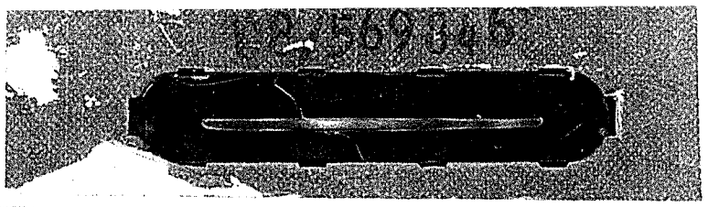
ISSUE CLASSIFICATION	Class	Subclass
	395	200.41

395/200.41



5758081

UTILITY SERIAL NUMBER	PATENT DATE	PATENT NUMBER
08/569,846	MAY 26 1998	

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
08/569,846	12/08/95	~~364~~ 395	200.41	2411	D. DINH

2356

APPLICANTS

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CONTINUING DATA********

VERIFIED

NONE.

XM

FOREIGN/PCT APPLICATIONS********

VERIFIED

NONE

XM

FOREIGN FILING LICENSE GRANTED 02/27/96 ***** SMALL ENTITY *****

Foreign priority claimed / 35 USC 119 conditions met / Verified and Acknowledged	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
☐ yes ☒ no / ☐ yes ☒ no / XMA (Examiner's initials)	→	CA	13	11	4	$414.00	

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TITLE

COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS

U.S. DEPT. OF COMM./ PAT. & TM—PTO-436L (Rev.12-9

PARTS OF APPLICATION FILED SEPARATELY

Applications Examiner

NOTICE OF ALLOWANCE MAILED	Assistant Examiner	CLAIMS ALLOWED: Total Claims	Print Claim
12-22-97		14	3

ISSUE FEE: Amount Due	Date Paid	DRAWING: Sheets Drwg.	Figs. Drwg.	Print Fig.
1600.00	3/17/98	16	16	1

DINH C. DUNG
PATENT EXAMINER
GROUP 2300

DUNG C DINH

Primary Examiner

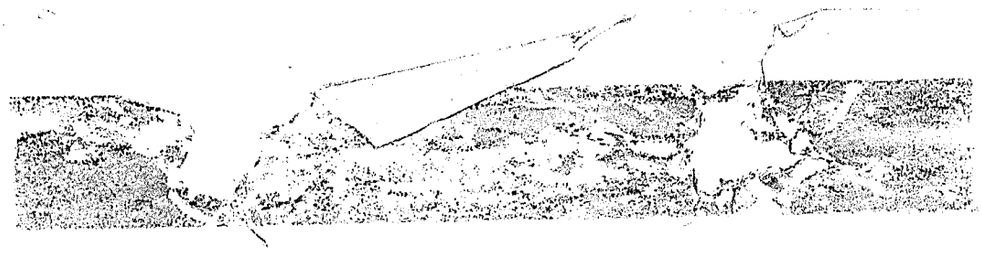
ISSUE BATCH NUMBER 077

Label Area

PREPARED FOR ISSUE 1/6/98

Form PTO-436A
(Rev. 8/92)

ISSUE FEE IN FILE



PATENT APPLICATION SERIAL NO. 08/569846

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

2317
205

M.C.
7-13-96

300 KJ 01/29/96 08569846
1 201 414.00 CK

PTO-1556
(5/87)

BAR CODE LABEL

U.S. PATENT APPLICATION

SERIAL NUMBER	FILING DATE	CLASS	GROUP ART UNIT
08/569,846	12/08/95	364	2411

APPLICANT

HALUK M. AYTAC, CUPERTINO, CA.

CONTINUING DATA********
VERIFIED

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FOREIGN/PCT APPLICATIONS********
VERIFIED

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FOREIGN FILING LICENSE GRANTED 02/27/96 ***** SMALL ENTITY *****

STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS	FILING FEE RECEIVED	ATTORNEY DOCKET NO.
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This is to certify that annexed hereto is a true copy from the records of the United States Patent and Trademark Office of the application which is identified above.

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08/569846

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To the Un States Patent and Trademark ce

Mailed 1995 Dec 8

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

Please file the following enclosed patent application papers:

Applicant #1, Name: Haluk M. Aytac

~~Applicant #2, Name:~~

Title: A computing and communications transmitting, receiving system, with a push-button interface, that is continuously on, that pairs up with ~~a personal computer and carries out mainly communications related~~ routine tasks

- Specification, Claims, and Abstract: Nr. of Sheets 39
- Declaration: Date Signed: 1995 Dec 8
- Drawing(s): Nr. of Sheets Enc.: (In Triplicate): Formal: 13 Informal: _____
- Small Entity Declaration Of Inventor(s) ■ SED of Non-Inventor / Assignee/Licensee
- Assignment; please record and return; recordal fee enclosed.
- Check for $ 454 for:
  - $ 375.- for filing fee (not more than three independent claims and twenty total claims are presented). + 39 for a 4th independent claim.
  - $ 40 Additional if Assignment is enclosed for recordal.
- Return Receipt Postcard Addressed to Applicant #1. • 3 Disclosure Doc. Ref. Letters
- 450 sheets of software, firmware source code.
- **Request Under MPEP § 707.07(j):** The undersigned, a pro-se applicant, respectfully requests that if the Examiner finds patentable subject matter disclosed in this application, but feels that Applicant's present claims are not entirely suitable, the Examiner draft one or more allowable claims for applicant.

Very respectfully,

Haluk M. Aytac
Applicant #1 Signature

Applicant #2 Signature

10270 Parkwood Dr 8
Address (Send Correspondence Here)

Cupertino, CA 95014

Address

Express Mail Label # EG707071221US; **Date of Deposit 199** 5 Dec 8

I hereby certify that this paper or fee is being deposited with the United States Postal Service using "Express Mail Post Office To Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to "Commissioner of Patents and Trademarks, Washington, DC 20231."

Signed: Haluk M. Aytac
Inventor

Form 10-1—Patent Application Transmittal Letter

PATENT APPLICATION

TITLE

A COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS

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ATTORNEY, AGENT OR FIRM

None

Claims on p. 31

FIELD OF THE INVENTION

The present invention relates generally to communications via electronic means using computers, and particularly, to methods and apparatus which implement telephony, voice reception, storage, playback, delivery, fax reception, printing, storage, delivery, call processing, electronic mail retrieval, multimedia content delivery, HTTP server functions in a standaside fashion in relation to computers.

BACKGROUND OF THE INVENTION

The present invention relates to a splitting of the Personal Computer in two units one of which may be the PC as is known today, including portable computers, and the other is described with this invention.

There are earlier models for this idea: The TV is paired with a VCR; the radio is paired with a tape recorder; the telephone is paired with an answering machine. In all these cases, a real time device is paired with a storage device.

The TV and radio are respectively video/sound and sound real time broadcast receivers. The VCR is used to record TV signals when TV is either off or on. One reason why TV and VCR are split maybe the disparity in power consumption. Consumers may leave their VCR operating while they are away, to record desired programs. VCR's do not consume much power. On the other hand, TV consumes more power, generates heat. Splitting the real time from the storage device, different power supplies may be employed so that VCR may be left on while TV is off.

Radio and tape recorder are typically only when the user is present. Sometimes these devices are split, sometimes they are housed in the same box. In all cases, they are separately operated, as in TV/VCR, with different sets of push buttons guiding each unit.

The phone and the answering machine are sometimes housed in the same box and sometimes in separate boxes. The advantage of separate boxes is enabling the user to receive a phone call while he is listening to his messages. The phone and the answering machine are always on. The phone

is powered from the Central Office and the answering machine is powered locally.

The computer, being a programmable device, can mimic the functions of all the devices described above and more. Indeed, all these functions have already been implemented inside a computer, especially personal computers (we will include portable computers with personal computers and sometimes call them PC's). Unfortunately, with the flexibility also comes complexity.

The preferred way to choose functions on a TV/VCR, phone/answering machine, and radio/tape recorder is via push buttons each of which denotes a fixed function. The computer, being far more flexible and this flexibility being made available to the user, works with a keyboard which can receive commands in the user's language. The keyboard allows a virtually unlimited number of commands. Graphical User Interfaces, on the other hand, coupled with pointing devices, create a push button type model on the monitor screen although more tedious to use than a push-button interface on a telephone or fax machine.

The immense popularity of the Personal Computer AT brought about a large peripherals industry. The varieties of functions that are possible and attractive are straining the capabilities of the PC/AT. Internal attachments to the PC/AT bus that perform fax, voice mail, electronic mail functions are available.

Users of personal computers are having to stretch their intellectual capabilities installing hardware and software. In the words of PC Magazine editor, Michael J. Miller, "Setting up hardware so it works with all your software, and vice versa, is ridiculously complicated on the PC." (PC Magazine, March 14, 1995, p.79) Graphical user interfaces (GUI) have brought some order on the desktop but have not quite solved the limitations of the hardware and the difficulties of multiple pieces of software all working together. A spot check of user mail to Compuserve forums for Windows 95 GUI based operating system on August 28, 1995 showed that COM ports and IRQ (interrupt) problems are very much alive.

Machines that perform fax and voice mail functions independently of a PC have been around for quite some time. The telephone answering machine was already mentioned. The fax machine is connected to the phone line which it may or may not share with a telephone. These machines are easy to use as they are operated with push buttons. They are available to perform around the clock as they do not consume much power. These

machines are also able to work with answering machines. If a phone call comes in and it is not a fax, the call is passed on to the answering machine. Some incorporate the answering machine function. A drawback of these machines is lack of long term storage. Accordingly, incoming faxes are stored on paper that is they are printed right away. Usually, there is some RAM in case paper runs out. Some fax machines have connections to a PC. This way the scanner and printer inside a fax machine can be used by the PC. Typically, this is a serial or parallel connection. The reason for this connection is as follows: fax machines originated during the days of the typewriter. A user typed a letter and then inserted it into the fax machine to be sent. With the advent of personal computers, documents were created mostly with word processors on these computers. A need arose to send such documents via fax. Fax cards attached to PC's satisfied this need. If fax machines can be attached to personal computers to let users send faxes from their PC via fax machines then fax cards would not be needed anymore. However, the serial connection is too slow to transfer faxes. The parallel port is fast enough but as there is only one parallel port on a PC, the printers in fax machines have to compete with better quality standalone printers for this port and they often lose. Moreover, fax cards are also data modem cards and users need these cards on the PC to access on-line, email services and the currently very popular Internet. Thus fax machines and fax cards continue to coexist.

There are good reasons for fax and voice mail to become a part of computers. Most owners of PC's also own a printer. The printer on a fax machine duplicates the same function at added cost. Likewise, some owners of PC's also own a scanner. The scanner on a fax machine duplicates the same function at added cost. In addition, as a scanner and printer come bundled with a fax machine, the user does not have the choice to mix and match scanners and printers and usually these scanners and printers are not of a high quality. To realize functionality equivalent to a fax machine a PC owner needs to aoquire a modem. Internal or external modems are available. The user can either scan a document or produce one on his PC. He can then send it as a fax via his fax modem. When a fax arrives, he can print it, after viewing it on his PC monitor. In contrast to a standalone fax machine that has to print incoming faxes as they show up, the PC has an internal storage such as hard disk or memory where it can store incoming faxes to be printed later.

Telephone answering machines are hardwired to a specific flow chart that implements voice mail functions. A computer would give the user the capability to change this flow chart and have it work on the same hardware. Moreover, most fax modems are also voice/data modems so that voice capability comes at little added cost.

On the other hand, new problems arise when faxing solely with a PC is attempted. A PC consumes power and aside from those at large businesses, PC's are shut down by users at night. Thus, owners of fax cards on PC/AT's are not able to tell others that they have a telephone number available to receive faxes. Likewise, they need a standalone phone answering machine in addition to their voice mail card if they wish to receive voice mail at night or when they are away.

In addition, from a simple push button user interface of a phone answering machine or a fax machine, the users are invited to switch to operating systems with GUI (graphical user interface) which is tedious for simple tasks. Also, the multiplicity of functions on a PC brings about a complexity that has kept the users largely frustrated as they attempt to add more functions to their machines.

In particular, the number of interrupt inputs is a limitation on the number of functions a PC/AT can accommodate. Users are having to have their peripheral hardware share interrupts with attendant conflicts. In addition, communications protocols are continually increasing their bandwidth. This puts a further strain on multitasking operating systems.

Printing is a slow process. Lately, printing protocols have been enhanced. The standard printing protocol (so called Centronics or SPP as it is now called) is being enhanced to EPP and ECP. A reference for these new protocols is Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers, IEEE P1284 D2.00. Most PC's are not now equipped to handle this new protocol. Users who wish to upgrade will have to add yet another card to their already crowded AT bus slots.

Even if users acquire these printing technologies on their PC's, there are limitations to printing speed in the current configuration. As PC's have to be available to users for input, some printing tasks are performed in the background. Once a print file is prepared, it takes time to send it to the printer in the background.

To summarize, there are a number of electronic gadgets that are hovering around a PC but never quite become a part of it. The phone, the

answering machine, fax machine, copier are the main examples of these gadgets. None of these have been successfully implemented on a PC in a way that has been accepted in the marketplace. PC has two main drawbacks in this situation:

1. It is not always on

2. It is not push button driven

Each one of these electronic gadgets has processing done at its core. The central processing units may all be different. The programs that run these gadgets are frozen at the factory. In a way this situation is not far different than what we had before the arrival of the PC: each piece of hardware came with its own software. With the arrival of PC the field became open for imagination to reveal itself in software.

There is a similar need for programmability for these gadgets. Any fax hardware is a good site for faxback capability. It is just extra software and storage. Any data modem site can be a World Wide Web delivery site.

OBJECTS AND ADVANTAGES OF THE PRESENT INVENTION

It is therefore desirable to split the routine communications functions apart from a personal computer into a separate embedded computer that is always on and has a push button interface. From here on, we call this separate embedded computer a CaTbox. This name is an allusion to the way this device sits between a Computing and a Telecommunications apparatus. The Computer is the PC, and the Telecommunications apparatus is either the Central Office or some PBX equipment. To give this new device a generic name, we call it Personal Telecommunicator or PT for short. The table below shows how PC and PT serve a user's needs for computing and communicating:

	PC	PT
interface	graphical, mouse, keyboard	push button, LCD
availability	off when not being used	always on
type of tasks	complex, requires user attention	routine
price	expensive	low cost

Thus, to accomplish a task, a user has two alternatives. If the task is a complex one such as that of writing an electronic mail to someone, he will use the PC. If the task is simple, such as retrieving email he might have at his access provider, he will push a button on the PT. Note that both tasks have to do with communications. He could also retrieve email from his PC. He just has a choice now. If the user wishes to send a fax, he can either send it from his PC or insert the document in the scanner and push buttons. If the user wishes to develop a WEB site on Internet, he can develop the content on his PC and write the files to CaTdisc. The delivery can be done by PT. For faxback, the faxback data base can be built on PT or PC. They both have access to the scanner. Voice mail comes directly to PT and is replayed there. A telephone number can be dialed from PC, from CaTbox PT, a handset, or a receiver that sits on an on hook/off hook cradle.

The relationship between PC and PT can be likened to the conventional oven / microwave oven relationship. To cook complex dishes one can use the conventional oven. For heating a snack for lunch one uses the microwave oven.

CaTbox would look like a hard disk to the PC and it would be attached to it via a cable. The preferred embodiment has CaTbox look like a SCSI

disk to the PC. A specification of SCSI is given in X3.131 SMALL COMPUTER SYSTEMS INTERFACE-2 REV:10L.

An advantage of this scheme is ability to update CaTbox software via PC, by loading it to CaTdisc. Upon reset, CaTbox would start using the new software. In most cases reset is not necessary. For example making a new voice file on PC and copying it to the file on CaTdisc assumed for a step will make it so next time the modem's step table traverses this step, the new sound will be emitted. A configuration file on CaTdisc links modems to their so called step tables which along with a set of foreground programs define their behavior under inputs. One can edit this file from an editor on PC to reassign step tables to modems. If new editions of CaTbox software becomes available, the user can download it from an Internet location, or receive it in the mail as a floppy disk. The new step tables and foreground programs would then be loaded to CaTdisc either from PC's floppy disk drive or directly from the Internet location. In addition, there may be programs on a PC that help edit and make new step tables. Again, writing these to CaTdisc and editing the configuration file on CaTdisc would create the new behavior on CaTbox. Thus, without changing the hardware, continuous improvements to the usefulness of CaTbox are possible.

CaTbox is then the open, programmable, single site for processing for the answering machine, fax machine, copier, and telephone. This invention takes out the processing core from each one of these gadgets and gives the tasks to a single central processing unit that is the CaTbox. It builds a multitasking operating system on top of DOS for this processing unit that allows for writing programs that implement answering machine, fax, telephony, and other functions such as an HTTP server for World Wide Web delivery. It makes the hard disk for this system available to a PC so that new programs can be downloaded to CaTbox. This downloading is simply a file copy from one disk (for example a floppy disk) to another (CaTdisc).

In the last section, we showed why communications functions cannot be brought into the PC in a way that would be user friendly. But they can be brought into a site next to a PC that is always on and is driven via a push button interface. So the answer to computer telephony integration is: a PC/PT pair.

The presence of a CaTbox would free the PC's parallel port, serial ports and its internal hardware interrupt lines. Thus, the PC can potentially become a simpler machine.

CaTbox would free the PC's Graphical User Interface from chores of printing and scanning faxes and receiving voice mail on the PC. These tasks take quite a bit of time now and as they execute, they occupy the PC's user interface and preoccupy the user's mind.

CaTbox would utilize printers and scanners currently attached to PC's. It would have a printer attached to it and it would receive printing requests from the PC along with its own internal requests and implement them both with faster printing protocols that the printer may respond to. It would receive the print files from PC as block transfers as opposed to character transfers. These files would be transferred to a special directory on the CaTdisc (the term we use to emphasize that CaTbox has a hard disk that looks like a SCSI disk to the PC). During the transfer, the directory path would be detected, the file name would be changed and this new file name would be put on a print queue. A print routine inside the CaTbox would periodically check this queue and would print any files found therein. As the CaTbox need not be available to users for input via keyboard and mouse, its foreground is available for tasks such as printing. The combination of block transfer of print files to CaTdisc and foreground printing allows considerable speedup of the printing process.

CaTbox would be independent of PC in terms of power supply; it would consume low power so that it can be left on while the PC is preferred to be off when not in use. The PC may even be a portable one that the user takes with him. The PC may not even have a hard disk: it could use the CaTdisc as a hard disk. CaTbox stays put to receive voice, fax, and email messages.

It is desirable that in the CaTbox, the sequence of functions implementing answering machine, voice mail, copy, faxback and other functions be described in a separate file from the program that steps through the sequences and executes them. This way, the file describing the sequencing could be changed without changing the program that executes it. Armed with a program that helps to create such a sequencing file, a user would be able to change the sequencing of functions on location. This way, one could create a faxback application, a voice mail application, a combination thereof, etc. Once such a file was created on the user's PC, it would be very easy to download it to CaTbox as it is also a CaTdisc i.e. a SCSI disk to PC. In addition, the user may need to create DOS programs to implement applications. Once created on host PC,

these programs would be written to special directories on CaTdisc, to be utilized by the sequencing files.

The modem(s) on the CaTbox would, upon detecting a RING, answer the phone, distinguish between voice, fax, data and act accordingly. These modems may also be cable TV modems instead of telephone modems.

CaTbox equipped with an ATA (IDE) hard disk (CaTdisc), would hold faxes and voice mail until the user wished to print or hear them. Just as the CaTbox shares the scanner with the PC, this hard disk could also be shared between these two computers. CaTdisc would look like a SCSI hard disk to the PC. The price of hard disks does not scale down linearly as capacity decreases when such capacity is of the order of what would be needed to store a normal load of faxes and voice mail. A larger hard disk that the PC could also use would be an economical way of sharing costs between the PC and the CaTbox. In some cases, users might wish to replace their current ATA (IDE) hard disks inside their PC with disks of higher capacity. Then, a CaTbox sold without a hard disk would provide a home for the old ATA hard disk that otherwise would sit idle in storage. It is also possible to use a SCSI disk in place of the ATA disk.

A CaTbox endowed with a keypad and an LCD would also be easier to use. Its interface would approximate that of the telephone or the standalone fax machine instead of the Graphical User Interfaces that are more complex and slow. Accessing the functions of the CaTbox would be achieved with the same interface on the keypad, on the handset, and from a remote handset.

CaTbox would make a separate fax machine and an answering machine unnecessary. If desired, it would also make a separate handset unnecessary.

A CaTbox that was an embedded PC could use the hardware and software that is available for PC's. CaTbox would be closed to expansion by the user so that its hardware and software were known to interact properly prior to sale to the user. The property of being closed to expansion by the user would also make it possible to set the speed of the internal busses to be the maximum possible speed determined at the factory. In particular, the AT bus could be run at higher speeds than the standard 8 MHz. The exception to expansion limitations would be changing the number of modems and changing the step tables that drive these modems. For example, one could change a modem from performing answering machine / fax machine tasks to faxback related tasks.

A host PC user program that implements fax functions via the CAS interface can still be used with the PC/CaT pair. Such programs usually talk to a TSR via INT 2Fh, AH=CBh calls. These calls are translated to SCSI calls via other LUNs (logical unit number) than the ones used to implement CaTdisc. At the CaTbox, this SCSI call now causes an INT 2Fh, AH=CBh call to the CAS TSR which implements the call via the modem on the CaTbox. Note that there is no modem or TSR on the host PC. An advantage of this scheme is to free memory on the host PC that the TSR would occupy. This is one of the main reasons why fax software vendors are getting away from CAS as it ties up too much memory sometimes causing loss of mouse use. Another advantage of this method is not using a hardware interrupt on the PC. Hardware interrupts (IRQ's) for communications ports (COM ports) are at a premium.

Now that the modem is no longer on the PC but on the CaTbox (CaTmodem), the user may still wish to access this modem as a data/fax/voice modem and as if it is on the host PC. This is implemented using yet other LUN's than the ones used for CaTdisc and CAS translation. An advantage of this approach is that CaTmodem does not require use of irq (hardware interrupts) dedicated to COM ports on the PC. This is a tremendous advantage as there are only 2 irq's allocated to the 4 COM ports. In some PC's, one irq is used by the mouse and another by the graphics chip. This makes for irq conflicts and causes users endless frustration.

Multiple modems may be installed on the CaTbox. This way, CaTbox may be used as a multiline faxback system, or, multiple host PC communications tasks may be run simultaneously each without a hardware interrupt on the host PC, or, CaTbox may be used as a multiline telephone/answering machine system. Each line may be configured differently by editing a configuration file on CaTdisc from PC, and changing the assignment of a step table file name to a modem. Thus, line A can be for voice/fax, line B can be for faxback call processing and delivery and line C can be for HTTP server for World Wide Web site HTML page delivery while each modem is still available for faxing and other modem transactions initiated at PC such as phone dialing.

Driven by the keypad, CaTbox may scan a document on the scanner and print it to the printer, thereby achieving the copy function. This copy function would be faster than one available on PC as the printing will be done in the foreground by CaTbox.

Driven by the keypad, CaTbox may dial a number, make a connection and the user may then either start a conversation via microphone/speaker or handset, or a receiver. CaTbox, may thus act like a telephone.

CaTbox, while implementing the functions expected from a fax machine, would be detached from a printer and a scanner so that a user may purchase scanners and printers separately from a CaTbox enabling him wider choice in which types of scanners and printers to buy.

The analogy here is to music systems. In some cases a radio, tape recorder, and CD player are sold together in one unit. Such units are called boomboxes. In other cases the pieces are sold separately. This version is called a rack system and includes a tape player, an amplifier, a tuner, a CD player. Each piece is interchangeable with another of its kind. The consumer can buy a better amplifier and still keep his other pieces.

Although, CaTbox is an embedded PC, running DOS augmented with multitasking, the present invention could also be realized using any other operating system and processor pair.

12

SUMMARY OF THE INVENTION

Briefly stated, the present invention describes an embedded PC (CaTbox PT), without a keyboard, mouse or screen, but with a keypad and character based small screen, that is paired with a PC and assumes the routine communications functions for that PC. The link between the pair is a SCSI cable. CaTbox is connected to a printer via a parallel cable. CaTbox is connected to a scanner via a SCSI cable. CaTbox is also connected to multiple phone lines via phone wires and to handsets or receivers via phone wires. CaTbox is continuously powered on and consumes low amounts of power.

Viewed from the host PC, CaTbox looks like

a. a SCSI hard disk (CaTdisc)
b. a print server
c. a remote data/voice/fax modem(s) (CaTmodem)
d. a remote fax device(s) implementing the CAS protocol

As a standalone unit, CaTbox implements the following functions:

a. print files found in a spool directory and pointed to in a queue
b. receive faxes and print them or store them on CaTdisc
c. send faxes driven by keypad
d. receive voice mail and store them on CaTdisc
e. play voice mail back driven by keypad
f. copy from scanner to printer
g. other functions that may be programmed such as email retrieval, faxback and data modem based TCP/IP/PPP node, dial a phone number

All functions implemented on CaTbox are based on a step table driven multitasking programming scheme built on top of DOS. Other applications such as email retrieval, faxback, WEB site delivery on TCP/IP/PPP may be realized in most cases by just writing step table sequences and foreground DOS programs. In sufficiently new and different applications one may need to write actions.

13

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description of a preferred embodiment, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings an embodiment which is presently preferred, it being understood, however, that the invention is not limited to the specific methods and instrumentalities disclosed. In the drawings:

FIG.1	shows how CaTbox is connected to a host PC, its peripherals and the telephone line.
FIG.2	is a schematic block diagram of the CaTbox motherboard.
FIG.3	shows the physical composition of the CaTbox.
FIG.4	shows a physical view of CaTbox from above.
FIG.5	is a schematic block diagram of the software subsystems residing on the PC/CaTbox pair.
FIG.6	is an example step table entry.
FIG.7	is a flow diagram of the stepper code.
FIG.8	is a timing diagram showing when various software components are active.
FIG.9A,B	is a flow diagram of MAESTRO decision code
FIG.10	is a flow diagram of TMAESTRO (TMO) action's decision code
FIG.11	step table sequence for fax back data base build
FIG.12	an example step table sequence ending in a request to TTQ

14

DESCRIPTION OF THE PREFERRED EMBODIMENT

Physical Configuration of CaTbox

FIG.1 shows how the CaTbox is connected to a host PC, its peripherals and telephone lines. A Personal Computer (PC) **101**, CaTbox **102** and scanner **104** are all connected to a SCSI bus **113**. A printer **103** is connected to CaTbox **102** via a parallel cable **114**. Handset **105**, receiver **107** are connected to CaTbox **102** via common telephone wires **115,117**. CaTbox **102** is connected to a Central Office **123** via common phone wires **116,118,120,122**. CaTbox **102** is provided with speaker **124**, and microphone **125**.

FIG.2 is a schematic block diagram of CaTbox motherboard **200**. It is a stripped down, embedded PC without a monitor, keyboard or mouse. It is comprised of an ISA bus **290** to which are attached an X86 processor **201** and its associated chipset **221**, a SCSI protocol chip **202** that is connected to a SCSI connector **213**, RAM memory **203**, an I/O chip **204**, BIOS EPROM **222**, and data/fax/voice modem daughterboard connectors **208,209,210,211**. I/O chip **204** interfaces to a parallel printer connector **214**, ATA/IDE hard disk connector **205**, a keypad connector **206**, an LCD display connector **207**, LED device connector **223**.

FIG.3 shows the physical composition of a CaTbox. A casing **300** is similar to casings that are available for SCSI hard disks. It houses a power supply **302**, a switchable fan **303**, a hard disk **301**, a motherboard **200** and daughterboards **308-311**. Fan **303** is normally off. It goes on when a phone call comes in or the hard disk **301** is in a state of prolonged activity. A fan may also be unnecessary. Motherboard **200** is attached to a SCSI connector **213** and a parallel connector **214**. The actual tie to SCSI bus **113** is implemented via SCSI connectors **312,313**. SCSI connectors **312,313** are shorted to one another and to connector **213** inside CaTbox **102**. The actual tie to parallel cable **114** is implemented via parallel connector **314**. Connector **314** and connector **214** are shorted inside CaTbox **102**. Motherboard **200** connects to a hard disk cable at connector **205**. Said hard disk cable attaches to hard disk **301** at connector **325**. Daughterboard **308** is connected to motherboard **200** via connector **208** and to a phone line via connector **315**, to a handset via connector **316**. Daughterboard **309** is connected to motherboard **200** via connector **209** and to a phone line via connector **317**, to a handset via

connector **318**. Daughterboard **310** is connected to motherboard **200** via connector **210** and to a phone line via connector **319**. Daughterboard **311** is connected to motherboard **200** via connector **211** and to a phone line via connector **321**. Daughterboards **308-311** each contain a voice/fax/data modem chipset as well as a Data Access Arrangement (DAA). Connectors **315,316,317,318,319,321** are tied to phone wires **116,115,118,117,120,122** respectively.

FIG.4 shows a physical view of CaTbox from above. The casing **300**, may be of plastic or metal. On top of casing **300** is mounted a plastic frame **401** that supports the LCD display **407**, keypad **406**, and LED diodes **412,413,414**. On the front side is a power switch **405**. On the sides, air vents **403** and a fan vent **402** provide for air circulation. LED diodes **412,413,414** go on when CaTbox has received a voice message, a fax, or email respectively.

Software Architecture of CaTbox PT/PC pair

FIG.5 is a schematic block diagram of the software subsystems residing on the PC/CaTbox pair. The SCSI protocol allows for one node to represent itself as up to 8 Logical Unit Numbers (LUN's). CaTbox/PC software architecture makes ample use of this feature. A description of the SCSI protocol is given in X3.131 small computer systems interface-2 rev:10l date:9/7/93 and X3T10/855D SCSI-3 parallel interface. In this document, we refer to SCSI as a protocol and not any specific underlying cable. Thus, for example, SCSI-3 Fiber Channel, SCSI-3 Serial Bus protocol may all be candidates to implement CaTbox connection to PC. Thus, SCSI cable **113** provides the physical frame for LUN=0 on CaTbox **102** SCSI node making the logical connection **550** to PC **101** in FIG.5. Likewise, LUN=4 on CaTbox **102** SCSI node makes the logical connection **554** to PC **101** and similarly with LUN=1 making the logical connection **551**, LUN=2 making the logical connection **552**, LUN=5 making the logical connection **555**, and LUN=7 making the logical connection **557**.

As a standalone unit, with PC **101** on or off, CaTbox **102** can operate a scanner and a printer to implement document copy function, fax receive and fax send functions. It can also receive voice messages and store

them to be played back, in the manner of an answering machine. Table I summarizes these functions:

TABLE I

Standalone Functions of CaTbox

a. print files found in a spool directory and pointed to in a queue
b. receive faxes and print them or store them on CaTdisc
c. send faxes driven by keypad
d. receive voice mail and store them on CaTdisc
e. play voice mail back driven by keypad
f. copy from scanner to printer
g. other functions that may be programmed such as email retrieval, faxback, data modem based TCP/IP/PPP node etc.

In addition, as a part of its link with PC **101**, CaTbox **102** is seen by the PC **101** as a SCSI disk, a print server, a remote modem (or modems if CaTbox **102** has multiple modems) and a remote fax device implementing the CAS protocol (A description of the CAS protocol is given in the book PC Interrupts by Brown and Kyle, Addison Wesley, 1991, Chapter 29). Table II summarizes these functions.

TABLE II

CaTbox provides the following functions to host PC

a. a SCSI hard disk (CaTdisc)
b. a print server
c. a remote modem(s) (CaTmodem)
d. a remote fax device(s) implementing the CAS protocol.

The logical connections mentioned above help implement these features. Feature (a) in Table II is implemented with logical connections **550,554**. Feature (b) in Table II is implemented with logical connections **550,554**. Feature (c) in Table II is implemented with logical connections **552,555**. Feature (d) in Table II is implemented with logical connection **551, 557**.

On the PC **101** side, Windows 95 **520** provides the operating system. An ASPI driver such as ASPI2DOS.SYS **521** from Adaptec corporation provides the SCSI interface layer to all LUNs on CaTbox **102** SCSI node, as well as other SCSI nodes. Another driver from Adaptec Corporation, such as

ASPIDISK.SYS **522** provides the disk driver. This driver utilizes the logical connection **550**. In tandem with this driver, a virtual device driver called CATSYNC.VXD **523** implements the synchronization between the operating system of PC **101** and that of CaTbox **102** that access the same CaTdisc **301**. The virtual device driver utilizes logical connection **554**. CATSYNC.VXD **523** hooks the File I/O calls from the PC operating system (in this case Windows95 **520**) and replaces the original call with the following:

```
if File I/O for CaTdisc

notify CaTdisc of beginning of File I/O
receive acknowledgment
flush File I/O caches for CaTdisc
make the intended File I/O call (LUN=0)
notify CaTdisc of end of File I/O
```

A Terminate and Stay Resident program called CATCAS.EXE **524** implements the remote CAS modem function. This program utilizes logical connections **551** and **557**. CAS calls are int 2F calls with AH=0CBh to the X86 processor. When such a call is made from a Windows fax program **526**, the program CATCAS.EXE **524** captures the call as it has hooked all such interrupts. It then routes it to CaTbox **102** via LUN=1 i.e. logical connection **551**. There is no CASMODEM TSR on the PC **101**. Therefore, we may call this a would be TSR (terminate and stay resident program). Instead, the int 2F call is delivered to CaTbox **102** where it is submitted to the CAS TSR **583** at the CaTbox **102**. The results of this call are an action that the fax software carries out and returns values in registers. Right after, CATCAS.EXE **524** issues a SCSI write command, it also issues a SCSI read command to receive the results of the CAS call. When the SCSI interrupt routine at CaTbox receives the results of this Int 2F call in X86 registers, it returns the values to PC **101**'s CATCAS.EXE **524** which returns them to the Windows fax program **526** at the PC **101**. To view a fax, a Windows fax program also makes a file read call. This call goes through LUN=0 as CaTbox is also a CaTdisc. There are some INT 2Fh calls that involve hard disk calls. We need to make sure that these calls do not corrupt local calls to CaTdisc. For example, while a fax is being sent from PC, an incoming call may be in the process of being recorded on CaTdisc. For this reason, the implementation of CAS translation utilizes LUN=7 to pass control information in the same way as it is done for CaTdisc accesses via

LUN=4. This way, MAESTRO stops all foreground execution and calls back a routine in SCSIISR to clear the path for INT 2Fh calls.

A virtual device driver program called CATSER.VXD **525** implements the remote modem (CaTmodem) function. This program utilizes the logical connections **552,555**. This program acts as a port driver for Windows 95 **520** operating system. It registers itself as a port driver for certain communications ports such as COM 3 and COM 5. From then on, the PC **101** operating system **520** calls CATSER.VXD **525** whenever applications make I/O calls to this particular port or ports. This scheme does not use any hardware interrupts on the PC **101** as there really is no modem on the PC **101**.

When a call to write data from a buffer to a port arrives, CATSER.VXD **525** makes note of the number of bytes and where they are. It then sends these bytes to CaTbox **102** using the logical connection **552**. At the CaTbox **102**, the transmit buffer interrupt of a modem out of the modem set **308-311** is enabled. When the interrupt comes, the bytes are delivered to this modem. There is no modem on PC. For this reason a port on PC is called a would be port. The physical port is on CaTbox.

When the receive buffer of a modem from the modem set **308-311** becomes non empty, a receive buffer interrupt is generated at the CaTbox **102**. The interrupt service routine inside MASPI.SYS **581** reads the bytes in the FIFO of a modem from the modem set **308-311**. When a read call comes, these bytes are delivered to the PC **101** using the logical connection **555**.

On the CaTbox **102** side, DOS **580** provides the basic operating system. MASPI.SYS **581** provides the drivers for the SCSI connection. MASPI.SYS is composed of MASPI proper which is a mini Advanced SCSI Programming Interface (ASPI) driver and SCSIISR which executes SCSI related interrupt service routines. ASPI is defined by Adaptec Corporation in a document called Advanced SCSI Programming Interface Software Developer's Kit Manual. MASPI.SYS also manages the transitions of CaTbox SCSI node from initiator mode to target mode and back. SCSIISR, in particular, translates hard disk SCSI read/write calls to local INT 13h calls to CaTdisc. CaTOS **590** is the name given to the multitasking operating system atop DOS **580**. In a sense, CaTOS also includes DOS as it uses DOS to make file I/O calls, read the time, and start CaTOS programs.

19

The following directories and files comprise the CaTOS **590** files (note that to DOS in CaTbox **102** CaTdisc **301** is disk C, to PC **101** CaTdisc **301** may take any letter depending on the order in which its driver was installed:

C:\CATBOX\CAT.CFG
C:\CATBOX\SCSI\MASPI.SYS
C:\CATBOX\CATSTEPS*.BIN
C:\CATBOX\PROGRAMS*.EXE
C:\CATBOC\VOICE*.PCM
C:\CATBOX\VOICE*.QUE
C:\CATBOX\PRINT\SPOOL*.PCL
C:\CATBOX\CATVOICE\CATVOICE.EXE
C:\CATBOX\FAXBACK\FAXBACK.IDX
C:\CATBOX\FAXBACK\FAXBACK.IDY
C:\CATBOX\FAXBACK\CAS.EXE **583**
C:\CATBOX\EMAIL\IN.TXT

The significant programs in CaTOS **590** are:

MASPI.SYS **581**, a DOS device driver referred to in CONFIG.SYS.

CATVOICE.EXE **582**, a DOS TSR referred to in AUTOEXEC.BAT.

CATVOICE.EXE is composed of the following modules:

TTISR, SERISR, ACTIONS, MAESTRO, CVBOOT, SYSDATA.

The following is a description of how the CaTOS operating system works. CaTbox responds to inputs from three different sources:

a. PC
b. phone line
c. keypad

In addition, there are multiple modems in the CaTbox. The multiplicity of modems and inputs creates a need for a scheme to allocate resources to implement tasks.

The inputs from PC were discussed previously. The response of each modem to inputs from phone line or keypad are defined by a STEP TABLE. An example STEP TABLE entry is shown In FIG.6. Each STEP TABLE entry specifies an ACTION. It also specifies what the next step will be based on the DTMF inputs during this step, or keypad inputs during this step, or various other conditions during this step. CaTbox, being a PC, has a

recurring interrupt called timer tick. Code called STEPPER **810** as shown in FIG. 8, is executed during each timer tick, for each modem. This code reads the STEP TABLE entries **600**, determines the ACTION **820** to call, and after the action is completed after many timer ticks, determines the next step to run. STEPPER **810** is in module TTISR. This is called the level_0 stepper. ACTION **820** is in module ACTIONS. In addition, there may be STEPPER code inside ACTIONS. These are higher level steppers. During execution of an ACTION, DI register keeps track of the level of stepper. Certain variables in the MODEM DATA STRUCTURE are used for every level. These variables are accessed with index DI. Higher level steppers make it possible for ACTIONs to call other ACTIONs. The STEP TABLE entry is somewhat like a program line, the STEPPER is like a program counter and instruction decoder and the ACTION is the microcode that implements the desired function.

ASSEMBLY LANGUAGE PROGRAMS	CATOS PROGRAMS
program line	STEP TABLE entry
instruction decoder, program counter	STEPPER
microcode	ACTION

In FIG.6 the first line in the STEP TABLE entry defines the ACTION for this step. The second line is where the return flag value is stored. The next few lines define the next step numbers based on either DTMF inputs or return flag values. Each STEP TABLE entry is reached by the STEPPER via a number specific to this entry. The last block of data are the parameters for the action. The first one specifies whether this action will accept DTMF inputs or not. If the ACTION accepts DTMF inputs, then the next step will be determined by DTMF value. The first entry in next step area will be for the case when flag value=1. The next entry will be for the case of no DTMF. The following lines will be for DTMF=*,#,0-9 respectively. If this action will not accept DTMF inputs, then the next step is defined by the return flag value. The first entry in next step area will be for flag=1, the next for flag=0,2,3-9,A,B,C,D respectively. Note that if out of an ACTION, the flag value is 1, then the next step is the same independent of whether DTMF inputs are accepted or not. The table in FIG.7 summarizes these results. Return flag may be set to a value depending on results in an ACTION. For example, if ANNOUNCE_AND_COLLECT_DIGITS has a wrong password entry, the flag is set

accordingly for the next step to emit a message alerting the caller that the password was wrong.

In the particular example of FIG.6, the next entry in the parameters block is an offset within the step table segment to the name of the voice file to play for this ACTION. This action happens to be ANNOUNCE_AND_COLLECT_DIGITS. So the voice file name is for the announcement. The third entry tells the ACTION which type of ANNOUNCE_AND_COLLECT_DIGITS this is. Possible choices are: get a phone number, get a faxback document number, get a voice mail number etc. The entry with the variable name 'vcon_session_faxback_doc_number' points to a location within the step table where this ACTION will store the received faxback document number. A subsequent step may also refer to this variable for a different ACTION. This may be a START_PROGRAM action where the program reads an index file and translates this document number into a fax file name to transmit back to the caller who requested it in the first place.

Finally, along with voice, steps may show LCD messages. If an LCD message is desired, then the parameter value is LCD_MESSAGE_YES. The message text will be typed in following this variable. In this case, we have a 2x20 LCD and so each screen is composed of two lines of 20 characters each and each screenful of text ends with 00h. The last message ends with 00h,00h.

There are two data structures for each modem. One is the STEP TABLE and its segment value is loaded into the FS register. The other is called MODEM DATA STRUCTURE (MDS) and its segment value is loaded into the GS register.

The name of the STEP TABLE for each modem is given in the file CAT.CFG. A module inside CATVOICE, called CVBOOT examines CAT.CFG and loads the required STEP TABLES from hard disk to allocated memory segments. CVBOOT then builds a table of FS,GS value pairs for each modem. When code associated with a modem is executing, there are three data segments that are of importance: STEP TABLE data segment (FS), MODEM DATA STRUCTURE data segment (GS), and SYSTEM DATA segment (DS).

As shown in FIG.8 during timer tick, each modem, gets a time slice where the ACTION code is executed. Before the timer tick slice for each modem, the proper FS, GS segment values are loaded. The system data segment (DS) value does not change.

As shown in FIG.7 the STEPPER code for a modem checks the ACTION for the current step and makes a call to that ACTION. ACTIONS are code that is designed to execute within the timer tick. Thus, care is taken to execute small chunks of code and not leave any wait loops such as when one expects OK from the modem for a Hayes command such as ATH.

Actions are procedures that are entered at each timer tick until they get completed. They are akin to microcode sequences that implement assembly language instructions. In this case, the corresponding entity to an assembly language instruction is the step table entry. Each action is passed a number of variables. One of these variables tells the ACTION that this is its first timer tick. The ACTION performs some initialization after which it sets this variable to false so that it does not enter this section of code at subsequent timer ticks. Another variable the ACTION gets is the address within the step table segment of the ACTION's step table entry. With this, the action can read the parameters values it gets to use. An example of such a parameter is whether the ACTION will check DTMF values or not. For an EMIT_MSG ACTION, a parameter is the file name of the voice file to play.

Each ACTION also has a variable that points where within the ACTION the next code segment to execute is. When ACTION code is entered, this variable is checked to decide which section of code to execute. Finally, a variable is set so the STEPPER will not call this ACTION within this step again. The STEPPER then proceeds to find the next step based on either flag value returned from previous ACTION or DTMF values received during the same action. For ACTIONS that complete once one DTMF value is received, STEPPER decides using DTMF values. For actions that expect multiple DTMF ending with #, STEPPER decides based on return flag values.

The names of some ACTIONS that are currently available are:

EMIT_MSG	plays a voice *.PCM file to an output device
RECO_MSG	records from an input to a hard disk file
START_PROGRAM	submits a DOS program to MAESTRO_TASK_QUEUE (MTQ)
TMO (TMAESTRO)	ACTION for the mother step for each modem (TMO stands for Timer Tick Maestro)
NO_ACTION	does nothing for a number of timer ticks
ACD	Announce and Collect Digits. plays a message and collects DTMF digits such as phone numbers
HANG_UP	hangs up the modem
TTQ_REQUEST	submits a request to TMAESTRO TASK QUEUE (TTQ)

VMA	Voice Mail Access
DIAL	Dial a phone number for telephone connection
CONN_PPP	To establish a PPP connection
CONN_TCPIP	To establish and maintain a TCP/IP connection

It is possible to have ACTIONS within ACTIONS. Currently ACTIONS may be 16 levels deep. There may be more. For example, ACD is called within timer tick by STEPPER LEVEL_0. It, in turn, has a STEPPER LEVEL_1 that calls EMIT_MSG, which has a STEPPER LEVEL_2 that calls START_PROGRAM.

ACTIONS do not make DOS calls. Thus, what happens during timer tick is controlled. An exception is CAS TSR. Under control of CaTOS, CAS is given control to execute on an incoming or outgoing fax. This code makes DOS calls during timer tick. Care is taken so that this different behavior does not impede the operation of CaTOS.

When there is a need to make DOS calls, the STEP TABLE includes an entry whose ACTION is called START_PROGRAM. This ACTION, places a request to run a program to the MAESTRO_TASK_QUEUE (MTQ), a data structure in SYSTEM DATA SEGMENT (DS). In this way, fairly complex programs may be run in the foreground. We distinguish between the background and foreground. Background is the time during timer tick interrupt. Other interrupts such as SCSI hardware interrupt and UART hardware interrupt are also background. Foreground is the remaining time. For example, when a DOS program runs, it runs in the foreground. Foreground programs act as if all system resources belong to them. Such programs, when they make DOS calls, do not need to check if another entity already has made a DOS call. This is important as DOS is not reentrant. Background programs however have to follow strict rules. They must check to see if a DOS call was in progress when they acquired control via a hardware interrupt.

If a timer tick was entered and the InDOS flag was equal to zero, meaning that no DOS INT 21h call was being made, control passes to a module of CATVOICE called MAESTRO after the end of timer tick. The relevant information for code that was executing as timer tick was entered is saved. MAESTRO examines the MTQ to see if there are jobs that need to be started. It also examines MTQ for any suspended jobs. MAESTRO either does nothing, or resumes a job, or starts a job. This is how, STEP TABLE sequences may make DOS calls.

MAESTRO is also involved when CaTdisc is accessed by host PC. MAESTRO works with a queue called MTQ i.e. Maestro Task Queue. Each entry in

this queue is called MTICS ie Maestro Task Information & Control Structure. Each MTICS has the following entries:

MTICS_PGM_STATUS which shows if the program associated with this entry is IDLE, RUNNING, SUSPENDED, COMPLETED.

MTICS_HANDSHAKE which shows the status of linkage with the START_PROGRAM ACTION that placed this request. Its values may be NULL, ST_REQ_MADE, meaning START_PROGRAM has made a request, M_REQ_ACKNOWLEDGED, meaning that Maestro acknowledged the request. START_PROGRAM bases its decision to continue on the value of this last variable. If request was acknowledged, START_PROGRAM either goes in a wait mode if this was prescribed in its STEP TABLE entry, or it terminates if no wait mode was specified.

MTICS_PRIORITY which shows the priority of the program. For example, ACTIONS that play voice will need to load the voice data to memory from hard disk files immediately. Indeed, the contents of voice files are loaded to hard disk cache first. The reason for this design choice is twofold: one, voice files take up a lot of memory space to load it all into memory; two, ACTIONS are not allowed to make DOS calls from within timer tick to load voice data directly from hard disk files in small chunks. DOS calls are complex and the time they take is variable. In contrast, BIOS 13h calls to hard disk are of well defined shorter duration. Each INT 13h call during timer tick, checks to see if an INT 13h call was in progress when timer tick was entered. If so, the call is skipped to check again at the next timer tick.

At boot time, each modem is assigned a hard disk cache space. This space is beyond the DOS partition. Neither DOS on CaTbox, nor Windows95 or equivalent on the host PC is aware of this space. It may only be called with INT 13h calls.

Priorities for programs in MTQ may be HI, LO, PERMANENT, DATA_MODEM. Programs such as LDFTOMEM.EXE that load voice data to hard disk cache are HI priority. There are other programs such as FP.EXE, that prints files in CaTdisc spool directory, that are called from time to time as they are initiated from TMAESTRO TASK QUEUE (TTQ). Such programs, when they return, do not free their MTICS entries. PERMANENT refers to such entries. Finally, DATA_MODEM is a priority given to programs activated during handling of host PC modem calls as they are translated into SCSI calls to finally drive modems on CaTdisc.

Remaining items on MTICS store the number of timer ticks lapsed from the time the program was launched, and the register values at the time of the arrival of this timer tick, if the program is about to be suspended.

At each timer tick register values (call them R) are stored into a Client_Regs structure (call it CR):

R -> CR

If MAESTRO is to come at the end of this timer tick, then the following moves take place:

CR -> SR, where SR denotes Saved_Regs

MR -> CR, where MR denotes MAESTRO register set

Finally, at the end of the timer tick, we have:

CR -> R, so that MAESTRO is activated.

If MAESTRO decides that the running program is to be suspended in favor of a higher priority program, then MAESTRO makes the following move:

SR -> MTICS to store the running program's registers.

FIG.9 shows MAESTRO's decision tree. MAESTRO is also involved when host PC makes a CaTdisc call, or when host PC application makes a CAS call. In these cases, MAESTRO waits until all high priority programs have executed and then stops launching new programs. MAESTRO then checks for a call back address and if this address is non zero, calls a routine at this address. The callback routine is inside MASPI.SYS (specifically, inside SCSIISR). This routine responds to the receive acknowledgment section of the CaTdisc call. When the CaTdisc call or CAS call sends a notification of the end of File I/O to CaTbox, MAESTRO resumes its normal operation.

In some cases, a task may not be accomplished during one sequence of STEP TABLE entries in a particular modem. For example, modem 2, may, following a sequence of steps, generate a TASK CONTROL FILE (TCF) for a faxback request. This happens during an inbound phone call. To satisfy the faxback request, however, we need a free modem to make an outbound call. The sequence of steps in the STEP TABLE must now be broken. As wait loops are not allowed inside the timer tick, a request is placed in a SYSTEM DATA queue called TMAESTRO TASK QUEUE (TTQ). This request specifies the number of the STEP to go to. Each request gets placed in a

TTQ entry called TTICS (TMAESTRO Task Information & Control Structure). An example is shown in FIG.12.

When modems have nothing to do, they return to the mother step 0. There, in all STEP TABLES, the ACTION is TMO (TMAESTRO). FIG.10 shows a flow diagram of TMO's decision code. One of the checks TMO makes is to see if TTQ has any requests in it. If there is one, such as send faxes for faxback, TMO checks to see if resources are available for the task. For example, a fixed line may be dedicated to cater to faxback requests. In this case, only that modem's TMO will find that the resources are available to enter this sequence in the STEP TABLE. Once entered, this sequence of steps will make a call to the faxback requester's fax machine and send the fax. The task of building a TCF based on the caller's request and delivering the faxback, thus takes two segments of STEP TABLE sequences. We call each such segment a RIBBON. The first part, that is the caller placing his requests is the INBOUND RIBBON and the second part where we deliver the faxback is called the OUTBOUND RIBBON.

CaTOS Programming Interface

Another significant advantage of CaTbox is the CaTOS operating system. Fax machines that bundle scanners, printers and modems are usually closed systems that can only be programmed at the factory. Answering machines are also preprogrammed except for recording new greetings. CaTbox has a DOS based multitasking system called CaTOS that enables script driven programming augmented with regular DOS programs. The example in FIG.11 shows an application that was implemented using CaTOS programming interface. This application builds a fax back data base. With the push of a button, the user brings a CaTbox STEP TABLE corresponding to a modem to step 0046h from step 0000h that is, the mother step TMO. In the following, we summarize the steps involved in building a fax back data base:

1. Play a voice message and display LCD message asking for a fax back document number. If given, go to step 2, else return to TMO.
2. Play a voice message and display LCD message asking the user to place the document that will go into fax back data base

on the scanner and then to press 1 (go to 3). If the user is done with all the pages of this document, he is to press # (go to TMO).

3. scan the page, make a DOS file name based on date/time, and place the data in this file. Store the filename in the step table. Go to 4.

4. add the document number and filename to the fax back index file. Go to 2.

The action for step table entry 0046h in FIG.11 is ANNOUNCE_AND_COLLECT_DIGITS. This implements step 1 in the previous paragraph. The action for step table entry 0047h is EMIT_MSG. Both these actions come with CaTOS. The actions for the next two steps are the same: START_PROGRAM. This action also comes with CaTOS and serves to launch DOS programs. For step table entry 0048h, the DOS program is called SCTOPCL.EXE. This program drives the scanner to scan a document, make a file name for it and store into this file. The last step table entry, 0049h, uses BLDFBXDB.EXE. This program takes as inputs, the file name and the document number and inserts these into a line in a file called FAXBACK.IDY.

Writing this application was relatively easy. The programs that needed to be created were SCTOPCL.EXE and BLDFBXDB.EXE. Actually, SCTOPCL.EXE is a standard program that is used in multiple instances as it scans a page.

To summarize, to develop any application with CaTOS, the programmer must:

1. always write a STEP TABLE SEQUENCE,
   insert it into a current step table source file,
   assemble this file
   turn this file into a binary file using DOS DEBUG,
   write this file to CaTdisc:\CATBOX\CATSTEPS*.BIN
   edit CaTdisc:\CaTbox\CAT.CFG to update the step table name

2. sometimes write a DOS PROGRAM,
   refer to this program in the step table entry where
   the action is START_PROGRAM,

place the executable in CaTdisc:\CATBOX\PROGRAMS*.EXE.

3. very seldom write an ACTION.

PC/PT Programming Model

The outlines of a method to write programs for the PC/PT pair will be described with an example. Suppose a software company intends to develop an application for Windows where users could access their bank accounts and conduct transactions. There is a part of this task that can be automated: downloading a checking statement. There will be cases where the user will just want to do this. There is no need to turn the PC on just for this although it could be done from the PC. This software company will then write a component of this application that can be driven from the keypad of CaTbox PT. It is desirable that the outcome of the download be printed. It is also desirable that this data be preserved on CaTdisc for the application from PC to make it a starting point for further transactions if the user so desires. The requirement, then, is that the CaTbox component be aware of the file structure of the PC component so that it can deliver data PC component can recognize.

To make this model more general, assume a file of multimedia data comes in from a distant source. The reception could be initiated by a remote source such as incoming fax, or by a local source such as push button on CaTbox. By multimedia data we mean text and images (visual data), sound (auditory data), or video (visual data). This data could be a fax for example. CaTbox would read this data and store it on CaTdisc as a file. The application program on PC would poll for the arrival of this file at any time. Once it found it, it would display it. Conversely, if an application on PC intends to send multimedia data to a distant receiver, this application would write this data to CaTdisc as a file and would alert a program on CaTbox. The alerted program would wake up and send the data right away or at a later time. This is a model of division of labor between PC/CaTbox PT.

Telephony Applications

CaTbox may also act as a telephone providing a receiver is added to it, instead of a handset. The receiver should sit on an off hook/on hook cradle. The receiver's connection may also be a wireless one. A phone

29

number may be dialed with push buttons on CaTbox under control of the action DIAL. When the connection is made, the user may pick up the receiver and start talking. A record may be kept of the number dialed and the time. When a call comes in, caller id circuitry may detect the caller's phone number. This number may be stored on CaTdisc in a log file with a note that this call is starting. The action TMO may determine that this is a voice call. A polling program on PC may detect that a voice call has come in by checking this CaTdisc file. It would then open up a window with information about the caller.

Internet Applications

CaTbox may be used as an Internet World Wide Web HTTP server. Content developed on PC could be written to CaTdisc for delivery. A specific keypad sequence would start the ACTION CONN_PPP making a connection with an access provider using the PPP protocol. Once established, CONN_TCPIP action would take over. This action would implement the TCP/IP protocol. For an incoming TCP packet, CONN_TCPIP would pass the data on to a START_PROGRAM within CONN_TCPIP called HTTP_SERVER along with some parameters. For a simplest task of getting an HTML file and sending it, HTTP_SERVER would make a DOS call to put the file in hard disk cache and return control to CONN_TCPIP. CONN_TCPIP in turn would send this data out. References for TCP/IP and HTML/HTTP are:

http://www.interNIC.net/ds/RFC791,793,1332,1548 for TCP,IP,PPP.

http://www.hp.co.uk/people/dsr/html3 for HTML.

http://www.ics.uci.edu/pub/ietf/http/draft-ietf-http-v10-spec-03.html for HTTP.

CaTbox thus helps a user establish a presence in voice, fax and multimedia data. The greeting of the answering machine is the voice presence. A faxback delivery capability is a fax presence. A World Wide Web HTML pages delivery capability is a multimedia data presence.

30

CLAIMS

I claim:

3 1. A second computer comprising

an operating system,

a plurality of hard disks and means whereby said hard disks are recognized by said operating system at said second computer,

a SCSI cable whereby said second computer is connected to a first computer,

a first programming means at said second computer whereby said second computer in SCSI target mode and said first computer in SCSI initiator mode communicate utilizing a SCSI protocol and said first programming means at said second computer operates said second computer's SCSI node in either target or initiator mode,

a second programming means at said second computer whereby an operating system at said first computer recognizes said hard disks of said second computer as SCSI hard disks of said first computer,

said second programming means at said second computer, a third programming means at said second computer, and a first programming means at said first computer, utilizing two SCSI logical unit numbers at said second computer whereby reliable access by said operating system at said first computer and by said operating system at said second computer to said hard disks at said second computer is achieved, one of said logical unit numbers providing for data transfers and another one of said logical unit numbers providing for control.

1 2. A second computer comprising

an operating system,

a plurality of hard disks and means whereby said hard disks are recognized by said operating system at said second computer,

a SCSI cable whereby said second computer is connected to a first computer,

a first programming means at said second computer whereby said second computer in SCSI target mode and said first computer in SCSI

3 1

initiator mode communicate utilizing a SCSI protocol and said first programming means at said second computer operates said second computer's SCSI node in either target or initiator mode,

a second programming means at said second computer whereby an operating system at said first computer recognizes said hard disks of said second computer as SCSI hard disks of said first computer,

said second programming means at said second computer, a third programming means at said second computer, and a first programming means at said first computer, utilizing two SCSI logical unit numbers at said second computer whereby a function call to a would be terminate and stay resident program at said first computer by an application program at said first computer is first translated into a SCSI write command to said second computer where said SCSI write command is decoded into a function call to a terminate and stay resident program at said second computer in a way that would not interfere with local accesses to said hard disks at said second computer, followed by a SCSI read command to said second computer where said SCSI read command is decoded to read the results of said function call at said second computer whereby said results are delivered back to said function call at said first computer whereby said application program receives said results.

V1

3. A second computer comprising

an operating system,

a plurality of hard disks and means whereby said hard disks are recognized by said operating system at said second computer,

a SCSI cable whereby said second computer is connected to a first computer,

a first programming means at said second computer whereby said second computer in SCSI target mode and said first computer in SCSI initiator mode communicate utilizing a SCSI protocol and said first programming means at said second computer operates said second computer's SCSI node in either target or initiator mode,

a second programming means at said second computer whereby an operating system at said first computer recognizes said hard disks of said second computer as SCSI hard disks of said first computer,

32

said second programming means at said second computer, a third programming means at said second computer, and a first programming means at said first computer, utilizing a first SCSI logical unit number at said second computer whereby a call to write contents of a first buffer of data on said first computer to a would be port at said first computer is translated into a SCSI write command to said second computer where said SCSI write command causes a write of contents of said first buffer of data on said first computer to a physical port on said second computer,

said second programming means at said second computer, said third programming means at said second computer, and said first programming means at said first computer, utilizing a second SCSI logical unit number at said second computer whereby a call to read data to a second buffer of data on said first computer from said would be port at said first computer is translated into a SCSI read command to said second computer where said SCSI read command causes a read of accumulated data from said physical port on said second computer to said second buffer of data on said first computer.

4. The arrangement of two computers in accordance with claim 3 wherein:

said second computer comprises a multiplicity of modems,
said second computer comprises a programming system means,
said programming system means having
a step table file for each said modem
each said step table file having a multiplicity of step table entries,
a stepper program means that operates during timer tick interrupt and reads one of said step table entries in a memory image of said step table for each said modem to identify an action to call for each said modem, and calls said actions, and keeps calling said actions at each timer tick until each said action is completed in turn, and based on said step table entry and DTMF, keypad inputs and return codes, determines a next one of said step table entries for each said modem,
said actions comprising their own version of said stepper whereby said actions can call other said actions in turn,

a first one of said actions whereby a request to execute foreground programs residing on said hard disks can be placed in a first queue,

a program means that is activated after the end of the timer tick, as conditions permit, that reads said first queue and chooses one of said foreground programs on said first queue to run,

a second one of said actions whereby a sequence of said step table entries may terminate in a request to a second queue

said second queue having entries wherein each one of said entries points to one of said step table entries,

a third one of said actions associated with a beginning one of said step table entries that examines said second queue and finding a request in an entry there jumps to one of said step table entries noted in said second queue entry,

said third one of said actions associated with said beginning one of said step table entries that examines an incoming phone call and determines if said phone call is a fax, voice or data call and jumps to one of said step table entries based on said determination,

said third one of said actions associated with said beginning one of said step table entries that examines a buffer for said keypad inputs and jumps to one of said step table entries based on said keypad input,

whereby, a multiplicity of modems, scanners, printers may be controlled to implement telephony, voice, fax, data applications in a push button driven, user friendly manner, independent of said first computer.

5. The arrangement of two computers in accordance with claim 3 wherein:

said second computer is connected to telecommunications lines,

said second computer comprises a fourth programming means whereby multimedia data is received from said telecommunications lines and stored as files on said second computer's said hard disks, and said first computer comprises a second programming means whereby arrival of said files is polled at any time and said files are converted to outputs, recreating said multimedia data at said first computer's output devices,

34

said first computer comprises a third programming means whereby multimedia input is converted to multimedia data and stored as files on said second computer's said hard disks and a message is sent to a fifth programming means on said second computer whereby said fifth programming means at said second computer sends said files out on said telecommunications lines right away or at a later time or as demanded by incoming calls.

6. The arrangement of two computers in accordance with claim 3 wherein:

said second computer is connected to telecommunications lines,

said second computer has a push button user interface,

said second computer is continuously on and available,

said first computer has a graphical user interface with a mouse and keyboard,

said first computer is sometimes on and available,

whereby, telecommunications related, routine tasks initiated by manipulating said push button interface are carried out by said second computer,

whereby, said telecommunications related, routine tasks initiated periodically are carried out by said second computer,

whereby, said telecommunications related, routine tasks initiated by signals from said telecommunications lines are carried out by said second computer,

whereby, complex tasks requiring user intervention are carried out by said first computer.

7. The arrangement of two computers in accordance with claim 3 wherein:

said second computer is connected to a scanner,

said second computer has a push button user interface,

said first computer is connected to said scanner,

said first computer has a graphical user interface with a mouse and keyboard,

said first computer is sometimes on and available,

35

whereby, said scanner related, routine tasks initiated by manipulating said push button interface are carried out by said second computer.

8. The arrangement of two computers in accordance with claim 4 wherein:

one of said hard disks on said second computer comprises a configuration file,

said configuration file contains a list of said step table file names linking said file names to said modems,

new versions of said step table files and said foreground program files may be copied to said hard disks on said second computer by means on said first computer,

said configuration file can be edited by an editor in said first computer to reassign said step tables to said modems,

whereby behavior of said modems may be customized and new functions added.

9. The arrangement of two computers in accordance with claim 4 wherein:

one of said foreground programs loads a voice file from said hard disks to a cache area of said hard disks that is not available to said operating system on said second computer and to said operating system on said first computer,

one of said actions plays said voice file reading said voice file data from said cache area of said hard disks to a memory area of said second computer.

10. The arrangement of two computers in accordance with claim 4 wherein:

one of said actions records voice data writing said voice data from a memory area of said second computer to a cache area of said hard disks that is not available to said operating system on said second computer and to said operating system on said first computer,

one of said foreground programs stores said voice data from said cache area of said hard disks to a voice file on said hard disks.

36

11. A second computer comprising

an operating system,

a plurality of hard disks and means whereby said hard disks are recognized by said operating system at said second computer,

a cable whereby said second computer is connected to a first computer,

a first programming means at said second computer whereby said second computer in target mode and said first computer in initiator mode communicate utilizing a protocol and said first programming means at said second computer operates said second computer in either target or initiator mode,

a second programming means at said second computer whereby an operating system at said first computer recognizes said hard disks of said second computer as hard disks of said first computer,

said second programming means at said second computer, a third programming means at said second computer, and a first programming means at said first computer whereby reliable access by said operating system at said first computer and by said operating system at said second computer to said hard disks at said second computer is achieved.

add a1

ABSTRACT

In a preferred embodiment an embedded PC/AT computer is connected to another PC via a SCSI cable, and to a Telecommunications switching facility such as a PBX or CO via telephone cables. From here on this embedded PC/AT will be called CaTbox or CaTdisc to distinguish it from a computer it may be connected to. The names are an allusion to the way this device sits between a Computing and a Telecommunications apparatus. CaTdisc is an allusion to the hard disk inside the CaTbox. CaTbox runs the DOS operating system and contains an ATA hard disk attached to its own ISA bus. By means of software resident on CaTbox and on a PC, this hard disk is accessible to a PC as a SCSI hard disk. The CaTbox has a parallel port. A printer is attached to this parallel port. A print job issued from a computer is redirected via a SCSI cable to the CaTbox where it is submitted to the DOS print spooler. This redirection is a file transfer to CaTdisc. The print program on CaTbox runs in the foreground and is therefore faster than it would be if run in the background as on a PC. CaTbox does not have a video screen or a keyboard. It has an LCD screen and a keypad. CaTbox does not have a floppy disk drive. CaTbox is connected to a telephone handset via a telephone cable. While the computer and the printer are both off, CaTbox can receive faxes and voice messages and store them on the CaTdisc. By means of the keypad, voice messages can be played via a speaker residing on the CaTbox. By means of the keypad, messages can be recorded via a microphone on the CaTdisc for later delivery during a phone call. By means of the keypad, received faxes can be printed on the printer. Fax software on the host PC allows a user to view and print received faxes as the CaTdisc is also a SCSI disk for this host PC. A user may also initiate fax transmissions from the host PC. The software interrupt calls initiated by a fax software on the host PC to drive a background program normally resident on the host PC are redirected via SCSI to the CaTbox to drive a copy of this background program resident on the CaTbox which in turn drives the modem on the CaTbox. The serial device calls initiated by a data modem software on the host PC are redirected via SCSI bus to CaTbox to drive the modem that resides on the CaTbox. This method has the advantage of not using a hardware interrupt on the PC. A scanner on the SCSI bus may be driven by CaTbox via keypad to scan documents to either print them (copy) or send them out as faxes. A computer on the SCSI bus may also drive the scanner to print documents or send them out as faxes. The program that records voice messages is a

TO 12/7/95

loop that references a step table that describes the state machine for the chain of events during a phone call. Different step tables may implement a voice mail system, or a faxback system, or an HTTP server for the World Wide Web, or other systems. Each CaTbox may have more than one telephone line. Each line is driven by its own step table and all these lines may be operating at the same time. The idle state step of all modems have the same code. This code, upon a RING from the line, can detect if the incoming call is voice, fax or data. As its loading is limited and known the ISA bus of the CaTbox may be run at frequencies higher than the standard ISA bus speed. Means to limit power consumption are implemented so that the CaTbox may run without a fan. Software means are put in place to ensure that multiple tasks on the CaTbox, initiated via keypad, the host PC, and the telecommunications lines are all implemented simultaneously as long as resources are free. Tasks related to multiple modems may submit requests to run foreground programs and these requests are evaluated right after a timer tick to decide which if any of the requests should be launched as programs. Some tasks involve an inbound phone call followed by an outbound phone call. These tasks may not necessarily complete in one sequence of steps from the step table of one modem. These tasks make requests to continue at a location in the step table when a modem can make an outbound call. Idle modems may look at such requests and implement them by jumping to the prescribed step table location. Procedures called actions that are specified in a step table entry are executed during the timer tick. These procedures implement state machines whose transition clock is the timer tick. Each modem gets a slice of the timer tick to execute such code. Reading the step table, executing its action, deciding on the next step are also implemented with code that executes during the timer tick. Actions may call other actions which in turn call other actions. In addition, the DOS operating system on the CaTbox and the operating system on the computer are synchronized so that the file structure on the CaTdisc is not corrupted.

ABSTRACT

Replace the abstract of record with the following:

An embedded computer, CaTbox, is connected to a PC via SCSI cable, and to a telecommunications switch. CaTbox runs an operating system, CaTOS, and contains a hard disk accessible to PC as a SCSI disk called CaTdisc. Print jobs issued from PC are transferred as files to CaTdisc, queued by CaTOS and driven in the foreground to a printer attached to CaTbox. CaTbox has an LCD screen, keypad, and is connected to telephone handsets. While PC and printer are off, CaTbox receives faxes, voicemail, email and stores them on CaTdisc. It delivers HTML pages stored on CaTdisc. Keypad directed, CaTbox plays voicemail and prints faxes or email. Modems on CaTbox, CaTmodems, are available for data, voice, fax communications from PC. A scanner on SCSI bus may be driven by CaTbox via keypad to scan documents to store on CaTdisc, print or send as faxes. CaTOS has step tables for each modem, actions, foreground programs, configuration files, and queues. Steps hold actions that execute within a time slice for a modem during timer tick. Actions emit, record messages, queue foreground program requests, queue requests for another step, call other actions, idle, answer a call etc. Steppers within each time slice move execution from step to step based on keypad inputs, events, conditions, and contents of step tables. Foreground programs move files to, from memory, print, scan etc. Idle actions check a queue for steps to execute. A scheduler runs after timer ticks to choose the next foreground program.

08/569,816

Declara) for Utility or Design Patent A[:ation

As a below-named inventor, I hereby declare that my residence, post office address, and citizenship are as stated below next to my name and that I believe that I am the original, first, and sole inventor [if only one name is listed below] or an original, first, and joint inventor [if plural names are listed below] of the subject matter which is claimed and for which a patent is sought on the invention, the specification of which is attached hereto and which has the following title:

A computing and communications transmitting, receiving system, with a push button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to in the oath or declaration. I acknowledge a duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Please send correspondence and make telephone calls to the First Inventor below.

1-00 *C

Signature: Sole/First Inventor: haluk m. aytac

Print Name: Haluk M. Aytac Date: 1995 Dec 8

Residence: Cupertino, CA Citizen Of: USA

Post Office Address: 10270 Parkwood Dr 8, Cupertino, CA 95014

Telephone: 408 253 6172

Signature: Joint/Second Inventor: _____

Print Name: _____ Date: _____

Residence: _____ Citizen Of: _____

Post Office Address: _____

_____

Telephone: _____

Form 10-2

In the United States Patent and Trademark Office

First/Sole Applicant: Haluk M. Aytac

Joint/Second Applicant: —

Title: " A computing and communications transmitting, receiving system, with a push button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks

Small Entity Declaration—Small Business Concern

I hereby declare that I am

H. M. Aytac X the owner of the small business concern identified below:

→ ● an officer of the small business concern empowered to act on behalf of the concern identified below:

Name of Concern: 3Tau Corporation

Address of Concern: 10270 Parkwood Dr 8, Cupertino, CA 95014

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above entitled invention of the above applicants and the specification filed herewith.

I acknowledge a duty to file, in the above application for patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Haluk M. aytac — 1995 Dec 8

Signature of Officer of Small Business Concern — Date

Haluk M. Aytac, Director

Name and Title of Officer

10270 Parkwood Dr 8, Cupertino, CA 95014

Address of Officer

Form 10-4B

In the United States Patent and Trademark Office

First/Sole Applicant: Haluk M. Aytac

Joint/Second Applicant: ----

Title: " A computing and communications transmitting, receiving system, with a push button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks

Small Entity Declaration—Independent Inventor(s)

As a below-named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35 United States Code, to the Patent and Trademark Office with regard to my above-identified invention described in the specification filed herewith. I have not assigned, granted, conveyed, or licensed—and am under no obligation under any contract or law to assign, grant, convey, or license—any rights in the invention to either (a) any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or (b) any concern which would not qualify as either (i) a small business concern under 37 CFR 1.9(d) or (ii) a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed—or am under an obligation under contract or law to assign, grant, convey, or license—any rights in the invention is listed below:

☐ There is no such person, concern, or organization.

● Any applicable person, concern, or organization is listed below:*

Full Name: 3Tau Corporation

Address: 10270 Parkwood Dr 8, Cupertino, CA 95014

I acknowledge a duty to file, in the above application for patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

haluk M. aytac
Signature of Sole/First Inventor

—
Signature of Joint/Second Inventor

Haluk Aytac
Print Name of Sole/First Inventor

—
Print Name of Second/Joint Inventor

Date of Signature: 1995 Dec 8

Date of Signature:

*Note: A separate Small Entity Statement is required from any listed entity.

Form 10-3

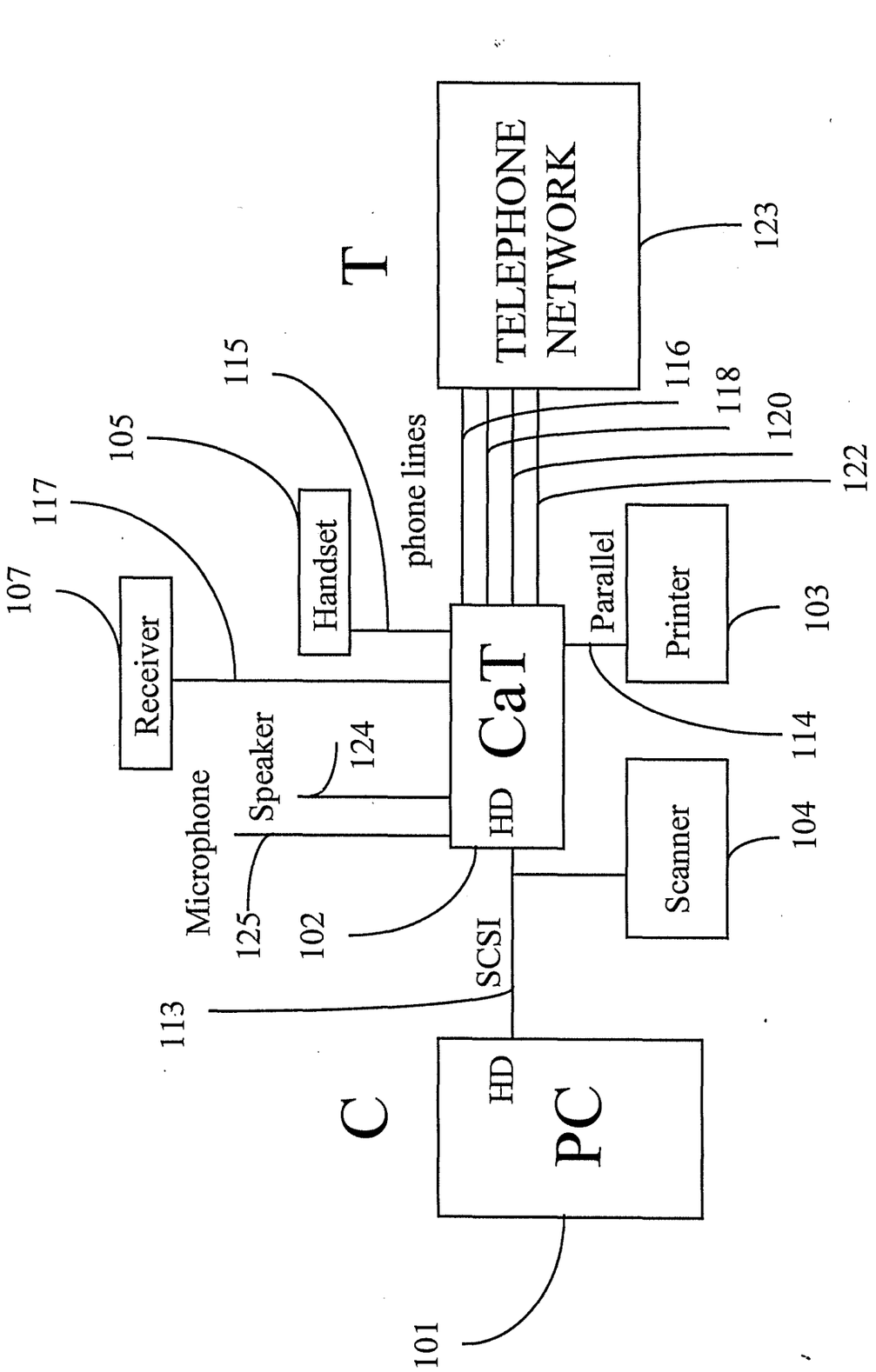
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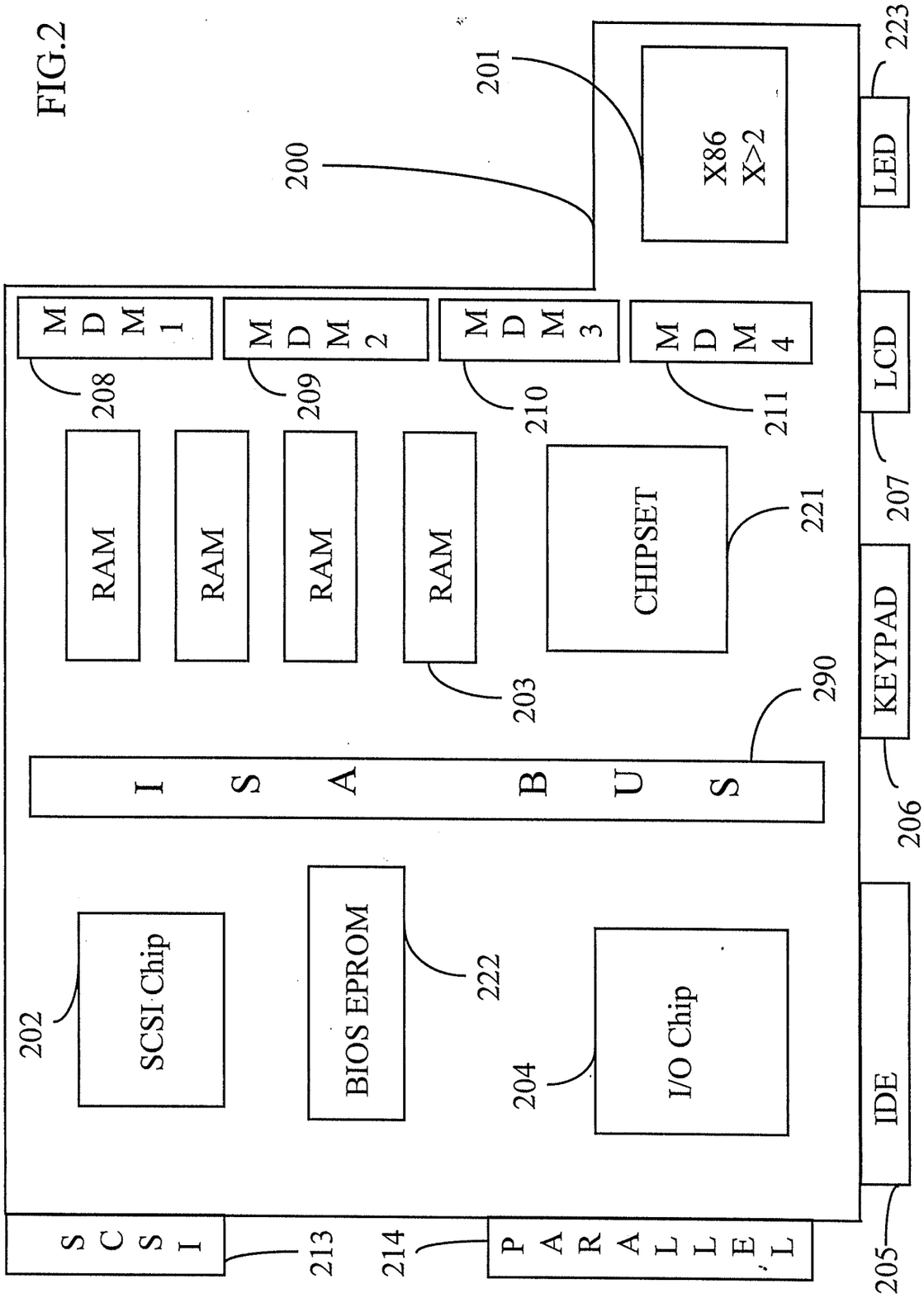
FIG.1

FIG.2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RAM
RAM
CHIPSET
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203
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SCSI
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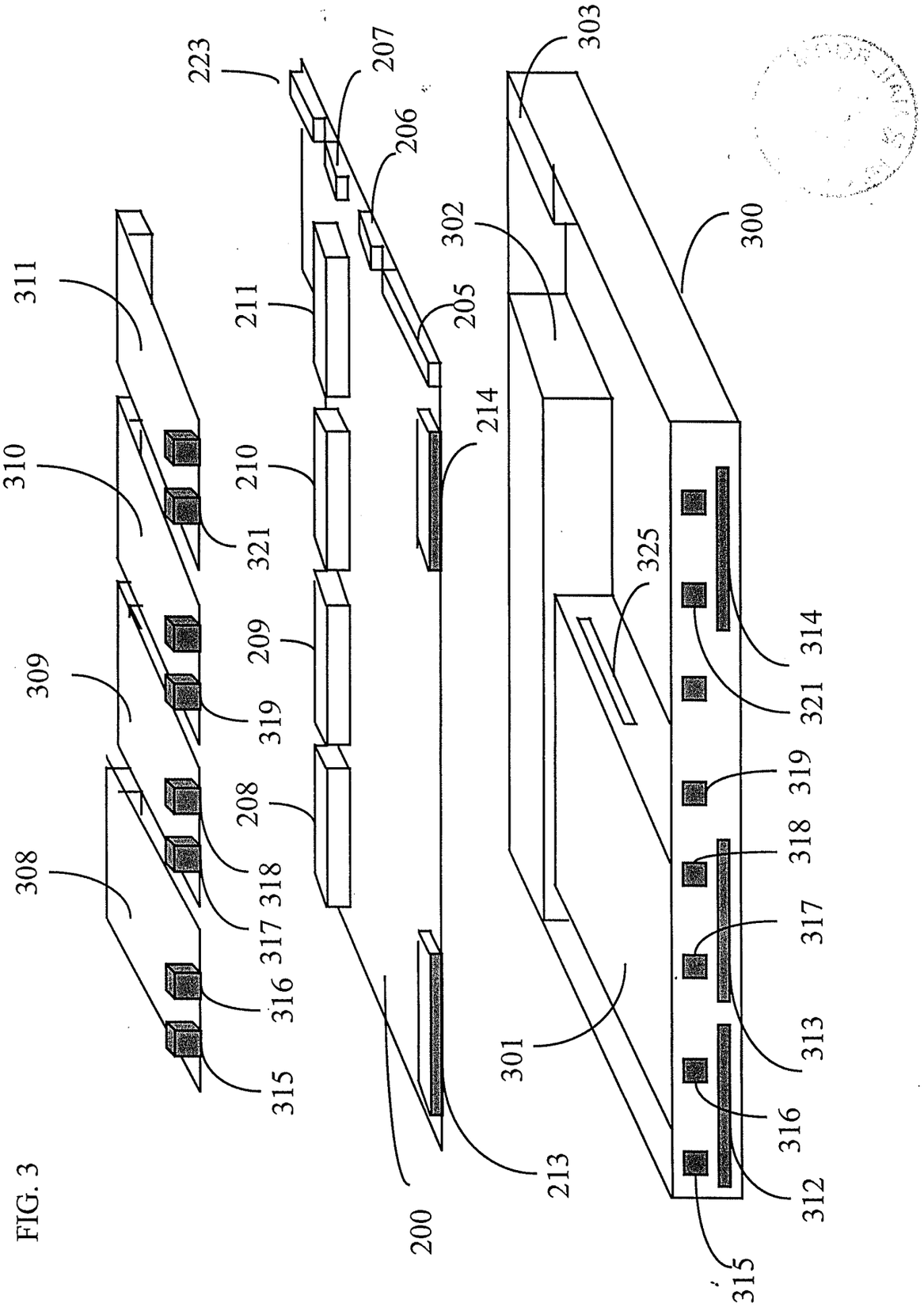
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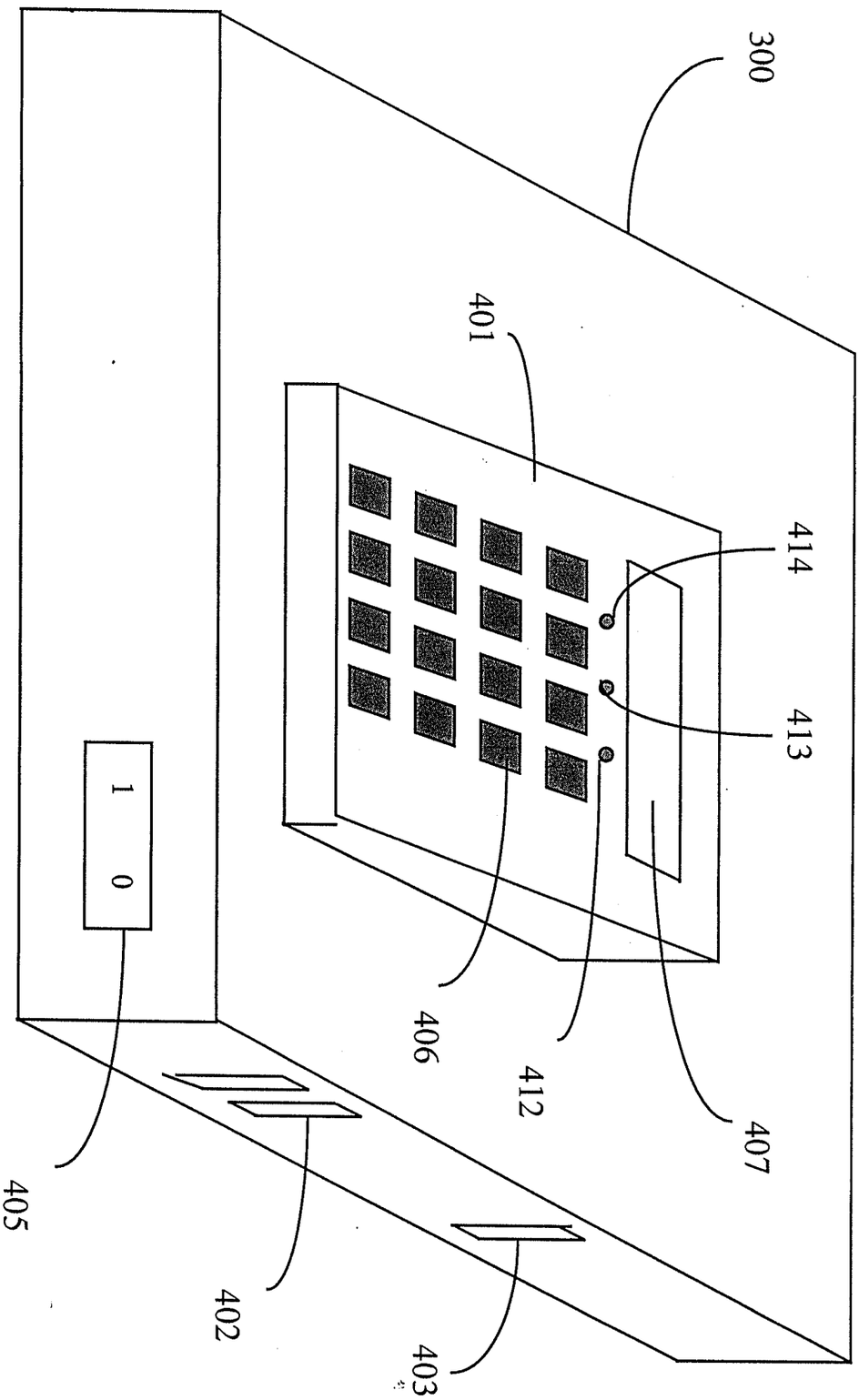
FIG. 3

FIG.4



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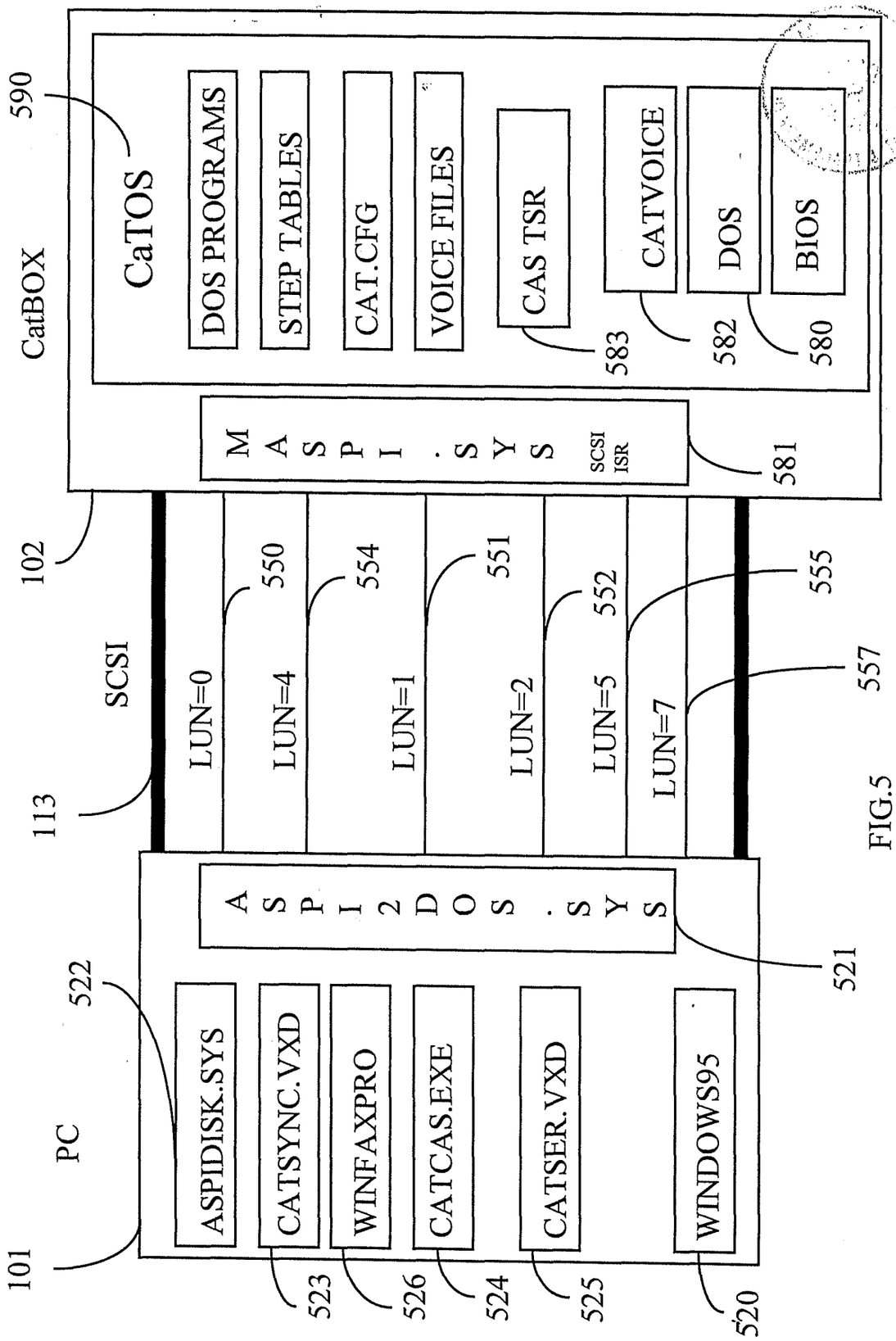
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STEP TABLES
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CAS TSR
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LUN=7
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ASPI2DOS.SYS
521
PC
101
ASPIDISK.SYS
522
CATSYNC.VXD
523
WINFAXPRO
526
CATCAS.EXE
524
CATSER.VXD
525
WINDOWS95
520

FIG.5

600

```
;*************************************************************
;*        BUILD FAXBACK DATA BASE                            *
;*************************************************************
;BUILD FAXBACK DATA BASE (I)
acd_bdfbx_get_doc_no dw       ST_ANNOUNCE_AND_COLLECT_DIGITS
                     dw       JUMP_UNCOND
step_0046_next_step  dw       0047h                          ; if all goes well
                     dw       0000h                          ; tmo, no dtmf, timeout etc
                     dw       0000h                          ; tmo for incoming fax
                     dw       0046h                          ; * goto emit_doc_list
                     dw       0000h                          ; # and non NULL doc no
                     dw       0000h                          ; # and NULL doc no
step_0046_parameters dw       DO_NOT_EXPECT_DTMF             ; so that F=0 works always
                     dw       vcon_session_filename_H        ; file to emit FBXBLD.PCM
                     dw       ACD_GET_FAXBACK_DOC_NUMBER     ; acd type
                     dw       vcon_session_repeat_count      ; rept count for timeout etc
                     dw       DO_NOT_STOP_ON_DLE
                     dw       vcon_session_faxback_doc_number ; ptr to step table variable
                     dw       LCD_MESSAGE_YES
                     db       "please enter faxback"
                     db       "document number and ", 00h
                     db       "press #              "
                     db       "thank you!           ", 00h, 00h
```

FIG.6 STEP TABLE ENTRY EXAMPLE

FIG.7

step table next step word	dtmf value if expect dtmf	return flag value if do not expect dtmf
0	flag = 1	flag = 1
1	no dtmf	flag = 0
2	dtmf = *	flag = 2
3	dtmf = #	flag = 3
4	dtmf = 0	flag = 4
5	dtmf = 1	flag = 5
6	dtmf = 2	flag = 6
7	dtmf = 3	flag = 7
8	dtmf = 4	flag = 8
9	dtmf = 5	flag = 9
10	dtmf = 6	flag = A
11	dtmf = 7	flag = B
12	dtmf = 8	flag = C
13	dtmf = 9	flag = D

08/569846

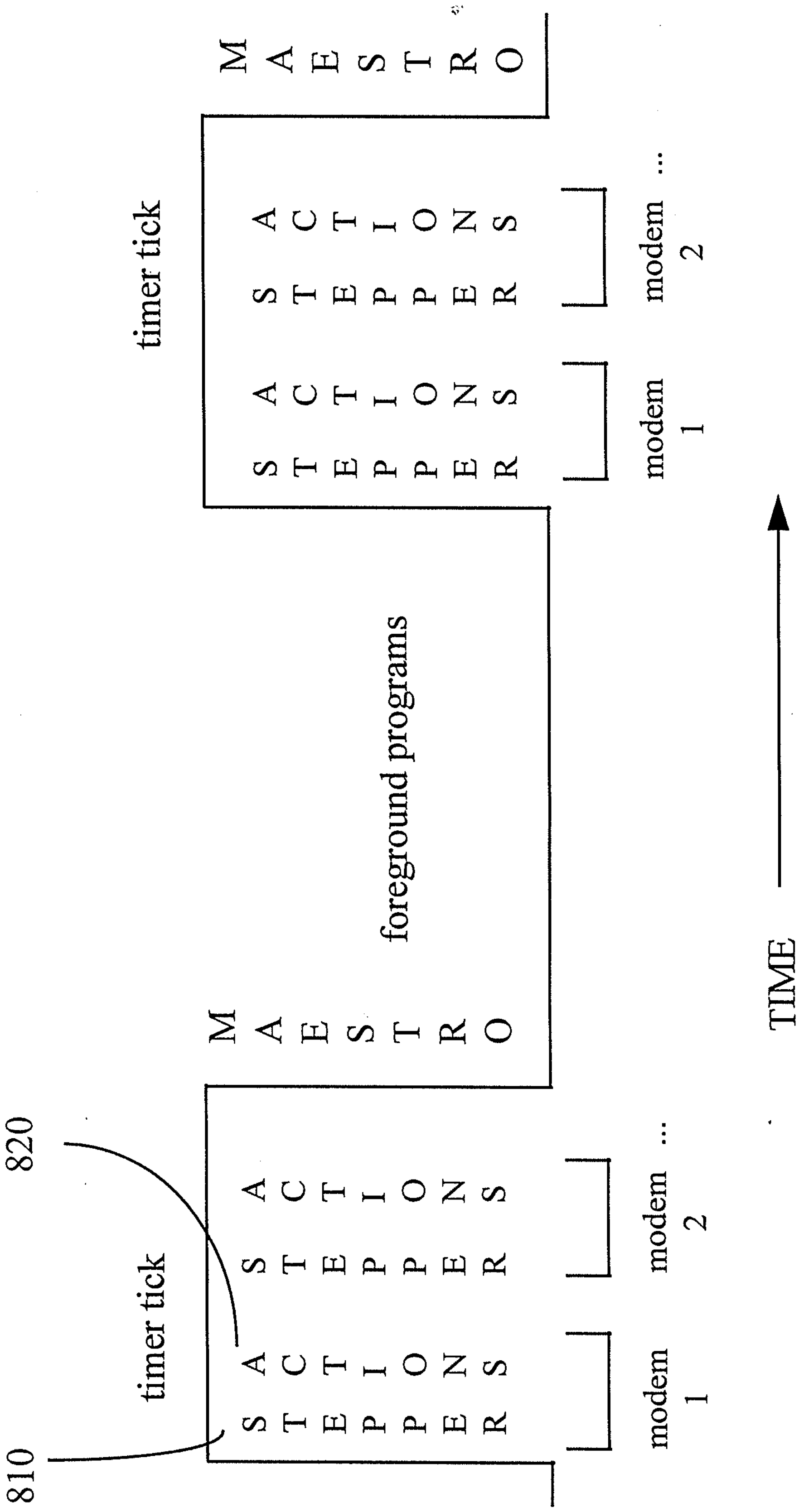


FIG.8

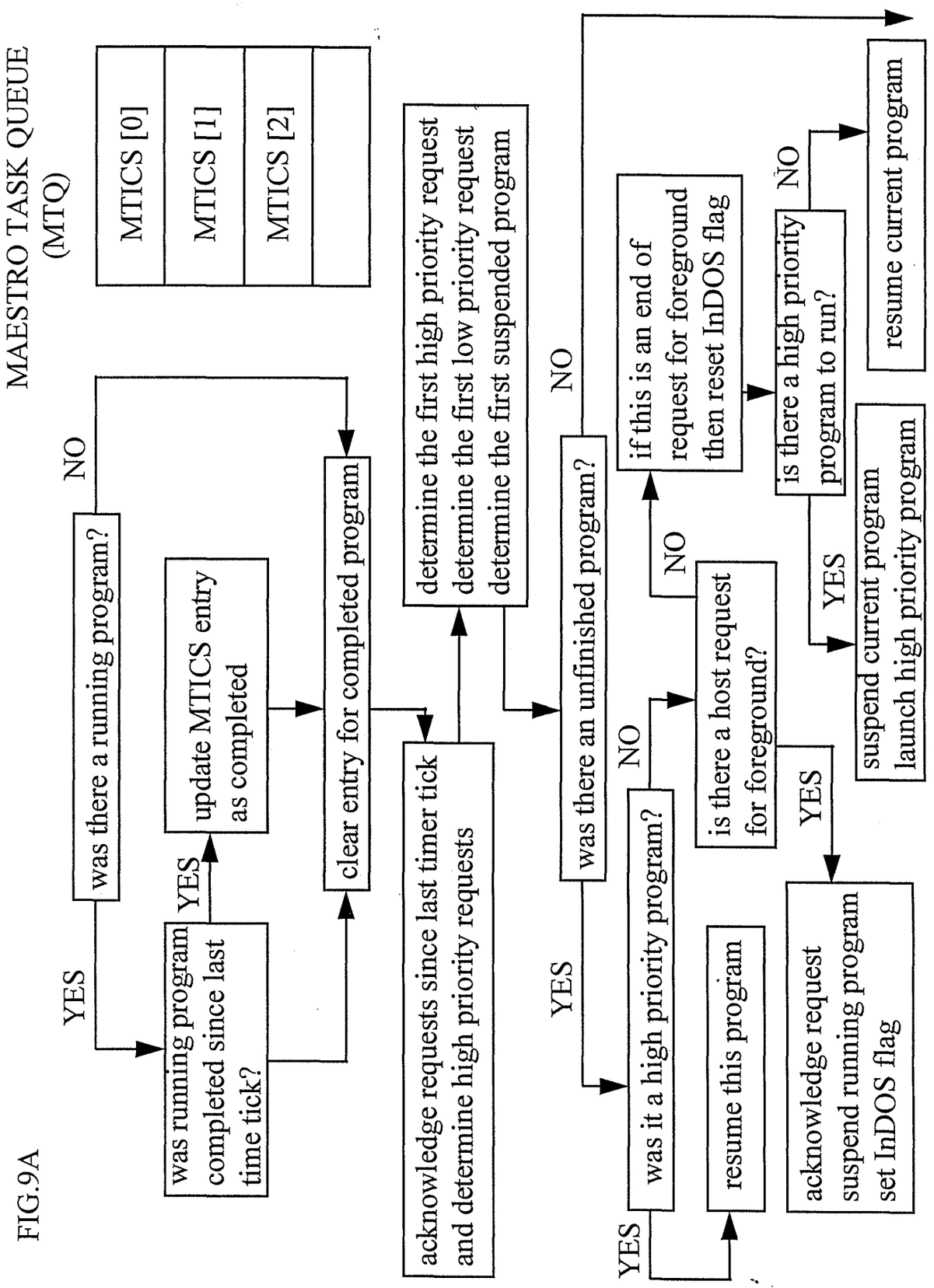

MAESTRO TASK QUEUE
(MTQ)
MTICS [0]
MTICS [1]
MTICS [2]
was there a running program?
YES
NO
was running program completed since last time tick?
YES
update MTICS entry as completed
clear entry for completed program
acknowledge requests since last timer tick and determine high priority requests
determine the first high priority request
determine the first low priority request
determine the first suspended program
was there an unfinished program?
YES
NO
was it a high priority program?
YES
NO
resume this program
is there a host request for foreground?
YES
NO
acknowledge request
suspend running program
set InDOS flag
if this is an end of request for foreground then reset InDOS flag
is there a high priority program to run?
YES
NO
suspend current program
launch high priority program
resume current program

FIG.9A

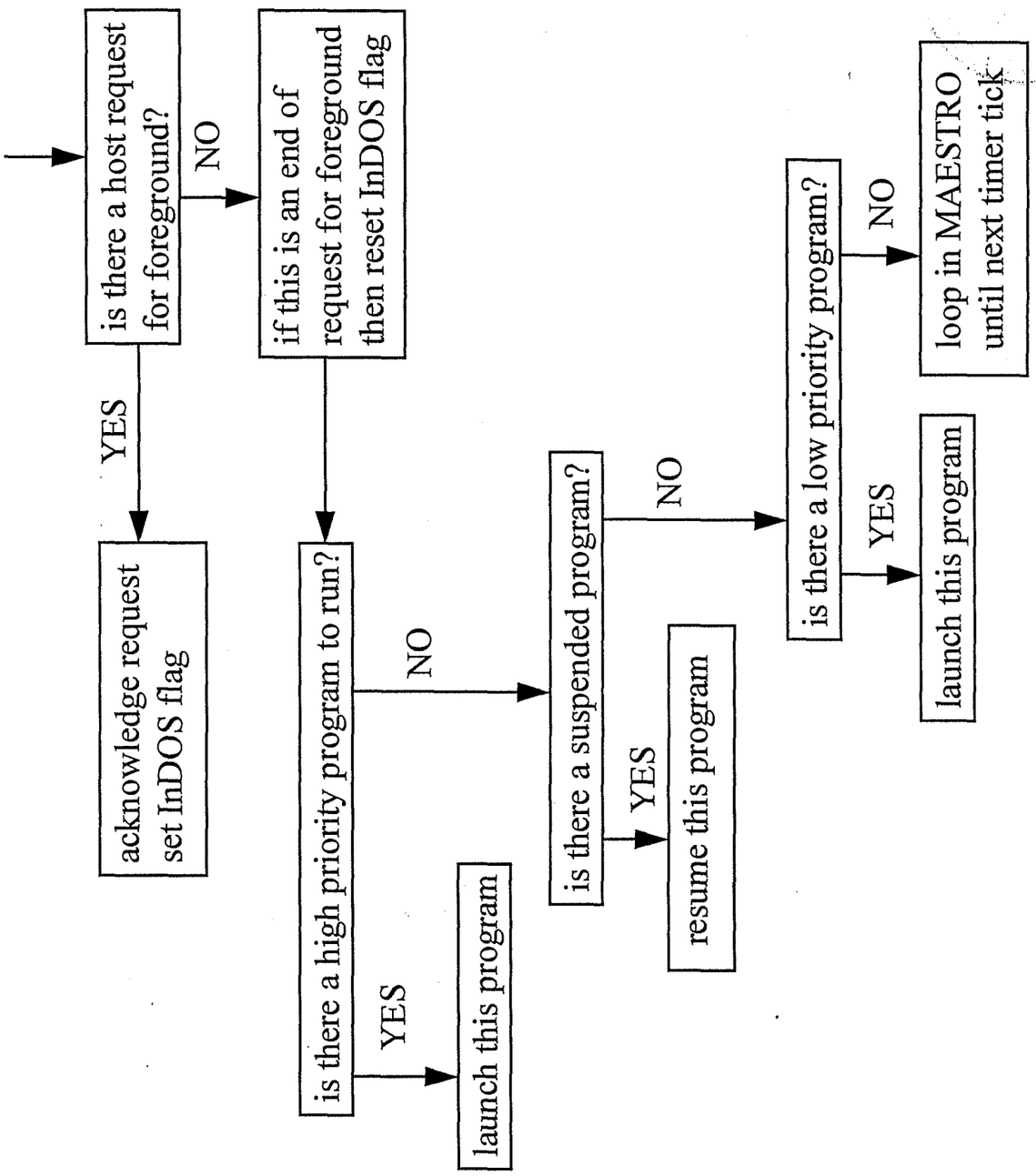

is there a host request for foreground?
YES
NO
acknowledge request set InDOS flag
if this is an end of request for foreground then reset InDOS flag
is there a high priority program to run?
YES
NO
launch this program
is there a suspended program?
YES
NO
resume this program
is there a low priority program?
YES
NO
launch this program
loop in MAESTRO until next timer tick

FIG.9B

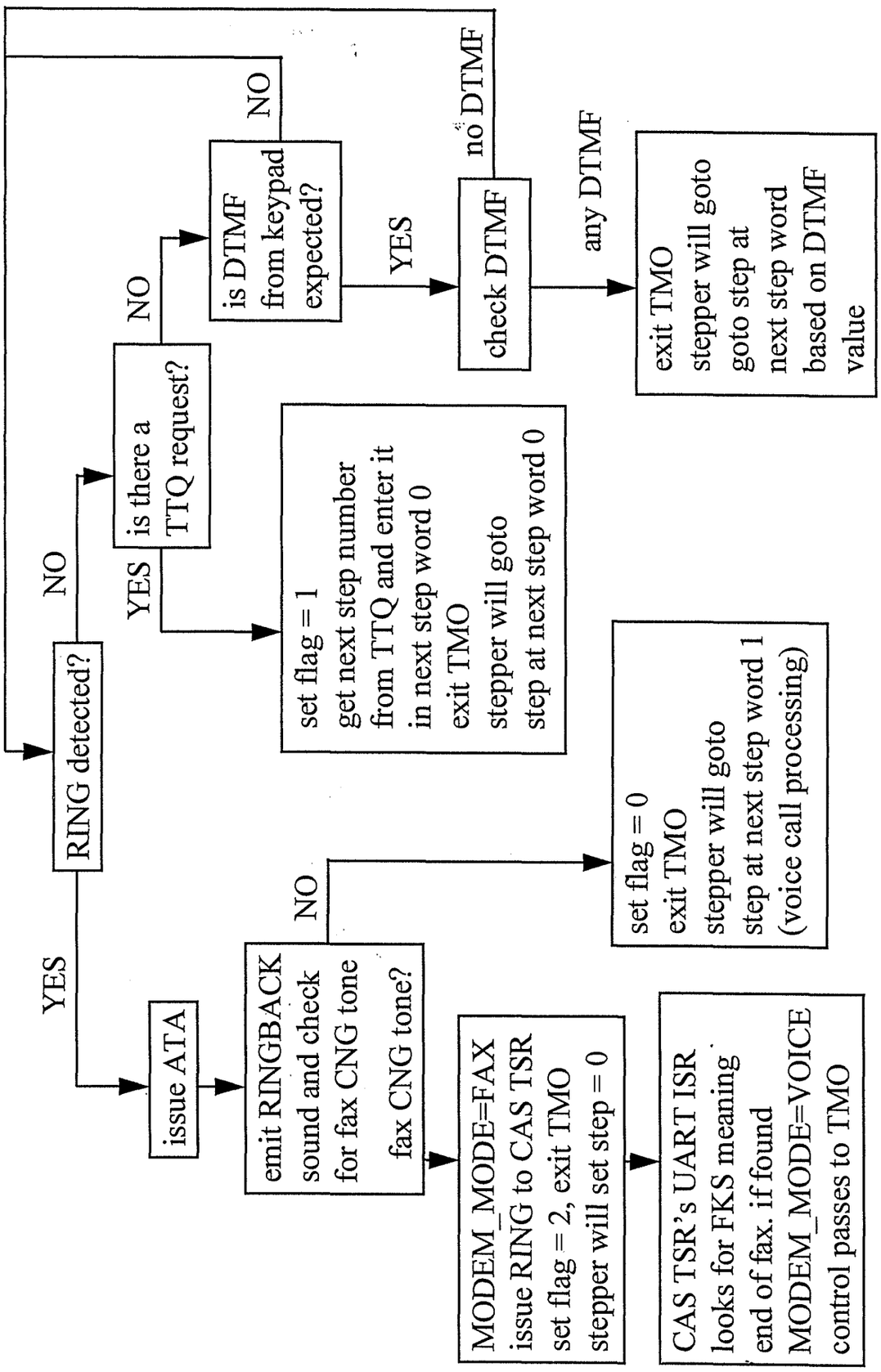

RING detected?
YES
NO
issue ATA
emit RINGBACK sound and check for fax CNG tone
fax CNG tone?
YES
NO
MODEM_MODE=FAX issue RING to CAS TSR set flag = 2, exit TMO stepper will set step = 0
CAS TSR's UART ISR looks for FKS meaning end of fax. if found MODEM_MODE=VOICE control passes to TMO
set flag = 0 exit TMO stepper will goto step at next step word 1 (voice call processing)
is there a TTQ request?
YES
NO
set flag = 1 get next step number from TTQ and enter it in next step word 0 exit TMO stepper will goto step at next step word 0
is DTMF from keypad expected?
YES
NO
check DTMF
any DTMF
no DTMF
exit TMO stepper will goto goto step at next step word based on DTMF value

FIG.10

FIG. 11

```
;*****************************************************************************
;*                        BUILD FAXBACK DATA BASE                            *
;**********************0046************************************************
acd_bdfbx_get_doc_no        dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
                            dw  step_0046_parameters
step_0046_next_step         dw  0047h                           ;make file name for tcf file
                            dw  0000h                           ;tmo: no_dtmf, timeout etc
                            dw  0000h                           ;tmo needs this for incoming fax
                            dw  0046h                           ;* go to emit_doc_list
                            dw  0000h                           ;# and there is non NULL doc number
                            dw  0000h                           ;# and there is NULL doc number
step_0046_parameters        dw  DO_NOT_EXPECT_DTMF              ;so that F=0 works. always.
                            dw  vcon_session_filename_H         ;file to emit FBXBLD.PCM
                            dw  ACD_GET_FAXBACK_DOC_NUMBER      ;acd type
                            dw  vcon_session_repeat_cnt         ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_faxback_doc_number ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "please enter faxback"
                            db  "document number and ", 00h

                            db  "press #              "
                            db  "thank you!           ", 00h, 00h
;**********************0047************************************************
em_bdfbx_data_base          dw  ST_EMIT_MSG
                            dw  DTMF_ANALYZE
                            dw  step_0047_parameters
step_0047_next_step         dw  0048h                           ;
                            dw  0000h                           ;no_dtmf. repeat first.
                            dw  0000h                           ;dtmf_*
                            dw  0000h                           ;dtmf_# = ttq_req
                            dw  0000h                           ;dtmf_0 =
                            dw  0048h                           ;dtmf_1 = scan to pcx.
step_0047_parameters        dw  EXPECT_DTMF
                            dw  vcon_session_filename_7         ;sfxmsg.pcm
                            dw  VCON_SPEAKER
                            dw  DO_NOT_STOP_ON_DLE
                            dw  LCD_MESSAGE_YES
                            db  "place page to fax on"
                            db  "scanner and press 1 ", 00h

                            db  "press # if no more  "
                            db  "pages to scan       ", 00h, 00h
;**********************0048************************************************
sp_bdfbx_sctopcx            dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0048_parameters            ;offset to parameters
step_0048_next_step         dw  0049h                           ;
                            dw  0000h                           ;in case scanner is off etc.
step_0048_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_7         ;program name = SCTOPCX.EXE
                            dd  00000000h                       ;argument_1. not used.
                            dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                            dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************0049************************************************
sp_bdfbx_incbdfbx           dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0049_parameters            ;offset to parameters
step_0049_next_step         dw  0047h                           ;
                            dw  0000h                           ;in case scanner is off etc.
step_0049_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_L         ;program name = BLDFBXDB.EXE
                            dw  vcon_session_faxback_doc_number ;argument_1. fbx document number
                            dw  step_table_seg_number
                            dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                            dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
```

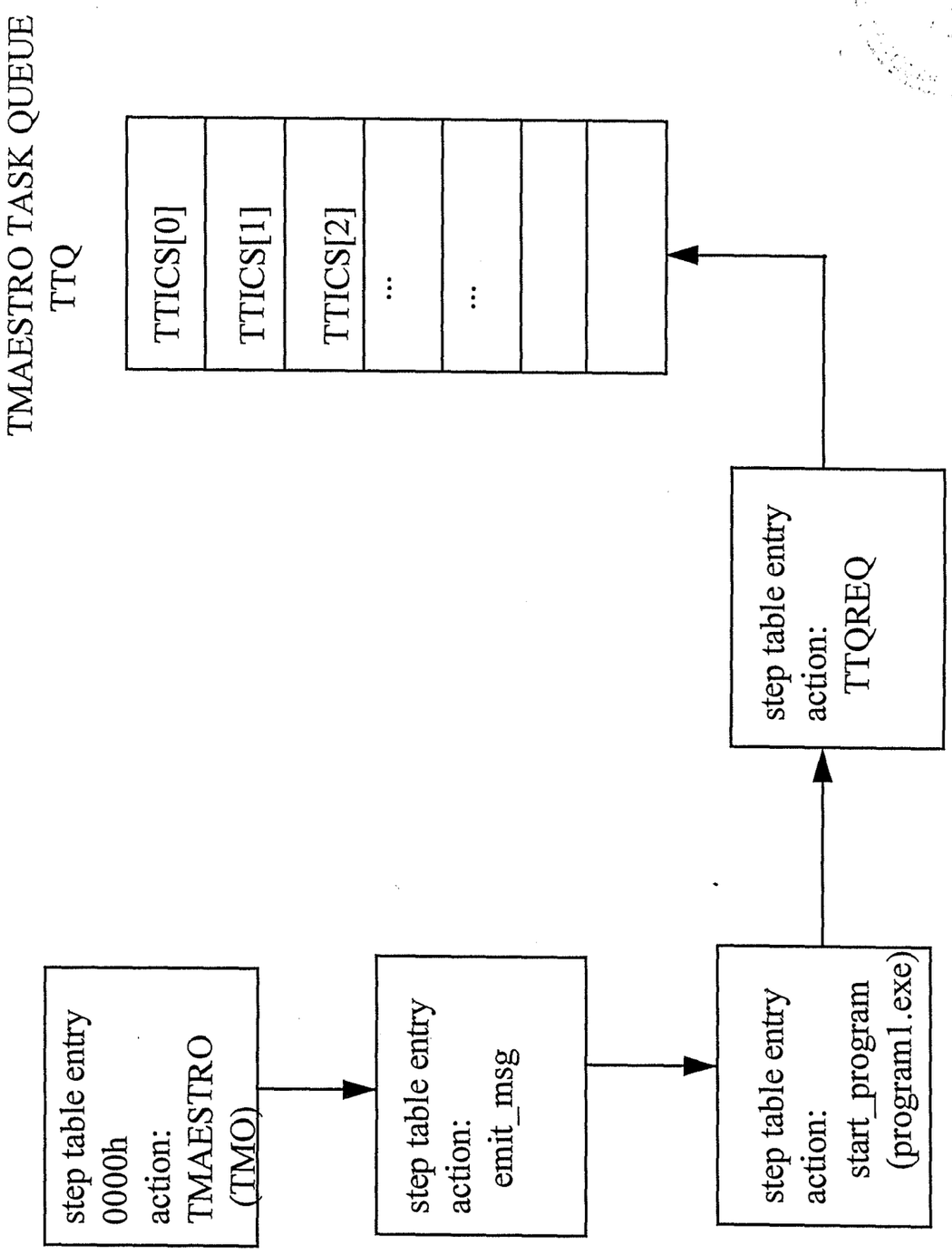

TMAESTRO TASK QUEUE
TTQ
TTICS[0]
TTICS[1]
TTICS[2]
...
...
step table entry
0000h
action:
TMAESTRO
(TMO)
step table entry
action:
emit_msg
step table entry
action:
start_program
(program1.exe)
step table entry
action:
TTQREQ

FIG. 12

379
96

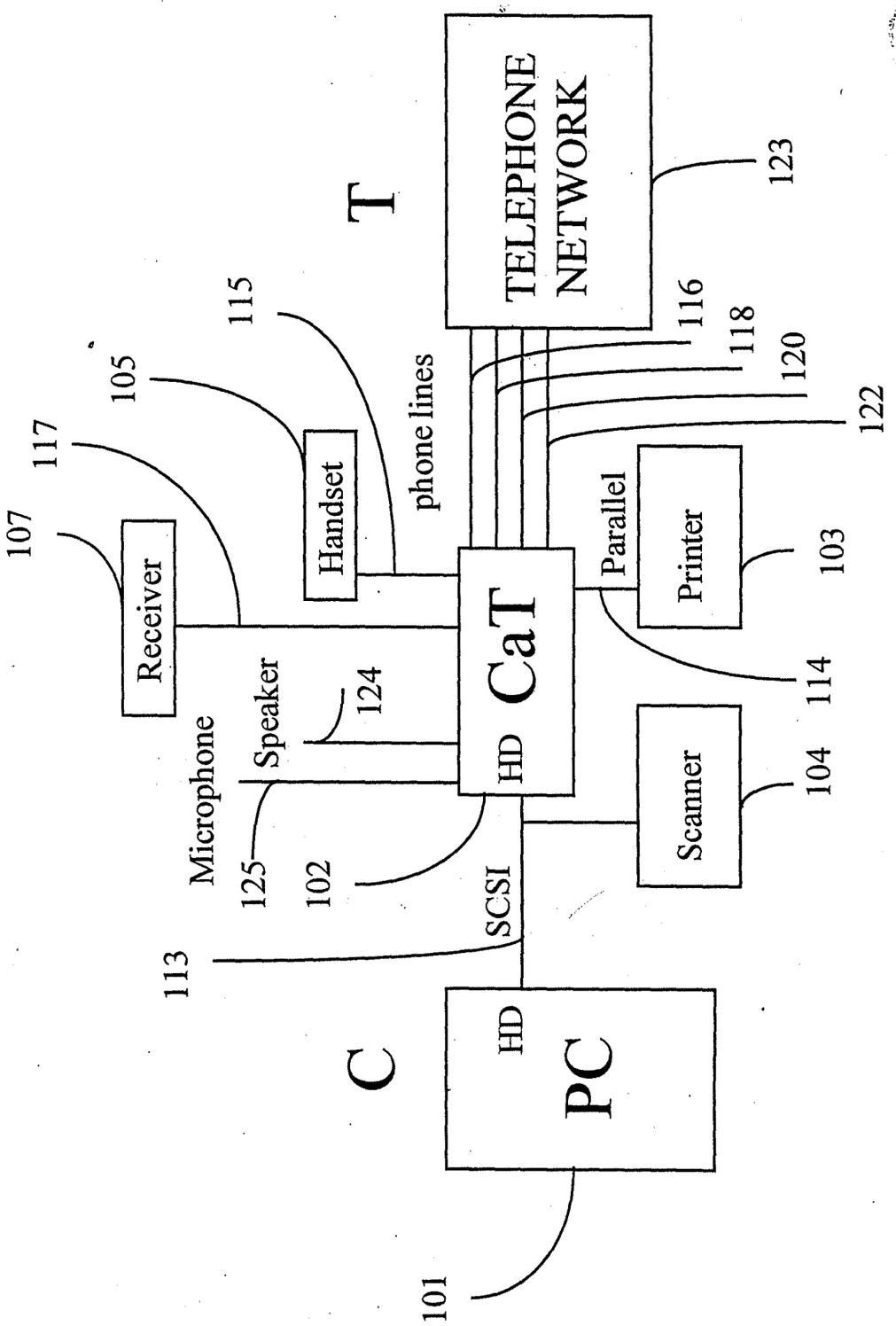
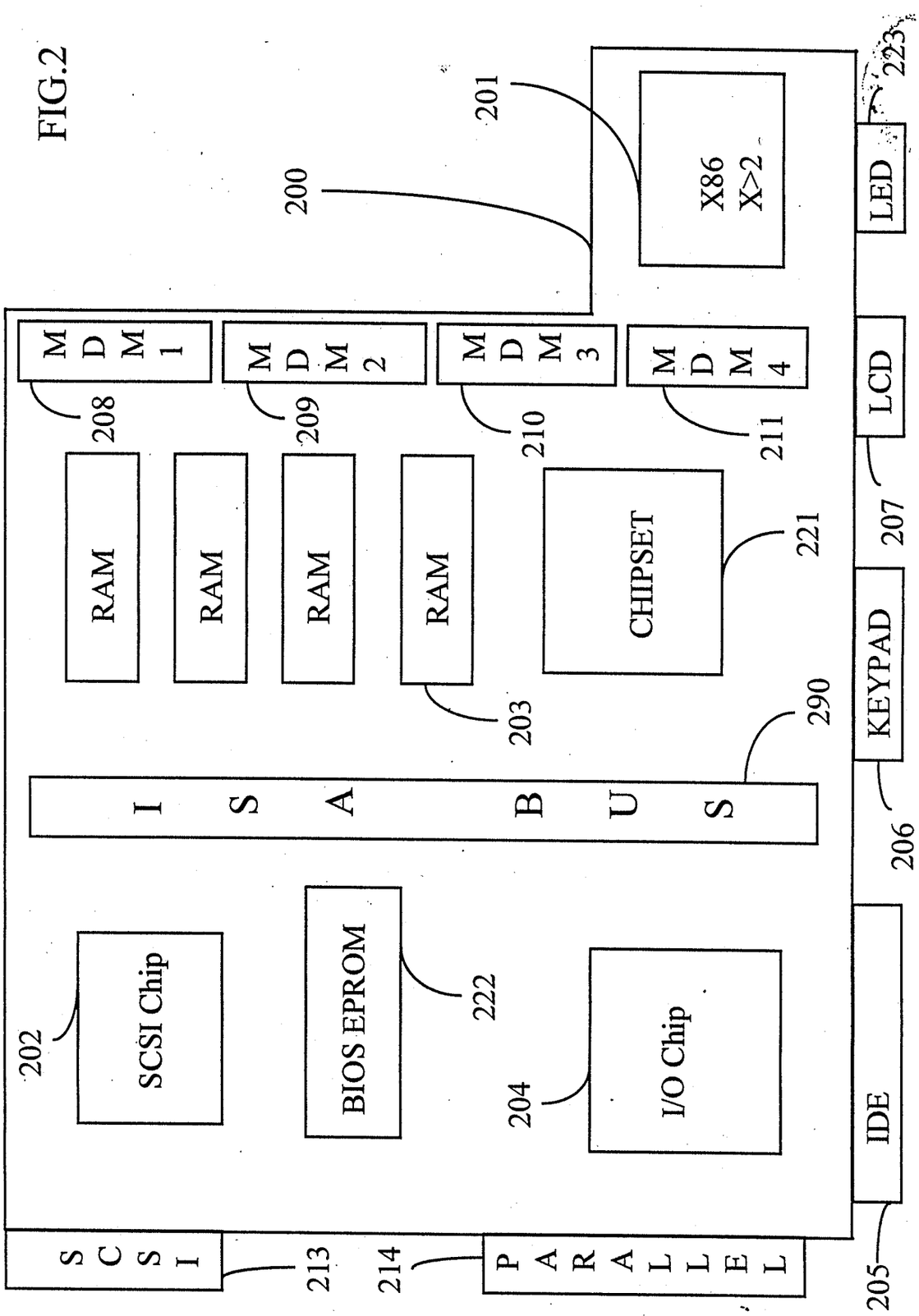

T
TELEPHONE NETWORK
123
115
116
118
120
122
105
117
107
phone lines
Handset
Parallel
Printer
103
Receiver
CaT
HD
Speaker
124
114
Microphone
125
102
Scanner
104
SCSI
113
C
HD
PC
101

FIG.1

FIG.2


200
201
X86
X>2
223
LED
LCD
207
KEYPAD
206
IDE
205
MDM 1
MDM 2
MDM 3
MDM 4
208
209
210
211
RAM
RAM
RAM
RAM
203
CHIPSET
221
290
ISA BUS
202
SCSI Chip
BIOS EPROM
222
204
I/O Chip
213
SCSI
214
PARALLEL

PRINT OF DRAWINGS
AS ORIGINALLY FILED

08/569846

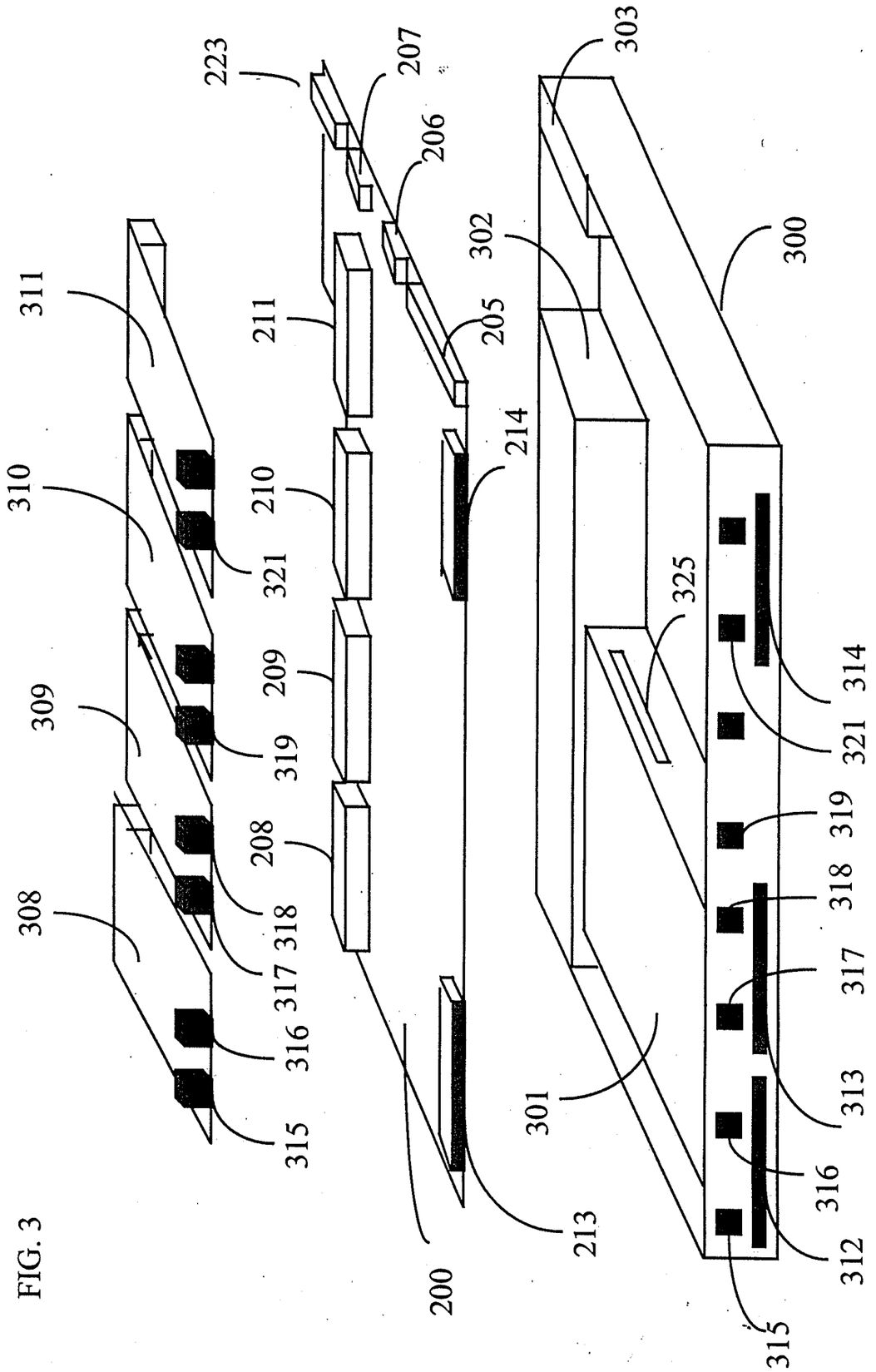


FIG. 3

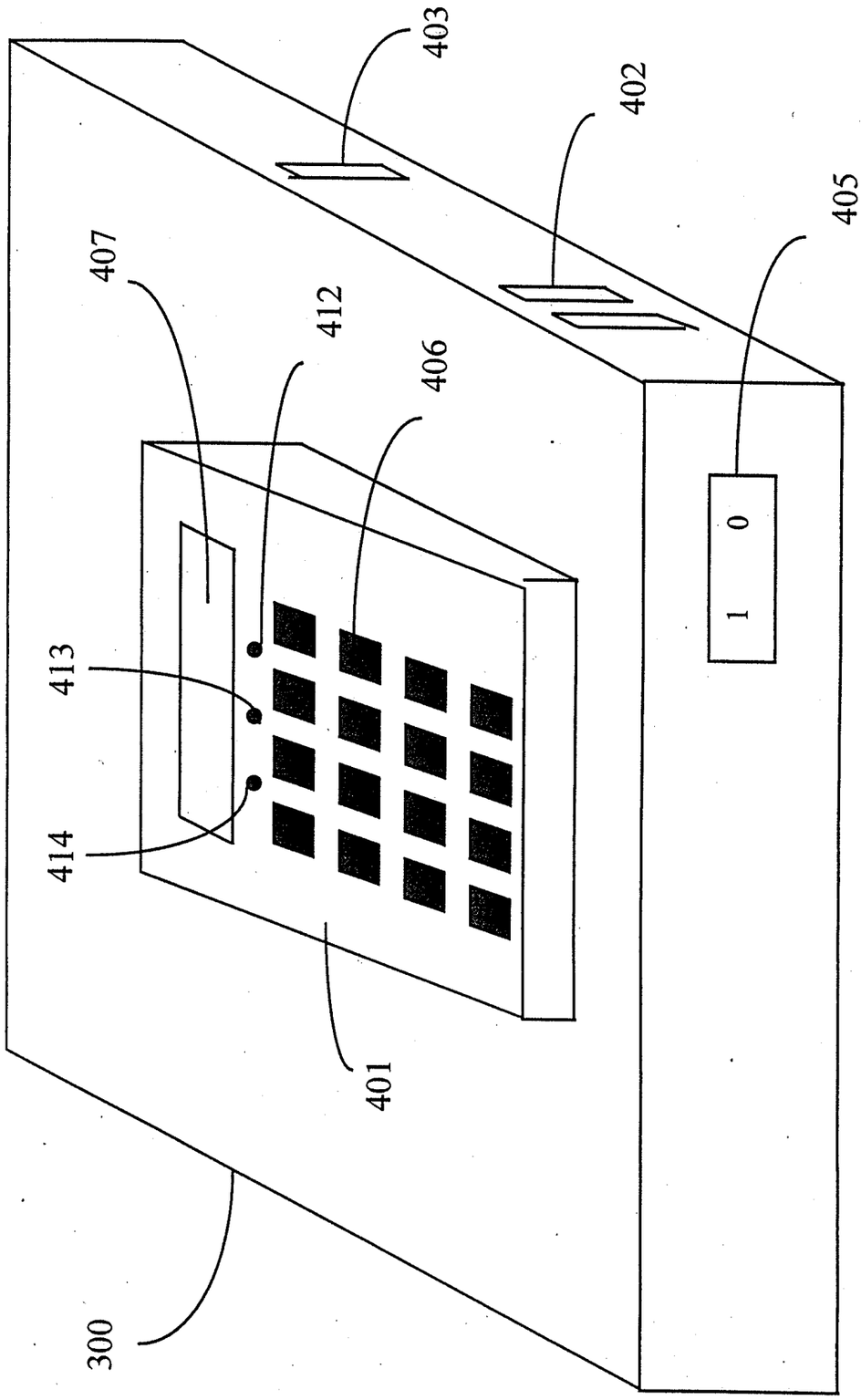


FIG.4

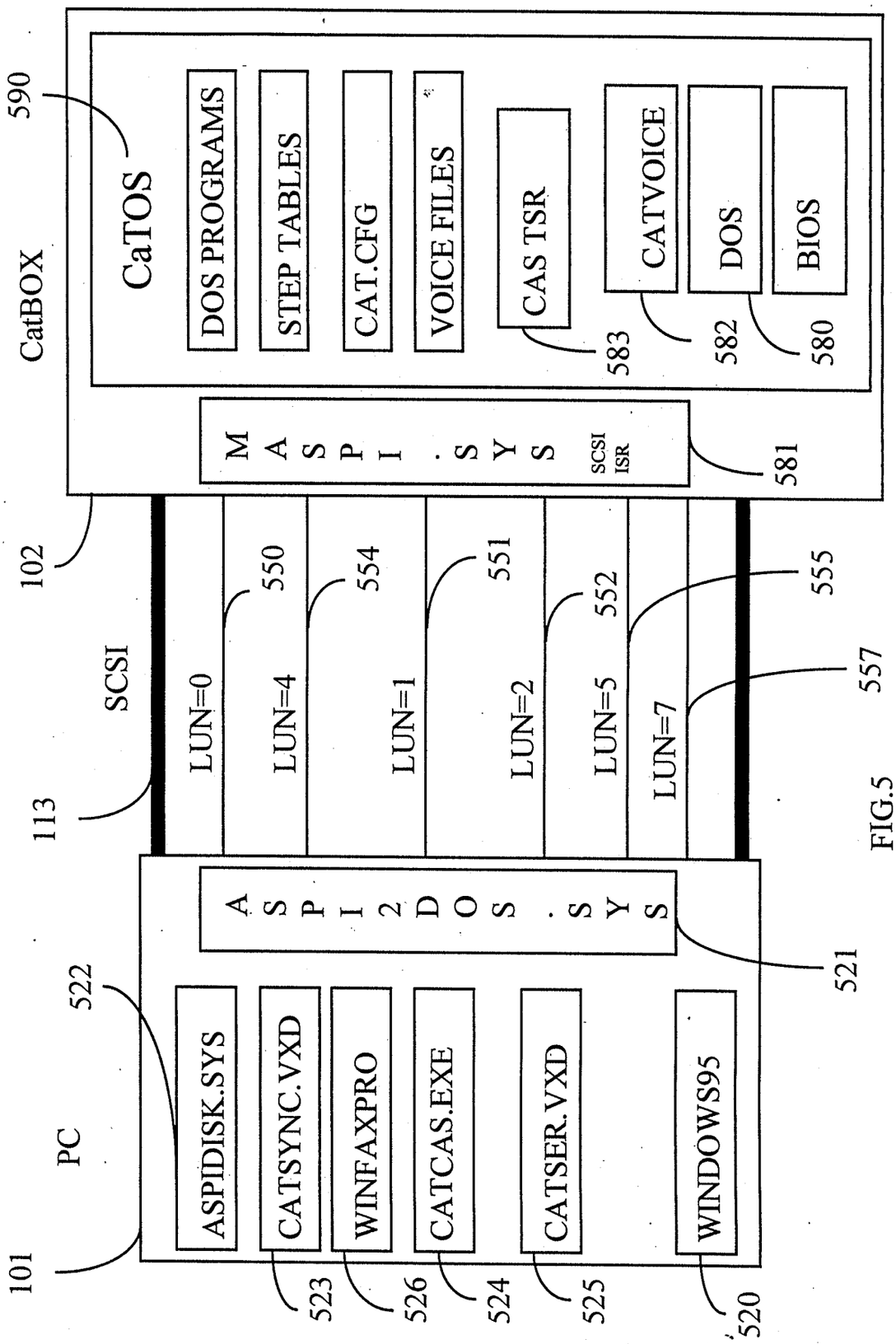

CatBOX
590
CaTOS
DOS PROGRAMS
STEP TABLES
CAT.CFG
VOICE FILES
CAS TSR
CATVOICE
DOS
BIOS
583
582
580
MASPI.SYS
SCSI ISR
581
102
SCSI
113
LUN=0
LUN=4
LUN=1
LUN=2
LUN=5
LUN=7
550
554
551
552
555
557
ASPI2DOS.SYS
521
PC
101
522
ASPIDISK.SYS
CATSYNC.VXD
WINFAXPRO
CATCAS.EXE
CATSER.VXD
WINDOWS95
523
526
524
525
520

FIG.5

600

```
;*****************************************************************
;*        BUILD FAXBACK DATA BASE                                *
;*****************************************************************
;BUILD FAXBACK DATA BASE (I)
acd_bdfbx_get_doc_no dw      ST_ANNOUNCE_AND_COLLECT_DIGITS
                     dw      JUMP_UNCOND
step_0046_next_step  dw      0047h                              ; if all goes well
                     dw      0000h                              ; tmo, no dtmf, timeout etc
                     dw      0000h                              ; tmo for incoming fax
                     dw      0046h                              ; * goto emit_doc_list
                     dw      0000h                              ; # and non NULL doc no
                     dw      0000h                              ; # and NULL doc no
step_0046_parameters dw      DO_NOT_EXPECT_DTMF                 ; so that F=0 works always
                     dw      vcon_session_filename_H            ; file to emit FBXBLD.PCM
                     dw      ACD_GET_FAXBACK_DOC_NUMBER         ; acd type
                     dw      vcon_session_repeat_count          ; rept count for timeout etc
                     dw      DO_NOT_STOP_ON_DLE
                     dw      vcon_session_faxback_doc_number ; ptr to step table variable
                     dw      LCD_MESSAGE_YES
                     db      "please enter faxback"
                     db      "document number and ", 00h
                     db      "press #             "
                     db      "thank you!          ", 00h, 00h
```

FIG.6 STEP TABLE ENTRY EXAMPLE

step table next step word	dtmf value if expect dtmf	return flag value if do not expect dtmf
0	flag = 1	flag = 1
1	no dtmf	flag = 0
2	dtmf = *	flag = 2
3	dtmf = #	flag = 3
4	dtmf = 0	flag = 4
5	dtmf = 1	flag = 5
6	dtmf = 2	flag = 6
7	dtmf = 3	flag = 7
8	dtmf = 4	flag = 8
9	dtmf = 5	flag = 9
10	dtmf = 6	flag = A
11	dtmf = 7	flag = B
12	dtmf = 8	flag = C
13	dtmf = 9	flag = D

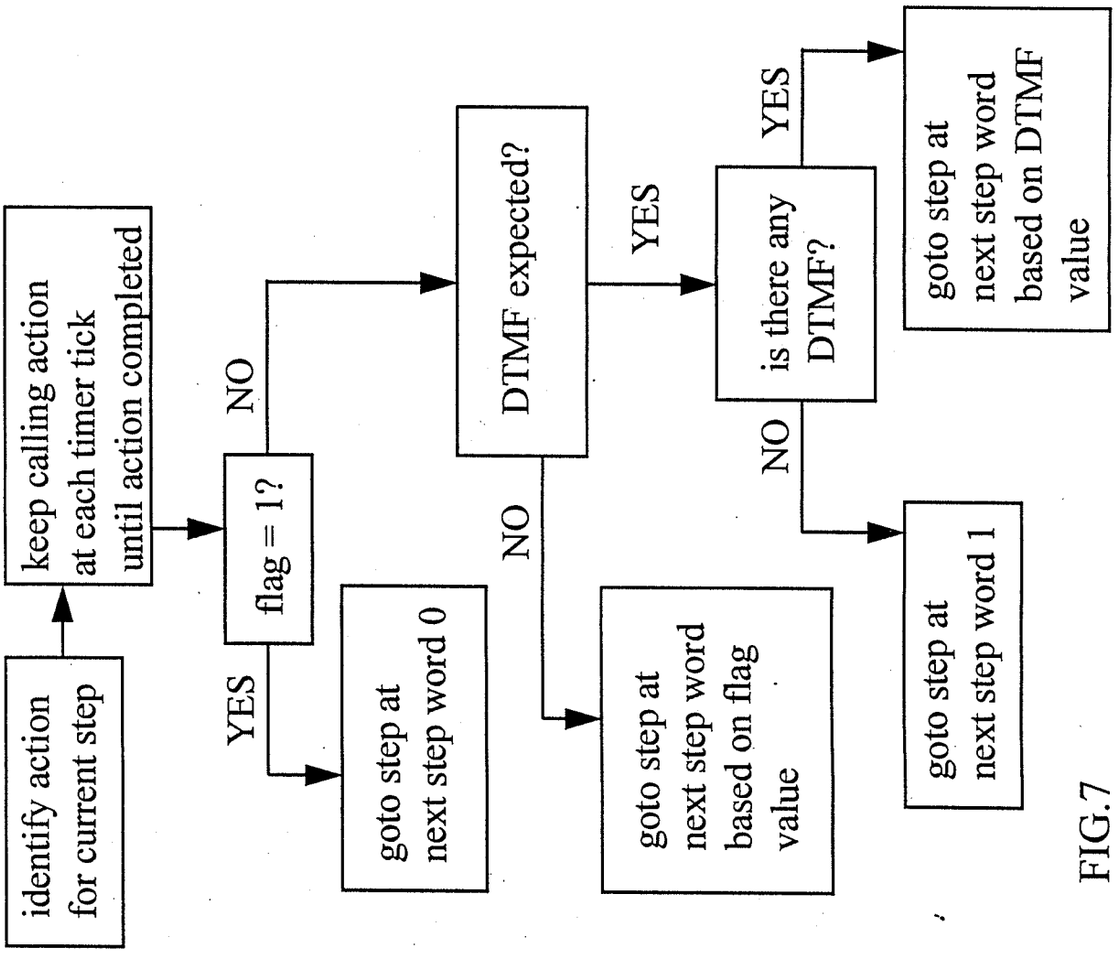


FIG.7

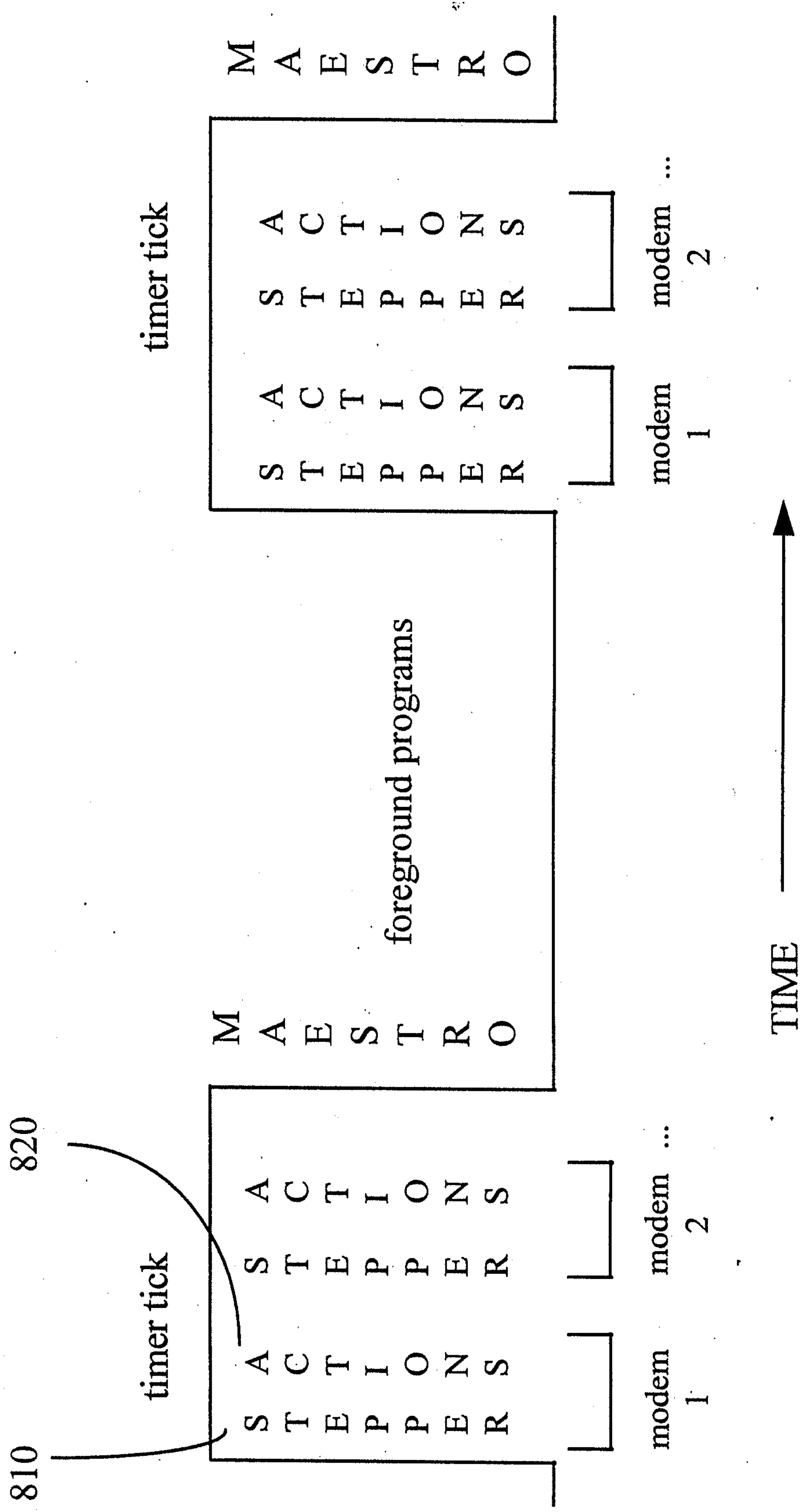

810
820
timer tick
STEPPERS
ACTIONS
STEPPERS
ACTIONS
modem 1
modem 2 ...
MAESTRO
foreground programs
timer tick
STEPPERS
ACTIONS
STEPPERS
ACTIONS
modem 1
modem 2 ...
MAESTRO
TIME

FIG.8

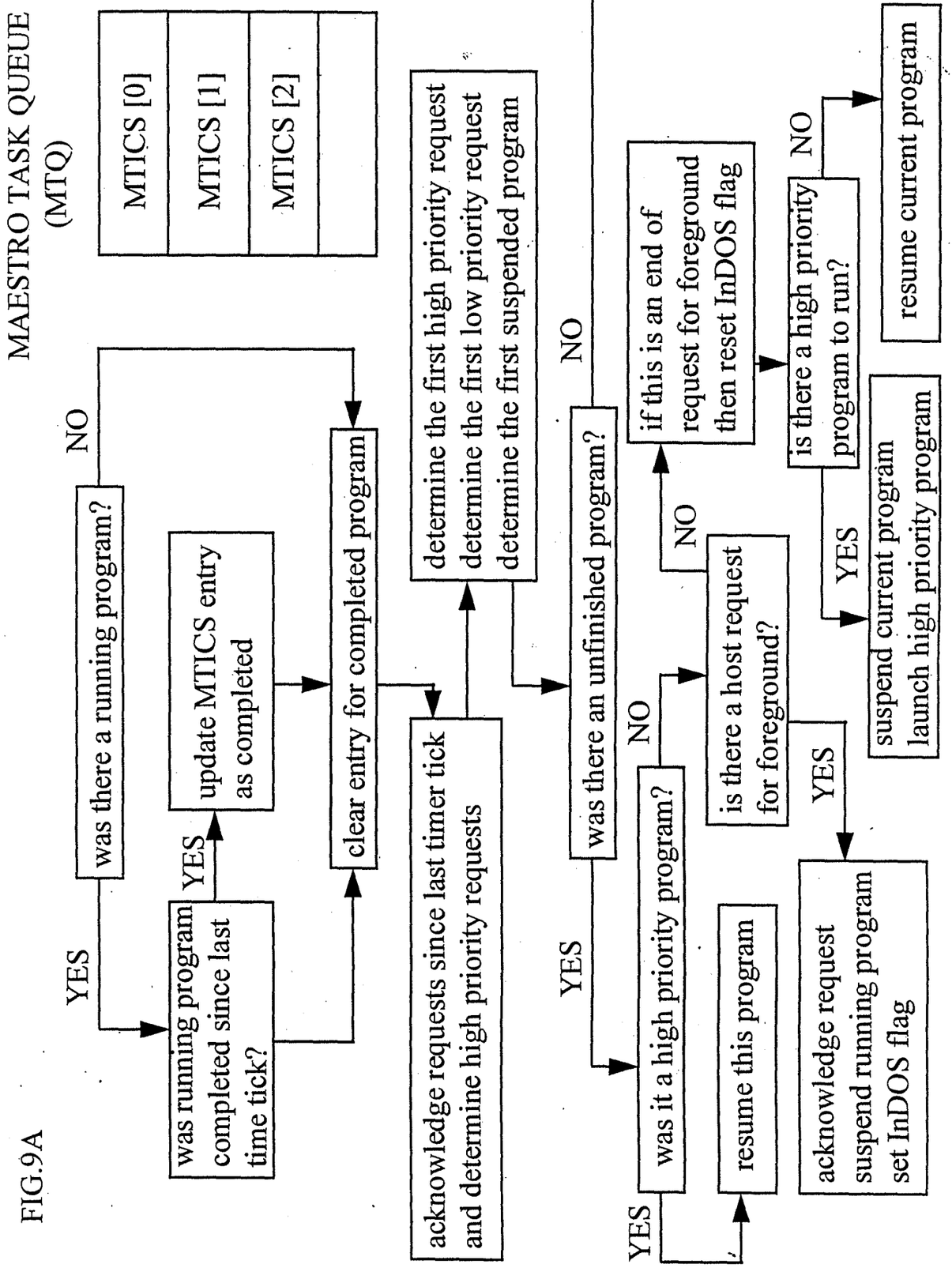

MAESTRO TASK QUEUE
(MTQ)
MTICS [0]
MTICS [1]
MTICS [2]
was there a running program?
YES
NO
was running program completed since last time tick?
YES
update MTICS entry as completed
clear entry for completed program
acknowledge requests since last timer tick and determine high priority requests
determine the first high priority request
determine the first low priority request
determine the first suspended program
was there an unfinished program?
YES
NO
was it a high priority program?
YES
NO
resume this program
is there a host request for foreground?
YES
NO
acknowledge request
suspend running program
set InDOS flag
if this is an end of request for foreground then reset InDOS flag
is there a high priority program to run?
YES
NO
suspend current program
launch high priority program
resume current program

FIG.9A

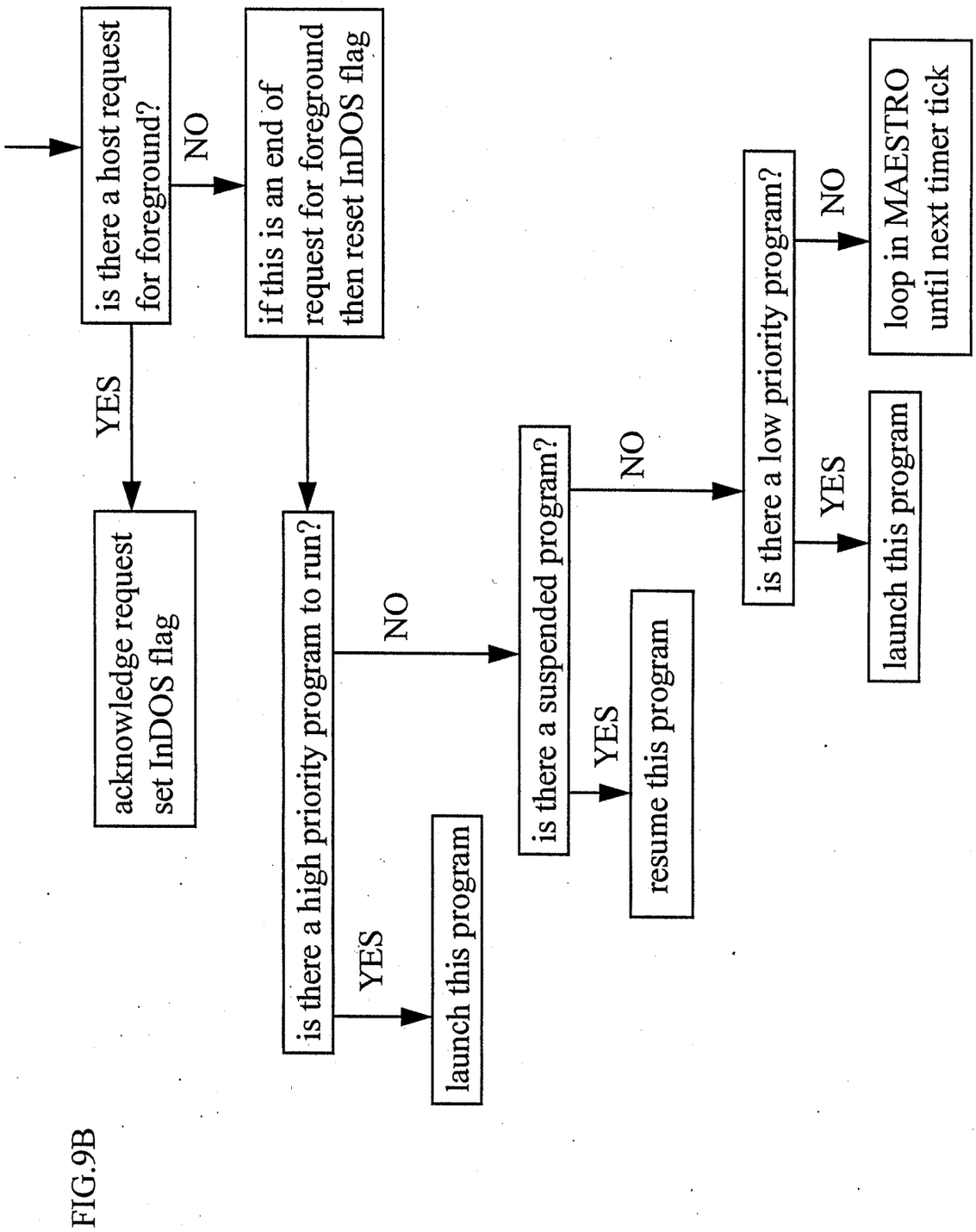

is there a host request for foreground?
YES
NO
acknowledge request set InDOS flag
if this is an end of request for foreground then reset InDOS flag
is there a high priority program to run?
YES
launch this program
NO
is there a suspended program?
YES
resume this program
NO
is there a low priority program?
YES
launch this program
NO
loop in MAESTRO until next timer tick

FIG.9B

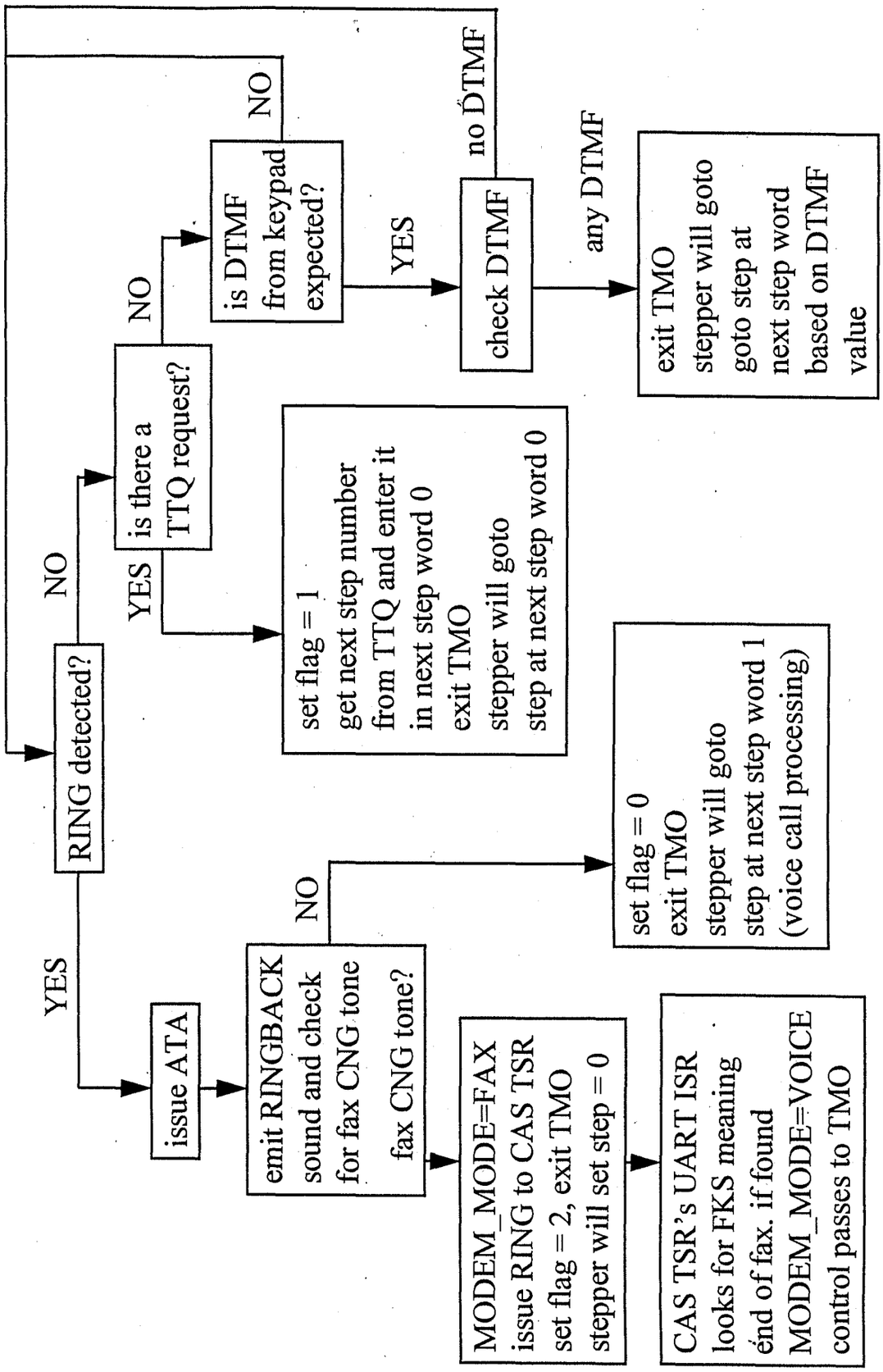

RING detected?
YES
NO
issue ATA
emit RINGBACK
sound and check
for fax CNG tone
fax CNG tone?
NO
MODEM_MODE=FAX
issue RING to CAS TSR
set flag = 2, exit TMO
stepper will set step = 0
CAS TSR's UART ISR
looks for FKS meaning
end of fax. if found
MODEM_MODE=VOICE
control passes to TMO
set flag = 0
exit TMO
stepper will goto
step at next step word 1
(voice call processing)
is there a
TTQ request?
YES
NO
set flag = 1
get next step number
from TTQ and enter it
in next step word 0
exit TMO
stepper will goto
step at next step word 0
is DTMF
from keypad
expected?
NO
YES
check DTMF
no DTMF
any DTMF
exit TMO
stepper will goto
goto step at
next step word
based on DTMF
value

FIG.10

FIG. 11

```
;*****************************************************************************
;*                        BUILD FAXBACK DATA BASE                            *
;*************************0046*********************************************************
acd_bdfbx_get_doc_no        dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
                            dw  step_0046_parameters
step_0046_next_step         dw  0047h                           ;make file name for tcf file
                            dw  0000h                           ;tmo: no_dtmf, timeout etc
                            dw  0000h                           ;tmo needs this for incoming fax
                            dw  0046h                           ;* go to emit_doc_list
                            dw  0000h                           ;# and there is non NULL doc number
                            dw  0000h                           ;# and there is NULL doc number
step_0046_parameters        dw  DO_NOT_EXPECT_DTMF              ;so that F=0 works. always.
                            dw  vcon_session_filename_H         ;file to emit FBXBLD.PCM
                            dw  ACD_GET_FAXBACK_DOC_NUMBER      ;acd type
                            dw  vcon_session_repeat_cnt         ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_faxback_doc_number ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "please enter faxback"
                            db  "document number and ", 00h

                            db  "press #              "
                            db  "thank you!           ", 00h, 00h
;*************************0047*********************************************************
em_bdfbx_data_base          dw  ST_EMIT_MSG
                            dw  DTMF_ANALYZE
                            dw  step_0047_parameters
step_0047_next_step         dw  0048h                           ;
                            dw  0000h                           ;no_dtmf. repeat first.
                            dw  0000h                           ;dtmf_*
                            dw  0000h                           ;dtmf_# = ttq_req
                            dw  0000h                           ;dtmf_0 =
                            dw  0048h                           ;dtmf_1 = scan to pcx.
step_0047_parameters        dw  EXPECT_DTMF
                            dw  vcon_session_filename_7         ;sfxmsg.pcm
                            dw  VCON_SPEAKER
                            dw  DO_NOT_STOP_ON_DLE
                            dw  LCD_MESSAGE_YES
                            db  "place page to fax on"
                            db  "scanner and press 1", 00h

                            db  "press # if no more  "
                            db  "pages to scan       ", 00h, 00h
;*************************0048*********************************************************
sp_bdfbx_sctopcx            dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0048_parameters            ;offset to parameters
step_0048_next_step         dw  0049h                           ;
                            dw  0000h                           ;in case scanner is off etc.
step_0048_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_7         ;program name = SCTOPCX.EXE
                            dd  00000000h                       ;argument_1. not used.
                            dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                            dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
;*************************0049*********************************************************
sp_bdfbx_incbdfbx           dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0049_parameters            ;offset to parameters
step_0049_next_step         dw  0047h                           ;
                            dw  0000h                           ;in case scanner is off etc.
step_0049_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_L         ;program name = BLDFBXDB.EXE
                            dw  vcon_session_faxback_doc_number ;argument_1. fbx document number
                            dw  step_table_seg_number
                            dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                            dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
```

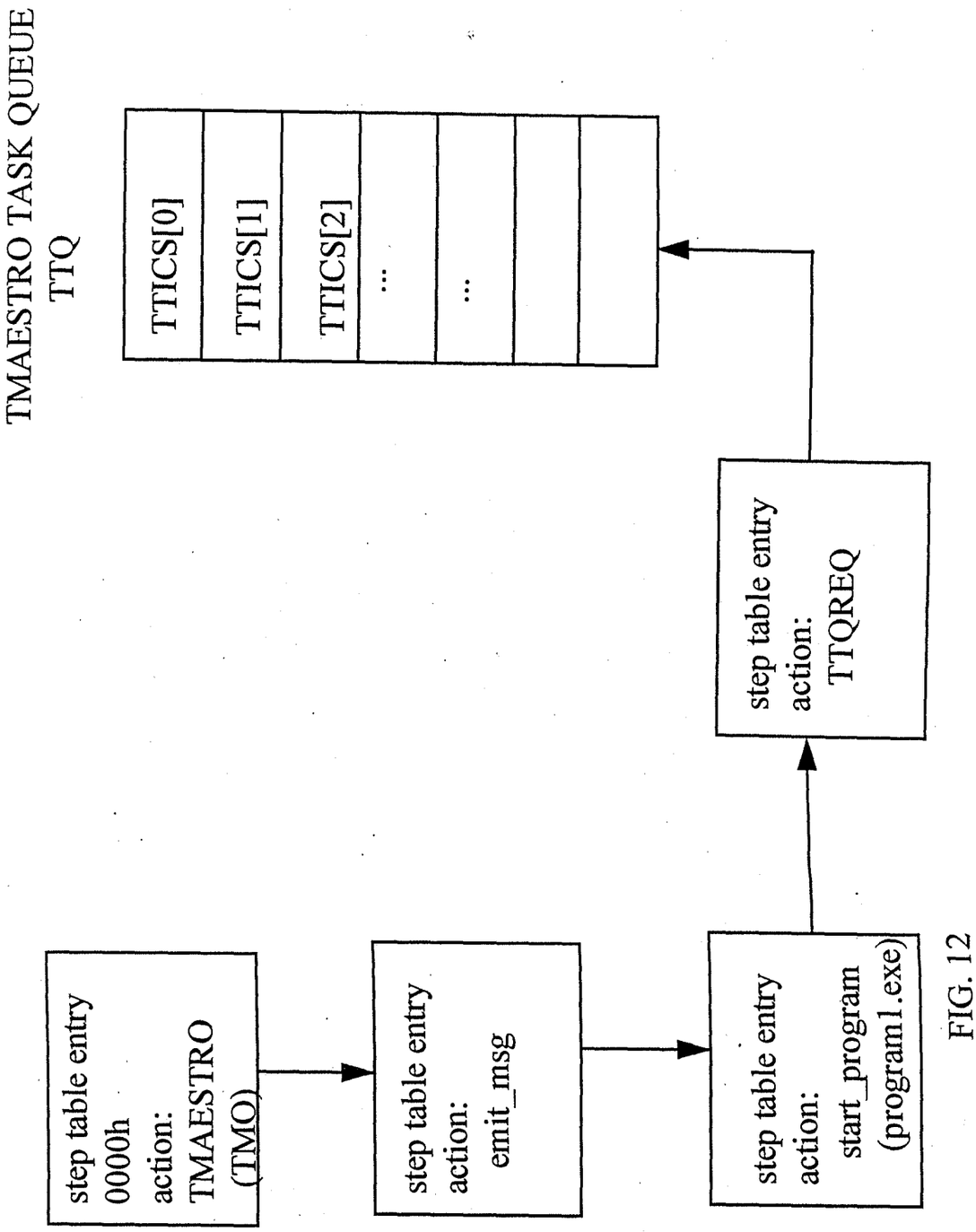


FIG. 12

08/569846

In the United States Patent and Trademark Office

Ser. No.: _____

Filed: _____

Applicant(s): Haluk M. Aytac

Title: A computing and communications transmitting, receiving system, with a push button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks

Group Art Unit: _____

Examiner: _____

Disclosure Document Reference Letter

Date: 1995 Dec 8

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

A disclosure document as identified below was previously filed in the Patent and Trademark Office. As this disclosure relates to the above patent application, applicant(s) request that this Disclosure Document be retained and referenced to the above application.

Disclosure Document Title: A Standaside Embedded PC Communications System

Disclosure Document Number: 359083

Disclosure Document Filing Date: August 4, 1994

Very Respectfully,

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_____
Address of Joint Applicant

_____

3-4

In the United States Patent and Trademark Office

Ser. No.: _____

Filed: _____

Applicant(s): Haluk M. Aytac

Title: A computing and communications transmitting, receiving system, with a push button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks

Group Art Unit: _____

Examiner: _____

Disclosure Document Reference Letter

Date: 1995 Dec 8

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

A disclosure document as identified below was previously filed in the Patent and Trademark Office. As this disclosure relates to the above patent application, applicant(s) request that this Disclosure Document be retained and referenced to the above application.

Disclosure Document Title: A State Machine System for Voice Mail, Fax Back, and Other Similar Applications

Disclosure Document Number: 364678

Disclosure Document Filing Date: November 4, 1994

Very Respectfully,

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Form 3-4

In the United States Patent and Trademark Office

Ser. No.: _____

Filed: _____

Applicant(s): Haluk M. Aytac

Title: A computing and communications transmitting, receiving system, with a push button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks

Group Art Unit: _____

Examiner: _____

Disclosure Document Reference Letter

Date: 1995 Dec 8

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

A disclosure document as identified below was previously filed in the Patent and Trademark Office. As this disclosure relates to the above patent application, applicant(s) request that this Disclosure Document be retained and referenced to the above application.

Disclosure Document Title: Maestro, A Multitasking Operating System for an Embedded DOS based computer

Disclosure Document Number: 377,454

Disclosure Document Filing Date: July 3, 1995

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Form 3-4

08/569,846

INVENTOR

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2317
7/21.97
WINCOM

TITLE

A COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS

SOURCE CODE FOR THIS PATENT APPLICATION

A total of 450 pages consisting of the following files:

maspi1b.asm	ldftohd6.asm
scsiissi.asm	stffmhd6.asm
catstpl9.asm	mergvef7.asm
ttisr00f.asm	sctopcl4.asm
serisr06.asm	sctopcx7.asm
action01.asm	opentcf.asm
vma0c.asm	incbdtcf.asm
tmo0b.asm	fp41.asm
ttq_request.asm	maltcfn.asm
acd02.asm	submitcf.asm
sw2fax.asm	makrmifn.asm
maestrok.asm	updatvq5.asm
cvboot07.asm	stindex6.asm
sysdata5.asm	fbxbdtcf.asm
fardata.asm	fbxuptcf.asm
catequ0e.inc	bldfbxdb.asm
catvocl7.mak	fbxdltcf.asm
catsyncj.asm	fstprnt2.asm
cat.cfg	hostsfx0.asm
catpat03.asm	infaxid0.asm
	pcx2pcl6.asm
	brkupdc0.asm

```
;*************************************************************;
;COPYRIGHT 1994, 1995, 1996 by Haluk Aytac. 3Tau              ;
;*************************************************************;
;maspi1b.asm <- maspi0z.asm. 10/6/95. int 2f cas changes.
;maspi0y.asm <- maspi0x.asm. 09/24/95. make cache buffer 32KB <- 512B
;maspi0x.asm <- maspi0w.asm. 09/24/95. change lun=0 write back to pio mode like read.
;maspi0w.asm <- maspi0v.asm. 08/25/95. add more connection to catvoice for R->CR for SCSI ISR.
;works with catvocl2. It turns out there is one more fix to do. maspi sets irq vector for irq 11.
;but DOS hooks it too. this wreaks havoc with check InIRQ and R->CR and CR->R. we must wait for
;cvboot to hook the irq for irq 11.
;maspi0v.asm <- maspi0t.asm. 08/07/95. connect with catvoice.
;maspi0t.asm <- maspi0s.asm. 06/20/95. with scsiissa.asm. faster read buffer.
;maspi0s.asm <- maspi0r.asm. 03/17/95. with scsiiss9.asm, caspat02.asm. final fixes to int 2f cb
;maspi0r.asm <- maspi0q.asm. 02/24/95. works with scsiiss8.asm to implement lpt VxD other side.
;maspi0q.asm <- maspi0p.asm. 02/11/95. further fix for cb07 handling. see 2-95-44. keep hooking 213d
;and note file name. the last file name out of 2fcb07 is the correct one.
;maspi0p.asm <- maspi0o.asm. 02/10/95. to match scsiiss6.asm. attempt to fix cb07 case. see scsi file.
;maspi0o.asm <- maspi0n.asm. 02/09/95. to match scsiiss5.asm. trying to fix the disconnect ASPI.
;maspi0n.asm <- maspi0m.asm. 02/08/95. to match scsiiss4.asm and also casvox23.asm at host side.
;maspi0m.asm <- maspi0l.asm. 02/07/95. to match scsiiss3.asm.
;maspi0l.asm <- maspi0k.asm. 02/06/95. to match scsiiss2.asm
;maspi0k.asm <- maspi0j.asm. 02/05/95. size change correction to scsi int2f buffers. scsiiss1.asm.
;maspi0j.asm <- maspi0i.asm. 01/16/95. goes with scsiisrz.asm otherwise no changes.
;maspi0i.asm <- maspi0h.asm. 01/16/95. goes with scsiisrz.asm otherwise no changes.
;maspi0h.asm <- maspi0g.asm. 01/04/94. goes with scsiisry.asm otherwise no changes.
;maspi0g.asm <- maspi0f.asm. 12/22/94. add posting. goes with scsiisrx.asm. no changes here.
;maspi0f.asm <- maspi0e.asm. 12/22/94. write tail end is fixed. now fix cases where although
;an SRB is specified with say 1fh many data bytes (eg a read(6) 08h code), scanner returns
;only 10h bytes and then issues a request to send status (status_reg=03h). my solution is
;to set xlen=0 after receiving the last data byte (it would work with sending data as well)
;so that the next time around control enters the xlen=0000 section. there is really no change
;from maspi0e to maspi0f. just to keep the bookkeeping straight.change is in scsiisr v->w.
;maspi0e.asm <- maspi0d.asm. 12/21/94. previous problem is solved. now fix write tail end.
;no change in maspi from d to e. change is in scsiisru to v.
;maspi0d.asm <- maspi0c.asm. 12/21/94. 333=41 on 0a,00,00,00,02,00 yields status=83 with a
;check condition status. manually experimenting with resubmitting the same CDB yields
;status=80.
;maspi0c.asm <- maspi0b.asm. 12/20/94. no change here but scsiisrs.asm -> scsiisrt.asm. problem
;with manipulating the status and message tail end of 333=10 processing. in this file some
;new variables are defined and made public. actually only one: status_reg_old. see 01-95-22
;maspi0b.asm <- maspi0a.asm. 12/19/94. no change here but scsiisrr.asm -> scsiisrs.asm. problem
;with emptying the fifo if 333=41 concludes unsuccessfully.
;maspi0a.asm <- maspi09.asm. 12/17/94. scsi_init_xlen consistently as a word.
;maspi09.asm <- maspi08.asm. 12/17/94. no ATN. scanner is scsi-I. scsi id from SRB.
;maspi08.asm works!! ie it loads as a device driver. now talking to the scanner. need to change
;to select w/o ATN. verified it to work. and also remove scsi_id=01 requirement.
;maspi08.asm <- maspi07.asm. 12/15/94. attempt to solve the problem where scsi irq is not taken.
;maspi07.asm <- maspi06.asm. 12/14/94. combine maspi and scsiisr. reason: they both need to be
;loaded before sjiix.sys comes along.
;maspi06.asm <- maspi05.asm. 12/14/94. add the initializing of NCR53C406A from tepegoz. as a
;part of DD init call.
;BIGGER PICTURE: maspi05.sys is our mini scsi manager. scsiisrp is our scsi isr. these two
;share some data for target to init handoff. in addition, maspi's whereabouts is easy to find.
;just make an ioctl call in DOS (21/4402). thus I put all variables that scsiisr uses in there
;also. this policy is good as it does not depend on whether I eventually put scsiisr in RAM or
;ROM.
;how to make maspi05.sys? find the address for nop after maspi_end and use this address while
;writing the file in debug. refer to sysmak.not in this directory.
;maspi05.asm installed on 12/12/94.
;how to make maspi050?
;1. ;.stack
;2. end str_routine -> end
;maspi05.asm <- maspi04.asm. 12/12/94. decided to include scsi variables with maspi. scsiisr,
;during install, will make an ioctl call and find out ds for these variables.
;maspi05.asm compiles by itself.
;NB:  I am;thinking of testing inside DOS from A: with the RT1600 card. I should compile
;things so the two code segments are "far" apart. ie .model medium. each code segment and the data
;segment are loaded in different segments. in the final product, this will be the case.
;scsi isr will be in EPROM. maspi will be loaded by DOS. sdata will be in the SRAM area
;of NCR53C406A. this way, if I reference a label or name in a code file from another code
;file, I must provide the segment:offset. How will I get caught? the assembler will tell me
;if I have not used "far" keyword. As for the code segments accessing the data segment,
;each code segment must do ds=dsdebug.
;way out: scsiisrp.asm,sdata*.asm compile together. also include cdata*.asm. scsiisrp.asm is a
;.exe file that installs as a TSR.
;        maspi04.asm and sdata*.asm also compile together. maspi.sys is created from maspi.exe
;and is loaded as a device driver by DOS.
;NB: MUST FIX THE NUMBER OF NOP'S SO THAT NCR VARIABLES HAVE THE SAME OFFSET AS IN CATDOS
;                                    ARCHITECTURE OF MASPI
;THIS PROGRAM LOADS AS A DEVICE DRIVER. THE PURPOSE OF THIS IS SO THAT SCSI DEVICE DRIVERS
```

```
;SUCH AS SJIIX.SYS CAN MAKE IOCTL DD CALLS TO FIND ITS ENTRY POINT.
;       APPLICATION PROGRAMS (COPIER, HP DEVELOPER'S KIT)
;               DOS (RECEIVES: open device, write to device, read from device)
;                       SJIIX.SYS (RECEIVES: DD calls from DOS such as write, read)
;                               MASPI.SYS (RECEIVES: SRB's)
;                                       SCSIISR*.ASM (RECEIVES: CDB's)
;thus, the way maspi works is by submitting CDB's and having scsiisr*.asm take care of it.
;maspi04.asm <- maspi03.asm. 12/08/94. continue with fixes. add HA_inquiry
;maspi03.asm <- maspi02.asm. 11/27/94. copy what sjiix.sys has.
;maspi02.asm <- maspi01.asm. 11/19/94. restart this to wrap up by end of November.
;the goal is to have COPIER work on the CATBOX. we also need this thing to scan files
;to be faxed. I made copier work with SJIIX.SYS + ASPI2DOS.SYS in DOS from A window.
;the combination SJIIX.SYS + MASPI.SYS will make the scanner look like a device/file to the
;s/w that comes with the HP developer's kit. So, when MAESTRO gets a [scan] [fax] keypad
;entry sequence, it will do four things:
;       a. it will scan the document and save it in a file.
;       b. the document must be converted to a format to ship as fax (.DCX)
;       c. a task file must be created for the fax.
;       d. an int 2F call must be made to make CASMODEM aware of this fax.
;I hope that once I can make all this work with HP ScanJet, the other scanners will work
;just as easily providing I have drivers for them (ie SJIIX.SYS like drivers). I also hope
;that these drivers work with MASPI.SYS.
;maspi00.asm. 07/17/94. BRAZIL WINS THE WORLD CUP SOCCER!!!!!!!!!!!!!!!!
;this program will be a minimal ASPI device driver for the CATBOX. currently its sole pupose is to
;provide an ASPI interface to SJIIX.SYS from HP. the deadline to achieve this is July 24, 1994. one
;week from today. notebook 7/94, p.4 shows how to make a .sys out of a .exe file. .model small is
;needed to have org 0000h. but all data references will be to the code area.
;
;this program has two masters.
;A. DOS. we need this program to install as a device driver so that DOS device driver calls can be
;utilized. thus all we need to know is the device name "SCSIMGR$". thus we need to support minimal
;response to DOS to install within config.sys processing. I am hoping that there will be a minimal
;number of device driver calls from DOS. FIRST GOAL: have this program be installed as a device driver
;in any DOS window and then in config.sys of catbox.
;B. SJIIX.SYS. SJIIX.SYS is a device driver also. it supports common device driver calls such as open
;driver, write to driver etc. these calls write commands to the scanner. the application programs
;utilize the HP provided libraries to use the DOS commands which in turn become translated into device
;driver calls for the HPSCAN device driver. this driver turns these calls into ASPI calls and this is
;what I need to support with this program (maspi00.asm). SECOND GOAL: implement the IOCTL call that
;provides the entry point to ASPI. a program that knows its entry point. THIRD GOAL: support the ASPI
;functions that SJIIX.SYS requests.
;include         d:\masm\samples\mon\tepegoz\tepecat\cdos\tepeequ.inc
include tepeequ.inc
include ..\..\catvoice\catvocl\catequ0e.inc
.model      small
.386P
;this creates 400h stack between PSP and code but making .sys it all disappears.
.stack
maspi_coda segment page public 'maspi_code'
;       public transfer_cntr_0
;       public transfer_cntr_1
;       public transfer_cntr_2
        public scsi_fifo_reg
        public command_reg
        public status_reg
        public status_reg_old
        public interrupt_reg
        public sequence_step
        public scsi_fifo_flags
        public config_1_reg
        public config_2_reg
        public config_3_reg
        public config_4_reg
        public jumper_sense
        public sram_addr_ptr
        public sram_data_port
;       public pio_fifo_0
;       public pio_fifo_1
;       public pio_fifo_2
;       public pio_fifo_3
;       public pio_status
;       public pio_flag_int_en
        public signature_reg
        public config_5_reg
        public config_6_reg
        public scsi_cmd_byte_0
        public scsi_cmd_byte_1
        public scsi_cmd_byte_2
        public scsi_cmd_byte_3
        public scsi_cmd_byte_4
        public scsi_cmd_byte_5
```


2

```
public scsi_cmd_byte_6
public scsi_cmd_byte_7
public scsi_cmd_byte_8
public scsi_cmd_byte_9
public scsi_cmd_byte_a
public scsi_cmd_byte_b
public scsi_cmd_complete
public scsi_cmd_group
public scsi_cmd_byte_order
public scsi_cmd_length
public scsi_cur_command
public scsi_bpb_sector
public scsi_bpb_head
public scsi_bpb_cylinder
public scsi_bus_id
public scsi_message_byte_0
public scsi_message_byte_1
public scsi_message_byte_2
public scsi_message_byte_3
public scsi_message_byte_4
public scsi_message_byte_5
public scsi_message_byte_6
public scsi_message_byte_7
public ext_msg_st_on
public ext_msg_st_length
public ext_msg_st_code
public ext_msg_length
public ext_msg_length_1eft
public ext_msg_code
public ext_msg_sdtr_xfer_per
public ext_msg_sdtr_reqack_offset
public msg_sent
public i_t_1source_id
public scsi_init_mode
public scsi_target_mode
public i_t_1lun
public i_t_1disc_priv
public i_t_1lun_ready
public scsi_message_0
public scsi_message_1
public seq_step
public cdb_inq_data16
public cdb_inq_data32
public scsi_ext_lba
public scsi_ext_xlen
public scsi_hd_cache_buffer
public sectors_written
public sectors_read
public scsi_ide_s
public scsi_ide_t
public scsi_ide_sector
public scsi_ide_head
public scsi_ide_cylinder
public first_lup_read_ext
public first_lup_write_ext
public scsi_reading_br
public ncr_init_req
public ncr_target_busy
public ncr_init_req_taken_fm_busy
public ncr_init_req_taken_fm_not_busy
public ncr_45_fm_aspi
public ncr_45_fm_isr
public SRB_bx
public SRB_es
public scsi_init_xlen
public scsi_init_data_off
public scsi_init_data_seg
public scsi_init_recv_data
public scsi_init_send_data
public scsi_int2f_out_buffer
public scsi_int2f_out_buf_ptr
public scsi_int2f_in_buffer
public scsi_lpt_out_buffer
public scsi_lpt_in_buffer
public ax_reg
public bx_reg
public cx_reg
public dx_reg
public IO_ecx_reg
public IO_edx_reg
public IO_eax_reg
```

```
        public cb_function
        public repeat_on_chk_cond
;scsiiss9.asm variables
        public tcf_path_drv
        public cat_disk_letter
        public tcf_number_of_FTR
        public tcf_offset_of_first_FTR
        public tcf_offset_FTR_filename
;end scsiiss9.asm variables

;scsiissa.asm variables
        public  init_number_in_pio_fifo
;end scsiissa.asm variables

;scsiissc.asm variables
        public  remote_modem_hport
        public  remote_modem_port_call
;remote_modem_cmd_type
        public  remote_modem_ret_code
        public  current_maspi_dms_ptr
        public  maspi_dms_1
;maspi_dms_2
;maspi_dms_3
;maspi_dms_4
        public  InIRQ_flag_off
        public  InIRQ_flag_seg
        public  s1_callback_off
        public  s1_callback_seg
        public  s7_callback_off
        public  s7_callback_seg
        public  s4_callback_off
        public  s4_callback_seg
        public  host_CAS_request_off
        public  host_CAS_request_seg
        public  host_DOS_request_off
        public  host_DOS_request_seg
;InDOS_flag_off
;InDOS_flag_seg
;end sciissc.asm variables
;scsiissd.asm variables
        public  client_regs_off_ptr
        public  client_regs_seg_ptr
;end scsiissd.asm variables

        extrn scsiisr_end:near
        extrn scsi11_isr:near

        org 0000h
        dd  0ffffffffh      ;link to next driver        0000
        dw  0c000h          ;char driver with IOCTL calls   0002
        dw  str_routine     ;offset of strategy routine 0006
        dw  int_routine     ;offset of interrupt routine    0008
        db  "SCSINCR$"      ;name of driver         000a
                            ;change to SCSIMGR$ as SJIIX.SYS calls it
                            ;with this name.
req_header_off  dw      ?                       ;request header offset 0012
req_header_seg  dw      ?                       ;request header        0014
old_sp          dw      ?
old_ss          dw      ?
local_stack     dw      255 dup("ss")           ;256 words of local stack
local_stack_end dw      "ee"
installed_msg   db      "device driver installed successfully SCSIMGR$"
scsi_manager_id db      "MASPI04.ASM     "
host_adapter_id db      "NCR53C406A      "

;begin SCSI variables
;NCR53C406A registers
;transfer_cntr_0    db  ?       ;NCR53C406A reg 330[0] data holder
;transfer_cntr_1    db  ?       ;NCR53C406A reg 331[0] data holder
;transfer_cntr_2    db  ?       ;NCR53C406A reg 33e[0] data holder
scsi_fifo_reg       db  ?       ;NCR53C406A reg 332[0] data holder
command_reg         db  ?       ;NCR53C406A reg 333[0] data holder
status_reg          db  ?       ;NCR53C406A reg 334[0] data holder
status_reg_old      db  ?
interrupt_reg       db  ?       ;NCR53C406A reg 335[0] data holder
sequence_step       db  ?       ;NCR53C406A reg 336[0] data holder
scsi_fifo_flags     db  ?       ;NCR53C406A reg 337[0] data holder
config_1_reg        db  ?       ;NCR53C406A reg 338[0] data holder
config_2_reg        db  ?       ;NCR53C406A reg 33b[0] data holder
config_3_reg        db  ?       ;NCR53C406A reg 33c[0] data holder
config_4_reg        db  ?       ;NCR53C406A reg 33d[0] data holder
```


4

```
jumper_sense        db  ?       ;NCR53C406A reg 330[1] data holder
sram_addr_ptr       db  ?       ;NCR53C406A reg 331[1] data holder
sram_data_port      db  ?       ;NCR53C406A reg 332[1] data holder
;pio_fifo_0         db  ?       ;NCR53C406A reg 334[1] data holder
;pio_fifo_1         db  ?       ;NCR53C406A reg 335[1] data holder
;pio_fifo_2         db  ?       ;NCR53C406A reg 336[1] data holder
;pio_fifo_3         db  ?       ;NCR53C406A reg 337[1] data holder
;pio_status         db  ?       ;NCR53C406A reg 338[1] data holder
;pio_flag_int_en    db  ?       ;NCR53C406A reg 33b[1] data holder
signature_reg       db  ?       ;NCR53C406A reg 33e[1] data holder
config_5_reg        db  ?       ;NCR53C406A reg 33d[1] data holder
config_6_reg        db  ?       ;NCR53C406A reg 33f[1] data holder

;SCSI related state variables to monitor progress and make correct decisions
;from interrupt to interrupt.
scsi_cmd_complete   db  ?   ;can be true or false.
scsi_bus_id         db  ?   ;contains source and dest id if arbitration.
scsi_message_byte_7 db  ?   ;seventh message byte. reverse order to use push and pop
                    db  ?   ;quirk of no push al
scsi_message_byte_6 db  ?   ;sixth   message byte
                    db  ?   ;quirk of no push al
scsi_message_byte_5 db  ?   ;fifth   message byte
                    db  ?   ;quirk of no push al
scsi_message_byte_4 db  ?   ;fourth  message byte
                    db  ?   ;quirk of no push al
scsi_message_byte_3 db  ?   ;third   message byte
                    db  ?   ;quirk of no push al
scsi_message_byte_2 db  ?   ;second  message byte
                    db  ?   ;quirk of no push al
scsi_message_byte_1 db  ?   ;first   message byte
                    db  ?   ;quirk of no push al
scsi_message_byte_0 db  ?   ;zeroth  message byte
                    db  ?   ;quirk of no push al
scsi_cmd_byte_b     db  ?   ;twelfth  byte of command. reverse order to use push, pop.
                    db  ?   ;quirk of no push al
scsi_cmd_byte_a     db  ?   ;eleventh byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_9     db  ?   ;tenth    byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_8     db  ?   ;ninth    byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_7     db  ?   ;eighth   byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_6     db  ?   ;seventh  byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_5     db  ?   ;sixth    byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_4     db  ?   ;fifth    byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_3     db  ?   ;fourth   byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_2     db  ?   ;third    byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_1     db  ?   ;second   byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_byte_0     db  ?   ;first    byte of command
                    db  ?   ;quirk of no push al
scsi_cmd_group      db  ?   ;00h,01h,02h
scsi_cmd_byte_order db  ?
scsi_cmd_length     db  ?
scsi_cur_command    db  ?   ;current command
ext_msg_st_on       db  ?   ;turning on the extended message state
ext_msg_st_length   db  ?   ;any message byte received in this case is a length
ext_msg_st_code     db  ?   ;any message byte received in this case is a code
ext_msg_length      db  ?   ;length byte of the extended message
ext_msg_length_left db  ?   ;number of bytes left to read in extended message
ext_msg_code        db  ?   ;code byte of the extended message
ext_msg_sdtr_xfer_per       db  ?
ext_msg_sdtr_reqack_offset  db  ?
msg_sent            db  ?
i_t_lsource_id      db  ?
scsi_init_mode      db  ?
scsi_target_mode    db  ?
i_t_llun            db  ?
i_t_ldisc_priv      db  ?
i_t_llun_ready      db  ?
scsi_message_0      db  ?
scsi_message_1      db  ?
seq_step            db  ?
cdb_inq_data16      db  ?
cdb_inq_data32      db  ?
```

```
scsi_ext_lba        dd  ?
scsi_ext_xlen       dw  ?
scsi_hd_cache_buffer    db  32768 dup("b")
sectors_written     db  ?
sectors_read        db  ?
scsi_ide_s          db  ?
scsi_ide_t          db  ?
scsi_ide_sector     db  ?
scsi_ide_head       db  ?
scsi_ide_cylinder   dw  ?
first_lup_read_ext  db  ?
first_lup_write_ext db  ?
scsi_reading_br     db  ?
ncr_init_req        db  ?
ncr_target_busy     db  ?
ncr_init_req_taken_fm_busy      db      ?
ncr_init_req_taken_fm_not_busy  db      ?
ncr_45_fm_aspi      db  ?
ncr_45_fm_isr       db  ?
SRB_bx              dw  ?
SRB_es              dw  ?
;maspi0a.asm change db->dw
;scsi_init_xlen     db  ?
scsi_init_xlen      dw  ?
scsi_init_data_off  dw  ?
scsi_init_data_seg  dw  ?
scsi_init_recv_data db  ?
scsi_init_send_data db  ?
;maspi0k.asm change. buffers' size was dw, dw. change to 522, 522 just as on host PC side.
scsi_int2f_out_buf_ptr  dw      ?
scsi_int2f_out_buffer   db      522 dup(00h)
scsi_int2f_in_buffer    db      522 dup(00h)
scsi_lpt_out_buffer     db      64 dup("o")
scsi_lpt_in_buffer      db      64 dup("i")
ax_reg                  dw      ?
bx_reg                  dw      ?
cx_reg                  dw      ?
dx_reg                  dw      ?
IO_ecx_reg              dd      ?
IO_edx_reg              dd      ?
IO_eax_reg              dd      ?
cb_function             db      ?
repeat_on_chk_cond      db      00h             ;start with reset state.
;scsiiss9.asm variables
tcf_path_drv            db      ?
cat_disk_letter         db      "E"
tcf_number_of_FTR       dw      ?
tcf_offset_of_first_FTR dw      ?
tcf_offset_FTR_filename dw      ?
;end scsiiss9.asm variables
;scsiissa.asm variables
init_number_in_pio_fifo db      ?
;end scsiissa.asm variables

;BIOS PARAMETER BLOCK
;DOS issues an init device driver call as it is building its device driver list.
;part of the init call return is an address to the BPB.
;the driver performs this as a INT 13h ah=08h read drive parameters call.
;the results are in registers. the driver then loads this into a free memory
;location. I suppose it makes a DOS call to find this free location. But at this
;time DOS calls are not installed(?). How then does the init routine come up with
;an address?
;In my case all this needs to be supported so that at the HOST a BPB is created.
;this section however deals with creating a parameter block that the hard disk
;can use. this is equivalent to what a scsi disk has to do. still it makes sense
;to do it in a rational way.
;for devices that are called from config.sys, DOS is there to allocate mem space
;for the new driver's device BPB. What about the built in chain. Where does the
;BPB come from? It must come from an INT 13h call and be stored in a DOS designated
;area. So I will do the same ie INT 13h call in tepeg"z*.asm
scsi_bpb_sector     db  ?   ;max sector number ie 10h for 17d sectors/track
scsi_bpb_head       db  ?   ;max head number ie 09h for 10d heads/cylinder
scsi_bpb_cylinder   db  ?   ;max no of cylinder ie 255h for 256h cylinders

end_of_data         db  ?
;end SCSI variables

;strategy routine
str_routine:    mov     cs:word ptr req_header_off, bx  ;request header offset
                mov     cs:word ptr req_header_seg, es  ;request header segment
                retf
```

```
;interrupt routine
;at this point, we know where the initrequest structure is. first we minimally respond to
;DOS to see the device driver in the chain.
;a. set status word to 0080h meaning "done". offset 3 wrt begin of req header.
;b. write a message to screen saying driver has initialized.
int_routine:    push    ds
                push    es
                push    ax
                push    bx
                push    cx
                push    dx
                push    di
                push    si
                push    bp
                pushf                           ;flags pushed on caller stack
;this change ensures that flags return intact to the caller. but this did not make the
;difference on the way to installation. It seems that DOS and DOS in OS/2 (fm A:) both
;would like some flags return untouched but not all.
                mov     cs:word ptr old_sp, sp
                mov     cs:word ptr old_ss, ss
                pushf                           ;saving flags while changing stack and setting cli
                pop     bx                      ;now bx=flags
                cli
                mov     ax, cs
                mov     ss, ax
                lea     ax, local_stack_end
;the error was here. local_stack instead of local_stack_end. thus push was writing to the
;old_ss, old_sp locations.
                mov     sp, ax
                push    bx      ;bx still=flags. push to local stack
                popf            ;flags back to previous value
;DOS seems to set ds=cs when calling int routine. SJIIX.SYS does not set ds=cs when called.
;I will do it anyway.
                mov     ax, cs
                mov     ds, ax          ;now, no need for cs:
                lea     bx, word ptr req_header_seg
                mov     es, word ptr [bx]
                lea     bx, word ptr req_header_off
                mov     bx, word ptr [bx]   ;es:bx->req. header
;read the function and decide where to go
                mov     ah, es:byte ptr [bx+02h];get the function in
                cmp     ah, 00h
                jz      initialize                ;DOS uses to put driver in chain
                cmp     ah, 03h
                jz      ioctl_read                ;SJIIX.SYS uses to get ASPIEntry address
                cmp     ah, 0dh
                jz      open_close_device
                cmp     ah, 0eh
                jz      open_close_device
;if not these then issue unknown command and exit
;irStatus
                mov     ax, 8003h
                mov     es:word ptr [bx+3h], ax ;set error and unknown command and return
                jmp     dev_drive_exit
;*****************************************************************************************
;DEV_DRIVE_EXIT
;*****************************************************************************************
dev_drive_exit: pushf                           ;flags changed because of cmp. push to local stack
                pop     bx                      ;bx=flags
                cli
                mov     ax, cs:word ptr old_ss
                mov     ss, ax
                mov     ax, cs:word ptr old_sp
                mov     sp, ax
                push    bx
                popf                            ;this version was corrupted because of cmp
                popf                            ;this is the caller's version.
                pop     bp
                pop     si
                pop     di
                pop     dx
                pop     cx
                pop     bx
                pop     ax
                pop     es
                pop     ds
                retf

;*****************************************************************************************
;INIT DEVICE DRIVER FUNCTION
;*****************************************************************************************
```


7

```
;MINIMUM CODE TO INSTALL A DRIVER. with this code int 21/3d00 works! (open device)
;irEndAddress
initialize:     mov     ax, cs
                mov     es:word ptr [bx+10h], ax
                lea     ax, word ptr scsiisr_end
;               lea     ax, word ptr maspi_end
;               mov     ax, 0200h
                mov     es:word ptr [bx+0eh], ax
;irStatus
                mov     ax, 0100h
                mov     es:word ptr [bx+3h], ax ;set done bit
;irUnits=0 for char devices
                mov     al, 00h
                mov     es:byte ptr [bx+0dh], al
;irParam=00000000h
                mov     ax, 0000h
                mov     es:word ptr [bx+12h], ax
                mov     es:word ptr [bx+14h], ax
;initialize NCR53C406A chip. bring code from tepegoz.

;-------------------------------------------------------------------------------+
;SET NCR53C406A UP IN TARGET MODE                                                |
;-------------------------------------------------------------------------------+
;the part is hardwired to address 330h. IOADR=1.
;NCR53C406A has two sets of registers: 0,1. At power up set 1 is available.
;ROM address: DC000-DFEFF. SRAM address DFF00-DFFFF. ROMSIZ =1
;                               ROMADR1=0
;                               ROMADR0=0
;SRAM enabled if CONFIG5[6]=1
;as it is, I am putting the SCSI ROM into the AMD27010 (E0000-FFFFF). Thus I have
;no need for the SRAM. Disable CONFIG5[6]=0. Now, it appears that even if I do
;not have use the ROM, it still occupies the address range. This is not true if
;ROMCS# is not tied to a memory. In the hardware, this signal is just tied to
;10k to VCC.
;
;In Non-DMA mode, which registers am I likely to use?
;   SET 0                       SET 1
;332h   SCSI FIFO register
;333h   Command Register
;334h   Status Register(R),Destination ID(W)     PIO FIFO Register
;335h   Interrupt Register(R),Timeout Reg(W)     PIO FIFO Register
;336h   Sequence Step(R), Synch Xfer Period(W)   PIO FIFO Register
;337h   SCSI FIFO Flags(R),Synch Offset(W)   PIO FIFO Register
;338h   CONFIG1 Register             PIO Status Register
;339h   Clock Conversion register(W)
;33bh   CONFIG2 Register             PIO Flag Interrupt Enable Register
;33ch   CONFIG3 Register
;33dh   CONFIG4 Register             CONFIG5 Register
;33fh   SCSI FIFO Bottom Register        CONFIG6 Register
;
;which subset will be needed during setup?
;remember that out of reset CONFIG5[7]=1 so that set 1 is visible
;INTERRUPTS
;335h[0]     NCR53C400A has an interrupt register at 335h set 0.
;334h[0][7]: INT pin state
;33dh[1][2]: SCSI Interrupt Enable (if =1). 0 at reset. ie interrupts not enabled.
;338h[0][6]: SCSI reset reporting Int disable (if =1). 0 at reset.
;338h[1][6]: INT pin state, other pins are PIO Error, PIO Mode.
;33bh[1]     all bits PIO FIFO related.
;Question: It seems that SCSI FIFO does not cause interrupts. It gives you enough FIFO
;information. PIO FIFO does cause interrupts but somehow they are not on the 335h[0].
;to determine that a valid clock is present on the chip
;
;NB: this is something I discovered today (1/21/94). 033d, when written with
;a 0 at bit-7 writes to set-0 register, when written with bit-7=1, writes to
;set-1 register.
;
;here is the reset sequence:
;   0   nop
;   1   chip reset
;   2   nop
;   3   set clock conversion value
;   4   check clock valid
;   5   flush fifo
;   6   set scsi-2 bit ie 033b=08h
;   6   reset scsi bus              ;skip
;   7   check for irq from reset scsi bus   ;skip
;   8   clear irq               ;skip
;   9   my scsi id
;   A   dest scsi id
;   B   enable irqs
```

```
;   C   command=44
;
;0  nop
                mov     dx, 033dh   ;SWITCH 1->0
                mov     al, 04h     ;Select Set 0. Other bits reset values.
                out     dx, al      ;active negation enabled

                mov     dx, 0333h
                mov     al, 00h
                out     dx, al      ;00=nop
;1  chip reset
                mov     dx, 0333h
                mov     al, 02h
                out     dx, al      ;02=reset
;2  nop
                mov     dx, 0333h
                mov     al, 00h
                out     dx, al      ;00=nop
;3  set clock conversion value
;339h[0]     Clock Conversion Register
;Clock frequency is 24MHz (same oscillator as 312)
;thus clock conversion factor is 5
                mov     dx, 339h
                mov     al, 05h
                out     dx, al
;4  check clock valid
;33fh[1]     CONFIG6 Register. Check for clock valid.
                mov     dx, 033dh   ;SWITCH 0->1
                mov     al, 0b2h    ;Select Set 1. Other bits reset values.
                out     dx, al

                mov     dx, 033fh
clkngood:       in      al, dx
                test    al, 02h     ;checking bit1: clock valid
                                    ;in power down feature, no valid clock
                jz      clkngood    ;if not set keep looping
;5  flush fifo
                mov     dx, 033dh   ;SWITCH 1->0
                mov     al, 04h     ;Select Set 0. Other bits reset values.
                out     dx, al

                mov     dx, 0333h
                mov     al, 01h
                out     dx, al      ;01=flush fifo
;6  set scsi-2 bit
                mov     dx, 033bh
                mov     al, 08h     ;set scsi-2 bit. adaptec puts out three byte message
                out     dx, al
;6  reset scsi bus
;               mov     dx, 0333h
;               mov     al, 03h
;               out dx, al          ;03=reset scsi bus
;7  check for irq from reset scsi bus
;               mov     dx, 0334h   ;status register
;irqlup:        in      al, dx
;               test    al, 10000000b
;               jz      irqlup
;8  clear irq
;               mov     dx, 0335h   ;interrupt register
;               in      al, dx      ;irq flushed out
;9  my scsi id
;338h[0]     CONFIG1 Register. SCSI Reset Int reporting enabled.
                mov     dx, 338h
                mov     al, 05h     ;assign SCSI id=5, and leave SCSI reset
                out     dx, al      ;reporting bit enabled. quantum disk is id=06
;A  dest scsi id
;334h[0]     Destination ID(W)
                mov     dx, 0334h
                mov     al, 07h     ;destination id=7 (adaptec at host)
                out     dx, al
;B  enable irqs
;33dh[1]     CONFIG5 Register. Interrupts are on. This should be done LAST!!! during setup.
                mov     dx, 033dh   ;SWITCH 0->1
                mov     al, 0b2h    ;Select Set 1. Other bits reset values.
                out     dx, al

                mov     dx, 033dh
                mov     al, 0b6h    ;all bits same as reset values + scsi int en.
                out     dx, al      ;
;C  command=44
;333h[0]     COMMAND REGISTER. ENABLE SELECT/RESELECT
```

```
                mov     dx, 033dh   ;SWITCH 1->0
                mov     al, 04h     ;Select Set 0. Other bits reset values.
                out     dx, al

                mov     dx, 0333h
                mov     al, 44h
                out     dx, al      ;44=enable select/reselect

                mov     dx, 03ffh   ;scsi_irq counter initialization
                mov     al, 00h
                out     dx, al
;-------------------------------------------------------------------------+
;END SET NCR53C406A UP IN TARGET MODE                                      |
;-------------------------------------------------------------------------+
;now reset the semaphores
                mov     byte ptr ncr_target_busy, 00h
                mov     byte ptr ncr_init_req, 00h
                mov     byte ptr ncr_init_req_taken_fm_busy, 00h
                mov     byte ptr ncr_init_req_taken_fm_not_busy, 00h
                mov     byte ptr ncr_45_fm_aspi, 00h
                mov     byte ptr ncr_45_fm_isr, 00h
;end reset semaphores
;now set irq vector to scsiisrq code
;maspi0w.asm change. do not hook now, let cvboot do it.
;but here, fill out "scsi11_isr_off/seg_ptr" variable so cvboot knows where to get the
;scsi11_isr vector.
                push    bx
                push    ax
                mov     bx, OFFSET scsi11_isr_off_ptr
                mov     ax, OFFSET scsi11_isr
                mov     word ptr [bx], ax
                mov     bx, OFFSET scsi11_isr_seg_ptr
                mov     ax, cs
                mov     word ptr [bx], ax
                pop     ax
                pop     bx
;WELL NOT SO EASY!!!!!
;scanner driver needs the scsi irq. so we provide a hook now and then later on
;during cvboot, the same hook is given again. overriding the dos hook.
;so we will be vulnerable to scsi irq between maspi install and cvboot.
                pushf
                pop     bx
                cli
                push    ds
                push    bx
                mov     ax, 0000h
                mov     ds, ax
                lea     bx, 01cch               ;hook irq11
                lea     ax, cs:word ptr scsi11_isr
                mov     [bx], ax
                mov     ax, cs
                mov     [bx+2], ax
                pop     bx
                pop     ds

;               mov     ax, cs                  ;probably redundant
;               mov     ds, ax                  ;scsiisrq sits on same cs as maspi07 where ds=cs
;               mov     ax, 2573h               ;adaptec at irq10 so this is fine.
;               lea     dx, cs:word ptr scsi11_isr
;               int     21h                     ;hook irq 11.
;end set irq vector to scsiisrq code
;now unmask irq11

                mov     dx, 00a1h
                in      al, dx                  ;read mask register
                and     al, 0f7h                ;1111 0111 unmask position 11
                out     dx, al                  ;irq11 unmasked
;now do an eoi for good measure
                mov     al, 20h
                out     0a0h, al
                jmp     $+2
                out     20h, al
                push    bx
                popf                            ;restore I flag to what it was before

;now announce the victory
                lea     dx, word ptr installed_msg
                mov     ah, 09h
                int     21h
                jmp     dev_drive_exit
;END MINIMUM CODE TO INSTALL A DRIVER
```


10

```
;*****************************************************************************************
;OPEN OR CLOSE DEVICE
;*****************************************************************************************
open_close_device:
;irStatus
                mov     ax, 0100h
                mov     es:word ptr [bx+3h], ax ;set done bit and return
                jmp     dev_drive_exit
;*****************************************************************************************
;IOCTL READ
;*****************************************************************************************
;int 21/4402 specifies cx(=4 in this case). this propagates to ioctl read function.
;aspi2dos seems to do something with cx=5 also. I am ignoring cx value at the moment.
ioctl_read:     push    es                      ;es->req header segment
                mov     di, es:word ptr [bx+0eh];buffer address from request header
                mov     ax, es:word ptr [bx+10h];buffer address from request header
                mov     es, ax                  ;es:di->buffer address for ioctl read
                lea     ax, word ptr ASPI_Entry
                mov     es:word ptr [di], ax
                mov     ax, cs
                mov     es:word ptr [di+02h], ax
                pop     es
;no need to change actual number of bytes read as it stays 4.
;irStatus
                mov     ax, 0100h
                mov     es:word ptr [bx+3h], ax ;set done bit and return
                jmp     dev_drive_exit
;*****************************************************************************************
;*                          MASPI_DATA_MODEM_STRUCTURE                                   *
;*  MASPI_DMS_HPORT             EQU     0                                               *
;*  MASPI_DMS_FREE_STATUS       EQU     4   MASPI_DMS_FREE_STATUS_FREE              0   *
;*                                          MASPI_DMS_FREE_STATUS_NOT_FREE          1   *
;*  MASPI_DMS_TASK_TYPE         EQU     6   MASPI_DMS_TASK_TYPE_PORT_OPEN               *
;*                                          MASPI_DMS_TASK_TYPE_PORT_WRITE              *
;*                                          MASPI_DMS_TASK_TYPE_PORT_READ               *
;*  MASPI_DMS_TASK_REQUEST      EQU     A   MASPI_DMS_TASK_REQUEST_MADE                 *
;*                                          MASPI_DMS_TASK_REQUEST_ACKNOWLEDGED         *
;*  MASPI_DMS_TASK_STATUS       EQU     C   MASPI_DMS_TASK_STATUS_NOT_DONE              *
;*                                          MASPI_DMS_TASK_STATUS_DONE                  *
;*  MASPI_DMS_CALLBACK_REQUEST  EQU     E   MASPI_DMS_CALLBACK_REQUEST_MADE             *
;*                                          MASPI_DMS_CALLBACK_REQUEST_ACKNOWLEDGED     *
;*  MASPI_DMS_CALLBACK_STATUS   EQU    10   MASPI_DMS_CALLBACK_STATUS_NOT_DONE          *
;*                                          MASPI_DMS_CALLBACK_STATUS_DONE              *
;*  MASPI_DMS_CALLBACK_POINTER  EQU    12   OFF:SEG                                     *
;*  MASPI_DMS_TTQ_ENTRY_PTR     EQU    16   OFF:SEG                                     *
;*  MASPI_DMS_ALLOCATED_MEM_PTR EQU    1A   OFF:SEG                                     *
;*  MASPI_DMS_TASK_SPECIFIC     EQU    1E   allocate 16 bytes for this area             *
;*  MASPI_DMS_SIZE              EQU    30   48 bytes for each one of the four entries.  *
;*****************************************************************************************
;*****************************************************************************************
;   LINK WITH CATVOICE DATA AREA
;*****************************************************************************************
;the following comes with the minimum pre-write or post-write
;maspi0w.asm change. add pointers to scsi11_isr
scsi11_isr_off_ptr      dw      ?       ; ASPI_Entry - MASPI_INIRQ_FLAG_OFF - 4 * MASPI_DMS_SIZE
                                        ; - MASPI_SCSI11_ISR_OFF_PTR  (=16H)
scsi11_isr_seg_ptr      dw      ?       ; ASPI_Entry - MASPI_INIRQ_FLAG_OFF - 4 * MASPI_DMS_SIZE
                                        ; - MASPI_SCSI11_ISR_SEG_PTR  (=14H)
;maspi0w.asm change. add memory for cvboot to write dword ptr for client_regs.
client_regs_off_ptr     dw      ?       ; ASPI_Entry - MASPI_INIRQ_FLAG_OFF - 4 * MASPI_DMS_SIZE
                                        ; - MASPI_CLIENT_REGS_OFF_PTR (=12H)
client_regs_seg_ptr     dw      ?       ; ASPI_Entry - MASPI_INIRQ_FLAG_OFF - 4 * MASPI_DMS_SIZE
                                        ; - MASPI_CLIENT_REGS_SEG_PTR (=10H)
remote_modem_hport      dd      ?       ; temp loc until scsi finds out what to do.
remote_modem_port_call  dd      ?
remote_modem_cmd_type   dw      ?       ; choices are pre-write, pre-read, post-read, post-write
;the following comes with the minimum pre-read or post-read
remote_modem_ret_code   dw      ?
;this variable remembers the current maspi_dms pointer between a pre-write and post-read say.
current_maspi_dms_ptr   dw      ?
maspi_dms_1             db      MASPI_DMS_SIZE  dup(00h) ;ASPI_Entry - MASPI_INIRQ_FLAG_OFF
                                                        ;           - 4 * MASPI_DMS_SIZE
maspi_dms_2             db      MASPI_DMS_SIZE  dup(00h) ;ASPI_Entry - MASPI_INIRQ_FLAG_OFF
                                                        ;           - 3 * MASPI_DMS_SIZE
maspi_dms_3             db      MASPI_DMS_SIZE  dup(00h) ;ASPI_Entry - MASPI_INIRQ_FLAG_OFF
                                                        ;           - 2 * MASPI_DMS_SIZE
maspi_dms_4             db      MASPI_DMS_SIZE  dup(00h) ;ASPI_Entry - MASPI_INIRQ_FLAG_OFF
                                                        ;           - 1 * MASPI_DMS_SIZE
;the following locations are written to by maspi when it needs to be called back.
;maestro gets the callback address from these locations
InIRQ_flag_off          dw      ?       ;ASPI_Entry - MASPI_INIRQ_FLAG_OFF          (=1CH)
```

```
InIRQ_flag_seg          dw      ?       ;ASPI_Entry - MASPI_INIRQ_FLAG_SEG          (=1AH)
s1_callback_off         dw      ?       ;ASPI_Entry - MASPI_S1_CALLBACK_OFF         (=18H)
s1_callback_seg         dw      ?       ;ASPI_Entry - MASPI_S1_CALLBACK_SEG         (=16H)
s7_callback_off         dw      ?       ;ASPI_Entry - MASPI_S7_CALLBACK_OFF         (=14H)
s7_callback_seg         dw      ?       ;ASPI_Entry - MASPI_S7_CALLBACK_SEG         (=12H)
s4_callback_off         dw      ?       ;ASPI_Entry - MASPI_S4_CALLBACK_OFF         (=10H)
s4_callback_seg         dw      ?       ;ASPI_Entry - MASPI_S4_CALLBACK_SEG         (=0EH)
;cvboot writes the pointer to the host_CAS_request at this location
host_CAS_request_off    dw      ?       ;ASPI_Entry - MASPI_CAS_REQ_OFF     S1      (=0CH)
host_CAS_request_seg    dw      ?       ;ASPI_Entry - MASPI_CAS_REQ_SEG     S1      (=0AH)

;cvboot writes the pointer to the host_DOS_request at this location
host_DOS_request_off    dw      ?       ;ASPI_Entry - MASPI_DOS_REQ_OFF     S4      (=08H)

host_DOS_request_seg    dw      ?       ;ASPI_Entry - MASPI_DOS_REQ_SEG     S4      (=06H)
;cvboot writes the pointer to the InDOS flag at this location

InDOS_flag_off          dw      ?       ;ASPI_Entry - MASPI_INDOS_FLAG_OFF          (=04H)
InDOS_flag_seg          dw      ?       ;ASPI_Entry - MASPI_INDOS_FLAG_SEG          (=02H)
;*********************************************************************************************
;ASPI_Entry
;*********************************************************************************************
ASPI_Entry:
;note that as we enter here, we have come from the calling program and its ds.
                push    bp
                mov     bp, sp
                pusha
                pushf
                push    es
                push    ds
;ASPI2DOS also sets ds=cs
                mov     ax, cs
                mov     ds, ax
                mov     bx, word ptr [bp+08h]
                mov     es, bx
                mov     bx, word ptr [bp+06h]   ;es:bx->SRB
;               push    ds
;               mov     ax, dsdebug
;               mov     ds, ax
                mov     word ptr SRB_es, es
                mov     word ptr SRB_bx, bx     ;needed by scsiisr
;               pop     ds
                mov     al, es:byte ptr [bx]    ;bring in SRB command code
                cmp     al, 02h     ;is it scsi_execute_i/o?
                jz      scsi_exec_io
                cmp     al, 00h
                jz      host_adapter_inq
                jmp     exit_maspi
exit_maspi:     pop     ds
                pop     es
                popf
                popa
                pop     bp
                retf
;from what I can see, aspi2dos.sys utilizes the following SRB commands:
;host adapter inquiry   00
;get device type    01
;execute scsi i/o   02
;abort scsi i/o     03
;reset scsi device  04
;set Host Adapter params 05
;get disk drive info    06
;*********************************************************************************************
;end ASPI_Entry
;*********************************************************************************************

;*********************************************************
;START SCSI_EXEC_I/O
;*********************************************************
;*********************************************************
;HOW TO TAKE OVER NCR SCSI CHIP CONTROL GRACEFULLY
;*********************************************************
;zeroth stage: we are here because sjiix.sys stuffed the SRB area and made a far call to this
;routine. before this, a pushbutton let dirkb know that the copier program had to be initiated.
;at any one place we could be interrupted with a scsi call from PC about a disk read or
;write. we will have a problem if we write to NCR registers without semaphores. because as we
;write to a register, the irq will come (caused by PC) in between and both irsr and this
;program will malfunction.
;WHAT TO DO?
;disabling irq with cli will not help. say we are in the process of filling the scsi fifo with
;CDB bytes. meanwhile NCR is responding to select calls as 0333=44. scsi fifo will get data
```

```
;from PC and from this program.
;zeroth stage:
scsi_exec_io:
;               push    ds
                push    bx
;               mov     ax, dsdebug
;               mov     ds, ax
                lea     bx, word ptr ncr_init_req
                mov     byte ptr [bx], true     ;set ncr_init_req
big_loop:       lea     bx, word ptr ncr_target_busy
ncr_tgt_bsy_lup:sti
                nop
                cli
;if scsi bus was not busy, you could get an arbitration here and irq for 333=44. but irq will
;not be taken because of cli.
                mov     al, byte ptr [bx]
                cmp     al, true
                jz      ncr_tgt_bsy_lup         ;ncr_target_busy loop
;now we find out how we got to not busy: from not busy or busy. if from busy then 0333=45
;is done for us. this way is safe as 333=24 right before and no selection is possible. the
;other way is from not busy. in this last case we set 333=45. but it might not be taken.
;an arbitration might have started already.
                lea     bx, word ptr ncr_init_req_taken_fm_busy
                mov     al, byte ptr [bx]
                cmp     al, true
                jz      can_have_sbus
;so now we have a situation where irq for 333=44 is pending and we try to force a 333=45.
;it will be ignored.
;here an assumption is made that all irq's programs will leave pointing to set 0 of NCR.
;irq's are cli/sti and thus cannot be interrupted in the middle of set 1 situations.
                lea     bx, word ptr ncr_45_fm_aspi
                mov     byte ptr [bx], true
                lea     bx, word ptr ncr_45_fm_isr
                mov     byte ptr [bx], false
                mov     dx, 0333h
                mov     al, 45h
                out     dx, al              ;write 333=45
                sti                         ;see which irq comes
                lea     bx, word ptr ncr_init_req_taken_fm_not_busy
                mov     cx, 0ffffh
;this is the case where scsi isr responds to 333=45. so top level waits for it. I would expect this
;not to take too long. this could be one place maestro could take over.
not_busy_lup:   dec     cx
                cmp     cx, 0000h
                jz      big_loop            ;time out on 333=45 irq, ncr_target_busy?
                mov     al, byte ptr [bx]
                cmp     al, true
                jnz     not_busy_lup
can_have_sbus:  sti
                pop     bx
;               pop     ds
;*************************************
;SETUP NCR REGISTERS FOR INITIATOR MODE
;*************************************
;flush fifo
                mov     dx, 0333h
                mov     al, 01h
                out     dx, al
;set timeout register for 250 milliseconds timeout
                mov     dx, 0335h
                mov     al, 92h
                out     dx, al
;*****************************
;CHECK SRB FOR CDB INSTRUCTION
;*****************************
                mov     al, es:byte ptr [bx+40h];get scsi command byte
                cmp     al, 12h         ;is it inquiry?
                jz      scsi_inquiry
                cmp     al, 08h         ;is it read?
                jz      scsi_read_6
                cmp     al, 0ah         ;is it write?
                jz      scsi_write_6
;sjiix.sys, from what I can see utilizes the following scsi commands:
;request sense      03
;test unit ready    00
;send diagnostic    1d
;read buffer        3c
;write buffer       3b
;inquiry            12
;read_6             08
;write_6            0a
```

```
;*****************************************************************************************
;INQUIRY,READ,WRITE can all share same code as all are 6 byte CDB's.
;*****************************************************************************************
scsi_read_6:
scsi_write_6:
scsi_inquiry:
;based on my experience with aspi2dos.sys, the inquiry that aspi2dos delivers when it is
;installing itself is a0,c0,01+sdtr message exchange. this happens with the disk drives
;that are on the bus. I am not sure if it does the same thing with scanners. I checked and
;aspi2dos.sys definitely inquires into the scanner. sjiix.sys also inquires. I will not
;have maspi.sys inquire as part of it installing itself. thus the business of sychronous
;transfers is eschewed.
;es:bx->SRB and bp still points to the place in stack (with ss not defined by us. maspi at
;this point is called by sjIIx.sys. here we will collect data from SRB and form the CDB. we
;then load CDB in NCR. at this point we start looping, checking the status byte of the SRB.
;the irq takes over when the CDB is shipped to the scanner. isr needs to know where the SRB
;is to load the data buffer with inquiry data. the isr stack has es,bx,bp. when isr exits,
;control is back to the status checking loop and we can then go on and return control back
;to sjIIx.sys with a retf.
;first stage: collect SRB data to make CDB.
repeat_cdb:     mov     byte ptr repeat_on_chk_cond, 00h
                mov     dx, 0332h
;maspi09.asm change. scanner is a scsi-I device. selection does not succeed if ATN.
;               mov     al, 80h         ;identify and no disconnect privileges.
;I am assuming that sjiix.sys and hp s/w are able to partition the scanner task into small
;enough components as the data rate from the scanner comes in bursts.
;               out     dx, al
;maspi0a.asm change.
                mov     al, es:byte ptr [bx+40h];inquiry,read,write byte 0 (works for all 6 byte CDBs)
;               mov     al, 12h     ;inquiry command, byte 0.
                out     dx, al
                mov     al, es:byte ptr [bx+41h];inquiry command, byte 1.
                out     dx, al
                mov     al, es:byte ptr [bx+42h];inquiry command, byte 2.
                out     dx, al
                mov     al, es:byte ptr [bx+43h];inquiry command, byte 3.
                out     dx, al
                mov     al, es:byte ptr [bx+44h];inquiry command, byte 4.
                out     dx, al
                mov     al, es:byte ptr [bx+45h];inquiry command, byte 5.
                out     dx, al
;we must reset the status byte to SCSI request in progress.
                mov     es:byte ptr [bx+01h], 00h
;destination id. as a part of maspi initialization, I could scan all scsi nodes for scanner devices.
;I could then store the id byte in sdata and use it here. I should do this because I do not know where
;the user will hook the scsi device. for now I set it to 1.
;maspi09.asm change. here is how dest id works. SJIIX.SYS sends inquiry CDB's to all possible scsi ids.
;the one that responds with HP scanner keywords gets identified and later SJIIX.SYS sends its other
;CDB's only to this scsi id. thus I do not have to do much other than read the SRB and set the dest id
;register with the correct value.
                mov     dx, 0334h
;maspi09.asm change.
                mov     al, es:byte ptr [bx+08h]        ;load target id from SRB.
;               mov     al, 01h
                out     dx, al
;NOTE: destination id is not required for target mode. thus we can leave this register as is.
;scsi fifo is now full with identify message and inquiry cdb. now issue 0333=42h
;this will cause an irq. scsiisrx.asm will have to continue. do we return control to
;sjiix.sys yet? scsiisr could update the status byte in SRB with 00 ie in progress. I choose
;to check status byte from here ie maspi and return to sjiix.sys.
;issue 0333=42h
                mov     dx, 0333h
;maspi09.asm change. scanner does not like ATN.
;               mov     al, 42h         ;select with ATN sequence
                mov     al, 41h         ;select w/o ATN
                out     dx, al          ;command issued. irq will come once CDB is
                                        ;delivered. isr will update the status byte.
                                        ;here we keep checking the status byte to
                                        ;go on. one could also issue a int 28h here
                                        ;to allow other s/w to hook.
status_loop:    mov     al, es:byte ptr [bx+01h];status byte
                cmp     al, 00h
                jz      status_loop
;maspi0d.asm change. if repeat_on_chk_cond=01h then resubmit the same CDB.
                mov     al, byte ptr repeat_on_chk_cond
                cmp     al, 00h
                jnz     repeat_cdb              ;if repeat is set then repeat
;either 01 ie complete or some extraordinary situation. in either case we return and let
;sjiix.sys handle it.
;               push    ds
;               mov     ax, dsdebug
```

```
;               mov     ds, ax
                lea     bx, word ptr ncr_init_req
                mov     byte ptr [bx], false
                lea     bx, word ptr ncr_init_req_taken_fm_busy
                mov     byte ptr [bx], false
                lea     bx, word ptr ncr_init_req_taken_fm_not_busy
                mov     byte ptr [bx], false
;               pop     ds
;and finally, we must enable select/reselect in case the PC wants the scsi bus for a hd transfer.
;it could also be a fax request. it is true that the tail end of processing is done all in isr,
;we do not want the isr to leave things in 0333=44 until we clear the variables here.
                mov     dx, 0333h
                mov     al, 44h
                out     dx, al
                jmp     exit_maspi
;*****************
;END SCSI_EXEC_I/O
;*****************

;*********************
;START SCSI_HA_INQUIRY
;*********************
;SJIIX.SYS, as a part of its init routine, issues HA_Inquiries to ASPIEntry for all adapters.
;there is no wait loop for this one. ie after ASPIEntry returns, it is either done or not. In
;this case, there is one adapter only. SJIIX.SYS will issue many HA_Inquiry calls, one for each
;adapter. Somehow, I need to let it know that there is only one.
;Here is how it works: ASPI when installing itself, finds out how many adapters there are. When
;SJIIX.SYS submits a HA_Inquiry for the first adapter (00), offset 08h returns the number of
;host adapters. If this number is more than one, SJIIX.SYS submits more HA_Inquiry calls.
;offset # of bytes      Input/Output?   description
;------ ----------      -------------   -----------------------------------
;00h    01h             I               SRB command code
;01h    01h             O               Status
;02h    01h             I               Host Adapter Number
;03h    01h             I               SCSI Request Flags
;04h    04h             I/O             reserved, in actuality 55,AA,02,00 in, AA,55,02,00 out
;08h    01h             O               Number of Host Adapters (=01h)
;09h    01h             O               ID of Host Adapter (=05h. needs to come from JMPSNS pins)
;0Ah    10h             O               SCSI Manager ID (=MASPI04.ASM). there is only one manager.
;1Ah    10h             O               Host Adapter ID (=NCR53C406A). there may be many cards.
;2Ah    10h             O               Host Adapter Unique Parameters. (00,00,00,00,40,03,0a,00,..)
;as the first such call will have host adapter number=00, I do not need to check. just return 1 card.
host_adapter_inq:
                mov     es:byte ptr [bx+01h], 01h       ;status=request completed w/o error
                mov     es:byte ptr [bx+04h], 0aah      ;to keep it same as what SJIIX gets fm ASPI2DOS
                mov     es:byte ptr [bx+05h], 55h       ;ditto
                mov     es:byte ptr [bx+06h], 02h       ;ditto
                mov     es:byte ptr [bx+08h], 01h       ;number of host adapters=01h
                mov     es:byte ptr [bx+09h], 05h       ;scsi id of host adapter is 05 in catbox
                lea     si, word ptr scsi_manager_id
                mov     di, bx
                add     di, 0ah                         ;es:di -> scsi_manager_id slot in SRB
                mov     cx, 0010h
                rep     movsb
                lea     si, word ptr host_adapter_id    ;di already pointing correctly
                mov     cx, 0010h
                rep     movsb
;will leave the issue of non zero bytes in host adapter unique parameters field to debug time.
                jmp     exit_maspi
;*********************
;END SCSI_HA_INQUIRY
;*********************


maspi_end       dw      ?
                nop             ;give the address of this as file size in debug making *.sys
                                ;to make OS/2 DOS box happy.
maspi_coda      ends
end             str_routine
```

```
;*************************************************************;
;COPYRIGHT 1994, 1995, 1996 by Haluk Aytac. 3Tau              ;
;*************************************************************;
;scsiissi.asm <- scsiissg.asm. 10/6/95. int 2f changes.
;scsiissg.asm <- scsiissf.asm. 09/25/95. 64 sectors at a time works well. now do it for read
;also. now a write 500KB takes 5 secs and to drive C: it takes 3 secs. another SCSI drive F:
;it takes 4 secs. Actually 32 sectors to 64 sectors did not make a difference. For memory
;reasons can reduce it to 32 again. I also changed the PIO write to double word and this also
;did not make any difference. But with 486 50MHz it might.
;scsiissf.asm <- scsiisse.asm. 09/24/95. it turns out repeated int 13h takes so much time that
;going to PIO did not make any difference. once we fix int 13h, however, it might.
;scsiisse.asm <- scsiissd.asm. 09/24/95. change lun=0 write back to pio mode like read.
;scsiissd.asm <- scsiissc.asm. 08/25/95. add R->CR and CR->R if InIRQ=we are first fm foreground.
;scsiissc.asm <- scsiissa.asm. 08/07/95. connect with catvoice. add LUN=4 synchronization.
;scsiissa.asm <- scsiiss9.asm. 06/20/95. faster read buffer. PIO.
;scsiiss9.asm <- scsiiss8.asm. 03/17/95. final fixes to int 2f translations. maspi0s.asm,
;caspat01.asm. description of fixes are in caspat01.asm. also see notebook 3-95-26.
;write a procedure called fix_task_control_file. this procedure takes a file that is known to
;be a TCF. the file is open already and there is a handle. the pointer is at the beginning.
;when the procedure is done. there are two users for this procedure. scsiisr is one of them.
;it hooks int 21 3D during int 2F CB07 to get the filename. During this time, it can also do
;the fixes. When it returns to scsiisr, int 2F is completed. At this time, the file is closed
;to be reopened by the host PC with the correct pathname for the file. The other user is
;maestro. Maestro will find where this device is because it is a device driver. At this point,
;I do not have a mechanism to locate where in the driver, this code will be. Whereas in the
;ASPI Entry point we have a known function, in this case we do not. But I will do something.
;for example it could be another ioctl call in the maspi section. Anyhow, maestro will use this
;during int 2F CB01. HERE IS THE SOLUTION: 2 bytes before ASPIEntry is the place where all these
;parameters' address is stored.
;SUMMARY OF USERS FOR FIX_TASK_CONTROL_FILE:
;       1. maestro.
;               a. using CB01 (to forward a fax), all references to C:
;               b. using CB07 (to print a fax), all references to C:
;       2. scsiisr representing the interests of host PC based GUI
;               a. during CB01 (to send/forward a fax), all references to C:
;               b. during CB07 (to view a fax), all references to E:
;what are the inputs?
;               a. file handle passed on register bx. note that this procedure will be called
;                  far from maestro and near from scsiiss.
;               b. which direction. requires knowing which disk letter from host PC. al=00 for
;                  converting all to C: and al=01 for converting all to E: (or whatever label).
;                  cat_disk_letter (near byte in scsiiss).
;
;NOW I HAVE TO PLAN THE SOFTWARE THAT WILL FIND THE DISK LABEL FOR THE CATDISK.
;this software will sit on CATPATCH.EXE at the hostPC.
;WHAT ARE THE FUNCTIONS OF CATPATCH.EXE?
;       1. int 2f translation in tandem with maspi+scsiiss. LUN=1 (int 2F translation channel)
;       2. find out which drive CaTbox sits on. LUN=0 (scsi hd channel). the result has to be
;          known by CATPATCH.EXE on host side (for 2F) and scsiiss on CaT side. After CATPATCH
;          finds this, it needs to communicate it to CaTbox via LUN=4 ie DOS synchronization.
;       3. to update the time on the CaTbox from the time on the host any time the host
;          is powered up. LUN=4. DOS synchronization channel. with maspi+scsiiss.
;BEGINNINGS DOS SYNCHRONIZATION
;       It will be contained in the file CATPATCH.EXE. It will communicate via LUN=4.
;       CATPATCH already has a portion that communicates via LUN=1 (int 2F).
;       it already knows the disk letter for CaTdisk. we should call this label, a byte
;       with the name: cat_disk_letter = "E" for example. a copy of it will be on the
;       scsiiss with the same name. Its location will be accessible from the word before
;       ASPIEntry. You know, maestro does not need to know about this letter. Maestro just has
;       to tell the direction to the fix_task_control_file in ax. and for maestro this
;       direction is always letter -> C:.
;scsiiss8.asm <- scsiiss7.asm. 02/23/95. there is still one problem with 2F translation: while
;building a task file Faxability gives an error. It just does not do int 2f call but I find the code
;directly in casmodem area???? anyhow, this revision is still left with this problem but it goes on
;to take care of printer redirection, LUN=3.
;scsiiss7.asm <- scsiiss6.asm. 02/14/95. see 2-95-44. need filename from last int 21 3d and not the
;first one.
;scsiiss6.asm <- scsiiss5.asm. 02/10/95. attempt to fix cb07 problem and int 21/3d at catbox problem.
;here is a description of the problems:
; 1.at the catbox level, some int 2f/cb calls will make file accesses or directory accesses.
;   amibios uses irql4h for int13h calls. as these calls are now within a scsi isr, I need to release
;   is bit for irql1 (I believe) so irq14 can be processed. thus eoi right before the int 2f call
;   followed by cli right before issuing ncr scsi commands.
; 2.for int 2f/cb07 we return a DOS file handle. but the handle we return is good for catbox as
;   this is where casmodem is executing from. thus we need a scheme where we learn the file name
;   when casmodem makes the int 21/3d call, and then return it to host PC (first close the file at
;   catbox level) so that host PC can make the int 21/3d call and return the handle to the GUI that
;   made the int 2f call in the first place.
;scsiiss5.asm <- scsiiss4.asm. 02/09/95. trying a solution to scsi problem where ASPI gets the
;data but still issues a faulty ending report (status in SRB+1 = 04). I believe this is due
```

```
;to the fact that ASPI does not have enough time to handle the data when its bus free irq
;comes. this is just a gues and I hope it is the right one.
;scsiiss4.asm <- scsiiss3.asm. 02/08/95. final fixes to int 2f/cb. along with maspi0n.asm and
;casvox23.asm.
;scsiiss3.asm <- scsiiss2.asm. the previous changes all worked. Introducing LUNs: aspi2dos is now
;loaded at host with /L switch. aspi2dos.sys makes inquiry calls to all LUNs. It understands that
;some luns do not have devices on them as in our case ofr LUN=6,7. The messages for those inquiries
;are not printed to screen like the other LUNs. After inquiry messages, aspi2dos.sys seems to issue
;TEST UNIT READY to all LUNs that had devices on them. NB: the CDB for TEST UNIT READY comes with
;LUN=0 but the identify message at the beginning comes with LUN=1 etc. LESSON: always ignore LUN
;assignment in CDB but note the one in IDENTIFY MESSAGE byte. I note the ID LUN in i_t_llun byte.
;at some places however, I compare it to the CDB LUN. if not equal I exit. This is the case for
;inquiry and there it seems at least from aspi2dos.sys we have the two luns equal to one another.
;scsiiss2.asm <- scsiiss1.asm. 02/06/95. major changes.
;first of all a report on scsiiss1.asm: I tried int 2f/cb00. I can write 2f cb 00 to CATBOX
;with a write extended CDB with 9 bytes of data. the casmodem at CATBOX responds to this with
;2f cb ff. this then, gets sent to host PC. somehow, PC and CATBOX do not disconnect, or they do
;and correct data gets received but status = 04 and all sorts of semi repeatable behavior.
;so this is what I will do:
; 1. in read and write extended, remove early eoi and confine it where it was needed ie processing
;    for lun=0.
; 2. for lun=01, process all 9 bytes all at once with 333=22 by loading them all to FIFO.
;    just as for the inquiry command, get out of isr for processing the remainder in the 333 was 22
;    section. cannot be done with write cdb (2a is one byte at a time)
; 3. might even try to make the number of data bytes even
; 4. institute inquiry command for non zero lun's as follows:
;       LUN     INQUIRY DATA ( bbb: peripheral qualifier; bh: peripheral device type; title )
;        0      000b 00000b ANGORA CaTdisk      Direct Access Device
;        1      000b 01001b INT2F Translator    Communications Device
;        2      000b 01001b SerialTranslator    Communications Device
;        3      000b 00010b PrintrTranslator    Printer Device
;        4      000b 00011b DOS Synchronizer    Processor Device
;scsiiss1.asm <- scsiiss0.asm. 02/05/95. host PC int 2f translation fixes.
;corresponding to maspi0k.asm. marked except for all "jmp     int2f_cb_end"
;scsiiss0.asm <- scsiisrz.asm. 01/17/95. early eoi makes it so, with softice-d and the fact
;that popf does not change the IF flag value in VM, int 13h causes IF=1 within a scsiisr.
;thus it is possible to have a scsi isr within a scsi isr such as at the end of read extended
;where after last 128Bs get shipped via PIO load to PIO buffer in NCR we get irq. this caused
;a PIO error somehow. As I work with softice-d, I decided to change and add cli after int13h.
;I think, w/o softice, after int 13h, it would have returned to IF=0 as we would then be purely
;in real mode.I think int 13h is using popf, retf instead of iret to come back. IRET in any
;mode completely restores values from stack including IF flag. This means that I need not woory
;about what happens after my iret's.
;with my BIOS, this change will not be necessary as I use iret to come back.
;scsiisrz.asm <- scsiisry.asm. 01/16/95. provides for early eoi (1-95-97) so that int 13h can
;utilize irq 14h. this is in read and write.
;scsiisry.asm <- scsiisrx.asm. 01/04/95. fixes the case of read cdb with 0 bytes. see 1-95-67.
;goes with maspi0h.asm.
;scsiisrx.asm <- scsiisrw.asm. 12/22/94. adds posting. changes to 333=12h processing. goes
;with maspi0g.asm.
;scsiisrw.asm <- scsiisrv.asm. 12/22/94. goes with maspi0f.asm. see maspi0f.asm header
;for fix description.
;scsiisrv.asm <- scsiisru.asm. 12/21/94. goes with maspi0e.asm. fixes tail end of write.
;see 01-95-26.
;scsiisru.asm <- scsiisrt.asm. 12/21/94. goes  with maspi0d.asm. resubmits write cdb, or
;any cdb if it results in check condition.
;scsiisrt.asm <- scsiisrs.asm. 12/20/94. see 01-95-22. fix tail end of 333=10 processing.
;scsiisrs.asm <- scsiisrr.asm. 12/19/94. if there is a problem with 333=41 then we must
;empty the fifo. if normal ending to 333=41, then fifo is empty as all bytes are shipped.
;scsiisrr.asm <- scsiisrq.asm. 12/17/94. scsi_init_xlen treated consistently as word.
;note that we also have to change its deifiniton in maspi09.asm. thus we also get
;maspi0a.asm this way.
;cdb_inquiry. sjiix.sys asks for 14h bytes. in byte 4 of inquiry data table, scanner
;tells that it wants to issue 1f+4+1=24h bytes (36d bytes vs 14h=20d bytes). sjiix.sys
;only needs 20 bytes. "HP      ","C175". after scsi_init_xlen=0, 333=10h is issued
;resulting in phase=7, 335=10, msg=00. scsiisrq.asm was issuing a 333=12 at this point.
;the correct way is to check for function complete in 335 and if not, to issue another
;333=10h. this results in phase=7, 335=08, msg=00. now issue 333=12 and it results in
;phase=00, 335=20h ie disconnect.
;scsiisrq.asm. 12/17/94. change 0333=42h to 0333=41h. similar change was already made in
;maspi08.asm.
;scsiisrq.asm <- scsiisrp.asm. combine maspi and scsiisr as both need to be loaded before sjiix.sys.
;scsiisrp.asm. remove reference to cdata, bring it to scsiisrp.asm. in final product
;this variable will be fixed with a call to IDE disk. now scsiisrp compiles with
;maspi only. maspi will be the data block for scsiisrp. how do we do this? the very
;last "end" statement now has "end install". in maspi05.asm, change "end str_routine"
;to just "end" for the purpose of this compilation. also remove .stack.
;maspi05.asm -> maspi050.asm    1. end str_routine -> end
;                               2. .stack commented out.
;scsiisrp.asm later decision: maspi now contains all variables for scsiisrp.asm
;scsiisrp install section makes an ioctl call and finds out ds where all data is.
```


17

```
;scsiisrp compiles with cdata*.asm (has one variable there) and maspi*.asm.
;cdata is in same code block.
;scsiisrp.asm <- scsiisro.asm. 12/11/94. make it so, this code can be standalone
;and apart from the rest of the EPROM based code. in other words, it hooks its
;interrupts, it compiles with sdata*.asm and cdata*.asm.
;scsiisrp.asm, cdata*.asm and sdata*.asm all compile together.
;scsiisro.asm <- scsiisrn.asm. 07/21/94. add processing to go with maspi01.asm.
;ie scanner functions. new variables that go in previous sections:
;    ncr_target_busy
;    ncr_init_req
;    ncr_init_req_taken_fm_busy
;    ncr_init_req_taken_fm_not_busy
;scsiisrn.asm <- scsiisrm.asm. 07/12/94. add lun=01 processing to go with
;casdrv04.asm. also change the lun processing. assume that the 2 message byte
;inquiry cdb only comes from aspi2dos.sys and only for lun=0. thus no change
;if for some reason lun=1 there. for the case of a0,c0,cdb the fork occurs not
;within 0333=44 processing but at each cdb processing spot. for example write_10.
;but here there is an error in treatment. there are two sources of lun: one from
;identify message, the other from byte_1 of cdb. currently I check if message lun
;is 0, if not I exit. if so then I make sure that it equals cdb lun. I change this
;to (only for read and write so far because they are the ones coming from casdrv
;via aspi2dos) check they are equal, if not exit and if so then continue if 0 and
;jump if not.
;scsiisrm.asm <- scsiisrk.asm. 07/04/94. do not use PIO for write_10. use SCSI
;FIFO instead and see if it works!
;scsiisrk.asm <- scsiisrj.asm. 07/02/94. int_reg avoidance worked. 6-94, p 112.
;now I handle the quirk of 0331 not always decrementing with abort dma command.
;and the added quirk of during a read_ext, 04 does not overwrite a2 but it
;overwrites aa.
;scsiisrj.asm <- scsiisri.asm. 07/01/94. interrupt register 0335 has problems.
;at normal voltages it comes up with 00h. all else works well. thus if we ignore
;int_reg values and work with seq_step values, we can work at 5v and would not
;see so much i/o 340h failures on adaptec card (hopefully!).
;scsiisri.asm <- scsiisrh.asm. 06/28/94. notebook 6-94, page 96. counter middle
;byte does not decrement properly although data is transmitted correctly over
;the scsi bus. NCR chip has weaknesses. thus I add abort DMA for both read ext
;and write ext. I had also added flush fifo and a 4th check for empty for read.
;these solutions (added to h) did not help. but for consistency add flush fifo
;to write. write already has 4th check for empty.
;scsiisrh.asm <- scsiisrg.asm. 06/26/94. active negation enable.
;scsiisrg.asm <- scsiisrf.asm. 06/23/94. implements write_10
;scsiisrf.asm <- scsiisre.asm. 06/23/94. "e" installs aspi2dos and aspidisk
;but I have to edit the boot record to change heads to 40h and reserved sectors
;to 01h. 6-94, p.71. this change detects that boot record is being read and
;edits these two numbers. you see cat DOS needs them to be 0a,12 and adaptec
;needs them to be 40,01. adaptec read master boot record so reserved sectors
;does not include the master boot track. DOS when coming up, does not use the
;information. it uses mbr to find where br is but does not use this info to
;figure in the res sectors somehow.
;scsiisre.asm <- scsiisrd.asm. 06/17/94. 4:43AM. adding read extended code.
;scsiisrd.asm <- scsiisrc.asm. 06/16/94. from read capacity.
;scsiisrc.asm <- scsiisrb.asm. 06/15/94. b completes aspi2dos (inquiry) and does
;test unit ready and inquiry from aspidisk.sys. c continues with start stop unit
;etc.
;scsiisrb.asm <- scsiisra.asm. 06/15/94. continue with dialoguing with aspidisk.sys.
;scsiisra.asm <- scsiisr9.asm. 06/14/94. scsiisr9.asm successfully dialogues with
;aspi2dos.sys. it basically goes through the steps of an inquiry command. you can
;see on screen the message: 3tau angora cat box version 1.00 etc. now we need to
;dialogue with aspidisk.sys to have it installed too. thus after a 0333=24h ie
;terminate command, we need to issue a 0333=24 ie enable select/reselect.
;scsiisr9.asm <- scsiisr8.asm. 06/14/94. correct an error.
;scsiisr8.asm <- scsiisr7.asm. 06/12/94. correct some. add 0333=2b. also make sure
;there are no explicit references to own scsi id. it can be fetched from the
;own id register (0338).
;scsiisr7.asm <- scsiisr3.asm. 06/10/94. update as scsiisr6.asm ie sram-ncr for ds.
;tepeequ.inc is local now. and do other fixes. continue with scsi irq event count
;as with scsiisr4,6.
;scsiisr3.asm <- scsiisr2.asm. 06/07/94. change treatment of scsi bus reset irq.
;scsiisr2.asm <- scsiisr1.asm. send message is simpler than I thought. 2/4/94.
;02/01/94. now that I know more....
;01/03/94. this file is to be executed upon a hardware interrupt from  NCR53C406A.
;there are two kinds of inputs from the host via scsi:
; 1. hard disk related inputs. these inputs are int 13h on the hard disk. I have
;    studied aspi2dos.sys and found that 13h is hooked and I have made a list of
;    scsi commands (CDB) that are used.
; 2. fax+voice+modem related inputs from host via scsi. I am assuming these will
;    be int 14h calls on the host. I have to call Delrina and find out what their
;    protocol is. If they just use int 14h to access the modem+fax, then I need to
;    hook int 14h and redirect ie translate to scsi requests.
; 2a.fax
; 2b.modem. here I must catch WinTerm calls.
```


18

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; 2c.voice. here I must comply with TYIN to start with.
;    my gues is that all three pieces of software use 14h to communicate with the
;    modem.
;    another point to consider: what if the customer has a number of things hooked
;    to com1 port say. Some software needs to be rerouted to scsi and some not.
;    I must thus recognize which software is making the call. How can I do this?
;
;I think, on this end, I can use LUN to distinguish between the calls. I know that
;ASPI uses no LUN ie it sets it to 0000. When I hook int 14h I could use LUN=0001
;etc.
;
;Eventually, I should have a manager to recognize which one is calling. At this point,
;I will try to have the int 13h calls handled by catbox so that the box looks like a
;scsi disk to aspi2dos.sys. If I achieve this by end of January, I have met my goal.
;
;
;How the chip works: it drives the scsi bus with commands and parameters in registers.
;it notices scsi activity initiated by others via interrupts.
;thus interrupts inputs
;     commands outputs
;
;list of conditions under which an irq is provided by the NCR53C406A:
;INTERRUPT REGISTER (read only)
;SET 0, ADDRESS 335h
;bit7: SRD  SCSI reset detected
;       this bit is set if the scsi reset reporting bit in Configuration1
;       register is not set and the chip detects a reset on the scsi bus.
;       if this bit (6) is set then NCR53C406A disconnects from the bus but
;       does not interrupt the host.
;bit6: IL   illegal command.
;bit5: DIS  disconnect. in target mode, this bit is set when a terminate sequence
;       or command complete sequence causes the 53C406A to disconnect from the
;       bus.
;bit4: BS   bus service. in target mode whenever the initiator asserts ATN.
;bit3  FC   function complete. in target mode after any command has completed.
;bit2  RESELECT if reselected in initiator mode.
;bit1  SELATN   selected with ATN in target mode.
;bit0  SELECT   when NCR53C406A is selected as a target.
;
;REGISTER SET (R) means read only, (W) means write only.
;   SET 0                   SET 1
;330h   Transfer Count Low          Jumper Sense Port(R)
;331h   Transfer Count Mid          SRAM Address Pointer
;332h   SCSI FIFO Register          SRAM Data Port
;333h   Command Register            -
;334h   Status Register(R),Destination ID(W)     PIO FIFO Register
;335h   Interrupt Register(R),Timeout Reg(W)     PIO FIFO Register
;336h   Sequence Step(R),Synch Xfer Period(W)    PIO FIFO Register
;337h   SCSI FIFO Flags(R),Synch Offset(W)  PIO FIFO Register
;338h   Configuration1 Register         PIO Status Register
;339h   Clock Conversion register(W)        ATA Command(W), ATA Status(R)
;33ah   Test Register(W)            ATA Features(W), ATA Error(R)
;33bh   Configuration2 Register         PIO Flag Interrupt Enable Register
;33ch   Configuration3 Register         -
;33dh   Configuration4 Register         Configuration5 Register
;33eh   Transfer Count   High(W)        Signature Register(R)
;   Transfer Counter High(R)
;33fh   SCSI FIFO Bottom Register       Configuration6 Register.model       small
;
;NCR53C406A command set
;
;code.  int?    miscellaneous group
;80/00      nop
;   01      flush scsi fifo (fifo flags reset to empty condition, bottom byte of fifo=00h)
;   02      reset chip (resets all functions and returns to a disconnected state)
;   03  yes*    reset scsi bus (will cause interrupt if not disabled by conf1 reg bit 6)
;
;       disconnected state group
;c0/40  yes reselect (timeout, destination id regs loaded and identify message placed in fifo)
;c1/41  yes     select w/o ATN sequence
;c2/42  yes select with ATN sequence
;c3/43  yes     select with ATN and stop sequence
;c4/44      enable selection/reselection (will respond to bus initiated selection/reselection)
;   45  yes     disable selection/reselection
;c6/46  yes     select with ATN3 sequence
;c7/47  yes     reselect3
;
;       target state group
;a0/20  yes send message
;a1/21  yes send status
;a2/22  yes send data
```

```
;a3/23  yes disconnect sequence
;a4/24  yes terminate sequence
;a5/25  yes target command complete sequence
;   27      disconnect
;a8/28  yes receive message sequence
;a9/29  yes receive command
;aa/2a  yes
;include d:\masm\samples\mon\tepegoz\tepecat\cdos\tepeequ.inc
include tepeequ.inc
include ..\..\catvoice\catvocl\catequ0e.inc
.model  small
.386
;.stack
maspi_coda segment byte public 'maspi_code'
;               extrn transfer_cntr_0:near
;               extrn transfer_cntr_1:near
;               extrn transfer_cntr_2:near
                extrn scsi_fifo_reg:near
                extrn command_reg:near
                extrn status_reg:near
                extrn status_reg_old:near
                extrn interrupt_reg:near
                extrn sequence_step:near
                extrn seq_step:near     ;just the lowest three bits
                extrn scsi_fifo_flags:near
                extrn config_1_reg:near
                extrn config_2_reg:near
                extrn config_3_reg:near
                extrn config_4_reg:near
                extrn jumper_sense:near
                extrn sram_addr_ptr:near
                extrn sram_data_port:near
;               extrn pio_fifo_0:near
;               extrn pio_fifo_1:near
;               extrn pio_fifo_2:near
;               extrn pio_fifo_3:near
;               extrn pio_status:near
;               extrn pio_flag_int_en:near
                extrn signature_reg:near
                extrn config_5_reg:near
                extrn config_6_reg:near
                extrn scsi_cmd_complete:near
                extrn scsi_bus_id:near
                extrn scsi_message_byte_0:near
                extrn scsi_message_byte_1:near
                extrn scsi_message_byte_2:near
                extrn scsi_message_byte_3:near
                extrn scsi_message_byte_4:near
                extrn scsi_message_byte_5:near
                extrn scsi_message_byte_6:near
                extrn scsi_message_byte_7:near
                extrn scsi_target_mode:near
                extrn scsi_init_mode:near
                extrn scsi_cmd_byte_0:near
                extrn scsi_cmd_group:near
                extrn scsi_cmd_byte_1:near
                extrn scsi_cmd_byte_2:near
                extrn scsi_cmd_byte_3:near
                extrn scsi_cmd_byte_4:near
                extrn scsi_cmd_byte_5:near
                extrn scsi_cmd_byte_6:near
                extrn scsi_cmd_byte_7:near
                extrn scsi_cmd_byte_8:near
                extrn scsi_cmd_byte_9:near
                extrn scsi_cmd_byte_a:near
                extrn scsi_cmd_byte_b:near
                extrn scsi_cmd_byte_order:near
                extrn scsi_cmd_length:near
                extrn scsi_cur_command:near
                extrn ext_msg_st_on:near
                extrn ext_msg_st_length:near
                extrn ext_msg_st_code:near
                extrn ext_msg_length:near
                extrn ext_msg_length_left:near
                extrn ext_msg_code:near
                extrn ext_msg_sdtr_xfer_per:near
                extrn ext_msg_sdtr_reqack_offset:near
                extrn msg_sent:near
                extrn i_t_lsource_id:near
                extrn i_t_llun:near
                extrn i_t_ldisc_priv:near
```


20

```
                extrn i_t_llun_ready:near
                extrn cdb_inq_data16:near
                extrn cdb_inq_data32:near
                extrn scsi_ext_lba:near
                extrn scsi_ext_xlen:near
                extrn scsi_hd_cache_buffer:near
                extrn sectors_written:near
                extrn sectors_read:near
                extrn scsi_ide_s:near
                extrn scsi_ide_t:near
                extrn scsi_ide_sector:near
                extrn scsi_ide_head:near
                extrn scsi_ide_cylinder:near
                extrn first_lup_read_ext:near
                extrn first_lup_write_ext:near
                extrn scsi_reading_br:near
                extrn ncr_target_busy:near
                extrn ncr_init_req:near
                extrn ncr_init_req_taken_fm_busy:near
                extrn ncr_init_req_taken_fm_not_busy:near
                extrn ncr_45_fm_aspi:near
                extrn ncr_45_fm_isr:near
                extrn scsi_init_xlen:near
                extrn scsi_init_data_off:near
                extrn scsi_init_data_seg:near
                extrn scsi_init_recv_data:near
                extrn scsi_init_send_data:near
                extrn scsi_int2f_out_buffer:near
                extrn scsi_int2f_out_buf_ptr:near
                extrn scsi_int2f_in_buffer:near
                extrn scsi_lpt_out_buffer:near
                extrn scsi_lpt_in_buffer:near
                extrn ax_reg:near
                extrn bx_reg:near
                extrn cx_reg:near
                extrn dx_reg:near
                extrn IO_ecx_reg:near
                extrn IO_edx_reg:near
                extrn IO_eax_reg:near
                extrn cb_function:near
                extrn SRB_bx:near
                extrn SRB_es:near
                extrn repeat_on_chk_cond:near
;scsiiss9.asm variables
                extrn tcf_path_drv:near
                extrn cat_disk_letter:near
                extrn tcf_number_of_FTR:near
                extrn tcf_offset_of_first_FTR:near
                extrn tcf_offset_FTR_filename:near
;end scsiiss9.asm variables

;scsiissa.asm variables
                extrn init_number_in_pio_fifo:near
;end scsiissa.asm variables

;scsiissc.asm variables
                extrn InIRQ_flag_off:near
                extrn InIRQ_flag_seg:near
                extrn s4_callback_off:near
                extrn s4_callback_seg:near
                extrn s7_callback_off:near
                extrn s7_callback_seg:near
                extrn s1_callback_off:near
                extrn s1_callback_seg:near
                extrn host_DOS_request_off:near

                extrn host_DOS_request_seg:near
                extrn host_CAS_request_off:near

                extrn host_CAS_request_seg:near
                extrn remote_modem_hport:near
                extrn remote_modem_port_call:near
                extrn remote_modem_ret_code:near
                extrn maspi_dms_1:near
                extrn current_maspi_dms_ptr:near
;end scsiissc.asm variables

;scsiissd.asm variables
                extrn client_regs_off_ptr:near
                extrn client_regs_seg_ptr:near
;end scsiissd.asm variables
```


21

```
                public scsiisr_end
                public scsiil_isr

;for this next variable, we should read this off from IDE directly during install of scsiisrp
;or we should get a result from BIOS. for example in 0040:xxxx area.
;               extrn read_capacity_data:near
scsiil_isr  proc    far
;the assumption is that we are left in the [0] set. if I left it a [0] from tepeg"z*.asm
;it will stay at zero, if I also end up in [0] out of scsi_isr. yes. tepeg"z.asm leaves it
;at [0].
                push    ax
                push    bx
                push    cx
                push    dx
                push    bp
                push    ds
                push    si
                push    es
                push    di
;scsi data area is in sram-ncr as is the debug data area.
;scsiisrp change. sdata*.asm will be placed here in .model small.
;final decision: scsi data area will go with maspi.sys. indeed, all data will go with maspi.
;TSR's that need the data, will make ioctl calls to SCSINCR$ and get its ASPIEntry point.
;they will use the segment portion of this address to set their own ds value.
;               lea     bx, cs:word ptr adjASPI_Entry
;               mov     ax, cs:word ptr [bx+2] ;segment address of maspi.sys data area.
;this word was initialized during scsiisrp.asm install.
;               mov     ax, DGROUP
;DOS from A:, use DGROUP.
;               mov     ax, dsdebug ;ncr variables and debug variables in the same
                                    ;area. once I fix the sram h/w to isolate the
                                    ;exact address 00000-3ffff I can have dsdebug=
                                    ;dff0. hopefully by then I have not used all
                                    ;256 bytes that would be possible in ncs-sram.
                                    ;06/13/94.
                mov     ax, cs      ;all data is here now, at maspi which has same cs.
                mov     ds, ax
;scsi irq event count
                mov     dx, 03ffh
                in      al, dx
                inc     al
                out     dx, al
;scsiissc.asm change
;increment InIRQ
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        inc     ES:byte ptr [di]

;scsiissd.asm change
        cmp     ES:byte ptr [di], 1
        ja      skip_R_to_CR
        call    store_to_Client_regs            ; similar to but not the same as
skip_R_to_CR:                                   ; procedure of same name in catvoice/maestro
;end scsiissd.asm change

;note: here I can make decisions on I_T_X nexus based on the (src id) or (dst id) byte and
;the identify message (LUN). I get from these (his id, my LUN). I can make decisions based on this
;information in addition to what the command (0333) was. specifically, this decision is made during
;select with ATN, analyzing the identify message byte. question: the state machine with LUN=001b
;ie fax/voice/data application, may or may not be the same as the hard disk sequence. I think the
;basic sequence will be the same ie what to do when selected etc. the differences come in in res-
;ponding to inquiry command and read/write commands. it may also be that I will use commands reserved
;for communications. it is best to set a variable called i_t_x_7.1=true meaning id=7 is the other
;scsi node, 1 is my LUN number on the catbox.
;scsiisrt.asm change: save previous value of status_reg in status_reg_old.
                mov     al, byte ptr status_reg
                mov     byte ptr status_reg_old, al
;read status register, save. has phase info and int state. not very useful.
                mov     dx, 0334h                   ;status register
                in      al, dx
                mov     byte ptr status_reg, al     ;save current status
;read sequence step register and save the lowest three bits.
                mov     dx, 0336h
                in      al, dx
                mov     byte ptr sequence_step, al  ;save sequence step reg contents
                and     al, 07h
                mov     byte ptr seq_step, al       ;save the lowest three bits
;now read interrupt register and clear int from NCR
                mov     dx, 335h
```

```
                in      al, dx                      ;335h[0](R),334h[0](R),336[0](R) are now cleared.
                mov     byte ptr interrupt_reg, al
;if the scsi reset detected bit is set then just go to iret (see notes in tepeg"z*.asm)
;this will happen only once before tepeg"z disables the scsi reset reporting.
;I am assuming that as I start a SCSI transaction and another SCSI node resets the bus, the NCR
;device will report an error in transaction. If not, I must read SCSI reset and do something about
;it. This could be restarting the transaction ie whatever I started to do I must restart. Thus
;somewhere I must store enough information to restart.
;06/07/94. we change the tack a bit for scsi bus reset. we just reactivate the command.
;we also keep cli throughout this irq so that it cannot be reentered.
                test    al, 10000000b
;j-change. if int_reg fail then 00h, if not fail then will not be 1 as no reset in case
;of interest. if reset then it will not be registered (int_reg=00h) or if registered
;(int_reg=80h) then isr will exit. so do not touch this line.
                jz      not_scsi_busrst
                mov     dx, 0333h
                in      al, dx
                out     dx, al      ;write the command back to reactivate
                                    ;this works with 44. will it work with others?
                                    ;NB 44 working depends on cli during scsi irq.
                                    ;you could otherwise get a reset from a third
                                    ;device when 44 was handled.
                jmp     scsi_int_exit
;first must establish how we got here by reading 0333 (ie command register).
not_scsi_busrst:
                mov     dx, 0333h
                in      al, dx
                mov     byte ptr command_reg, al
                cmp     byte ptr command_reg, 044h          ;is it enable select/reselect?
                jnz     go_fm44
;-------------------------------------------------------------------------------------------------------+
;COMMAND_REG=44H        enable select/reselect                                  |
;-------------------------------------------------------------------------------------------------------+
;               seq step/irq
;6 cases for scsi-2 bit set and 5 for no atn.
;this section must also accommodate 000b/01h
;                   001b/01h
;                   001b/11h
;                   010b/01h
;                   010b/11h ie all cases of selection w/o ATN.
                mov     al, byte ptr interrupt_reg
;j-change. assume adaptec always puts out int_reg=02h ie atn enabled.
                mov     al, 02h             ;j-change. fixup.
                test    al, 00000011b           ;are we selected?
                jz      go_fmselected
                mov     byte ptr scsi_target_mode, true
                mov     byte ptr scsi_init_mode, false
                jmp     target_seq
go_fmselected:  mov     byte ptr scsi_target_mode, false;we are then reselected
                mov     byte ptr scsi_target_mode, false
                mov     byte ptr scsi_init_mode, true
                jmp     init_seq
target_seq:
;this is the place to set ncr_target_busy. to be reset at terminate section.
                lea     bx, word ptr ncr_target_busy
                mov     byte ptr [bx], true
                mov     al, byte ptr interrupt_reg
;j-change. assume adaptec always puts out int_reg=02h ie atn enabled.
                mov     al, 02h                 ;j-change. fixup.
                test    al, 00000010b
                jz      go_fmselected_with_atn
                cmp     byte ptr seq_step, 00h
                jnz     go_fm440
;                       SEQ_STEP=000 INT_REG=0000 0010 COMMAND_REG=44h
                jmp     scsi_int_exit           ;while I do not know what to do
;                       END  SEQ_STEP=000 INT_REG=0000 0010 COMMAND_REG=44h
go_fm440:       cmp     byte ptr seq_step, 04h
                jnz     go_fm444
;                       SEQ_STEP=100 INT_REG=???? ???? COMMAND_REG=44H
                cmp     byte ptr interrupt_reg, 02h ;parity error during 2nd or 3rd message byte
                mov     al, 12h                 ;j-change. fixup. when seq_step=04, assume
                cmp     al, 02h                 ;int_reg=12h always.
                jnz     go_fm44402
;                       SEQ_STEP=100 INT_REG=0000 0010 COMMAND_REG=44H
                jmp     scsi_int_exit           ;while I do not know what to do
;                       END  SEQ_STEP=100 INT_REG=0000 0010 COMMAND_REG=44H
;
go_fm44402: cmp byte ptr interrupt_reg, 12h ;ATN remained true after 3rd message byte?
                mov     al, 12h                 ;j-change. fixup. again, when seq_step=04,
                cmp     al, 12h                 ;assume int_reg=12h always.
                jnz     go_fm44412
```


23

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;                           SEQ_REG=100 INT_REG=0001 0010 COMMAND_REG=44H
;now read the data. I am using non-dma mode ie everything is in the SCSI FIFO.
                mov     ax, 0000h
                mov     dx, 0337h               ;read SCSI Flags register
                in      al, dx
                and     al, 1fh                 ;lowest 5 bits are fifo flags
                cmp     al, 00h
                jz      go_fm444120
                mov     cx, ax
                mov     bp, sp
                mov     bx, ss
                mov     ax, ds
                mov     ss, ax              ;scsi irq ie cli
                lea     ax, word ptr scsi_message_byte_0+2
                mov     sp, ax
lup44412:       mov     dx, 0332h           ;scsi fifo
                in      al, dx
                push    ax                      ;data to scsi_message_byte_n
                loopnz  lup44412
                mov     ss, bx
                mov     sp, bp
;first byte of message is or of scsi ids. it does not come from msg xfer but fm selection phase.
;second byte is first message. these two will establish a i_t_x nexus.
;these can be stored somehow. but here we need to fetch more message bytes.
                mov     al, byte ptr scsi_message_byte_0
;following line not needed and also uses explicit reference to own scsi id.
;               and     al, 10111111b           ;isolating my scsi id
                test    al, 10000000b           ;is it scsi node 7?
                jz      go_fmscsi_id_7
                mov     byte ptr i_t_lsource_id, 07h
                mov     al, byte ptr scsi_message_byte_1;this is the identify message
                and     al, 07h                 ;isolating LUN bits
                mov     byte ptr i_t_1lun, al   ;LUN no saved. during response to inquiry command
                mov     al, byte ptr scsi_message_byte_1;to check for disc privilege
                and     al, 40h                 ;isolate disc priv bit
                shr     al, 6
                mov     byte ptr i_t_ldisc_priv, al ;store it in memory
                jmp     over1               ;I must use LUN number.
                                            ;LUN=000b is the hard disk hat I am wearing
                                            ;LUN=001b is the FAX/VOICE/DATA
                                            ;NOTE: I am not recording if the initiator
                                            ;handles disconnects. I have some reservations
                                            ;about disconnecting. Angora CatBox handles hard
                                            ;disk and FAX/VOICE/DATA related requests. it may
                                            ;be that one assumes the completion of the other.
                                            ;at the host level this needs to be incorporated
                                            ;also. thus no disconnect seems to be the clean
                                            ;approach at least at first.
go_fmscsi_id_7: jmp     scsi_int_exit       ;I do not know what to do if other than the PC
                                            ;host calls me. what is a way of rejecting a
                                            ;request for interaction. perhaps during inquiry
                                            ;command? thus, I could probably pursue this
                                            ;request like the one from scsi node 7 and if this
                                            ;node responds properly to the fact that my
                                            ;LUN=000 is a direct access device then I am set.
;third byte will tell us what the next message is. here we check to see if it is
;extended. here is my policy: check every element and program the sequence you
;have seen. this way when you see another sequence it can be incorporated easily.
over1:          cmp     byte ptr scsi_message_byte_2, 01h   ;extended message?
                jnz     go_fm4441201
;                       EXTENDED MESSAGE
;state machine of extended message handling
;set ext_msg_st_on=TRUE keep so until last byte of message is read.
;set ext_msg_st_length=TRUE ie next message is the length
;set ext_msg_st_code=FALSE ie next byte is not code
;set ext_msg_length=00h
;set ext_msg_code=ffh
                mov     byte ptr ext_msg_st_on, true
                mov     byte ptr ext_msg_st_length, true;next byte is a length
                mov     byte ptr ext_msg_st_code, false ;the byte after is a code
                mov     byte ptr ext_msg_length, 00h
                mov     byte ptr ext_msg_length_left, 00h
                mov     byte ptr ext_msg_code, 0ffh
                mov     dx, 0333h
                mov     al, 28h
                out     dx, al                          ;receive message sequence
;now we must relinquish control here and wait for the interrupt.
                jmp     scsi_int_exit
go_fm4441201:   jmp     scsi_int_exit                   ;case of a not an extended message after identify msg
go_fm444120:    jmp     scsi_int_exit                   ;case of no message bytes including id byte
go_fm44412:     jmp     scsi_int_exit                   ;we should not see this case
```

```
;this will work. IRQ from SCSI is a level interrupt and is only reset when 0335[0]
;is read. Although 0333[0]=28 may complete before sti we will be OK. we need however that
;the irr (int req reg) bit is reset and this will be as we entered the scsi_isr.
;                       END  SEQ_REG=100 INT_REG=0001 0010 COMMAND_REG=44H
;                       END  SEQ_REG=100 INT_REG=???? ???? COMMAND_REG=44H
go_fm444:       cmp     byte ptr seq_step, 05h
                jnz     go_fm445
;                            SEQ_REG=101 INT_REG=???? ???? COMMAND_REG=44H
                jmp     scsi_int_exit
;                       END  SEQ_REG=101 INT_REG=???? ???? COMMAND_REG=44H
go_fm445:       cmp     byte ptr seq_step, 06h
                jnz     go_fm446
;                            SEQ_REG=110 INT_REG=???? ???? COMMAND_REG=44H
                jmp     scsi_int_exit
;                       END  SEQ_REG=110 INT_REG=0000 0010 COMMAND_REG=44H
go_fm446:       cmp     byte ptr seq_step, 02h          ;although the data book excludes this case,
                jnz     go_fm442                        ;aspidisk.sys initiates it and ncr406a is able
                mov     al, byte ptr interrupt_reg      ;to handle it successfully.
                mov     al, 02h                         ;j-change. fixup. assume that if seq_step=02
                                                        ;int_reg=02 also.
                cmp     al, 02h                         ;if int_reg=02 then a0,c0,cdb are all in.
                jnz     go_fm4422
                mov     dx, 0332h
                in      al, dx
                mov     byte ptr scsi_message_byte_0, al;store a0
                in      al, dx
                mov     byte ptr scsi_message_byte_1, al;store c0
;first byte of message is or of scsi ids. it does not come from msg xfer but fm selection phase.
;second byte is first message. these two will establish a i_t_x nexus.
;these can be stored somehow. but here we need to fetch more message bytes.
                mov     al, byte ptr scsi_message_byte_0
;following line not needed and also uses explicit reference to own scsi id.
;               and     al, 10111111b                   ;isolating my scsi id
                test    al, 10000000b                   ;is it scsi node 7?
                jz      go_fmscsi_id_7
                mov     byte ptr i_t_lsource_id, 07h
                mov     al, byte ptr scsi_message_byte_1;this is the identify message
                and     al, 07h                         ;isolating LUN bits
                mov     byte ptr i_t_llun, al           ;LUN no saved. during response to inquiry command
                mov     al, byte ptr scsi_message_byte_1;to check for disc privilege
                and     al, 40h                         ;isolate disc priv bit
                shr     al, 6
                mov     byte ptr i_t_ldisc_priv, al     ;store it in memory
;now read the cdb data.
                mov     ax, 0000h
                mov     dx, 0337h                       ;has decreased by two
                in      al, dx
                and     al, 1fh                         ;lowest 5 bits are fifo flags
                mov     cx, ax
                mov     bp, sp
                mov     bx, ss
                mov     ax, ds
                mov     ss, ax                          ;scsi irq ie cli
                lea     ax, word ptr scsi_cmd_byte_0+2
                mov     sp, ax
lup44cdb:       mov     dx, 0332h                       ;scsi fifo
                in      al, dx
                push    ax                              ;data to scsi_cmd_byte_n
                loopnz  lup44cdb
                mov     ss, bx
                mov     sp, bp
;so far messages have been stored and analized. cdb also stored. now look at cdb.
                mov     al, byte ptr scsi_cmd_byte_0
                cmp     al, 00h                         ;is it test unit ready command?
                jz      cdb_test_unit_ready
                cmp     al, 12h                         ;is it inquiry command?
                jz      cdb_inquiry
                cmp     al, 1bh                         ;is it start stop unit command
                jz      cdb_start_stop_unit
                cmp     al, 25h                         ;is it read capacity
                jz      cdb_read_capacity
                cmp     al, 28h                         ;is it read extended?
                jz      cdb_read_extended
                cmp     al, 2ah                         ;is it write extended?
                jz      cdb_write_extended
                jmp     scsi_int_exit                   ;not handling other commands yet.
go_fm4422:
go_fm442:       jmp     scsi_int_exit                   ;we should not see this case
go_fmselected_with_atn:
                jmp     scsi_int_exit                   ;place for xxxb/01h or xxxb/11h(should not happen)
init_seq:       jmp     scsi_int_exit                   ;until I do more here for scanner application
```


25

```
;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=44H        enable select/reselect                                    |
;-------------------------------------------------------------------------------------------------------------+
go_fm44:        cmp     byte ptr command_reg, 028h      ;is it receive message sequence?
                jnz     go_fm28
;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=28H        receive message sequence (one byte at a time for non-dma)        |
;-------------------------------------------------------------------------------------------------------------+
                cmp     byte ptr ext_msg_st_on, true
                jnz     go_fmext_msg_st_on
                cmp     byte ptr ext_msg_st_length, true
                jnz     go_fmext_msg_st_length
                mov     dx, 0332h
                in      al, dx
                mov     byte ptr ext_msg_length, al
                mov     byte ptr ext_msg_length_left, al
                mov     byte ptr ext_msg_st_length, false
                mov     byte ptr ext_msg_st_code, true
                mov     dx, 0333h
                mov     al, 28h
                out     dx, al              ;receive message byte (code byte)
                jmp     scsi_int_exit
go_fmext_msg_st_length:
                cmp     byte ptr ext_msg_st_code, true
                jnz     go_fmext_msg_st_code
                mov     dx, 0332h
                in      al, dx
                mov     byte ptr ext_msg_code, al
                mov     byte ptr ext_msg_st_code, false
                dec     byte ptr ext_msg_length_left
;if extended message length > 1 then go get the arguments
                cmp     byte ptr ext_msg_length_left, 00h
                                    ;if 00 it included code so we are done
                                    ;this will not happen
                jng     go_fmext_msg_length00
                mov     dx, 0333h
                mov     al, 28h
                out     dx, al              ;receive message byte (argument(s))
                jmp     scsi_int_exit
go_fmext_msg_length00:
                jmp     scsi_int_exit       ;we do not really expect this case
                                    ;ie extended msg 01,length,code,nothing
go_fmext_msg_st_code:
                mov     al, byte ptr ext_msg_code
                cmp     al, ext_msg_sdtr
                jnz     go_fmext_msg_sdtr
                cmp     byte ptr ext_msg_length_left, 02h
                jnz     go_fmext_msg_sdtr_1l02      ;it is either 2 or 1
                mov     dx, 0332h
                in      al, dx
                mov     byte ptr ext_msg_sdtr_xfer_per, al
                dec     byte ptr ext_msg_length_left
                mov     dx, 0333h
                mov     al, 28h
                out     dx, al
                jmp     scsi_int_exit
go_fmext_msg_sdtr_1l02:
                mov     dx, 0332h
                in      al, dx
                mov     byte ptr ext_msg_sdtr_reqack_offset, al
                mov     byte ptr ext_msg_st_on, false   ;concludes the extended message state
;sdtr response. extended message.
;must make the whole message here and then send it.
                mov     dx, 0332h
                mov     al, 01h                 ;extended message
                out     dx, al
                mov     al, 03h                 ;length byte
                out     dx, al
                mov     al, 01h                 ;synchronous data xfer request
                out     dx, al
                mov     al, 19h                 ;100ns from req edge to req edge
                out     dx, al
                mov     al, 00h                 ;let us go asynchronous
                out     dx, al
                mov     dx, 0333h
                mov     al, 20h                 ;the whole message is shipped
                out     dx, al                  ;when we come back from int we "receive cmd"
                mov     byte ptr msg_sent, ext_msg_sdtr
                jmp     scsi_int_exit
go_fmext_msg_st_on:
go_fmext_msg_sdtr:
```

```
go_fm_ext_msg_st_on:
                jmp     scsi_int_exit           ;do not know what to do with it yet.
;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=28H        receive message sequence (one byte at a time for non-dma)                         |
;-------------------------------------------------------------------------------------------------------------+
go_fm28:        cmp     byte ptr command_reg, 020h          ;is it enable select/reselect?
                jnz     go_fm20
;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=20H        send message                                    |
;-------------------------------------------------------------------------------------------------------------+
;CLASSIFICATION OF EXTENDED MESSAGES
;NAME                    CODE HOW MANY BYTES BEYOND THE FIRST 01H (ie extended msg code)
;--------------------------------    ---- ------------------------------------------------------------
;MODIFY DATA POINTER                00H  06
;SYNCHRONOUS DATA TRANSFER REQUEST     01H  04
;WIDE DATA TRANSFER REQUEST            03H  03
;VENDOR SPECIFIC
;if the message sent was "message sdtr" the next step is "receive command sequence"
                cmp     byte ptr msg_sent, ext_msg_sdtr
                jnz     go_fmmsg_ext_sdtr
                mov     dx, 0333h
                mov     al, 2bh
                out     dx, al
                jmp     scsi_int_exit
go_fmmsg_ext_sdtr:
;if the message sent was "command complete" the next step is "disconnect"
;disconnect does not generate an interrupt. so nothing further to do.
                cmp     byte ptr msg_sent, msg_cmd_cmplete
                jnz     go_fmmsg_cmd_cmplete
                mov     dx, 0333h
                mov     al, 27h
                out     dx, al                  ;disconnect command
                mov     al, 44h
                out     dx, al                  ;enable select/reselect
                jmp     scsi_int_exit
go_fmmsg_cmd_cmplete:
                jmp     scsi_int_exit           ;modify when other messages are sent out.
;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=20H        send message                                                                      |
;-------------------------------------------------------------------------------------------------------------+
go_fm20:        cmp     byte ptr command_reg, 021h
                jnz     go_fm21
;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=21H        send status                                                                           |
;-------------------------------------------------------------------------------------------------------------+

;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=21H        send status                                                                       |
;-------------------------------------------------------------------------------------------------------------+

go_fm21:        cmp     byte ptr command_reg, 022h
                jnz     go_fm22

;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=22H                                                                                              |
;-------------------------------------------------------------------------------------------------------------+
;identifying what went on before
                cmp     byte ptr cdb_inq_data16, true
                jnz     gofm_cdb_inq_data16
                mov     dx, 0332h
                lea     si, word ptr lun_00_id
                mov     ah, 00h
                mov     al, byte ptr i_t_llun
                shl     ax, 4
                add     si, ax
                mov     cx, 0010h
                rep     outsb
                mov     byte ptr cdb_inq_data16, false
                mov     al, byte ptr scsi_cmd_byte_4    ;allocation length
                cmp     al, 20h                         ;is it just 20h?
                jz      last_batch                      ;if not 20h then 24h.
                mov     byte ptr cdb_inq_data32, true
last_batch:     mov     dx, 0333h
                mov     al, 22h                         ;send data
                out     dx, al                          ;issue command
                jmp     scsi_int_exit                   ;while NCR is doing its thing, get ready for irq.
lun_00_id       db      "ANGORA CaTdisk  "
lun_01_id       db      "INT2F Translator"
lun_02_id       db      "SerialTranslator"
lun_03_id       db      "PrintrTranslator"
lun_04_id       db      "DOS Synchronizer"
```

```
lun_05_id       db      "WIN Synchronizer"
lun_06_id       db      "Not a Device    "
lun_07_id       db      "Not a Device    "
gofm_cdb_inq_data16:
                cmp     byte ptr cdb_inq_data32, true
                jnz     gofm_cdb_inq_data32
                mov     dx, 0332h
                mov     al, "1"                         ;32 product revision label
                out     dx, al
                mov     al, "."                         ;33
                out     dx, al
                mov     al, "0"                         ;34
                out     dx, al
                mov     al, "0"                         ;35 end of inquiry data
                out     dx, al
                mov     byte ptr cdb_inq_data16, false
                mov     byte ptr cdb_inq_data32, false
                mov     dx, 0333h
                mov     al, 22h                         ;send data
                out     dx, al
                jmp     scsi_int_exit                   ;while NCR is doing its thing, get ready for irq.

gofm_cdb_inq_data32:
;we have not encountered these cases yet.
                mov     al, byte ptr scsi_cmd_byte_0    ;read the currently executing scsi command
                cmp     al, 12h
                jnz     gofm_not_cmd_12
;if command 12, ie inquiry and we just sent data, then we must be at the end of it as otherwise
;the previous checks of data16 or data32 would have caught it.
                mov     dx, 0332h                       ;point to scsi fifo
                mov     al, 00h                         ;status "good"
                out     dx, al
                mov     al, 00h                         ;message "command complete"
                out     dx, al
                mov     dx, 0333h
                mov     al, 24h                         ;terminate sequence
                out     dx, al
                jmp     scsi_int_exit

gofm_not_cmd_12:mov     al, byte ptr scsi_cmd_byte_0
                cmp     al, 25h
                jz      gofm_cmd_25
                cmp     al, 28h
                jnz     gofm_not_cmd_2822
                mov     bl, byte ptr i_t_llun
                cmp     bl, 01h
                jnz     gofm_2822_but_not_01
;now for read extended (28h) with lun=01 ie int2f processing
;its tail end is terminate sequence only if all bytes are shipped.
;else another round of 333=22h
                mov     si, word ptr scsi_int2f_out_buf_ptr
                mov     ax, word ptr scsi_ext_xlen
                cmp     ax, 0000h
                jnz     gofm_ax_0000                    ;if no more bytes we are done
;here we introduce a delay loop to give ASPI more time to process the data we supplied it.
;it seems to me the disconnect irq comes too soon.
                mov     cx, 0ffffh
delay_lup:      mov     ax, 0000h
                nop
                loop    delay_lup
                jmp     gofm_cmd_25                     ;done with read cdb lun=01
gofm_ax_0000:   cmp     ax, 0010h                       ;cf. 16 decimal
                ja      xlen_gt_1622
                mov     cx, word ptr scsi_ext_xlen
                jmp     over_xlen_gt_1622
xlen_gt_1622:   mov     cx, 0010h
over_xlen_gt_1622:
                sub     word ptr scsi_ext_xlen, cx
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time.
                mov     dx, 0332h                       ;dx-> SCSI FIFO
                rep     outsb                           ;read one byte from ds:si to (dx), incr si.
                mov     word ptr scsi_int2f_out_buf_ptr, si
                mov     dx, 0333h
                mov     al, 22h                         ;send data non DMA version
                out     dx, al
;if scsi command 28, ie read_ext and we just sent data, then we must be at the end of it.
                jmp     scsi_int_exit

gofm_cmd_25:    mov     dx, 0332h                       ;point to scsi fifo
                mov     al, 00h                         ;status "good".
                out     dx, al
```

```
                mov     al, 00h                         ;message "command complete"
                out     dx, al
                mov     dx, 0333h
                mov     al, 24h                         ;terminate sequence
                out     dx, al
                jmp     scsi_int_exit

gofm_2822_but_not_01:
                mov     bl, byte ptr i_t_llun
                cmp     bl, 03h
                jnz     gofm_2822_but_not_03
;here we introduce a delay loop to give ASPI more time to process the data we supplied it.
;it seems to me the disconnect irq comes too soon.
                mov     cx, 0ffffh
delay_lup1:     mov     ax, 0000h
                nop
                loop    delay_lup1
                jmp     gofm_cmd_25                     ;done with read cdb for lun=03
gofm_2822_but_not_03:
;scsiissc.asm change
                mov     bl, byte ptr i_t_llun
                cmp     bl, 04h
                jnz     gofm_2822_but_not_04
;here we introduce a delay loop to give ASPI more time to process the data we supplied it.
;it seems to me the disconnect irq comes too soon.
;maspi0w.sys change. 9/1/95. see how low we can go before it fails
;first try: 0ffffh -> 01000h.
                mov     cx, 01000h                      ;need to minimize this delay
delay_lup9:     mov     ax, 0000h
                nop
                loop    delay_lup9
                jmp     gofm_cmd_25                     ;done with read cdb for lun=03
;end scsiissc.asm change

gofm_2822_but_not_04:
;scsiissi.asm change
                mov     bl, byte ptr i_t_llun
                cmp     bl, 07h
                jnz     gofm_2822_but_not_07
;here we introduce a delay loop to give ASPI more time to process the data we supplied it.
;it seems to me the disconnect irq comes too soon.
;maspi0w.sys change. 9/1/95. see how low we can go before it fails
;first try: 0ffffh -> 01000h.
                mov     cx, 01000h                      ;need to minimize this delay
delay_lup97:    mov     ax, 0000h
                nop
                loop    delay_lup97
                jmp     gofm_cmd_25                     ;done with read cdb for lun=03
;end scsiissc.asm change

gofm_2822_but_not_07:
                jmp     scsi_int_exit
gofm_not_cmd_2822:
                jmp     scsi_int_exit
;-----------------------------------------------------------------------------------------------------------+
;COMMAND_REG=22H                                                                                            |
;-----------------------------------------------------------------------------------------------------------+

go_fm22:    cmp byte ptr command_reg, 0a2h
        jnz go_fma2

;-----------------------------------------------------------------------------------------------------------+
;COMMAND_REG=A2H                                                                                            |
;-----------------------------------------------------------------------------------------------------------+
        mov al, byte ptr scsi_cmd_byte_0    ;read the currently executing scsi command
        cmp al, 28h
        jnz gofm_not_cmd_28
;if command 28, ie read_ext and we just sent data, then we must be at the end of it.
;need to reset the features bit and the PIO enable bit.
        mov dx, 033bh
        in  al, dx
        and al, 10111111b   ;reset the features bit
        out dx, al
        mov dx, 033dh
        mov al, 0b6h
        out dx, al      ;0->1
        mov dx, 0338h
        mov al, 00h
        out dx, al      ;reset PIO enable bit
        mov dx, 033dh
        mov al, 04h
```

```
        out dx, al      ;1->0
        mov dx, 0332h   ;point to scsi fifo
        mov al, 00h     ;status "good"
        out dx, al
        mov al, 00h     ;message "command complete"
        out dx, al
        mov dx, 0333h
        mov al, 24h     ;terminate sequence
        out dx, al
        jmp scsi_int_exit

gofm_not_cmd_28:jmp scsi_int_exit
;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=A2H                                                                                              |
;-------------------------------------------------------------------------------------------------------------+

;go_fma2:   cmp byte ptr command_reg, 0aah
;go_fma2:   cmp byte ptr command_reg, 04h
go_fma2:    ;cmp    byte ptr command_reg, 2ah
;post processing belongs with the scsi command write_10 as we poll and not use irq's.
        jmp go_fmaa

go_fmaa:    cmp byte ptr command_reg, 024h
        jnz go_fm24

;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=24H                                                                                              |
;-------------------------------------------------------------------------------------------------------------+
;the following cases are possible:  seq step    interrupt reg
;                   000         0001 1000  ATN set after status byte
;                   001         0001 1000      ATN set after status and message
;                   010         0010 1000  terminate complete. disconnected
;I will ignore the ATN cases for the time being. they lead to NCR not disconnecting after all and issuing
;a message out phase. these cases will end up in scsi_int_exit
        mov al, byte ptr seq_step
        cmp al, 02h             ;is it the success case?
        jnz scsi_int_exit           ;if not do not deal with it now.
        mov al, byte ptr interrupt_reg
        mov al, 28h             ;j-change. fixup. assume that here int_reg=28h
        cmp al, 28h             ;is it the success case?
        jnz scsi_int_exit           ;if not do not deal with it now.
;if successful termination, issue 0333=44h ie enable select/reselect
        lea bx, word ptr ncr_init_req
        mov al, byte ptr [bx]
        cmp al, true
        jnz no_init_req
        lea bx, word ptr ncr_45_fm_aspi
        mov byte ptr [bx], false
        lea bx, word ptr ncr_45_fm_isr
        mov byte ptr [bx], true
        mov dx, 0333h
        mov al, 45h
        out dx, al
        jmp scsi_int_exit
no_init_req:    lea bx, word ptr ncr_target_busy
        mov byte ptr [bx], false
        mov dx, 0333h
        mov al, 44h
        out dx, al
        jmp scsi_int_exit
;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=24H                                                                                          |
;-------------------------------------------------------------------------------------------------------------+

go_fm24:    cmp byte ptr command_reg, 045h
        jnz go_fm45

;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=45H                                                                                              |
;-------------------------------------------------------------------------------------------------------------+
        lea bx, word ptr ncr_45_fm_aspi
        mov al, byte ptr [bx]
        cmp al, true
        jnz not_fm_aspi
        lea bx, word ptr ncr_init_req_taken_fm_not_busy
        mov byte ptr [bx], true
        lea bx, word ptr ncr_init_req_taken_fm_busy
        mov byte ptr [bx], false
        jmp scsi_int_exit
not_fm_aspi:    lea bx, word ptr ncr_target_busy
        mov byte ptr [bx], false
```

```
        lea bx, word ptr ncr_init_req_taken_fm_not_busy
        mov byte ptr [bx], false
        lea bx, word ptr ncr_init_req_taken_fm_busy
        mov byte ptr [bx], true
        jmp scsi_int_exit
;
;-------------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=45H                                                    |
;-------------------------------------------------------------------------------------------------------------------+

go_fm45:    cmp byte ptr command_reg, 041h
;go_fm45:   cmp byte ptr command_reg, 042h
        jnz go_fm42                             ;no need to change the label

;-------------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=41H                                                        |
;-------------------------------------------------------------------------------------------------------------------+
;cases for 42h
;cases are: seq_step    interrupt_reg   description action
;       000     0010 0000   time-out, disc.
;       000     0001 1000   no atn
;       010     0001 1000   no cmd
;       011     0001 1000   partial cmd
;       100     0001 1000   successful!
;cases for 41h
;cases are:     seq_step        interrupt_reg   description     action
;               000             0010 0000       arb complete, selection timeout, disconnected
;               010             0001 1000       arb, sel complete. target did not assert command phase
;               011             0001 1000       stopped during command, target changed phase early
;               100             0001 1000       select sequence complete
;we will assume we were successful. in non success cases we will return with status 02 ie scsi aborted
;by host. sjiix.sys ought to know what to do.
;es:bx->SRB.
                mov     bx, word ptr SRB_bx
                mov     es, word ptr SRB_es

        mov al, byte ptr seq_step
        cmp al, 04h             ;is it the success case?
        jz  cont_42
        mov es:byte ptr [bx+01h], 02h   ;status=scsi request aborted by host
;scsiisrs.asm change. empty the fifo.
fifo_empty_lup: mov     dx, 0337h
                in      al, dx
;scsiisru.asm change.
                and     al, 1fh         ;isolate the scsi fifo count bits
                cmp     al, 00h
                jz      status_02_exit
                mov     dx, 0332h
                in      al, dx                          ;unload fifo
                jmp     fifo_empty_lup
status_02_exit: jmp scsi_int_exit           ;return to main program control
cont_42:
;scsiisru.asm change.
                mov     al, byte ptr status_reg
                and     al, 07h                         ;isolate the phase bits
                cmp     al, 03h
                jnz     cont_with_cdb
;scsiisry.asm change
;check that the cdb has zero bytes of transfer length. if so do not set this byte.
                mov     al, es:byte ptr [bx+43h]        ;MSB of xfer length. actually this byte
                                                        ;is for LBA but scanner does not use these
                                                        ;bytes for that purpose.
                cmp     al, 00h
                jnz     set_repeat_byte
                mov     al, es:byte ptr [bx+44h]        ;LSB of xfer length
                cmp     al, 00h
                jnz     set_repeat_byte
                jmp     init_ncr10_setup
set_repeat_byte:mov     byte ptr repeat_on_chk_cond, 01h
;end scsiisry.asm change
                jmp     init_ncr10_setup
;end scsiisru.asm change
;we got here from inquiry, read_6, or write_6. in all cases we must know how many bytes we are expecting.
;this is available in the CDB (es:bx).
;       mov al, es:byte ptr [bx+44h]    ;transfer length from CDB
;       mov byte ptr scsi_init_xlen, al ;save number of bytes
;bad approach as not all CDB's have transfer length in the same area.
;at this point, I need to know if I will send data or receive data. for receiving data, it does not quite
;matter that I know how many bytes are coming in. from status bits, I can tell the phase we are in and if
;data in, put the data bytes in the data area of SRB. if status, I can read it and if it is good, go on,
;if it is "check condition" then issue a "request sense". I can then return a certain status byte in the
```

```
;SRB. SJIIX.SYS issues request sense CDB. perhaps then I just somehow pass on "check condition" to the SRB
;and let SJIIX.SYS issue the request sense. similarly with message. if it is "command complete" then go on.
;if I am sending data, then I need to know how many bytes. these data bytes are in the data area of the
;SRB already. SRB has two places that tell me how many bytes there are. in the SRB proper there is a length
;of buffer byte and in the CDB section of SRB there is a transfer length byte or word. they must be consis-
;tent. must ask Adaptec BBS.
;so send: number of bytes sent depends on xfer length in CDB.
;receive: number of bytes received depends on phase being a data in phase.
;now we determine if send data or receive data
cont_with_cdb:  mov al, 00h
        mov byte ptr scsi_init_xlen+1, al   ;upper byte of transfer length
;store data offset and segment in variables. the offset value will change as data is read/written
        mov ax, es:word ptr [bx+0fh]
        mov word ptr scsi_init_data_off, ax
        mov ax, es:word ptr [bx+11h]
        mov word ptr scsi_init_data_seg, ax
;read buffer has a 24 bit transfer length. I will use 16 bit transfer length.
        mov al, es:byte ptr [bx+40h]    ;CDB scsi command code
        cmp al, 12h             ;is it inquiry?
        jnz init_03
        mov al, es:byte ptr [bx+44h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov byte ptr scsi_init_recv_data, true
        mov byte ptr scsi_init_send_data, false
        jmp init_ncr10_setup
init_03:    cmp al, 03h             ;is it request sense?
        jnz init_08
        mov al, es:byte ptr [bx+44h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov byte ptr scsi_init_recv_data, true
        mov byte ptr scsi_init_send_data, false
        jmp init_ncr10_setup
init_08:    cmp al, 08h             ;is it read?
        jnz init_3c
        mov al, es:byte ptr [bx+44h]    ;transfer length from CDB
;start scsiisrx.asm change
                mov     ah, es:byte ptr [bx+43h]        ;see 01-95-36
                mov     byte ptr scsi_init_xlen+1, ah   ;counting on byte 3 being either 0 or msb
;end start scsiisrx.asm change                          ;of number of bytes
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov byte ptr scsi_init_recv_data, true
        mov byte ptr scsi_init_send_data, false
;scsiissa.asm change
        cmp ax, 0080h
        jb  init_ncr10_setup
        jmp init_ncr90_setup
init_3c:    cmp al, 3ch             ;is it read buffer?
        jnz init_1d
        mov al, es:byte ptr [bx+48h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov al, es:byte ptr [bx+47h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen+1, al   ;save number of bytes
        mov byte ptr scsi_init_recv_data, true
        mov byte ptr scsi_init_send_data, false
;scsiissa.asm change
        jmp init_ncr90_setup
init_1d:    cmp al, 1dh             ;is it send diagnostic?
        jnz init_0a
;NB: SJIIX.SYS sends self test command and thus no data.
        mov al, es:byte ptr [bx+44h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov al, es:byte ptr [bx+43h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen+1, al   ;save number of bytes
        mov byte ptr scsi_init_recv_data, true
        mov byte ptr scsi_init_send_data, false
        jmp init_ncr10_setup
init_0a:    cmp al, 0ah             ;is it write?
        jnz init_3b
        mov al, es:byte ptr [bx+44h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov byte ptr scsi_init_recv_data, false
        mov byte ptr scsi_init_send_data, true
;now must transfer data from data buffer pointer to the ncr scsi fifo
        push    ds
        push    bx
        mov bx, word ptr scsi_init_data_off
        mov ax, word ptr scsi_init_data_seg
        mov ds, ax
        mov al, byte ptr [bx]
        mov dx, 0332h
        out dx, al              ;byte from data buffer -> scsi fifo
```

```
        inc bx
        mov word ptr scsi_init_data_off, bx ;incremented offset value in variable
        mov ax, word ptr scsi_init_xlen
        dec ax
        mov word ptr scsi_init_xlen, ax ;if, now, xlen=0, then upon irq, we set up
                        ;for status, message.
        pop bx
        pop ds
        jmp init_ncr10_setup
init_3b:    cmp al, 3bh             ;is it write buffer?
        jnz init_??
        mov al, es:byte ptr [bx+48h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen, al ;save number of bytes
        mov al, es:byte ptr [bx+47h]    ;transfer length from CDB
        mov byte ptr scsi_init_xlen+1, al   ;save number of bytes
        mov byte ptr scsi_init_recv_data, false
        mov byte ptr scsi_init_send_data, true
;now must transfer data from data buffer pointer to the ncr scsi fifo
        push    ds
        push    bx
        mov bx, word ptr scsi_init_data_off
        mov ax, word ptr scsi_init_data_seg
        mov ds, ax
        mov al, byte ptr [bx]
        mov dx, 0332h
        out dx, al              ;byte from data buffer -> scsi fifo
        inc bx
        mov word ptr scsi_init_data_off, bx ;incremented offset value in variable
        mov ax, word ptr scsi_init_xlen
        dec ax
        mov word ptr scsi_init_xlen, ax ;if, now, xlen=0, then upon irq, we set up
                        ;for status, message.
        pop bx
        pop ds
        jmp init_ncr10_setup
init_??:    jmp scsi_int_exit           ;should not occur
;here we setup for 333=10h and exit isr. upon return have enough clues to decide what to do.
init_ncr10_setup:
        mov dx, 0333h
        mov al, 10h                     ;transfer information
        out dx, al
        jmp scsi_int_exit
;scsiissa.asm change
init_ncr90_setup:
        mov ax, word ptr scsi_init_xlen
        cmp ax, 0080h                   ; > 128 ?
        jb  read_buffer_less_than_128
        mov dx, 0330h           ;write to transfer count register
        mov al, 80h
        mov byte ptr init_number_in_pio_fifo, al
        out dx, al
issue_ncr90:
        mov dx, 0331h           ;write to transfer count register
        mov al, 00h
        out dx, al
        mov dx, 033dh           ; 0 -> 1
        mov al, 0b6h
        out dx, al
        mov dx, 0338h           ;PIO Mode Bit Set
        mov al, 01h
        out dx, al
        mov dx, 033dh           ; 1 -> 0
        mov al, 04h
        out dx, al
        mov dx, 0333h           ;command register
        mov al, 90h
        out dx, al
        jmp scsi_int_exit

read_buffer_less_than_128:
        mov dx, 0330h           ;write to transfer count register
        mov al, byte ptr scsi_init_xlen
        mov byte ptr init_number_in_pio_fifo, al
        out dx, al
        jmp issue_ncr90

;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=42H                                                                                          |
;-------------------------------------------------------------------------------------------------------------+
;scsiissa.asm change
go_fm42:    cmp byte ptr command_reg, 010h
```

```
            je  command_reg_eq_10_90
            cmp byte ptr command_reg, 090h
            je  command_reg_eq_10_90
            jnz go_fm10

command_reg_eq_10_90:
;-------------------------------------------------------------------------------------------------------+
;COMMAND_REG=10H                                                                                        |
;-------------------------------------------------------------------------------------------------------+
;what do we do here? if receive data then we find byte in scsi fifo. if send data then we just sent
;data and need to send another one if the counter is not zero.
        cmp     byte ptr scsi_init_recv_data, true
        jnz init_send_data
;if receive data, then we have a byte in scsi fifo. we need to place it in the SRB data area. we then
;decrement the transfer counter. if not zero, we issue another 333=10. it could also be that the counter
;is zero to begin with. in this case issue a 10 because now you are waiting for status and message. one
;could also check for data or message or status at each step. we will assume that the sequence is pro-
;ceeding properly.
        mov ax, word ptr scsi_init_xlen
;scsiisrr.asm change
                cmp     ax, 0000h               ;if 0000, we just got a status byte or msg byte
;       cmp al, 00h     ;if 00, we just got a status byte or a message byte
        jnz init_recv_data
;if status, it could be "good", "check condition", "busy" etc. note that up to this point we have not
;made contact with the scanner. it may really be busy. wait! not quite so. the fact that we got here
;means we got the scsi bus. so we will not get unexpected status.
;thus do not expect busy. but expect "check condition". if so then issue a "request sense" and upon
;return from it get the sense data put it in the correct place in SRB and then update the status byte
;in SRB. note that maspi is looping on status=00 ie in progress. once status .ne. 00 then the loop
;will break and then we far return to sjiix.sys. just great!
;first must distinguish between status or message.
;scsiisrt.asm change
status_message: mov     al, byte ptr status_reg_old
                and     al, 07h                 ;isolate the phase bits
                cmp     al, 03h
                jnz     status_07
                mov     dx, 0332h
                in      al, dx
                cmp     al, 00h                 ;check for status good
;scsiisru.asm change
                jz      what_to_issue           ;if good, go on.
                cmp     al, 02h                 ;is it check condition
                jnz     sts_not_good            ;if not hang
                mov     al, byte ptr repeat_on_chk_cond
                cmp     al, 01h                 ;is it a repeat cdb situation
                jnz     sts_not_good            ;if not hang
                jmp     what_to_issue
sts_not_good:   jnz     sts_not_good            ;if not good hang
;end scsiisru.asm change
status_07:      cmp     al, 07h
                jnz     status_00               ;if not message then what else?
                mov     dx, 0332h
                in      al, dx
                cmp     al, 00h                 ;check for message command complete
msg_not_good:   jnz     msg_not_good            ;if not good hang
                jmp     what_to_issue
;scsiisrv.asm change
status_00:      cmp     al, 00h                 ;interim state in write. no bytes. just passing.
status_not_00:  jnz     status_not_00
                jmp     what_to_issue
;end scsiisrv.asm change
;now what to do next
what_to_issue:  mov     al, byte ptr interrupt_reg
                test    al, 00001000b           ;test function complete bit
                jz      init_ncr10_setup        ;if zero then issue 333=10 else issue 333=12
                mov     dx, 0333h
                mov     al, 12h
                out     dx, al
                jmp     scsi_int_exit
;###############################################
;               mov al, byte ptr status_reg
;       and al, 07h     ;isolate the phase bits.
;       cmp al, 03h     ;is it status phase?
;       jz  init_stat_phase
;       cmp al, 07h     ;is it message in phase?
;we will assume that is has to be.
;       mov dx, 0332h
;       in  al, dx
;       cmp al, 00h     ;is it command complete message?
;       jz  init_msg_cmd_cmp
;here we process other messages such as: abort etc. but for now, do not expect them
```

```
;init_msg_cmd_cmp:
;scsiisrr.asm change: check if interrupt_reg=08h ie function complete. if so, issue 333=12 but if
;not, issue another 333=10h.
;               mov     al, byte ptr interrupt_reg
;               test    al, 00001000b           ;test function complete bit
;               jnz     scsi_10_fn_cmp          ;if set, issue 333=12
;               jmp     init_ncr10_setup
;if command complete, we are done with CDB. do not update status in SRB yet. we have to go through
;the terminate process. in this case, the ACK from the initiator is still on, must issue a message
;accepted command which will reset ACK. now the target will release the bus.
;scsi_10_fn_cmp:    mov dx, 0333h
;       mov al, 12h
;       out dx, al
;       jmp scsi_int_exit
;init_stat_phase:mov    dx, 0332h
;       in  al, dx      ;read the status byte
;       cmp al, 00h     ;is status good?
;       jz  init_stat_good
;here we issue request sense cdb. after sense data is in, set target status area of SRB.
;init_stat_good:    jmp init_ncr10_setup
;###############################################
init_recv_data:
        cmp     byte ptr command_reg, 090h
        jne     command_reg_eq_10
        PUSH    ES
        push    di
        mov     di, word ptr scsi_init_data_off
        mov     ax, word ptr scsi_init_data_seg
        mov     ES, ax
        mov     ch, 0
        mov     cl, byte ptr init_number_in_pio_fifo
        sub     word ptr scsi_init_xlen, cx
        test    cl, 01h
        mov     bx, 0
        jz      init_count_even
        mov     bx, 1
init_count_even:
        mov     dx, 033dh                       ; 0 -> 1
        mov     al, 0b6h
        out     dx, al
        mov     dx, 0334h                       ;PIO FIFO register
        shr     cx, 1
        rep     insw
        cmp     bx, 0
        je      init_skip_odd
        insb
init_skip_odd:
        mov     word ptr scsi_init_data_off, di
        mov     dx, 033dh                       ; 1 -> 0
        mov     al, 04h
        out     dx, al
        pop     di
        POP     ES
;if scsi_init_xlen=0 then issue 10, else issue 90.
        cmp     word ptr scsi_init_xlen, 0000h
        je      init_ncr10_setup
        jmp     init_ncr90_setup

;get data from fifo, place in data buffer of SRB, increment the buffer pointer, decrement the byte cntr.

command_reg_eq_10:
        push    ds
        push    bx
        mov bx, word ptr scsi_init_data_off
        mov ax, word ptr scsi_init_data_seg
        mov ds, ax
        mov dx, 0332h
        in  al, dx              ;byte from scsi fifo -> data buffer
        mov byte ptr [bx], al
        inc bx
        mov word ptr scsi_init_data_off, bx ;incremented offset value in variable
;scsiisrw.asm change. if status_reg=03 or 83, then set xlen=0000h
                mov     al, byte ptr status_reg
                and     al, 07h
                cmp     al, 03h
                jnz     cont_xlenr
                mov     word ptr scsi_init_xlen, 0000h
                jmp     skip_xlenr
cont_xlenr: mov ax, word ptr scsi_init_xlen
        dec ax
        mov word ptr scsi_init_xlen, ax ;if, now, xlen=0, then upon irq, we set up
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35

```
                                ;for status, message.
skip_xlenr: pop bx
        pop ds
;end scsiisrw.asm change.
        jmp init_ncr10_setup
init_send_data:
;here, if we have xlen=00, it means that all data is sent. in this case we are waiting for a status
;and a message byte. we could use the same code section above that deals with the situation.
        mov ax, word ptr scsi_init_xlen
;scsiisrt.asm change
                cmp     ax, 0000h
;       cmp al, 00h     ;if 00, we just got a status byte or a message byte
        jz  status_message
;get data from SRB, place in scsi fifo, increment the buffer pointer, decrement the byte cntr.
        push    ds
        push    bx
        mov bx, word ptr scsi_init_data_off
        mov ax, word ptr scsi_init_data_seg
        mov ds, ax
        mov al, byte ptr [bx]
        mov dx, 0332h
        out dx, al              ;byte from scsi fifo -> data buffer
        inc bx
        mov word ptr scsi_init_data_off, bx ;incremented offset value in variable
;scsiisrw.asm change. if status_reg=03 or 83, then set xlen=0000h
                mov     al, byte ptr status_reg
                and     al, 07h
                cmp     al, 03h
                jnz     cont_xlens
                mov     word ptr scsi_init_xlen, 0000h
                jmp     skip_xlens
cont_xlens: mov ax, word ptr scsi_init_xlen
        dec ax
        mov word ptr scsi_init_xlen, ax ;if, now, xlen=0, then upon irq, we set up
                                ;for status, message.
skip_xlens: pop bx
        pop ds
;end scsiisrw.asm change.
        jmp init_ncr10_setup

;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=10H                                                    |
;-------------------------------------------------------------------------------------------------------------+

go_fm10:    cmp byte ptr command_reg, 012h
        jnz go_fm12

;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=12H                                                        |
;-------------------------------------------------------------------------------------------------------------+
;at this point, scsi bus is released by target. we need to update status in SRB and return
                mov     bx, word ptr SRB_bx
                mov     es, word ptr SRB_es
        mov es:byte ptr [bx+01h], 01h   ;SRB status: completion w/o error
;scsiisru.asm change. no need to release init status. it will be done when returned to maspi
;unless there is a repeat situation.
;now that this transaction is done, we initialize handshake variables and set 333=44
;       mov     byte ptr ncr_init_req, 00h
;       mov     byte ptr ncr_init_req_taken_fm_busy, 00h
;       mov     byte ptr ncr_init_req_taken_fm_not_busy, 00h
;               mov     byte ptr ncr_45_fm_aspi, 00h
;               mov     byte ptr ncr_45_fm_isr, 00h
;334h[0]    Destination ID(W)            ;now that not in init mode, switch dest id from scanner
;       mov dx, 0334h               ;to host adapter card on host PC
;       mov al, 07h     ;destination id=7 (adaptec at host)
;       out dx, al
;enable select/reselect
;               mov     dx, 0333h
;               mov     al, 44h
;               out     dx, al
;end scsiisru.asm change
;scsiisrx.asm change. check the SRB SCSI Request flags for post bit set
                mov     bx, word ptr SRB_bx
                mov     es, word ptr SRB_es
                mov     al, byte ptr es:[bx+3h]
                and     al, 01h                 ;isolate the post bit
                cmp     al, 01h                 ;is it set?
                jnz     no_post
                push    es
                push    bx
                call    dword ptr es:[bx+1ah]
```


36

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                pop     bx
                pop     es
;end scsiisrx.asm change
no_post:    jmp scsi_int_exit
;the status loop will detect this change and return far to sjiix.sys.
;-------------------------------------------------------------------------------------------------------------+
;END COMMAND_REG=12H                                                                                          |
;-------------------------------------------------------------------------------------------------------------+

go_fm12:    cmp byte ptr command_reg, 02bh
        jnz go_fm2b

;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=2BH                                                                                              |
;-------------------------------------------------------------------------------------------------------------+
;with irq, the cdb will most likely be in the scsi fifo. the following cases may occur:
;seq step   int reg
;    1        08        parity error. we do not check parity.
;    1        18        parity error and ATN asserted. we do not check parity.
;    2        08        received entire command description block.
;    2        18        received entire cdb, initiator asserted ATN.
        mov al, byte ptr seq_step       ;if =1 exit
        cmp al, 01h
        jz  scsi_int_exit
;now read the data. I am using non-dma mode ie everything is in the SCSI FIFO.
        mov ax, 0000h
        mov dx, 0337h           ;read SCSI Flags register
        in  al, dx
        and al, 1fh             ;lowest 5 bits are fifo flags
        mov cx, ax
        mov bp, sp
        mov bx, ss
        mov ax, ds
        mov ss, ax              ;scsi irq ie cli
        lea ax, word ptr scsi_cmd_byte_0+2
        mov sp, ax
lup2bcdb:   mov dx, 0332h           ;scsi fifo
        in  al, dx
        push    ax              ;data to scsi_message_byte_n
        loopnz  lup2bcdb
        mov ss, bx
        mov sp, bp
;check to see if ATN is asserted. if asserted then must read the message before taking action.
;probably what the scsi command is will have a bearing. but those decisions will have to await
;the full message. meanwhile the command bytes are secured in ram.
        mov al, byte ptr interrupt_reg
        mov al, 08h             ;j-change. fixup. assume int_reg=08h.
        cmp al, 18h             ;is ATN asserted?
        jz  go_fm2b_atn
;case of cdb in fifo and no ATN.
;first byte of cmd is group code and command code.
        mov al, byte ptr scsi_cmd_byte_0    ;get group and command code
        cmp al, 12h             ;is it inquiry command?
        jz  cdb_inquiry
        jmp scsi_int_exit           ;ignore other commands for now.
;case of atn asserted
go_fm2b_atn:    mov al, 28h
        mov dx, 0333h
        out dx, al              ;issue "receive message sequence"
        jmp scsi_int_exit   ;while NCR is doing its thing, get ready for irq.
;need to follow up on it in 28h area with label: go_fmext_msg_st_on. it could still be an extended
;message but we do not know it yet.
;-------------------------------------------------------------------------------------------------------------+
;COMMAND_REG=2BH                                                                                              |
;-------------------------------------------------------------------------------------------------------------+

go_fm2b:
;-------------------------------------------------------------------------------------------------------------+
;SCSI_INT_EXIT                                                                                                |
;-------------------------------------------------------------------------------------------------------------+
;isr tail: send eoi and then sti and then iret
;now must clear the 8259 by sending eoi. clears int from 315
scsi_int_exit:
                mov     al, eoi
                out     intb00, al
                jmp     $+2
                out     inta00, al
scsi_int_exiu:
;decrement InIRQ
        cli
        mov     di, word ptr InIRQ_flag_seg
```


37

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        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        dec     ES:byte ptr [di]

;scsiissd.asm change
        cmp     ES:byte ptr [di], 0
        ja      skip_CR_to_R
        call    restore_fm_Client_regs          ; similar to but not the same as
skip_CR_to_R:                                   ; procedure of same name in catvoice/maestro
;end scsiissd.asm change

                pop     di
                pop     es
                pop     si
                pop     ds
                pop     bp
                pop     dx
                pop     cx
                pop     bx
                pop     ax
               ;sti                             ;this is superfluous
                iret
;-----------------------------------------------------------------------------------------------------------+
;END SCSI_INT_EXIT                                                                                          |
;-----------------------------------------------------------------------------------------------------------+


;-----------------------------------------------------------------------------------------------------------+
;CDB INQUIRY. group 0 command. code 12h.                                                                    |
;-----------------------------------------------------------------------------------------------------------+
;first we check which i_t_l nexus this is. if LUN=000b we respond as direct access device.
cdb_inquiry:
;this was from in identify message. it needs to be consistent with the LUN field in the inquiry command.
        mov al, byte ptr scsi_cmd_byte_1
        and al, 0e0h    ;isolate the LUN bits
        shr al, 5
        cmp al, byte ptr i_t_llun
        jnz gofm_idlun_ne_inqlun_12
;next we check evpd bit. if 1 then we send it off to be handled later
        mov al, byte ptr scsi_cmd_byte_1
        and al, 01h     ;isolate the evpd bit.
        cmp al, 01h
        jz  caseof_evpd_in_inquiry
;next we check the allocation length. as evpd was not set in this part of the flow, the standard
;inquiry data will be supplied. it has 36 (24h) bytes. thus no need to check it.
;well this was aspi2dos.sys. aspidisk.sys requires 20h (32) data.
;here we set up the inquiry data and send its first byte out.
        mov dx, 0332h
                lea     bx, word ptr lun_00_perqual
                mov     ah, 00h
                mov     al, byte ptr i_t_llun
                add     bx, ax
                mov     al, byte ptr [bx]
                out     dx, al
                jmp     over_perqual
lun_00_perqual  db      00h                     ;direct access device           SCSI disk
lun_01_perqual  db      09h                     ;communications device          int 2F translation
lun_02_perqual  db      09h                     ;communications device          serial VxD
lun_03_perqual  db      02h                     ;printer device                 parallel VxD
lun_04_perqual  db      03h                     ;DOS synchronization            processor device
lun_05_perqual  db      03h                     ;WIN synchronization            processor device
lun_06_perqual  db      7fh                     ;not a device
lun_07_perqual  db      7fh                     ;not a device
over_perqual:   mov al, 00h     ; lrmb=0b, device type modifier=0000000b
        out dx, al
        mov al, 02h     ; 2iso version=00b, ecma=000b, ansi=010b
        out dx, al
        mov al, 02h     ; 3aenc=0b, trmIOP=0b, res=00b, inquiry response data format=0010b
        out dx, al
;       mov al, 20h     ; 4additional length=20h
                mov     al, byte ptr scsi_cmd_byte_4
                sub     al, 04h
        out dx, al
        mov al, 00h     ; 5reserved
        out dx, al
        mov al, 00h     ; 6reserved
        out dx, al
        mov al, 00h     ; 7among other things, hard reset alternative. I am currently incon-
                ; sistent as I do not recognize scsi reset interrupt. I must change
                ; it and recognize it. How? by resetting the state machine that I
                ; have put together.
```

```
        out dx, al
        mov al, "3"     ; 8 vendor identification
        out dx, al
        mov al, "t"     ; 9
        out dx, al
        mov al, "a"     ;10
        out dx, al
        mov al, "u"     ;11
        out dx, al
        mov al, 20h     ;12
        out dx, al
        mov al, 20h     ;13
        out dx, al
        mov al, 20h     ;14
        out dx, al
        mov al, 20h     ;15 this fills up the scsi fifo
        out dx, al
;we still have more data to send awaiting irq from ncr command 22h
        mov byte ptr cdb_inq_data16, true
        mov byte ptr cdb_inq_data32, false
        mov dx, 0333h
        mov al, 22h     ;send data
        out dx, al
        jmp scsi_int_exit   ;while NCR is doing its thing, get ready for irq.
caseof_evpd_in_inquiry:
;case of evpd request. I must handle it saying do not have it.
gofm_idlun_ne_inqlun_12:
;case of identify message lun not being equal to the inquiry command lun.
go_fmi_t_llun00_12:
;this is the case of LUN=001 hopefully. then it will let the initiator know that this is a communications
;device. if another LUN we must send an inquiry data that says that this is an unattached device, a non-
;operational device.
        jmp scsi_int_exit   ;for the time being
;-----------------------------------------------------------------------------------------------------------+
;END CDB INQUIRY                                                                                            |
;-----------------------------------------------------------------------------------------------------------+

;-----------------------------------------------------------------------------------------------------------+
;CDB TEST UNIT READY. group 0 command. code 00h.                                                            |
;-----------------------------------------------------------------------------------------------------------+
;first we check which i_t_l nexus this is. if LUN=000b we respond as direct access device.
;scsiiss3.asm change. allow LUN=0,1,2,3,4,5 and issue "good" status. for LUN=6,7 issue "check cond".
;DO NOT CHECK FOR EQUALITY OF CDB LUN AND ID LUN AS CDB LUN IS ZERO FROM ASPI2DOS WHEN ID LUN=1.
cdb_test_unit_ready:
;       cmp byte ptr i_t_llun, 00h
;       jnz go_fmi_t_llun00_00
;this was from in identify message. it needs to be consistent with the LUN field in the inquiry command.
;       mov al, byte ptr scsi_cmd_byte_1
;       and al, 0e0h    ;isolate the LUN bits
;       shr al, 5
;       cmp al, byte ptr i_t_llun
;       jnz gofm_idlun_ne_inqlun_00

        mov dx, 0332h   ;point to scsi fifo
                cmp     byte ptr i_t_llun, 05h
                jna     test_unit_good
                mov     al, 02h                 ;status "check condition"
                jmp     cont_test_unit
test_unit_good: mov al, 00h     ;status "good". we are faking it here
;this command is designed for situations where the hardware is up but not quite ready to engage in
;transactions. how would we determine this in our case?
cont_test_unit: out dx, al
        mov al, 00h     ;message "command complete"
        out dx, al
        mov dx, 0333h
        mov al, 24h     ;terminate sequence
        out dx, al
        jmp scsi_int_exit

gofm_idlun_ne_inqlun_00:
;case of identify message lun not being equal to the inquiry command lun.
go_fmi_t_llun00_00:
;this is the case of LUN=001 hopefully. then it will let the initiator know that this is a communications
;device. if another LUN we must send an inquiry data that says that this is an unattached device, a non-
;operational device.
        jmp scsi_int_exit   ;for the time being
;-----------------------------------------------------------------------------------------------------------+
;CDB TEST UNIT READY. group 0 command. code 00h.                                                            |
;-----------------------------------------------------------------------------------------------------------+

;-----------------------------------------------------------------------------------------------------------+
```

```
;CDB START STOP UNIT. group 0 command. code 1bh.                                    |
;-----------------------------------------------------------------------------------+
;first we check which i_t_l nexus this is. if LUN=000b we respond as direct access device.
cdb_start_stop_unit:
        cmp byte ptr i_t_llun, 00h
        jnz go_fmi_t_llun00_1b
;this was from in identify message. it needs to be consistent with the LUN field in the inquiry command.
        mov al, byte ptr scsi_cmd_byte_1
        and al, 0e0h    ;isolate the LUN bits
        shr al, 5
        cmp al, byte ptr i_t_llun
        jnz gofm_idlun_ne_inqlun_1b

        mov al, byte ptr scsi_cmd_byte_4        ;checking the start bit
        and al, 00000001b          ;isolate the start bit
        mov byte ptr i_t_llun_ready, al ;store it for qualifying read/write operations.

        mov dx, 0332h   ;point to scsi fifo
        mov al, 00h     ;status "good". we are faking it here
;this command is designed for situations where the hardware is up but not quite ready to engage in
;transactions. how would we determine this in our case?
        out dx, al
        mov al, 00h     ;message "command complete"
        out dx, al
        mov dx, 0333h
        mov al, 24h     ;terminate sequence
        out dx, al
        jmp scsi_int_exit

gofm_idlun_ne_inqlun_1b:
;case of identify message lun not being equal to the inquiry command lun.
go_fmi_t_llun00_1b:
;this is the case of LUN=001 hopefully. then it will let the initiator know that this is a communications
;device. if another LUN we must send an inquiry data that says that this is an unattached device, a non-
;operational device.
        jmp scsi_int_exit   ;for the time being
;-----------------------------------------------------------------------------------+
;CDB START STOP UNIT. group 0 command. code 1bh.                                    |
;-----------------------------------------------------------------------------------+

;-----------------------------------------------------------------------------------+
;CDB READ CAPACITY. group 1 command. code 25h.                                      |
;-----------------------------------------------------------------------------------+
;first we check which i_t_l nexus this is. if LUN=000b we respond as direct access device.
cdb_read_capacity:
        cmp byte ptr i_t_llun, 00h
        jnz go_fmi_t_llun00_25
;this was from in identify message. it needs to be consistent with the LUN field in the inquiry command.
        mov al, byte ptr scsi_cmd_byte_1
        and al, 0e0h    ;isolate the LUN bits
        shr al, 5
        cmp al, byte ptr i_t_llun
        jnz gofm_idlun_ne_inqlun_25
;core of the command. we ship the total number of sectors ie the number you would get from the ide
;identify command.
        mov cx, 0008h
        mov dx, 0332h
        lea bx, cs:byte ptr read_capacity_data
stuff_data: mov al, cs:byte ptr [bx]
        inc bx
        out dx, al
        loop    stuff_data
        mov dx, 0333h
        mov al, 22h     ;send data
        out dx, al
        jmp scsi_int_exit
gofm_idlun_ne_inqlun_25:
;case of identify message lun not being equal to the inquiry command lun.
go_fmi_t_llun00_25:
;this is the case of LUN=001 hopefully. then it will let the initiator know that this is a communications
;device. if another LUN we must send an inquiry data that says that this is an unattached device, a non-
;operational device.
        jmp scsi_int_exit   ;for the time being
;-----------------------------------------------------------------------------------+
;CDB READ CAPACITY. group 1 command. code 25h.                                      |
;-----------------------------------------------------------------------------------+


;-----------------------------------------------------------------------------------+
;CDB READ EXTENDED. group 1 command. code 28h.                                      |
;-----------------------------------------------------------------------------------+
```

```
;first we check which i_t_l nexus this is. if LUN=000b we respond as direct access device.
cdb_read_extended:
;scsiiss4.asm change. move this line to after llun=0 is determined.
;       mov byte ptr scsi_reading_br, false
;       cmp byte ptr i_t_llun, 00h
;       jnz go_fmi_t_llun00_28
;this was from in identify message. it needs to be consistent with the LUN field in the inquiry command.
        mov al, byte ptr scsi_cmd_byte_1
        and al, 0e0h    ;isolate the LUN bits
        shr al, 5
        cmp al, byte ptr i_t_llun
        jnz gofm_idlun_ne_inqlun_28
        cmp al, 00h
        jnz go_fmi_t_llun00_28
        mov byte ptr scsi_reading_br, false
                mov al, eoi
        out intb00, al
        jmp $+2
        out inta00, al
;core of the command. int 13 / 08h gives us the disk parameters.    s=17 sectors / track
;                                   t=10 tracks / cylinder
;LBA is 32 bits and Transfer Length is 16 bits (number of sectors). S=starting sector number
;                                   H=starting head number
;                                   C=starting cylinder number
; rem ( L / s ) = S - 1             L   S   H   C
; rem ( res ( L / s ) / t ) = H         0   1   0   0
; res ( res ( L / s ) / t ) = C            16      17   0   0
;                          17       1   1   0
;                         170   1   0   1
;                         169      17       9   0
;                         171       2   0   1
;first task is to translate L (LBA) into S,H,C. L is a 32 bit number. the results of division will also
;end up being a 32 bit number. it is thus best to use eax etc. registers for this purpose. specifically,
; rem ( L / s ) < 17
; res ( L / s ) can be larger than a 16 bit number (65,536).
; ebx=s, eax=L, edx=00000000h. div ebx yields res(L/s)=eax and rem(L/s)=edx (=>dl)
;note that the LBA is in cmd bytes as follows:
;       LBA(3)  scsi_cmd_byte_2
;       LBA(2)  scsi_cmd_byte_3
;       LBA(1)  scsi_cmd_byte_4
;       LBA(0)  scsi_cmd_byte_5
;note that the command bytes are separated by a byte to accomodate inability to do push al.
;thus we need to bring it together in one double word we call scsi_ext_lba.
;       LBA(3)  scsi_cmd_byte_2   scsi_ext_lba+3
;       LBA(2)  scsi_cmd_byte_3   scsi_ext_lba+2
;       LBA(1)  scsi_cmd_byte_4   scsi_ext_lba+1
;       LBA(0)  scsi_cmd_byte_5   scsi_ext_lba+0
        lea bx, word ptr scsi_ext_lba       ;bx->scsi_ext_lba
        mov al, byte ptr scsi_cmd_byte_5
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_4
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_3
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_2
        mov byte ptr [bx], al
;at this point, dword scsi_ext_lba has the LBA.
;now we need to get the IDE parameters. use int 13/08 for this.
;the variables will be called as follows:   s = scsi_ide_s      byte
;                       t = scsi_ide_t      byte
;                       S = scsi_ide_sector byte
;                       H = scsi_ide_head   byte
;                       C = scsi_ide_cylinder   word
        mov ah, 08h
        mov dl, 80h
        int 13h
;scsiiss0.asm change
                cli
        inc dh                  ;head number -> number of heads
        mov byte ptr scsi_ide_t, dh         ;tracks per cylinder
;scsiisrz.asm change
                and     cl, 00111111b
;       and cl, 00011111b               ;get number of sectors/track isolated
        mov byte ptr scsi_ide_s, cl
;now we can start the arithmetic.
        mov eax, dword ptr scsi_ext_lba     ;eax=L
        mov edx, 00000000h              ;edx=0
        mov     ebx, 00000000h
```


41

```
        mov bl, byte ptr scsi_ide_s
        div ebx                 ;res(L/s)=eax, rem(L/s)=edx (00 00 00 ss)
        inc dl
        mov byte ptr scsi_ide_sector, dl    '     ;we know the beginning sector
        mov edx, 00000000h              ;edx=0
        mov bl, byte ptr scsi_ide_t
        div ebx                 ;res(res(L/s)/t)=eax, rem(res(L/s)/t)=edx
        mov word ptr scsi_ide_cylinder, ax      ;beginning cylinder. assumes cylinders < 65,536
        mov byte ptr scsi_ide_head, dl      ;beginning head
;note that Quantum has an LBA mode that would make this calculation redundant.
;now we are ready to call int 13h and do a read. there are a couple of issues however. two issues
;A. int 13h/02h requires us to give a buffer es:bx
;B. number of sectors to read is at most 256 for int 13h whereas for scsi it can be 65,536. thus we need
;   to manage this situation. probably use a disconnect scheme.
;see notebook 6-94, p.43-50.
;here are the conclusions: one must transfer 512 bytes out of the hd as we would otherwise lose our pointer
;to the sector in the cache. Quantum lets you partition the cache into a number of segments. this is trans-
;parent to the user once the configuration is set. still, although you probably would not lose your sector
;you would still lose your pointer. thus transfer 512 bytes at a time. the complications arising here are two:
;for one thing the PIO only has 128 bytes of space. the second complication has an answer for the first one.
;hd is an i/o and so is PIO on NCR. thus we must make a transfer to memory first. what are the indivisible
;parts? all 256 words must be transfered under cli/sti protection.&%# how long will this take? assuming we run
;fast enough to match the cycle time for a Quantum hard disk we have 130ns for a word transfer. this takes
;32usecs. note that at 38,400 speed, SM will generate an irq every 1/38,400 = 25usecs. thus we will lose
;data. a hardware fifo is necessary. with 16 bytes we take the restriction to 400usecs. of course, I could
;also make the load from hard disk cache memory to cat box memory interruptible to SM irq's. the way to
;achieve this in a reliable way is to prevent another hard disk cache access. I wonder if I could access
;hard disk itself? so the question is: if you submit a command to hard disk, do you lose your pointer to
;the spot in cache memory where you were fetching data from? assume now that you cannot do that. the only
;thing I will assume is that you can make many disk accesses resting assured that the cache contents from one
;access will not be written over by the next access. this is the case for Maxtor but not Quantum. so here is
;the summary (after more on int 13h):
;I also have given a lot of thought to int 13h and how I could make it more available. It seems for int 13h
;it is enough to make the polling loop unprotected by cli/sti. one must also set a byte that says that we
;are accessing the disk now.
;all this thinking (more of it is in the notebook) is geared towards not missing a byte of SM data. bearing
;all this in mind, I will use the current int 13h read call to be revised later on. at this point my goal
;is to bring up the catbox as a scsi disk.
        lea bx, word ptr scsi_ext_xlen
        mov al, byte ptr scsi_cmd_byte_8
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_7
        mov byte ptr [bx], al
;now scsi_ext_xlen contains the number of sectors to transfer. max sectors is 65,536. ie 30MB.
        mov dx, 033dh       ;0->1 set
        mov al, 0b6h
        out dx, al
        mov dx, 0338h       ;dx->PIO status register
        mov al, 01h         ;to set the PIO mode bit
        out dx, al
        mov dx, 033dh       ;1->0 set
        mov al, 04h
        out dx, al
;now enable features bit so 24 bit timer is activated. PIO bit and features bit to be reset with a2
;processing.
        mov dx, 033bh
        in  al, dx
        or  al, 01000000b       ;set features. SCSI phase is also latched. it will not
;make a difference as I am issuing a command at a time.
        out dx, al
;now flush the PIO FIFO
        mov dx, 0333h
        mov al, 01h         ;flush fifo command
        out dx, al          ;at this point scsi fifo is empty (had command)
;now set the counter to 512 * scsi_ext_xlen bytes. this way send data will not irq until the
;whole scsi request is honored..
        mov dx, 0330h
        mov al, 00h         ;512 bytes per sector so low byte=00h
        out dx, al
        mov ax, word ptr scsi_ext_xlen
        shl ax, 1           ;we just lost bit 16. so far max sectors is 32,767
        mov dx, 0331h
        out dx, al
        mov dx, 033eh
        mov al, ah
        out dx, al
        mov byte ptr first_1up_read_ext, true
;16 bit transfer length to map to 8 bit number of sectors. the lower byte number of sectors to be
;fetched first.
;MAXTOR 2585. a zero in the sector count register causes a transfer of 256 sectors.
```


92

```
;BIOS rule: the number of sectors specified in AL must not be zero or larger than 128. 512x128=64k
;which causes a data overrun error (wrap around of 16 bit address).
;I do not have any checks on these in my BIOS. Thus DOS must have been responsible so far.
;what do I do? hhhh hhhh hlll llll. fetch all lll llll sectors first. if hhhh hhhh h000 0000 is non
;zero, then fetch 128 sector chunks each time decrementing hhhh hhhh h by one each time.
;CACHE consideration: MAXTOR cache size is 32K. Quantum cache siz is 96K but can be segmented.
;Let us say we segment it into 3 portions which results in 32K bytes again ie 64 sectors.
;thus we must make int13h/02 (read) calls at most 64 sectors at a time.
;so here is the algorithm: hhhh hhhh hhll llll. fetch ll llll sectors first. check that hhhh hhhh hh
;is not zero. if not, fetch 64 sectors again decrementing hhhh hhhh hh by one.
;note: the way things are, when DOS is accessing int 13h, cli/sti prevents scsi int 13 from coming in.
;and when scsi 13h has the processor, DOS cannot get it as DOS does not cause interrupts.
;note: the amount of memory set aside for memory buffer is now 32K bytes. this is quite a bit. the other
;issue is this: we need to keep the scsi bus busy while we are reading from hd. what is the correct
;granularity? must be one sector. with drq driven irq we would be interrupted this often. the cache
;scheme will work so more than one sector is fetched anyway. of course in MAXTOR case, the extra
;fetches will be wiped out by other applications so that each fetch will cause hard disk delays.
;so now we do single sector fetches.
        mov dx, 033dh
        mov al, 0b6h
        out dx, al          ;0->1 set
        mov bx, ds          ;for int 13h
        mov es, bx
big_lup:
        cmp     word ptr scsi_ext_xlen, 40h
        jae     can_rd_64_sectors_0
        mov     ax, word ptr scsi_ext_xlen
        mov     ah, 02h
        mov     byte ptr sectors_read, al
        jmp     can_rd_lt_64_sectors_0
can_rd_64_sectors_0:
        mov     al, 40h
        mov     ah, 02h
        mov     byte ptr sectors_read, al
can_rd_lt_64_sectors_0:

        mov dl, 80h         ;first drive
        mov dh, byte ptr scsi_ide_head
        mov cl, byte ptr scsi_ide_sector
        mov ch, byte ptr scsi_ide_cylinder
        mov bl, byte ptr scsi_ide_cylinder + 1
        and     bl, 00000011b       ;assume number of cylinders < 1024. see DOS internals
;p.59 and 6-94 p. 55 for a discussion. Need to find out what the limitation is for DOS 4.01? this may
;be one reason I need to go to DOS 5.0. not quite. maxtor 540AT has more sectors per track so that
;number of cylinders is less than 4096. so dh (7:6) scheme will work.
        shl bl, 6
        or  cl, bl
;       mov bx, ds          ;done above once for all loops.
;       mov es, bx
        lea bx, word ptr scsi_hd_cache_buffer
        int 13h     ;read from hard disk
;scsiiss0.asm change
                cli
;the eventual int 13h should also set semaphores and remove cli/sti at least partially while not
;jeopardizing irq00h calls. a semaphore is a more precise form of cli/sti. it discourages other
;hd accesses but not SM irq's. this way we do not lose bytes.
;hopefully the disk read more than one sector.
;the next step is to put this data on to the scsi, 128 bytes at a time.
;need to set to pio mode and issue dma commands. for this time, we will not use interrupts
;for checking pio fifo status. of course when we issue a data send command we will use irq.
;a question is if pio fifo irq shows up on 0335,0334 and how?
;the algorithm is to stuff 128 bytes into the pio fifo and issue a send data command. now I see
;another complication. send data will cause an irq when the command is completed. by that time
;however, the pio fifo will be empty. well the answer is this: the counter register is loaded
;with 256, meaning send data will irq when the counter decrements to zero. pio irq register will
;irq when pio fifo becomes emptied to the degree desired. I am choosing to irq with 256 bytes
;of send data only. pio will be polled.
;now we need to fill the PIO FIFO with data from the buffer called scsi_hd_cache_buffer
;we will assume this FIFO is empty. we must make sure that at the end the FIFO is empty.
;here we look for the condition dh=01, ch=00, cl=01 to set scsi_reading_br=true.
        cmp dh, 01h
        jnz not_reading_br
        cmp ch, 00h
        jnz not_reading_br
        cmp cl, 01h
        jnz not_reading_br
        mov byte ptr scsi_reading_br, true
not_reading_br:
        lea si, word ptr scsi_hd_cache_buffer
        cmp byte ptr scsi_reading_br, true
        jnz not_reading_br1
```

```
        mov bx, 001ah
        mov al, 40h         ;number of heads=40h
        mov byte ptr [si+bx], al
        mov bx, 000eh
        mov al, 01h         ;reserved sectors=01h
        mov byte ptr [si+bx], al
not_reading_br1:

        cmp     word ptr scsi_ext_xlen, 40h
        jae     can_wr_64_sectors_0
        mov     bx, word ptr scsi_ext_xlen
        mov     word ptr scsi_ext_xlen, 0
        jmp     can_wr_lt_64_sectors_0
can_wr_64_sectors_0:
        mov     bx, 40h
        sub     word ptr scsi_ext_xlen, 40h
can_wr_lt_64_sectors_0:

small_lupr:

        mov dx, 0338h       ;dx->PIO status register
lup_fifo_mpty_0:in  al, dx          ;to check the fifo empty bit
        test    al, 00010000b
        jz  lup_fifo_mpty_0     ;loop until fifo empty.
        mov dx, 0334h       ;dx->PIO FIFO
        cld
        mov cx, 0040h       ;128 bytes or 64 words
        rep outsw           ;after this, buffer has 384 bytes
;issue send data. it will not irq as the count is 512 bytes.
        mov al, byte ptr first_lup_read_ext
        cmp al, true
        jnz skp_isu_cmd_a2
        mov byte ptr first_lup_read_ext, false
        mov dx, 033dh
        mov al, 04h
        out dx, al          ;1->0 set
        mov dx, 0333h
        mov al, 0a2h        ;send data DMA version (PIO)
        out dx, al
        mov dx, 033dh       ;0->1 set
        mov al, 0b6h
        out dx, al
;now watch the PIO for empty indicator. si is still pointing to
;the next word that is set to go from buffer to scsi.
skp_isu_cmd_a2: mov dx, 0338h       ;dx->PIO status register
lup_fifo_mpty_1:in  al, dx          ;to check the fifo empty bit
        test    al, 00010000b
        jz  lup_fifo_mpty_1     ;loop until fifo empty.
        mov dx, 0334h       ;dx->PIO FIFO
        cld
        mov cx, 0040h       ;128 bytes or 64 words
        rep outsw           ;after this, buffer has 256 bytes
;now watch the PIO for empty indicator. si is still pointing to
;the next word that is set to go from buffer to scsi.
        mov dx, 0338h       ;dx->PIO status register
lup_fifo_mpty_2:in  al, dx          ;to check the fifo empty bit
        test    al, 00010000b
        jz  lup_fifo_mpty_2     ;loop until fifo empty.
        mov dx, 0334h       ;dx->PIO FIFO
        cld
        mov cx, 0040h       ;128 bytes or 64 words
        rep outsw           ;after this, buffer has 128 bytes
;now watch the PIO for empty indicator. si is still pointing to
;the next word that is set to go from buffer to scsi.
        mov dx, 0338h       ;dx->PIO status register
lup_fifo_mpty_3:in  al, dx          ;to check the fifo empty bit
        test    al, 00010000b
        jz  lup_fifo_mpty_3     ;loop until fifo empty.
        mov dx, 0334h       ;dx->PIO FIFO
        cld
        mov cx, 0040h       ;128 bytes or 64 words
        rep outsw           ;after this, buffer has no bytes

        dec bx
        cmp bx, 0
        jne small_lupr

;at this point we have to exit and wait for 0333=a2 to run its course. before this we
;must decrement the transfer number of sectors count.
        mov ax, word ptr scsi_ext_xlen  ;decrement by 1 sector.
;as we shifted xlen into ax, above, we have lost ability to handle xlen=65,536. our
```

```
;limit is 32,767. to be consistent:
        and ax, 7fffh
        cmp ax, 0000h
;if zero no more sectors to read. this hopefully also means that the counter will come to zero
;after all is shipped out. thus must eoi and recover when 0333=a2h irq's.
;in a2 processing reset PIO enable bit and features enable bit.
        jnz read_ext_cont
;first must check that PIO FIFO is empty. see p.5-18 NCR53C406A data book. it is a condition of
;target abort dma command.
        mov dx, 0338h           ;dx->PIO status
lup_fifo_mpty_4:in  al, dx
        test    al, 00010000b
        jz  lup_fifo_mpty_4         ;check for PIO FIFO empty
        mov dx, 033dh           ;1->0
        mov al, 04h
        out dx, al
        mov dx, 0333h           ;dx->command register
        mov al, 04h             ;command=target abort dma
;note that 0333=a2 still although 04 came along. this makes sure that our current
;way of doing things ie going back to a2 postprocessing is still valid.
        jmp scsi_int_exiu           ;leaving pointing to set 0.
;if not zero, update hard disk pointer set and return to big_lup.
read_ext_cont:
        mov al, byte ptr scsi_ide_sector
        add al, byte ptr sectors_read
        mov byte ptr scsi_ide_sector, al
        cmp al, byte ptr scsi_ide_s
        jbe easy_way_out
rd_ide_lup_t:
        sub al, byte ptr scsi_ide_s
        inc byte ptr scsi_ide_head
        cmp al, byte ptr scsi_ide_s
        ja  rd_ide_lup_t
        mov byte ptr scsi_ide_sector, al

        mov al, byte ptr scsi_ide_head
        cmp al, byte ptr scsi_ide_t ;unlike sectors, heads start at 0
        jb  easy_way_out
rd_ide_lup_c:
        sub al, byte ptr scsi_ide_t
        inc word ptr scsi_ide_cylinder
        cmp al, byte ptr scsi_ide_t
        jae rd_ide_lup_c
        mov byte ptr scsi_ide_head, al
easy_way_out:
        jmp big_lup

gofm_idlun_ne_inqlun_28:
        jmp scsi_int_exit
;case of identify message lun not being equal to the inquiry command lun.
;*****************************************************************************************************
;LUN=01 PROCESSING. COUNTERPART OF CASDRV*.ASM
;*****************************************************************************************************
go_fmi_t_llun00_28:
;this is the case of LUN=001 hopefully. then it will let the initiator know that this is a communications
;device. if another LUN we must send an inquiry data that says that this is an unattached device, a non-
;operational device.
        cmp     byte ptr i_t_llun, 01h
        jnz     go_fmi_t_llun01_28
;scsiiss1.asm change. add cli. note that to accomodate amibios for hard disk read/write case, I had to
;issue eoi at the beginning of read and write extended. this was because int 13h uses irq 14h. but int 13h
;also sets IF so that upon return we have IF=1. this causes scsi irq within scsi irq whereas in read and
;write extended I chose to do PIO mode with polling. LUN=01 continues this trend. thus interrupts are not
;allowed. this must be changed eventually because while I am driving casmodem, I could get a phone call.
;what happens at host PC, when I am driving casmodem with GUI and a phone call comes? casmodem is many
;things. a part of it is irq03. if=0 would of course starve it so that it could not answer the phone.
;because it could not form "RING".
;       cli
;lun=01 write_10 processing. this is what we do: store cdb byte_8 to xlen. store byte_7
;at xlen+1. byte_7 will always be zero.
;lba=0.
;length of transfer in bytes in xlen.
        lea     bx, word ptr scsi_ext_xlen
        mov     al, byte ptr scsi_cmd_byte_8
        mov     byte ptr [bx], al
        inc     bx
        mov     al, byte ptr scsi_cmd_byte_7
        mov     byte ptr [bx], al
;now flush the SCSI FIFO
        mov     dx, 0333h
        mov     al, 01h             ;flush fifo command
```

```
        out     dx, al              ;at this point scsi fifo is empty (had command)

;       mov     bx, ds              ;for insw
;       mov     es, bx

        mov     dx, 0337h           ;dx->FIFO status register
lup_fifo_empty_2:
        in      al, dx              ;to check fifo empty
        and     al, 00011111b       ;isolate fifo flags
        cmp     al, 00h             ;is it empty
        jnz     lup_fifo_empty_2    ;loop until fifo EMPTY.

        lea     si, word ptr scsi_int2f_out_buffer
        mov     ax, word ptr scsi_ext_xlen
        cmp     ax, 0010h           ;cf. 16 decimal
        ja      xlen_gt_16
        mov     cx, word ptr scsi_ext_xlen
        jmp     over_xlen_gt_16
xlen_gt_16:
        mov     cx, 0010h
over_xlen_gt_16:
        sub     word ptr scsi_ext_xlen, cx
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time.
        mov dx, 0332h               ;dx-> SCSI FIFO
        rep     outsb               ;read one byte from ds:si to (dx), incr si.
        mov     word ptr scsi_int2f_out_buf_ptr, si
        mov     dx, 0333h
        mov     al, 22h             ;send data non DMA version
        out     dx, al
;if scsi command 28, ie read_ext and we just sent data, then we must be at the end of it.
        jmp     scsi_int_exit


;*****************************************************************************************************
;LUN=03 PROCESSING. COUNTERPART OF VSCSI2PD.386
;*****************************************************************************************************
go_fmi_t_llun01_28:
;this is the case of LUN=011 hopefully.
        cmp byte ptr i_t_llun, 03h
        jnz go_fmi_t_llun03_28
;lun=03 write_10 processing. this is what we do: store cdb byte_8 to xlen. store byte_7
;at xlen+1. byte_7 will always be zero.
;lba=0.
;length of transfer in bytes in xlen.
        lea bx, word ptr scsi_ext_xlen
        mov al, byte ptr scsi_cmd_byte_8
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_7
        mov byte ptr [bx], al
;now flush the SCSI FIFO
        mov dx, 0333h
        mov al, 01h         ;flush fifo command
        out dx, al          ;at this point scsi fifo is empty (had command)

;       mov bx, ds          ;for insw
;       mov es, bx

        mov     dx, 0337h           ;dx->FIFO status register
lup_fifo_empty_4:
        in      al, dx              ;to check fifo empty
        and     al, 00011111b       ;isolate fifo flags
        cmp     al, 00h             ;is it empty
        jnz     lup_fifo_empty_4    ;loop until fifo EMPTY.

        lea     si, word ptr scsi_lpt_out_buffer
        mov     cx, word ptr scsi_ext_xlen
        mov     dx, 0332h           ;dx-> SCSI FIFO
        rep     outsb               ;read one byte from ds:si to (dx), incr si.
        mov     dx, 0333h
        mov     al, 22h             ;send data non DMA version
        out     dx, al
;if scsi command 28, ie read_ext and we just sent data, then we must be at the end of it.
        jmp     scsi_int_exit
;*****************************************************************************************************
;LUN=04 PROCESSING. COUNTERPART OF CATSYNC.VXD
;*****************************************************************************************************
go_fmi_t_llun03_28:
        cmp     byte ptr i_t_llun, 04h
        jne     go_fmi_t_llun04_28
```

```
        lea     bx, word ptr scsi_ext_xlen
        mov     al, byte ptr scsi_cmd_byte_8
        mov     byte ptr [bx], al
        inc     bx
        mov     al, byte ptr scsi_cmd_byte_7
        mov     byte ptr [bx], al
;now place a callback for maestro
        mov     ax, CS
        mov     word ptr s4_callback_seg, ax
        mov     ax, OFFSET llun04_28_callback
        mov     word ptr s4_callback_off, ax
        jmp     scsi_int_exit
;and now the body of the callback
;-------------------------------------------------------+
;       CALLBACK                                        |
;-------------------------------------------------------+
llun04_28_callback:
        push    DS
        push    ES
;setup the ds value to maspi0v CS value
        mov     ax, CS
        mov     DS, ax
;disable the scsi irq
        in      al, 0a1h
        or      al, 08h
        out     0a1h, al
;increment InIRQ
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        inc     ES:byte ptr [di]
        sti                                     ; t2 can come but scsi irq cannot (a1h masked)
;flush the SCSI FIFO
        mov     dx, 0333h
        mov     al, 01h
        out     dx, al
;check FIFO empty
        mov     dx, 0337h
lup_fifo_empty6:
        in      al, dx
        and     al, 00011111b
        cmp     al, 00h
        jne     lup_fifo_empty6
;get the data to send
        mov     dx, 0332h                               ; SCSI FIFO
        mov     bx, word ptr host_DOS_request_off       ; points to host_DOS_request_type in catvoice
        mov     ax, word ptr host_DOS_request_seg
        mov     ES, ax
        mov     al, ES:byte ptr [bx + 2]                ; type(0), fn(2), resp(4)
        out     dx, al
        mov     al, ES:byte ptr [bx + 3]                ; type(0), fn(2), resp(4)
        out     dx, al
        mov     al, ES:byte ptr [bx + 4]                ; type(0), fn(2), resp(4)
        out     dx, al
        mov     al, ES:byte ptr [bx + 5]                ; type(0), fn(2), resp(4)
        out     dx, al
;issue send data NCR command
        mov     dx, 0333h
        mov     al, 22h
        out     dx, al
;decrement InIRQ
        cli
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        dec     ES:byte ptr [di]
;enable scsi irq
        in      al, 0a1h
        and     al, 0f7h
        out     0a1h, al
;return to maestro
        pop     ES
        pop     DS
        retf
;-------------------------------------------------------+
;       CALLBACK END                                    |
;-------------------------------------------------------+
;*****************************************************************************************************
;LUN=07 PROCESSING. COUNTERPART OF CATSYNC.VXD
;*****************************************************************************************************
go_fmi_t_llun04_28:
```


47

```
        cmp     byte ptr i_t_llun, 07h
        jne     go_fmi_t_llun07_28

        lea     bx, word ptr scsi_ext_xlen
        mov     al, byte ptr scsi_cmd_byte_8
        mov     byte ptr [bx], al
        inc     bx
        mov     al, byte ptr scsi_cmd_byte_7
        mov     byte ptr [bx], al
;now place a callback for maestro
        mov     ax, CS
        mov     word ptr s7_callback_seg, ax
        mov     ax, OFFSET llun07_28_callback
        mov     word ptr s7_callback_off, ax
        jmp     scsi_int_exit
;and now the body of the callback
;-------------------------------------------------------+
;       CALLBACK                                        |
;-------------------------------------------------------+
llun07_28_callback:
        push    DS
        push    ES
;setup the ds value to maspi0v CS value
        mov     ax, CS
        mov     DS, ax
;disable the scsi irq
        in      al, 0a1h
        or      al, 08h
        out     0a1h, al
;increment InIRQ
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        inc     ES:byte ptr [di]
        sti                                     ; t2 can come but scsi irq cannot (a1h masked)
;flush the SCSI FIFO
        mov     dx, 0333h
        mov     al, 01h
        out     dx, al
;check FIFO empty
        mov     dx, 0337h
lup_fifo_empty67:
        in      al, dx
        and     al, 00011111b
        cmp     al, 00h
        jne     lup_fifo_empty67
;get the data to send
        mov     dx, 0332h                               ; SCSI FIFO
        mov     bx, word ptr host_CAS_request_off       ; points to host_DOS_request_type in catvoice
        mov     ax, word ptr host_CAS_request_seg
        mov     ES, ax
        mov     al, ES:byte ptr [bx + 2]                ; type(0), fn(2), resp(4)
        out     dx, al
        mov     al, ES:byte ptr [bx + 3]                ; type(0), fn(2), resp(4)
        out     dx, al
        mov     al, ES:byte ptr [bx + 4]                ; type(0), fn(2), resp(4)
        out     dx, al
        mov     al, ES:byte ptr [bx + 5]                ; type(0), fn(2), resp(4)
        out     dx, al
;issue send data NCR command
        mov     dx, 0333h
        mov     al, 22h
        out     dx, al
;decrement InIRQ
        cli
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        dec     ES:byte ptr [di]
;enable scsi irq
        in      al, 0a1h
        and     al, 0f7h
        out     0a1h, al
;return to maestro
        pop     ES
        pop     DS
        retf
;-------------------------------------------------------+
;       CALLBACK END                                    |
;-------------------------------------------------------+
;*************************************************************************************************
```

```
;LUN=02 PROCESSING. COUNTERPART OF SERIAL.VXD
;*****************************************************************************
;this channel is used for commands to process Port Calls from serial.vxd. the actual calls come
;on LUN=5. in addition, there is a constant read on channel 6.
;the first two double words always are: hport and port call type. the remainder depend on the
;call. at this point, I am thinking that each port call will have a pre-write and a post-read.
;the actual call (on lun=5) is sandwiched in between. it may also be that we need to pass port
;information back and forth in which case, we might also have a pre-read and a post-write.
;thus we should have:
;                   dword   hport
;                   dword   port call type
;                   word    type of command (pre-write, pre-read, post-write, post-read)
;scsi should read the first 10 bytes (4+4+2) and decide where the rest of the data should go.
;for example, port information data should go to the relevant structure in a GS: structure.
;this transaction takes place a byte at a time with a NCR 2a issued for each.
;also note that, the reads take place with NCR 28 command. both reads and writes use the same
;data structures as they are issued sequentially from the host ie our version of serial.
;NOTE: for PortOpen, we need to have a pre-write and a post-read and nothing sandwiched in
;between.
;new variables:     temporary holding locations (alive during this scsi isr) for incoming
;variables until scsi isr figures out where they go.
;                   remote_modem_hport      dword
;                   remote_modem_port_call  dword
;                   remote_modem_cmd_type   word
go_fmi_t_llun07_28:
        cmp     byte ptr i_t_llun, 02h
        jne     go_fmi_t_llun02_28

        lea     bx, word ptr scsi_ext_xlen
        mov     al, byte ptr scsi_cmd_byte_8
        mov     byte ptr [bx], al
        inc     bx
        mov     al, byte ptr scsi_cmd_byte_7
        mov     byte ptr [bx], al
;now place a callback for hmp_task_master.
        mov     si, word ptr current_maspi_dms_ptr
        mov     word ptr [si +  MASPI_DMS_CALLBACK_REQUEST], MASPI_DMS_CALLBACK_REQUEST_MADE
        mov     word ptr [si +  MASPI_DMS_CALLBACK_STATUS], MASPI_DMS_CALLBACK_STATUS_NOT_DONE
        mov     ax, CS
        mov     word ptr [si + MASPI_DMS_CALLBACK_POINTER + 2], ax
        mov     ax, OFFSET llun02_28_callback
        mov     word ptr [si +  MASPI_DMS_CALLBACK_POINTER], ax
        jmp     scsi_int_exit
;and now the body of the callback
;-------------------------------------------------------+
;       CALLBACK                                        |
;-------------------------------------------------------+
llun02_28_callback:
        push    DS
        push    ES
;setup the ds value to maspi0v CS value
        mov     ax, CS
        mov     DS, ax
;disable the scsi irq
        in      al, 0a1h
        or      al, 08h
        out     0a1h, al
;increment InIRQ
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        inc     ES:byte ptr [di]
        sti                                     ; t2 can come but scsi irq cannot (a1h masked)
;flush the SCSI FIFO
        mov     dx, 0333h
        mov     al, 01h
        out     dx, al
;check FIFO empty
        mov     dx, 0337h
lup_fifo_empty7:
        in      al, dx
        and     al, 00011111b
        cmp     al, 00h
        jne     lup_fifo_empty7
;get the data to send
        mov     dx, 0332h                       ; SCSI FIFO
        mov     ax, word ptr remote_modem_ret_code      ; points to host_DOS_request_type in catvoice
        out     dx, al
        mov     al, ah
        out     dx, al
;issue send data NCR command
```


49

```
        mov     dx, 0333h
        mov     al, 22h
        out     dx, al
;decrement InIRQ
        cli
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        dec     ES:byte ptr [di]
;enable scsi irq
        in      al, 0a1h
        and     al, 0f7h
        out     0a1h, al
;return to hmp_task_master
        pop     ES
        pop     DS
        retf
;-------------------------------------------------------+
;       CALLBACK END                                    |
;-------------------------------------------------------+

go_fmi_t_llun02_28:
        jmp     scsi_int_exit               ;for the time being
;-----------------------------------------------------------------------------------------------------------------+
;CDB READ EXTENDED. group 1 command. code 28h.                                                                    |
;-----------------------------------------------------------------------------------------------------------------+


;-----------------------------------------------------------------------------------------------------------------+
;CDB WRITE EXTENDED. group 1 command. code 2Ah.                                                                   |
;-----------------------------------------------------------------------------------------------------------------+
;first we check which i_t_l nexus this is. if LUN=000b we respond as direct access device.
cdb_write_extended:
;redundant for write:       mov byte ptr scsi_reading_br, false
;       cmp byte ptr i_t_llun, 00h
;       jnz go_fmi_t_llun00_2a
;this was from in identify message. it needs to be consistent with the LUN field in the inquiry command.
        mov al, byte ptr scsi_cmd_byte_1
        and al, 0e0h    ;isolate the LUN bits
        shr al, 5
        cmp al, byte ptr i_t_llun
        jnz gofm_idlun_ne_inqlun_2a
        cmp al, 00h
        jnz go_fmi_t_llun00_2a
        mov al, eoi
        out intb00, al
        jmp $+2
        out inta00, al
;core of the command. int 13 / 08h gives us the disk parameters.    s=17 sectors / track
;                                   t=10 tracks / cylinder
;LBA is 32 bits and Transfer Length is 16 bits (number of sectors). S=starting sector number
;                                   H=starting head number
;                                   C=starting cylinder number
; rem ( L / s ) = S - 1             L   S   H   C
; rem ( res ( L / s ) / t ) = H         0   1   0   0
; res ( res ( L / s ) / t ) = C           16      17   0   0
;                          17       1   1   0
;                         170   1   0   1
;                         169      17       9   0
;                         171       2   0   1
;first task is to translate L (LBA) into S,H,C. L is a 32 bit number. the results of division will also
;end up being a 32 bit number. it is thus best to use eax etc. registers for this purpose. specifically,
; rem ( L / s ) < 17
; res ( L / s ) can be larger than a 16 bit number (65,536).
; ebx=s, eax=L, edx=00000000h. div ebx yields res(L/s)=eax and rem(L/s)=edx (=>dl)
;note that the LBA is in cmd bytes as follows:
;       LBA(3)  scsi_cmd_byte_2
;       LBA(2)  scsi_cmd_byte_3
;       LBA(1)  scsi_cmd_byte_4
;       LBA(0)  scsi_cmd_byte_5
;note that the command bytes are separated by a byte to accomodate inability to do push al.
;thus we need to bring it together in one double word we call scsi_ext_lba.
;       LBA(3)  scsi_cmd_byte_2   scsi_ext_lba+3
;       LBA(2)  scsi_cmd_byte_3   scsi_ext_lba+2
;       LBA(1)  scsi_cmd_byte_4   scsi_ext_lba+1
;       LBA(0)  scsi_cmd_byte_5   scsi_ext_lba+0
        lea bx, word ptr scsi_ext_lba       ;bx->scsi_ext_lba
        mov al, byte ptr scsi_cmd_byte_5
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_4
```

```
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_3
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_2
        mov byte ptr [bx], al
;at this point, dword scsi_ext_lba has the LBA.
;now we need to get the IDE parameters. use int 13/08 for this.
;the variables will be called as follows:   s = scsi_ide_s      byte
;                       t = scsi_ide_t      byte
;                       S = scsi_ide_sector byte
;                       H = scsi_ide_head   byte
;                       C = scsi_ide_cylinder   word
        mov ah, 08h
        mov dl, 80h
        int 13h
;scsiiss0.asm change
                cli
        inc dh                  ;head number -> number of heads
        mov byte ptr scsi_ide_t, dh         ;tracks per cylinder
;scsiisrz.asm change
                and     cl, 00111111b
;       and cl, 00011111b               ;get number of sectors/track isolated
        mov byte ptr scsi_ide_s, cl
;now we can start the arithmetic.
        mov eax, dword ptr scsi_ext_lba     ;eax=L
        mov edx, 00000000h              ;edx=0
        mov     ebx, 00000000h
        mov bl, byte ptr scsi_ide_s
        div ebx                 ;res(L/s)=eax, rem(L/s)=edx (00 00 00 ss)
        inc dl
        mov byte ptr scsi_ide_sector, dl        ;we know the beginning sector
        mov edx, 00000000h              ;edx=0
        mov bl, byte ptr scsi_ide_t
        div ebx                 ;res(res(L/s)/t)=eax, rem(res(L/s)/t)=edx
        mov word ptr scsi_ide_cylinder, ax      ;beginning cylinder. assumes cylinders < 65,536
        mov byte ptr scsi_ide_head, dl      ;beginning head

        lea bx, word ptr scsi_ext_xlen
        mov al, byte ptr scsi_cmd_byte_8
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_7
        mov byte ptr [bx], al

; begin scsiisse.asm change
        mov dx, 033dh       ;0->1 set
        mov al, 0b6h
        out dx, al
        mov dx, 0338h       ;dx->PIO status register
        mov al, 01h         ;to set the PIO mode bit
        out dx, al
        mov dx, 033dh       ;1->0 set
        mov al, 04h
        out dx, al
;now enable features bit so 24 bit timer is activated. PIO bit and features bit to be reset with aa
;(receive data in dma mode) processing.
        mov dx, 033bh
        in  al, dx
        or  al, 01000000b   ;set features. SCSI phase is also latched. it will not
;make a difference as I am issuing a command at a time.
        out dx, al
;now flush the PIO FIFO
        mov dx, 0333h
        mov al, 01h         ;flush fifo command
        out dx, al          ;at this point scsi fifo is empty (had command)
;now set the counter to 512 * scsi_ext_xlen bytes. this way receive data will not irq until the
;whole scsi request is honored..
        mov dx, 0330h
        mov al, 00h         ;512 bytes per sector so low byte=00h
        out dx, al
        mov ax, word ptr scsi_ext_xlen
        shl ax, 1           ;we just lost bit 16. so far max sectors is 32,767
        mov dx, 0331h
        out dx, al
        mov dx, 033eh
        mov al, ah
        out dx, al
        mov byte ptr first_1up_write_ext, true
        mov dx, 0333h
```

```
        mov al, 0aah        ;receive data DMA version (PIO)
        out dx, al
        mov dx, 033dh
        mov al, 0b6h
        out dx, al          ;0->1 set
; end scsiisse.asm change.

        mov bx, ds          ;for int 13h and rep insw
        mov es, bx

big_lupw:
;each big loop processes one sector of data
        lea     di, word ptr scsi_hd_cache_buffer

        cmp     word ptr scsi_ext_xlen, 40h
        jae     can_rd_64_sectors
        mov     bx, word ptr scsi_ext_xlen
        jmp     can_rd_lt_64_sectors
can_rd_64_sectors:
        mov     bx, 40h
can_rd_lt_64_sectors:

small_lupw:

;now watch the PIO for full indicator. di is pointing to word in cache_buffer to write to
;from data in PIO.
        mov     dx, 0338h           ;dx->PIO status register
lup_fifo_full_1:
        in      al, dx              ;to check the fifo full bit
        test    al, 00000010b
        jz      lup_fifo_full_1
        mov     dx, 0334h           ;dx->PIO FIFO
        cld
        mov     cx, 0020h           ;128 bytes or 64 words
        rep     insd                ;now buffer has 128 bytes
;now watch the PIO for full indicator. di is pointing to word in cache_buffer to write to
;from data in PIO.
        mov     dx, 0338h           ;dx->PIO status register
lup_fifo_full_2:
        in      al, dx              ;to check the fifo full bit
        test    al, 00000010b
        jz      lup_fifo_full_2
        mov     dx, 0334h           ;dx->PIO FIFO
        cld
        mov     cx, 0020h           ;128 bytes or 64 words
        rep     insd                ;now buffer has 256 bytes
;now watch the PIO for full indicator. di is pointing to word in cache_buffer to write to
;from data in PIO.
        mov     dx, 0338h           ;dx->PIO status register
lup_fifo_full_3:
        in      al, dx              ;to check the fifo full bit
        test    al, 00000010b
        jz      lup_fifo_full_3
        mov     dx, 0334h           ;dx->PIO FIFO
        cld
        mov     cx, 0020h           ;128 bytes or 64 words
        rep     insd                ;now buffer has 384 bytes
;now watch the PIO for full indicator. di is pointing to word in cache_buffer to write to
;from data in PIO.
        mov     dx, 0338h           ;dx->PIO status register
lup_fifo_full_4:
        in      al, dx              ;to check the fifo full bit
        test    al, 00000010b
        jz      lup_fifo_full_4
        mov     dx, 0334h           ;dx->PIO FIFO
        cld
        mov     cx, 0020h           ;128 bytes or 64 words
        rep     insd                ;now buffer has 512 bytes
;the last 128 bytes generates an irq. during int 13h, it will be taken and there is no code
;to service it. this solution is a bit redundant but it should work. prevents scsi inside scsi.
        mov dx, 033dh       ;1->0 set
        mov al, 04h
        out dx, al
        mov dx, 0335h
        in  al, dx
        mov dx, 033dh       ;0->1 set
        mov al, 0b6h
        out dx, al

        dec bx
        cmp bx, 0
```

```
        jne small_lupw

;now that we accumulated 512 bytes we can write to hard disk.
        cmp     word ptr scsi_ext_xlen, 40h
        jae     can_wr_64_sectors
        mov     ax, word ptr scsi_ext_xlen
        mov     ah, 03h
        mov     word ptr scsi_ext_xlen, 0
        mov     byte ptr sectors_written, al
        jmp     can_wr_lt_64_sectors
can_wr_64_sectors:
        mov     al, 40h
        mov     ah, 03h
        sub     word ptr scsi_ext_xlen, 40h
        mov     byte ptr sectors_written, al
can_wr_lt_64_sectors:

        mov     dl, 80h             ;first drive
        mov     dh, byte ptr scsi_ide_head
        mov     cl, byte ptr scsi_ide_sector
        mov     ch, byte ptr scsi_ide_cylinder
        mov     bl, byte ptr scsi_ide_cylinder + 1
        and     bl, 00000011b       ;assume number of cylinders < 1024. see DOS internals
;p.59 and 6-94 p. 55 for a discussion. Need to find out what the limitation is for DOS 4.01? this may
;be one reason I need to go to DOS 5.0. not quite. maxtor 540AT has more sectors per track so that
;number of cylinders is less than 4096. so dh (7:6) scheme will work.
        shl bl, 6
        or  cl, bl
;       mov bx, ds      ;was done above (setting di)
;       mov es, bx
        lea bx, word ptr scsi_hd_cache_buffer
        int 13h     ;write to hard disk
;scsiiss0.asm change
        cli
;at this point we have to exit and wait for 0333=aa to run its course. before this we
;must decrement the transfer number of sectors count.
        mov ax, word ptr scsi_ext_xlen  ;decrement by 1 sector.
;       dec ax
;       mov word ptr scsi_ext_xlen, ax
;as we shifted xlen into ax, above, we have lost ability to handle xlen=65,536. our
;limit is 32,767. to be consistent:
        and ax, 7fffh
        cmp ax, 0000h
;if zero no more sectors to read. this hopefully also means that the counter will come to zero
;after all is shipped out. thus must eoi and recover when 0333=a2h irq's.
;in a2 processing reset PIO enable bit and features enable bit.
        jnz write_ext_cont1
;there is a chance that my count and adaptec count do not match. then adaptec will send more stuff
;into the fifo.
;if scsi command 2a, ie write_ext and we just received data, then we must be at the end of it.
        mov dx, 033dh   ;1->0 set
        mov al, 04h
        out dx, al
        mov dx, 0335h   ;clear irq resulting from 0aah getting completed
        in  al, dx
;need to reset the features bit and the PIO enable bit.
        mov dx, 033bh
        in  al, dx
        and al, 10111111b   ;reset the features bit
        out dx, al
        mov dx, 033dh
        mov al, 0b6h
        out dx, al      ;0->1
        mov dx, 0338h
        mov al, 00h
        out dx, al      ;reset PIO enable bit
        mov dx, 033dh
        mov al, 04h
        out dx, al      ;1->0
        mov dx, 0332h   ;point to scsi fifo
        mov al, 00h     ;status "good"
        out dx, al
        mov al, 00h     ;message "command complete"
        out dx, al
        mov dx, 0333h
        mov al, 24h     ;terminate sequence
        out dx, al
        jmp scsi_int_exiu

;if not zero, update hard disk pointer set and return to big_lup.
write_ext_cont1:
```

```
        mov al, byte ptr scsi_ide_sector
        add al, byte ptr sectors_written
        mov byte ptr scsi_ide_sector, al
        cmp al, byte ptr scsi_ide_s
        jbe easy_way_outw
wr_ide_lup_t:
        sub al, byte ptr scsi_ide_s
        inc byte ptr scsi_ide_head
        cmp al, byte ptr scsi_ide_s
        ja  wr_ide_lup_t
        mov byte ptr scsi_ide_sector, al

        mov al, byte ptr scsi_ide_head
        cmp al, byte ptr scsi_ide_t ;unlike sectors, heads start at 0
        jb  easy_way_outw
wr_ide_lup_c:
        sub al, byte ptr scsi_ide_t
        inc word ptr scsi_ide_cylinder
        cmp al, byte ptr scsi_ide_t
        jae wr_ide_lup_c
        mov byte ptr scsi_ide_head, al
easy_way_outw:
        jmp big_lupw

gofm_idlun_ne_inqlun_2a:
        jmp scsi_int_exit
;case of identify message lun not being equal to the inquiry command lun.
;*****************************************************************************************************
;LUN=01 PROCESSING. COUNTERPART OF CASDRV*.ASM
;*****************************************************************************************************
go_fmi_t_llun00_2a:
;this is the case of LUN=001 hopefully. then it will let the initiator know that this is a communications
;device. if another LUN we must send an inquiry data that says that this is an unattached device, a non-
;operational device.
        cmp     byte ptr i_t_llun, 01h
        jnz     go_fmi_t_llun01_2a
;scsiiss1.asm change. see notes for the previous case of same change.
;       cli
;lun=01 write_10 processing. this is what we do: store cdb byte_8 to xlen. store byte_7
;at xlen+1. byte_7 will always be zero.
;lba=0.
;length of transfer in bytes in xlen.
        lea     bx, word ptr scsi_ext_xlen
        mov     al, byte ptr scsi_cmd_byte_8
        mov     byte ptr [bx], al
        inc     bx
        mov     al, byte ptr scsi_cmd_byte_7
        mov     byte ptr [bx], al
;now flush the SCSI FIFO
        mov     dx, 0333h
        mov     al, 01h             ;flush fifo command
        out     dx, al              ;at this point scsi fifo is empty (had command)

        mov     bx, ds              ;for insw
        mov     es, bx

        mov     dx, 0337h           ;dx->FIFO status register
lup_fifo_empty_1:
        in      al, dx              ;to check fifo empty
        and     al, 00011111b       ;isolate fifo flags
        cmp     al, 00h             ;is it empty
        jnz     lup_fifo_empty_1    ;loop until fifo EMPTY.

        lea     di, word ptr scsi_int2f_in_buffer
        mov     bx, 0000h           ;reset byte counter
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time.
lup_back1:
        mov     dx, 0333h
        mov     al, 2ah             ;receive data non DMA version
        out     dx, al
        mov     dx, 0337h           ;dx->FIFO status register
lup_fifo_byte1:
        in      al, dx              ;to check the fifo
        and     al, 00011111b
        cmp     al, 01h             ;does fifo have one byte?
        jnz     lup_fifo_byte1      ;loop until fifo has a byte.
        mov     dx, 0332h           ;dx-> SCSI FIFO
        insb                        ;read one byte from (dx) to es:di, incr di.
        mov     dx, 0335h           ;dx-> int_reg
        in      al, dx              ;found out need to read this reg at least every
                                    ;other time to proceed. probably req does not come.
```

```
        inc     bx
        cmp     bx, word ptr scsi_ext_xlen
                                ;are all bytes in?
        jnz     lup_back1
;before we leave, flush fifo again. later it will contain message and status bytes.
;now flush the SCSI FIFO
        mov     dx, 0333h
        mov     al, 01h         ;flush fifo command
        out     dx, al          ;at this point scsi fifo is empty (had command)
;we also need to clear the irq's resulting from receive data byte by byte.
        mov     dx, 0335h
        in      al, dx
;there is a chance that my count and adaptec count do not match. then adaptec will send more stuff
;into the fifo.
;now we process the data and decide what to provide for the read. actually, casdrv05.asm knows what
;to expect and we better deliver it. here we decode what to do and submit it to DOS as an int 2F
;call. this is where I have to face the InDos flag business. no need to use int 28h as the program
;dirkb will always be running, having been brought up by autoexec.bat. thus using InDos will make
;sense. I will figure this out later.
;for now, all data is at scsi_int2f_in_buffer. remember! that all register data that is not an output
;of the current int 2f call should be passed on to scsi_int2f_out_buffer. same is true for the regis-
;ters used as inputs but not outputs. in this case, first pass on the value to the relevant register.
;all bytes are in scsi_int2f_in_buffer. now we start feeding int 2f and scsi_int2f_out_buffer.
;at that point we are ready to terminate the write_10 and receive read_10 from ASPI.
;first we blindly pass on all register values (a,b,c,d) on to the out_buffer. int2f asm routine
;only gets what is in the spec and only its precribed outputs get to write over out_buffer.
        lea     di, word ptr scsi_int2f_in_buffer
        lea     bx, word ptr scsi_int2f_out_buffer
        mov     al, byte ptr [di]    ;2f byte
        mov     byte ptr [bx], al
        mov     ax, word ptr [di+1] ;ax_reg
        mov     word ptr ax_reg, ax
        mov     word ptr [bx+1], ax
        mov     ax, word ptr [di+3] ;bx_reg
        mov     word ptr bx_reg, ax
        mov     word ptr [bx+3], ax
        mov     ax, word ptr [di+5] ;cx_reg
        mov     word ptr cx_reg, ax
        mov     word ptr [bx+5], ax
        mov     ax, word ptr [di+7] ;dx_reg
        mov     word ptr dx_reg, ax
        mov     word ptr [bx+7], ax
;now identify the function and save it in cb_function
        lea     bx, word ptr scsi_int2f_in_buffer
        mov     al, byte ptr [bx+1] ;points to al from PC. CB function number.
        mov     byte ptr cb_function, al
;-------------------------------------------------+
;       PLACE A CALLBACK FOR MAESTRO              |
;-------------------------------------------------+
        mov     ax, CS
        mov     word ptr s1_callback_seg, ax
        mov     ax, OFFSET llun01_2a_callback
        mov     word ptr s1_callback_off, ax
        jmp     scsi_int_exit
;-------------------------------------------------+
;       CALLBACK                                  |
;-------------------------------------------------+
llun01_2a_callback:
;--------------------------+
;   CALLBACK HEADER        |
;--------------------------+
;as 2f calls end up in 21 calls which then go to int13 calls which use irq14, I need to clear is
;bit. scsiiss6.asm change. int13 enables if somehow. so there is a danger that ncr scsi calls we make
;within this one scsi isr will lead to another scsi isr within this isr. we are not able to handle
;this as we use memory and not stack. thus do cli before ncr commands.
;       mov     al, eoi
;       out     intb00, al
;       jmp     $+2
;       out     inta00, al
;eoi is not needed as we come from the foreground.
;save DS, ES values
        push    DS
        push    ES
;setup the DS value to maspi DS value
        mov     ax, CS
        mov     DS, ax
;disable the scsi irq
        in      al, 0a1h
        or      al, 08h
        out     0a1h, al
;increment InIRQ. this makes sure that t2 does not return to maestro which called this callback.
```


35

```
        mov     di, word ptr InIRQ_flag_seg
        mov     ES, di
        mov     di, word ptr InIRQ_flag_off
        inc     ES:byte ptr [di]
        sti
;---------------------------+
;   END CALLBACK HEADER     |
;---------------------------+
;pointer to scsi_int2f_out_buffer
        lea     si, word ptr scsi_int2f_out_buffer
        cmp     byte ptr cb_function, 01h   ;case of file name send
        jz      yes_cb01
        cmp     byte ptr cb_function, 0eh   ;case of data return
        jz      yes_cb0e
        cmp     byte ptr cb_function, 10h   ;case of data return
        jz      yes_cb0e
        cmp     byte ptr cb_function, 12h   ;case of data return
        jz      yes_cb0e
        cmp     byte ptr cb_function, 14h   ;case of file name send
        jz      yes_cb01
        cmp     byte ptr cb_function, 15h   ;case of data send
        jz      yes_cb15
;scsiiss6.asm change. separate cb07 case
        cmp     byte ptr cb_function, 07h   ;case of file handle reflection
        jz      yes_cb07
;if none of the above, then it must be the following:
;*************************************************************************************************
;PROCESSING FOR CB00,02,05,06,[[[07.. removed with scsiiss6.asm]]],08,09,0A,0B,0C,0D,0F,11,13,16,17
;*************************************************************************************************
yes_cb00:
        cmp     byte ptr cb_function, 00h
        jnz     yes_cb02
        mov     ax, word ptr ax_reg
        int     2fh
        mov     byte ptr [si+1], al     ;al to al position in out_buffer
        jmp     int2f_cb_end
yes_cb02:
        cmp     byte ptr cb_function, 02h
        jnz     yes_cb05
        mov     ax, word ptr ax_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb05:
        cmp     byte ptr cb_function, 05h
        jnz     yes_cb06
        mov     ax, word ptr ax_reg
        mov     cx, word ptr cx_reg
        mov     dx, word ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        mov     word ptr [si+3], bx     ;bx to bx position in out_buffer
        jmp     int2f_cb_end
yes_cb06:
        cmp     byte ptr cb_function, 06h
;       jnz     yes_cb07
;scsiiss6.asm change.
        jnz     yes_cb08
        mov     ax, word ptr ax_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        mov     word ptr [si+3], bx     ;bx to bx position in out_buffer
        jmp     int2f_cb_end
;scsiiss6.asm change
;yes_cb07:
;       cmp     byte ptr cb_function, 07h
;       jnz     yes_cb08
;       mov     ax, word ptr ax_reg
;       mov     bx, word ptr bx_reg
;       mov     cx, word ptr cx_reg
;       mov     dl, byte ptr dx_reg
;       int     2fh
;       mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
;       mov     word ptr [si+3], bx     ;bx to bx position in out_buffer
;       jmp     int2f_cb_end
yes_cb08:
        cmp     byte ptr cb_function, 08h
        jnz     yes_cb09
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
```

```
        mov     cx, word ptr cx_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb09:
        cmp     byte ptr cb_function, 09h
        jnz     yes_cb0a
        mov     ax, word ptr ax_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb0a:
        cmp     byte ptr cb_function, 0ah
        jnz     yes_cb0b
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        mov     word ptr [si+5], cx     ;cx to cx position in out_buffer
        mov     word ptr [si+7], dx     ;dx to dx position in out_buffer
        jmp     int2f_cb_end
yes_cb0b:
        cmp     byte ptr cb_function, 0bh
        jnz     yes_cb0c
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     cx, word ptr cx_reg
        mov     dx, word ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb0c:
        cmp     byte ptr cb_function, 0ch
        jnz     yes_cb0d
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        mov     word ptr [si+5], cx     ;cx to cx position in out_buffer
        mov     word ptr [si+7], dx     ;dx to dx position in out_buffer
        jmp     int2f_cb_end
yes_cb0d:
        cmp     byte ptr cb_function, 0dh
        jnz     yes_cb0f
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     cx, word ptr cx_reg
        mov     dx, word ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb0f:
        cmp     byte ptr cb_function, 0fh
        jnz     yes_cb11
        mov     ax, word ptr ax_reg
        mov     dx, word ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb11:
        cmp     byte ptr cb_function, 11h
        jnz     yes_cb13
        mov     ax, word ptr ax_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        mov     word ptr [si+3], bx     ;bx to bx position in out_buffer
        mov     word ptr [si+5], cx     ;cx to cx position in out_buffer
        jmp     int2f_cb_end
yes_cb13:
        cmp     byte ptr cb_function, 13h
        jnz     yes_cb16
        mov     ax, word ptr ax_reg
        mov     dl, byte ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
```

```
yes_cb16:
        cmp     byte ptr cb_function, 16h
        jnz     yes_cb17
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     cx, word ptr cx_reg
        mov     dx, word ptr dx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb17:
        cmp     byte ptr cb_function, 17h
        jnz     yes_cb01
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     cl, byte ptr cx_reg
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
;*****************************************************************************************
;PROCESSING FOR CB01,14
;*****************************************************************************************
yes_cb01:
        cmp     byte ptr cb_function, 01h
        jnz     yes_cb14
;the following is a first instance of synchronization between two machines. when host PC creates
;task.tcf, CaTbox does not know about it yet as its directory information about the CaTdisk is
;in its buffers and they were not updated (of course not!) when host PC wrote to its own buffers
;directory info about task.tcf.
        mov     ah, 0dh
        int     21h
        lea     dx, word ptr scsi_int2f_in_buffer
                                        ;ds->dsdebug
        add     dx, 0009                ;ds:dx->filename
;scsiiss9.asm change. fix the tcf file before submitting. all E:->C:
;open the file, get a handle in bx, call tcf fixup procedure
;after procedure completes close the file. this has to be done here ie inside scsi isr.
;we must check InDOS flag and also we must make sure scsiisr is interruptible.
;this is because, in case of waiting for InDOS, the isr does not hog the system.
;WARNING!!!! THERE IS A POTENTIAL FOR A LOCKUP HERE????
        mov     ax, 3d02h               ;read/write access
        int     21h
        mov     bx, ax
;       mov     ax, cs
;       push    ax
        mov     al, 00h
        call    fix_task_control_file
        mov     ah, 3eh
        int     21h
;end scsiiss9.asm change. file path drive was changed to C: at catpat01.asm.
        mov     ax, word ptr ax_reg
        int     2fh                     ;ds:dx correct
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb14:
        cmp     byte ptr cb_function, 14h
        jnz     yes_cb0e
        mov     ax, word ptr ax_reg
        mov     bx, word ptr bx_reg
        mov     cx, word ptr cx_reg
        lea     dx, word ptr scsi_int2f_in_buffer
                                        ;ds->dsdebug
        add     dx, 0009                ;ds:dx->filename
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
;*****************************************************************************************
;PROCESSING FOR CB0E,10,12
;*****************************************************************************************
yes_cb0e:
        cmp     byte ptr cb_function, 0eh
        jnz     yes_cb10
        mov     ax, word ptr ax_reg
        lea     dx, word ptr scsi_int2f_out_buffer
                                        ;ds->dsdebug
        add     dx, 0009                ;ds:dx->data area in out_buffer
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
yes_cb10:
        cmp     byte ptr cb_function, 10h
```


50

```
        jnz     yes_cb12
        mov     ax, word ptr ax_reg
        lea     dx, word ptr scsi_int2f_out_buffer
                                        ;ds->dsdebug
        add     dx, 0009                ;ds:dx->data area in out_buffer
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        mov     word ptr [si+3], bx     ;bx to bx position in out_buffer
        jmp     int2f_cb_end
yes_cb12:
        cmp     byte ptr cb_function, 12h
        jnz     yes_cb15
        mov     ax, word ptr ax_reg
        lea     dx, word ptr scsi_int2f_out_buffer  ;ds->dsdebug
        add     dx, 0009                ;ds:dx->data area in out_buffer
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
;*************************************************************************************************
;PROCESSING FOR CB15
;*************************************************************************************************
yes_cb15:
        cmp     byte ptr cb_function, 15h
        jnz     int2f_cb_end
        mov     ax, word ptr ax_reg
        lea     dx, word ptr scsi_int2f_in_buffer
                                        ;ds->dsdebug
        add     dx, 0009                ;ds:dx->data area in out_buffer
        int     2fh
        mov     word ptr [si+1], ax     ;ax to ax position in out_buffer
        jmp     int2f_cb_end
;the following section is wholly a scsiiss6.asm change
;*************************************************************************************************
;PROCESSING FOR CB07
;*************************************************************************************************
;plan of action:
;1. temporarily hook int 21 right here. do I know if any other int 21's will come during this time?
;   this is the scsi isr and eoi has been given. but if=0 for the moment. thus nothing can come in.
;   after int 13h enables if=1 we could have other interrupts. for example int 21/3d itself might
;   be interrupted by irq03. timer tick might have some int 21 calls also. Hopefully, it will check
;   for the DOS flag before executing. Voice processing will have int 13h calls. For example, while
;   the user is getting ready to send a fax via intel faxability s/w, the user might also be getting
;   ready to record his own voice. Anyhow, I will assume that other programs will refrain from using
;   DOS calls during this DOS call.
;2. the hook checks yes_2fcb07. if false, it passes it on. this is in case we do get an int 21h
;   while we are in this piece of code. for example, although other int 21h or int 13h will not come
;   during this int 21, after completion and while still in int 2f processing, we could get an
;   int 21h. it could even be an int 21/3d. how will I know if it is related to our case or not?
;   this situation is akin to a case where a fax is coming in on the host (no catbox here) and at
;   the same time, the user is opening the faxability application. the opening will cause a 2fcb07
;   leading to int 21/3d while the incoming fax will cause some writes to hard disk. these writes
;   sit on the timer tick interrupt which may come during 2f processing of 2fcb07 although not
;   inside the int 21 itself. but here the problem will not occur because 2fcb07 decided which file
;   it will open.
;   int 2f cb07
;               int 21 3d00
;               return a handle
;   pass the handle on
;   .....our version:
;   int 2f cb07
;               ....will there be any int 21's other than ours in here???????
;               our hook on int 21 checks yes_2fcb07 and if also 3d00 records the filename
;               passes control to int 21h proper which opens the file and returns a handle
;               also within this int 21 hook, reset yes_2fcb07=00h. the assumption here is that
;               while there may be other int 21's in here, none will come between the start of
;               int 2f and our int 21. here, we are counting on intel casmodem not enabling if=1
;               during int 2f call. this I can check. another trick will worK:
;                       do not do eoi until you get to int 21h, then you know it is the int 21
;                       inside the 2f cb07 inside this scsi isr. NO! because int 2f may enable if=1
;                       in which case an irq higher than scsi irq might come and issue int 21h.
;                       thus it all hinges on what intel casmodem int 2f does. so test it. if
;                       it enables if=1 then nous sommes foutus, si pas on est heureux. I just have
;                       to step through a case of 2f cb07. I did and at int 21h if=1.
;       ANOTHER SOLUTION IS TO HAVE A SEMAPHORE: CASMODEM_ACTIVE.
;
;   int 2f records the handle and returns it
;   now close the file with the handle and write its name to the output buffer.
yes_cb07:   cmp byte ptr cb_function, 07h
        jnz int2f_cb_end                ;this should not occur
;hook int 21
                mov     al, 21h
```

```
                mov     ah, 35h
                int     21h
                mov     cs:word ptr dos_int21_off, bx   ;store current vector locally
                mov     cs:word ptr dos_int21_seg, es
                push    ds
                mov     ax, cs
                mov     cx, ax
                mov     ax, 0000h
                mov     ds, ax
                mov     bx, 0084h
                lea     ax, cs:word ptr int_213d_hook
                pushf
                cli
                mov     word ptr [bx], ax               ;set new vector
                mov     word ptr [bx+2], cx
                popf
                pop     ds
;end hooking int 21/3d
                mov     ax, word ptr ax_reg
                mov     bx, word ptr bx_reg
                mov     cx, word ptr cx_reg
                mov     dl, byte ptr dx_reg
;               mov     byte ptr yes_2fcb07, 01h        ;zero out during int 21 hook
                int     2fh
                mov     word ptr [si+1], ax             ;ax to ax position in out_buffer
                mov     word ptr [si+3], bx             ;bx to bx position in out_buffer
;scsiiss9.asm change. change task file first. first must know that it is a task file
;and not a data file. how do we do this? By checking the cx register: if =0000h then
;control file.
                cmp     ax, 0000h
                jnz     int213d_hook_c1
                cmp     cx, 0000h
                jnz     int213d_hook_c0                 ;if non zero, not a control file
;the file was opened read only (see CAS spec). close it and open it again.
;need its name. it is at cs:scsi_int2f_out_buffer + 9. still path drive of C:
                mov     ah, 3eh                         ;bx=handle
                int     21h
                mov     dx, OFFSET scsi_int2f_out_buffer;file name is here
                add     dx, 0009h                       ;ds=cs already
                mov     ax, 3d02h                       ;read/write
                int     21h
                mov     bx, ax                          ;handle for read/write but same file
                mov     al, 01h                         ;go to cat_disk_letter in this case
;as maestro has to make a far call, must be uniform
;               mov     cx, cs
;               push    cx
                call    fix_task_control_file           ;bx=handle already.
;now close the file. the handle is in bx and this is where int 21 3e wants it.
int213d_hook_c0:mov     ah, 3eh
                int     21h
;unhook int 21
int213d_hook_c1:push    ds
                mov     ax, 0000h
                mov     ds, ax
                mov     bx, 0084h
                mov     ax, cs:word ptr dos_int21_off   ;store current vector locally
                mov     cx, cs:word ptr dos_int21_seg
                pushf
                cli
                mov     word ptr [bx], ax               ;set new vector
                mov     word ptr [bx+2], cx
                popf
                pop     ds
;end unhooking int 21
                jmp     int2f_cb_end
;yes_2fcb07     db      00h
dos_int21_off   dw      ?
dos_int21_seg   dw      ?
;the following is the int 21 hook
int_213d_hook:  pushf
;               cmp     cs:byte ptr yes_2fcb07, 01h     ;is it 2f cb07?
;               jnz     pass_to_previous_21_handler     ;if not let go
                cmp     ah, 3dh                         ;is it open file?
                jnz     pass_to_previous_21_handler     ;if not let go
;it seems that this is the int 21 3d we want. other interrupts have come in before and some perhaps
;have issued int 21 3d. we do not know if this is one of those or the one we want. the solution will
;be to have a semaphore called CASMODEM_ACTIVE so that other int 21 3d calls are held. another way of
;finding out is to check the stack. if this int 21 call was made from casmodem then we are ok. but
;this scsi isr is loaded as a device driver and does not know where casmodem is because casmodem is
;loaded later on with autoexec.bat. I will leave this issue for later. PERHAPS, I SHOULD HAVE A RULE
;WHERE EACH ONE OF MY PROGRAMS WRITE THEIR LOCATION TO 0040:XXXX. FOR CASMODEM, THIS COULD BE DONE
```

```
;BY HOOKING INT 2F AH=00 IS CHECK INSTALLED STATE.
;assuming we solved this problem, we go to store filename pointed to by  ds:dx to the scsi_int2f_out_
;buffer. we are still inside the 2f handler, so we cannot say that si points to this buffer.
;ds:dx = ds:si -> es:di (cs:scsi_int2f_out_buffer+9)
;               mov     cs:byte ptr yes_2fcb07, 00h
;if there is any other int 21/3d before this one we will know about it as
                push    di
                push    si
                push    ax
                push    es
                lea     di, cs:word ptr scsi_int2f_out_buffer
                add     di, 0009h
                mov     ax, cs
                mov     es, ax
                mov     si, dx                  ;ds:dx -> filename ASCIIZ
move_filename:  movsb
                cmp     byte ptr [si], 00h
                jnz     move_filename
                movsb                           ;move Z of ASCIIZ also.
                pop     es
                pop     ax
                pop     si
                pop     di
pass_to_previous_21_handler:
                popf
                jmp     cs:dword ptr dos_int21_off

;*************************************************************************************************
;END PROCESSING OF INT 2F CASES. SCSI_INT2F_OUT_BUFFER NOW READY TO BE READ
;*************************************************************************************************
;if scsi command 2a, ie write_ext and we just received data, then we must be at the end of it.
int2f_cb_end:
;               cli
;the above line was a scsiiss6.asm change. as we gave early eoi, we need to disable if flag that
;was enabled with int 13 so that the following ncr commands do not cause an isr within another isr.
                mov     dx, 0332h   ;point to scsi fifo
                mov     al, 00h     ;status "good"
                out     dx, al
                mov     al, 00h     ;message "command complete"
                out     dx, al
                mov     dx, 0333h
                mov     al, 24h     ;terminate sequence
                out     dx, al
;---------------------------+
;   CALLBACK TAIL           |
;---------------------------+
;decrement InIRQ
                cli
                mov     di, word ptr InIRQ_flag_seg
                mov     ES, di
                mov     di, word ptr InIRQ_flag_off
                dec     ES:byte ptr [di]
;enable SCSI IRQ
                in      al, 0a1h
                and     al, 0f7h
                out     0a1h, al
;return to maestro
                pop     ES
                pop     DS
                retf
;---------------------------+
;   END CALLBACK TAIL       |
;---------------------------+
;               jmp     scsi_int_exit
;scsiiss6.asm change. now that we gave earlt eoi for all cb functions (only the ones that access
;hard disk would need it), we need to skip eoi section of exit.
;               jmp     scsi_int_exiu
;*************************************************************************************************
;LUN=03 processing. counterpart of VP2SCSID.386
;*************************************************************************************************
go_fmi_t_1lun01_2a:
;this is the case of LUN=011 hopefully.
        cmp byte ptr i_t_1lun, 03h
        jnz go_fmi_t_1lun03_2a
;length of transfer in bytes in xlen.
        lea bx, word ptr scsi_ext_xlen
        mov al, byte ptr scsi_cmd_byte_8
        mov byte ptr [bx], al
        inc bx
        mov al, byte ptr scsi_cmd_byte_7
        mov byte ptr [bx], al
```

```
;now flush the SCSI FIFO
        mov dx, 0333h
        mov al, 01h         ;flush fifo command
        out dx, al          ;at this point scsi fifo is empty (had command)

        mov bx, ds          ;for insw
        mov es, bx

        mov     dx, 0337h           ;dx->FIFO status register
lup_fifo_empty_3:
        in      al, dx              ;to check fifo empty
        and     al, 00011111b       ;isolate fifo flags
        cmp     al, 00h             ;is it empty
        jnz     lup_fifo_empty_3        ;loop until fifo EMPTY.

        lea di, word ptr scsi_lpt_in_buffer
        mov bx, 0000h       ;reset byte counter
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time.
lup_back2:
        mov dx, 0333h
        mov al, 2ah         ;receive data non DMA version
        out dx, al
        mov dx, 0337h       ;dx->FIFO status register
lup_fifo_byte2:
        in  al, dx          ;to check the fifo
        and al, 00011111b
        cmp al, 01h         ;does fifo have one byte?
        jnz lup_fifo_byte2  ;loop until fifo has a byte.
        mov dx, 0332h       ;dx-> SCSI FIFO
        insb                ;read one byte from (dx) to es:di, incr di.
        mov dx, 0335h       ;dx-> int_reg
        in  al, dx          ;found out need to read this reg at least every
                            ;other time to proceed. probably req does not come.
        inc bx
        cmp bx, word ptr scsi_ext_xlen  ;are all bytes in?
        jnz lup_back2
;before we leave, flush fifo again. later it will contain message and status bytes.
;now flush the SCSI FIFO
        mov dx, 0333h
        mov al, 01h         ;flush fifo command
        out dx, al          ;at this point scsi fifo is empty (had command)
;we also need to clear the irq's resulting from receive data byte by byte.
        mov dx, 0335h
        in  al, dx
;there is a chance that my count and adaptec count do not match. then adaptec will send more stuff
;into the fifo.
;now we process the data and decide what to provide for the read. actually, casdrv05.asm knows what
;to expect and we better deliver it. here we decode what to do and submit it to DOS as an int 2F
;call. this is where I have to face the InDos flag business. no need to use int 28h as the program
;dirkb will always be running, having been brought up by autoexec.bat. thus using InDos will make
;sense. I will figure this out later.
;for now, all data is at scsi_int2f_in_buffer. remember! that all register data that is not an output
;of the current int 2f call should be passed on to scsi_int2f_out_buffer. same is true for the regis-
;ters used as inputs but not outputs. in this case, first pass on the value to the relevant register.
;all bytes are in scsi_int2f_in_buffer. now we start feeding int 2f and scsi_int2f_out_buffer.
;at that point we are ready to terminate the write_10 and receive read_10 from ASPI.
;first we blindly pass on all register values (a,b,c,d) on to the out_buffer. int2f asm routine
;only gets what is in the spec and only its precribed outputs get to write over out_buffer.
;now transfer in buffer contents to out buffer. if the i/o instruction was
;an output instruction, there is nothing to write back to host PC. In case of
;an input i/o instruction, the eax double word will change.
        lea di, word ptr scsi_lpt_in_buffer
        lea bx, word ptr scsi_lpt_out_buffer
        mov eax, dword ptr [di+0]       ;first double word register: ecx
        mov dword ptr [bx+0], eax
        mov dword ptr IO_ecx_reg, eax
        mov eax, dword ptr [di+4]       ;second double word register: edx
        mov dword ptr [bx+4], eax
        mov dword ptr IO_edx_reg, eax
        mov eax, dword ptr [di+8]       ;third double word register: eax
        mov dword ptr [bx+8], eax
        mov dword ptr IO_eax_reg, eax

;now identify the function and save it in cb_function
;we do not need this as print calls do not generate int 13h
;       mov al, eoi
;       out intb00, al
;       jmp $+2
;       out inta00, al
;now analyse the IOType variable in ecx and duplicate the call.
;this is very simple, if in al, dx then do it and update eax in output buffer
```

```
;if out dx, al then just do it an do not change the output buffer.
;choices: host might decide that for an out dx, al it does not need to read anything back.
;in this case, another i/o might come too soon for CaTbox. so, for now, I will treat them
;all the same way and will do a read after a write even for out dx, al
        mov cl, byte ptr IO_ecx_reg
        and cl, 04h                     ;would be a out dx, al
        jnz must_be_input

        mov dx, word ptr IO_edx_reg
        in  al, dx

        mov byte ptr IO_eax_reg, al
        lea bx, word ptr scsi_lpt_out_buffer
        mov byte ptr [bx+8], al         ;store in output buffer
        jmp lpt_end

must_be_input:
        and cl, 00h
        jnz lpt_end                     ;do nothing for now if anything else

        mov dx, word ptr IO_edx_reg
        out dx, al
        jmp lpt_end

;*****************************************************************************************
;END PROCESSING OF LPT CASES. SCSI_LPT_OUT_BUFFER NOW READY TO BE READ
;*****************************************************************************************
;if scsi command 2a, ie write_ext and we just received data, then we must be at the end of it.
;int2f_cb_end:   cli
;the above line was a scsiiss6.asm change. as we gave early eoi, we need to disable if flag that
;was enabled with int 13 so that the following ncr commands do not cause an isr within another isr.
;no need for above as no early eoi.
lpt_end:mov dx, 0332h   ;point to scsi fifo
        mov al, 00h     ;status "good"
        out dx, al
        mov al, 00h     ;message "command complete"
        out dx, al
        mov dx, 0333h
        mov al, 24h     ;terminate sequence
        out dx, al
        jmp scsi_int_exit
;scsiiss6.asm change. now that we gave earlt eoi for all cb functions (only the ones that access
;hard disk would need it), we need to skip eoi section of exit.
;       jmp     scsi_int_exiu

;*****************************************************************************************
;LUN=04 PROCESSING. COUNTERPART OF CATSYNC.VXD
;*****************************************************************************************
go_fmi_t_llun03_2a:
            cmp     byte ptr i_t_llun, 04h
            jne     go_fmi_t_llun04_2a
;mask scsi irq as we will issue irq generating commands but will handle them within this
;interrupt service routine by polling. this is not necessary as for this path eoi is not
;issued. only issued for lun=00 at this point.
            in      al, 0a1h
            or      al, 08h                         ; mask position 11 decimal
            out     0a1h, al                        ; any irq will come but scsi irq.
;length of transfer in bytes in xlen
            lea     bx, word ptr scsi_ext_xlen
            mov     al, byte ptr scsi_cmd_byte_8
            mov     byte ptr [bx], al
            inc     bx
            mov     al, byte ptr scsi_cmd_byte_7
            mov     byte ptr [bx], al
;now flush the SCSI FIFO
            mov     dx, 0333h
            mov     al, 01h
            out     dx, al
;setup es:di for insw
            mov     di, word ptr host_DOS_request_off   ; points to host_DOS_request_type in catvoice
            mov     ax, word ptr host_DOS_request_seg
            mov     ES, ax
;double check for FIFO empty
            mov     dx, 0337h
lup_fifo_empty_5:
            in      al, dx
            and     al, 00011111b
            cmp     al, 00h
            jne     lup_fifo_empty_5

            mov     bx, 0000h                       ; reset byte counter
```

```
;scsiissd.asm change. bug 12-004. 9/2/95. add cld.
            cld
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time
lup_back4:
            mov     dx, 0333h
            mov     al, 2ah                         ; receive data non-DMA version
            out     dx, al
            mov     dx, 0337h                       ; FIFO Flags register
lup_fifo_byte4:
            in      al, dx
            and     al, 00011111b
            cmp     al, 01h                         ; does FIFO have one byte?
            jne     lup_fifo_byte4
            mov     dx, 0332h                       ; SCSI FIFO
            insb                                    ; read one byte from (dx) to es:di inc di
            mov     dx, 0335h                       ; int reg
            in      al, dx
            inc     bx
            cmp     bx, word ptr scsi_ext_xlen      ; are all bytes in?
            jne     lup_back4
;flush fifo
            mov     dx, 0333h
            mov     al, 01h
            out     dx, al
;clear irq's
            mov     dx, 0335h
            in      al, dx
;load status good and message command complete
;scsiissc.asm experiment. delay between delivery of data and terminate
;           mov     cx, 0ffffh
;delay_lup66:mov         ax, 0
;           nop
;           loop    delay_lup66

            mov     dx, 0332h
            mov     al, 00h
            out     dx, al                          ; status "good"
            mov     al, 00h
            out     dx, al                          ; message "command complete"
            mov     dx, 0333h
            mov     al, 24h
            out     dx, al                          ; terminate sequence

            cli
            in      al, 0a1h
            and     al, 0f7h                        ; unmask position 11 decimal
            out     0a1h, al
            jmp     scsi_int_exit                   ; iret will cause sti
;*************************************************************************************************
;LUN=07 PROCESSING. COUNTERPART OF CATPAT.EXE
;*************************************************************************************************
go_fmi_t_llun04_2a:
            cmp     byte ptr i_t_llun, 07h
            jne     go_fmi_t_llun07_2a
;mask scsi irq as we will issue irq generating commands but will handle them within this
;interrupt service routine by polling. this is not necessary as for this path eoi is not
;issued. only issued for lun=00 at this point.
            in      al, 0a1h
            or      al, 08h                         ; mask position 11 decimal
            out     0a1h, al                        ; any irq will come but scsi irq.
;length of transfer in bytes in xlen
            lea     bx, word ptr scsi_ext_xlen
            mov     al, byte ptr scsi_cmd_byte_8
            mov     byte ptr [bx], al
            inc     bx
            mov     al, byte ptr scsi_cmd_byte_7
            mov     byte ptr [bx], al
;now flush the SCSI FIFO
            mov     dx, 0333h
            mov     al, 01h
            out     dx, al
;setup es:di for insw
            mov     di, word ptr host_CAS_request_off   ; points to host_DOS_request_type in catvoice
            mov     ax, word ptr host_CAS_request_seg
            mov     ES, ax
;double check for FIFO empty
            mov     dx, 0337h
lup_fifo_empty_57:
            in      al, dx
            and     al, 00011111b
            cmp     al, 00h
```

```
            jne     lup_fifo_empty_57

            mov     bx, 0000h                       ; reset byte counter
;scsiissd.asm change. bug 12-004. 9/2/95. add cld.
            cld
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time
lup_back47:
            mov     dx, 0333h
            mov     al, 2ah                         ; receive data non-DMA version
            out     dx, al
            mov     dx, 0337h                       ; FIFO Flags register
lup_fifo_byte47:
            in      al, dx
            and     al, 00011111b
            cmp     al, 01h                         ; does FIFO have one byte?
            jne     lup_fifo_byte47
            mov     dx, 0332h                       ; SCSI FIFO
            insb                                    ; read one byte from (dx) to es:di inc di
            mov     dx, 0335h                       ; int reg
            in      al, dx
            inc     bx
            cmp     bx, word ptr scsi_ext_xlen      ; are all bytes in?
            jne     lup_back47
;flush fifo
            mov     dx, 0333h
            mov     al, 01h
            out     dx, al
;clear irq's
            mov     dx, 0335h
            in      al, dx
;load status good and message command complete
;scsiissc.asm experiment. delay between delivery of data and terminate
;           mov     cx, 0ffffh
;delay_lup66:mov    ax, 0
;           nop
;           loop    delay_lup66

            mov     dx, 0332h
            mov     al, 00h
            out     dx, al                          ; status "good"
            mov     al, 00h
            out     dx, al                          ; message "command complete"
            mov     dx, 0333h
            mov     al, 24h
            out     dx, al                          ; terminate sequence

            cli
            in      al, 0a1h
            and     al, 0f7h                        ; unmask position 11 decimal
            out     0a1h, al
            jmp     scsi_int_exit                   ; iret will cause sti
;*****************************************************************************************
;LUN=02 PROCESSING. COUNTERPART OF SERIAL.VXD
;*****************************************************************************************
;this channel is used for commands to process Port Calls from serial.vxd. the actual calls come
;on LUN=5. in addition, there is a constant read on channel 6.
;the first two double words always are: hport and port call type. the remainder depend on the
;call. at this point, I am thinking that each port call will have a pre-write and a post-read.
;the actual call (on lun=5) is sandwiched in between. it may also be that we need to pass port
;information back and forth in which case, we might also have a pre-read and a post-write.
;thus we should have:
;                   dword   hport
;                   dword   port call type
;                   word    type of command (pre-write, pre-read, post-write, post-read)
;scsi should read the first 10 bytes (4+4+2) and decide where the rest of the data should go.
;for example, port information data should go to the relevant structure in a GS: structure.
;this transaction takes place a byte at a time with a NCR 2a issued for each.
;also note that, the reads take place with NCR 28 command. both reads and writes use the same
;data structures as they are issued sequentially from the host ie our version of serial.
;NOTE: for PortOpen, we need to have a pre-write and a post-read and nothing sandwiched in
;between.
;new variables:     temporary holding locations (alive during this scsi isr) for incoming
;variables until scsi isr figures out where they go.
;                   remote_modem_hport      dword
;                   remote_modem_port_call  dword
;                   remote_modem_cmd_type   word
go_fmi_t_llun07_2a:
            cmp     byte ptr i_t_llun, 02h
            jne     go_fmi_t_llun02_2a
;mask scsi irq as we will issue irq generating commands but will handle them within this
;interrupt service routine by polling. this is not necessary as for this path eoi is not
```

```
;issued. only issued for lun=00 at this point.
            in      al, 0a1h
            or      al, 08h                         ; mask position 11 decimal
            out     0a1h, al                        ; any irq will come but scsi irq.
;length of transfer in bytes in xlen
            lea     bx, word ptr scsi_ext_xlen
            mov     al, byte ptr scsi_cmd_byte_8
            mov     byte ptr [bx], al
            inc     bx
            mov     al, byte ptr scsi_cmd_byte_7
            mov     byte ptr [bx], al
;now flush the SCSI FIFO
            mov     dx, 0333h
            mov     al, 01h
            out     dx, al
;setup es:di for insw
            mov     di, OFFSET remote_modem_hport
            mov     ax, CS
            mov     ES, ax
;double check for FIFO empty
            mov     dx, 0337h
lup_fifo_empty_7:
            in      al, dx
            and     al, 00011111b
            cmp     al, 00h
            jne     lup_fifo_empty_7

            mov     bx, 0000h                       ; reset byte counter
;issue receive data NCR command. data will be filling up the SCSI FIFO a byte at a time
lup_back5:
            mov     dx, 0333h
            mov     al, 2ah                         ; receive data non-DMA version
            out     dx, al
            mov     dx, 0337h                       ; FIFO Flags register
lup_fifo_byte5:
            in      al, dx
            and     al, 00011111b
            cmp     al, 01h                         ; does FIFO have one byte?
            jne     lup_fifo_byte5
            mov     dx, 0332h                       ; SCSI FIFO
            insb                                    ; read one byte from (dx) to es:di inc di
            mov     dx, 0335h                       ; int reg
            in      al, dx
            inc     bx
            cmp     bx, 0ah                         ; are all of first 10 bytes in?
            jne     lup_back5
;clear irq's for the 10th byte
            mov     dx, 0335h
            in      al, dx
;this is where we have to make decisions. we got hport, port call type and cmd type.
;there may be more data coming in such as items from the port information structure
;this depends on what port call is being made.
            cmp     dword ptr remote_modem_port_call, MASPI_DMS_TASK_TYPE_PORT_OPEN
            jne     rm_not_port_open
;first let us treat the case of PortOpen.
;PortOpen:
;   1. find a free modem_dms structure and set to not free. you are bound to have a structure
;      as we have as many modems as we say we have at host. in other words, the modems we do
;      not have are getting kicked back before they get to serial.vxd at host level.
;   2. enter the hport number there.
;   3. also write PortOpen to task # entry.
;   4. fill out task_request and task_status entries.
;   5. activate the related TTQ entry.
;   6. exit the isr after setting NCR up to complete the scsi link.
search_free_maspi_dms:
            mov     si, OFFSET maspi_dms_1
            cmp     word ptr [si + MASPI_DMS_FREE_STATUS], MASPI_DMS_FREE_STATUS_FREE
            je      free_maspi_dms_found
            add     si, MASPI_DMS_SIZE
            jmp     search_free_maspi_dms
free_maspi_dms_found:
            mov     word ptr current_maspi_dms_ptr, si
            mov     word ptr [si + MASPI_DMS_FREE_STATUS], MASPI_DMS_FREE_STATUS_NOT_FREE
            mov     eax, dword ptr remote_modem_hport
            mov     dword ptr [si + MASPI_DMS_HPORT], eax
            mov     eax, dword ptr remote_modem_port_call
            mov     dword ptr [si + MASPI_DMS_TASK_TYPE], eax
            mov     di, word ptr [si + MASPI_DMS_TTQ_ENTRY_PTR + 2]
            mov     ES, di
            mov     di, word ptr [si + MASPI_DMS_TTQ_ENTRY_PTR]
            mov     ES:byte ptr  [di + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
```

```
rm_not_port_open:
;load status good and message command complete
            mov     dx, 0332h
            mov     al, 00h
            out     dx, al                          ; status "good"
            mov     al, 00h
            out     dx, al                          ; message "command complete"
            mov     dx, 0333h
            mov     al, 24h
            out     dx, al                          ; terminate sequence

            cli
            in      al, 0a1h
            and     al, 0f7h                        ; unmask position 11 decimal
            out     0a1h, al
            jmp     scsi_int_exit                   ; iret will cause sti


go_fmi_t_llun02_2a:
            jmp     scsi_int_exit                   ; for the time being
;-----------------------------------------------------------------------------------------------------------+
;CDB WRITE EXTENDED. group 1 command. code 2Ah.                                                             |
;-----------------------------------------------------------------------------------------------------------+
;the following word gets updated during install of scsiisrp.asm
;enetually, this should come from a call to the IDE disk.
read_capacity_data  db  00h
            db  02h
            db  8bh
            db  72h
            db  00h
            db  00h
            db  02h
            db  00h
scsi11_isr  endp

;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                                          ;
;       PROCEDURE FIX_TASK_CONTROL_FILE                                                                    ;
;                                                                                                          ;
;THIS PROCEDURE FIXES THE PATHNAME FOR TASK CONTROL FILES                                                   ;
;       INPUTS  BX = FILE HANDLE                                                                           ;
;               AL = 00 IF TO C:, 01 IF TO CAT_DISK_LETTER:                                                ;
;               CAT_DISK_LETTER (byte in maspi)                                                            ;
;AT START, THE FILE IS OPEN. AT END, THE FILE IS STILL OPEN AND POINTER AT BEGINNING                        ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&;
fix_task_control_file   proc    far
                push    ax
                push    bx
                push    cx
                push    dx
                push    ds
;               mov     word ptr tcf_file_handle, bx   ;no need as bx not used.
                cmp     al, 00h
                jnz     direction_cat_disk_letter
                mov     ah, "C"
                mov     byte ptr tcf_path_drv, ah
                jmp     fix_tcf_cont0
direction_cat_disk_letter:
                mov     ah, byte ptr cat_disk_letter
                mov     byte ptr tcf_path_drv, ah
                jmp     fix_tcf_cont0
fix_tcf_cont0:  mov     cx, 0000h
                mov     dx, 012fh               ;offset of PCX file directory from file start
                mov     al, 00h                 ;start at begin of file
                mov     ah, 42h                 ;move file pointer
                int     21h                     ;now pointer is at offset 010fh
                mov     cx, 0001h               ;one byte to write
                mov     dx, cs
                mov     ds, dx
                mov     dx, OFFSET tcf_path_drv
                mov     ah, 40h                 ;write file or device
                int     21h                     ;now drive letter fixed for .PCX file
                mov     cx, 0000h
                mov     dx, 0008h               ;offset of number of FTR's from file start
                mov     al, 00h                 ;start at begin of file
                mov     ah, 42h                 ;move file pointer
                int     21h                     ;now pointer is at offset 0008h
                mov     cx, 0002h               ;two bytes to read
                mov     dx, cs
                mov     ds, dx
                mov     dx, OFFSET tcf_number_of_FTR
```

```
                mov     ah, 3fh                     ;read file or device
                int     21h                         ;number of FTR's is at tcf_number_of_FTR
                mov     ax, word ptr tcf_number_of_FTR
                cmp     ax, 0000h                   ;no FTR's? ie just a cover sheet
                jz      fix_tcf_contl               ;if none then we are done
                mov     cx, 0002h                   ;pointer already at offset of first ftr
                mov     dx, cs
                mov     ds, dx
                mov     dx, OFFSET tcf_offset_of_first_FTR
                mov     ah, 3fh                     ;read the offset
                int     21h                         ;offset of first FTR at tcf_offset_of_first_FTR
;now move file pointer to first FTR filename location. increment by 80h (128decimal)
                mov     dx, word ptr tcf_offset_of_first_FTR
                add     dx, 000fh                   ;dx = offset of first file to send
                mov     word ptr tcf_offset_FTR_filename, dx
fix_tcf_loop0:
;in this loop, move file pointer to tcf_offset_FTR_filename. change the byte and loop until #=0
                mov     cx, 0000h
                mov     dx, word ptr tcf_offset_FTR_filename
                mov     al, 00h                     ;start at begin of file
                mov     ah, 42h
                int     21h                         ;file pointer at drive letter
                mov     cx, 0001h                   ;one byte to write
                mov     dx, cs
                mov     ds, dx
                mov     dx, OFFSET tcf_path_drv
                mov     ah, 40h                     ;write file or device
                int     21h                         ;now drive letter fixed for .PCX file
                mov     dx, word ptr tcf_offset_FTR_filename
                add     dx, 0080h                   ;length of one FTR
                mov     word ptr tcf_offset_FTR_filename, dx
                mov     cx, word ptr tcf_number_of_FTR
                dec     cx
                mov     word ptr tcf_number_of_FTR, cx
                cmp     cx, 0000h
                jnz     fix_tcf_loop0
fix_tcf_contl:
                pop     ds
                pop     dx
                pop     cx
                pop     bx
                pop     ax
                retf
fix_task_control_file   endp
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                       ;
;       END PROCEDURE FIX_TASK_CONTROL_FILE                                             ;
;                                                                                       ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&;

;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                       ;
;       PROCEDURE   STORE_TO_CLIENT_REGS                                                ;
;                                                                                       ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
store_to_Client_regs    proc
                mov     di, word ptr client_regs_seg_ptr
                mov     ES, di
                mov     di, word ptr client_regs_off_ptr
                mov     bp, SP

                mov     ax, word ptr [bp + 12h]
                mov     ES:word ptr [di + MASPI_CLIENT_AX_OFFSET], ax

                mov     ax, word ptr [bp + 10h]
                mov     ES:word ptr [di + MASPI_CLIENT_BX_OFFSET], ax

                mov     ax, word ptr [bp + 0eh]
                mov     ES:word ptr [di + MASPI_CLIENT_CX_OFFSET], ax

                mov     ax, word ptr [bp + 0ch]
                mov     ES:word ptr [di + MASPI_CLIENT_DX_OFFSET], ax

                mov     ax, word ptr [bp + 0ah]
                mov     ES:word ptr [di + MASPI_CLIENT_BP_OFFSET], ax

                mov     ax, word ptr [bp + 02h]
                mov     ES:word ptr [di + MASPI_CLIENT_DI_OFFSET], ax

                mov     ax, word ptr [bp + 06h]
                mov     ES:word ptr [di + MASPI_CLIENT_SI_OFFSET], ax
```

```
            mov     ax, word ptr [bp + 04h]
            mov     ES:word ptr [di + MASPI_CLIENT_ES_OFFSET], ax

            mov     ax, SS
            mov     ES:word ptr [di + MASPI_CLIENT_SS_OFFSET], ax

            mov     ax, bp
            add     ax, 1ah
            mov     ES:word ptr [di + MASPI_CLIENT_SP_OFFSET], ax

            mov     ax, FS
            mov     ES:word ptr [di + MASPI_CLIENT_FS_OFFSET], ax

            mov     ax, GS
            mov     ES:word ptr [di + MASPI_CLIENT_GS_OFFSET], ax

            mov     ax, word ptr [bp + 08h]
            mov     ES:word ptr [di + MASPI_CLIENT_DS_OFFSET], ax

            mov     ax, word ptr [bp + 14h]
            mov     ES:word ptr [di + MASPI_CLIENT_IP_OFFSET], ax

            mov     ax, word ptr [bp + 16h]
            mov     ES:word ptr [di + MASPI_CLIENT_CS_OFFSET], ax

            mov     ax, word ptr [bp + 18h]
            mov     ES:word ptr [di + MASPI_CLIENT_FLAGS_OFFSET], ax

                    ret
store_to_Client_regs    endp
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                 ;
;       END PROCEDURE   STORE_TO_CLIENT_REGS                                      ;
;                                                                                 ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&


;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                 ;
;       PROCEDURE   RESTORE_FM_CLIENT_REGS                                        ;
;                                                                                 ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
restore_fm_Client_regs  proc
            mov     di, word ptr client_regs_seg_ptr
            mov     ES, di
            mov     di, word ptr client_regs_off_ptr
            mov     bp, SP

            mov     ax, ES:word ptr [di + MASPI_CLIENT_AX_OFFSET]
            mov     word ptr [bp + 12h], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_BX_OFFSET]
            mov     word ptr [bp + 10h], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_CX_OFFSET]
            mov     word ptr [bp + 0eh], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_DX_OFFSET]
            mov     word ptr [bp + 0ch], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_BP_OFFSET]
            mov     word ptr [bp + 0ah], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_DI_OFFSET]
            mov     word ptr [bp + 02h], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_SI_OFFSET]
            mov     word ptr [bp + 06h], ax

            mov     ax, ES:word ptr [di + MASPI_CLIENT_ES_OFFSET]
            mov     word ptr [bp + 04h], ax

;we do not change stack in scsii isr.
;           mov     ax, ES:word ptr [di + MASPI_CLIENT_SS_OFFSET]
;           mov     SS, ax
;we are stack neutral so that SP will get back to its original value
;           mov     ax, bp
;           add     ax, 1ah
;           mov     ES:word ptr [di + MASPI_CLIENT_SP_OFFSET]
```

```
                mov     ax, ES:word ptr [di + MASPI_CLIENT_FS_OFFSET]
                mov     FS, ax

                mov     ax, ES:word ptr [di + MASPI_CLIENT_GS_OFFSET]
                mov     GS, ax

                mov     ax, ES:word ptr [di + MASPI_CLIENT_DS_OFFSET]
                mov     word ptr [bp + 08h], ax

                mov     ax, ES:word ptr [di + MASPI_CLIENT_IP_OFFSET]
                mov     word ptr [bp + 14h], ax

                mov     ax, ES:word ptr [di + MASPI_CLIENT_CS_OFFSET]
                mov     word ptr [bp + 16h], ax

                mov     ax, ES:word ptr [di + MASPI_CLIENT_FLAGS_OFFSET]
                mov     word ptr [bp + 18h], ax

                        ret
restore_fm_Client_regs  endp
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                         ;
;       END PROCEDURE   RESTORE_FM_CLIENT_REGS                                            ;
;                                                                                         ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&

scsiisr_end     db      ?
maspi_coda  ends
;scsiisrq change
;end install
end
```

```
;catstpl9.asm <- catstpl8.asm. 11/03/95. L7 changes incorporated here. ie removing the initial
;detection ringback.
;catstpl8.asm <- catstpl7.asm. 10/28/95. vma when entered from remote, needs to have a separate
;set of steps because of the returning point at the end. it should return to 31 which is main
;menu for voice path (if password was correct). whereas from console it should return to
;0 which is tmo. as all our modems are on an equal footing now, we have to have all capabilities
;in all modems.
;catstpl7.asm <- catstpl6.asm. 10/12/95. add two ribbons for programming print incoming faxes
;and fix and switch to fax for host outgoing faxes.
;catstpl6.asm <- catstpl5.asm. 9/14/95. change copy step to work with catvocl3 which adds
;a printer task queue (PTQ). also add a new print step for fgprint.exe.
;catstpl5.asm <- catstpl4.asm. 8/26/95. add faxback steps
;CATSTPL4.ASM <- CATSTPL3.ASM. 8/10/95. add action hmp_task_master
;CATSTPL3.ASM <- CATSTPL2.ASM. 7/18/95. add rmi as a sequence of steps. add modem# to beginning.
;CATSTPL2.ASM <- CATSTPL1.ASM. 7/4/95. add dtmf_4 ribbon.
;CATSTPL1.ASM <- CATSTPL0.ASM. 6/30/95. toward the final version.
;CATSTPL0.ASM <- CATSTEPB.ASM. 6/12/95. CATVOCL. TO INCORPORATE TMO AND SFX.
;catstepb.asm <- catstepa.asm. 6/7/95. to incorporate tmo.
;flow of events:
;   tmo
;   if ring and voice   em_gp (not written yet. gets password)
;                       if password correct then do vma
;                       if password incorrect then do rmi
;   if ring and fax then this machine stops and CASMODEM is activated
;
;   if no ring and ttq item, then whatever the item wants, go to that step.
;emr (email retrieval) must also be present. it may be requested by fmaestro via ttq.
;copy does not require a modem and it will be present only on the keypad modem.
;pfi (print fax indirect) is a function for the keypad step table.
;
;sfx (send fax) is also a function of the keypad step table. it will build up to a task control file.
;after this point, it goes to ttq where a line modem picks it up.
;the components of sfx are: scan, build task control file, submit to casmodem, ttq request.
;the request is to a step where the action is switch to fax.
;
.NOLIST
;catstep7.asm <- catstep6.asm. 5/22/95. to experiment with updatfq0.asm. step 0007 -> vcon_session_4
;catstep6.asm <- catstep5.asm. 5/18/95. DOS MULTITASKER WORKEDWITH CATSTEP5.ASM!!!!!!!!!!!!!!
;in this revision, we have no_action,emit_msg,start_program,many emit_msg's.
;catstep5.asm <- catstep4.asm. 5/15/95. works with catvoce. add start_program for SCAN.
;catvoce works with SCAN. now remove WAIT_TO_COMPLETE from step_0007 to see true multitasking.
;catstep4.asm <- catstep3.asm. 5/12/95. works with catvocd and after. has stffmhdc for reco_msg.
;catstep3.asm <- catstep2.asm. 5/7/95. works with catvoc06. add argument_2 to start_program
;catstep2.asm <- catstep1.asm. 5/1/95. add ending identifier.
;
;INCLUDE E:\MASM\SAMPLES\MON\TEPEGOZ\TEPECAT\CATVOICE\CATVOCD\CATEQU05.INC
.LIST
INCLUDE CATEQU0e.INC
PAGE
.MODEL  SMALL
.386P
.STACK
.CODE
;*************************************************************************
;*                                                                       *
;*      CATSTPL1.ASM                                                     *
;*      COPYRIGHT 3TAU 1995                                              *
;*      WRITTEN BY HALUK M. AYTAC                                        *
;*      start date: October 1994                                         *
;*      JUNE 30, 1995                                                    *
;*      name catsteps suggested by Fatih Unal                            *
;*      former name was state table                                      *
;*                                                                       *
;*************************************************************************
;NOTE: LOAD MPS IN CVBOOT.
;next step ordering:    F = 1   ttq
;                       F = 0   voice next step or as handled internally to tmo:          NO_DTMF
;                       F = 2   fax (next stepper level_0, if dtmf=NULL sets vcon_state=0)  DTMF_*
;                                                                                          DTMF_#
;                                                                                          DTMF_0

                        ORG 0000H
START:
vcon_step_machine       dw  session_parameters_area
step_table_seg_number   dw  0000H                       ;to be filled in by cvboot
mps_seg_number          dw  0000H                       ;to be filled in by cvboot
sys_data_seg_number     dw  0000H                       ;to be filled in by cvboot (used first by rem)
st_modem_number         dw  0000H                       ;ASCII eg 3130H (which is 30H and at higher mem 31H)
                                                        ;if wish to add to filename, db "C:\CATBOX\FN01.PCM",00
H
```


71

```
;step POINTER AREA                                    ;OFFSET_TO_STEP_ENTRIES
step_0000_ptr          dw  starter_step
step_0001_ptr          dw  start_program_for_emit_msg
step_0002_ptr          dw  start_program_for_reco_msg
step_0003_ptr          dw  start_program_for_vma
step_0004_ptr          dw  emit_msg_for_vma
step_0005_ptr          dw  no_action_for_vma
step_0006_ptr          dw  start_program_1_for_rmi
step_0007_ptr          dw  start_program_2_for_rmi
step_0008_ptr          dw  start_program_3_for_rmi
step_0009_ptr          dw  start_program_1_for_pfi
step_000a_ptr          dw  start_program_2_for_pfi
step_000b_ptr          dw  no_action_for_pfi
step_000c_ptr          dw  emit_msg_for_tmo
step_000d_ptr          dw  emit_msg_for_acd
step_000e_ptr          dw  no_action_for_acd
step_000f_ptr          dw  start_program_for_acd
step_0010_ptr          dw  ?
step_0011_ptr          dw  ?
step_0012_ptr          dw  ?
step_0013_ptr          dw  ?
step_0014_ptr          dw  ?
step_0015_ptr          dw  ?
step_0016_ptr          dw  ?
step_0017_ptr          dw  ?
step_0018_ptr          dw  ?
step_0019_ptr          dw  ?
step_001a_ptr          dw  ?
step_001b_ptr          dw  ?
step_001c_ptr          dw  ?
step_001d_ptr          dw  ?
step_001e_ptr          dw  ?
step_001f_ptr          dw  ?
step_0020_ptr          dw  play_rec_recamsg_message
step_0021_ptr          dw  now_record_recamsg
step_0022_ptr          dw  play_recamsg_back
step_0023_ptr          dw  sp_for_fast_print
step_0024_ptr          dw  play_from_answering_machine
step_0025_ptr          dw  end_of_session
step_0026_ptr          dw  start_program_for_COPY
step_0027_ptr          dw  get_number_of_copies
step_0028_ptr          dw  get_ph_nmbr_for_send_fax
step_0029_ptr          dw  start_pgm_make_fn_for_sfx
step_002a_ptr          dw  start_pgm_open_tcf_for_sfx
step_002b_ptr          dw  emit_msg_for_sfx
step_002c_ptr          dw  scan_to_pcx_for_sfx
step_002d_ptr          dw  incrally_build_tcf_for_sfx
step_002e_ptr          dw  ttq_req_for_sfx
step_002f_ptr          dw  print_incoming_faxes

step_0030_ptr          dw  get_password
step_0031_ptr          dw  main_menu
step_0032_ptr          dw  ?
step_0033_ptr          dw  submit_a_fax
step_0034_ptr          dw  switch_to_fax

step_0035_ptr          dw  sp_make_fn_for_rmi
step_0036_ptr          dw  record_msg_for_rmi
step_0037_ptr          dw  hang_up_for_rmi
step_0038_ptr          dw  sp_updatevq_for_rmi

step_0039_ptr          dw  sp_merge_for_vma
step_003a_ptr          dw  vma_for_vma
step_003b_ptr          dw  sp_store_for_vma

step_003c_ptr          dw  get_script_to_memory
step_003d_ptr          dw  run_script_download_email
step_003e_ptr          dw  append_email
step_003f_ptr          dw  create_email_pcl

step_0040_ptr          dw  acd_fbx_main_options
step_0041_ptr          dw  acd_fbx_emit_doc_list
step_0042_ptr          dw  sp_ver_docno_bd_tcf
step_0043_ptr          dw  acd_fbx_get_phone_number
step_0044_ptr          dw  sp_fbx_update_tcf_w_ph_no
step_0045_ptr          dw  ttq_req_for_fbx              ;points to step 33 like sfx

step_0046_ptr          dw  acd_bdfbx_get_doc_no
step_0047_ptr          dw  em_bdfbx_data_base
step_0048_ptr          dw  sp_bdfbx_sctopcx
```


72

```
step_0049_ptr           dw  sp_bdfbx_incbdfbx

step_004a_ptr           dw  em_fbx_invalid_file_doc_no
step_004b_ptr           dw  em_fbx_invalid_no_retries
step_004c_ptr           dw  sp_fbx_del_tcf
step_004d_ptr           dw  host_modem_process

step_004e_ptr           dw  sp_for_fg_print
step_004f_ptr           dw  fix_host_fax_tcf                ;sp fix .tcf and then switch_to_fax
step_0050_ptr           dw  check_for_inc_faxes             ;sp
step_0051_ptr           dw  inc_fax_pcx_pcl                 ;sp
step_0052_ptr           dw  brkup_dcx_inc_fax

step_0053_ptr           dw  sp_merge_for_vma_rem            ;vma remote version
step_0054_ptr           dw  vma_for_vma_remote              ;vma remote version
step_0055_ptr           dw  sp_store_for_vma_rem            ;vma remote version
step_0056_ptr           dw  vma_index_busy_msg_rem          ;vma remote version

step_0057_ptr           dw  vma_index_busy_msg              ;local version

step_0058_ptr           dw  dlet_induced_no_action

;SESSION PARAMETERS AREA
session_parameters_area         dw  0000H
modem_resource_in               dw  VCON_LINE
modem_resource_out              dw  VCON_LINE
modem_resource_dtmf             dw  VCON_LINE
vcon_session_number_of_copies   dw  0000H       ;lower byte most significant. this value will be refered to
                                dw  0000H       ;by the start_pgm for copy with SEG:OFF. start_pgm will
                                                ;load the SEG:OFF to MTQ. maestro will consider this as an
                                                ;ASCIZ string and write to PSP:82. ergo, the 0000H word.

vcon_session_repeat_cnt         dw  0003H
;note 10/20/95. ACD has its own modem_data location for counter. I do not think this is being used.
vcon_session_repeat_counter     dw  0003H       ;gets decremented at each no_dtmf. if =0 then set to cnt.
vcon_session_phone_number       db  "011 90 216 302 5869", 00H
                                db  12 dup(00H) ;32 bytes allocated
vcon_session_faxback_doc_number db  8 dup(00H)
vcon_session_password           db  32 dup(00H)
vcon_session_password_check     db  32 dup(00H)
vcon_session_length_of_msg      dw  0014h
vcon_session_number_of_rings    db  ?
vcon_session_zero               db  00h
vcon_session_repeat_cnt_one     dw  0001H
vcon_session_repeat_cnt_two     dw  0002H
vcon_session_repeat_cnt_three   dw  0003H
vcon_session_repeat_cnt_four    dw  0004H
vcon_session_repeat_cnt_five    dw  0005H

;CONSTANTS (THESE NAMES ARE ALWAYS PRESENT INDEPENDENT OF THE PARTICULAR STEP TABLE)
vcon_session_constant_1         db      "C:\CATBOX\PROGRAMS\LDFTOHDC.EXE", 00H
vcon_session_constant_2         db      "C:\CATBOX\PROGRAMS\STFFMHDC.EXE", 00H
vcon_session_constant_3         db      "C:\CATBOX\PROGRAMS\MERGEVEF.EXE", 00H
vcon_session_constant_4         db      "C:\CATBOX\PROGRAMS\MAKFNAME.EXE", 00H
vcon_session_constant_5         db      "C:\CATBOX\PROGRAMS\UPDATEVQ.EXE", 00H
vcon_session_constant_6         db      "C:\CATBOX\PROGRAMS\SCTOPCL.EXE", 00H
vcon_session_constant_7         db      "C:\CATBOX\PROGRAMS\SCTOPCX.EXE", 00H
vcon_session_constant_8         db      "C:\CATBOX\PROGRAMS\OPENTCF.EXE", 00H
vcon_session_constant_9         db      "C:\CATBOX\PROGRAMS\INCBDTCF.EXE", 00H
vcon_session_constant_A         db      "C:\CATBOX\PROGRAMS\FP.EXE", 00H
vcon_session_constant_B         db      "C:\CATBOX\PROGRAMS\MAKTCFN.EXE", 00H
vcon_session_constant_C         db      "C:\CATBOX\PROGRAMS\SUBMITCF.EXE", 00H
vcon_session_constant_D         db      "C:\CATBOX\PROGRAMS\MAKRMIFN.EXE", 00H
vcon_session_constant_E         db      "C:\CATBOX\PROGRAMS\UPDATEVQ.EXE", 00H
vcon_session_constant_F         db      "C:\CATBOX\PROGRAMS\STINDEX.EXE", 00H
vcon_session_constant_G         db      "C:\CATBOX\PROGRAMS\LDF2MEM.EXE", 00H
vcon_session_constant_H         db      "C:\CATBOX\PROGRAMS\APEMAIL.EXE", 00H
vcon_session_constant_I         db      "C:\CATBOX\PROGRAMS\CP2SPOOL.EXE", 00H
vcon_session_constant_J         db      "C:\CATBOX\PROGRAMS\FBXBDTCF.EXE", 00H
vcon_session_constant_K         db      "C:\CATBOX\PROGRAMS\FBXUPTCF.EXE", 00H
vcon_session_constant_L         db      "C:\CATBOX\PROGRAMS\BLDFBXDB.EXE", 00H
vcon_session_constant_M         db      "C:\CATBOX\PROGRAMS\FBXDLTCF.EXE", 00H
vcon_session_constant_N         db      "C:\CATBOX\PROGRAMS\FGPRINT.EXE", 00H
vcon_session_constant_O         db      "C:\CATBOX\PROGRAMS\HOSTSFX.EXE", 00H
vcon_session_constant_P         db      "C:\CATBOX\PROGRAMS\INFAXID.EXE", 00H
vcon_session_constant_Q         db      "C:\CATBOX\PROGRAMS\PCX2PCL.EXE", 00H
vcon_session_constant_R         db      "C:\CATBOX\PROGRAMS\BRKUPDCX.EXE", 00H


;SESSION FIXED FILENAMES
```

```
vcon_session_filename_1         db  "c:\catbox\voice\pcm8.pcm",00h
vcon_session_filename_2         db  "c:\catbox\voice\record01.pcm",00h
vcon_session_filename_3         db  "C:\CATBOX\VOICE\VMA00000.QUF", 00H
vcon_session_filename_4         db  "C:\CATBOX\VOICE\RINGBACK.PCM", 00H
vcon_session_filename_5         db  "C:\CATBOX\VOICE\COPYMSG.PCM", 00H
vcon_session_filename_6         db  "C:\CATBOX\VOICE\GETPHNUM.PCM", 00H
vcon_session_filename_7         db  "C:\CATBOX\VOICE\SFXMSG.PCM", 00H
vcon_session_filename_8         db  "C:\CATBOX\VOICE\GREETING.PCM", 00H
vcon_session_filename_9         db  "C:\CATBOX\VOICE\MAINMENU.PCM", 00H
vcon_session_filename_A         db  "C:\CATBOX\FAX\FMA00000.QUE", 00H
vcon_session_filename_B         db  "C:\CATBOX\VOICE\RECAMSG.PCM", 00H
vcon_session_filename_C         db  "C:\CATBOX\EMAIL\EMAIL_IN.TXT", 00H
vcon_session_filename_D         db  "C:\CATBOX\VOICE\FBXMAIN.PCM", 00H
vcon_session_filename_E         db  "C:\CATBOX\VOICE\FAXBKLST.PCM", 00H
vcon_session_filename_F         db  "C:\CATBOX\VOICE\FBXRETRY.PCM", 00H
vcon_session_filename_G         db  "C:\CATBOX\VOICE\FBXHNGUP.PCM", 00H
vcon_session_filename_H         db  "C:\CATBOX\VOICE\FBXBLD.PCM", 00H
vcon_session_filename_I         db  "C:\CATBOX\VOICE\VMABUSY.PCM", 00H

;SESSION VARIABLES
vcon_session_fax_filename       db      64 dup(?)
vcon_session_tcf_filename       db      64 dup(?)
vcon_session_rmi_filename       db      64 dup(?)
;later on an acd will write to where the zeroes are based on phone extension or code.
;this is why we place this in the variables area.
voice_index_tag_filename        db      "C:\CATBOX\VOICE\VMA00000.QUF", 00H
vcon_session_variable_1         db      64 dup(?)
vcon_session_variable_2         db      64 dup(?)
vcon_session_variable_3         db      64 dup(?)
vcon_session_variable_4         db      64 dup(?)

;STEP DATA AREA
;*****************************************************************************
;*****************************************************************************
;**                                                                         **
;**             THE MOTHER STEP:    TMO                                     **
;**                                                                         **
;*****************************************************************************
;*****************************************************************************
;***********************0000**************************************************
starter_step                dw  ST_TIMER_TICK_MAESTRO
                            dw  DTMF_ANALYZE
                            dw  step_0000_parameters
step_0000_next_step         dw  0000H   ; CUR_STEP_STATUS=1  ttq item. will be loaded from TTQ
                            dw  0030H   ;+CUR_STEP_STATUS=0  voice path:        ACD(PASSWORD)
;if <DLE>c then CUR_STEP_STATUS=2 and [VCON_STATE]=0 is forced by ttisr level_0 stepper.
;so the next step entry for DTMF_* for keypad path really can be anything.
                            dw  0000H   ; DTMF_*    kpad path                   TMO (could be any step)
                            dw  0000H   ; DTMF_#        "                       TMO (could be any step)
;to study the voice path bypassing RING.
                            dw  0030H   ; DTMF_0        "                       CHANGE PARAMETERS
                            dw  0039H   ;+DTMF_1        "                       VOICE MAIL ACCESS
                            dw  0000H   ; DTMF_2        "                       PRINT INCOMING FAXES
                            dw  0028H   ;+DTMF_3        "                       SEND A FAX
                            dw  0020H   ;+DTMF_4        "                       RECORD/PLAY CYCLE.
                            dw  0027H   ;*DTMF_5        "                       COPY
                            dw  0046H   ; DTMF_6        "                       BUILD FAX DATA BASE
                            dw  0040H   ; DTMF_7        "                       FAX BACK
                            dw  003CH   ;+DTMF_8        "                       RETRIEVE EMAIL
                            dw  0000H   ; DTMF_9        "                       HANDSET PATH (7-95-69)
step_0000_parameters        dw  EXPECT_DTMF
;*****************************************************************************
;**                    NO_ACTION WHILE PARKED WAITING FOR DLEH                **
;***********************0058**************************************************
dlet_induced_no_action          dw  ST_NO_ACTION
                                dw  JUMP_UNCOND
                                dw  step_0058_parameters
step_0058_next_step             dw  0025h                   ; if no <DLE>h it hangs up.
step_0058_parameters            dw  DO_NOT_EXPECT_DTMF
                                dw  STOP_ON_DLEH

;*****************************************************************************
;*****************************************************************************
;**                                                                         **
;**                     THE VOICE PATH                                      **
;**                                                                         **
;*****************************************************************************
;*****************************************************************************
;***********************0030**************************************************
get_password                dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
```

```
                        dw  step_0030_parameters
step_0030_next_step     dw  0031h                       ;MAIN MENU FOR USER. pwd match
                        dw  0035h                       ;RMI FOR CALLER
step_0030_parameters    dw  DO_NOT_EXPECT_DTMF          ;so that F=0 works. always.
                        dw  vcon_session_filename_8     ;GREETING.PCM
                        dw  ACD_GET_PASSWORD            ;acd type
                        dw  vcon_session_repeat_cnt_one ;rept count for timeout etc
;catstp19.asm change. 11/4/95. enable dlec, dlet detection.
                        dw  STOP_ON_DLEC + STOP_ON_DLET
                        dw  vcon_session_password_check ;ptr to step table variable
                        dw  LCD_MESSAGE_YES
                        db  "Please enter       "
                        db  "password           ", 00h, 00h
;**********************0031*************************************************************
;*******************************************************************************
;**                                                                           **
;**                     REMOTE MAIN MENU                                      **
;**                                                                           **
;*******************************************************************************
;*******************************************************************************
main_menu               dw  ST_EMIT_MSG                 ;console menu for remote
                        dw  DTMF_ANALYZE
                        dw  step_0031_parameters
step_0031_next_step     dw  0000H                       ;not of consequence as expect_dtmf
                        dw  0025H                       ;NO_DTMF = HANG_UP
                        dw  0031H                       ;DTMF_*  = HANG_UP
                        dw  0031H                       ;DTMF_#  = MAIN_MENU
                        dw  0031H                       ;DTMF_0  = CHANGE PARAMETERS
                        dw  0053H                       ;DTMF_1  = VOICE MAIL ACCESS
                        dw  ?                           ;DTMF_2  = PRINT INCOMING FAXES
                        dw  0028H                       ;DTMF_3  = SEND A FAX
                        dw  0020H                       ;DTMF_4  = RECORD/PLAY CYCLE
                        dw  0027H                       ;DTMF_5  = COPY
                        dw  ?                           ;DTMF_6  = BUILD FAX DATA BASE
                        dw  ?                           ;DTMF_7  = FAX BACK
                        dw  ?                           ;DTMF_8  = RETRIEVE EMAIL
                        dw  ?                           ;DTMF_9  =
step_0031_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_filename_9     ;MAINMENU.PCM
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
;catstp18.asm change. make no lcd message explicit. now it is working by luck
                        dw  LCD_MESSAGE_NO
;**********************0035*************************************************************
;*                     RECORD MESSAGE INDIRECT SEQUENCE                                *
;*******************************************************************************
;RMI AS A SEQUENCE OF STEPS.
; 1. MAKE A FILENAME FOR THE VOICE FILE.
; 2. RECORD THE MESSAGE  AND SAVE IT AS THAT VOICE FILE (VCON_RECORD_MSG).
; 3. UPDATE THE VMA INDEX FILE.
;**********************0035*************************************************************
;RECORD MESSAGE INDIRECT (I)
sp_make_fn_for_rmi      dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_0035_parameters        ;offset to parameters
step_0035_next_step     dw  0036h                       ;open tcf file and write phone number
                        dw  0000h
step_0035_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_D     ;pgm name = MAKRMIFN make RMI fname
                        dd  00000000h                   ;argument_1. not used.
                        dw  vcon_session_rmi_filename   ;argument_2. SEG:OFF of fn to be
                        dw  step_table_seg_number       ;returned by makfname.exe. (FS)
                        dw  WAIT_TO_COMPLETE            ;hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message
;**********************0036*************************************************************
;RECORD MESSAGE INDIRECT (II)
record_msg_for_rmi      dw  ST_RECO_MSG
                        dw  DTMF_ANALYZE
                        dw  step_0036_parameters
step_0036_next_step     dw  0000h                       ;inconsequential in this case
                        dw  0038h                       ;no_dtmf
                        dw  0038h                       ;dtmf_*
                        dw  0038h                       ;dtmf_#
                        dw  0038h                       ;dtmf_0
                        dw  0038h                       ;dtmf_1
                        dw  0038h                       ;dtmf_2
                        dw  0038h                       ;dtmf_3
                        dw  0038h                       ;dtmf_4
                        dw  0038h                       ;dtmf_5
                        dw  0038h                       ;dtmf_6
                        dw  0038h                       ;dtmf_7
```

```
                        dw  0038h                       ;dtmf_8
                        dw  0038h                       ;dtmf_9
step_0036_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_rmi_filename
                        dw  VCON_RESOURCE_IN_CURRENT
                        dw  STOP_ON_DLEQ + STOP_ON_DLES
                        dw  vcon_session_length_of_msg
;**********************0037************************************************************
;RECORD MESSAGE INDIRECT (III)
hang_up_for_rmi         dw  ST_HANG_UP
                        dw  JUMP_UNCOND
                        dw  step_0037_parameters
step_0037_next_step     dw  0000H                       ;return to tmo
step_0037_parameters    dw  DO_NOT_EXPECT_DTMF
;**********************0038************************************************************
;RECORD MESSAGE INDIRECT (IV)
sp_updatevq_for_rmi     dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_0038_parameters        ;offset to parameters
step_0038_next_step     dw  0037h                       ;back to tmo
step_0038_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_E     ;pgm name = UPDATEVQ
                        dw  voice_index_tag_filename    ;both filenames may be overwritten
                        dw  step_table_seg_number       ;by the next call. the first is pro-
                        dw  vcon_session_rmi_filename   ;tected because it gets written to
                        dw  step_table_seg_number       ;maestro_task_queue. so do ath last
                        dw  WAIT_TO_COMPLETE            ;is the solution. then wait_to_complete
                        dw  LCD_MESSAGE_NO              ;no LCD message

;*****************************************************************************************
;*****************************************************************************************
;**                                                                                     **
;**             THE ELEMENTS OF 3TAU INTEGRATED MESSAGING SYSTEM                        **
;**                                                                                     **
;*****************************************************************************************
;*****************************************************************************************
;
;**********************0039************************************************************
;*                      VOICE MAIL ACCESS LOCAL                                         *
;*****************************************************************************************
;step_0039_ptr          dw  sp_merge_for_vma
;step_003a_ptr          dw  vma_for_vma
;step_003b_ptr          dw  sp_store_for_vma
;step_0057_ptr          dw  vma_index_busy_msg
;**********************0039************************************************************
;VOICE MAIL ACCESS (I)
sp_merge_for_vma        dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_0039_parameters        ;offset to parameters
step_0039_next_step     dw  003ah                       ;if index file not busy go next step
                        dw  0057h                       ;if busy go here
step_0039_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_3     ;program name = MERGEVEF.EXE
                        dw  voice_index_tag_filename    ;registers with sydata (load index fn)
;in the near future we may have acd write to this location a code or extension number.

                        dw  step_table_seg_number       ;if tag_file already registered, sets
                        dw  0000H                       ;GS:[INDEX_FILE_BUSY]=TRUE
                        dw  step_table_seg_number       ;so code knows st segment
                        dw  WAIT_TO_COMPLETE            ;hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message
;**********************003A************************************************************
;VOICE MAIL ACCESS (II)
vma_for_vma             dw  ST_VOICE_MAIL_ACCESS
                        dw  DTMF_ANALYZE
                        dw  step_003a_parameters
step_003a_next_step     dw  0000h                       ;not used
                        dw  003bh                       ;??? NO_DTMF | after emitting BUSY INDEX (FRE)
                        dw  003bh                       ;DTMF_*
                        dw  003bh                       ;DTMF_#
                        dw  003bh                       ;DTMF_0
step_003a_parameters    dw  EXPECT_DTMF
                        dw  0000h                       ;merged VMA00000.QUE in INDEX_FILE_IN_MPS
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
;**********************003B************************************************************
;VOICE MAIL ACCESS (III)
sp_store_for_vma        dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_003b_parameters        ;offset to parameters
step_003b_next_step     dw  0000h                       ;back to tmo.
```

```
step_003b_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_F         ;program name = STINDEX.EXE
                            dw  voice_index_tag_filename        ;clears registration at sysdata (loaded
                            dw  step_table_seg_number           ;index file name). gets modem # from st seg
                            dw  0000h
                            dw  step_table_seg_number           ;so code knows st segment
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************0057************************************************************
;VOICE MAIL ACCESS (IV)
vma_index_busy_msg          dw  ST_EMIT_MSG
                            dw  JUMP_UNCOND
                            dw  step_0057_parameters
step_0057_next_step         dw  0000h                           ;after message goto tmo

step_0057_parameters        dw  DO_NOT_EXPECT_DTMF
                            dw  vcon_session_filename_I         ;vmabusy.pcm
                            dw  VCON_RESOURCE_OUT_CURRENT
                            dw  DO_NOT_STOP_ON_DLE
                            dw  LCD_MESSAGE_YES
                            db  "answering machine is"
                            db  "busy. pls try again.", 00H, 00H

;**********************0053************************************************************
;*                         VOICE MAIL ACCESS FOR REMOTE                                *
;******************************************************************************
;step_0053_ptr          dw  sp_merge_for_vma_rem
;step_0054_ptr          dw  vma_for_vma_remote
;step_0055_ptr          dw  sp_store_for_vma_rem
;step_0056_ptr          dw  vma_index_busy_msg_rem
;**********************0053************************************************************
;VOICE MAIL ACCESS (I)
sp_merge_for_vma_rem        dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0053_parameters            ;offset to parameters
step_0053_next_step         dw  0054h                           ;if index file not busy go next step
                            dw  0056h                           ;if busy go here
step_0053_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_3         ;program name = MERGEVEF.EXE
                            dw  voice_index_tag_filename        ;registers with sydata (load index fn)
;in the near future we may have acd write to this location a code or extension number.

                            dw  step_table_seg_number           ;if tag_file already registered, sets
                            dw  0000H                           ;GS:[INDEX_FILE_BUSY]=TRUE
                            dw  step_table_seg_number           ;so code knows st segment
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************0054************************************************************
;VOICE MAIL ACCESS (II)
vma_for_vma_remote          dw  ST_VOICE_MAIL_ACCESS
                            dw  DTMF_ANALYZE
                            dw  step_0054_parameters
step_0054_next_step         dw  0000h                           ;not used
                            dw  0055h                           ;??? NO_DTMF | after emitting BUSY INDEX (FRE)
                            dw  0055h                           ;DTMF_*
                            dw  0055h                           ;DTMF_#
                            dw  0055h                           ;DTMF_0
step_0054_parameters        dw  EXPECT_DTMF
                            dw  0000h                           ;merged VMA00000.QUE in INDEX_FILE_IN_MPS
                            dw  VCON_RESOURCE_OUT_CURRENT
                            dw  DO_NOT_STOP_ON_DLE
;**********************0055************************************************************
;VOICE MAIL ACCESS (III)
sp_store_for_vma_rem        dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0055_parameters            ;offset to parameters
step_0055_next_step         dw  0031h                           ;back to tmo.
step_0055_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_F         ;program name = STINDEX.EXE
                            dw  voice_index_tag_filename        ;clears registration at sysdata (loaded
                            dw  step_table_seg_number           ;index file name). gets modem # from st seg
                            dw  0000h
                            dw  step_table_seg_number           ;so code knows st segment
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************0056************************************************************
;VOICE MAIL ACCESS (IV)
vma_index_busy_msg_rem      dw  ST_EMIT_MSG
                            dw  JUMP_UNCOND
                            dw  step_0056_parameters
step_0056_next_step         dw  0031h                           ;after message goto main_menu
```

```
step_0056_parameters        dw  DO_NOT_EXPECT_DTMF
                            dw  vcon_session_filename_I         ;vmabusy.pcm
                            dw  VCON_RESOURCE_OUT_CURRENT
                            dw  DO_NOT_STOP_ON_DLE
                            dw  LCD_MESSAGE_YES
                            db  "answering machine is"
                            db  "busy. pls try again.", 00H, 00H

;**********************0024*****************************************************
;*                      VOICE MAIL ACCESS   (NOT USED)                          *
;*******************************************************************************
play_from_answering_machine dw  ST_VOICE_MAIL_ACCESS
                            dw  DTMF_ANALYZE
                            dw  step_0024_parameters
step_0024_next_step         dw  0000H                       ;not of consequence as expect_dtmf
                            dw  0000H                       ;NO_DTMF
                            dw  0000H                       ;DTMF_*
                            dw  0000H                       ;DTMF_#
                            dw  0000H                       ;DTMF_0
step_0024_parameters        dw  EXPECT_DTMF
                            dw  voice_index_tag_filename    ;VMA00000.QUF fm variables area
;in the near future we may have acd write to this location a code or extension number.

                            dw  VCON_RESOURCE_OUT_CURRENT
                            dw  DO_NOT_STOP_ON_DLE
;**********************0025*****************************************************
;*                      HANGUP                                                  *
;*******************************************************************************
end_of_session              dw  ST_HANG_UP
                            dw  DTMF_ANALYZE
                            dw  step_0025_parameters
step_0025_next_step         dw  0000H                       ;return to tmo
step_0025_parameters        dw  DO_NOT_EXPECT_DTMF
;**********************0027*****************************************************
;*                      COPY                                                    *
;*******************************************************************************
get_number_of_copies        dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  DTMF_ANALYZE
                            dw  step_0027_parameters
step_0027_next_step         dw  0026h                       ;RUN SCTOPCL
                            dw  0000h                       ;tmo: no_dtmf, timeout etc
step_0027_parameters        dw  DO_NOT_EXPECT_DTMF          ;so that F=0 works. always.
                            dw  vcon_session_filename_5     ;file to emit COPYMSG.PCM
                            dw  ACD_GET_NBR_OF_COPIES       ;acd type
                            dw  vcon_session_repeat_cnt     ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_number_of_copies   ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "please enter number "
                            db  "of copies           ", 00h, 00h

;**********************0026*****************************************************
start_program_for_COPY      dw  ST_START_PROGRAM            ;action start_program=0007h
                            dw  JUMP_UNCOND                 ;flags register for this step
                            dw  step_0026_parameters        ;offset to parameters
step_0026_next_step         dw  0000h                       ;back to tmo
;catstpl6.asm change. add sys_data segment to parameter passing. works with SCTOPCL2.ASM.
step_0026_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_6     ;program name C:\CATBOX\PROGRAMS\SCTOPCL.EXE
                            dw  vcon_session_number_of_copies   ;ASCIIZ string for number of copies.
                            dw  step_table_seg_number       ;start program will load FS.
;bug: if you do acd while this is not completed, the number of copies will be overwritten.
;cure: start_program will load the ASCIIZ string to MTQ. this will fix it.
;catstpl6.asm change. was dd 00000000h.
                            dw  0000h
                            dw  sys_data_seg_number
                            dw  DO_NOT_WAIT_TO_COMPLETE     ;do not hold up the step table
                                                            ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                            dw  LCD_MESSAGE_NO              ;no LCD message

;**********************002F*****************************************************
;*                      PRINT INCOMING FAXES                                    *
;*******************************************************************************
print_incoming_faxes        dw  ST_VOICE_MAIL_ACCESS
                            dw  DTMF_ANALYZE
                            dw  step_002f_parameters
step_002f_next_step         dw  0000H                       ;not of consequence as expect_dtmf
                            dw  0000H                       ;NO_DTMF
                            dw  0000H                       ;DTMF_*
                            dw  0000H                       ;DTMF_#
```

```
                        dw  0000H                       ;DTMF_0
step_002f_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_filename_A     ;FMA00000.QUF
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
;*****************************************************************************
;*      PRINT INCOMING FAXES                                                 *
;**********************0050***************************************************
check_for_inc_faxes     dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_0050_parameters        ;offset to parameters
step_0050_next_step     dw  0052h                       ;switch to fax if all went well
                        dw  0000h                       ;to tmo if no inc fax found
step_0050_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_P     ;C:\CATBOX\PROGRAMS\INFAXID.EXE
                        dw  0000H                       ;argument_1. not used
                        dw  0000H
                        dw  0000H                       ;INCOMING_FAX_FILE_NAME
                        dw  step_table_seg_number       ;to register return code
                        dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message

;**********************0052***************************************************
brkup_dcx_inc_fax       dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_0052_parameters        ;offset to parameters
step_0052_next_step     dw  0051h                       ;back to tmo in all cases.
step_0052_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_R     ;C:\CATBOX\PROGRAMS\BRKUPDCX.EXE
                        dw  0000H                       ;argument_1. not used
                        dw  0000H
                        dw  0000h                       ;INCOMING_FAX_FILE_NAME
                        dw  step_table_seg_number       ;to register return code
                        dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message

;**********************0051***************************************************
inc_fax_pcx_pcl         dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_0051_parameters        ;offset to parameters
step_0051_next_step     dw  0000h                       ;back to tmo in all cases.
step_0051_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_Q     ;C:\CATBOX\PROGRAMS\PCX2PCL.EXE
                        dw  0000H                       ;argument_1. not used
                        dw  0000H
                        dw  0000h                       ;INCOMING_FAX_FILE_NAME
                        dw  step_table_seg_number       ;to register return code
                        dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message

;**********************0028***************************************************
;*                      SEND A FAX                                           *
;*****************************************************************************
;SEND A FAX (I)
get_ph_nmbr_for_send_fax    dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
                            dw  step_0028_parameters
step_0028_next_step         dw  0029h                   ;make file name for tcf file
                            dw  0000h                   ;tmo: no_dtmf, timeout etc
step_0028_parameters        dw  DO_NOT_EXPECT_DTMF      ;so that F=0 works. always.
                            dw  vcon_session_filename_6 ;file to emit GETPHNUM.PCM
                            dw  ACD_GET_PHONE_NUMBER    ;acd type
                            dw  vcon_session_repeat_cnt ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_phone_number   ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "please enter phone  "
                            db  "number              ", 00h, 00h
;**********************0029***************************************************
;SEND A FAX (II)
start_pgm_make_fn_for_sfx   dw  ST_START_PROGRAM        ;action start_program=0007h
                            dw  JUMP_UNCOND             ;flags register for this step
                            dw  step_0029_parameters    ;offset to parameters
step_0029_next_step         dw  002ah                   ;open tcf file and write phone number
                            dw  0000h
step_0029_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_B ;pgm name = MAKTCFN make TCF fname
                            dd  00000000h               ;argument_1. not used.
                            dw  vcon_session_tcf_filename   ;argument_2. SEG:OFF of fn to be
                            dw  step_table_seg_number   ;returned by makfname.exe. (FS)
                            dw  WAIT_TO_COMPLETE        ;hold up the step table
```

```
                        dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************002A************************************************************
;SEND A FAX (III)
start_pgm_open_tcf_for_sfx  dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_002a_parameters            ;offset to parameters
step_002a_next_step     dw  002bh                           ;emit msg for place fax page on scanner
                        dw  0000h
step_002a_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_8         ;program name = OPENTCF.EXE
                        dw  vcon_session_tcf_filename
                        dw  step_table_seg_number
                        dw  vcon_session_phone_number       ;argument_2. SEG:OFF of phone no.
                        dw  step_table_seg_number           ;to be used by opentcf.exe. (FS)
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message

;**********************002B************************************************************
;SEND A FAX (IV)
emit_msg_for_sfx        dw  ST_EMIT_MSG
                        dw  DTMF_ANALYZE
                        dw  step_002b_parameters
step_002b_next_step     dw  0000h                           ;
                        dw  0000h                           ;no_dtmf. repeat first.
                        dw  0000h                           ;dtmf_*
                        dw  002eh                           ;dtmf_# = ttq_req
                        dw  0000h                           ;dtmf_0 =
                        dw  002ch                           ;dtmf_1 = scan to pcx.
step_002b_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_filename_7         ;sfxmsg.pcm
                        dw  VCON_SPEAKER
                        dw  DO_NOT_STOP_ON_DLE
                        dw  LCD_MESSAGE_YES
                        db  "place page to fax on"
                        db  "scanner and press 1 ", 00h

                        db  "press # if no more  "
                        db  "pages to scan       ", 00h, 00h
;**********************002C************************************************************
;SEND A FAX (V)
scan_to_pcx_for_sfx     dw  ST_START_PROGRAM                ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_002c_parameters            ;offset to parameters
step_002c_next_step     dw  002dh                           ;
                        dw  0000h                           ;in case scanner is off etc.
step_002c_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_7         ;program name = SCTOPCX.EXE
                        dd  00000000h                       ;argument_1. not used.
                        dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                        dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************002D************************************************************
;SEND A FAX (VI)
incrally_build_tcf_for_sfx  dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_002d_parameters            ;offset to parameters
step_002d_next_step     dw  002eh                           ;
                        dw  0000h                           ;
step_002d_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_9         ;program name = INCBDTCF.EXE
                        dw  vcon_session_tcf_filename       ;
                        dw  step_table_seg_number           ;
                        dw  vcon_session_fax_filename       ;
                        dw  step_table_seg_number           ;
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************002E************************************************************
;SEND A FAX (VII)
ttq_req_for_sfx         dw  ST_TTQ_REQUEST                  ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_002e_parameters            ;offset to parameters
step_002e_next_step     dw  0000h                           ;will not run next step for this.
step_002e_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  0033H                           ;submit_a_fax
                        dw  vcon_session_tcf_filename       ;argument_1. points to .TCF file
                        dw  TTICS_STA_MODEM_1_REQUIRED      ;FS: is assumed for filename
;**********************0033************************************************************
;SEND A FAX (VIII)
submit_a_fax            dw  ST_START_PROGRAM                ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
```

```
                        dw  step_0033_parameters            ;offset to parameters
step_0033_next_step     dw  0034h                           ;
                        dw  0000h                           ;
step_0033_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  vcon_session_constant_C         ;program name = SUBMITCF.EXE
                        dw  0000H                           ;tmo writes TTQ filename offset
                        dw  sys_data_seg_number             ;.TCF file name ptr -> fn in TTQ
                        dw  0000H                           ;tmo has access to sys data area.
                        dw  0000H                           ;
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************0034*************************************************************
;SEND A FAX (IX)
switch_to_fax           dw  ST_SWITCH_TO_FAX
                        dw  JUMP_UNCOND
                        dw  step_0034_parameters
step_0034_next_step     dw  0000H
step_0034_parameters    dw  DO_NOT_EXPECT_DTMF
;*******************************************************************************
;*      SEND A FAX FROM HOST                                                   *
;**********************004F*************************************************************
fix_host_fax_tcf        dw  ST_START_PROGRAM                ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_004f_parameters            ;offset to parameters
step_004f_next_step     dw  0034h                           ;go to "switch to fax" if all went well
                        dw  0000h                           ;to tmo if no inc fax found
step_004f_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_0         ;C:\CATBOX\PROGRAMS\HOSTSFX.EXE
                        dw  0000H                           ;argument_1. not used
                        dw  0000H
                        dw  0000h
                        dw  step_table_seg_number           ;DS: for InIRQ
                                                            ;GS: to register return code
                        dw  WAIT_TO_COMPLETE                ;do not hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message

;*******************************************************************************
;*                      RECORD A VOICE FILE                                    *
;**********************0020*************************************************************
;RECORD A VOICE FILE (I)
play_rec_recamsg_message    dw  ST_EMIT_MSG
                        dw  JUMP_UNCOND
                        dw  step_0020_parameters
step_0020_next_step     dw  0021H
step_0020_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  vcon_session_filename_1         ;pcm8.pcm
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
                        dw  LCD_MESSAGE_YES
                        db  "start recording at  "
                        db  "the beep. any key   ", 00H
                        db  "will stop the       "
                        db  "          recording ", 00H, 00H
;**********************0021*************************************************************
;RECORD A VOICE FILE (II)
now_record_recamsg      dw  ST_RECO_MSG
                        dw  DTMF_ANALYZE
                        dw  step_0021_parameters
step_0021_next_step     dw  0000h                           ;inconsequential in this case
                        dw  0022h                           ;no_dtmf
                        dw  0022h                           ;dtmf_*
                        dw  0022h                           ;dtmf_#
                        dw  0022h                           ;dtmf_0
                        dw  0022h                           ;dtmf_1
                        dw  0022h                           ;dtmf_2
                        dw  0022h                           ;dtmf_3
                        dw  0022h                           ;dtmf_4
                        dw  0022h                           ;dtmf_5
                        dw  0022h                           ;dtmf_6
                        dw  0022h                           ;dtmf_7
                        dw  0022h                           ;dtmf_8
                        dw  0022h                           ;dtmf_9
step_0021_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_filename_B
                        dw  VCON_HANDSET
                        dw  DO_NOT_STOP_ON_DLE
                        dw  vcon_session_length_of_msg
;**********************0022*************************************************************
;RECORD A VOICE FILE (III)
play_recamsg_back       dw  ST_EMIT_MSG
                        dw  DTMF_ANALYZE
```


81

```
                        dw  step_0022_parameters
step_0022_next_step     dw  0000h                       ;inconsequential in this case
                        dw  0000h                       ;if no_dtmf, you liked it
                        dw  0000h                       ;if dtmf_*, you liked it
                        dw  0000h                       ;if dtmf_#, you liked it
                        dw  0020h                       ;if dtmf_0, you DID NOT like it
                        dw  0000h                       ;if dtmf_1, you liked it
                        dw  0000h                       ;if dtmf_2, you liked it
                        dw  0000h                       ;if dtmf_3, you liked it
                        dw  0000h                       ;if dtmf_4, you liked it
                        dw  0000h                       ;if dtmf_5, you liked it
                        dw  0000h                       ;if dtmf_6, you liked it
                        dw  0000h                       ;if dtmf_7, you liked it
                        dw  0000h                       ;if dtmf_8, you liked it
                        dw  0000h                       ;if dtmf_9, you liked it
step_0022_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_filename_B
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
                        dw  LCD_MESSAGE_YES
                        db  "press 0 if you like "
                        db  "to record over      ", 00H
                        db  "any other key will  "
                        db  "return to idle      ", 00H, 00H

;*****************************************************************************
;*                      RETRIEVE EMAIL                                       *
;**********************003C*************************************************
;***********************003C: GET SCRIPT TO MEMORY*******************************
;EMAIL RETRIEVAL (I)
get_script_to_memory    dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_003c_parameters        ;offset to parameters
step_003c_next_step     dw  003dh                       ;run on script file
                        dw  0000h                       ;if program completed and failed.
step_003c_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_G     ;program name = load file to mem
                        dw  0000H                       ;tmo writes TTQ filename offset (.SCR)
                        dw  sys_data_seg_number         ;DS --> segment of TTQ
                        dw  EMAIL_SCRIPT_BUFFER         ;tmo writes TTQ entry offset
                        dw  mps_seg_number              ;GS:
                        dw  WAIT_TO_COMPLETE            ;hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message

;***********************003d: RUN SCRIPT DOWNLAOD EMAIL*****************************
;EMAIL RETRIEVAL (II)
run_script_download_email   dw  ST_RETRIEVE_EMAIL
                        dw  JUMP_UNCOND
                        dw  step_003d_parameters
step_003d_next_step     dw  003eh                       ;if no errors, go to append to in.mbx.
                        dw  0000h                       ;if error, go to call release
step_003d_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  vcon_session_filename_C     ;download email to this file
                        dw  VCON_RESOURCE_IN_CURRENT    ;RESOURCE=LINE
                        dw  DO_NOT_STOP_ON_DLE          ;if user picks up handset, ignore.

;***********************003e: APPEND EMAIL*********************************************
;EMAIL RETRIEVAL (III)
;this step goes to cat.cfg, matches the .scr given here by tmo with the .cfg entry to find the
;file to append email to.
append_email            dw  ST_START_PROGRAM            ;action start_program=0007h
                        dw  JUMP_UNCOND                 ;flags register for this step
                        dw  step_003e_parameters        ;offset to parameters
step_003e_next_step     dw  003fh                       ;run on script file
                        dw  0000h                       ;if program completed and failed.
step_003e_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  vcon_session_constant_H     ;program name = append email to in.mbx
                                                        ;vcon_session_filename_C is the file
                                                        ;this step knows the file name because
                                                        ;it is hardwired always called
                                                        ;EMAIL_IN.TXT
                        dw  vcon_session_filename_C     ;
                        dw  mps_seg_number              ;
                        dw  EMAIL_SCRIPT_BUFFER
                        dw  mps_seg_number              ;
                        dw  WAIT_TO_COMPLETE            ;hold up the step table
                        dw  LCD_MESSAGE_NO              ;no LCD message

;***********************003f: PUT FILE IN PRINT SPOOL**********************************
;EMAIL RETRIEVAL (IV)
;fp (fast print) will print .txt as easily as .pcl
```

```
create_email_pcl            dw  ST_START_PROGRAM
                            dw  JUMP_UNCOND
                            dw  step_003f_parameters
step_003f_next_step         dw  0000h
                            dw  0000h
step_003f_parameters        dw  DO_NOT_EXPECT_DTMF
                            dw  vcon_session_constant_I         ;cp2spool
                            dw  vcon_session_filename_C
                            dw  step_table_seg_number
                            dd  00000000H
                            dw  DO_NOT_WAIT_TO_COMPLETE         ;do not hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message

;*****************************************************************************
;*      A PERMANENT TTQ ELEMENT: FAST PRINT SPOOL FILES                      *
;**********************0023************************************************
sp_for_fast_print           dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0023_parameters            ;offset to parameters
step_0023_next_step         dw  0000h                           ;back to tmo
step_0023_parameters        dw  DO_NOT_EXPECT_DTMF
                            dw  vcon_session_constant_A         ;C:\CATBOX\PROGRAMS\FP.EXE
                            dw  0000H                           ;argument_1. not used
                            dw  0000H
                            dD  00000000h
;L2-bug report 001. catstpl5.asm change -> wait_to_complete
                            dw  WAIT_TO_COMPLETE                ;do not hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message

;catstpl6.asm change. sp for fgprint.exe
;*****************************************************************************
;*      A PERMANENT TTQ ELEMENT: NEW FAST PRINT SPOOL FILES                  *
;**********************004E************************************************
sp_for_fg_print             dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_004e_parameters            ;offset to parameters
step_004e_next_step         dw  0000h                           ;back to tmo
step_004e_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_N         ;C:\CATBOX\PROGRAMS\FGPRINT.EXE
                            dw  0000H                           ;argument_1. not used
                            dw  0000H
;catstpl6.asm change. was dd 00000000h
                            dw  0000h
                            dw  sys_data_seg_number
;L2-bug report 001. catstpl5.asm change -> wait_to_complete
                            dw  WAIT_TO_COMPLETE                ;do not hold up the step table
                            dw  LCD_MESSAGE_NO                  ;no LCD message

;**********************004D: HOST MODEM PROCESS*************************************
;HOST MODEM PROCESS
host_modem_process          dw  ST_HPM_TASK_MASTER
                            dw  JUMP_UNCOND
                            dw  step_004d_parameters
step_004d_next_step         dw  0000h                           ;if no errors, go to append to in.mbx.
step_004d_parameters        dw  DO_NOT_EXPECT_DTMF

;*****************************************************************************
;*                      FAX BACK                                             *
;**********************0040************************************************
;FAX BACK (I)
acd_fbx_main_options        dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
                            dw  step_0040_parameters
step_0040_next_step         dw  0042h                           ;make file name for tcf file
                            dw  004ch                           ;tmo: no_dtmf, timeout etc
                            dw  0000h                           ;tmo needs this for incoming fax
                            dw  0041h                           ;* go to emit_doc_list
                            dw  0043h                           ;# and there is non NULL doc number
                            dw  0025h                           ;# and there is NULL doc number
step_0040_parameters        dw  DO_NOT_EXPECT_DTMF              ;so that F=0 works. always.
                            dw  vcon_session_filename_D         ;file to emit FBXMAIN.PCM
                            dw  ACD_GET_FAXBACK_DOC_NUMBER      ;acd type
                            dw  vcon_session_repeat_cnt         ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_faxback_doc_number ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "please enter doc no "
                            db  "or press * to get   ", 00h

                            db  "a list of available "
                            db  "documents           ", 00h, 00h
```

```
;**********************0041*****************************************************************
;FAX BACK (II)
acd_fbx_emit_doc_list       dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
                            dw  step_0041_parameters
step_0041_next_step         dw  0042h                           ;make file name for tcf file
                            dw  0025h                           ;tmo: no_dtmf, timeout etc
                            dw  0000h                           ;tmo needs this for incoming fax
                            dw  0041h                           ;* go to emit_doc_list
                            dw  0043h                           ;# and there is non NULL doc number
                            dw  0025h                           ;# and there is NULL doc number
step_0041_parameters        dw  DO_NOT_EXPECT_DTMF              ;so that F=0 works. always.
                            dw  vcon_session_filename_E         ;file to emit FAXBKLST.PCM
                            dw  ACD_GET_FAXBACK_DOC_NUMBER      ;acd type
                            dw  vcon_session_repeat_cnt         ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_faxback_doc_number ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "press 480# for      "
                            db  "the menu            ", 00h

                            db  "and 1# for a list   "
                            db  "of documents        ", 00h, 00h

;**********************0042*****************************************************************
;FAX BACK (III)
sp_ver_docno_bd_tcf         dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0042_parameters            ;offset to parameters
step_0042_next_step         dw  0043h                           ;F=1 match goto get_ph_number
                            dw  004ah                           ;F=0 no match/no file retry
                            dw  0000h                           ;F=2 tmo needs this for incoming fax
                            dw  004bh                           ;F=3 no match/no file no more retries
step_0042_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_J         ;pgm name = FBXBDTCF
                            dw  vcon_session_faxback_doc_number
                            dw  step_table_seg_number           ;argument_1. not used.
                            dw  MPS_TCF_FILENAME                ;argument_2. SEG:OFF of fn to be
                            dw  mps_seg_number                  ;returned/used by FBXBDTCF
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_YES                 ;no LCD message
                            db  "verifying doc no    "
                            db  "and adding to tcf...", 00h, 00h


;**********************0043*****************************************************************
;FAX BACK (IV)
acd_fbx_get_phone_number    dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                            dw  JUMP_UNCOND
                            dw  step_0043_parameters
step_0043_next_step         dw  0044h                           ;make file name for tcf file
                            dw  0025h                           ;tmo: no_dtmf, timeout etc
step_0043_parameters        dw  DO_NOT_EXPECT_DTMF              ;so that F=0 works. always.
                            dw  vcon_session_filename_6         ;file to emit GETPHNUM.PCM
                            dw  ACD_GET_PHONE_NUMBER            ;acd type
                            dw  vcon_session_repeat_cnt         ;rept count for timeout etc
                            dw  DO_NOT_STOP_ON_DLE
                            dw  vcon_session_phone_number       ;ptr to step table variable
                            dw  LCD_MESSAGE_YES
                            db  "please enter        "
                            db  "your phone number   ", 00h

                            db  "followed by the     "
                            db  "pound sign          ", 00h, 00h

;**********************0044*****************************************************************
;FAX BACK (V)
sp_fbx_update_tcf_w_ph_no   dw  ST_START_PROGRAM                ;action start_program=0007h
                            dw  JUMP_UNCOND                     ;flags register for this step
                            dw  step_0044_parameters            ;offset to parameters
step_0044_next_step         dw  0045h                           ;F=1 match goto TTQ req
step_0044_parameters        dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                            dw  vcon_session_constant_K         ;pgm name = FBXUPTCF
                            dw  vcon_session_phone_number
                            dw  step_table_seg_number           ;argument_1. not used.
                            dw  MPS_TCF_FILENAME                ;argument_2. SEG:OFF of fn to be
                            dw  mps_seg_number                  ;returned/used by FBXBDTCF
                            dw  WAIT_TO_COMPLETE                ;hold up the step table
                            dw  LCD_MESSAGE_YES                 ;no LCD message
                            db  "adding phone number "
```

```
                        db  "to tcf file         ", 00h, 00h

;***********************0045*****************************************************************
;FAX BACK (VI)
ttq_req_for_fbx         dw  ST_TTQ_REQUEST                  ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_0045_parameters            ;offset to parameters
step_0045_next_step     dw  0000h                           ;will not run next step for this.
step_0045_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  0033H                           ;submit_a_fax
                        dw  MPS_TCF_FILENAME                ;argument_1. points to .TCF file
                        dw  mps_seg_number
                        dw  TTICS_STA_MODEM_1_REQUIRED      ;FS: is assumed for filename

;***********************004A*****************************************************************
;FAX BACK (VII)
em_fbx_invalid_file_doc_no  dw  ST_EMIT_MSG
                        dw  JUMP_UNCOND
                        dw  step_004a_parameters
step_004a_next_step     dw  0040h                           ;
step_004a_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  vcon_session_filename_F         ;FBXRETRY.PCM
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
                        dw  LCD_MESSAGE_YES
                        db  "the doc number you  "
                        db  "entered does not    ", 00h

                        db  "try again carefully "
                        db  "3Tau wants your mony", 00h, 00h

;***********************004B*****************************************************************
;FAX BACK (VIII)
em_fbx_invalid_no_retries   dw  ST_EMIT_MSG
                        dw  JUMP_UNCOND
                        dw  step_004b_parameters
step_004b_next_step     dw  0025h                           ;
step_004b_parameters    dw  DO_NOT_EXPECT_DTMF
                        dw  vcon_session_filename_G         ;FBXHNGUP.PCM
                        dw  VCON_RESOURCE_OUT_CURRENT
                        dw  DO_NOT_STOP_ON_DLE
                        dw  LCD_MESSAGE_NO
;***********************004C*****************************************************************
;FAX BACK (V)
sp_fbx_del_tcf          dw  ST_START_PROGRAM                ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_004c_parameters            ;offset to parameters
step_004c_next_step     dw  0025h                           ;F=1 match goto get_ph_number
step_004c_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_M         ;pgm name = FBXDLTCF
                        dw  0000H
                        dw  0000H                           ;argument_1. not used.
                        dw  MPS_TCF_FILENAME                ;argument_2. SEG:OFF of fn to be
                        dw  mps_seg_number                  ;returned/used by FBXBDTCF
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message

;*****************************************************************************************
;*                      BUILD FAXBACK DATA BASE                                          *
;***********************0046*****************************************************************
;BUILD FAX BACK DATA BASE (I)
acd_bdfbx_get_doc_no    dw  ST_ANNOUNCE_AND_COLLECT_DIGITS
                        dw  JUMP_UNCOND
                        dw  step_0046_parameters
step_0046_next_step     dw  0047h                           ;make file name for tcf file
                        dw  0000h                           ;tmo: no_dtmf, timeout etc
                        dw  0000h                           ;tmo needs this for incoming fax
                        dw  0046h                           ;* go to emit_doc_list
                        dw  0000h                           ;# and there is non NULL doc number
                        dw  0000h                           ;# and there is NULL doc number
step_0046_parameters    dw  DO_NOT_EXPECT_DTMF              ;so that F=0 works. always.
                        dw  vcon_session_filename_H         ;file to emit FBXBLD.PCM
                        dw  ACD_GET_FAXBACK_DOC_NUMBER      ;acd type
                        dw  vcon_session_repeat_cnt         ;rept count for timeout etc
                        dw  DO_NOT_STOP_ON_DLE
                        dw  vcon_session_faxback_doc_number ;ptr to step table variable
                        dw  LCD_MESSAGE_YES
                        db  "please enter faxback"
                        db  "document number and ", 00h
```

```
                        db  "press #              "
                        db  "thank you!           ", 00h, 00h

;***********************0047*****************************************************************
;BUILD FAX BACK DATA BASE (II)
em_bdfbx_data_base      dw  ST_EMIT_MSG
                        dw  DTMF_ANALYZE
                        dw  step_0047_parameters
step_0047_next_step     dw  0048h                           ;
                        dw  0000h                           ;no_dtmf. repeat first.
                        dw  0000h                           ;dtmf_*
                        dw  0000h                           ;dtmf_# = ttq_req
                        dw  0000h                           ;dtmf_0 =
                        dw  0048h                           ;dtmf_1 = scan to pcx.
step_0047_parameters    dw  EXPECT_DTMF
                        dw  vcon_session_filename_7         ;sfxmsg.pcm
                        dw  VCON_SPEAKER
                        dw  DO_NOT_STOP_ON_DLE
                        dw  LCD_MESSAGE_YES
                        db  "place page to fax on"
                        db  "scanner and press 1 ", 00h

                        db  "press # if no more  "
                        db  "pages to scan       ", 00h, 00h

;***********************0048*****************************************************************
;BUILD FAX BACK DATA BASE (III)
sp_bdfbx_sctopcx        dw  ST_START_PROGRAM                ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_0048_parameters            ;offset to parameters
step_0048_next_step     dw  0049h                           ;
                        dw  0000h                           ;in case scanner is off etc.
step_0048_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_7         ;program name = SCTOPCX.EXE
                        dd  00000000h                       ;argument_1. not used.
                        dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                        dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message

;***********************0049*****************************************************************
;BUILD FAX BACK DATA BASE (IV)
sp_bdfbx_incbdfbx       dw  ST_START_PROGRAM                ;action start_program=0007h
                        dw  JUMP_UNCOND                     ;flags register for this step
                        dw  step_0049_parameters            ;offset to parameters
step_0049_next_step     dw  0047h                           ;
                        dw  0000h                           ;in case scanner is off etc.
step_0049_parameters    dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw  vcon_session_constant_L         ;program name = BLDFBXDB.EXE
                        dw  vcon_session_faxback_doc_number ;argument_1. fbx document number
                        dw  step_table_seg_number
                        dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
                        dw  step_table_seg_number           ;returned by sctopcx.exe. (FS)
                        dw  WAIT_TO_COMPLETE                ;hold up the step table
                        dw  LCD_MESSAGE_NO                  ;no LCD message



;*************************************************************************************
;*************************************************************************************
;**                                                                                 **
;**             THE STEP LIBRARY: SUB ELEMENTS OF COMPLEX ACTIONS                   **
;**                                                                                 **
;*************************************************************************************
;*************************************************************************************
;***********************0001*****************************************************************
;*************************************************************************************
;*                                                                                   *
;*      START_PROGRAM FOR USE BY EMIT_MSG                                            *
;*                                                                                   *
;*************************************************************************************
start_program_for_emit_msg      dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0001_parameters        ;offset to parameters
step_0001_next_step             dw  0ffffh                      ;will not run next step for this.
```

```
                                dw  0ffffh                      ;case of step_status=0
step_0001_parameters            dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                                dw  vcon_session_constant_1     ;program name
                                dw  0000H
                                dw  step_table_seg_number       ;a pointer to an ST file
                                dw  0000h                       ;no longer CHS
                                dw  mps_seg_number              ;give ldftohdc the whole mps.
                                dw  WAIT_TO_COMPLETE            ;hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;**********************0002*************************************************************
;*******************************************************************************
;*                                                                             *
;*      START_PROGRAM FOR USE BY  RECO_MSG                                     *
;*                                                                             *
;*******************************************************************************
start_program_for_reco_msg      dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0002_parameters        ;offset to parameters
step_0002_next_step             dw  0ffffh                      ;will not run next step for this.
                                dw  0ffffh                      ;case of step_status=0
step_0002_parameters            dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                                dw  vcon_session_constant_2     ;program name
                                dw  0000H
                                dw  step_table_seg_number       ;argument_1. a pointer to a ST file
                                dw  0000h                       ;no longer CHS
                                dw  mps_seg_number              ;CHS sshhcccc
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;**********************0003*************************************************************
;*******************************************************************************
;*                                                                             *
;*      START_PROGRAM FOR USE BY VMA                                           *
;*                                                                             *
;*******************************************************************************
start_program_for_vma           dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0003_parameters        ;offset to parameters
step_0003_next_step             dw  0ffffh                      ;will not run next step for this.
                                dw  0ffffh                      ;case of step_status=0
step_0003_parameters            dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                                dw  vcon_session_constant_3     ;program name
                                dw  0000H                       ;[VMA_FILENAME_PTR]
                                dw  step_table_seg_number       ;FS:file_ptr
                                dw  SP_LAUNCHED_PGM_DWORD       ;stepper loads anyway
                                dw  mps_seg_number              ;GS:SP_LAUNCHED_PGM_DWORD
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;**********************0004*************************************************************
;*******************************************************************************
;*                                                                             *
;*      EMIT_MSG FOR USE BY VMA                                                *
;*                                                                             *
;*******************************************************************************
emit_msg_for_vma                dw  ST_EMIT_MSG
                                dw  DTMF_ANALYZE
                                dw  step_0004_parameters
step_0004_next_step             dw  0ffffh
step_0004_parameters            dw  EXPECT_DTMF                 ;catstp10.asm change
                                dw  vcon_session_variable_1
                                dw  VCON_RESOURCE_OUT_CURRENT
                                dw  DO_NOT_STOP_ON_DLE
;catstpl8.asm change. make no lcd message explicit. now it is working by luck
;also change it to YES and allow for one LCD full of messages
                                dw  LCD_MESSAGE_YES
                                db  "message received on "
                                db  "DEC-25-95 at 12:00AM", 00h, 00h
;**********************0005*************************************************************
;*******************************************************************************
;*                                                                             *
;*      NO_ACTION FOR USE BY VMA                                               *
;*                                                                             *
;*******************************************************************************
no_action_for_vma               dw  ST_NO_ACTION
                                dw  DTMF_ANALYZE
                                dw  step_0005_parameters
step_0005_next_step             dw  0ffffh
step_0005_parameters            dw  EXPECT_DTMF                 ;catstpl0.asm change
                                dw  DO_NOT_STOP_ON_DLE
```

```
;************************0006*********************************************************************
;*****************************************************************************************
;*                                                                                       *
;*      START_PROGRAM_1 FOR USE BY  RMI                                                  *
;*                                                                                       *
;*****************************************************************************************
start_program_1_for_rmi         dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0006_parameters        ;offset to parameters
step_0006_next_step             dw  0fffFh                      ;will not run next step for this.
                                dw  0fffFh                      ;case of step_status=0
step_0006_parameters            dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                                dw  vcon_session_constant_4     ;program name
                                dd  00000000h                   ;not used
                                dw  SP_LAUNCHED_PGM_DWORD       ;stepper loads anyway
                                dw  mps_seg_number              ;GS:SP_LAUNCHED_PGM_DWORD
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;************************0007*********************************************************************
;*****************************************************************************************
;*                                                                                       *
;*      START_PROGRAM_2 FOR USE BY  RMI                                                  *
;*                                                                                       *
;*****************************************************************************************
start_program_2_for_rmi         dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0007_parameters        ;offset to parameters
step_0007_next_step             dw  0fffFh                      ;will not run next step for this.
                                dw  0fffFh                      ;case of step_status=0
step_0007_parameters            dw  DO_NOT_EXPECT_DTMF
                                dw  vcon_session_constant_2     ;program name
                                dw  0000H                       ;[RMI_FILENAME_PTR]
                                dw  step_table_seg_number       ;FS:file ptr
                                dd  00000000h                   ;CHS
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;************************0008*********************************************************************
;*****************************************************************************************
;*                                                                                       *
;*      START_PROGRAM_3 FOR USE BY  RMI                                                  *
;*                                                                                       *
;*****************************************************************************************
start_program_3_for_rmi         dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0008_parameters        ;offset to parameters
step_0008_next_step             dw  0fffFh                      ;will not run next step for this.
                                dw  0fffFh                      ;case of step_status=0
step_0008_parameters            dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                                dw  vcon_session_constant_5     ;program name
                                dw  0000H                       ;[VOICE_MSG_FILENAME]
                                dw  mps_seg_number              ;
                                dw  SP_LAUNCHED_PGM_DWORD       ;stepper loads anyway
                                dw  mps_seg_number              ;
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;************************0009*********************************************************************
;*****************************************************************************************
;*                                                                                       *
;*      START_PROGRAM_1 FOR USE BY  PFI                                                  *
;*                                                                                       *
;*****************************************************************************************
start_program_1_for_pfi         dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_0009_parameters        ;offset to parameters
step_0009_next_step             dw  0fffFh                      ;will not run next step for this.
                                dw  0fffFh                      ;case of step_status=0
step_0009_parameters            dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                                dw  vcon_session_constant_2     ;program name
                                dw  0000H                       ;[PFI_FILENAME_PTR]
                                dw  step_table_seg_number       ;
                                dw  SP_LAUNCHED_PGM_DWORD       ;stepper loads anyway
                                dw  mps_seg_number
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;************************000A*********************************************************************
;*****************************************************************************************
;*                                                                                       *
```


88

```
;*      START_PROGRAM_2 FOR USE BY  PFI                                          *
;*                                                                               *
;*********************************************************************************
start_program_2_for_pfi         dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_000a_parameters        ;offset to parameters
step_000a_next_step             dw  0ffffh                      ;will not run next step for this.
                                dw  0ffffh                      ;case of step_status=0
step_000a_parameters            dw  DO_NOT_EXPECT_DTMF
                                dw  vcon_session_constant_2     ;program name
                                dd  00000000h                   ;not used. sp will insert 00H(Z) in MTICS
                                dd  00000000h                   ;not used. maestro will not pass to pgm.
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;**********************000B*****************************************************
;*********************************************************************************
;*                                                                               *
;*      NO_ACTION FOR USE BY PFI                                                 *
;*                                                                               *
;*********************************************************************************
no_action_for_pfi               dw  ST_NO_ACTION
                                dw  DTMF_ANALYZE
                                dw  step_000b_parameters
step_000b_next_step             dw  0ffffh
step_000b_parameters            dw  DO_NOT_EXPECT_DTMF
                                dw  vcon_session_variable_2
;catstpl0.asm change: resource variable really does not belong with no_action. so remove it

;                               dw  VCON_HANDSET
                                dw  DO_NOT_STOP_ON_DLE
                                dw  vcon_session_zero

;**********************000C*****************************************************
;*********************************************************************************
;*                                                                               *
;*      EMIT_MSG FOR USE BY TMO                                                  *
;*                                                                               *
;*********************************************************************************
emit_msg_for_tmo                dw  ST_EMIT_MSG
                                dw  DTMF_ANALYZE
                                dw  step_000c_parameters
step_000c_next_step             dw  0ffffh
step_000c_parameters            dw  DO_NOT_EXPECT_DTMF
                                dw  vcon_session_filename_4
                                dw  VCON_LINE
                                dw  STOP_ON_DLEC
;catstpl8.asm change. make no lcd message explicit. now it is working by luck
                                dw  LCD_MESSAGE_NO
;                               dw  vcon_session_zero
;**********************000D*****************************************************
;*********************************************************************************
;*                                                                               *
;*      EMIT_MSG FOR USE BY ACD                                                  *
;*                                                                               *
;*********************************************************************************
emit_msg_for_acd                dw  ST_EMIT_MSG
                                dw  DTMF_ANALYZE
                                dw  step_000d_parameters
step_000d_next_step             dw  0ffffh
step_000d_parameters            dw  EXPECT_DTMF
                                dw  vcon_session_variable_3
                                dw  VCON_RESOURCE_OUT_CURRENT
;catstpl9.asm change. 11/4/95. was do_not_stop_on_dle and keep it that way.
                                dw  DO_NOT_STOP_ON_DLE
                                dw  LCD_MESSAGE_YES
                                db  "please enter number "              ;in case some acd's have

                                db  "of copies           ", 00h         ;long messages, we gave it

                                db  "please enter number "              ;3 screenfuls.
                                db  "of copies           ", 00h

                                db  "please enter number "
                                db  "of copies           ", 00h, 00h

;**********************000E*****************************************************
;*********************************************************************************
;*                                                                               *
;*      NO_ACTION FOR USE BY ACD                                                 *
;*                                                                               *
```

```
;*******************************************************************************
no_action_for_acd               dw  ST_NO_ACTION
                                dw  DTMF_ANALYZE
                                dw  step_000e_parameters
step_000e_next_step             dw  0ffffh
step_000e_parameters            dw  EXPECT_DTMF                 ;catstpl0.asm change
;catstpl9.asm change. 11/4/95. was do_not_stop_on_dle and keep it that way.
                                dw  DO_NOT_STOP_ON_DLE
;**********************000F*************************************************
;*******************************************************************************
;*                                                                             *
;*      START_PROGRAM FOR USE BY ACD                                           *
;*                                                                             *
;*******************************************************************************
start_program_for_acd           dw  ST_START_PROGRAM            ;action start_program=0007h
                                dw  DTMF_ANALYZE                ;flags register for this step
                                dw  step_000f_parameters        ;offset to parameters
step_000f_next_step             dw  0ffffh                      ;will not run next step for this.
                                dw  0ffffh                      ;case of step_status=0
step_000f_parameters            dw  DO_NOT_EXPECT_DTMF
                                dw  vcon_session_variable_4     ;program name
                                dd  00000000h                   ;
                                dd  00000000h                   ;
                                dw  WAIT_TO_COMPLETE            ;do not hold up the step table
                                                                ;SP_OFFSET_TO_WAIT_TO_COMPLETE
                                dw  LCD_MESSAGE_NO              ;no LCD message
;*******************************************************************************
;*                                                                             *
;*                          END OF STEP TABLE                                  *
;*                                                                             *
;*******************************************************************************
                            DB  "END OF STEP TABLE"


END     START



;FIXED LOCATION STEPS
;====================
;tmaestro                                               step_0000

;start_program inside emit_msg (program_name: ldftohdc)     step_0001

;start_program inside reco_msg (program_name: stffmhdc)     step_0002

;start_program inside vma      (program_name: mergevef)     step_0003
;emit_msg inside vma                                       step_0004
;no_action inside vma                                      step_0005

;start_program #1 inside rmi   (program_name: makfname)     step_0006
;start_program #2 inside rmi   (program_name: stffmhdc)     step_0007
;start_program #3 inside rmi   (program_name: updatevq)     step_0008

;start_program #1 inside pfi   (program_name: updatefq)     step_0009
;start_program #2 inside pfi   (program_name: printfax)     step_000a
;no_action inside pfi                                      step_000b
;
;emit_msg inside tmo                                       step_000c
;
;emit_msg_inside acd                                       step_000d
;no_action inside acd                                      step_000e
;start_program inside acd                                  step_000f
;
;emit_msg inside sfx                                       step_0010
;start_program #1 inside sfx   (program_name: sctopcx )     step_0011
;start_program #2 inside sfx   (program_name: bldtcf  )     step_0012
;ttqreq inside sfx                                         step_0013
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*****************************************************************************
;*                                                                           *
;*                                                                           *
;*              TIMER  TICK  INTERRUPT  SERVICE  ROUTINE                     *
;*                      updated by Haluk M. Aytac                            *
;*                              June 7, 1995                                 *
;*                                                                           *
;*                                                                           *
;*****************************************************************************
;ttisr00f.asm <- ttisr00e.asm. 11/3/95. change level_0 next stepper to include F=3
;and F=4. each go to different next steps. F=3 goes to step 58h, dlet_induced_no_action
;F=4 retrieves [VCON_STATE_OLD].
;ttisr00e.asm <- ttisr00d.asm. 10/12/95. host_initiated_send_fax_count.
;also remove the remnant from if ATH then back to CAS code in level_0 stepper.
;also remove automatic repeat of a step in case of no_dtmf. we have this in acd
;and it is controlled (ie you choose how many repeats).
;ttisr00d.asm <- ttisr00c.asm. 9/21/95. remove sys_data structure.
;ttisr00c.asm <- ttisr00b.asm. 9/17/95. change to work with modem_data and sys_data.
;add PTQ changes as per print0.txt in this directory. ie check PTQ and if an item, enable
;the fast print TTQ entry. its offset is given to us from when cvboot has installed it.
;ttisr00b.asm <- ttisr00a.asm. 8/26/95. add f=3,4,5 processing for SP_RETURN_FLAGS for faxback.
;ttisr008.asm <- ttisr006.asm. 7/15/95. fix keypad to dle so that each tt checks for items.
;ttisr006.asm <- ttisr005.asm. 6/12/95. catvocl. add keypad to dle buffer condition (6/26. 7-95-68)
;ttisr005.asm <- ttisr002.asm. 6/10/95. 6-95-79. even when timer tick was busy we still enter
;timer_tick isr. this is required for casmodem. I think cas makes a DOS call that stretches over
;multiple ttisr's. if we do not do tt during this time we probably fail to deliver what the
;modem expects. 6-95-71. it seems there, DTE does not issue AT+FDR on time so that modem issues
;an +FHNG. when modem receives training pulse w/o AT+FDR, it issues +FHNG.
;a cure is to allow tt within tt. even then we need the dos call in the beginning and not a part
;of the cas. dos call issues eoi. this makes it so the next irq can come early.
;NOTE: I NEED TO PROTECT CAT VOICE PROCESS SECTION FROM DOUBLE TT'S BECAUSE I AM NOT COUNTING
;ON THEM. SO IF TIMER_TICK_BUSY=01 IN THAT SECTION, THEN WE SKIP PROCESSING. BUT IF CAS DOS CALL
;LASTS TOO LONG ,THEN HOW DO I FEED THE VOICE? I SHOULD CREATE ANOTHER VARIABLE THAT TELLS ME IF
;I AM IN THE MIDDLE OF PROCESSING AN ACTION. AND NEXT TIME I COME IN THERE AND THE VARIABLE IS NOT SET
;THEN I CAN DO STEPPER/ACTION WHATEVER. BESIDES. THE TT WITHIN TT WILL ARISE BECAUSE OF A DOS CALL
;SO IN MOST CASES THE ORIGINAL TT WILL BE INSIDE A DOS CALL. SO THE CASE WILL HAPPEN THAT AN EARLIER
;TIMER TICK WILL PROCESS A LATER STEP OF A STEPPER/ACTION. THIS IS OK. THE SEMAPHORE IS STILL NEEDED
;BECAUSE AFTER THE CAS DOS CALL, THERE WILL BE SOME VOICE PROCESSING AND DURING THIS TIME ANOTHER
;TT MAY COME. THERE SHOULD BE AS MANY VARIABLES AS THERE ARE MODEMS. THE VARIABLES SHOULD EXCLUDE
;DUAL VOICE PROCESSING BUT NOT DUAL CAS PROCESSING WITHIN THE SAME MODEM.
;SO here we change timer tick busy from a decision making signal to a diagnostic signal.
;we inc/dec instead of yes/no.
;ALSO I remove start timer stop timer pairs from where they were.
;ALSO ADD PUSHF/POPF TO START TIMER. STOP TIMER HAD IT ALREADY.
;ttisr002.asm <- ttisr001.asm. 6/7/95. remove the voice to fax portion. new scheme:
;tmo checks for dlec and if so, writes to cas irq03 receive buffer: RING and then
;lets cas handle the rest. God help me here.
;CASMODEM WORKS WITH THIS CODE. I JUST HAD TO REMOVE THE PORTION HERE TT IS NOT TAKEN IF
;IT IS IN TT ALREADY. SOMEHOW CASMODEM DOES NOT LIKE IT. TTISR003.ASM WILL TRY THE CASE
;WHERE WE EXIT AFTER WE DO DOS CALL IN CASE OF IN TT ALREADY.
;ttisr001.asm <- ttisr000.asm. 6/7/95. remove front end text.
;ttisr000.asm <- irqcod0c.asm. 6/7/95. split into timer tick and irq03 isr's.
;irqcod0c.asm <- irqcod0b.asm. 6/3/95. catvoch. else no changes.
;irqcod0b.asm <- irqcod0a.asm. 5/18/95. job history. here just equ version change.
;plus timer_tick_count_all.
;irqcod0a.asm <- irqcod09.asm. 5/18/95. int 13h add In_INT13H.
;irqcod09.asm <- irqcod08.asm. 5/11/95. 5-95-80. multitasking.
;irqcod08.asm <- irqcod07.asm. 5/10/95. fix R->CR including other irq's than t2.
;ON ENTRY:
;       t2                                              other irq
;=============================================   ========================================
;       If In_DOS=1 skip all                            If In_DOS=1 skip all
;       If maestro_active=YES skip all                  If maestro_active=YES skip all
;       If In_IRQ=OK call store_to_Client_regs          If In_IRQ=OK call store_to_Client_regs
;       call store_DTA_PSP_to_Client
;       call switch_to_maestro
;skip_all: continue                                 skip_all: continue
;
;ON EXIT:
;       t2                                              other irq
;=============================================   ========================================
```


91

```
;       If In_DOS=1 skip all                            If In_DOS=1 skip all
;       If maestro_active=YES skip all                  If maestro_active=YES skip all
;       call restore_DTA_PSP_fm_Client
;       If In_IRQ=OK call restore_fm_Client_regs If In_IRQ=OK call restore_fm_Client_regs
;skip_all: continue                                  skip_all: continue
;
;ASSUMPTIONS:    irq, other than t2, do not change PSP, DTA
;               t2, if it changes PSP, DTA, also restores it. I mean casmodem.
;               if we have to change PSP etc within t2, we must also restore it.
;               do not change PSP etc if In_DOS.
;               when irq's envelop t2, at least one irq will have In_IRQ=OK.
;irqcod05.asm <- irqcod04.asm. 5/6/95. fix errors for catvoc06
;irqcod04.asm <- irqcod03.asm. 5/2/95. PSP,DTA.
;now that we do PSP, DTA ie DOS calls, the critical segment at begin irq00 is not non interruptible
;anymore. Thus, move inc In_IRQ closer to the top ie before DOS call in store_to_Client_regs.
;Although, we have not given eoi, this change will give uniform code that can be used with other
;irq's as well.
;Also add code to prevent timer tick reentering itself.
;irqcod03.asm <- irqcod02.asm. 5/1/95. fix in irq00 entry.
;IRQCOD01.ASM <- IRQCOD00.ASM. 4/27/95. ADD KEYPAD CODE FROM CAP*.ASM
;CATVOC0B-2 goodcv06\catequ02 -> goodcv07\catequ03.inc
INCLUDE CATEQU0E.INC
.MODEL  COMPACT
.386P
;sys data
                extrn   modems_tcb_st_seg_table:far             ;near

                extrn   irq_03_buf_ptr:far                      ;near
                extrn   irq_03_buffer:far                       ;near
                extrn   irq_03_buf_end:far                      ;near

                extrn   vcon_InDOS_flag_off:far                 ;near
                extrn   vcon_InDOS_flag_seg:far                 ;near

                extrn   TIMER_TICK_BUSY:far                     ;near
                extrn   timer_tick_count:far                    ;near
                extrn   timer_tick_count_all:far                ;near
                extrn   timer_tick_tail_end_count:far           ;near

                extrn   In_IRQ:far                              ;near
                extrn   maestro_active:far                      ;near
                extrn   Maestro_PSP:far                         ;near
                extrn   Maestro_DTA_off:far                     ;near
                extrn   Maestro_DTA_seg:far                     ;near

                extrn   key_value:far                           ;near
                extrn   key_pressed:far                         ;near
                extrn   key_released:far                        ;near
                extrn   irq00_cur_0_keypad_value:far            ;near
                extrn   irq00_cur_1_keypad_value:far            ;near
                extrn   irq00_cur_2_keypad_value:far            ;near
                extrn   keypad_buffer:far                       ;near
                extrn   keypad_buffer_end:far                   ;near
                extrn   keypad_buffer_wr_ptr:far                ;near
                extrn   keypad_buffer_rd_ptr:far                ;near

                extrn   In_INT13H:far                           ;near

                extrn   modem_0_get_key_value:far               ;near

                extrn   tmaestro_task_queue:far
                extrn   tmaestro_task_queue_end:far
                extrn   host_DOS_request_resp:far

                extrn   printer_task_queue:far
                extrn   ttq_fgprint_ptr:far
                extrn   ttq_send_host_fax_ptr:far
                extrn   ttq_print_in_fax_ptr:far
                extrn   printer_task_queue_end:far
                extrn   host_initiated_send_fax_count:far
                extrn   incoming_fax_count:far

;procedures
```

```
                extrn   store_to_Client_regs:near
                extrn   switch_to_Maestro:near
                extrn   restore_fm_Client_regs:near
                extrn   store_DTA_PSP_to_Client:near
                extrn   restore_DTA_PSP_fm_Client:near

                extrn   vcon_no_action:near
                extrn   vcon_emit_msg:near
                extrn   vcon_record_msg:near
                extrn   vcon_hangup:near
                extrn   record_msg_indirect:near
                extrn   voice_mail_access:near
                extrn   print_fax_indirect:near
                extrn   tmaestro:near
                extrn   announce_and_collect_digits:near
                extrn   send_a_fax:near
                extrn   retrieve_email:near
                extrn   send_fax_indirect:near
                extrn   build_fax_database:near
                extrn   vcon_start_program:near
                extrn   TTQ_request:near
                extrn   vcon_wait_for_pgm_to_complete:near
                extrn   sw_2_fax:near

;data in cs
                extrn   dos_irq00_off:near
                extrn   dos_int13_off:near
                extrn   dos_int28_off:near
                extrn   dos_int15_off:near


                public  start_timer
                public  stop_timer
                public  new_irq00_off
                public  new_int13_off
                public  new_int15_off
                public  new_int28_off

.CODE

;*****************************************************************************
;*                                                                           *
;*              T I M E R       T I C K                                      *
;*      new_irq00_off     CAT IRQ00 Interrupt Service Routine                 *
;*                                                                           *
;*****************************************************************************
new_irq00_off:
;at this point ds is whatever from the pgm executing at the time the irq came.
;mimic cs:inc word ptr [016c]. cs=0fc2 in this context
;if vcon process then just do the dos irq00
;*************************************************************
;*                                                           *
;*              MAESTRO RELATED                              *
;*                                                           *
;*************************************************************
                pushf
;cazvox28.asm change. SET TIMER_TICK_BUSY=YES. CHECK IN_IRQ. IF 0 CALL STORE_TO_CLIENT_REGS
;THEN CALL SWITCH_TO_MAESTRO. FINALLY, INCREMENT IN_IRQ.
                cli                                         ;CRITICAL SECTION
                PUSH    DS
                PUSH    AX
                MOV     AX, SEG TIMER_TICK_BUSY
                MOV     DS, AX
                POP     AX
                ASSUME  DS:SEG TIMER_TICK_BUSY
                inc     word ptr timer_tick_count_all
;ttisr005.asm changes
;irqcod04.asm change
;               cmp     byte ptr TIMER_TICK_BUSY, YES
;ttisr002.asm experiment
```

```
;               jmp     not_t2_within_t2
;               jnz     not_t2_within_t2
;               POP     DS
;               POPF
;               IRET
;end irqcod04.asm change
;not_t2_within_t2:
;               mov     byte ptr TIMER_TICK_BUSY, YES
                cmp     byte ptr TIMER_TICK_BUSY, 00H
                jne     do_not_start_timer
                call    start_timer
do_not_start_timer:
                inc     byte ptr TIMER_TICK_BUSY
;ttisr006.asm change
;*****************************************************************
;*                                                               *
;*      INCREMENT ALL INTERVAL COUNTERS IN TTQ                   *
;*                                                               *
;*****************************************************************
;ttisr00b.asm change. 8/27/95.
;L2-BUG REPORT 001. increment only if the TTICS entry is not running.
                push    si
                mov     si, OFFSET tmaestro_task_queue
incr_ttq_interval_counters:
                cmp     byte ptr [si + TTICS_STA_STATUS], TTICS_STA_STATUS_RUNNING
                je      do_not_inc_int_counter
                inc     dword ptr [si + TTICS_STA_INTERVAL_COUNTER]
do_not_inc_int_counter:
                add     si, TTQ_ENTRY_DELTA
                cmp     si, word ptr tmaestro_task_queue_end
                jb      incr_ttq_interval_counters
                pop     si
;*****************************************************************
;*                                                               *
;*      CHECK PTQ, IF ITEM AND TTQ(FGPRINT) HANDSHAKE=NULL       *
;*                 SET HANDSHAKE = REQ                           *
;*                                                               *
;*****************************************************************
                push    di
                push    si
                mov     di, OFFSET printer_task_queue
;search for a free slot to place the filename in
check_PTQ:
                cmp     DS:byte ptr [di + PTICS_HANDSHAKE], PTICS_HANDSHAKE_REQ_MADE
                jne     check_next_PTQ_entry
                mov     si, word ptr ttq_fgprint_ptr
                cmp     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                jne     check_PTQ_entry_cont0
                mov     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
                jmp     check_PTQ_entry_cont0
check_next_PTQ_entry:
                add     di, PTQ_ENTRY_DELTA
                cmp     di, OFFSET printer_task_queue_end
                jne     check_PTQ
check_PTQ_entry_cont0:
                pop     si
                pop     di
;*****************************************************************
;*                                                               *
;*      CHECK host_initiated_send_fax_count, IF > 0              *
;*              AND TTQ(send host fax) HANDSHAKE=NULL            *
;*                 SET HANDSHAKE = REQ                           *
;*                                                               *
;*****************************************************************
;check the count if >0 and TTQ entry for this ribbon is not busy,
;activate the TTQ entry and decrement the count. if TTQ entry is busy
;let it be. (this is similar to what was done for printing).
                push    di
                push    si
                cmp     word ptr host_initiated_send_fax_count, 0
                je      no_host_send_fax
                mov     si, word ptr ttq_send_host_fax_ptr
                cmp     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
```

```
                jne     no_host_send_fax
                mov     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
                dec     word ptr host_initiated_send_fax_count
no_host_send_fax:
                pop     si
                pop     di
;*****************************************************************
;*                                                               *
;*      CHECK incoming_fax_count, IF > 0                         *
;*              AND TTQ(print incoming fax) HANDSHAKE=NULL       *
;*                 SET HANDSHAKE = REQ                           *
;*                                                               *
;*****************************************************************
;check the count if >0 and TTQ entry for this ribbon is not busy,
;activate the TTQ entry and decrement the count. if TTQ entry is busy
;let it be. (this is similar to what was done for printing).
                push    di
                push    si
                cmp     word ptr incoming_fax_count, 0
                je      no_incoming_fax
                mov     si, word ptr ttq_print_in_fax_ptr
                cmp     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                jne     no_incoming_fax
                mov     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
                dec     word ptr incoming_fax_count
no_incoming_fax:
                pop     si
                pop     di
;*****************************************************************
                inc     word ptr timer_tick_count
                inc     byte ptr In_IRQ
;begin irqcod08.asm change
;check for In_DOS=1. if so skip all
;ttisr00a.asm change
                cmp     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                je      tt_maestro_active_test_b
                PUSH    DS
                push    ax
                push    bx
                mov     bx, DS:word ptr vcon_InDOS_flag_off
                mov     ax, DS:word ptr vcon_InDOS_flag_seg
                mov     DS, ax
                mov     al, DS:byte ptr [bx]
                cmp     al, 00h
                pop     bx
                pop     ax
                POP     DS
                jnz     irq00_donot_switch_to_maestro
;check for maestro_active=YES. if so, skip all
tt_maestro_active_test_b:
                cmp     byte ptr maestro_active, NO
;NOTE!!!!!! MUST ALSO SKIP SWITCH TO MAESTRO IF THE PROGRAM IS IN DOS. THUS CHECK INDOS.
                jnz     irq00_donot_switch_to_maestro

;ttisr006.asm change
                cmp     byte ptr TIMER_TICK_BUSY, 01h
                ja      irq00_donot_switch_to_maestro

;if In_IRQ=OK, R->CR.
                cmp     byte ptr In_IRQ, 01h
                jnz     irq00_in_irq_not_one
                call    store_to_Client_regs
irq00_in_irq_not_one:
;ttisr00b.asm change. 9/1/95.
                cmp     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                je      skip_get_DTA_PSP
                call    store_DTA_PSP_to_Client                 ;makes DOS call
skip_get_DTA_PSP:
;end irqcod08.asm change
                call    switch_to_Maestro
irq00_donot_switch_to_maestro:
                POP     DS                                      ;REVERTS TO ENTRY DS
                popf                                            ;end critical section
```

```
;end cazvox28.asm change
;*****************************************************************
;*                                                               *
;*              CALL DOS IRQ00                                   *
;*                                                               *
;*****************************************************************
;THE FOLLOWING VARIABLE CAN ONLY BE CS: RELATIVE. IF DS THEN IN DOS DS IS DIFFERENT
;THAN AT ENTRY. CANNOT BE GS: BECAUSE ENTER DOS ONLY ONCE.
                PUSHF
                CALL    CS:dword ptr dos_irq00_off
;HERE CHECK ALL VCON_DETECTED FROM FIRST MODEMS. IF NOT SET GO TO THE IRQ00 OF CAS.
;JUST REENTER THIS WITH DIFFERENT GS. ROUTINE REMAINS THE SAME.

;*****************************************************************
;*                                                               *
;*              KEYPAD READER                                    *
;*                                                               *
;*****************************************************************
;KEYPAD READER
;key pad layout in terms of word at 381h,380h
;       [1] ffef    [2] fffe    [3] efff    [A] feff    [MSG]
;       [4] ffdf    [5] fffd    [6] dfff    [B] fdff    [HANDSET/MIC_SPKR]
;       [7] ffbf    [8] fffb    [9] 7fff    [C] fbff    [COPY]
;       [*] ff7f    [0] fff7    [#] bfff    [D] f7ff    [PGM]
;algorithm: at each irq00 store the state of 381h,380h in 3 words:
;       irq00_cur_0_keypad_value
;       irq00_cur_1_keypad_value
;       irq00_cur_2_keypad_value
;in this irq00, first push 1 -> 2
;              then  push 0 -> 1
;ttisr006.asm change. Franco changed the addresses 380,1 -> 382,3
;         and read 381h,380h to 0
;now compare all three. if they are all equal and also equal to ffff then do
;nothing. but if they are all equal and also equal to another value from the
;list above, then set a byte called 'key_pressed' (note that pressing two
;keys will not create a result. it will be ignored). now watch for ffff three
;in a row. if you see it, reset key_pressed and set key_released. now you
;are ready to copy the key to a key_buffer and reset key_released..
;to summarize:
;             at first key_pressed=00h
;                      key_released=00h
; if key_pressed=00h and key_released=00h look for 3 equal key pressesin a row.
; if 3 equal key presses in a row are found then set key_pressed
; if key_pressed is set then look for 3 equal ffff in a row. when found set
;    key_released and reset key_pressed.
; if key_released is set then record the value to the keypad_buffer and reset
;    key_released. now you are back to the beginning.
                pushf
                push    ax
                push    bx
                push    cx
                push    dx
                PUSH    DS
                push    si
                PUSH    GS

                mov     ax, SEG irq00_cur_0_keypad_value
                mov     ds, ax

;ttisr006.asm change
                mov     byte ptr modem_0_get_key_value, FALSE

                mov     bx, OFFSET irq00_cur_0_keypad_value
                mov     ax, word ptr [bx+2]
                mov     word ptr [bx+4], ax                     ; 1 -> 2
                mov     ax, word ptr [bx]
                mov     word ptr [bx+2], ax                     ; 0 -> 1
;ttisr006.asm change 380 -> 382
                mov     dx, 0382h
                in      al, dx          ;read lower byte
                mov     byte ptr [bx], al
;ttisr006.asm change 381 -> 383
                mov     dx, 0383h
```

```
                in      al, dx          ;read higher byte
                mov     byte ptr [bx+1], al                     ; keypad -> 0
                mov     ax, word ptr [bx] '
                cmp     word ptr [bx+2], ax
                jnz     keypad_cont0
                cmp     word ptr [bx+4], ax
                jnz     keypad_cont0
                mov     cx, ax                                  ;save value in cx
;case of last three readings being all the same.
;if key_pressed=00 and key_released=00 then see if it is not ffff. note that even if it is
;not, it may still not be what we want ie only one bit=0.
;here are the cases
;                       key_pressed     key_released       look for
;                               00              00              all three .ne. ffff
;                                                               and if .ne. then = a single 0
;                               01              00              all three = ffff
;                               00              01              nothing to look for
                cmp     byte ptr key_pressed, 00h
                jnz     keypad_cont1
                cmp     byte ptr key_released, 00h
                jnz     keypad_cont2
;key_pressed=00h, key_released=00h
                cmp     cx, 0ffffh
                jz      keypad_cont0                            ;all equal to ffff

                cmp     cx, 0ffefh
                jnz     key_value_not_1
                mov     byte ptr key_value, "1"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_1:cmp     cx, 0fffeh
                jnz     key_value_not_2
                mov     byte ptr key_value, "2"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_2:cmp     cx, 0efffh
                jnz     key_value_not_3
                mov     byte ptr key_value, "3"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_3:cmp     cx, 0ff7fh
                jnz     key_value_not_s
;ttisr006.asm change
;               mov     byte ptr key_value, "*"
                mov     byte ptr key_value, "."
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_s:cmp     cx, 0fff7h
                jnz     key_value_not_0
                mov     byte ptr key_value, "0"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_0:cmp     cx, 0bfffh
                jnz     key_value_not_p
;ttisr006.asm change
;               mov     byte ptr key_value, "#"
                mov     byte ptr key_value, "/"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_p:cmp     cx, 0ffdfh
                jnz     key_value_not_4
                mov     byte ptr key_value, "4"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_4:cmp     cx, 0fffdh
                jnz     key_value_not_5
                mov     byte ptr key_value, "5"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_5:cmp     cx, 0dfffh
                jnz     key_value_not_6
                mov     byte ptr key_value, "6"
                mov     byte ptr key_pressed, 01h
```

```
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_6:cmp     cx, 0ffbfh
                jnz     key_value_not_7
                mov     byte ptr key_value, "7"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_7:cmp     cx, 0fffbh
                jnz     key_value_not_8
                mov     byte ptr key_value, "8"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_8:cmp     cx, 07fffh
                jnz     key_value_not_9
                mov     byte ptr key_value, "9"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_9:cmp     cx, 0feffh
                jnz     key_value_not_A
                mov     byte ptr key_value, "A"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_A:cmp     cx, 0fdffh
                jnz     key_value_not_B
                mov     byte ptr key_value, "B"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_B:cmp     cx, 0fbffh
                jnz     key_value_not_C
                mov     byte ptr key_value, "C"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_C:cmp     cx, 0f7ffh
                jnz     key_value_not_D
                mov     byte ptr key_value, "D"
                mov     byte ptr key_pressed, 01h
                jmp     keypad_cont0                            ;got what we wanted for this round
key_value_not_D:jmp     keypad_cont0                            ;all same, not ffff but no valid key
;case of key_pressed=01h and key_released=00h. look for ffff
keypad_cont1:   cmp     cx, 0ffffh
                jnz     keypad_cont0
                mov     byte ptr key_pressed, 00h
                mov     byte ptr key_released, 01h
                jmp     keypad_cont0
;case of key_pressed=00h and key_released=01h. write to keypad_buffer.
;check if buffer_wr_ptr = OFFSET keypad_buffer_end and if so reset it to keypad_buffer
;now write to buffer using this pointer. increment the pointer. just to test it write
;to screen also.
;WRITING TO KEYPAD BUFFER. ONE BYTE AT A TIME.
keypad_cont2:   mov     bx, word ptr keypad_buffer_wr_ptr
                mov     al, byte ptr key_value
                mov     byte ptr [bx], al

                inc     bx
                cmp     bx, OFFSET keypad_buffer_end
                jb      keypad_cont3
                mov     bx, OFFSET keypad_buffer
keypad_cont3:   mov     word ptr keypad_buffer_wr_ptr, bx       ;updated wr pointer.

                mov     byte ptr key_released, 00h
                mov     byte ptr modem_0_get_key_value, TRUE

;READING FROM KEYPAD BUFFER. POSSIBLY MULTIPLE BYTES OR MAY BE NONE.
;ttisr008.asm change. attempt to read at each timer tick and not just when there is a valid key.
;ttisr06.asm change
keypad_cont0:   mov     bx, OFFSET modems_tcb_st_seg_table
                mov     bx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                mov     GS, bx
                cmp     GS:byte ptr [KEYPAD_TO_DLE_BUFFER_OK], YES
                jne     keypad_cont00

;ttisr006.asm change. write to dle buffer until rd_ptr = wr_ptr
                mov     si, word ptr keypad_buffer_rd_ptr
                mov     bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]      ;write pointer
```

```
read_fm_keypad_buffer:
                cmp     si, word ptr keypad_buffer_wr_ptr
                je      keypad_cont00

                mov     al, byte ptr [si]
                mov     GS:byte ptr [bx], al

                inc     bx                                              ;inc read ptr
                cmp     bx, VCON_DLE_NUMBER_BUFFER_END
                jb      kp_skp_dle_number_buf_end
                mov     bx, VCON_DLE_NUMBER_BUFFER                      ;set read ptr to begin of bu
ffer
kp_skp_dle_number_buf_end:
                mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR], bx

                inc     si
                cmp     si, OFFSET keypad_buffer_end
                jb      keypad_cont4
                mov     si, OFFSET keypad_buffer
keypad_cont4:   mov     word ptr keypad_buffer_rd_ptr, si               ;updated wr pointer.

                jmp     read_fm_keypad_buffer
                ;'cause could be above.

keypad_cont00:
                POP     GS
                pop     si
                POP     DS
                pop     dx
                pop     cx
                pop     bx
                pop     ax
                popf
;END KEYPAD READER


                PUSH    FS
                PUSH    GS
                PUSH    DS
                PUSH    AX
                PUSH    BX

;*****************************************************************
;*                                                               *
;*    MODEM_0 ACQUIRES FS = SEG STEP TABLE, GS = SEG TCB         *
;*    IF EITHER ONE = 0000H, SKIPS TO MODEM_1 TIMER TICK         *
;*                                                               *
;*****************************************************************
vcon_irq00_cont00:
                mov     ax, SEG modems_tcb_st_seg_table
                mov     DS, ax
                mov     bx, OFFSET modems_tcb_st_seg_table

                mov     ax, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                cmp     ax, 0000h
                jz      vcon_irq00_cont10
                mov     GS, ax

                mov     ax, DS:word ptr [bx + 4 * MODEM_0 + MODEM_ST]
                cmp     ax, 0000h
                jz      vcon_irq00_cont10
                mov     FS, ax

;***********************************************
;*                                             *
;*      VCON TIMER TICK FOR MODEM_0            *
;*                                             *
;***********************************************
vcon_irq00_cont02:
                push    ds
                push    ax
                push    cx
```

```
                push    es
                push    bx
                push    si
                push    di
                mov     ax, SEG TIMER_TICK_BUSY
                mov     ds, ax      ;ds=1fb1h

                cmp     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                jnz     vcon_skip_what_action0
;find out what the action is for the current state
                mov     bx, GS:word ptr [VCON_STATE]        ;a part of irq00
                shl     bx, 1                   ;double for word
                mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]   ;ax=address of state data area
                mov     GS:word ptr [VCON_CUR_STEP_DATA_AREA_ADDR], ax
                mov     bx, ax
                mov     di, FS:word ptr [bx]                        ;di=action number for state
                mov     GS:word ptr [VCON_CUR_STATE_ACTION_NUMBER], di
                shl     di, 1
                lea     bx, cs:word ptr vcon_action_table
;now that the action is known go and execute it. input are registered.
;remember that ds-> vcon_step_machine segment. we might want to change this.
;ax=address of state_data_area.
                add     bx, di
                mov     GS:word ptr [VCON_CUR_ACTION_ADDRS_ADDR], bx
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;   EXECUTE THE ACTION FOR THE CURRENT STATE                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_skip_what_action0:
                    mov     di, 0000h                               ;TCB_LEVEL_DB_SIZE * LEVEL_0 = 0
                    mov     bx, GS:word ptr [VCON_CUR_ACTION_ADDRS_ADDR]
                    call    cs:word ptr [bx]                        ;call the action
                    cmp     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
;if the action is not completed, there is nothing for us to do in irq00
                    jz      tt_m0_exit
                    jmp     vcon_next_state_eval00
;if this state was vcon_hangup state, then revert back to casmodem.
;ttisr0e.asm change. this was a remnant from when I started in CAS.
;                   cmp     GS:word ptr [VCON_CUR_STATE_ACTION_NUMBER], 0005h; was current state hangup?
;                   jnz     vcon_next_state_eval00
;                   mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
;                   mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
;                   jmp     tt_m0_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;   FIND THE NEXT STATE                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;based on inputs and current state, find out what the next state is.
;the fact that we got here says that vcon_action_complete_cur_step=01h
vcon_next_state_eval00:
                    mov     bx, GS:word ptr [VCON_STATE]                ;a part of irq00
                    shl     bx, 1                                       ;double for word
                    mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]   ;ax=address of state data area
                    add     ax, 0002h                                   ;ax=address of vcon Flag registe
r
                    mov     bx, ax                                      ;bx=address of vcon Flag registe
r
                    mov     ax, FS:word ptr [bx]                        ;ax=vcon flag register
                    mov     GS:word ptr [CUR_STEP_STATUS], ax
                    cmp     ax, 0001h                                   ;is F=1?
                    jnz     vcon_next_state_eval01
                    add     bx, 0004h                                   ;bx=address of state_i_next_stat
e
                    mov     ax, FS:word ptr [bx]                        ;ax=next state value
                    mov     GS:word ptr [VCON_STATE], ax                ;vcon_state=new value
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit
vcon_next_state_eval01:
;flag=0000h. what is last_dle_numbr?
                    cmp     GS:byte ptr [VCON_CUR_STEP_DTMF], NULL
                    jnz     vcon_next_state_eval02
                    cmp     GS:word ptr [CUR_STEP_STATUS], 0000H
                    jne     vcon_next_step_flag_02
                    add     bx, 0006h                                   ;bx=address of either no_dtmf or
```

```
nf next
                    mov     ax, FS:word ptr [bx]                            ;next state value based on NF
                    mov     GS:word ptr [VCON_STATE], ax
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit
vcon_next_step_flag_02:
                    cmp     GS:word ptr [CUR_STEP_STATUS], 0002H
                    jne     next_step_flag_gt_20
;each step is either fish or fowl ie either dtmf is expected or not. thus the meaning of next step entries
;is clear. the only one that is both is tmo. luckily, no_dtmf is handled inside tmo. so that next step entry
;is for F=0 ie voice path. for F=2 ie fax, the stepper inserts 0 for next step so that the next step entry
;is for dtmf_*.
                    mov     GS:word ptr [VCON_STATE], 0000H
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit
next_step_flag_gt_20:
;ttisr00f.asm change. 11/3/95.
;we use large values of F in two places: SP, where it is used to go to next steps specified in the
;step table entry. EM, NA, where it is used to go to predefined steps as these actions allow dtmf
;inputs.
                    cmp     GS:word ptr [VCON_CUR_STATE_ACTION_NUMBER], ST_START_PROGRAM
                    jne     vcon_next_state_not_sp_0

                    mov     ax, GS:word ptr [CUR_STEP_STATUS]
                    shl     ax,1
                    add     bx, ax
                    add     bx, 4
                    mov     ax, FS:word ptr [bx]                            ;next state value based on NF
                    mov     GS:word ptr [VCON_STATE], ax
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit

vcon_next_state_not_sp_0:
                    cmp     GS:word ptr [CUR_STEP_STATUS], GOTO_WAIT_ON_DLEH
                    jne     vcon_next_state_f_is_not_30
                    mov     GS:word ptr [VCON_STATE], 0058H  ; dlet_induced_no_action
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit

vcon_next_state_f_is_not_30:
                    cmp     GS:word ptr [CUR_STEP_STATUS], GOTO_ATH_OR_PREV_STATE
                    jne     vcon_next_state_f_is_not_30      ; infinite loop if neither

                    mov     ax, GS:word ptr [VCON_STATE_OLD]
                    mov     GS:word ptr [VCON_STATE], ax     ; where we were
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit

vcon_next_state_eval02:
;flag=0000h. last_dle_numbr .ne. 00h, is it 01h?
                    cmp     GS:byte ptr [VCON_CUR_STEP_DTMF], NO_DTMF
                    jnz     vcon_next_state_eval03
;ttisr006.asm change.
;ttisr00e.asm change. no repeats.
;                   mov     si, bx
;                   mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]   ;bx=address of sess param area
;                   mov     dx, FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_CNT]
;                   dec     FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_COUNTER]
;                   cmp     FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_COUNTER], 0
;                   jne     no_dtmf_run_same_st0
;                   mov     FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_COUNTER], dx
;                   mov     bx, si
;end ttisr006.asm change
                    add     bx, 0006h                                       ;bx=address of either no_dtmf or
 nf next
                    mov     ax, FS:word ptr [bx]                            ;next state value based on no_dt
mf_input
                    mov     GS:word ptr [VCON_STATE], ax
```

```
;no_dtmf_run_same_st0:
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit
vcon_next_state_eval03:
;now for true dtmf inputs.
                    add     bx, 0008h                                   ;bx=address of dtmf_0 case
                    mov     al, GS:byte ptr [VCON_CUR_STEP_DTMF]
                    mov     ah, 00h
;ttisr006.asm change. start from * to economize on entering a lot of next step entries. 30 -> 2e

                    sub     ax, 002eh                                   ;ascii to number
                    shl     ax, 1                                       ;word
                    add     bx, ax                                      ;bx->next state number
                    mov     ax, FS:word ptr [bx]
;ttisr006.asm change. cs:GS: -> GS:
                    mov     GS:word ptr [VCON_STATE], ax
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;   END irq00 STATE MACHINE DRIVEN SECTION                                                     ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
tt_m0_exit:
                        pop     di
                        pop     si
                        pop     bx
                        pop     es
                        pop     cx
                        pop     ax
                        pop     ds
;end irq00 vcon processing*****************************************************************
                        jmp     vcon_irq00_cont10


;****************************************************************
;*                                                              *
;*    MODEM_1 ACQUIRES FS = SEG STEP TABLE, GS = SEG TCB        *
;*    IF EITHER ONE = 0000H, SKIPS TO MODEM_2 TIMER TICK        *
;*                                                              *
;****************************************************************
vcon_irq00_cont10:
                mov     ax, SEG modems_tcb_st_seg_table
                mov     DS, ax
                mov     bx, OFFSET modems_tcb_st_seg_table

                mov     ax, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     ax, 0000h
                jz      vcon_irq00_cont20
                mov     GS, ax

                mov     ax, DS:word ptr [bx + 4 * MODEM_1 + MODEM_ST]
                cmp     ax, 0000h
                jz      vcon_irq00_cont20
                mov     FS, ax

                cmp     GS:byte ptr [CAS_FKS_DETECTED], TRUE
                jne     cas_fks_detectedt10
                mov     GS:byte ptr [CAS_FKS_DETECTED], FALSE
                mov     GS:byte ptr [CAS_AFTER_FKS], TRUE
                mov     ax, GS:word ptr [CAS_TT_COUNT]
                add     ax, CAS_FKS_TO_CAT
                mov     GS:word ptr [CAS_TT_BEYOND_FKS], ax

 cas_fks_detectedt10:
                cmp     GS:byte ptr [CAS_AFTER_FKS], TRUE
                jne     cas_fks_detectedt11
                mov     ax, GS:word ptr [CAS_TT_COUNT]
                cmp     ax, GS:word ptr [CAS_TT_BEYOND_FKS]
                jb      cas_fks_detectedt11
                mov     GS:byte ptr [MODEM_MODE], CAT
```

```
                mov     GS:byte ptr [CAS_AFTER_FKS], FALSE
;ttisr00e.asm change
                cmp     GS:byte ptr [INCOMING_FAX], YES
                jne     cas_fks_detectedt11
                mov     GS:byte ptr [INCOMING_FAX], NO
                inc     DS:word ptr incoming_fax_count
;end ttisr00e.asm change
cas_fks_detectedt11:
                cmp     GS:byte ptr [MODEM_MODE], CAT
                je      vcon_irq00_cont12
                cmp     GS:byte ptr [MODEM_MODE], CAS
                je      vcon_irq00_cont13
                jmp     cas_fks_detectedt11                     ;hang if neither

vcon_irq00_cont13:
                inc     GS:word ptr [CAS_TT_COUNT]
                pushf
                call    GS:dword ptr [CAS_IRQ00_OFF]
                jmp     vcon_irq00_cont20

;***********************************************
;*                                             *
;*      VCON TIMER TICK FOR MODEM_1            *
;*                                             *
;***********************************************
vcon_irq00_cont12:
                push    ds
                push    ax
                push    cx
                push    es
                push    bx
                push    si
                push    di
                mov     ax, SEG TIMER_TICK_BUSY
                mov     ds, ax      ;ds=1fb1h

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;   irq00 STATE MACHINE DRIVEN SECTION                                                             ;
;                                                                                                  ;
;   there are four sections:                                                                       ;
;           basic loop: 1. find the action for the current state                                   ;
;                       2. call the action procedure and execute it                                ;
;                       3. if the action was hang_up, go back to fax state                         ;
;                       4. find the next state and jump to basic loop                              ;
;   0. initialize/install section                                                                  ;
;       vcon_first_irq00_cur_step = 01h                                                            ;
;       vcon_action_complete_cur_step = 00h                                                        ;
;   1. find the action for the current state                                                       ;
;       if vcon_first_irq00_cur_step = 00h then skip section                                       ;
;   2. call the action procedure and execute it (the following takes place within the proc)        ;
;       if vcon_first_irq00_cur_step = 00h then skip irq00 the very first entry section            ;
;       if vcon_first_irq00_cur_step = 01h then execute the very first entry                       ;
;                           and vcon_first_irq00_cur_step = 00h                                    ;
;       if procedure complete (or wrap up) then vcon_action_complete_cur_step = 01h                ;
;   3. if the action was hang_up, go back top fax state                                            ;
;       if vcon_action_complete_cur_step = 00h then skip this section                              ;

;       vcon_action_complete_cur_step = 00h                                                        ;
;       vcon_first_irq00_cur_step = already 00h                                                    ;
;       vcon_state_1 = 00h   in new terminology = CAT_BACK_TO_CAS   (vcon_state_0 = 00 already)    ;
;   4. find the next state and jump to basic loop                                                  ;
;       if vcon_action_complete_cur_step = 00h then skip this section                              ;
;       vcon_first_irq00_cur_step = 01h                                                            ;
;       vcon_action_complete_cur_step = 00h                                                        ;

;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;ttisr002.asm change
;the whole state machine driven section is state_1. when exiting to fax set it to 00h
;vcon_ck_state_1:
;cazvox1x.asm change
;                       cmp     GS:word ptr [MODEM_STATE], MODEM_VOICE_MODEM
```

```
;                       jnz     tt_m1_exit
;end ttisr002.asm change
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;   FIND THE ACTION FOR THE CURRENT STATE                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;begin casvox11.asm changes. 10-30-94. 11-94 book. vsm100.asm. hflowch3.sam.
;as we enter here, vcon_state=00. the state machine is in a near data segment and its label is
;vcon_step_machine.
                        cmp     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                        jnz     vcon_skip_what_action1
;find out what the action is for the current state
                        mov     bx, GS:word ptr [VCON_STATE]        ;a part of irq00
                        shl     bx, 1                   ;double for word
                        mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]   ;ax=address of state data area
                        mov     GS:word ptr [VCON_CUR_STEP_DATA_AREA_ADDR], ax
                        mov     bx, ax
                        mov     di, FS:word ptr [bx]            ;di=action number for state
                        mov     GS:word ptr [VCON_CUR_STATE_ACTION_NUMBER], di
                        shl     di, 1
                        lea     bx, cs:word ptr vcon_action_table
;now that the action is known go and execute it. input are registered.
;remember that ds-> vcon_step_machine segment. we might want to change this.
;ax=address of state_data_area.
                        add     bx, di
                        mov     GS:word ptr [VCON_CUR_ACTION_ADDRS_ADDR], bx
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;   EXECUTE THE ACTION FOR THE CURRENT STATE                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_skip_what_action1:
                        mov     di, 0000h                               ;TCB_LEVEL_DB_SIZE * LEVEL_0 = 0
                        mov     bx, GS:word ptr [VCON_CUR_ACTION_ADDRS_ADDR]
                        call    cs:word ptr [bx]                ;call the action
                        cmp     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
;if the action is not completed, there is nothing for us to do in irq00
                        jz      tt_m1_exit
;ttisr00e.asm change. remnant from when I started in CAS.
                        jmp     vcon_next_state_eval0
;if this state was vcon_hangup state, then revert back to casmodem.
;                       cmp     GS:word ptr [VCON_CUR_STATE_ACTION_NUMBER], 0005h; was current state hangup?
;                       jnz     vcon_next_state_eval0
;it is the hangup state. reset vcon_detected to 00h and then jump somewhere???? it is definitely no fax.
;nevertheless we wish to leave the fax state machine in good order. we also wish to leave the voice
;state machine in good order also. we hope fax will issue +FKS and willl reset its state machine and also
;the modem. we could also do some resetting here. we will experiment and do the minimum.
;                       mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
;                       mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
;cazvox1x.asm change
;ttisr002.asm change
;                       mov     GS:word ptr [MODEM_STATE], MODEM_BACK_TO_CAS
;                       mov     GS:byte ptr [VCON_DETECTED], 00h
;end ttisr002.asm change
;                       jmp     tt_m1_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;   FIND THE NEXT STATE                                                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;based on inputs and current state, find out what the next state is.
;the fact that we got here says that vcon_action_complete_cur_step=01h
vcon_next_state_eval0:
                        mov     bx, GS:word ptr [VCON_STATE]                    ;a part of irq00
                        shl     bx, 1                                           ;double for word
                        mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]   ;ax=address of state data area
                        add     ax, 0002h                                       ;ax=address of vcon Flag registe
r
                        mov     bx, ax                                          ;bx=address of vcon Flag registe
r
                        mov     ax, FS:word ptr [bx]                            ;ax=vcon flag register
                        mov     GS:word ptr [CUR_STEP_STATUS], ax
                        cmp     ax, 0001h                                       ;is F=1?
                        jnz     vcon_next_state_eval11
                        add     bx, 0004h                                       ;bx=address of state_i_next_stat
e
                        mov     ax, FS:word ptr [bx]                            ;ax=next state value
                        mov     GS:word ptr [VCON_STATE], ax                    ;vcon_state=new value
```

```
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m1_exit
vcon_next_state_eval11:
;flag=0000h. what is last_dle_numbr?
                    cmp     GS:byte ptr [VCON_CUR_STEP_DTMF], NULL
                    jnz     vcon_next_state_eval12
                    cmp     GS:word ptr [CUR_STEP_STATUS], 0000H
                    jne     vcon_next_step_flag_12
                    add     bx, 0006h                                   ;bx=address of either no_dtmf or
 nf next
                    mov     ax, FS:word ptr [bx]                        ;next state value based on NF
                    mov     GS:word ptr [VCON_STATE], ax
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m1_exit
vcon_next_step_flag_12:
                    cmp     GS:word ptr [CUR_STEP_STATUS], 0002H
                    jne     next_step_flag_gt_21
;each step is either fish or fowl ie either dtmf is expected or not. thus the meaning of next step entries
;is clear. the only one that is both is tmo. luckily, no_dtmf is handled inside tmo. so that next step entry
;is for F=0 ie voice path. for F=2 ie fax, the stepper inserts 0 for next step so that the next step entry
;is for dtmf_*.
                    mov     GS:word ptr [VCON_STATE], 0000H
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m1_exit
next_step_flag_gt_21:
;ttisr00f.asm change. 11/3/95.
;we use large values of F in two places: SP, where it is used to go to next steps specified in the
;step table entry. EM, NA, where it is used to go to predefined steps as these actions allow dtmf
;inputs.
                    cmp     GS:word ptr [VCON_CUR_STATE_ACTION_NUMBER], ST_START_PROGRAM
                    jne     vcon_next_state_not_sp_1

                    mov     ax, GS:word ptr [CUR_STEP_STATUS]
                    shl     ax,1
                    add     bx, ax
                    add     bx, 4
                    mov     ax, FS:word ptr [bx]                        ;next state value based on NF
                    mov     GS:word ptr [VCON_STATE], ax
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit

vcon_next_state_not_sp_1:
                    cmp     GS:word ptr [CUR_STEP_STATUS], GOTO_WAIT_ON_DLEH
                    jne     vcon_next_state_f_is_not_31
                    mov     GS:word ptr [VCON_STATE], 0058H  ; dlet_induced_no_action
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit

vcon_next_state_f_is_not_31:
                    cmp     GS:word ptr [CUR_STEP_STATUS], GOTO_ATH_OR_PREV_STATE
                    jne     vcon_next_state_f_is_not_31      ; infinite loop if neither

                    mov     ax, GS:word ptr [VCON_STATE_OLD]
                    mov     GS:word ptr [VCON_STATE], ax     ; where we were
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m0_exit

vcon_next_state_eval12:
;flag=0000h. last_dle_numbr .ne. 00h, is it 01h?
                    cmp     GS:byte ptr [VCON_CUR_STEP_DTMF], NO_DTMF
                    jnz     vcon_next_state_eval13
;ttisr006.asm change.
;ttisr00e.asm change. no repeats
;                   mov     si, bx
;                   mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]   ;bx=address of sess param area
;                   mov     dx, FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_CNT]
;                   dec     FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_COUNTER]
```

```
;                   cmp     FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_COUNTER], 0
;                   jne     no_dtmf_run_same_st1
;                   mov     FS:word ptr [bx + ST_SESS_PARAMS_REPEAT_COUNTER], dx
;                   mov     bx, si
;end ttisr006.asm change
                    add     bx, 0006h                                       ;bx=address of either no_dtmf or
 nf next
                    mov     ax, FS:word ptr [bx]                            ;next state value based on no_dt
mf_input
                    mov     GS:word ptr [VCON_STATE], ax
;no_dtmf_run_same_st1:
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m1_exit
vcon_next_state_eval13:
;now for true dtmf inputs.
                    add     bx, 0008h                                       ;bx=address of dtmf_0 case
                    mov     al, GS:byte ptr [VCON_CUR_STEP_DTMF]
                    mov     ah, 00h
;ttisr006.asm change. start from * to economize on entering a lot of next step entries. 30 -> 2e

                    sub     ax, 002eh                                       ;ascii to number
                    shl     ax, 1                                           ;word
                    add     bx, ax                                          ;bx->next state number
                    mov     ax, FS:word ptr [bx]
;ttisr006.asm change. cs:GS: -> GS:
                    mov     GS:word ptr [VCON_STATE], ax
                    mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], 01h
                    mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], 00h
                    jmp     tt_m1_exit
;end casvox1l.asm changes.
;end casvox1j.asm changes
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;   END irq00 STATE MACHINE DRIVEN SECTION                                                     ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
tt_m1_exit:
                         pop     di
                         pop     si
                         pop     bx
                         pop     es
                         pop     cx
                         pop     ax
                         pop     ds
;end irq00 vcon processing*******************************************************
                         jmp     vcon_irq00_cont20

;****************************************************************
;*                                                              *
;*    MODEM_2 ACQUIRES FS = SEG STEP TABLE, GS = SEG TCB        *
;*    IF EITHER ONE = 0000H, SKIPS TO MODEM_3 TIMER TICK        *
;*                                                              *
;****************************************************************
vcon_irq00_cont20:
                mov     ax, SEG modems_tcb_st_seg_table
                mov     DS, ax
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     ax, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     ax, 0000h
                jz      vcon_irq00_cont30
                mov     GS, ax
                mov     ax, DS:word ptr [bx + 4 * MODEM_2 + MODEM_ST]
                cmp     ax, 0000h
                jz      vcon_irq00_cont30
                mov     FS, ax

                cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jnz     vcon_irq00_cont21
                jmp     vcon_irq00_cont22
vcon_irq00_cont21:
                cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
                jnz     vcon_irq00_cont23
```

```
                jmp     vcon_irq00_cont22
vcon_irq00_cont23:
                pushf
                call    GS:dword ptr [CAS_IRQ00_OFF]
                jmp     vcon_irq00_cont30
vcon_irq00_cont22:
                jmp     vcon_irq00_cont30

;*************************************************************
;*                                                           *
;*    MODEM_3 ACQUIRES FS = SEG STEP TABLE, GS = SEG TCB     *
;*    IF EITHER ONE = 0000H, SKIPS TO MODEM_4 TIMER TICK     *
;*                                                           *
;*************************************************************
vcon_irq00_cont30:
                mov     ax, SEG modems_tcb_st_seg_table
                mov     DS, ax
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     ax, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     ax, 0000h
                jz      vcon_irq00_cont40
                mov     GS, ax
                mov     ax, DS:word ptr [bx + 4 * MODEM_3 + MODEM_ST]
                cmp     ax, 0000h
                jz      vcon_irq00_cont40
                mov     FS, ax

                cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jnz     vcon_irq00_cont31
                jmp     vcon_irq00_cont32
vcon_irq00_cont31:
                cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
                jnz     vcon_irq00_cont33
                jmp     vcon_irq00_cont32
vcon_irq00_cont33:
                pushf
                call    GS:dword ptr [CAS_IRQ00_OFF]
                jmp     vcon_irq00_cont40
vcon_irq00_cont32:
                jmp     vcon_irq00_cont40


;*************************************************************
;*                                                           *
;*    MODEM_4 ACQUIRES FS = SEG STEP TABLE, GS = SEG TCB     *
;*    IF EITHER ONE = 0000H, SKIPS TO MODEM_4 TIMER TICK     *
;*                                                           *
;*************************************************************
vcon_irq00_cont40:
                mov     ax, SEG modems_tcb_st_seg_table
                mov     DS, ax
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     ax, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     ax, 0000h
                jz      vcon_irq00_cont50
                mov     GS, ax
                mov     ax, DS:word ptr [bx + 4 * MODEM_4 + MODEM_ST]
                cmp     ax, 0000h
                jz      vcon_irq00_cont50
                mov     FS, ax

                cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jnz     vcon_irq00_cont41
                jmp     vcon_irq00_cont42
vcon_irq00_cont41:
                cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
                jnz     vcon_irq00_cont43
                jmp     vcon_irq00_cont42
vcon_irq00_cont43:
                pushf
                call    GS:dword ptr [CAS_IRQ00_OFF]
                jmp     vcon_irq00_cont50
vcon_irq00_cont42:
```

```
                jmp     vcon_irq00_cont50

;*****************************************************************
;*                                                               *
;*    TAIL END OF TIMER TICK INTERRUPT SERVICE ROUTINE           *
;*                                                               *
;*****************************************************************
vcon_irq00_cont50:
                POP     BX
                POP     AX
                POP     DS
                POP     GS
                POP     FS
;cazvox28.asm change. SET TIMER_TICK_BUSY=NO. CHECK IN_IRQ. IF 1 CALL RESTORE_FM_CLIENT_REGS
;DECREMENT IN_IRQ.
                PUSHF
                CLI                     ;CRITICAL SECTION
                PUSH    DS
                PUSH    AX
                MOV     AX, SEG TIMER_TICK_BUSY
                MOV     DS, AX
                POP     AX
;ttisr005.asm change
;               mov     byte ptr TIMER_TICK_BUSY, NO
                inc     word ptr timer_tick_tail_end_count
;ttisr005.asm change. diagnostics changes flags. fix. 6-95-86.
                        pushf
                        push    ax
                        push    bx
                        push    cx
                        push    ds
                        mov     bx, SEG modems_tcb_st_seg_table
                        mov     ds, bx
                        mov     bx, word ptr irq_03_buf_ptr
                        mov     dword ptr [bx], "0000"
                        add     bx, 0004h
                        mov     word ptr [bx], "TT"
                        add     bx, 0002h
                        mov     byte ptr [bx], "="
                        add     bx, 0001h
                        mov     ax, word ptr timer_tick_tail_end_count
                        mov     word ptr [bx], ax
                        add     bx, 0002h
                        lea     cx, word ptr irq_03_buf_end
                        cmp     bx, cx
                        jb      jirq_03_not_ful
                        lea     bx, word ptr irq_03_buffer
jirq_03_not_ful:        mov     word ptr irq_03_buf_ptr, bx
                        pop     ds
                        pop     cx
                        pop     bx
                        pop     ax
                        popf

                dec     byte ptr TIMER_TICK_BUSY
                cmp     byte ptr TIMER_TICK_BUSY, 00H
                jne     do_not_stop_timer
                call    stop_timer
do_not_stop_timer:
;check for In_DOS=1. if so skip all
;ttisr00a.asm change
                cmp     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                je      tt_maestro_active_test_e
                PUSH    DS
                push    ax
                push    bx
                mov     bx, DS:word ptr vcon_InDOS_flag_off
                mov     ax, DS:word ptr vcon_InDOS_flag_seg
                mov     DS, ax
                mov     al, DS:byte ptr [bx]
                cmp     al, 00h
                pop     bx
                pop     ax
```

```
                POP     DS
                jnz     irq00_no_switch_process

;check for maestro_active=YES. if so, skip all
tt_maestro_active_test_e:
                cmp     byte ptr maestro_active, NO
;NOTE!!!!!! MUST ALSO SKIP SWITCH TO MAESTRO IF THE PROGRAM IS IN DOS. THUS CHECK INDOS.
                jnz     irq00_no_switch_process

;ttisr006.asm change
                cmp     byte ptr TIMER_TICK_BUSY, 00h
                ja      irq00_no_switch_process
;ttisr00b.asm change. 9/1/95.
                cmp     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                je      skip_set_DTA_PSP
                call    restore_DTA_PSP_fm_Client               ;makes DOS call
skip_set_DTA_PSP:

;if In_IRQ=OK, CR->R.
                cmp     byte ptr In_IRQ, 01h
                jnz     irq00_no_switch_process
                call    restore_fm_Client_regs
;restore has DOS which makes it interruptible. when this code is an irq other than t2, a higher
;irq will come (such as t2) to find In_IRQ=1 and will not do R=>CR. thus must protect from
;dec to exit
irq00_no_switch_process:
                cli                     ;irqcod04.asm change
                dec     byte ptr In_IRQ
                POP     DS
                POPF                    ;END CRITICAL SECTION
                iret


;*****************************************************************************************
;*                                                                                       *
;*      ACTION TABLE                                                                     *
;*                                                                                       *
;*****************************************************************************************
vcon_action_table       dw  vcon_no_action                  ;action number=00
                        dw  vcon_emit_msg                   ;action number=01
                        dw  voice_mail_access               ;action number=02
                        dw  announce_and_collect_digits     ;action number=03
                        dw  vcon_record_msg                 ;action number=04
                        dw  vcon_hangup                     ;action number=05
                        dw  record_msg_indirect             ;action number=06
                        dw  vcon_start_program              ;action number=07
                        dw  vcon_wait_for_pgm_to_complete   ;action number=08
                        dw  print_fax_indirect              ;action number=09
                        dw  tmaestro                        ;action number=0A
                        dw  send_a_fax                      ;action number=0B
                        dw  retrieve_email                  ;action number=0C
                        dw  send_fax_indirect               ;action number=0D
                        dw  build_fax_database              ;action number=0E
                        dw  TTQ_request                     ;action number=0F
                        dw  sw_2_fax                        ;action number=10


;*****************************************************************************************
;*                                                                                       *
;*              INT 13H                                                                  *
;*                                                                                       *
;*****************************************************************************************
new_int13_off:
;irqcod0a.asm change
; 0. INCREMENT IN_INT13H. this variable sits on system data area ie DS: relative.
                PUSH    DS
                push    dx
                mov     dx, SEG In_INT13H
                mov     DS, dx
                inc     byte ptr In_INT13H
                pop     dx
                POP     DS
```

```
;end irqcod0a.asm change
; 1. ALWAYS DO DOS INT 13H FIRST.
                pushf                                   ;stack for iret in dos int 13h
                call    CS:dword ptr dos_int13_off
                PUSH    GS
; 2. LOAD GS: FROM DS: TABLE
vcon_int13_cont10:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int13_cont20
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int13_cont12
                jmp     vcon_int13_cont20
;vcon_int13_cont11:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int13_cont12
;               jmp     vcon_int13_cont20
vcon_int13_cont12:
                pushf                                   ;stack for iret in cas int 13h
                call    GS:dword ptr [CAS_INT13_OFF]    ;call after dos int 13h locn in cas int13h
                jmp     vcon_int13_cont20
; 2. LOAD GS: FROM DS: TABLE
vcon_int13_cont20:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int13_cont30
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int13_cont22
                jmp     vcon_int13_cont30
;vcon_int13_cont21:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int13_cont22
;               jmp     vcon_int13_cont30
vcon_int13_cont22:
                pushf                                   ;stack for iret in cas int 13h
                call    GS:dword ptr [CAS_INT13_OFF]    ;call after dos int 13h locn in cas int13h
                jmp     vcon_int13_cont30
; 2. LOAD GS: FROM DS: TABLE
vcon_int13_cont30:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
```

```
                pop     dx
                pop     bx
                jz      vcon_int13_cont40
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int13_cont32
                jmp     vcon_int13_cont40
;vcon_int13_cont31:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int13_cont32
;               jmp     vcon_int13_cont40
vcon_int13_cont32:
                pushf                                           ;stack for iret in cas int 13h
                call    GS:dword ptr [CAS_INT13_OFF]            ;call after dos int 13h locn in cas int13h
                jmp     vcon_int13_cont40
; 2. LOAD GS: FROM DS: TABLE
vcon_int13_cont40:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int13_cont50
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int13_cont42
                jmp     vcon_int13_cont50
;vcon_int13_cont41:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int13_cont42
;               jmp     vcon_int13_cont50
vcon_int13_cont42:
                pushf                                           ;stack for iret in cas int 13h
                call    GS:dword ptr [CAS_INT13_OFF]            ;call after dos int 13h locn in cas int13h
                jmp     vcon_int13_cont50
vcon_int13_cont50:
                POP     GS
;irqcod0a.asm change
                PUSH    DS
                push    dx
                mov     dx, SEG In_INT13H
                mov     DS, dx
                dec     byte ptr In_INT13H
                pop     dx
                POP     DS
;end irqcod0a.asm change
                iret


;*************************************************************************************
;*                                                                                   *
;*              INT 28H                                                              *
;*                                                                                   *
;*************************************************************************************
new_int28_off:
; 1. ALWAYS DO DOS INT 28H FIRST.
                pushf                                           ;stack for iret in dos int 28h
                call    CS:dword ptr dos_int28_off
                PUSH    GS
; 2. LOAD GS: FROM DS: TABLE
vcon_int28_cont10:
                push    bx
                push    dx
```


///

```
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int28_cont20
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int28_cont12
                jmp     vcon_int28_cont20
;vcon_int28_cont11:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int28_cont12
;               jmp     vcon_int28_cont20
vcon_int28_cont12:
                pushf                                   ;stack for iret in cas int 28h
                call    GS:dword ptr [CAS_INT28_OFF]    ;call after dos int 28h locn in cas int28h
                jmp     vcon_int28_cont20
; 2. LOAD GS: FROM DS: TABLE
vcon_int28_cont20:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int28_cont30
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int28_cont22
                jmp     vcon_int28_cont30
;vcon_int28_cont21:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int28_cont22
;               jmp     vcon_int28_cont30
vcon_int28_cont22:
                pushf                                   ;stack for iret in cas int 28h
                call    GS:dword ptr [CAS_INT28_OFF]    ;call after dos int 28h locn in cas int28h
                jmp     vcon_int28_cont30
; 2. LOAD GS: FROM DS: TABLE
vcon_int28_cont30:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int28_cont40
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int28_cont32
                jmp     vcon_int28_cont40
;vcon_int28_cont31:
```

```
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int28_cont32
;               jmp     vcon_int28_cont40
vcon_int28_cont32:
                pushf                                           ;stack for iret in cas int 28h
                call    GS:dword ptr [CAS_INT28_OFF]            ;call after dos int 28h locn in cas int28h
                jmp     vcon_int28_cont40
; 2. LOAD GS: FROM DS: TABLE
vcon_int28_cont40:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int28_cont50
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int28_cont42
                jmp     vcon_int28_cont50
;vcon_int28_cont41:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int28_cont42
;               jmp     vcon_int28_cont50
vcon_int28_cont42:
                pushf                                           ;stack for iret in cas int 28h
                call    GS:dword ptr [CAS_INT28_R_OFF]          ;call after dos int 28h locn in cas int28h
                jmp     vcon_int28_cont50
vcon_int28_cont50:
                POP     GS
                iret

;*****************************************************************************************
;*                                                                                       *
;*              INT 15H                                                                  *
;*                                                                                       *
;*****************************************************************************************
new_int15_off:
; 1. ALWAYS DO DOS INT 15H FIRST.
                pushf                                           ;stack for iret in dos int 15h
                call    CS:dword ptr dos_int15_off
                PUSH    GS
; 2. LOAD GS: FROM DS: TABLE
vcon_int15_cont10:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int15_cont20
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int15_cont12
                jmp     vcon_int15_cont20
;vcon_int15_cont11:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int15_cont12
;               jmp     vcon_int15_cont20
```

```
vcon_int15_cont12:
                pushf                                   ;stack for iret in cas int 15h
                call    GS:dword ptr [CAS_INT15_OFF]    ;call after dos int 15h locn in cas int15h
                jmp     vcon_int15_cont20
; 2. LOAD GS: FROM DS: TABLE
vcon_int15_cont20:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int15_cont30
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int15_cont22
                jmp     vcon_int15_cont30
;vcon_int15_cont21:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int15_cont22
;               jmp     vcon_int15_cont30
vcon_int15_cont22:
                pushf                                   ;stack for iret in cas int 15h
                call    GS:dword ptr [CAS_INT15_OFF]    ;call after dos int 15h locn in cas int15h
                jmp     vcon_int15_cont30
; 2. LOAD GS: FROM DS: TABLE
vcon_int15_cont30:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
                pop     bx
                jz      vcon_int15_cont40
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int15_cont32
                jmp     vcon_int15_cont40
;vcon_int15_cont31:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int15_cont32
;               jmp     vcon_int15_cont40
vcon_int15_cont32:
                pushf                                   ;stack for iret in cas int 15h
                call    GS:dword ptr [CAS_INT15_OFF]    ;call after dos int 15h locn in cas int15h
                jmp     vcon_int15_cont40
; 2. LOAD GS: FROM DS: TABLE
vcon_int15_cont40:
                push    bx
                push    dx
                PUSH    DS
                MOV     DX, SEG modems_tcb_st_seg_table
                MOV     DS, DX
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                POP     DS
                pop     dx
```

```
                pop     bx
                jz      vcon_int15_cont50
; 3. CHECK VCON_DETECTED AND VCON_VTOF_IRQ03_FIRST
                cmp     GS:byte ptr [MODEM_MODE], CAT
;               cmp     GS:byte ptr [VCON_DETECTED], VCON_YES
                jne     vcon_int15_cont42
                jmp     vcon_int15_cont50
;vcon_int15_cont41:
;               cmp     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], TRUE
;               jnz     vcon_int15_cont42
;               jmp     vcon_int15_cont50
vcon_int15_cont42:
                pushf                                   ;stack for iret in cas int 15h
                call    GS:dword ptr [CAS_INT15_OFF]    ;call after dos int 15h locn in cas int15h
                jmp     vcon_int15_cont50
vcon_int15_cont50:
                POP     GS
                iret

;cazvox21.asm change
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;       DIAGNOSTIC TIMER PROCEDURES                                                                ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;These procedures will be used to find out how long interrupt calls take. For example, how long
;irq00 takes from start to end. In general, we can use these procedures to find how long it takes
;to get from point to point.
;START_TIMER: clears all remnants of the past and starts the timer 2.
;STOP_TIMER: stops the timer, reads the elapsed value and writes it to irq_03_buffer as follows:
;       "time="value, where value is a 16 bit number in hex.
start_timer     proc
                PUSHF
                push    ax

                in      al, 61h
                jmp     $+2
                and     al, 0feh        ;clear port 61h bit 0 ie gate=0 ie timer stops
                out     61h, al
                jmp     $+2

                mov     al, 0b0h        ;timer 2 16 bit load, mode 0 ie single timeout
                out     43h, al
                jmp     $+2
                mov     al, 0ffh
                out     42h, al         ;lsb to counter
                jmp     $+2
                out     42h, al         ;msb to counter
                jmp     $+2

                in      al, 61h
                jmp     $+2
                or      al, 01h         ;gate=1
                out     61h, al
                jmp     $+2

                pop     ax
                POPF
                ret
start_timer     endp

stop_timer      proc
;cazvox26.asm change
                pushf
;end cazvox26.asm change
                push    ax
                push    dx

                mov     al, 80h         ;latch output command for timer 2
                out     43h, al
                jmp     $+2

                in      al, 42h         ;lsb of counter from latch
```

```
                jmp     $+2
                mov     dl, al

                in      al, 42h         ;msb of counter from latch
                jmp     $+2
                mov     dh, al

                mov     ax, 0ffffh      ;start value
                sub     ax, dx          ;ax=duration of event

                        push    ax
                        push    bx
                        push    cx
                        push    ds
                        mov     bx, SEG modems_tcb_st_seg_table
                        mov     ds, bx
                        mov     bx, word ptr irq_03_buf_ptr
                        mov     dword ptr [bx], "EMIT"
                        add     bx, 0004h
                        mov     byte ptr [bx], "="
                        add     bx, 0001h
                        mov     word ptr [bx], ax
                        add     bx, 0002h
                        lea     cx, word ptr irq_03_buf_end
                        cmp     bx, cx
                        jb      wirq_03_not_ful
                        lea     bx, word ptr irq_03_buffer
wirq_03_not_ful:        mov     word ptr irq_03_buf_ptr, bx
                        pop     ds
                        pop     cx
                        pop     bx
                        pop     ax

                pop     dx
                pop     ax
;cazvox26.asm change
                popf
;end cazvox26.asm change
                ret
stop_timer      endp


END
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*****************************************************************************
;*                                                                           *
;*                                                                           *
;*              SERIAL  INTERRUPT  SERVICE  ROUTINE                          *
;*                      updated by Haluk M. Aytac                            *
;*                              June 7, 1995                                 *
;*                                                                           *
;*                                                                           *
;*****************************************************************************
;*                                                                           *
;* THERE WILL BE ONE SUCH INTERRUPT SERVICE ROUTINE PER MODEM                *
;*                                                                           *
;*****************************************************************************
;serisr06.asm <- serisr05.asm. 6/12/95. catvocl. add dleq, dles detection.
;serisr05.asm <- serisr04.asm. fix bug I introduced while putting in CAT_RING_DETECTED circuitry.
;serisr04.asm <- serisr03.asm <- serisr02.asm. 6/10/95. serisr03 works.
;this last rev removes diagnostics (ie timing irq03 width)
;serisr02.asm <- serisr01.asm. 6/7/95. RING detection in CAT irq03 isr.
;GS:byte ptr [VCON_DETECTED] is replaced by GS:byte ptr [MODEM_MODE] = CAT or CAS
;remove stuff related to Acrlf etc that had to do with vtof old way.
;serisr01.asm <- serisr00.asm. 6/7/95. remove front end text.
;serisr00.asm <- irqcod0c.asm. 6/7/95. split irqcod in tt and ser
;irqcod0c.asm <- irqcod0b.asm. 6/3/95. catvoch. else no changes.
;irqcod0b.asm <- irqcod0a.asm. 5/18/95. job history. here just equ version change.
;plus timer_tick_count_all.
;irqcod0a.asm <- irqcod09.asm. 5/18/95. int 13h add In_INT13H.
;irqcod09.asm <- irqcod08.asm. 5/11/95. 5-95-80. multitasking.
;irqcod08.asm <- irqcod07.asm. 5/10/95. fix R->CR including other irq's than t2.
;ON ENTRY:
;       t2                                              other irq
;=============================================   ========================================
;       If In_DOS=1 skip all                            If In_DOS=1 skip all
;       If maestro_active=YES skip all                  If maestro_active=YES skip all
;       If In_IRQ=OK call store_to_Client_regs          If In_IRQ=OK call store_to_Client_regs
;       call store_DTA_PSP_to_Client
;       call switch_to_maestro
;skip_all: continue                                  skip_all: continue
;
;ON EXIT:
;       t2                                              other irq
;=============================================   ========================================
;       If In_DOS=1 skip all                            If In_DOS=1 skip all
;       If maestro_active=YES skip all                  If maestro_active=YES skip all
;       call restore_DTA_PSP_fm_Client
;       If In_IRQ=OK call restore_fm_Client_regs    If In_IRQ=OK call restore_fm_Client_regs
;skip_all: continue                                  skip_all: continue
;
;ASSUMPTIONS:   irq, other than t2, do not change PSP, DTA
;               t2, if it changes PSP, DTA, also restores it. I mean casmodem.
;               if we have to change PSP etc within t2, we must also restore it.
;               do not change PSP etc if In_DOS.
;               when irq's envelop t2, at least one irq will have In_IRQ=OK.
;irqcod05.asm <- irqcod04.asm. 5/6/95. fix errors for catvoc06
;irqcod04.asm <- irqcod03.asm. 5/2/95. PSP,DTA.
;now that we do PSP, DTA ie DOS calls, the critical segment at begin irq00 is not non interruptible
;anymore. Thus, move inc In_IRQ closer to the top ie before DOS call in store_to_Client_regs.
;Although, we have not given eoi, this change will give uniform code that can be used with other
;irq's as well.
;Also add code to prevent timer tick reentering itself.
;irqcod03.asm <- irqcod02.asm. 5/1/95. fix in irq00 entry.
;IRQCOD01.ASM <- IRQCOD00.ASM. 4/27/95. ADD KEYPAD CODE FROM CAP*.ASM
;CATVOC0B-2 goodcv06\catequ02 -> goodcv07\catequ03.inc
INCLUDE CATEQU0B.INC
.MODEL  COMPACT
.386P
                extrn   loc0006:far     ;FAKEDATA CASMODEM DS:
                extrn   loc00a0:far
                extrn   loc02b6:far
                extrn   loc1459:far
                extrn   loc19f6:far
                extrn   loc1fa3:far
                extrn   loc1fa4:far
                extrn   loc1fa6:far
                extrn   loc1faa:far
                extrn   loc1fac:far
                extrn   loc1fb6:far
                extrn   loc1fc0:far
                extrn   loc1fc5:far
                extrn   loc1fc6:far
```

```
                extrn   loc1fce:far
                extrn   loc1fcf:far
                extrn   loc1fd0:far
                extrn   loc1fdl:far
                extrn   loc1fd2:far
                extrn   loc1fd4:far
                extrn   loc1fda:far
                extrn   loc1fde:far
                extrn   loc1fe0:far
                extrn   loc23e7:far
                extrn   loc23e9:far
                extrn   loc23eb:far
                extrn   loc3082:far
                extrn   loc37c1:far
;sys data
                extrn   modems_tcb_st_seg_table:far         ;near
                extrn   vcon_InDOS_flag_off:far             ;near
                extrn   vcon_InDOS_flag_seg:far             ;near

                extrn   irq_03_buf_ptr:far                  ;near
                extrn   irq_03_buffer:far                   ;near
                extrn   irq_03_buf_end:far                  ;near

                extrn   In_IRQ:near

;procedures
                extrn   start_timer:near
                extrn   stop_timer:near

                public  vcon_set_tbfirq
                public  new_irq03_off
                public  new_irq05_off

.CODE
;*****************************************************************************
;*                                                                           *
;*      MODEM_1     SERIAL  IRQ03       C A S  /  C A T    DECISION POINT     *
;*                                                                           *
;*****************************************************************************
;serisr06.asm change. make new_irq03_off a jump location from a proc so that all ser irq
;entry points can jump inside this area.
new_irq03_off:
                        PUSH    AX
                        PUSH    DX
                        PUSH    DI
                        PUSH    DS      ;ds=??? whatever it was at entry.
                        PUSH    GS
                        MOV     AX, SEG modems_tcb_st_seg_table
                        MOV     DS, AX
                        ASSUME  DS:SEG modems_tcb_st_seg_table
                        push    bx
                        mov     bx, OFFSET modems_tcb_st_seg_table
                        mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                        mov     GS, dx
                        pop     bx

                        cmp     GS:byte ptr [MODEM_MODE], CAT           ;CAT EQU 01H, CAS EQU 02H
;end serisr02.asm change
                        je      vcon_process
                        jmp     cas_process
;*****************************************************************************
;*                                                                           *
;*      MODEM_0     SERIAL  IRQ05       C A T    ENTRY POINT               *
;*                                                                           *
;*****************************************************************************
;serisr06.asm change. make new_irq03_off a jump location from a proc so that all ser irq
;entry points can jump inside this area.
new_irq05_off:
                        PUSH    AX
                        PUSH    DX
                        PUSH    DI
                        PUSH    DS      ;ds=??? whatever it was at entry.
                        PUSH    GS
                        MOV     AX, SEG modems_tcb_st_seg_table
                        MOV     DS, AX
                        ASSUME  DS:SEG modems_tcb_st_seg_table
                        push    bx
                        mov     bx, OFFSET modems_tcb_st_seg_table
                        mov     dx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                        mov     GS, dx
                        pop     bx
```

```
                        jmp     vcon_process

;*****************************************************************************
;*                                                                           *
;*          C A S       SERIAL  IRQ     INTERRUPT SERVICE ROUTINE            *
;*                                                                           *
;*****************************************************************************
;*****************************************************************************
;*                                                                           *
;*      CASMODEM IRQ03                                                       *
;*      CS: SAME AS CATVOICE.EXE                                             *
;*      DS: CASMODEM'S OWN                                                   *
;*      GS: PARTICULAR TO THIS MODEM                                         *
;*      NO NEED FOR IN_IRQ AS THIS IS NOT INTERRUPTIBLE TO HAVE IRQ00 INSIDE IT *
;*                                                                           *
;*****************************************************************************
cas_process:            mov     ax, GS:word ptr [CAS_IRQ03_SEG]
                        mov     ds, ax                          ;now ds->1214. cs=1fb1h.
                        ASSUME  DS:SEG loc37c1
                        CALL    label3384
irq03_int_exit:         MOV     AL,20h
                        OUT     20h, AL
                        POP     GS
                        POP     DS
                        POP     DI
                        POP     DX
                        POP     AX
                        IRET
;this is the same as the beginning section of irq03 minus ds update. when is it used?
;this routine assumes ds=cs=1214 it seems. whereas ds=ds of caller.no calls to it from
;within class2.fxh. same call but not an irq. possibly, the copy in 1214 will be the one
;to be executed defeating our purpose. must see when it uses this version.
                        PUSH    AX
                        PUSH    DX
                        PUSH    DI
                        PUSH    DS
                        PUSH    GS
                        CALL    label3384
                        POP     GS
                        POP     DS
                        POP     DI
                        POP     DX
                        POP     AX
                        RETF
;                       dw      04d2h
;this location is being written to somehow. the writer thinks it is at segment 1214h.
;I need to read what is at 1214:3082. as ds->1214, no change is needed.
;*****************************************************************************************
;*      BEGINNING OF CASMODEM IRQ03 ISR                                                  *
;*****************************************************************************************
label3384:              cmp     word ptr loc3082, 04d2h
                        JZ      label338F
                        NOP
                        NOP
                        NOP
label338f:              cmp     word ptr loc37c1, 0000h
                        JZ      label33A0
                        PUSH    DS
                        mov     ds, word ptr loc37c1
                        inc     byte ptr loc00a0
                        POP     DS
label33a0:
                        mov     dx, word ptr loc1fa6
                        IN      AL,DX
                        TEST    AL, 01h
                        JNZ     label33B4
                        AND     AX,0006
                        MOV     DI,AX
;check that [1fae]=an address in 1214 that has a table of addresses. even so,
;I have to have my own table. change to "call cs:[di+tabl_addr]
                        push    bx
;FOR EACH MODEM IRQ, NEED TO HAVE A SEPARATE TABLE IN CS: AREA. INDEED, THIS TABLE SHOULD BE INSIDE
;IRQ03 CODE AND EACH IRQ0 WHATEVER SHOULD HAVE ITS OWN COPY.
                        lea     bx, word ptr irq_03_table
                        call    cs: word ptr [di+bx]
fcon_ret_locn:          pop     bx
                        JMP     label338F
label33b4:              cmp     byte ptr loc1fa3, 00h
                        JZ      label33CC
                        mov     byte ptr loc1fa3, 00h
```

```
                        mov     dx, word ptr loc1fac
                        IN      AL,DX
                        TEST    AL, 20h
                        JZ      label33CC
                        CALL    label341B
label33cc:              RET
;*****************************************************************************************
;*      MSR IRQ                                                                          *
;*****************************************************************************************
task1:                  mov     dx, word ptr loc1fc0
                        ADD     DX, 06h
                        IN      AL,DX
                        MOV     AH,AL
                        AND     AH, 80h
                        mov     byte ptr loc1fc6, ah
                        mov     byte ptr loc1fd1, al
                        test    byte ptr loc1fd0, 02h
                        JZ      label3408
                        TEST    AL, 01h
                        JZ      label3408
                        MOV     AH,AL
                        SHR     AH, 01h
                        SHR     AH, 01h
                        SHR     AH, 01h
                        SHR     AH, 01h
                        AND     AH, 01h
                        XOR     AH, 01h
                        mov     byte ptr loc1fce, ah
                        CMP     AH, 00h
                        JNZ     label3408
                        CALL    label3409
label3408:              RET

label3409:              mov     dx, word ptr loc1fa4
                        IN      AL,DX
                        TEST    AL, 02h
                        JNZ     label341A
                        OR      AL, 02h
                        OUT     DX,AL
                        JMP     label3417
label3417:              JMP     label3419
label3419:              OUT     DX,AL
label341a:              RET
;*****************************************************************************************
;*      TBF IRQ                                                                          *
;*****************************************************************************************
task2:
label341b:              mov     dx, word ptr loc1fac
                        IN      AL,DX
                        TEST    AL, 20h
                        JZ      label3469
                        cmp     byte ptr loc1fce, 00h
                        JNZ     label3461
                        cmp     word ptr loc23e9, 00h
                        JNZ     label343E
                        cmp     byte ptr loc19f6, 00h
                        JZ      label3461
                        MOV     AL, 00h
                        JMP     label3457
                        NOP
label343e:              mov     di, word ptr loc23e7
                        MOV     AL,[DI]
                        dec     word ptr loc23e9
                        INC     DI
                        CMP     DI,2BEBh
                        JB      label3453
                        lea     di, word ptr loc23eb
label3453:              mov     word ptr loc23e7, di
label3457:              mov     dx, word ptr loc1fc0
                        OUT     DX,AL
                        mov     byte ptr loc1fb6, al
                        JMP     label341B
label3461:              mov     dx, word ptr loc1fa4
                        IN      AL,DX
                        AND     AL, 0FDh
                        OUT     DX,AL
label3469:              MOV     AL, 0FFh
                        RET

;this is where you jump to, from vcon_irq03_rbf. first f_irq03. second f_irq03 will first
;get to task3 location.
```

```
label346c:              mov     dx, word ptr loc1fac
                        IN      AL,DX
                        TEST    AL,01h
                        JNZ     label347A                                   ;case of a byte
                        inc     byte ptr loc1fa3
                        RET
;*****************************************************************************************
;*      RBF IRQ                                                                          *
;*****************************************************************************************
task3:                                                                      ;case of a byte
label347a:              mov     dx, word ptr loc1fc0
                        IN      AL,DX
                        mov     byte ptr loc1fd4, al
                        cmp     word ptr loc0006, -01h
                        JZ      label348F

                        mov     word ptr loc0006, 007eh
label348f:              test    byte ptr loc1fd0, 01h
                        JZ      label34AF
                        CMP     AL, 11h
                        JNZ     label34A4
                        mov     byte ptr loc1fce, 00h
                        CALL    label3409
                        JMP     label346C
label34a4:              CMP     AL, 13h
                        JNZ     label34AF
                        mov     byte ptr loc1fce, 01h
                        JMP     label346C
label34af:              cmp     word ptr loc1fde, 0400h
                        JZ      label3512
;*******************************************************
;*      MOVE INCOMING DATA TO BUFFER                   *
;*******************************************************
                        mov     di, word ptr loc1fda
                        MOV     [DI],AL
;***********************************************
;*store all irq03 rbuf contents in local buffer *
;***********************************************
;serisr05.asm change. diagnostics changes flags. fix. 6-95-86.
                        pushf
                        push    ds
                        push    ax
                        push    bx
                        push    cx
                        push    dx
                        mov     dl, al                      ;store byte from rbuf
                        mov     bx, 1459h
                        mov     dh, byte ptr [bx]
                        mov     ax, SEG irq_03_buf_ptr
                        mov     ds, ax                      ;ds=1fb1h
                        ASSUME  DS:SEG irq_03_buf_ptr

                        mov     bx, word ptr irq_03_buf_ptr
                        mov     byte ptr [bx], dl
                        inc     bx
                        mov     byte ptr [bx], dh
                        inc     bx
                        lea     cx, word ptr irq_03_buf_end
                        cmp     bx, cx
;serisr04.asm change jnz -> jb
                        jb      irq_03_not_ful
                        lea     bx, word ptr irq_03_buffer
irq_03_not_ful:
                        mov     word ptr irq_03_buf_ptr, bx

                        mov     al, GS:byte ptr [CAS_RBUF_WINDOW_1]
                        mov     GS:byte ptr [CAS_RBUF_WINDOW_0], al ;....R ....V
                        mov     al, GS:byte ptr [CAS_RBUF_WINDOW_2]
                        mov     GS:byte ptr [CAS_RBUF_WINDOW_1], al ;...RI ...VC
                        mov     al, GS:byte ptr [CAS_RBUF_WINDOW_3]
                        mov     GS:byte ptr [CAS_RBUF_WINDOW_2], al ;..RIN ..VCO
                        mov     al, GS:byte ptr [CAS_RBUF_WINDOW_4]
                        mov     GS:byte ptr [CAS_RBUF_WINDOW_3], al ;.RING .VCON
                        mov     GS:byte ptr [CAS_RBUF_WINDOW_4], dl ;RING* VCON* * meaning 0dh

                        pop     dx
                        pop     cx
                        pop     bx
                        pop     ax
                        pop     ds
                        popf
```

```
                        ASSUME  DS:SEG loc37c1
;*********************************************
;end store all irq03 rbuf contents in local buffer
;*********************************************
                        inc     word ptr loc1fde
                        INC     DI
                        CMP     DI,23E0h
                        JB      label34CC
                        lea     di, word ptr loc1fe0
label34cc:              mov     word ptr loc1fda, di
;*****************************************************
;end move incoming data to buffer
;*****************************************************
                        cmp     word ptr loc1fde, 03c0h
                        JB      label34F6
                        cmp     byte ptr loc1fcf, 00h
                        JNZ     label34F6
                        mov     dx, word ptr loc1fac
                        IN      AL,DX
                        TEST    AL, 20h
                        JZ      label34F6
                        mov     dx, word ptr loc1fc0
                        MOV     AL, 13h
                        OUT     DX,AL
                        CALL    label3518
                        inc     byte ptr loc1fcf
label34f6:              cmp     byte ptr loc1459, 00h
                        JNZ     label3506
;*****************************************************************
;[1459]=00h means that what we are receiving is not data but controls
;thus we know that we are not getting a coincidental RING or VCON
;code to detect RING, VCON. it is not important to detect 0d,0a after.
;when RING is detected, go and change AT command string:
;ATM2X1&D2S7=096H1[+FCLASS=2] to ...[#CLS=8]
;it turns out (casvox17.asm, only RING shows up with [1459]=00)
                        push    bx
                        cmp     GS:byte ptr [CAS_RBUF_WINDOW_0], "+"
                        jne     ring_exit
                        cmp     GS:byte ptr [CAS_RBUF_WINDOW_1], "F"
                        jne     ring_exit
                        cmp     GS:byte ptr [CAS_RBUF_WINDOW_2], "K"
                        jne     ring_exit
                        cmp     GS:byte ptr [CAS_RBUF_WINDOW_3], "S"
                        jne     ring_exit
                        cmp     GS:byte ptr [CAS_RBUF_WINDOW_4], 0dh
                        jne     ring_exit
;serisr06.asm change
                        mov     GS:byte ptr [CAS_FKS_DETECTED], TRUE
;                       mov     GS:byte ptr [MODEM_MODE], CAT
;the byte ring_detected is not used for checks. just leave it here for diagnostic.
;                       mov     GS:byte ptr [CAS_RING_DETECTED], 01h
ring_exit:              pop     bx
;*****************************************************************
                        CMP     AL, 0Dh
                        JNZ     label3506
                        mov     byte ptr loc02b6, 01h                   ;carriage return received

label3506:
                        JMP     label346C
;*************************************************************************************
;*      LSR IRQ                                                                      *
;*************************************************************************************
task4:                  mov     dx, word ptr loc1fac
                        IN      AL,DX
                        TEST    AL, 02h
                        JZ      label3517
label3512:              mov     byte ptr loc1fd2, 01h
label3517:              RET

label3518:              PUSH    DX
                        mov     dx, word ptr loc1faa
                        IN      AL,DX
                        AND     AL, 0FDh
                        cmp     byte ptr loc1fc5, 00h
                        JZ      label3528
                        OUT     DX,AL
label3528:              POP     DX
                        RET

label352a:              PUSH    DX
                        mov     dx, word ptr loc1faa
```

```
                        IN      AL,DX
                        OR      AL, 02h
                        cmp     byte ptr loc1fc5, 00h
                        JZ      label353A
                        OUT     DX,AL
label353a:              POP     DX
                        RET

label353c:              PUSH    DX
                        mov     dx, word ptr loc1faa
                        PUSHF
                        CLI
                        IN      AL,DX
                        AND     AL, 0FEh
                        PUSH    AX
                        CALL    label3194
                        POP     AX
                        cmp     byte ptr loc1fc5, 00h
                        JZ      label3553
                        OUT     DX,AL
label3553:              JMP     label3556
label3555:              IRET

label3556:              PUSH    CS
                        CALL    label3555
                        POP     DX
                        RET

label355c:              PUSH    DX
                        mov     dx, word ptr loc1faa
                        PUSHF
                        CLI
                        IN      AL,DX
                        OR      AL, 01h
                        PUSH    AX
                        CALL    label3194
                        POP     AX
                        cmp     byte ptr loc1fc5, 00h
                        JZ      label3573
                        OUT     DX,AL
label3573:              JMP     labe13576
label3575:              IRET

label3576:              PUSH    CS
                        CALL    label3575
                        POP     DX
                        RET

label3194:              ret


irq_03_table            dw  task1       ;msr irq
                        dw  task2       ;tbf irq
                        dw  task3       ;rbf irq
                        dw  task4       ;lsr irq


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                               ;
;       IRQ03 PROCESSING                                                        ;
;                                                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;       THIS IS WHAT THERE IS:
;               IRQ03 CODE FOR CASMODEM
;               MY EDITED COPY OF CASMODEM IRQ03 CODE
;               VOICE SPECIFIC IRQ03 CODE (THIS SECTION)
;The original irq03 casmodem code is not used ecept during the short time where
;casmodem is installed as TSR and CATVOICE.EXE is not installed yet. In the CaT
;AUTOEXEC.BAT we will have:
;                               CASMODEM CASMODEM.CFG
;                               CATVOICE CATBOX.CFG
;Once CATVOICE is installed, our copy of casmodem irq03 yakes over. This is basically
;the same as INTEL code plus some data taking and checking for RING and VCON.
;When phone rings, casmodem irq03 is made to respond a certain way with AT#CLS=8
;and upon detection of VCON, this section fully takes over.

;*******************************************************************************
;*                                                                             *
;*          C A T       SERIAL  IRQ     INTERRUPT SERVICE ROUTINE              *
;*                                                                             *
```

```
;*****************************************************************************
vcon_process:
;if this is the first time we enter vcon process then we must copy some bytes
;from cas.
;at this point, ds=whatever from the current program and cs=1fb1h
;we want ds=1fb1h
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;DS IS INHERITED FROM INTERRUPTED CODE, SO CHANGE TO OUR CS                     ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    mov     ax, SEG irq_03_buf_ptr
                    mov     ds, ax          ;ds=1fb1h
                    ASSUME  DS:SEG irq_03_buf_ptr
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;JUMP TO MAIN IRQ03 CODE                                                       ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    call    vcon_irq03_dir
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;EXIT IRQ03                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    MOV     AL,20h
                    OUT     20h, AL
                    POP     GS
                    POP     DS
                    POP     DI
                    POP     DX
                    POP     AX
                    IRET
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;MAIN IRQ03 CODE: DECIDE WHICH IRQ AND CALL THAT ROUTINE                        ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_irq03_dir:     mov     dx, GS:word ptr [VCON_REGADD_IIR]
                    in      al, dx
                    test    al, 01h
                    jnz     vcon_irq03_no           ;if no irq then recv done but is there any xmit?
                    and     ax, 0006h
                    mov     di, ax
                    push    bx
                    lea     bx, word ptr vcon_irq03_table
                    call    cs: word ptr [di+bx]
vcon_ret_locn:      pop     bx
                    jmp     vcon_irq03_dir
vcon_irq03_no:      cmp     GS:byte ptr [VCON_1FA3], 00h
                ;   jz      vcon_irq03_exit
                    jnz     vcon_skp_exit1
                    ret                             ;to after call vcon_irq03_dir
vcon_skp_exit1:     mov     GS:byte ptr [VCON_1FA3], 00h
                    mov     dx, GS:word ptr [VCON_REGADD_LSR]
                    in      al, dx
                    test    al, 20h
                ;   jz      vcon_irq03_exit
                    jnz     vcon_skp_exit2
                    ret                             ;to after call vcon_irq03_dir
vcon_skp_exit2:     call    vcon_tbf_irq
                ;   jmp     vcon_irq03_exit
                    ret                             ;to after call vcon_irq03_dir
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;END MAIN IRQ03 CODE: DECIDE WHICH IRQ AND CALL THAT ROUTINE                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;*****************************************************************************
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*          MODEM STATUS IRQ                                                  ;*
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*****************************************************************************
;IF CLEAR TO SEND CHANGE THEN UPDATE OKTO_TRANSMIT AND IF OK THEN CALL XMIT
vcon_msr_irq:   mov dx, GS:word ptr [VCON_REGADD_MSR]
                    in      al,dx                   ;clears the int from SM
                    mov     ah, al
                    and     ah, 80h                 ;isolate DCD
                    mov     GS:byte ptr [VCON_CUR_MSR_DCD], ah
                    mov     GS:byte ptr [VCON_CUR_MSR], al
                    test    GS:byte ptr [VCON_CTSXON], 02h
                    jz      vcon_msr_exit           ;bit1=0 means not CTS driven handshake
                    test    al, 01h         ;delta CTS=?
                    jz      vcon_msr_exit           ;CTS driven and delta CTS=0 so ignore irq
                    mov     ah, al
                    shr     ah, 01h
                    shr     ah, 01h
                    shr     ah, 01h
                    shr     ah, 01h         ;CTS now in position 0.
                    and     ah, 01h
                    xor     ah, 01h         ;0  0  0  0    0  0  0  CTS#
```

```
                        mov     GS:byte ptr [VCON_OKTO_XMIT], ah
                        cmp     ah, 00h
                        jnz     vcon_msr_exit               ;if 01 then CTS=0 thus return (cannot xmit)
                        call    vcon_set_tbfirq
vcon_msr_exit:          ret
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;TRANSMIT FIFO EMPTY IRQ ROUTINE                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;THIS PROCEDURE ENABLES THE TBF IRQ
vcon_set_tbfirq         proc
                        push    dx
                        push    ax
                        mov     dx, GS:word ptr [VCON_REGADD_IER]
                        in      al, dx
                        test    al, 02h         ;tbuf irq enable bit
                        jnz     exit                    ;if set already return
                        or      al, 02h
                        out     dx, al
                        jmp     delay1
delay1:                 jmp     delay2
delay2:                 out     dx, al
exit:                   pop     ax
                        pop     dx
                        ret
vcon_set_tbfirq         endp
;*****************************************************************************
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*  START OF TBF IRQ PROPER                                                    ;*
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*****************************************************************************
;CHECK TBUF EMPTY AND IF SO LOAD 16 BYTES IF THERE ARE THAT MANY TO LOAD
;THIS IRQ DISABLES THE TBUF EMPTY IRQ IF XMIT_COUNT=0. TIMER TICK ENABLES IT AGAIN.
;OTHER ENABLERS OF TBF IRQ ARE MSR IRQ, RBF IRQ.
vcon_tbf_irq:           mov     dx, GS:word ptr [VCON_REGADD_LSR]
                        in      al, dx
                        test    al, 20h                         ;check xmit reg empty
                        jz      vcon_tbf_exit
                        cmp     GS:byte ptr [VCON_OKTO_XMIT], 00h
                        jnz     vcon_dis_tbfirq
;cazvox22.asm change
                        mov     GS:byte ptr [VCON_XMIT_FIFO_LD_CNT], 00h
xmit_FIFO_loop:         cmp     GS:word ptr [VCON_XMIT_COUNT], 0000h
;                       cmp     word ptr vcon_xmit_count, 0000h
;end cazvox22.asm change
                        jz      vcon_dis_tbfirq                 ;01 means no xmit
                        mov     di, GS:word ptr [VCON_IRQ03_TBUF_PTR]
                        mov     al, GS:byte ptr [di]
                                                                ;***if new string then detect 3<CR>
                        mov     dx, GS:word ptr [VCON_IRQ03_TBF_NEWSTR_PTR]
                        cmp     di, dx
                        jnz     vcon_no_new_str
                        mov     GS:byte ptr [VCON_DETECT_3CR], 01h
                        mov     GS:word ptr [VCON_IRQ03_TBF_NEWSTR_PTR], 0000h
                                                                ;this way di will never equal 0000h. else durin
g data transfers detect_3cr will
                                                                ;get triggered once every round around the buff
er.
                                                                ;***
vcon_no_new_str:        dec     GS:word ptr [VCON_XMIT_COUNT]
                        inc     di
                        mov     dx, VCON_IRQ03_TBUF_END
                        cmp     di, dx
                        jb      skip_tbuf_end
                        mov     di, VCON_IRQ03_TBUF
skip_tbuf_end:          mov     GS:word ptr [VCON_IRQ03_TBUF_PTR], di
                        mov     dx, GS:word ptr [VCON_REGADD_DATA]
                        out     dx, al
                        mov     GS:byte ptr [VCON_LAST_XMIT_BYTE], al
;start casvox1s.asm changes
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;store bytes in irq_03_buffer                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;serisr05.asm change. diagnostics changes flags. fix. 6-95-86.
                        pushf
                        push    bx
                        push    cx
                        mov     bx, word ptr irq_03_buf_ptr
                        mov     byte ptr [bx], al
                        inc     bx
                        lea     cx, word ptr irq_03_buf_end
                        cmp     bx, cx
```

```
                        jb      virq_03_not_ful
                        lea     bx, word ptr irq_03_buffer
virq_03_not_ful:        mov     word ptr irq_03_buf_ptr, bx
                        pop     cx
                        pop     bx
                        popf
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;end store voice bytes to irq_03_buffer                          ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;end casvoxls.asm changes

;cazvox22.asm changes
                        inc     GS:byte ptr [VCON_XMIT_FIFO_LD_CNT]
                        cmp     GS:byte ptr [VCON_XMIT_FIFO_LD_CNT], 10h
                        jb      xmit_FIFO_loop
                        jmp     vcon_tbf_exit
;                       jmp     vcon_tbf_irq
;end cazvox22.asm changes

vcon_dis_tbfirq:        mov     dx, GS:word ptr [VCON_REGADD_IER]
                        in      al, dx
                        and     al, 0fdh                                ;tbf irq enable bit reset
                        out     dx, al

vcon_tbf_exit:          mov     al, 0ffh
                        ret
;*****************************************************************
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*                      RBF IRQ                                 ;*
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*****************************************************************
vcon_rbf_irq:
                        mov     dx, GS:word ptr [VCON_REGADD_LSR]
                        in      al, dx
                        test    al, 01h                         ;test the rbuf full bit
                        jnz     vcon_rbf_irq1
                        inc     GS:byte ptr [VCON_1FA3]         ;send tbuf items if there are any
                        ret
;NB: f_irq03_rbf enters at vcon_rbf_irq1, checking rbf full bit is redundant at first entry.
;it is useful for fifo cases after reading the first byte.

vcon_rbf_irq1:
                        mov     dx, GS:word ptr [VCON_REGADD_DATA]
                        in      al, dx
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       RING DETECT CIRCUITRY                           ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;serisr05.asm change. next 2 lines and the next pop ax.
                        mov     dl, al
                        push    ax

                        mov     al, GS:byte ptr [CAT_RBUF_WINDOW_1]
                        mov     GS:byte ptr [CAT_RBUF_WINDOW_0], al ;....R ....V
                        mov     al, GS:byte ptr [CAT_RBUF_WINDOW_2]
                        mov     GS:byte ptr [CAT_RBUF_WINDOW_1], al ;...RI ...VC
                        mov     al, GS:byte ptr [CAT_RBUF_WINDOW_3]
                        mov     GS:byte ptr [CAT_RBUF_WINDOW_2], al ;..RIN ..VCO
                        mov     al, GS:byte ptr [CAT_RBUF_WINDOW_4]
                        mov     GS:byte ptr [CAT_RBUF_WINDOW_3], al ;.RING .VCON
                        mov     GS:byte ptr [CAT_RBUF_WINDOW_4], dl ;RING* VCON* * meaning 0dh

                        cmp     GS:byte ptr [CAT_RBUF_WINDOW_0], "R"
                        jnz     after_cat_ring_detect
                        cmp     GS:byte ptr [CAT_RBUF_WINDOW_1], "I"
                        jnz     after_cat_ring_detect
                        cmp     GS:byte ptr [CAT_RBUF_WINDOW_2], "N"
                        jnz     after_cat_ring_detect
                        cmp     GS:byte ptr [CAT_RBUF_WINDOW_3], "G"
                        jnz     after_cat_ring_detect
                        cmp     GS:byte ptr [CAT_RBUF_WINDOW_4], 0dh
                        jnz     after_cat_ring_detect
;the byte ring_detected is not used for checks. just leave it here for diagnostic.
                        mov     GS:byte ptr [CAT_RING_DETECTED], 01h
after_cat_ring_detect:
                        pop     ax
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       store bytes in irq_03_buffer                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;ttisr005.asm change. diagnostics changes flags. fix. 6-95-86.
                        pushf
                        push    bx
```

```
                        push    cx
                        mov     bx, word ptr irq_03_buf_ptr
                        mov     DS:byte ptr [bx], al
                        inc     bx
                        lea     cx, word ptr irq_03_buf_end
                        cmp     bx, cx
;serisr04.asm change jnz -> jb
                        jb      zirq_03_no_ful
                        lea     bx, word ptr irq_03_buffer
zirq_03_no_ful:
                        mov     word ptr irq_03_buf_ptr, bx
                        pop     cx
                        pop     bx
                        popf
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       if XON/XOFF enabled then process                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                        mov     GS:byte ptr [VCON_LAST_RECV_BYTE], al
                        test    GS:byte ptr [VCON_CTSXON], 01h
                        jz      vcon_rcv_no_x
                        cmp     al, 11h         ;XON?
                        jnz     vcon_rcv_no_xon
                        mov     GS:byte ptr [VCON_OKTO_XMIT], 00h
                        mov     GS:byte ptr [VCON_XON_DETECTED], TRUE
                        call    vcon_set_tbfirq
                        jmp     vcon_rbf_irq
vcon_rcv_no_xon:        cmp     al, 13h         ;XOFF?
                        jnz     vcon_rcv_no_x
                        mov     GS:byte ptr [VCON_OKTO_XMIT], 01h   ;not OK to xmit
                        mov     GS:byte ptr [VCON_XOFF_DETECTED], TRUE
                        jmp     vcon_rbf_irq
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       IS RECEIVE BUFFER FULL?                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;cazvox26.asm change
vcon_rcv_no_x:          cmp     GS:word ptr [VCON_RECV_COUNT], 0800h
;vcon_rcv_no_x:         cmp     word ptr vcon_recv_count, 0400h
;end cazvox26.asm change
                        jz      vcon_rbf_exit1
                        mov     di, GS:word ptr [VCON_IRQ03_RBUF_PTR]
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       DETECT RESPONSE TO MODEM COMMANDS                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;start of detect 3<CR> (including the <LF> after the second <CR>). 10-94-7
;there may be cases where we have:
;AT
;
;OK, instead of
;AT
;OK but we ignore these cases for the moment
                        cmp     GS:byte ptr [VCON_DETECT_3CR], 01h
                        jnz     vcon_no_det_3cr
                        cmp     al, 0dh
                        jnz     vcon_ck_0a
                        inc     GS:byte ptr [VCON_CR_COUNT]
                        jmp     vcon_no_det_3cr
vcon_ck_0a:             cmp     al, 0ah
                        jnz     vcon_no_det_3cr
                        cmp     GS:byte ptr [VCON_CR_COUNT], 02h
                        jnz     vcon_no_det_2cr
                        mov     GS:byte ptr [VCON_2CR_DETECTED], 01h
                        mov     dx, GS:word ptr [VCON_IRQ03_RBUF_PTR]
                        mov     GS:word ptr [VCON_RBF_2CR_DETECTED_PTR], dx
                        jmp     vcon_no_det_3cr
vcon_no_det_2cr:        cmp     GS:byte ptr [VCON_CR_COUNT], 03h
                        jnz     vcon_no_det_3cr
                        mov     GS:byte ptr [VCON_3CR_DETECTED], 01h
;we do not reset the buffer at this point because irq00 must read OK
                        mov     GS:byte ptr [VCON_DETECT_3CR], 00h
                        mov     GS:byte ptr [VCON_CR_COUNT], 00h
                        mov     dx, GS:word ptr [VCON_IRQ03_RBUF_PTR]
                        mov     GS:word ptr [VCON_RBF_3CR_DETECTED_PTR], dx
                        jmp     vcon_no_det_3cr
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;           DLE DETECTION                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;start of <DLE> counter. see 9-94-101. and better yet 9-94-119.
vcon_no_det_3cr:        cmp     al, 10h
                        jnz     vcon_not_10h
                        mov     GS:byte ptr [VCON_DLE_COUNT_VALID], 00h
                        inc     GS:byte ptr [VCON_DLE_COUNT]
```

```
                        jmp     vcon_skp_10h
vcon_not_10h:           mov     GS:byte ptr [VCON_DLE_COUNT_VALID], 01h
;end of <DLE> counter.

;check incoming byte stream for DTMF and other transparent codes. 9-94-99.
vcon_skp_10h:           cmp     GS:byte ptr [VCON_DLE_COUNT_VALID], 01h
                        jnz     vcon_skp_dle0
                        test    GS:byte ptr [VCON_DLE_COUNT], 01h   ;is it odd?
                        jz      vcon_wr_rbuf
                        cmp     al, "c"
                        jnz     vcon_skp_dle1
                        mov     GS:byte ptr [VCON_DLEC_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dle1:          cmp     al, "t"
                        jnz     vcon_skp_dle2
                        mov     GS:byte ptr [VCON_DLET_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dle2:          cmp     al, 03h         ;<DLE><ETX>?
                        jnz     vcon_skp_dleq
                        mov     GS:byte ptr [VCON_DLE_ETX_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dleq:          cmp     al, "q"
                        jnz     vcon_skp_dles
                        mov     GS:byte ptr [VCON_DLEQ_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dles:          cmp     al, "s"
                        jnz     vcon_skp_dleb
                        mov     GS:byte ptr [VCON_DLES_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
;serisr06.asm change. 7/18/95.
vcon_skp_dleb:          cmp     al, "b"
                        jnz     vcon_skp_dled
                        mov     GS:byte ptr [VCON_DLEB_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dled:          cmp     al, "d"
                        jnz     vcon_skp_dleo
                        mov     GS:byte ptr [VCON_DLED_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dleo:          cmp     al, "o"
                        jnz     vcon_skp_dleu
                        mov     GS:byte ptr [VCON_DLEO_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dleu:          cmp     al, "u"
                        jnz     vcon_skp_dle_capt
                        mov     GS:byte ptr [VCON_DLEU_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf
vcon_skp_dle_capt:      cmp     al, "T"
                        jnz     vcon_skp_dle3
                        mov     GS:byte ptr [VCON_DLE_CAPT_DETECTED], TRUE
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                        jmp     skip_wr_rbuf

;it is <DLE>something. if it is a phone keypad DTMF then we store it in a buffer.
;serisr006.asm change: 30h =< al =< 39h, or al=23h(#)=>2fh(/) and al=2ah(*)=>2eh(.).
;for this to happen, 30h =< al =< 39h ,or al=23h ,or al=2ah. In any case, the byte
;does not get written to vcon_irq03_rbuf because it is of the form <DLE>"x"
vcon_skp_dle3:          mov     GS:byte ptr [VCON_DLE_COUNT], 00h ;this has to happen in any case
                        cmp     al, "9"
                        ja      skip_wr_rbuf            ;>39h
;being here means that it is smaller than 3ah.
                        cmp     al, "0"
                        jb      vcon_dle_ck_str_pnd
                        jmp     vcon_load_dle_buf
vcon_dle_ck_str_pnd:
                        cmp     al, "*"
                        jne     vcon_dle_ck_pnd
;serisr006.asm change. : -> . (2e)  and ; -> / (2f)
                        mov     al, "."         ;"*" gets 3a to ease next state calc
                        jmp     vcon_load_dle_buf
vcon_dle_ck_pnd:        cmp     al, "#"
                        jne     skip_wr_rbuf
                        mov     al, "/"         ;"#" gets 3b to ease next state calc
```

```
vcon_load_dle_buf:
;here we know that it is phone keypad DTMF and we load it
;we use di which is also used by irq03_rbuf. but in this pass through irq03 this buffer
;will not be loaded, so the di value will not be used.
                        mov     di, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]
                        mov     GS:byte ptr [di], al
                        inc     di
                        mov     dx, VCON_DLE_NUMBER_BUFFER_END
                        cmp     di, dx
                        jb      skip_dle_number_buf_end
                        mov     di, VCON_DLE_NUMBER_BUFFER
skip_dle_number_buf_end:
                        mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR], di
                        jmp     skip_wr_rbuf
vcon_skp_dle0:          test    GS:byte ptr [VCON_DLE_COUNT], 01h   ;is it odd?
                        jnz     skip_wr_rbuf
                        mov     GS:byte ptr [VCON_DLE_COUNT], 00h
;end check incoming byte stream.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       WRITE TO RECEIVE BUFFER                           ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_wr_rbuf:           mov     GS:byte ptr [di], al        ;same di as way back when
                        inc     GS:word ptr [VCON_RECV_COUNT]
                        inc     di
                        lea     dx, GS:word ptr [VCON_IRQ03_RBUF_END]
                        cmp     di, dx
                        jb      skip_rbuf_end
                        mov     di, VCON_IRQ03_RBUF
skip_rbuf_end:          mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], di
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;       IF BUFFER TOO FULL                                ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;cazvox26.asm change
;skip_wr_rbuf:          cmp     word ptr vcon_recv_count, 03c0h
skip_wr_rbuf:           cmp     GS:word ptr [VCON_RECV_COUNT], 09c0h
;end cazvox26.asm change
                        jb      vcon_rbf_irq
;we do this only once thus the need for vcon_rbuf_3c0
                        cmp     GS:byte ptr [VCON_RBUF_3C0], 01h
;if was done once already go fetch another byte
                        jz      vcon_rbf_irq
;now, doing it for the first time. check vcon_ctsxon (bit1:CTS,bit0:XON)
;note that my flow is somewhat different than casmodem. need at least one of RTS/CTS or
;XON/XOFF to be the case in vcon_ctsxon. but remember in WinTerm, you have the option
;of no handshake. I do not know where we set the hadnshake option for casmodem???
                        test    GS:byte ptr [VCON_CTSXON], 01h  ;testing if XON/XOFF handshake
                        jz      vcon_3c0_ck_rts
                        mov     dx, GS:word ptr [VCON_REGADD_LSR]
                        in      al, dx
                        test    al, 20h
;here I will differ from casmodem and not go to the top. check to see if xon/xoff
;                       jz      vcon_rbf_irq
                        jz      vcon_3c0_ck_rts
                        mov     dx, GS:word ptr [VCON_REGADD_DATA]
                        mov     al, 13h                         ;XOFF. must take notice of this as in
                        out     dx, al                          ;original 9-94-50. irq00 must reverse.
vcon_3c0_ck_rts:        test    GS:byte ptr [VCON_CTSXON], 02h  ;testing if CTS/RTS handshake
                        jz      vcon_rbf_irq
;watch out, we are dead if neither cts/rts nor xon/xoff
;here we disable RTS
                        mov     dx, GS:word ptr [VCON_REGADD_MCR]
                        in      al, dx
                        and     al, 0fdh
                        out     dx, al
                        inc     GS:byte ptr [VCON_RBUF_3C0]
                        jmp     vcon_rbf_irq
vcon_rbf_exit1:         mov     GS:byte ptr [VCON_OE], 01h  ;buffer full/overrun error
vcon_rbf_exit:          ret
;*********************************************************
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*      LSR IRQ                                         ;*
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*********************************************************
vcon_lsr_irq:           mov     dx, GS:word ptr [VCON_REGADD_LSR]
                        in      al, dx
                        test    al, 02h                         ;test for overrun error
                        jz      vcon_lsr_exit
vcon_set_oe:            mov     GS:byte ptr [VCON_OE], 01h                  ;overrun error
vcon_lsr_exit:          ret

;*********************************************************
```

```
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*      IRQ03 TABLE                                                       ;*
;*;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;*
;*****************************************************************
vcon_irq03_table        dw      vcon_msr_irq
                        dw      vcon_tbf_irq
                        dw      vcon_rbf_irq
                        dw      vcon_lsr_irq

;new_irq03_off   endp

END
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;action0i.asm <- action0h.asm. 11/3/95. make L7 changes. dlet,dlec in no_action and emit_msg.
;action0h.asm <- action0g.asm. 10/19/95. add BEEP to reco msg.
;fix emit_msg for vma_pause. also add dle_can for when dtmf.
;correct <DLE>S, <DLE>Q checks in reco_msg. 10/21/95.
;action0g.asm <- action0f.asm. 8/26/95. change start program to allow return codes from foreground
;programs.
;action0f.asm <- action0e.asm. 8/8/95. disable scsi irq while checking and doing int 13h
;in emit and reco.  8(II)-95-89.
;action0e.asm <- action0d.asm. 7/18/95. changes to fix the reco msg problems. after 15 secs
;I get <dle>o. this results in no response to "!". see 8-95-84. I see another problem and I
;understand it. this is where the rd ptr may point to third sector and recv count has more
;than a sector in it. then beyond rbuf is also written to hard disk cache. the solution is
;to do it like emit_msg. ie, if recv_count is more than 2 sectors, then write 2 sectors.
;then between two writes, no more than 2 sectors worth of data should arrive. this is 1/8 sec
;ie 2 timer ticks. I can double the size of the buffer to 4K. then I empty out 2K each time
;and if at one time it was close to full, it has 2K bytes worth of room. this will be enough
;for 1/4 second ie about 5 timer ticks. but first, to verify the concept, let me just make it
;like emit with the buffer size that we have.
;action0d.asm <- action0c.asm. 6/12/95. catvocl. change emit msg to respond to <dle>c.
;generalize dle detection somewhat for emit_msg. will also add <dle>q,s for reco_msg.
;action0c.asm <- action0b.asm. 6/10/95. add [di + cur_step] changes for vma. to no_action and emit_msg.
;not needed for reco_msg because it is not called, but duplicated, inside rmi. BUT IT DOES NOT
;HURT TO ADD IT EVERYWHERE BECAUSE DI=0 FOR SUCH CASES.
;move CHS from beginning to further out in emit_msg. again for vma.
;action0b.asm <- action0a.asm. 6/10/95. works with catvock
;action0a.asm <- action09.asm. 6/3/95. try inserting delay for ATH problem in emit_msg. works.
;16 good, 2 bad, 17 good, 2 bad etc. bad ones last around 15 secs. see 6-95-41. did the same for record.
;also works. still need to do it for record_msg_indirect.
;action09.asm <- action08.asm. 6/3/95. catvoch. else no changes.
;action08.asm <- action07.asm. 5/18/95. job history.
;action07.asm <- action06.asm. 5/16/95. change start_program to have the wait/no wait
;related conditional jump moved to the wait for acknowledge section from issue lcd message
;section.
;also insert code checking for In_INT13H. and if so skip the current attempt to int 13h.
;MODEM PROBLEM: IN EMIT_MSG, IF VLS=HANDSET, MUST DO ATH IN CASE THE NEXT ACTION REQUIRES
;VLS=LINE (PERHAPS JUST AN AT#CLS=8 WILL ALSO DO). THE PROBLEM IS OK FOR ATH DOES NOT COME
;OR IS SPORADIC. SP TEMPORARILT, IN EMIT_MSG, I SKIP ATH.
;fix TICK_buffer writes to check for en of buffer and reset.
;action06.asm <- action05.asm. 5/12/95. reco message overhaul.
;action05.asm <- action04.asm. 5/11/95. 5-95-80. multitasking.
;action04.asm <- action03.asm. 5/10/95.
;CATVOC0B-1 branching in actions uses di whereas di is for
;level indication. di->si. also preserve calling stepper's DI in start_program embedded
;inside emit_msg.
;CATVOC0B-2 see 5-95-65. change all relevant files to implement adding start CHS to
;ldftohdc, stffmhdc, ldftomem, stffmmem
;CATVOC0B-3 see 5-95-65. clean emit_msg, add start_program to reco_msg.
;action03.asm <- action02.asm. 5/6/95. fix errors for catvoc06
;action02.asm <- action01.asm. 5/4/95. skip LCD in start program. add the completion leg
;as a step so we can jump to it.
;CATVOC0B-2. \goodcv06\catequ02.inc -> \goodcv07\catequ03.inc
INCLUDE CATEQU0E.INC
.MODEL  COMPACT
.386P

;procedures
                extrn   vcon_set_tbfirq:near            ;procedure in irqcod*.asm
                extrn   start_timer:near                ;procedure in instal*.asm
                extrn   stop_timer:near                 ;procedure in instal*.asm
                extrn   sim_ring_to_cas:near            ;procedure in tmo*.asm (actually a label)
;sys data
                extrn   vcon_at_cls_8:far               ;near
                extrn   vcon_at_vbs_4:far               ;near
                extrn   vcon_at_bdr_16:far              ;near
                extrn   vcon_at_vls:far                 ;near
                extrn   vcon_at_vtx:far                 ;near
                extrn   vcon_dle_etx:far                ;near
                extrn   vcon_dle_can:far
                extrn   vcon_ath:far                    ;near
                extrn   vcon_at_vrx:far                 ;near
                extrn   vcon_exclam:far                 ;near
```

```
                extrn   vcon_at_vls_ck:far              ;near
                extrn   vcon_at_vts:far

                extrn   In_INT13H:far                   ;near
                extrn   LCD_BUSY:far                    ;near
                extrn   LCD_ACCESS_COUNTER:far          ;near
                extrn   maestro_task_queue:far          ;near
                extrn   maestro_task_queue_end:far      ;near
                extrn   vcon_InDOS_flag_off:far         ;near
                extrn   vcon_InDOS_flag_seg:far         ;near
                extrn   TICK_buffer_ptr:far             ;near
                extrn   TICK_buffer:far                 ;near
                extrn   TICK_buffer_end:far             ;near
                extrn   irq_03_buffer:far               ;near
                extrn   irq_03_buf_ptr:far              ;near
                extrn   irq_03_buf_end:far              ;near

                public  vcon_no_action
                public  vcon_emit_msg
                public  send_a_fax
                public  send_fax_indirect
                public  build_fax_database
                public  vcon_record_msg
                public  vcon_hangup
                public  vcon_start_program
                public  vcon_wait_for_pgm_to_complete
                public  vcon_issue_class2_cmd
.CODE
                ASSUME  DS:SEG LCD_BUSY
;MAKE SURE ALL BUFFER SIZES HAVE VARIABLES IN THEM AND NOT NUMBERS. CMD2 PROC AND EMIT/RECO.
;*************************************************************************
;*                                                                       *
;*      ACTIONS.ASM                                                      *
;*      COPYRIGHT 3TAU 1995                                              *
;*      WRITTEN BY HALUK M. AYTAC                                        *
;*                                                                       *
;*************************************************************************
;*                                                                       *
;*                                                                       *
;*      ON ENTRY:       DI = LEVEL SHIFTER                               *
;*                      FS = SEG STEP TABLE                              *
;*                      GS = TRANSACTION CONTROL BLOCK                   *
;*                      ALL VARIABLES DEFINED IN EQUS                    *
;*                                                                       *
;*                                                                       *
;*************************************************************************
;*                                                                       *
;*                                                                       *
;*      VARIABLES THAT ARE CALLED WITH LEVEL SHIFT:                      *
;*                      VCON_CUR_STEP_DATA_AREA_ADDR                     *
;*                      VCON_FIRST_IRQ00_CUR_STEP                        *
;*                      VCON_DO_NOT_LOAD_CUR_STEP_BUFFER                 *
;*                      VCON_RESOURCE                                    *
;*                      VCON_STOP_ON_DLE                                 *
;*                      VCON_ACTION_COMPLETE_CUR_STEP                    *
;*                                                                       *
;*                                                                       *
;*************************************************************************
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                            ;
;   PROCEDURE   VCON_NO_ACTION                                                               ;
;                                                                                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;this is like emit_msg. the difference is that the file name to be emitted does not come as a
;variable or a constant. rather it is in a file whose name comes as a constant or a variable.
vcon_no_action          proc
                        push    ds
                        push    ax
                        push    bx
                        push    di
                        push    es
                        push    dx
                        push    cx
```

```
                    push    si
                    cmp     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                    jne     vcon_no_action_skp_entry
;*************************************************************
;*                                                           *
;*  WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP         *
;*                                                           *
;*************************************************************
;action0i.asm change. 11/4/95. ACD sets no_action_stop=true although no_action of
;ACD might not be operating at the time. this will make it so all subsequent no_actions
;will be stopped (at least the very next one because at the end stop=false)
                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], FALSE
                    mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                    mov     GS:byte ptr [VCON_NO_ACTION_COMPLETE], FALSE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                    mov     ax, FS:word ptr [bx + OFFSET_TO_INPUTS]
                    cmp     ax, EXPECT_DTMF
                    jne     vcon_no_inputs
vcon_yes_inputs:
                    mov     GS:byte ptr [VCON_NO_ACTION_INPUTS_YES], YES
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], FALSE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], DTMF_ANALYZE
                    jmp     vcon_no_action_cont_entry
vcon_no_inputs:
                    mov     GS:byte ptr [VCON_NO_ACTION_INPUTS_YES], NO
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], JUMP_UNCOND
                    jmp     vcon_no_action_cont_entry
vcon_no_action_cont_entry:
;4 seconds of doing nothing, interruptible by <dle>t, while we wait for inputs.
;count the number of irq00 timer ticks. 20 per second, thus 80decimal=50h
;action0h.asm change. 10/26/95. make time much longer: 30 seconds ie 600 decimal or 240h=576
;was 50h
                    mov     GS:word ptr [VCON_NO_ACTION_TIMER], 0240h
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                    mov     ax, FS:word ptr [bx + NA_OFFSET_TO_STOP_ON_DLE]
                    mov     GS:word ptr [DI + VCON_STOP_ON_DLE], ax
;*************************************************************
;*                                                           *
;*  WHAT YOU DO AT EACH TIMER TICK FOR CURRENT STEP          *
;*                                                           *
;*************************************************************
vcon_no_action_skp_entry:
;action0i.asm change. check dle before dtmf.
;*************************************************************
;*                                                           *
;*                  CHECK FOR DLE                            *
;*                                                           *
;*************************************************************
;note: as we place dlec check before dlet check we insure that if they both come simultaneously,
;dlet will be ignored. but this also means it will not be reset. and way down the line, when
;the user has hung up the phone long ago, we will have branching based on dlet. BUT, this will
;happen in cases where we do not look at dlet also. I think this is OK. because if dlet and
;dleh afterwards, we will come back anyway.
;no_action will need dlec,dlet,dleh checks.
;           if dlec detected, ignore the rest (if dlec detection was requested of course)
;           if dlec not detected, see dlet and reset it. can skip over dleh. It will turn out
; that, no_action will either check dlet or dleh. and dlet,dleh come in pairs.
                    cmp     GS:word ptr [DI + VCON_STOP_ON_DLE], DO_NOT_STOP_ON_DLE
                    je      vcon_no_action_skp_dle

vcon_no_action_dlec_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLEC
                    jz      vcon_no_action_dlet_check
                    cmp     GS:byte ptr [VCON_DLEC_DETECTED], TRUE          ;set by irq03
                    jne     vcon_no_action_dlet_check

                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
```

```
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;action0i.asm change. reset this variable.
                    mov     GS:byte ptr [VCON_DLEC_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     vcon_no_action_skp_buffer

vcon_no_action_dlet_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLET
                    jz      vcon_no_action_dleh_check
                    cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE          ;set by irq03
                    jne     vcon_no_action_dleh_check

                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH  ; F=3
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;action0i.asm change. if dlet then store current state
;this will work even when no_action is inside another action because vcon_state refers to level_0
                    mov     ax, GS:word ptr [VCON_STATE]
                    mov     GS:word ptr [VCON_STATE_OLD], ax
;action0i.asm change. reset this variable.
                    mov     GS:byte ptr [VCON_DLET_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     vcon_no_action_skp_buffer

vcon_no_action_dleh_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLEH
                    jz      vcon_no_action_skp_dle
                    cmp     GS:byte ptr [VCON_DLEH_DETECTED], TRUE          ;set by irq03
                    jne     vcon_no_action_skp_dle

                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_ATH_OR_PREV_STATE ; F=4
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;action0i.asm change. reset this variable.
                    mov     GS:byte ptr [VCON_DLEH_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     vcon_no_action_skp_buffer

vcon_no_action_skp_dle:
                    cmp     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                    je      vcon_no_action_skp_buffer
;*****************************************************************
;*                                                               *
;*                  CHECK FOR DTMF                               *
;*                                                               *
;*****************************************************************
;here we check the irq03_dle_buffer. circular. keep it large enough so no overwrite. some little brat
;might be pressing all the buttons.
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NO_DTMF
                    mov     ax, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]
                    mov     bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR]
                    cmp     ax, bx
                    je      vcon_no_action_skp_buffer
                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
                    mov     al, GS:byte ptr [bx]
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], al
                    inc     bx
                    mov     dx, VCON_DLE_NUMBER_BUFFER_END
                    cmp     bx, dx
                    jb      skp_dle_number_buf_end
                    mov     bx, VCON_DLE_NUMBER_BUFFER
skp_dle_number_buf_end:
                    mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
```

```
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
vcon_no_action_skp_buffer:
;***************************************************************
;*                                                             *
;*          NO_ACTION PROPER TAKES PLACE HERE                  *
;*                                                             *
;***************************************************************
;the no_action action takes place here. loop on timer to 4 secs, if no stop exit. else (dlet or dtmf)
;jmp to completed section
                    cmp     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
                    je      vcon_no_action_completed
                    cmp     GS:byte ptr [VCON_NO_ACTION_INPUTS_YES], TRUE
                    jne     vcon_no_action_completed
;if no inputs were expected, then no_action does not last 4 secs.
                    dec     GS:word ptr [VCON_NO_ACTION_TIMER]
                    jz      vcon_no_action_completed
                    jmp     vcon_no_action_exit
;***************************************************************
;*                                                             *
;*          COMPLETE NO_ACTION                                 *
;*                                                             *
;***************************************************************
vcon_no_action_completed:
;action0i.asm change. 11/4/95.
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    cmp     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
                    jne     no_action_not_goto_fax
                    cmp     di, 0                   ; if not level_0 then do not do this
                    jne     no_action_not_goto_fax  ; because acd will do this at its last step.
;actually this is redundant as no_action step table entry inside acd will not be written to
;(ie the flag). because, no-action inside acd does not have dlec enabled. but leave it in anyway.

                    call    sim_ring_to_cas
no_action_not_goto_fax:
                    mov     GS:byte ptr [VCON_NO_ACTION_COMPLETE], TRUE
                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], FALSE
                    mov     GS:byte ptr [DI + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
vcon_no_action_exit:
                    pop     si
                    pop     cx
                    pop     dx
                    pop     es
                    pop     di
                    pop     bx
                    pop     ax
                    pop     ds
                    ret
vcon_no_action      endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                          ;
; END   PROCEDURE   VCON_NO_ACTION                                                         ;
;                                                                                          ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                          ;
;   PROCEDURE   VCON_EMIT_MSG                                                              ;
;                                                                                          ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;CATVOC0B-3: clean all comments at the beginning. old versions available to review comments.
vcon_emit_msg       proc
                    push    ds
                    push    ax
                    push    bx
                    push    di
                    push    es
                    push    dx
                    push    cx
                    push    si
;do not make the assumption that ax=address of step_data_area. it is only so once.
                    cmp     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                    jnz     vcon_emit_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
```

```
;                                                                                    ;
;   WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                                 ;
;                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;action0i.asm change. 11/4/95. ACD sets no_action_stop=true although no_action of
;ACD might not be operating at the time. this will make it so all subsequent no_actions
;will be stopped (at least the very next one because at the end stop=false)
                mov     GS:byte ptr [VCON_NO_ACTION_STOP], FALSE
                mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                mov     GS:byte ptr [VCON_EMIT_MSG_COMPLETE], FALSE
;action0d.asm change
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], 0000H
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000H
                mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]         ;ax=addr of step parameters
                mov     ax, FS:word ptr [bx + OFFSET_TO_INPUTS]         ;first entry in params: inputs?
                cmp     ax, EXPECT_DTMF                         ;inputs?
                jnz     vcon_no_inputs
                mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], FALSE
                mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], DTMF_ANALYZE          ;modify step_sta
tus register
                jmp     vcon_emit_msg_cont_entry
vcon_no_inputs:
;action0c.asm change add di
                mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
                mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], JUMP_UNCOND           ;modify step_sta
tus register
vcon_emit_msg_cont_entry:
                mov     bx,. GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]         ;ax=address of step paramete
rs
                mov     ax, FS:word ptr [bx + OFFSET_TO_FILENAME]           ;ax=filename pointer
                mov     GS:word ptr [VCON_EMIT_MSG_FILENAME_PTR], ax
                mov     ax, FS:word ptr [bx + EM_OFFSET_TO_VLS]             ;ax=resource number

;hairmi05.asm change
                push    bx
                cmp     ax, VCON_RESOURCE_IN_CURRENT
                je      em_resource_is_current
                mov     GS:word ptr [DI + VCON_RESOURCE], ax
                jmp     emit_msg_resource_calc
em_resource_is_current:
                mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]               ;bx=address of sess para
m area
                mov     ax, FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_OUT]
                mov     GS:word ptr [DI + VCON_RESOURCE], ax
emit_msg_resource_calc:
                pop     bx
;end hairmi05.asm change

                mov     ax, FS:word ptr [bx + EM_OFFSET_TO_STOP_ON_DLE]     ;ax=stop_on_dlet
                mov     GS:word ptr [DI + VCON_STOP_ON_DLE], ax
;action0c.asm change. move the section on current CHS = start CHS to first pass of send data.
                mov     GS:byte ptr [EMIT_MSG_FIRST_DATA], TRUE
;action0a.asm change
                mov     GS:byte ptr [EM_ATH_DELAY], 10h     ;about 1 second delay (10h)
                                                            ;still dies after 5-10 emits.
                                                            ;change 10h -> 20h. no changes.
                                                            ;0ffh no different either. thus
                                                            ;10h was very effective.
                mov     GS:word ptr [EM_ATH_TO_OK_COUNT], 0000h
;action0d.asm change
                mov     gs:byte ptr [LCD_PROCESS_DONE], 00000000b               ;LCD
                mov     gs:byte ptr [LCD_IN_ACTION_IN_PROGRESS], FALSE          ;LCD
;end action0d.asm change
                mov     bx, OFFSET TICK_buffer
                mov     word ptr TICK_buffer_ptr, bx

vcon_emit_skp_entry:
;action0i.asm. change the order of dtmf and dle checking. dle comes first.
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                    ;
;       IF STOP_ON_DLE ENABLED, CHECK FOR DLE   (HANDSET OFF-HOOK)                                  ;
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    cmp     GS:word ptr [DI + VCON_STOP_ON_DLE], DO_NOT_STOP_ON_DLE
                    je      vcon_emit_skp_dle

vcon_emit_dlec_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLEC
                    jz      vcon_emit_dlet_check
                    cmp     GS:byte ptr [VCON_DLEC_DETECTED], TRUE          ;set by irq03
                    jne     vcon_emit_dlet_check

                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;action0i.asm change. reset this variable.
                    mov     GS:byte ptr [VCON_DLEC_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     vcon_emit_skp_read_buffer

vcon_emit_dlet_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLET
                    jz      vcon_emit_dleh_check
                    cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE          ;set by irq03
                    jne     vcon_emit_dleh_check

                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH  ; F=3
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;action0i.asm change. if dlet then store current state
;this will work even when no_action is inside another action because vcon_state refers to level_0
                    mov     ax, GS:word ptr [VCON_STATE]
                    mov     GS:word ptr [VCON_STATE_OLD], ax
;action0i.asm change. reset this variable.
                    mov     GS:byte ptr [VCON_DLET_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     vcon_emit_skp_read_buffer

vcon_emit_dleh_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLEH
                    jz      vcon_emit_skp_dle
                    cmp     GS:byte ptr [VCON_DLEH_DETECTED], TRUE          ;set by irq03
                    jne     vcon_emit_skp_dle

                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_ATH_OR_PREV_STATE ; F=4
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;action0i.asm change. reset this variable.
                    mov     GS:byte ptr [VCON_DLEH_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     vcon_emit_skp_read_buffer

vcon_emit_skp_dle:
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                    ;
;       IF DTMF INPUTS EXPECTED, COLLECT DTMF FROM IRQ03                                            ;
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    cmp     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;end casvox1s.asm change
                    jz      vcon_emit_skp_read_buffer
;here we check the irq03_dle_buffer. circular. keep it large enough so no overwrite. some little brat
```

```
;might be pressing all the buttons.
;action0c.asm change. add di
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NO_DTMF          ;in case of no byte
                    mov     ax, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]      ;write pointer
                    mov     bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR]      ;read pointer
                    cmp     ax, bx
                    jz      vcon_emit_skp_read_buffer                                ;if equal no new DTMF
                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE                   ;can wrap up now as we g
ot our DTMF
                    mov     al, GS:byte ptr [bx]
;action0c.asm change. add di.
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], al
                    inc     bx                                                       ;inc read ptr
                    mov     dx, VCON_DLE_NUMBER_BUFFER_END
                    cmp     bx, dx
                    jb      skp_dle_number_buf_end
                    mov     bx, VCON_DLE_NUMBER_BUFFER                               ;set read ptr to begin o
f buffer
skp_dle_number_buf_end:
                    mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE    ;got our DTMF, lets
wrap up
                                                                                         ;this action (emit_m
sg). ie
                                                                                         ;close .pcm file, is
sue ATH etc.
vcon_emit_skp_read_buffer:
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;       PROCESS THE MODEM RESPONSES BASED ON RESPONSE COUNTER VALUE                               ;
;                                                                                                  ;
;       CASE OF vcon_emit_msg_response_cntr                                                       ;
;               0:    vcon_emit_msg_issue                                                         ;
;               1:    vcon_emit_msg_exp_ok                                                        ;
;               2:    vcon_emit_msg_exp_vcon                                                      ;
;               3:    vcon_emit_msg_exp_conn                                                      ;
;               4:    vcon_emit_msg_exp_xmit_cnt_0                                                ;
;               5:    vcon_emit_msg_exp_vcon_2                                                    ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;

; BRANCH BASED ON CHECK RESPONSE COUNTER                                                          ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;CATVOCOB-1
;action04.asm change. di->si in the next 4 lines.
                    lea     bx, word ptr vcon_emit_msg_response_table
                    mov     si, GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR]
                    shl     si, 1
                    jmp     cs:word ptr [si+bx]
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;

; case of 1:    EXPECT "OK" FROM MODEM                                                            ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_exp_ok:
;action0a.asm change
                    cmp     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_ath_issued
                    jne     not_ok_from_ath_or_few_counts
                    inc     GS:word ptr [EM_ATH_TO_OK_COUNT]
                    cmp     GS:word ptr [EM_ATH_TO_OK_COUNT], 0030h
                    jne     not_ok_from_ath_or_few_counts
                    mov     GS:word ptr [EM_ATH_TO_OK_COUNT], 0000h
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_etx_issued
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                    jmp     vcon_emit_msg_exit
not_ok_from_ath_or_few_counts:
;end action0a.asm change
```

```
                cmp     GS:byte ptr [VCON_3CR_DETECTED], TRUE
                jnz     vcon_emit_msg_exit
                mov     GS:byte ptr [VCON_3CR_DETECTED], FALSE
                mov     GS:byte ptr [VCON_2CR_DETECTED], FALSE
                                        ;here we must check that the response was indeed "ok".
                                        ;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points
 to the last '0ah'
                mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
                                        ;OK,'0dh','0ah'
                sub     bx, 03h                                         ;now points to OK
                cmp     GS:word ptr [bx], "KO"
                jnz     vcon_emit_msg_exit
                                        ;I really do not know what happens if the response is not OK.
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                                        ;reset so that next time control goes to issue
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h            ;flush the vcon_rbuf as a
n interpretation is made

                mov     ax, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
                                        ;now we can issue the next command.
                jmp     vcon_emit_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                        ;
;       CASE OF  :      EXPECT "OK" FROM MODEM  CASE OF AT#VLS?                          ;
;                                                                                        ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
em_exp_nbr_vls_ck:
                cmp     GS:byte ptr [VCON_3CR_DETECTED], 01h
                jnz     vcon_emit_msg_exit
                mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
                mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
;0,0dh,0ah
                sub     bx, 02h
;extract answer to question: AT#VLS?:
                mov     al, GS:byte ptr [bx]
                sub     al, 30h
                mov     ah, 0
                mov     GS:word ptr [MODEM_VLS_STATE], ax
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
;reset the vcon_rbuf as an interpretation is made
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     ax, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                jmp     vcon_emit_msg_issue

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;

; case of 2:    EXPECT "VCON" FROM MODEM                                                       ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_exp_vcon:
                cmp     GS:byte ptr [VCON_3CR_DETECTED], TRUE
                jnz     vcon_emit_msg_exit
                mov     GS:byte ptr [VCON_3CR_DETECTED], FALSE
                mov     GS:byte ptr [VCON_2CR_DETECTED], FALSE
                                        ;here we must check that the response was indeed "ok".
                                        ;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to
 the last '0ah'
                mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
                                        ;OK,'0dh','0ah'
                sub     bx, 05h                                         ;now it points to VCON
                cmp     GS:dword ptr [bx], "NOCV"
                jnz     vcon_emit_msg_exit
                                        ;I really do not know what happens if the response is not OK.
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                                        ;flush the vcon_rbuf as an interpretation is made
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     ax, VCON_IRQ03_RBUF
```

```
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
                                ;now we can issue the next command.
                jmp     vcon_emit_msg_issue

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                           ;
; case of 3:    EXPECT "CONNECT" FROM MODEM                                                                 ;
;                                                                                                           ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_exp_conn:
                cmp     GS:byte ptr [VCON_3CR_DETECTED], TRUE
                jnz     vcon_emit_msg_exit
                mov     GS:byte ptr [VCON_3CR_DETECTED], FALSE
                mov     GS:byte ptr [VCON_2CR_DETECTED], FALSE
                                ;here we must check that the response was indeed "ok".
                                ;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to
 the last '0ah'
                mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
                                ;OK,'0dh','0ah'
                sub     bx, 08h                                         ;now points to CONNECT
                cmp     GS:dword ptr [bx], "NNOC"
                jnz     vcon_emit_msg_exit
                                ;I really do not know what happens if the response is not OK.
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                                ;flush the vcon_rbuf as an interpretation is made
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     ax, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
                                ;now we can issue the next command.
                jmp     vcon_emit_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                           ;
; case of 4:    EXPECT XMIT COUNT = 0 (FROM IRQ03, NOT FROM MODEM)                                          ;
;                                                                                                           ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_exp_xmit_cnt_0:
                cmp     GS:word ptr [VCON_XMIT_COUNT], 0000h
                jnz     vcon_emit_msg_exit
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                jmp     vcon_emit_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                           ;
; case of 5:    EXPECT "VCON_2" FROM MODEM                                                                  ;
;                                                                                                           ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_exp_vcon_2:
                cmp     GS:byte ptr [VCON_2CR_DETECTED], TRUE
                jnz     vcon_emit_msg_exit
                mov     GS:byte ptr [VCON_2CR_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DETECT_3CR], FALSE
                mov     GS:byte ptr [VCON_CR_COUNT], 00h        ;here we must check that the respons
e was indeed "ok".
                                ;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to
 the last '0ah'
                mov     bx, GS:word ptr [VCON_RBF_2CR_DETECTED_PTR]
                                ;OK,'0dh','0ah'
                sub     bx, 05h                                         ;adjust pointer to VCON
                cmp     GS:dword ptr [bx], "NOCV"
                jnz     vcon_emit_msg_exit
                                ;I really do not know what happens if the response is not OK.
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                                ;reset the vcon_rbuf as an interpretation is made
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     ax, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
                                ;now we can issue the next command.
                jmp     vcon_emit_msg_issue
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                   ;
;       ISSUE MODEM AT COMMANDS BASED ON ISSUE COUNTER VALUE                                        ;
;                                                                                                   ;
;       CASE OF vcon_emit_msg_issue_cntr                                                            ;
;               0:  vcon_emit_msg_open_file                                                         ;
;               1:  vcon_emit_msg_cls                                                               ;
;               2:  vcon_emit_msg_vbs                                                               ;
;               3:  vcon_emit_msg_bdr                                                               ;
;               4:  vcon_emit_msg_vls                                                               ;
;               5:  vcon_emit_msg_vtx                                                               ;
;               6:  vcon_emit_msg_data                                                              ;
;               7:  vcon_emit_msg_etx                                                               ;
;               8:  vcon_emit_msg_clos_file                                                         ;
;               9:  vcon_emit_msg_ath                                                               ;
;                                                                                                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_issue:
;CATVOC0B-1
;action04.asm change. di->si in the next 4 lines
                    lea     bx, word ptr vcon_emit_msg_issued_table
                    mov     si, GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR]
                    shl     si, 1                               ;adjust to word
                    jmp     cs:word ptr [si+bx]
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                   ;

; case of 0:    OPEN FILE                                                                           ;
;                                                                                                   ;
;first must check that DOS is not in progress by checking the InDOS flag. ??????                    ;
;note that since cli here, checking InDOS is valid. No other process can take over                  ;
;while we are looking.                                                                              ;
;check for InDOS. initialize routine captured the InDOS flag address (es:bx)                        ;
;                                                                                                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_open_file:
;CATVOC0B-3: remove comments.
                    mov     al, LEVEL_2
                    mov     cl, TCB_LEVEL_DB_SIZE
                    mul     cl
;CATVOC0B-1
;action04.asm change PUSH DI. so that level_0 stepper (or vma level_1 stepper) preserve the
;calling DI.
                    PUSH    DI
                    mov     di, ax
                    cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                    jnz     skip_what_action
                    mov     bx, EMIT_MSG_START_PROGRAM_STEP
                                                                ;fixed step number for start_program templat
e
                    shl     bx, 1                               ;double for word
                    mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                                                                ;ax=address of state data area
                    mov     GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR], ax
                    mov     bx, ax
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                    mov     ax, GS:word ptr [VCON_EMIT_MSG_FILENAME_PTR]
                    mov     FS:word ptr [bx + OFFSET_TO_ARGUMENT], ax
;action0d.asm change. now, argument is a dword ptr.
;ACTION0D.ASM CHANGE. NO NEED TO LOAD FS AS STEP TABLE ENTRY FOR EMIT_MSG WILL SPECIFY WHICH.

;                   mov     ax, FS
;                   mov     FS:word ptr [bx + OFFSET_TO_ARGUMENT + 2], ax
;CATVOC0B-2
;action04.asm change. add the following 6 lines
;action0d.asm change. st entry loads GS:0 for param dword. SP will load to MTQ. no need here.
;                   mov     ax, GS:word ptr [START_CYLINDER]
;                   mov     FS:word ptr [bx + OFFSET_TO_PGM_PARAMETER], ax
;                   mov     al, GS:byte ptr [START_HEAD]
;                   mov     FS:byte ptr [bx + OFFSET_TO_PGM_PARAMETER + 2], al
;                   mov     al, GS:byte ptr [START_SECTOR]
```

```
;                   mov     FS:byte ptr [bx + OFFSET_TO_PGM_PARAMETER + 3], al
skip_what_action:   call    vcon_start_program
                    cmp     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
;CATVOC0B-1
;action04.asm change. POP DI. see above for explanation
                    POP     DI
                    jnz     vcon_emit_msg_exit
;action07.asm change
;we do not do cli from here to actual int 13h call because any interrupting irq must
;check for int 13h activity. we are just checking to see if there is int 13h at the
;foreground. scsi isr might interrupt and it makes int 13h calls but 5-95-108 specifies that
;scsi isr will be administered by maestro.
vcon_em_chk_int13_1:
;action0f.asm change
;disable scsi irq
                    in      al, 0a1h
                    or      al, 08h
                    out     0a1h, al
                    PUSH    DS
                    push    dx
                    mov     dx, SEG In_INT13H
                    mov     DS, dx
                    cmp     byte ptr In_INT13H, 00h
                    pop     dx
                    POP     DS
;action08.asm change
                    je      vcon_emit_msg_cont0
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], VCON_EMIT_MSG_CHK_INT13_1
;action0f.asm change
;enable scsi irq
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    jmp     vcon_emit_msg_exit
;end action07.asm change

;CATVOC0B-1
;action04.asm change.
vcon_emit_msg_cont0:mov     al, LEVEL_2
;end action08.asm change
                    mov     cl, TCB_LEVEL_DB_SIZE
                    mul     cl
                    PUSH    DI
                    mov     di, ax

                    mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], FALSE
                    mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
;CATVOC0B-2
;action04.asm change. 5-95-65. get sector count from hdc first sector, now that ldftohdc has completed
;next 16 lines, incluyding moving the now commented sector count line
                    mov     ax, GS
                    mov     ES, ax
;temporary use of transmit buffer. we assume we have exclusive use of this modem now.
                    mov     bx, VCON_IRQ03_TBUF
                    mov     dl, 80h
                    mov     dh, GS:byte ptr [START_HEAD]
                    mov     cx, GS:word ptr [START_CYLINDER]
                    shr     cx, 2
                    and     cl, 0c0h
                    or      cl, GS:byte ptr [START_SECTOR]
                    mov     ch, GS:byte ptr [START_CYLINDER]
                    mov     ax, 0201h
                    int     13h
                    mov     bx, VCON_IRQ03_TBUF
                    mov     ax, GS:word ptr [bx]
;sector count always an even number. emit_msg data portion expects it.
;action0h.asm change. 10/26/95. if vma_resume then keep old count.
                    cmp     GS:byte ptr [VMA_PAUSE], AM_RESUME
                    je      skip_sector_count_fm_hdc

                    and     ax, 0fffeh
                    mov     GS:word ptr [VCON_EMIT_MSG_SECTOR_COUNT], ax     ;140KB 7.2KHz 8PCM.
skip_sector_count_fm_hdc:
```

```
;CATVOC0B-1
;action04.asm change. POP DI. see above for explanation
                    POP     DI
;action02.asm change. remove di from the following instruction
;CATVOCD byte ptr  ->  word ptr
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], VCON_EMIT_MSG_OPENED_FILE
;action0f.asm change
;enable scsi irq
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    jmp     vcon_emit_msg_exit                  ;until next irq00
;end cazvox28.asm change
;action0d.asm change
;***********************************************
;*                                             *
;*      ISSUE LCD MESSAGE                      *
;*                                             *
;***********************************************
;2
em_issue_lcd_msg:       cmp     GS:byte ptr [LCD_IN_ACTION_IN_PROGRESS], TRUE
                        je      skip_over_chk_lcd_busy
                        pushf
                        cli
                        cmp     DS:byte ptr LCD_BUSY, TRUE              ;initialize to FALSE with CATVOICE
 install
                        je      skip_over_lcd
                        mov     DS:byte ptr LCD_BUSY, TRUE
                        mov     GS:byte ptr [LCD_IN_ACTION_IN_PROGRESS], TRUE
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE
                        popf
skip_over_chk_lcd_busy: call    lcd_sequencing
                        cmp     GS:byte ptr [LCD_PROCESS_DONE], 0ffh
                        jne     vcon_emit_msg_exit
                        mov     gs:byte ptr [LCD_PROCESS_DONE], 00000000b           ;LCD
                        mov     GS:byte ptr [LCD_IN_ACTION_IN_PROGRESS], FALSE
                        mov     DS:byte ptr LCD_BUSY, FALSE

                        mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], VCON_EMIT_MSG_ISSUED_LCD
                        jmp     vcon_emit_msg_exit
skip_over_lcd:          popf
                        jmp     vcon_emit_msg_exit

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                      ;

; case of 1:    AT#CLS=8 (PUT MODEM IN VOICE MODE)                                                     ;
;                                                                                                      ;
;I find that it is necessary to do at#cls=8 between two assignments of vls to prevent error           ;
;message. for vls=4, ath is also needed.                                                               ;
;                                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_cls:
                    mov     cx, lat_cls_8
                    lea     si, vcon_at_cls_8
                    call    vcon_issue_class2_cmd
                    jc      vcon_emit_msg_exit
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], VCON_EMIT_MSG_CLS_ISSUED
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], VCON_EMIT_MSG_EXPECT_OK
                    jmp     vcon_emit_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                      ;
; case of 2:    ISSUE AT#VBS=4 (BITS PER SAMPLE = 4)                                                   ;
;                                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_vbs:
                    mov     cx, lat_vbs_4
                    lea     si, word ptr vcon_at_vbs_4
                    call    vcon_issue_class2_cmd
```

```
                jc      vcon_emit_msg_exit
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_vbs_issued
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_ok
                jmp     vcon_emit_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                             ;

; case of 3:    ISSUE AT#BDR=16 (BAUD RATE = 16 * 2400 = 38,400)                                              ;
;                                                                                                             ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_bdr:
                mov     cx, lat_bdr_16
                lea     si, word ptr vcon_at_bdr_16
                call    vcon_issue_class2_cmd
                jc      vcon_emit_msg_exit
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_bdr_issued
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_ok
                jmp     vcon_emit_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                        ;
;       CASE OF  :      AT#VLS?    (CHECK MODEM RESOURCE STATE)                          ;
;                                                                                        ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
em_vls_check:   mov     cx, lat_vls_ck
                lea     si, word ptr vcon_at_vls_ck
                call    vcon_issue_class2_cmd
                jc      vcon_emit_msg_exit
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], em_vls_ck_issued
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], em_expect_nbr_to_vls_ck
                jmp     vcon_emit_msg_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                             ;


; case of 4:    ISSUE AT#VLS= from step table entry for this action                                           ;
;                                                                                                             ;
;for vls, we need to use the input vcon_resource which can have values of 0,1,2,3,4                          ;
;it is a byte. given this value, we need to go edit the data bytes at the start. si will                     ;
;point there. we shall have AT#VLS=n,0dh,00h. thus [si+7] will acquire a value.                              ;
;                                                                                                             ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;modem_vls_state is now available. first determine where the required vls number is. if
;the resource for the action is the current one, then go get it from the step table session
;parameters area. then check it against the modems vls number at the moment. there may or may
;not be a necessity to change it. if I did everthing allright, then we should not have
;situations where (0,4) <-> (1,2,3). such requests will give errors. perhaps in such cases I should
;just not do anything.
vcon_emit_msg_vls:  mov     ax, GS:word ptr [DI + VCON_RESOURCE]
                cmp     GS:word ptr [MODEM_VLS_STATE], ax
                jne     em_vls_state_not_equal
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_vls_issued
                jmp     vcon_emit_msg_exit
em_vls_state_not_equal:
;ideally we should check to see if the change requested is among (0,4) or (1,2,3)
;and if not, we hould not do it.
                mov     cx, lat_vls
                lea     si, word ptr vcon_at_vls
                                ;here we turn the byte vcon_resource to an
                                ;ascii value. 0000 0100 becomes 0011 0100.
                mov     ax, GS:word ptr [DI + VCON_RESOURCE]
                add     ax, ASCII_BASE          ;make ascii number =0030h
;action00.asm change... action writing to ds:data area that other modems also access
                pushf
                cli
                mov     byte ptr [si+OFF_TO_RESOURCE_IN_VLSSTR], al
                                ;AT#VLS=3 for example
                call    vcon_issue_class2_cmd
                jnc     skip_000
                popf
                jmp     vcon_emit_msg_exit
```

```
skip_000:           popf
;end action00.asm change
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_vls_issued
                                            ;NB not always OK, sometimes VCON depending
                                            ;on VLS value. 0=OK,1=VCON,2=VCON,3=N/A,4=OK
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_line
;begin casvox1s.asm changes
                    jnz     vcon_emit_msg_res_notol
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_ok
                    jmp     vcon_emit_msg_exit
vcon_emit_msg_res_notol:
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_line_handset_spkr
;end casvox1s.asm changes
                    jnz     vcon_emit_msg_res_notok
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_ok
                    jmp     vcon_emit_msg_exit
vcon_emit_msg_res_notok:
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_vcon
                    jmp     vcon_emit_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                    ;
; case of 5:    ISSUE AT#VTX  (VOICE TRANSMIT)                                                       ;
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_vtx:
                    mov     cx, lat_vtx
                    lea     si, word ptr vcon_at_vtx
                    call    vcon_issue_class2_cmd
                    jc      vcon_emit_msg_exit
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_vtx_issued
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_connect
                    jmp     vcon_emit_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                    ;
; case of 6:    TRANSMIT DATA UPON "CONNECT" FROM MODEM                                              ;
;                                                                                                    ;
;in this section we read the file whose handle we got and we stuff the data down the socket         ;
;modem. also here, we check for vcon_stop_msg. if stop message, then we skip to sending             ;
;<dle><etx>. first we reset the transmit buffer pointer as at this time, we know that the            ;
;class2 command was issued and response received. then we read 2048 bytes from the file             ;
;and put it to the buffer. this is really a memory to memory transfer. DOS does not use DMA         ;
;to do this transfer.                                                                                ;
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_data:
                    cmp     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
                    jz      vcon_emit_msg_stopped

                    cmp     GS:byte ptr [EMIT_MSG_FIRST_DATA], TRUE
                    jnz     not_emit_msg_first_data
                    mov     GS:byte ptr [EMIT_MSG_FIRST_DATA], FALSE
                    mov     bx, VCON_IRQ03_TBUF
                    mov     GS:word ptr [VCON_IRQ03_TBUF_PTR], bx
                    mov     GS:word ptr [VCON_IRQ00_TBUF_PTR], bx
                    mov     GS:word ptr [VCON_EMIT_MSG_DATA_CNT], 0000h
;action0c.asm change. move current CHS = start CHS to here to facilitate pause/resume.
;begin cazvox27.asm change. set values for CHS from start values
;action0h.asm change. vma0b.asm change. 10/24/95. pause solution.
                    cmp     GS:byte ptr [VMA_PAUSE], AM_RESUME
                    je      not_emit_msg_first_data

                    mov     ax, GS:word ptr [START_CYLINDER]
                    mov     GS:word ptr [CURRENT_CYLINDER], ax
                    mov     al, GS:byte ptr [START_HEAD]
                    mov     GS:byte ptr [CURRENT_HEAD], al
                    mov     al, GS:byte ptr [START_SECTOR]
;CATVOC0B-3: first current_sector = start_sector + 1 as the start_sector has file size data.
                    inc     al
                    mov     GS:byte ptr [CURRENT_SECTOR], al
```

```
not_emit_msg_first_data:
;action0h.asm change. vma0b.asm change. 10/24/95. pause solution. am_pause should never come here.
                    mov     GS:byte ptr [VMA_PAUSE], AM_NULL

                    inc     GS:word ptr [VCON_EMIT_MSG_DATA_CNT]
;action0c.asm change. diagnostics changes flags. fix. 5-95-86.
                    pushf
                    push    bx
                    push    dx
                    mov     bx, word ptr TICK_buffer_ptr
                    mov     dword ptr [bx], "=tnc"
                    add     bx, 4
                    mov     dx, GS:word ptr [VCON_EMIT_MSG_DATA_CNT]
                    mov     word ptr [bx], dx
                    add     bx, 2
                    mov     dword ptr [bx], "=SOD"
                    add     bx, 4
                    mov     byte ptr [bx], al
                    add     bx, 1
                    mov     dword ptr [bx], "=1cx"
                    add     bx, 4
                    mov     dx, GS:word ptr [VCON_XMIT_COUNT]
                    mov     word ptr [bx], dx
                    add     bx, 2
                    cmp     bx, OFFSET TICK_buffer_end
                    jb      TICK_buf_cont0
                    mov     bx, OFFSET TICK_buffer
TICK_buf_cont0:     mov     word ptr TICK_buffer_ptr, bx
                    pop     dx
                    pop     bx
                    popf

                    cmp     GS:word ptr [VCON_XMIT_COUNT], 0400h
                    jae     vcon_emit_msg_exit

;action07.asm change
;we do not do cli from here to actual int 13h call because any interrupting irq must
;check for int 13h activity. we are just checking to see if there is int 13h at the
;foreground. scsi isr might interrupt and it makes int 13h calls but 5-95-108 specifies that
;scsi isr will be administered by maestro.
;action0f.asm change
;disable scsi irq
                    in      al, 0a1h
                    or      al, 08h
                    out     0a1h, al
                    PUSH    DS
                    push    dx
                    mov     dx, SEG In_INT13H
                    mov     DS, dx
                    cmp     byte ptr In_INT13H, 00h
                    pop     dx
                    POP     DS
;action0f.asm change
                    je      vcon_emit_msg_cont8
;action0f.asm change
;enable scsi irq
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    jmp     vcon_emit_msg_exit
;end action07.asm change
vcon_emit_msg_cont8:
                    mov     al, 02h
                    mov     GS:byte ptr [SECTORS_TO_READ], al
                    mov     cx, GS
                    mov     ES, cx
                    mov     bx, GS:word ptr [VCON_IRQ00_TBUF_PTR]
                    mov     dl, 80h
                    mov     dh, GS:byte ptr [CURRENT_HEAD]
                    mov     cx, GS:word ptr [CURRENT_CYLINDER]
                    shr     cx, 2
                    and     cl, 0c0h
```

```
                    or      cl, GS:byte ptr [CURRENT_SECTOR]
                    mov     ch, GS:byte ptr [CURRENT_CYLINDER]
                    mov     ah, 02h

;action0c.asm change. diagnostics changes flags. fix. 6-95-86.
;as I changed start_timer to preserve carry, the fact that this diagnostic changed carry
;came to the fore. jc for is int 13 was not successful was exiting each time.
                    pushf
                    push    bx
                    push    cx
;                   push    ds

                    mov     bx, word ptr irq_03_buf_ptr
                    mov     dword ptr [bx], "trts"
                    add     bx, 0004h
                    lea     cx, word ptr irq_03_buf_end
                    cmp     bx, cx
                    jb      yyirq_03_not_ful
                    lea     bx, word ptr irq_03_buffer
yyirq_03_not_ful:   mov     word ptr irq_03_buf_ptr, bx

;                   pop     ds
                    pop     cx
                    pop     bx
                    popf

before_13h:         call    start_timer
                    int     13h
                    call    stop_timer
;action0f.asm change
;enable scsi irq
                    pushf                       ; so that and does not affect jc
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    popf

                    pushf
                    push    bx
                    push    cx
;                   push    ds

                    mov     bx, word ptr irq_03_buf_ptr
                    mov     dword ptr [bx], "pots"
                    add     bx, 0004h
                    lea     cx, word ptr irq_03_buf_end
                    cmp     bx, cx
                    jb      zzirq_03_not_ful
                    lea     bx, word ptr irq_03_buffer
zzirq_03_not_ful:   mov     word ptr irq_03_buf_ptr, bx

;                   pop     ds
                    pop     cx
                    pop     bx
                    popf


after_13h:          jc      vcon_emit_msg_exit
;now update the current CHS values. start with the sector
                    mov     al, GS:byte ptr [SECTORS_TO_READ]
                    add     GS:byte ptr [CURRENT_SECTOR], al
                    mov     bl, GS:byte ptr [MAX_USABLE_SECTOR]
                    cmp     GS:byte ptr [CURRENT_SECTOR], bl
                    jbe     no_inc_head_or_cyl1
                    sub     GS:byte ptr [CURRENT_SECTOR], bl

                    inc     GS:byte ptr [CURRENT_HEAD]          ;assumes sectors written were < max_sectors
                    mov     bl, GS:byte ptr [MAX_USABLE_HEAD]
                    cmp     GS:byte ptr [CURRENT_HEAD], bl
                    jbe     no_inc_head_or_cyl1
                    sub     GS:byte ptr [CURRENT_HEAD], bl
                    dec     GS:byte ptr [CURRENT_HEAD]
```

```
                    inc     GS:word ptr [CURRENT_CYLINDER]
                    mov     bx, GS:word ptr [MAX_USABLE_CYLINDER]
                    cmp     GS:word ptr [CURRENT_CYLINDER], bx
                    jbe     no_inc_head_or_cyl1
                    mov     bx, GS:word ptr [START_CYLINDER]
                    mov     GS:word ptr [CURRENT_CYLINDER], bx   ;if voice is so long, then back to start

no_inc_head_or_cyl1:mov     ah, 00h
                    sub     GS:word ptr [VCON_EMIT_MSG_SECTOR_COUNT], ax
                    jnz     not_last_sector
                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
not_last_sector:    shl     ax, 9
                    add     GS:word ptr [VCON_XMIT_COUNT], ax   ;actual number of bytes written
                    add     GS:word ptr [VCON_IRQ00_TBUF_PTR], ax;new irq00 ptr
                    mov     bx, VCON_IRQ03_TBUF_END
                    cmp     bx, GS:word ptr [VCON_IRQ00_TBUF_PTR]
                    ja      vcon_irq00_tbuf_wrapskp      ;if ptr < buf_end_ptr then no wrap
                    mov     bx, VCON_IRQ03_TBUF
                    mov     GS:word ptr [VCON_IRQ00_TBUF_PTR], bx   ;modulo arithmetic

vcon_irq00_tbuf_wrapskp:
                    call    vcon_set_tbfirq
                    jmp     vcon_emit_msg_exit                                      ;stay at this step

vcon_emit_msg_stopped:
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_data_issued
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_xmit_cnt_0
                    jmp     vcon_emit_msg_exit

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;


; case of 7:    ISSUE <DLE> ETX (10H 03H)                                                         ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_etx:
                    mov     cx, lvcon_dle_etx
;action0h.asm change. 10/27/95. if dtmf then can, if not then etx
                    cmp     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NO_DTMF          ;in case of no byte
                    jne     send_dle_can
                    lea     si, word ptr vcon_dle_etx
                    jmp     make_the_call
send_dle_can:       lea     si, word ptr vcon_dle_can
make_the_call:      call    vcon_issue_class2_cmd
                    jc      vcon_emit_msg_exit
;action07.asm change
;                   mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_ath_issued
                    mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_etx_issued
;end action07.asm change
                    mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_vcon_2
                    jmp     vcon_emit_msg_exit
;CATVOC0B-3. close file is not needed anymore. ldftohdc.exe read file to hdc and closed it.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;

; case of 9:    ISSUE ATH (HANG UP, ON HOOK)                                                      ;
;                                                                                                  ;
;ath so that during the next action we can just do at#cls=8 and still can do at#vls=0-4          ;
;w/o error messages. switching from vls=1,2,3 to vls=0,4 causes error message w/o ath in between.  ;
;with this change at#cls=8,at#vls=x will always work.                                             ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_ath:
;action0a.asm change
                    dec     GS:byte ptr [EM_ATH_DELAY]
                    jnz     vcon_emit_msg_exit
                    mov     GS:byte ptr [EM_ATH_DELAY], 10h     ;about 1 second delay (10h)
;end action0a.asm change
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_handset
                                            ;if handset, do ath
                    jz      vcon_emit_msg_issue_ath
```

```
                cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_speaker
                                        ;if speaker, do ath
                jz      vcon_emit_msg_issue_ath
                                        ;ath not required. but still must give value to
                                        ;issued cntr to move on to next state.
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_ath_issued
                jmp     vcon_emit_msg_exit
vcon_emit_msg_issue_ath:
                mov     cx, lath
                lea     si, word ptr vcon_ath
                call    vcon_issue_class2_cmd
                jc      vcon_emit_msg_exit
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], vcon_emit_msg_ath_issued
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], vcon_emit_msg_expect_ok
                jmp     vcon_emit_msg_exit              ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
; COMPLETE THE EMIT_MSG ACTION                                                                     ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_completed:
;action0i.asm change. 11/4/95.
                mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                cmp     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
                jne     emit_msg_not_goto_fax
                cmp     di, 0                   ; if not level_0 then do not do this
                jne     emit_msg_not_goto_fax   ; because acd will do this at its last step.
;actually this is redundant as emit_msg step table entry inside acd will not be written to
;(ie the flag). because, emit_msg inside acd does not have dlec enabled. but leave it in anyway.

                call    sim_ring_to_cas
emit_msg_not_goto_fax:

                mov     GS:byte ptr [VCON_EMIT_MSG_COMPLETE], TRUE
                mov     GS:byte ptr [VCON_EMIT_MSG_STOP], FALSE
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], 0000h
                mov     GS:byte ptr [DI + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
vcon_emit_msg_exit:

;cazvox27.asm change
;action0c.asm change. diagnostics changes flags. fix. 6-95-86.
                pushf
                push    bx
                push    ax
                mov     bx, word ptr TICK_buffer_ptr
                mov     dword ptr [bx], "=2cx"
                add     bx, 4
                mov     ax, GS:word ptr [VCON_XMIT_COUNT]
                mov     word ptr [bx], ax
                add     bx, 2
                cmp     bx, OFFSET TICK_buffer_end
                jb      TICK_buf_cont1
                mov     bx, OFFSET TICK_buffer
TICK_buf_cont1: mov     word ptr TICK_buffer_ptr, bx
                pop     ax
                pop     bx
                popf
;cazvox27.asm change

                pop     si
                pop     cx
                pop     dx
                pop     es
                pop     di
                pop     bx
                pop     ax
                pop     ds
                ret
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;   PROCESS TABLES                                                                                 ;
```

```
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_emit_msg_issued_table      dw  vcon_emit_msg_open_file      ;if cntr=0
                                dw  em_issue_lcd_msg             ;if cntr=1
                                dw  vcon_emit_msg_cls            ;if cntr=1. SKIP
                                dw  vcon_emit_msg_vbs            ;if cntr=2. SKIP
                                dw  vcon_emit_msg_bdr            ;if cntr=3. SKIP
                                dw  em_vls_check                 ;if cntr=5
                                dw  vcon_emit_msg_vls            ;if cntr=6
                                dw  vcon_emit_msg_vtx            ;if cntr=7
                                dw  vcon_emit_msg_data           ;if cntr=8
                                dw  vcon_emit_msg_etx            ;if cntr=9
;CATVOC0B-3: remove clos_file
                                dw  vcon_emit_msg_ath            ;if cntr=A. SKIP
                                dw  vcon_emit_msg_completed      ;if cntr=B
                                dw  vcon_em_chk_int13_1          ;if cntr=C

vcon_emit_msg_response_table    dw  vcon_emit_msg_issue          ;0 if no resp exp then issued
                                dw  vcon_emit_msg_exp_ok         ;1
                                dw  vcon_emit_msg_exp_vcon       ;2
                                dw  vcon_emit_msg_exp_conn       ;3
                                dw  vcon_emit_msg_exp_xmit_cnt_0;4
                                dw  vcon_emit_msg_exp_vcon_2     ;5
                                dw  em_exp_nbr_vls_ck            ;6
vcon_emit_msg       endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                    ;
; END   PROCEDURE   VCON_EMIT_MSG                                                                    ;
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                    ;
;   PROCEDURE   VCON_RECORD_MSG (direct)                                                             ;
;                                                                                                    ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_record_msg     proc
                    push    ds
                    push    ax
                    push    bx
                    push    di
                    push    es
                    push    dx
                    push    cx
                    push    si
;do not make the assumption that ax=address of state_data_area. it is only so once.
                    cmp     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                    jz      vcon_reco_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                                       ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                    mov     GS:byte ptr [VCON_RECO_MSG_COMPLETE], 00h
;action0d.asm change
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], 0003H
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000H
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]      ;ax=addr of state parameters
                    mov     ax, FS:word ptr [bx + OFFSET_TO_INPUTS]          ;first entry in params: inputs?
                    cmp     ax, EXPECT_DTMF                                  ;inputs?
                    jz      vcon_yes_inputs
;action0c.asm change. add di
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], JUMP_UNCOND   ;set flag register
                    jmp     vcon_reco_msg_cont_entry
vcon_yes_inputs:    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], FALSE
```

```
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], DTMF_ANALYZE  ;reset flag register

vcon_reco_msg_cont_entry:
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]          ;ax=address of state par
ameters
                    mov     ax, FS:word ptr [bx + OFFSET_TO_FILENAME]            ;ax=filename pointer
                    mov     GS:word ptr [VCON_RECO_MSG_FILENAME_PTR], ax
                    mov     ax, FS:word ptr [bx + RM_OFFSET_TO_VLS]              ;ax=resource number

;hairmi05.asm change
                    push    bx
                    cmp     ax, VCON_RESOURCE_IN_CURRENT
                    je      rm_resource_is_current
                    mov     GS:word ptr [DI + VCON_RESOURCE], ax
                    jmp     reco_msg_resource_calc
rm_resource_is_current:
                    mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]            ;bx=address of sess para
m area
                    mov     ax, FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_IN]
                    mov     GS:word ptr [DI + VCON_RESOURCE], ax
reco_msg_resource_calc:
                    pop     bx
;end hairmi05.asm change

                    mov     ax, FS:word ptr [bx + RM_OFFSET_TO_STOP_ON_DLE]       ;ax=stop_on_dlet
                    mov     GS:word ptr [DI + VCON_STOP_ON_DLE],ax
                    mov     bx, FS:word ptr [bx + RM_OFFSET_TO_SESSION_LENGTH_MSG_PTR] ;ax=address of sessio
n length of msg
                    mov     ax, FS:word ptr [bx]                                  ;ax=length of message in
 seconds
;now we need to transform this to a number of timer ticks. ie multiply it by 18.2. if we just mul-
;tiply it by 18.0 the percentage difference is 1%.
                    mov     bx, ax
                    shl     bx, 1                               ;multiply by 2
                    shl     ax, 4                               ;multiply by 16
                    add     ax, bx                              ;multiply by 18
                    mov     GS:word ptr [VCON_RECO_MSG_LENGTH], ax ;length in timer ticks
;the assembler knows to add cs: as these variables are inside the code segment. if these variables
;were inside a data segment then we would have to use es,fs,gs to refer to them. and then the
;assembler would not know which one to use. the assume statement would have been too general.
;CATVOCD-0
                    mov     GS:byte ptr [RECO_MSG_FIRST_DATA], TRUE

;action0a.asm change
                    mov     GS:byte ptr [RM_ATH_DELAY], 10h     ;about 1 second delay (10h)
                                                                ;still dies after 5-10 emits.
                                                                ;change 10h -> 20h. no changes.
                                                                ;0ffh no different either. thus
                                                                ;10h was very effective.
                    mov     GS:word ptr [RM_ATH_TO_OK_COUNT], 0000h
;end action0a.asm change

                    mov     bx, OFFSET TICK_buffer
                    mov     word ptr TICK_buffer_ptr, bx
;end cazvox27.asm change
;end cazvox26.asm change
;begin casvox1s.asm change
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                  ;
;       IF DTMF INPUTS EXPECTED, COLLECT DTMF FROM IRQ03                           ;
;                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_skp_entry:cmp     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;end casvox1s.asm change
                    jz      vcon_reco_skp_buffer
;here we check the irq03_dle_buffer. circular. keep it large enough so no overwrite. some little brat
;might be pressing all the buttons.
;action0c.asm change. add di
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NO_DTMF;in case of no byte
                    mov     ax, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]
                    mov     bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR]
```

```
                cmp     ax, bx
                jz      vcon_reco_skp_buffer            ;if equal no new bytes or a brat
                                                        ;pushed all the buttons
                mov     GS:byte ptr [VCON_RECO_MSG_STOP], 01h;can wrap up now as we got our byte
                mov     al, GS:byte ptr [bx]
;action0c.asm change. add di
                mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], al
                inc     bx
                mov     dx, VCON_DLE_NUMBER_BUFFER_END
                cmp     bx, dx
                jb      skr_dle_number_buf_end
                mov     bx, VCON_DLE_NUMBER_BUFFER
skr_dle_number_buf_end:
                mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
                mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                                                        ;got our byte, lets go.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                               ;
;       IF STOP_ON_DLE ENABLED, CHECK FOR DLE (HANDSET OFF HOOK)                ;
;                                                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;action0h.asm change. 10/21/95. check each occurrence and reset to false as there may have been
;more than one type occurring since the last t2.
vcon_reco_skp_buffer:
                test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLET + STOP_ON_DLEQ + STOP_ON_DLES
                jz      vcon_reco_skp_dle
vcon_reco_dlet_chk: test GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLET
                jz      vcon_reco_dles_chk
                cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE
                jne     vcon_reco_dles_chk
                mov     GS:byte ptr [VCON_RECO_MSG_STOP], 01h
                mov     GS:byte ptr [VCON_DLET_DETECTED], FALSE
                jmp     vcon_reco_dles_chk
vcon_reco_dles_chk: test GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLES
                jz      vcon_reco_dleq_chk
                cmp     GS:byte ptr [VCON_DLES_DETECTED], TRUE
                jne     vcon_reco_dleq_chk
                mov     GS:byte ptr [VCON_RECO_MSG_STOP], 01h
                mov     GS:byte ptr [VCON_DLES_DETECTED], FALSE
                jmp     vcon_reco_dleq_chk
vcon_reco_dleq_chk: test GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLEQ
                jz      vcon_reco_dlex_chk
                cmp     GS:byte ptr [VCON_DLEQ_DETECTED], TRUE
                jne     vcon_reco_dlex_chk
                mov     GS:byte ptr [VCON_RECO_MSG_STOP], 01h
                mov     GS:byte ptr [VCON_DLEQ_DETECTED], FALSE
                jmp     vcon_reco_dlex_chk
vcon_reco_dlex_chk:

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                               ;
;                                                                               ;
;       PROCESS MODEM RESPONSES BASED ON RESPONSE COUNTER VALUE                 ;
;                                                                               ;
;                                                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;CATVOC0B-1
;action04.asm change. di->si in the next 4 lines.
;action0h.asm change. 10/21/95. change label to dlet: -> dle:
vcon_reco_skp_dle:  lea bx, word ptr vcon_reco_msg_response_table
                mov     si, GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR]
                shl     si, 1
                jmp     cs:word ptr [si+bx]
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                               ;
;       CASE OF 1:      EXPECT "OK" FROM MODEM                                  ;
;                                                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_exp_ok:
;action0a.asm change
                cmp     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_ath_issued
                jne     not_ok_from_ath_or_few_countt
                inc     GS:word ptr [RM_ATH_TO_OK_COUNT]
```

```
                    cmp     GS:word ptr [RM_ATH_TO_OK_COUNT], 0030h
                    jne     not_ok_from_ath_or_few_countt
                    mov     GS:word ptr [RM_ATH_TO_OK_COUNT], 0000h
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_closed_file
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
                    jmp     vcon_reco_msg_exit
not_ok_from_ath_or_few_countt:
;end action0a.asm change
                    cmp     GS:byte ptr [VCON_3CR_DETECTED], 01h
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                    mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
;here we must check that the response was indeed "ok".
;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to the last '0ah'
                    mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
;OK,'0dh','0ah'
                    sub     bx, 03h
                    cmp     GS:word ptr [bx], "KO"
                    jnz     vcon_reco_msg_exit
;I really do not know what happens if the response is not OK.
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
;reset the vcon_rbuf as an interpretation is made
                    mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                    jmp     vcon_reco_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                             ;
;       CASE OF  :      EXPECT "OK" FROM MODEM  CASE OF AT#VLS?                               ;
;                                                                                             ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
rm_exp_nbr_vls_ck:
                    cmp     GS:byte ptr [VCON_3CR_DETECTED], 01h
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                    mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
                    mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
;0,0dh,0ah
                    sub     bx, 02h
;extract answer to question: AT#VLS?:
                    mov     al, GS:byte ptr [bx]
                    sub     al, 30h
                    mov     ah, 0
                    mov     GS:word ptr [MODEM_VLS_STATE], ax
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
;reset the vcon_rbuf as an interpretation is made
                    mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                    jmp     vcon_reco_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                             ;
;       CASE OF 2:      EXPECT "VCON" FROM MODEM                                              ;
;                                                                                             ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_exp_vcon:
                    cmp     GS:byte ptr [VCON_3CR_DETECTED], 01h
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                    mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
;here we must check that the response was indeed "ok".
;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to the last '0ah'
                    mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
;OK,'0dh','0ah'
                    sub     bx, 05h
                    cmp     GS:dword ptr [bx], "NOCV"
                    jnz     vcon_reco_msg_exit
;I really do not know what happens if the response is not OK.
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
;reset the vcon_rbuf as an interpretation is made
                    mov     GS:word ptr [VCON_RECV_COUNT], 0000h
```

```
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                    jmp     vcon_reco_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                         ;
;       CASE OF 3:      EXPECT "CONNECT" FROM MODEM                                       ;
;                                                                                         ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_exp_conn:
                    cmp     GS:byte ptr [VCON_3CR_DETECTED], 01h
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                    mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
;here we must check that the response was indeed "ok".
;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to the last '0ah'
                    mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
;OK,'0dh','0ah'
                    sub     bx, 08h
                    cmp     GS:dword ptr [bx], "NNOC"
                    jnz     vcon_reco_msg_exit
;I really do not know what happens if the response is not OK.
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
;reset the vcon_rbuf as an interpretation is made
                    mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                    jmp     vcon_reco_msg_issue
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                         ;
;       CASE OF 4:      EXPECT "DLE_ETX" FROM MODEM                                       ;
;                                                                                         ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_exp_dlex:
                    cmp     GS:byte ptr [VCON_DLE_ETX_DETECTED], 01h
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [VCON_DLE_ETX_DETECTED], 00h
;start casvox1w.asm change
;                   mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_vcon_2
;end casvox1w.asm change
;reset the vcon_rbuf as an interpretation is made
;start casvox1w.asm changes
;not true. we have one more response to receive ie VCON. once we receive it, then we can
;reset irq03_rbuf
;                   mov     GS:word ptr [VCON_RECV_COUNT], 0000h
;                   mov     ax, VCON_IRQ03_RBUF
;                   mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
;not true. we do not want to go to the next command yet.
;                   jmp     vcon_reco_msg_issue
                    jmp     vcon_reco_msg_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                         ;
;       CASE OF 5:      EXPECT "VCON_2" FROM MODEM                                        ;
;                                                                                         ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_exp_vcon_2:
                    cmp     GS:byte ptr [VCON_2CR_DETECTED], 01h
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
                    mov     GS:byte ptr [VCON_DETECT_3CR], 00h
                    mov     GS:byte ptr [VCON_CR_COUNT], 00h
;here we must check that the response was indeed "ok".
;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points to the last '0ah'
                    mov     bx, GS:word ptr [VCON_RBF_2CR_DETECTED_PTR]
;OK,'0dh','0ah'
                    sub     bx, 05h
                    cmp     GS:dword ptr [bx], "NOCV"
                    jnz     vcon_reco_msg_exit
;I really do not know what happens if the response is not OK.
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
```

```
;reset the vcon_rbuf as an interpretation is made
                    mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                    jmp     vcon_reco_msg_issue
;end casvox1w.asm changes
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                      ;
;                                                                                      ;
;       ISSUE MODEM AT COMMANDS BASED ON ISSUE COUNTER VALUE                           ;
;                                                                                      ;
;                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;CATVOC0B-1
;action04.asm change. di->si in the next 4 lines.
vcon_reco_msg_issue:lea     bx, word ptr vcon_reco_msg_issued_table
                    mov     si, GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR]
                    shl     si, 1
                    jmp     cs:word ptr [si+bx]
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                      ;
;       CASE OF 1:      AT#CLS=8                                                       ;
;                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_cls:  mov     cx, lat_cls_8
                    lea     si, word ptr vcon_at_cls_8
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_cls_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                      ;
;       CASE OF 2:      AT#VBS=8  (8 BIT PCM)                                          ;
;                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_vbs:  mov     cx, lat_vbs_4
                    lea     si, word ptr vcon_at_vbs_4
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_vbs_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                      ;
;       CASE OF 3:      AT#BDR=48 (BAUD RATE)                                          ;
;                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_bdr:  mov     cx, lat_bdr_16
                    lea     si, word ptr vcon_at_bdr_16
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_bdr_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit          ;until next irq00
;for vls, we need to use the input vcon_resource which can have values of 0,1,2,3,4
;it is a byte. given this value, we need to go edit the data bytes at the start. si will
;point there. we shall have AT#VLS=n,0dh,00h. thus [si+7] will acquire a value.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                      ;
;       CASE OF  :      AT#VLS?    (CHECK MODEM RESOURCE STATE)                        ;
;                                                                                      ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
rm_vls_check:       mov     cx, lat_vls_ck
                    lea     si, word ptr vcon_at_vls_ck
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], rm_vls_ck_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], rm_expect_nbr_to_vls_ck
                    jmp     vcon_reco_msg_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                      ;
```

```
;       CASE OF 4:       AT#VLS=    (CHOOSE RESOURCE)                                          ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;modem_vls_state is now available. first determine where the required vls number is. if
;the resource for the action is the current one, then go get it from the step table session
;parameters area. then check it against the modems vls.number at the moment. there may or may
;not be a necessity to change it. if I did everthing allright, then we should not have
;situations where (0,4) <-> (1,2,3). such requests will give errors. perhaps in such cases I should
;just not do anything.
vcon_reco_msg_vls:  mov     ax, GS:word ptr [DI + VCON_RESOURCE]
                    cmp     GS:word ptr [MODEM_VLS_STATE], ax
                    jne     rm_vls_state_not_equal
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_vls_issued
                    jmp     vcon_reco_msg_exit
rm_vls_state_not_equal:
;ideally we should check to see if the change requested is among (0,4) or (1,2,3)
;and if not, we hould not do it.
                    mov     cx, lat_vls
                    lea     si, word ptr vcon_at_vls
;here we turn the byte vcon_resource to an ascii value. 0000 0100 becomes 0011 0100.
                    mov     ax, GS:word ptr [DI + VCON_RESOURCE]
                    add     ax, ASCII_BASE              ;make ascii number
;action00.asm change... action writing to ds:data area that other modems also access
                    pushf
                    cli
                    mov     byte ptr [si+OFF_TO_RESOURCE_IN_VLSSTR], al     ;AT#VLS=3 for example [+7]
                    call    vcon_issue_class2_cmd
                    jnc     skip_001
                    popf
                    jmp     vcon_reco_msg_exit
skip_001:           popf
;end action00.asm change
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_vls_issued
;NB not always OK, sometimes VCON depending on VLS value. 0=OK,1=VCON,2=VCON,3=N/A,4=OK
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_line
;begin casvoxls.asm changes
                    jnz     vcon_reco_msg_res_notol
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit
vcon_reco_msg_res_notol:
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_line_handset_spkr
;end casvoxls.asm changes
                    jnz     vcon_reco_msg_res_notok
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit
vcon_reco_msg_res_notok:
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_vcon
                    jmp     vcon_reco_msg_exit          ;until next irq00
;action0h.asm change
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       CASE OF 5:       AT#VTS   (BEEP)                                                       ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_vts:  mov     cx, lat_vts
                    lea     si, word ptr vcon_at_vts
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_vts_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       CASE OF 5:       AT#VRX   (SET TO RECEIVE MODE)                                        ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_vrx:  mov     cx, lat_vrx
                    lea     si, word ptr vcon_at_vrx
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_vrx_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_connect
                    jmp     vcon_reco_msg_exit          ;until next irq00
```

```
;in this section, we read the irq03_rbuf and write the data to the file whose handle we got
;above. also here, we check for vcon_stop_msg. if stop message, then we skip to sending "!"
;the receive buffer has been cleared by now. irq03_rbuf_ptr has been reset to the
;beginning of irq03_rbuf.   tbuf and rbuf are
;setup differently. tbuf wraps around whereas rbuf tries to detect buffer about to get full
;situations to put out an <XOFF> to the SM. and with instruction echoes, the policy has been
;to clear the buffer as soon as the "OK" or other response is received. so in this case, we
;read what was there (we know this from recv_count) in the irq03_rbuf and then stuff it in the
;file. after having done this we reset the receive buffer.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       CASE OF 6:      RECORD DATA                                                            ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_data: cmp     GS:byte ptr [VCON_RECO_MSG_STOP], 01h
                    je      vcon_reco_msg_stopped

                    cmp     GS:byte ptr [RECO_MSG_FIRST_DATA], TRUE
                    jne     not_reco_msg_first_data
                    mov     GS:byte ptr [RECO_MSG_FIRST_DATA], FALSE

                    mov     bx, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], bx
                    mov     GS:word ptr [VCON_IRQ00_RBUF_PTR], bx

                    mov     GS:word ptr [VCON_RECO_MSG_DATA_CNT], 0000H
                    mov     GS:word ptr [VCON_RECO_MSG_SECTOR_COUNT], 0000H

                    mov     ax, GS:word ptr [START_CYLINDER]
                    mov     GS:word ptr [CURRENT_CYLINDER], ax
                    mov     al, GS:byte ptr [START_HEAD]
                    mov     GS:byte ptr [CURRENT_HEAD], al
                    mov     al, GS:byte ptr [START_SECTOR]
                    inc     al
                    mov     GS:byte ptr [CURRENT_SECTOR], al

not_reco_msg_first_data:
                    inc     GS:word ptr [VCON_RECO_MSG_DATA_CNT]
                    dec     GS:word ptr [VCON_RECO_MSG_LENGTH]          ;length in timer ticks
                    jnz     vcon_reco_skp_length
                    mov     GS:byte ptr [VCON_RECO_MSG_STOP], 01h

vcon_reco_skp_length:
;action0c.asm change. diagnostics changes flags. fix. 6-95-86.
                    pushf
                    push    bx
                    push    dx
                    mov     bx, word ptr TICK_buffer_ptr
                    mov     dword ptr [bx], "=tnc"
                    add     bx, 4
                    mov     dx, GS:word ptr [VCON_RECO_MSG_LENGTH]
                    mov     word ptr [bx], dx
                    add     bx, 2
                    mov     dword ptr [bx], "=1cr"
                    add     bx, 4
                    mov     dx, GS:word ptr [VCON_RECV_COUNT]
                    mov     word ptr [bx], dx
                    add     bx, 2
                    cmp     bx, OFFSET TICK_buffer_end
                    jb      TICK_buf_cont2
                    mov     bx, OFFSET TICK_buffer
TICK_buf_cont2:     mov     word ptr TICK_buffer_ptr, bx
                    pop     dx
                    pop     bx
                    popf

                    mov     ax, GS:word ptr [VCON_RECV_COUNT]
                    cmp     ax, 0400h
                    jb      vcon_reco_msg_exit

;we do not do cli from here to actual int 13h call because any interrupting irq must
;check for int 13h activity. we are just checking to see if there is int 13h at the
;foreground. scsi isr might interrupt and it makes int 13h calls but 5-95-108 specifies that
```

```
;scsi isr will be administered by maestro.
;action0f.asm change
;disable scsi irq
                    in      al, 0a1h
                    or      al, 08h
                    out     0a1h, al

                    PUSH    DS
                    push    dx
                    mov     dx, SEG In_INT13H
                    mov     DS, dx
                    cmp     byte ptr In_INT13H, 00h
                    pop     dx
                    POP     DS
;action0f.asm change
                    je      vcon_reco_msg_cont8
;action0f.asm change
;enable scsi irq
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    jmp     vcon_reco_msg_exit
vcon_reco_msg_cont8:
                    mov     al, 02h
                    mov     GS:byte ptr [SECTORS_TO_WRITE], al

                    mov     cx, GS
                    mov     ES, cx
                    mov     bx, GS:word ptr [VCON_IRQ00_RBUF_PTR]
                    mov     dl, 80h
                    mov     dh, GS:byte ptr [CURRENT_HEAD]
                    mov     cx, GS:word ptr [CURRENT_CYLINDER]
                    shr     cx, 2
                    and     cl, 0c0h
                    or      cl, GS:byte ptr [CURRENT_SECTOR]
                    mov     ch, GS:byte ptr [CURRENT_CYLINDER]
                    mov     ah, 03h

before_13h:         int     13h
;action0f.asm change
;enable scsi irq
                    pushf
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    popf
after_13h:          jc      vcon_reco_msg_exit
;now update the current CHS values. start with the sector
                    mov     al, GS:byte ptr [SECTORS_TO_WRITE]
                    mov     ah, 00h
                    add     GS:word ptr [VCON_RECO_MSG_SECTOR_COUNT], ax
                    add     GS:byte ptr [CURRENT_SECTOR], al
                    mov     bl, GS:byte ptr [MAX_USABLE_SECTOR]
                    cmp     GS:byte ptr [CURRENT_SECTOR], bl
                    jbe     no_inc_head_or_cyl
                    sub     GS:byte ptr [CURRENT_SECTOR], bl

                    inc     GS:byte ptr [CURRENT_HEAD]          ;assumes sectors'written were < max_sectors
                    mov     bl, GS:byte ptr [MAX_USABLE_HEAD]
                    cmp     GS:byte ptr [CURRENT_HEAD], bl
                    jbe     no_inc_head_or_cyl
                    sub     GS:byte ptr [CURRENT_HEAD], bl
                    dec     GS:byte ptr [CURRENT_HEAD]

                    inc     GS:word ptr [CURRENT_CYLINDER]
                    mov     bx, GS:word ptr [MAX_USABLE_CYLINDER]
                    cmp     GS:word ptr [CURRENT_CYLINDER], bx
                    jbe     no_inc_head_or_cyl
                    mov     bx, GS:word ptr [START_CYLINDER]
                    mov     GS:word ptr [CURRENT_CYLINDER], bx      ;if voice is so long, then back to start

no_inc_head_or_cyl: mov     ah, 00h
                    shl     ax, 9
```

```
                    sub     GS:word ptr [VCON_RECV_COUNT], ax        ;actual number of bytes written
                    add     GS:word ptr [VCON_IRQ00_RBUF_PTR], ax    ;new irq00 ptr
;vcon_adj_rbuf_irq00_ptr:
                    mov     bx, VCON_IRQ03_RBUF_END                  ;if ptr goes beyond buf end.
                    cmp     bx, GS:word ptr [VCON_IRQ00_RBUF_PTR]
                    ja      vcon_irq00_rbuf_wrapskp                  ;if ptr < buf_end_ptr then no wrap
                    mov     bx, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ00_RBUF_PTR], bx    ;modulo arithmetic
vcon_irq00_rbuf_wrapskp:
                    jmp     vcon_reco_msg_exit
;NOTE ON THE NEW RBUF FOR VOICE:         THE NEW RBUF IS 5 SECTORS LONG.
;RBUF_END IS LOCATED AT THE END OF THE 4TH SECTOR. 3C0 BECOMES 9C0. THIS WAY RBUF WRAPS AROUND
;AFTER 4TH SECTOR AND 3C0 ISSUES NEVER COME UP.

vcon_reco_msg_stopped:
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_data_issued
                    jmp     vcon_reco_msg_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                          ;
;       CASE OF 7:      ISSUE "!"                                                          ;
;                                                                                          ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;issue "!"
vcon_reco_msg_exclam:
                    mov     cx, lvcon_exclam
                    lea     si, word ptr vcon_exclam
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_exclam_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_dle_etx
                    jmp     vcon_reco_msg_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                          ;
;       CASE OF 8:      CLOSE FILE                                                         ;
;                                                                                          ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_clos_file:
                    PUSH    DI
                    mov     al, LEVEL_2
                    mov     cl, TCB_LEVEL_DB_SIZE
                    mul     cl
                    mov     di, ax
                    cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                    jnz     skip_what_action

;action07.asm change
;we do not do cli from here to actual int 13h call because any interrupting irq must
;check for int 13h activity. we are just checking to see if there is int 13h at the
;foreground. scsi isr might interrupt and it makes int 13h calls but 5-95-108 specifies that
;scsi isr will be administered by maestro.
;action0f.asm change
;disable scsi irq
                    in      al, 0a1h
                    or      al, 08h
                    out     0a1h, al

                    PUSH    DS
                    push    dx
                    mov     dx, SEG In_INT13H
                    mov     DS, dx
                    cmp     byte ptr In_INT13H, 00h
                    pop     dx
                    POP     DS
;action0f.asm change
                    je      vcon_reco_msg_cont9
;action0f.asm change
;enable scsi irq
                    pushf
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al
                    popf
                    jmp     reco_msg_int13h_busy_exit
```

```
;end action07.asm change

;write the number of sectors recorded to first sector.
vcon_reco_msg_cont9:
                    mov     ax, GS
                    mov     ES, ax
                    mov     bx, VCON_RECO_MSG_SECTOR_COUNT
                    mov     ax, GS:word ptr [bx]
;sector count always an even number. reco_msg data portion expects it.
                    and     ax, 0fffeh
                    mov     GS:word ptr [VCON_RECO_MSG_SECTOR_COUNT], ax     ;140KB 7.2KHz 8PCM.
                    mov     dl, 80h
                    mov     dh, GS:byte ptr [START_HEAD]
                    mov     cx, GS:word ptr [START_CYLINDER]
                    shr     cx, 2
                    and     cl, 0c0h
                    or      cl, GS:byte ptr [START_SECTOR]
                    mov     ch, GS:byte ptr [START_CYLINDER]
                    mov     ax, 0301h
                    int     13h
;action0f.asm change
;enable scsi irq
                    in      al, 0a1h
                    and     al, 0f7h
                    out     0a1h, al

                    mov     bx, RECO_MSG_START_PROGRAM_STEP
                                                            ;fixed step number for start_program templat
e
                    shl     bx, 1                           ;double for word
                    mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                                                            ;ax=address of state data area
                    mov     GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR], ax
                    mov     bx, ax
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                    mov     ax, GS:word ptr [VCON_RECO_MSG_FILENAME_PTR]
                    mov     FS:word ptr [bx + OFFSET_TO_ARGUMENT], ax
;action0d.asm change. now, argument is a dword ptr.
;action0d.asm change. no need to load FS. it is specified in the step table entry for this sp.

;                   mov     ax, FS
;                   mov     FS:word ptr [bx + OFFSET_TO_ARGUMENT + 2], ax
;action0d.asm change. we are now passing GS:0 and let stffmhdc figure out the rest.
;                   mov     ax, GS:word ptr [START_CYLINDER]
;                   mov     FS:word ptr [bx + OFFSET_TO_PGM_PARAMETER], ax
;                   mov     al, GS:byte ptr [START_HEAD]
;                   mov     FS:byte ptr [bx + OFFSET_TO_PGM_PARAMETER + 2], al
;                   mov     al, GS:byte ptr [START_SECTOR]
;                   mov     FS:byte ptr [bx + OFFSET_TO_PGM_PARAMETER + 3], al

skip_what_action:   call    vcon_start_program
                    cmp     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
;action07.asm change. add label.
reco_msg_int13h_busy_exit:
;end action07.asm change
                    POP     DI
;NOTE: if this jnz changes, reconsider the int 13 busy check above.
                    jnz     vcon_reco_msg_exit

                    PUSH    DI
                    mov     al, LEVEL_2
                    mov     cl, TCB_LEVEL_DB_SIZE
                    mul     cl
                    mov     di, ax
                    mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], FALSE
                    mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                    POP     DI

                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_closed_file
                    jmp     vcon_reco_msg_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;       CASE OF 9:      ATH     (HANG UP)                                                          ;
```

```
;                                                                                         ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

vcon_reco_msg_ath:
;action0a.asm change
                    dec     GS:byte ptr [RM_ATH_DELAY]
                    jnz     vcon_reco_msg_exit
                    mov     GS:byte ptr [RM_ATH_DELAY], 10h     ;about 1 second delay (10h)
;end action0a.asm change
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_handset    ;if handset, do ath
                    jz      vcon_reco_msg_issue_ath
;begin casvox1s.asm change
                    cmp     GS:word ptr [DI + VCON_RESOURCE], vcon_microphone ;if microphone, do ath
;end casvox1s.asm change
                    jz      vcon_reco_msg_issue_ath
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_ath_issued
                    jmp     vcon_reco_msg_exit          ;until next irq00
;ath so that during the next action we can just do at#cls=8 and still can do at#vls=0-4
;w/o error messages. switching from vls=1,2,3 to vls=0,4 causes error message w/o ath in between.
;with this change at#cls=8,at#vls=x will always work.
vcon_reco_msg_issue_ath:
                    mov     cx, lath
                    lea     si, word ptr vcon_ath
                    call    vcon_issue_class2_cmd
                    jc      vcon_reco_msg_exit
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], vcon_reco_msg_ath_issued
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], vcon_reco_msg_expect_ok
                    jmp     vcon_reco_msg_exit          ;until next irq00
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                         ;
;       CASE OF A:      COMPLETE RECO_MSG                                                 ;
;                                                                                         ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_completed:
                    mov     GS:byte ptr [VCON_RECO_MSG_COMPLETE], TRUE
                    mov     GS:byte ptr [VCON_RECO_MSG_STOP], FALSE
;action0d.asm change
                    mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], 0003H
                    mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
                    mov     GS:byte ptr [DI + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                    mov     bx, VCON_IRQ03_RBUF
                    mov     GS:word ptr [VCON_IRQ00_RBUF_PTR], bx
vcon_reco_msg_exit:

;cazvox24.asm change
;action0c.asm change. diagnostics changes flags. fix. 6-95-86.
                    pushf
                    push    bx
                    push    ax
                    mov     bx, word ptr TICK_buffer_ptr
                    mov     dword ptr [bx], "=2cr"
                    add     bx, 4
                    mov     ax, GS:word ptr [VCON_RECV_COUNT]
                    mov     word ptr [bx], ax
                    add     bx, 2
                    cmp     bx, OFFSET TICK_buffer_end
                    jb      TICK_buf_cont3
                    mov     bx, OFFSET TICK_buffer
TICK_buf_cont3:     mov     word ptr TICK_buffer_ptr, bx
                    pop     ax
                    pop     bx
                    popf
;cazvox24.asm change

                    pop     si
                    pop     cx
                    pop     dx
                    pop     es
                    pop     di
                    pop     bx
                    pop     ax
                    pop     ds
                    ret
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                         ;
;       RECO_MSG PROCESS TABLES                                                           ;
;                                                                                         ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_reco_msg_issued_table      dw  vcon_reco_msg_cls        ;if cntr=0. SKIP
                                dw  vcon_reco_msg_vbs        ;if cntr=1. SKIP
                                dw  vcon_reco_msg_bdr        ;if cntr=2. SKIP
                                dw  rm_vls_check             ;if cntr=3
                                dw  vcon_reco_msg_vls        ;if cntr=4
                                dw  vcon_reco_msg_vrx        ;if cntr=5
                                dw  vcon_reco_msg_data       ;if cntr=6
                                dw  vcon_reco_msg_exclam     ;if cntr=7
                                dw  vcon_reco_msg_clos_file  ;if cntr=8
                                dw  vcon_reco_msg_ath        ;if cntr=9. SKIP
                                dw  vcon_reco_msg_completed  ;if cntr=A
                                dw  vcon_reco_msg_vts        ;if cntr=B

vcon_reco_msg_response_table    dw  vcon_reco_msg_issue      ;0 if no resp exp then issued
                                dw  vcon_reco_msg_exp_ok     ;1
                                dw  vcon_reco_msg_exp_vcon   ;2
                                dw  vcon_reco_msg_exp_conn   ;3
                                dw  vcon_reco_msg_exp_dlex   ;4
                                dw  vcon_reco_msg_exp_vcon_2;5
                                dw  rm_exp_nbr_vls_ck        ;6
vcon_record_msg     endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                               ;
; END   PROCEDURE   VCON_reco_MSG                                                               ;
;                                                                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                               ;
;   PROCEDURE   VCON_HANGUP                                                                     ;
;                                                                                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;this is like emit_msg. the difference is that the file name to be emitted does not come as a
;variable or a constant. rather it is in a file whose name comes as a constant or a variable.
vcon_hangup     proc
                push    ds
                push    ax
                push    bx
                push    di
                push    es
                push    dx
                push    cx
                push    si
                cmp     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                jnz     vcon_hang_up_skp_entry
;**************************************************************
;*                                                            *
;*  WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP          *
;*                                                            *
;**************************************************************
;action0d.asm change
                mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                mov     GS:byte ptr [HUP_ATH_DELAY], 10h
                mov     GS:word ptr [HUP_ATH_TO_OK_COUNT], 0000h
                mov     GS:word ptr [VCON_HANG_UP_ISSUED_CNTR], 0000H
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], 0000H
vcon_hang_up_skp_entry:
                lea     bx, word ptr vcon_hang_up_response_table
                mov     si, GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR]
                shl     si, 1
                jmp     cs:word ptr [si+bx]
vcon_hang_up_exp_ok:
;action0d.asm change
                inc     GS:word ptr [HUP_ATH_TO_OK_COUNT]
                cmp     GS:word ptr [HUP_ATH_TO_OK_COUNT], 0030h
                jne     hup_few_counts
                mov     GS:word ptr [HUP_ATH_TO_OK_COUNT], 0000h
```

```
                mov     GS:word ptr [VCON_HANG_UP_ISSUED_CNTR], 0000H
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], 0000H
                jmp     vcon_hang_up_exit
hup_few_counts:
                cmp     GS:byte ptr [VCON_3CR_DETECTED], 01h
                jnz     vcon_hang_up_exit
                mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
                mov     bx, GS:word ptr [VCON_RBF_3CR_DETECTED_PTR]
                sub     bx, 03h
                cmp     GS:word ptr [bx], "KO"
                jnz     vcon_hang_up_exit
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], 0000h
;reset the vcon_rbuf as an interpretation is made
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     ax, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], ax
;now we can issue the next command.
                jmp     vcon_hang_up_issue

vcon_hang_up_issue:
                lea     bx, word ptr vcon_hang_up_issued_table
                mov     si, GS:word ptr [VCON_HANG_UP_ISSUED_CNTR]
                shl     si, 1
                jmp     cs:word ptr [si+bx]
vcon_hang_up_ath:
                dec     GS:byte ptr [HUP_ATH_DELAY]
                jnz     vcon_hang_up_exit
                mov     GS:byte ptr [HUP_ATH_DELAY], 10h        ;about 1 second delay (10h)
                mov     cx, lath
                lea     si, word ptr vcon_ath
                call    vcon_issue_class2_cmd
                jc      vcon_hang_up_exit
                mov     GS:word ptr [VCON_HANG_UP_ISSUED_CNTR], vcon_hang_up_ath_issued
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], vcon_hang_up_expect_ok
                jmp     vcon_hang_up_exit
vcon_hang_up_completed:
                mov     GS:word ptr [VCON_HANG_UP_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], 0000h
;action0h.asm change
                mov     GS:byte ptr [TMO_ATH_ISSUED_IN_RIBBON], TRUE
                mov     GS:byte ptr [DI + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
vcon_hang_up_exit:
                pop     si
                pop     cx
                pop     dx
                pop     es
                pop     di
                pop     bx
                pop     ax
                pop     ds
                ret
vcon_hang_up_issued_table       dw  vcon_hang_up_ath        ;if cntr=0
                                dw  vcon_hang_up_completed  ;if cntr=1
vcon_hang_up_response_table     dw  vcon_hang_up_issue      ;0
                                dw  vcon_hang_up_exp_ok     ;1

vcon_hangup     endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
; END   PROCEDURE   VCON_HANGUP                                                                    ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;strtpgm1.asm <- strtpgm0.asm. 4/18/95. MAKE TCB RELATED CHANGES.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;   PROCEDURE   VCON_START_PROGRAM                                                                 ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;       step table entry for start_program
```

```
;
;step_0003_data_area     dw      START_PROGRAM           ;action: start_program ie 0007h
;                        dw      DTMF_ANALYZE            ;step_status register for this step. 0000h at start
;                        dw      step_0003_parameters    ;offset to parameters
;step_0003_next_step     dw      DO_NOT_CARE             ;step_status=0002h does not happen: no repeat
;                        dw      DO_NOT_CARE             ;expect inputs so f=0000 within action and this does
 not come up
;                        dw      SEND_FAX_STEP_2         ;no dtmf
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=0 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=1 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=2 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=3 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=4 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=5 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=6 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=7 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=8 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=9 abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=* abort
;                        dw      ABORT_SEND_FAX_AT_STEP_1;dtmf=# abort
;step_0003_parameters    dw      EXPECT_DTMF             ;ie 0001h       DO_NOT_EXPECT_DTMF=0000h
;                        dw      vcon_session_filename_4 ;c:\catbox\scan\scan.exe /r /i=c:\catbox\scan\w0.ini
;action0d.asm change. argument ptr is a dword. this is for when tqr places requests in ttq from one modem
;to be executed by another modem. you need to pass the step table SEG also. it may also be that fmaestro
;is submitting tasks for ttq (such as email retrieval), in which case it gives SEG=system data area.
;the main reason for this change is this: there may be a faxback request that results in ttq entry and
;before this one is executed, there may be another one with a different filename for .tcf. if only a
;pointer is passed, the value in the pointed area might change before the first ttq entry is executed.
;MY THINKING ON JUNE 29, 1995. GO BACK TO WORD FOR ARGUMENT POINTER. OR EASIER, HAVE START_PROGRAM
;JUST LOAD FS FOR ARGUMENT DWORD PTR + 2 OF MTQ AS IT DID BEFORE. IT IS VERY HARD TO PASS THE SEG NO
;OF ST ANY OTHER WAY.
;HOW IS THE ARGUMENT USED? PASS FILE NAMES AS ARGUMENTS FOR PROGRAMS. FOR EXAMPLE FOR EMIT MSG, THE
;FILENAME IS THE FILE OF VOICE MESSAGE TO EMIT. SOMETIMES THESE NAMES ARE IN VCON_SESSION_CONSTANT
;LOCATIONS. THEN THEY WILL NOT BE OVERWRITTEN. IN SOME CASES, THEY WILL BE IN VCON_SESSION_VARIABLE
;LOCATIONS. AN EXAMPLE IS VMA'S EMIT MESSAGE. BUT HERE, THE NEXT VOICE MAIL MESSAGE WILL NOT BE ISSUED
;BEFORE THIS ONE IS COMPLETED. FOR TTQ, WE WILL LOAD THE FILE NAME ITSELF SO WE ARE SAFE. FOT MTQ, WE
;ARE LOADING THE POINTERS. THIS MAY CHANGE. SO MAYBE, INSTEAD OF LOADING POINTERS WITH START_PROGRAM,
;WE LOAD THE FILENAME. THUS INSTEAD OF MEASTRO DOING THIS, WE DO IT WITH START_PROGRAM.
;S O L U T I O N : HAVE START_PROGRAM LOAD THE FILENAME OR WHATEVER ASCI STRING TO MTQ INSTEAD OF MTQ
;DECODING THE POINTER TO THE ASCIIZ STRING. THIS PREVENTS OVERWRITING. BUT NOT MAKING THE ARGUMENT
;POINTER A DWORD.
;WHY THE SAME PROBLEM DOES NOT OCCUR FOR PROGRAM NAME? BECAUSE PROGRAM NAMES ARE AT VCON_SESSION_CONSTANT
;LOCATIONS.
;                        dd      00000000h               ;argument pointer
;                        dw      00000000h               ;argument ptr if any
;                        dd      00000000h               ;program parameter.
;                        dw      WAIT_TO_COMPLETE        ;ie 0001h       DO_NOT_WAIT_TO_COMPLETE=0000h
;                        dw      LCD_MESSAGE_YES         ;
;                        db      "send_a_fax", 00h       ;LCD message
;                                "", 00h
;                        db      "place your fax", 00h
;                                "document on scanner", 00h
;                        db      "and enter the phone", 00h
;                                "number", 00h, 00h      ;00h, 00h means end of LCD message
;
;description of the procedure:
;this action handshakes with maestro to pass to it a request to load and execute a program.
;it issues  REQUEST_TO_START_PROGRAM = TRUE and then waits for
;maestro to issue   ACKNOWLEDGE_OF_REQUEST_TO_START_PROGRAM = TRUE
;upon receipt of this, START_PROGRAM resets REQUEST_TO_START_PROGRAM = FALSE
;if WAIT_TO_COMPLETE = TRUE from the step table, START_PROGRAM continues, if not START_PROGRAM keeps
;checking for COMPLETION_OF_START_PROGRAM_REQUEST = TRUE
;
;START_PROGRAM issues LCD_SEQUENCING call upon receipt of acknowledge from maestro.
;
;START_PROGRAM allows dtmf inputs. However, unlike all other actions, the presence of a dtmf does
;       not always cause the stopping of the action. For example, SCAN cannot be stopped midstream. An abort
;       at the step containing start_program (SCAN.EXE) only means do not continue with the sequence, eg sen
d a fax,
;       after SCAN.EXE is completed. On the other hand, an executing fax send can be aborted.
;       I will have a program called FAXPRGRS that will be active during a fax send operation. It will make
;       inquiries as to progress and print LCD messages from maestro level. This program will be sensitive
;       to an abort key press.
```

```
;       No, I will not have a program like this. Instead after submitting a TCF, I will continue to Main Men
u
;       THE RULE IS: IF WAIT_TO_COMPLETE THEN DTMF ALLOWED. IF DO_NOT_WAIT_TO_COMPLETE THEN NO DTMF.
;       MM_24 WILL BE ABORT CURRENT FAX PROCESS VIA A START_PROGRAM TO PROGRAM THAT DOES INT 2F CB.
;
;THE QUESTION OF LCD: WHEN MAESTRO ACKNOWLEDGES REQUEST TO START PROGRAM, THERE IS NO GUARANTEE THAT THE PRO
GRAM
;WILL START ANY TIME SOON. DOES IT MAKE SENSE THEN TO ISSUE AN LCD MESSAGE SAYING: "SENDING A FAX" OR WHATEV
ER?
;WHAT COULD HAPPEN?
;MAESTRO EITHER ACCEPTS THE REQUEST OR REJECTS IT. FOR EXAMPLE, A SCAN REQUEST THAT COMES RIGHT AFTER ANOTHE
R SHOULD
;BE REJECTED. AN ALTERNATIVE IS TO PUT IT IN QUEUE. THEN IT DOES NOT MAKE SENSE TO SAY IT IS BEING EXECUTED
ON THE LCD.
;SHALL WE HAVE MAESTRO ALSO ISSUE LCD MESSAGES? PROBABLY NOT. WE COULD SAY "REQUEST QUEUED". WHEN MAESTRO ST
ARTS IT
;THEN WE COULD HAVE MAESTRO ISSUE MESSAGES. FOR NOW, I WILL IGNORE THIS QUESTION.
;
;
;steps to the action:
; 1. issue MTICS_HANDSHAKE_ST_REQ_MADE
; 2. wait for MTICS_HANDSHAKE_M_REQ_ACKNOWLEDGED
; 3. reset REQUEST_TO_START_PROGRAM
; 4. issue LCD_SEQUENCING
; 5. if DO_NOT_WAIT_TO_COMPLETE go to lcd_action_end_processing
; 6. if WAIT_TO_COMPLETE wait for COMPLETION_OF_START_PROGRAM_REQUEST
; 7. once 6 is satisfied, go to lcd_action_end_processing
; 8. lcd_action_end_processing
; 9. action complete.
;
;note that there is no early completion due to dtmf or dlet but both are noted for next step code.
;
vcon_start_program      proc
                        push    ds
                        push    ax
                        push    bx
                        push    di
                        push    es
                        push    dx
                        push    cx
                        push    si
                        cmp     gs:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jnz     vcon_start_program_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                           ;
;       WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                                                     ;
;                                                                                                           ;
;       1. CHECK IF DTMF IS EXPECTED. IF NOT STEP_STATUS=1, IF SO STEP_STATUS=0                             ;
;       2. CHECK IF STOP ON DLET. RECORD IT IN LOCAL VARIABLE                                               ;
;       3. LCD VARIABLES SET TO INITIAL VALUES                                                              ;
;       4. STATE COUNTER RESET                                                                              ;
;       5. RESET GS:WORD PTR [SP_RETURN_FLAGS]=1 (SAME AS JUMP_UNCOND)                                      ;
;                                                                                                           ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                        mov     gs:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                        mov     gs:byte ptr [VCON_START_PROGRAM_COMPLETE], FALSE
                        mov     bx, gs:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     bx, fs:word ptr [bx + OFFSET_TO_PARAM_ADDR]       ;ax=addr of step parame
ters
                        mov     ax, fs:word ptr [bx + OFFSET_TO_INPUTS]           ;first entry in params:
 inputs?
;action0d.asm change. remove bit that tells how to interpret param + 2.
                        and     ax, 7fffh
;end action0d.asm change
                        cmp     ax, EXPECT_DTMF                                   ;inputs?
                        jnz     vcon_no_inputs
                        mov     gs:byte ptr [VCON_START_PROGRAM_INPUTS_YES], TRUE
                        mov     gs:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], FALSE
                        mov     bx, gs:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     fs:word ptr [bx + OFFSET_TO_STEP_STATUS], DTMF_ANALYZE;reset flag register

                        jmp     vcon_start_program_cont_entry
vcon_no_inputs:
```

```
                        mov     gs:byte ptr [VCON_START_PROGRAM_INPUTS_YES], FALSE
                        mov     gs:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
                        mov     gs:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                        mov     bx, gs:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     fs:word ptr [bx + OFFSET_TO_STEP_STATUS], JUMP_UNCOND   ;set flag register
vcon_start_program_cont_entry:
                        mov     bx, gs:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     bx, fs:word ptr [bx + OFFSET_TO_PARAM_ADDR]             ;ax=address of step
parameters
                        mov     ax, fs:word ptr [bx + SP_OFFSET_TO_WAIT_TO_COMPLETE]    ;ax=wait to complete
?
                        mov     gs:word ptr [VCON_WAIT_TO_COMPLETE], ax

                        mov     gs:byte ptr [LCD_PROCESS_DONE], 00000000b               ;LCD
                        mov     gs:byte ptr [LCD_IN_ACTION_IN_PROGRESS], FALSE          ;LCD
                        mov     gs:word ptr [START_PROGRAM_STATE_COUNTER], SP_ISSUE_REQUEST
;action0g.asm change
                        mov     GS:word ptr [SP_RETURN_FLAGS], 1
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                            ;
;       WHAT YOU DO AT ALL TIMER TICKS                                                       ;
;                                                                                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_start_program_skp_entry:
                        cmp     gs:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                        jz      vcon_start_program_skp_buffer
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                            ;
;       IF DTMF EXPECTED, COLLECT DTMF FROM IRQ03                                            ;
;                                                                                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;here we check the irq03_dle_buffer. circular. keep it large enough so no overwrite. some little brat
;might be pressing all the buttons.
;action0c.asm change. add di
                        mov     gs:byte ptr [DI + VCON_CUR_STEP_DTMF], NO_DTMF          ;in case of no byte
                        mov     ax, gs:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]
                        mov     bx, gs:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR]
                        cmp     ax, bx
                        jz      vcon_start_program_skp_buffer                           ;if equal no new by
tes
                        mov     gs:byte ptr [VCON_START_PROGRAM_STOP], TRUE             ;can wrap up now as
 we got our byte
                        mov     al, gs:byte ptr [bx]
                        mov     gs:byte ptr [DI + VCON_CUR_STEP_DTMF], al
                        inc     bx
                        lea     dx, gs:word ptr [VCON_DLE_NUMBER_BUFFER_END]
                        cmp     bx, dx
                        jb      skp_dle_number_buf_end
                        lea     bx, gs:word ptr [VCON_DLE_NUMBER_BUFFER]
skp_dle_number_buf_end: mov     gs:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
                        mov     gs:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE;got our byte, lets
 go.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                            ;
;       START_PROGRAM ACTION TAKES PLACE HERE                                                ;
;                                                                                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_start_program_skp_buffer:
                        mov     si, GS:word ptr [START_PROGRAM_STATE_COUNTER]
                        shl     si, 1
                        mov     bx, OFFSET start_program_seq_step
                        jmp     cs:word ptr [bx + si]
;*************************************************
;*                                               *
;*      ISSUE A REQUEST TO MAESTRO               *
;*                                               *
;*************************************************
;0
issue_request:          mov     si, OFFSET maestro_task_queue
sp_issue_req_free_lup:  cmp     DS:byte ptr [si + MTICS_FREE_TO_USE_STATUS], MTICS_FREE_TO_USE
                        je      sp_issue_req_cont0
                        add     si, MTQ_ENTRY_DELTA
                        cmp     si, OFFSET maestro_task_queue_end
```

```
                        je      vcon_start_program_exit                         ;ERROR
                        jmp     sp_issue_req_free_lup

sp_issue_req_cont0:     mov     DS:byte ptr '[si + MTICS_FREE_TO_USE_STATUS], MTICS_NOT_FREE_TO_USE
                        mov     DS:byte ptr [si + MTICS_HANDSHAKE], MTICS_HANDSHAKE_ST_REQ_MADE
                        mov     bx, GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]     ;ax=address of step
parameters
                        mov     ax, FS:word ptr [bx + OFFSET_TO_FILENAME]
;program name is passed as pointer because it is a constant in the step table ie will not be written over.

                        mov     DS:word ptr [si + MTICS_PGM_NAME_DWORD_PTR], ax
                        mov     ax, FS                                          ;fixed in ST entry
                        mov     DS:word ptr [si + MTICS_PGM_NAME_DWORD_PTR + 2], ax
;major change. argument is passed as a name (ASCIIZ) and not a pointer. It may be written over in ST with
;another pass on the same ST entry (eg another TCF before this one is submitted via ttqreq. ttqreq will
;take place but swtofax might not in time before another send fax request). now maestro does not have to do
;this. really did not need to have sp decode this entry for FS/GS but let us have the flexibility.

;first, evaluate the +2 word to get the value. it now always is a pointer to begin ST table where the FS/GS
;segment values reside.
                        push    si
                        push    di
                        push    bx
                        PUSH    DS
                        PUSH    ES
                        mov     cx, FS:word ptr [bx + OFFSET_TO_ARGUMENT]
                        mov     bx, FS:word ptr [bx + OFFSET_TO_ARGUMENT + 2]
                        cmp     bx, 0000H                                       ;is address = 0 ?
                        jne     sp_load_arg
                        mov     DS:word ptr [si + MTICS_PGM_ARGUMENT], 0000H    ;no ASCIIZ element
                        jmp     sp_do_not_load_arg
sp_load_arg:            mov     ax, FS:word ptr [bx]                            ;ax = FS or GS or DS
                        mov     di, si
                        add     di, MTICS_PGM_ARGUMENT
                        mov     bx, DS
                        mov     ES, bx
                        mov     DS, ax
                        mov     si, cx
sp_move_arg:            movsb
                        cmp     DS:byte ptr [si], 00H
                        jne     sp_move_arg
                        movsb
sp_do_not_load_arg:     POP     ES
                        POP     DS
                        pop     bx
                        pop     di
                        pop     si
;end of major change.
                        mov     ax, GS:word ptr [VCON_WAIT_TO_COMPLETE]
                        mov     DS:word ptr [si + MTICS_WAIT_TO_COMPLETE], ax
;major change. check to see if param + 2 is to be interpreted as a segment value and passes on.
;the answer is in dtmf check word. only FS, GS. DS not used as its memory allocation is on dw not [XX].

                        test    FS:word ptr [bx + OFFSET_TO_INPUTS], SP_PARAM_2_SEG
                        jnz     sp_interpret_param
                        mov     eax, FS:dword ptr [bx + OFFSET_TO_PGM_PARAMETER]
                        mov     DS:dword ptr [si + MTICS_PGM_PARAMETER_DWORD], eax
                        jmp     sp_cont_param_pass
sp_interpret_param:     mov     ax, FS:word ptr [bx + OFFSET_TO_PGM_PARAMETER]
                        mov     DS:word ptr [si + MTICS_PGM_PARAMETER_DWORD], ax
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PGM_PARAMETER + 2]
                        mov     ax, FS:word ptr [bx]
                        mov     DS:word ptr [si + MTICS_PGM_PARAMETER_DWORD + 2], ax
;end of major change
sp_cont_param_pass:     mov     GS:word ptr [START_PROGRAM_STATE_COUNTER], SP_WAIT_FOR_ACK
                        mov     GS:word ptr [START_PROGRAM_MTQ_PTR], si
                        jmp     vcon_start_program_exit
;***********************************************
;*                                             *
;*      WAIT FOR MAESTRO TO ACKNOWLEDGE        *
;*                                             *
;***********************************************
```

```
;1
wait_for_ack:           mov     si, gs:word ptr [START_PROGRAM_MTQ_PTR]
                        cmp     ds:byte ptr [si + MTICS_HANDSHAKE], MTICS_HANDSHAKE_M_REQ_ACKNOWLEDGED
                        jnz     vcon_start_program_exit
                        mov     gs:word ptr [START_PROGRAM_STATE_COUNTER], SP_ISSUE_LCD_MSG
                        jmp     vcon_start_program_exit
;************************************************
;*                                              *
;*      ISSUE LCD MESSAGE                       *
;*                                              *
;************************************************
;2
stp_issue_lcd_msg:      cmp     GS:byte ptr [LCD_IN_ACTION_IN_PROGRESS], TRUE
                        je      skip_over_chk_lcd_busy
                        pushf
                        cli
                        cmp     DS:byte ptr LCD_BUSY, TRUE              ;initialize to FALSE with CATVOICE
 install
                        je      skip_over_lcd
                        mov     DS:byte ptr LCD_BUSY, TRUE
                        mov     GS:byte ptr [LCD_IN_ACTION_IN_PROGRESS], TRUE
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE
                        popf
skip_over_chk_lcd_busy: call    lcd_sequencing
                        cmp     GS:byte ptr [LCD_PROCESS_DONE], 0ffh
                        jne     vcon_start_program_exit
                        mov     gs:byte ptr [LCD_PROCESS_DONE], 00000000b            ;LCD
                        mov     GS:byte ptr [LCD_IN_ACTION_IN_PROGRESS], FALSE
                        mov     DS:byte ptr LCD_BUSY, FALSE

                        cmp     GS:byte ptr [VCON_WAIT_TO_COMPLETE], WAIT_TO_COMPLETE
                        jnz     not_wait_to_complete
                        mov     GS:word ptr [START_PROGRAM_STATE_COUNTER], SP_WAIT_FOR_COMPLETION
                        jmp     vcon_start_program_exit
not_wait_to_complete:   mov     GS:word ptr [START_PROGRAM_STATE_COUNTER], SP_COMPLETE
                        jmp     vcon_start_program_exit
skip_over_lcd:          popf
                        jmp     vcon_start_program_exit
;************************************************
;*                                              *
;*   IF SPECIFIED WAIT FOR COMPLETION           *
;*                                              *
;************************************************
;4
wait_for_completion:    mov     si, gs:word ptr [START_PROGRAM_MTQ_PTR]
                        cmp     ds:byte ptr [si + MTICS_PGM_STATUS], MTICS_PGM_STATUS_COMPLETED
                        jnz     vcon_start_program_exit
                        mov     ds:byte ptr [si + MTICS_HANDSHAKE], MTICS_HANDSHAKE_ST_COMPLETION_ACKED
                        mov     gs:word ptr [START_PROGRAM_STATE_COUNTER], SP_COMPLETE
;action0g.asm change
                        mov     bx, gs:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     ax, GS:word ptr [SP_RETURN_FLAGS]
                        mov     fs:word ptr [bx + OFFSET_TO_STEP_STATUS], ax   ;set flag register
                        jmp     vcon_start_program_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                ;
;       EXIT                                                                                     ;
;                                                                                                ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vcon_start_program_completed:
                        mov     gs:byte ptr [VCON_START_PROGRAM_COMPLETE], TRUE
                        mov     gs:byte ptr [VCON_START_PROGRAM_STOP], FALSE
                        mov     gs:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        mov     gs:word ptr [START_PROGRAM_STATE_COUNTER], SP_ISSUE_REQUEST
vcon_start_program_exit:pop     si
                        pop     cx
                        pop     dx
                        pop     es
                        pop     di
                        pop     bx
                        pop     ax
                        pop     ds
                        ret
```

```
start_program_seq_step  dw      issue_request                   ;0
                        dw      wait_for_ack                    ;1
                        dw      stp_issue_lcd_msg               ;2
                        dw      wait_for_completion             ;3
                        dw      vcon_start_program_completed    ;4

vcon_start_program      endp

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
; END   PROCEDURE   VCON_start_program                                                            ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


vcon_wait_for_pgm_to_complete   proc
                                ret
vcon_wait_for_pgm_to_complete   endp



;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
;   PROCEDURE   VCON_ISSUE_CLASS2_CMD                                                             ;
;                                                                                                 ;
;check for minimum size logical room                                                              ;
;if not enough logical room set carry and return                                                  ;
;(the calling routine has the following piece of code: (placed after the call)                    ;
;                                                       jc      vcon_emit_msg_exit                ;
;                                                       mov     issued_cntr, issued               ;
;                                                       mov     response_cntr, expected           ;
;                                                       jmp     vcon_emit_msg_exit)               ;
;if enough minimum logical room then do same as emit_msg data area.                               ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;mov    cx, lvcon_to_fax2
;lea    si, word ptr vcon_to_fax2
;call   vcon_issue_class2_cmd
;mov    byte ptr vcon_expect_ok, 01h
vcon_issue_class2_cmd   proc
                        push    ax
                        push    bx
                        push    si
                        push    di
                        push    es
;compute available logical room ie (buffer size) - (xmit_count)
                        mov     ax, 0800h
                        sub     ax, GS:word ptr [VCON_XMIT_COUNT]
                        mov     GS:word ptr [VCON_IRQ03_TBUF_LOGICAL_ROOM], ax
;logical room must be >= then cx-1 (lvcon includes 00h and we will not write it to buffer now)
                        dec     cx
                        cmp     ax, cx                          ;compare logical vs min
                        jae     vcon_issue_cmd_proceed
                        stc                                     ;caller must check carry
                        jmp     vcon_issue_cmd_exit
;here we know we have minimum logical room. ax=logical room.
vcon_issue_cmd_proceed:
;compute available head room
                        mov     bx, VCON_IRQ03_TBUF_END         ;0800h
                        sub     bx, GS:word ptr [VCON_IRQ00_TBUF_PTR]   ;07ffh means one byte to write.
                        mov     GS:word ptr [VCON_IRQ03_TBUF_HEAD_ROOM], bx
;we already know that (logical) > (length). if (head) >= (length) then one shot
;if (head) < (length) then cx=(head) and still need to do (length)-(head)
                        cmp     bx, cx                          ;head room vs length of cmd
                        ja      vcon_head_gt_length
                        mov     ax, bx
                        jmp     vcon_skp_head_logical
vcon_head_gt_length:    mov     ax, cx
;coming to this point, ax=number of bytes to write to buffer the first time (and maybe only time)
;action02.asm change. cs -> GS in the following line.
vcon_skp_head_logical:
;action08.asm change. next 2 lines.
                        pushf
```

```
                        cli
                        mov     bx, GS
                        mov     es, bx
                        mov     di, GS:word ptr [VCON_IRQ00_TBUF_PTR]
                        mov     GS:word ptr [VCON_IRQ03_TBF_NEWSTR_PTR], di
                        mov     bx, cx  ;save cx
                        mov     cx, ax  ;how many to write this time
                        rep     movsb
                        add     GS:word ptr [VCON_XMIT_COUNT], ax           ;actual number of bytes read
                        add     GS:word ptr [VCON_IRQ00_TBUF_PTR], ax       ;update irq00_tbuf_ptr
                        mov     cx, bx  ;restore cx ie total to write
                        cmp     cx, ax  ;compare total to how many written
                        jz      vcon_issue_done     ;either cx>ax or cx=ax
                        sub     cx, ax  ;what more there is to do
                        mov     ax, cx  ;save number to write
                        mov     di, VCON_IRQ03_TBUF
                        rep     movsb
                        add     GS:word ptr [VCON_XMIT_COUNT], ax           ;actual number of bytes read
                        add     GS:word ptr [VCON_IRQ00_TBUF_PTR], ax       ;update irq00_tbuf_ptr
vcon_issue_done:
;wrap around arithmetic.
;start casvox1s.asm changes
                        mov     bx, VCON_IRQ03_TBUF_END                     ;if ptr goes beyond buf end.
                        cmp     bx, GS:word ptr [VCON_IRQ00_TBUF_PTR]
                        ja      vcon_irq00_tbuf_wrapskp                     ;if ptr < buf_end_ptr then n
o wrap
                        sub     GS:word ptr [VCON_IRQ00_TBUF_PTR], 0800h    ;modulo arithmetic
vcon_irq00_tbuf_wrapskp:
;now we need to set tbf irq active.
;action08.asm change. next line
                        popf
                        call    vcon_set_tbfirq
                        clc
vcon_issue_cmd_exit:    pop     es
                        pop     di
                        pop     si
                        pop     bx
                        pop     ax
                        ret
vcon_issue_class2_cmd   endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
; END   PROCEDURE   VCON_ISSUE_CLASS2_CMD                                                         ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;lcdseqs2.asm <- lcdseqs1.asm. 4/21/95. tcb changes.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
;   PROCEDURE   LCD_SEQUENCING                                                                    ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;lcdseqs1.asm <- lcdseqs0.asm. 03/30/95. more edits. swap steps 7<->6
;FIRST A LIST OF THINGS TO DO INSIDE AN ACTION:
;THIS IS THE BASIS OF THE PROCEDURE LCD_SEQUENCING
;       0. check that there is an LCD MESSAGE in the action and if so:
;       1. save display memory contents
;       2. display off
;       3. write first segment of 20 characters to the top line
;       4. write second segment of 20 characters to the bottom line
;       5. display on
;       7. spend some idle time eg 3 seconds
;       6. check for 00h,00h at the end. if so then go to 9
;       8. jump to 2
;       9. exit
;AT THE END OF THE ACTION
;THIS PROBABLY WILL BECOME LCD_TAIL_SEQUENCING
;note: maestro may have done something like this during the execution of the action. before calling
;lcd_sequencing, an action will et LCD_BUSY = TRUE and after it will do LCD_BUSY = FALSE. the action
;is still continuing. For example, for emit_msg, the message may last 10 seconds but one lcd screen
;lasts for 3 seconds. Thus, before the end of the emit_msg, maestro may come and update time or incoming
;faxes etc. But, it is good practice for the action to do it too.
```

```
;But, it will then restore an earlier time. Thus, must check to see if maestro has accessed LCD since
;the start of the action.
;Let us do this: we have another variable called LCD_ACCESS_COUNTER. If the action determines that
;there has been another access in the interim, then it skips the routine that implements the next three
;steps.
;       1. display off
;       2. restore display memory contents
;       3. display on
;
;
;example entry from an action's lcd line:
;       SEND_A_FAX.action_lcd_msg_yes           dw      LCD_MESSAGE             // NO_LCD_MESSAGE
;       SEND_A_FAX.action_lcd_msg_content       db      "send_a_fax         "
;                                                       "                   ", 00h
;                                               db      "place your fax     "
;                                                       "document on scanner ", 00h
;                                               db      "and enter the phone "
;                                                       "number             ", 00h, 00h
;RULES:
;1. if there is a message at all, a full screeful must be written out even if bottom line all blanks.
;THIS RULE IS FOR MIODRAG'S GENERATOR
;
;inputs:
;               ax = specifies action (save, write, restore) (start point) (#of characters)
;               es:cx = pointer to string to write.
;               ah = 000..... clear whole screen (memory clear also)
;                    001..... function set
;                    010..... display off
;                    011..... display on
;                    100..... save whole screen
;                    101..... restore whole screen
;                    11...... write to portions of screen
;               ah = 110xxxxx number of characters to write
;               al = 1yxxxxxx start location. y=0 first line, y=1 second line
;outputs:
;               al = return status
;                    0.......b means completed successfully
;                    1.......b means that we are not done yet.
;
;
;
;
;IT IS REQUIRED THAT THE ACTION PERFORM THE FOLLOWING:
; 1. AT THE FIRST IRQ00 OF CURRENT STEP MOV     BYTE PTR LCD_PROCESS_DONE, 00000000B
; 2. check for LCD_BUSY, if FALSE set it true. Do pushf, cli ... popf. If TRUE and so on...
;    see: START_PROGRAM code for this.
lcd_sequencing          proc
                        push    ax
                        push    bx
                        push    cx
                        push    dx
                        push    ds
                        push    es
                        cmp     GS:byte ptr [LCD_PROCESS_DONE], 0ffh
                        je      lcd_sequencing_exit                             ;once all done, this is all yo
u do in proc
; 0. CHECK THAT THERE IS AN LCD MESSAGE IN THE ACTION
skip_lcd_0:             test    GS:byte ptr [LCD_PROCESS_DONE], 00000001b
                        jnz     skip_lcd_2
                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     cx, FS:word ptr [bx]                            ;cx = action number ds:relativ
e
                        mov     ax, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]     ;parameter area offset
                        mov     bx, OFFSET lcd_offset_from_parameters           ;READ ONLY IE CS: RELATIVE
                        shl     cx, 1                                           ;mpy by 2 for word
                        add     bx, cx                                          ;bx->lcd offset from param
                        mov     bx, cs:word ptr [bx]                            ;offset
                        add     bx, ax                                          ;LCD message offset
                        cmp     FS:word ptr [bx], LCD_MESSAGE_YES
                        jne     lcd_sequencing_final_exit
                        add     bx, 0002h
                        mov     GS:word ptr [LCD_MESSAGE_ADDRESS], bx
                        mov     dx, FS
```

```
                        mov     GS:word ptr [LCD_MESSAGE_ADDRESS + 2], dx
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 00000001b
                        jmp     lcd_sequencing_exit
; 2. DISPLAY OFF
skip_lcd_2:             test    GS:byte ptr [LCD_PROCESS_DONE], 00000100b
                        jnz     skip_lcd_3
                        mov     ah, LCD_DISPLAY_OFF
                        mov     al, 80h
                        call    lcd_processing
                        test    al, 80h
                        jnz     lcd_sequencing_exit
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 00000111b
                        jmp     lcd_sequencing_exit
; 3. WRITE FIRST SEGMENT OF 20 CHARACTERS TO THE TOP LINE
skip_lcd_3:             test    GS:byte ptr [LCD_PROCESS_DONE], 00001000b
                        jnz     skip_lcd_4
                        mov     ah, LCD_WRITE_SCREEN_LINE
                        or      ah, 14h
                        mov     al, 80h
                        mov     cx, GS:word ptr [LCD_MESSAGE_ADDRESS]
                        mov     dx, GS:word ptr [LCD_MESSAGE_ADDRESS + 2]
                        mov     ES, dx
                        call    lcd_processing
                        test    al, 80h
                        jnz     lcd_sequencing_exit
                        add     cx, 0014h
                        mov     GS:word ptr [LCD_MESSAGE_ADDRESS], cx
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 00001111b
                        jmp     lcd_sequencing_exit
; 4. WRITE SECOND SEGMENT OF 20 CHARACTERS TO THE BOTTOM LINE
skip_lcd_4:             test    GS:byte ptr [LCD_PROCESS_DONE], 00010000b
                        jnz     skip_lcd_5
                        mov     ah, LCD_WRITE_SCREEN_LINE
                        or      ah, 14h
                        mov     al, 0c0h
                        mov     cx, GS:word ptr [LCD_MESSAGE_ADDRESS]
                        mov     dx, GS:word ptr [LCD_MESSAGE_ADDRESS + 2]
                        mov     ES, dx
                        call    lcd_processing
                        test    al, 80h
                        jnz     lcd_sequencing_exit
                        add     cx, 0014h
                        mov     GS:word ptr [LCD_MESSAGE_ADDRESS], cx       ;points to either 00h or 00h,00
h.
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 00011111b
                        jmp     lcd_sequencing_exit
; 5. DISPLAY ON
skip_lcd_5:             test    GS:byte ptr [LCD_PROCESS_DONE], 00100000b
                        jnz     skip_lcd_6
                        mov     ah, LCD_DISPLAY_ON
                        mov     al, 80h
                        call    lcd_processing
                        test    al, 80h
                        jnz     lcd_sequencing_exit
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 00111111b
                        jmp     lcd_sequencing_exit
; 6. CHECK FOR 00H OR 00H,00H. IF DOUBLE THEN FINAL_EXIT. IF SINGLE GOTO NEXT STEP TO SPEND 3 SECONDS.
skip_lcd_6:             test    GS:byte ptr [LCD_PROCESS_DONE], 01000000b
                        jnz     skip_lcd_7
                        mov     bx, GS:word ptr [LCD_MESSAGE_ADDRESS]
                        inc     bx                                          ;bx->second 00h or next lcd msg
                        cmp     FS:byte ptr [bx], 00h
                        jz      lcd_sequencing_final_exit
                        mov     GS:word ptr [LCD_MESSAGE_ADDRESS], bx
                        mov     GS:word ptr [LCD_TIMER_TICK_COUNTER], 0000h
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 01111111b
                        jmp     lcd_sequencing_exit
; 7. INCREMENT TIMER TICK COUNT UNTIL 3 SECONDS, THEN JUMP TO 2.
skip_lcd_7:             mov     bx, GS:word ptr [LCD_TIMER_TICK_COUNTER]
                        inc     bx
                        mov     GS:word ptr [LCD_TIMER_TICK_COUNTER], bx
                        cmp     bx, 0040h                                   ;64 timer ticks
                        jb      lcd_sequencing_exit
```

```
lcd_time_is_up:         mov     GS:byte ptr [LCD_PROCESS_DONE], 00000011b
                        jmp     lcd_sequencing_exit

lcd_sequencing_final_exit:
                        mov     GS:byte ptr [LCD_PROCESS_DONE], 11111111b
lcd_sequencing_exit:    pop     es
                        pop     ds
                        pop     dx
                        pop     cx
                        pop     bx
                        pop     ax
                        ret

lcd_offset_from_parameters      dw      0000H           ;action: NO_ACTION
                                dw      0008H           ;action: EMIT_MSG
                                dw      0000H           ;action: VOICE_MAIL_ACCESS
                                dw      0000H           ;action: ANNOUNCE_AND_COLLECT_DIGITS
                                dw      0000H           ;action: RECO_MSG
                                dw      0000H           ;action: HANG_UP
                                dw      0000H           ;action: RECO_MSG_INDIRECT
                                dw      000EH           ;action: START_PROGRAM

lcd_sequencing          endp


;revamp lcdproc3.asm <- updated lcdproc1.asm (also dated same day ie June 27, 1995).
;LCDPROC1.ASM <- LCDPROC0.ASM. 4/21/95. TCB RELATED CHANGES.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                       ;
;                                       PROCEDURE   LCD_PROCESSING                                      ;
;                                                                                                       ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;NOTE FOR MAESTRO:      LCD_PROCESSING MAKES SURE, WHEN WRITTEN, AN LCD MESSAGE STAYS ON FOR
;3 SECONDS. IT IS POSSIBLE THAT AS THE ACTION WANTS TO WRITE AN LCD MESSAGE, MAESTRO IS IN THE
;PROCESS OF WRITING ONE. THIS COULD DELAY PROGRESS OF LCD_SEQUENCING MACHINE WHILE THE REST OF
;THA MACHINES IN THE ACTION ARE PROCEEDING. IN THIS CASE, THE ACTION COULD WRAP UP AS LCD IS
;JUST GETTING OFF THE GROUND. THIS WILL BE OK IN THE SENSE THAT IT WILL CAUSE LOCKUPS. BUT FROM
;THE USER'S POINT OF VIEW, HE WILL NOT SEE THE MESSAGE.
;       RULE FOR MAESTRO: WHEN MAESTRO WRITES TO LCD, IT WILL NOT SEEK A 3 SECOND DISPLAY. IT
;WILL WRITE AND GET OUT SO THA THE ACTION CAN WRITE. IT IS OK FOR THE TIME TO DISAPPEAR A SPLIT
;SECOND AFTER IT WAS UPDATED. THE ACTION SAVES THE SCREEN CONTENTS AND RESTORES THEM LATER.
;DURING INSTALL OF CATVOICE.EXE LCD IS INITIALIZED AS FOLLOWS:
;                       as given in the data sheet
;this procedure will perform these activities regarding the LCD
;               1. save the contents of the screen
;               2. write to screen
;               3. restore the contents of the screen
;               4. clear the screen
;               5. display off
;               6. display on
;who calls this procedure?
;       A. maestro calls it to periodically update voice mail, fax and email counts
;       B. maestro calls it to update the time
;       C. actions call it to write messages. actions call this procedure via lcd_sequencing
;                                                                       or lcd_tail_sequencing
;what will the screen look like?
;       F:##.V:##.E:##......
;       SAT.10.NOV..09:05.AM
;a 20x2 LCD.
;actions keep writing to LCD
;maestro periodically writes to LCD
;
;inputs:
;               ax = specifies action (save, write, restore) (start point) (#of characters)
;               es:cx = pointer to string to write.
;               ah = 000..... clear whole screen (memory clear also)
;                    001..... function set
;                    010..... display off
;                    011..... display on
;                    100..... save whole screen
;                    101..... restore whole screen
;                    110..... write to portions of screen
;                    111..... write "*" to portions of screen.
```

```
;               ah = 110xxxxx number of characters to write
;               ah = 111xxxxx number of chars to write and display is "*" for all chars.
;               al = 1yxxxxxx start location. y=0 first line, y=1 second line
;outputs:
;               al = return status
;                    0.......b means completed successfully
;                    1.......b means that we are not done yet.
;
;
;step/action point of view:
;       during the execution of an action, there are more than one thread of execution.
;       for example, emit_msg_get_param will be emitting a message, getting dtmf inputs and
;       also be writing to LCD.
;       emit_msg_gete_param itself was called from the stepper machine.
;
;write the LCD_PROCESSING call, considering the fact that we keep reentering the action code
;FIRST A LIST OF THINGS TO DO INSIDE AN ACTION:
;THIS IS THE BASIS OF THE PROCEDURE LCD_SEQUENCING
;       0. check that there is an LCD MESSAGE in the action and if so:
;       1. save display memory contents
;       2. display off
;       3. write first segment of 20 characters to the top line
;       4. write second segment of 20 characters to the bottom line
;       5. display on
;       6. check for 00h,00h at the end. if so then go to 9
;       7. spend some idle time eg 3 seconds
;       8. jump to 2
;       9. exit
;AT THE END OF THE ACTION
;THIS PROBABLY WILL BECOME LCD_TAIL_SEQUENCING
;       1. display off
;       2. restore display memory contents
;       3. display on
;
;
;example entry from an action's lcd line:
;       SEND_A_FAX.action_lcd_msg_yes           dw      LCD_MESSAGE             // NO_LCD_MESSAGE
;       SEND_A_FAX.action_lcd_msg_content       db      "send_a_fax          "
;                                                       "                    ", 00h
;                                               db      "place your fax      "
;                                                       "document on scanner ", 00h
;                                               db      "and enter the phone "
;                                                       "number              ", 00h, 00h
;RULES:
;1. if there is a message at all, a full screeful must be written out even if bottom line all blanks.
;THIS RULE IS FOR MIODRAG'S GENERATOR
;
lcd_processing          proc
                        push    si
                        push    dx
                        push    cx
                        push    bx
                        push    ax

                        mov     bh, ah
                        and     bh, 11100000b
                        cmp     bh, 00h
                        jz      clear_screen
                        cmp     bh, 20h
                        jz      function_set
                        cmp     bh, 40h
                        jz      display_off
                        cmp     bh, 60h
                        jz      display_on
                        cmp     bh, 80h
                        jz      save_screen
                        cmp     bh, 0a0h
                        jz      restore_screen
                        and     bh, 11000000b
                        cmp     bh, 0c0h
                        jz      write_screen_line
                        mov     al, 00h
                        jmp     lcd_passing_exit
```

```
;*****************************************************************************************************
;*                                                                                                   *
;*                                        CLEAR SCREEN                                               *
;*                                                                                                   *
;*****************************************************************************************************
clear_screen:           mov     GS:byte ptr [LCD_STEP_COUNT], 00H
clear_screen1:          inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     clear_screen1
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h               ;write to data buffer
                        mov     al, 01h
                        out     dx, al                  ;clear display command
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                                        FUNCTION SET                                               *
;*                                                                                                   *
;*****************************************************************************************************
function_set:           mov     GS:byte ptr [LCD_STEP_COUNT], 00H
function_set1:          inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     function_set1
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h               ;write to data buffer
                        mov     al, 38h
                        out     dx, al                  ;clear display command
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
```

```
                        out     dx, al                  ;pulse low to IR
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                                        DISPLAY OFF                                                *
;*                                                                                                   *
;*****************************************************************************************************
display_off:            mov     GS:byte ptr [LCD_STEP_COUNT], 00H
display_off1:           inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     display_off1
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h               ;write to data buffer
                        mov     al, 08h
                        out     dx, al                  ;display off command
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                                        DISPLAY ON                                                 *
;*                                                                                                   *
;*****************************************************************************************************
display_on:             mov     GS:byte ptr [LCD_STEP_COUNT], 00H
display_on1:            inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     display_on1
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h               ;write to data buffer
                        mov     al, 0ch
                        out     dx, al                  ;display on command
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
```

```
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                                        SAVE SCREEN                                                *
;*                                                                                                   *
;*****************************************************************************************************
save_screen:            mov     GS:byte ptr [LCD_STEP_COUNT], 00H
                        cmp     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE   ;init at CATVOICE install
                        jne     save_screen_not_first_time
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], FALSE
                        mov     GS:byte ptr [SAVE_SCREEN_TOGGLE], FIRST
                        mov     ax, SAVED_SCREEN
                        mov     GS:word ptr [SAVED_SCREEN_PTR], ax
                        mov     GS:byte ptr [SET_DDRAM_ADDRESS], 80h
save_screen_not_first_time:
                        inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     save_screen_not_first_time
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h
                        mov     al, GS:byte ptr [SET_DDRAM_ADDRESS]
                        out     dx, al
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
save_screen_ddram_inc_auto:
                        inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     save_screen_ddram_inc_auto
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0382h
                        mov     al, 06h
                        out     dx, al
                        mov     al, 07h
                        out     dx, al
```

```
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        mov     bx, GS:word ptr [SAVED_SCREEN_PTR]
                        mov     GS:byte ptr [bx], al
                        mov     dx, 0382h
                        mov     al, 06h
                        out     dx, al
                        inc     GS:word ptr [SAVED_SCREEN_PTR]
                        inc     GS:byte ptr [SET_DDRAM_ADDRESS]
                        cmp     GS:byte ptr [SAVE_SCREEN_TOGGLE], FIRST         ;FIRST sets up ddram address
                        jne     save_screen_chk_second_line_end
                        cmp     GS:byte ptr [SET_DDRAM_ADDRESS], 94h            ;end of line
                        jb      save_screen_ddram_inc_auto
                        mov     GS:byte ptr [SET_DDRAM_ADDRESS], 0C0H           ;next line
                        mov     GS:byte ptr [SAVE_SCREEN_TOGGLE], SECOND
                        jmp     save_screen_not_first_time

save_screen_chk_second_line_end:
                        cmp     GS:byte ptr [SET_DDRAM_ADDRESS], 0D4H
                        jb      save_screen_ddram_inc_auto
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                                        RESTORE SCREEN                                             *
;*                                                                                                   *
;*****************************************************************************************************
restore_screen:         mov     GS:byte ptr [LCD_STEP_COUNT], 00H
                        cmp     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE   ;init at CATVOICE install
                        jne     restore_screen_not_first_time
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], FALSE
                        mov     GS:byte ptr [RESTORE_SCREEN_TOGGLE], FIRST
                        mov     ax, SAVED_SCREEN
                        mov     GS:word ptr [SAVED_SCREEN_PTR], ax
                        mov     GS:byte ptr [SET_DDRAM_ADDRESS], 80h
restore_screen_not_first_time:
                        inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     restore_screen_not_first_time
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h
                        mov     al, GS:byte ptr [SET_DDRAM_ADDRESS]
                        out     dx, al
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
restore_screen_ddram_inc_auto:
                        inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
```

```
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     restore_screen_ddram_inc_auto
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     bx, GS:word ptr [SAVED_SCREEN_PTR]
                        mov     al, GS:byte ptr [bx]
                        mov     dx, 0381h
                        out     dx, al
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 04h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 05h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 04h
                        out     dx, al                  ;pulse low to IR

                        inc     GS:word ptr [SAVED_SCREEN_PTR]
                        inc     GS:byte ptr [SET_DDRAM_ADDRESS]
                        cmp     GS:byte ptr [RESTORE_SCREEN_TOGGLE], FIRST      ;FIRST sets up ddram address
                        jne     restore_screen_chk_second_line_end
                        cmp     GS:byte ptr [SET_DDRAM_ADDRESS], 94h            ;end of line
                        jb      restore_screen_ddram_inc_auto
                        mov     GS:byte ptr [SET_DDRAM_ADDRESS], 0C0H           ;next line
                        mov     GS:byte ptr [SAVE_SCREEN_TOGGLE], SECOND
                        jb      restore_screen_not_first_time

restore_screen_chk_second_line_end:
                        cmp     GS:byte ptr [SET_DDRAM_ADDRESS], 0D4H
                        jb      restore_screen_ddram_inc_auto
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                             WRITE ONE LINE TO SCREEN                                              *
;*                                                                                                   *
;*****************************************************************************************************
write_screen_line:      mov     GS:byte ptr [LCD_STEP_COUNT], 00H
                        cmp     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE   ;init at CATVOICE install
                        jne     write_screen_not_first_time
                        mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], FALSE
                        mov     GS:byte ptr [SET_DDRAM_ADDRESS], al
                        mov     GS:word ptr [LCD_WRITE_PTR], cx
;action0d.asm change. acd password
                        mov     si, ax
                        and     ah, 1fh
                        mov     GS:byte ptr [LCD_WRITE_COUNT], ah
                        cmp     ah, 00h
                        je      lcd_passing_exit
write_screen_not_first_time:
                        inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
```

```
                        test    al, 80h
                        jnz     write_screen_not_first_time
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     dx, 0381h
                        mov     al, GS:byte ptr [SET_DDRAM_ADDRESS]
                        out     dx, al
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 01h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 00h
                        out     dx, al                  ;pulse low to IR
write_screen_ddram_inc_auto:
                        inc     GS:byte ptr [LCD_STEP_COUNT]
                        cmp     GS:byte ptr [LCD_STEP_COUNT], LCD_MAX_STEP_COUNT
                        ja      lcd_failing_exit
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al
                        mov     al, 03h
                        out     dx, al
                        call    delay_40us
                        mov     dx, 0381h
                        in      al, dx
                        test    al, 80h
                        jnz     write_screen_ddram_inc_auto
                        mov     dx, 0382h
                        mov     al, 02h
                        out     dx, al

                        mov     bx, GS:word ptr [LCD_WRITE_PTR]
;action0d.asm change for acd password.
                        test    si, 2000h
                        jnz     lcd_encrypt_display
                        mov     al, ES:byte ptr [bx]
                        jmp     lcd_display_char
lcd_encrypt_display:    mov     al, "*"

lcd_display_char:       mov     dx, 0381h
                        out     dx, al
                        mov     dx, 0382h               ;write to command buffer
                        mov     al, 04h
                        out     dx, al                  ;pulse low to IR
                        mov     al, 05h
                        out     dx, al                  ;pulse high to IR
                        mov     al, 04h
                        out     dx, al                  ;pulse low to IR

                        inc     GS:word ptr [LCD_WRITE_PTR]
                        inc     GS:byte ptr [SET_DDRAM_ADDRESS]
                        dec     GS:byte ptr [LCD_WRITE_COUNT]
                        jz      exit_lcd_write_line
                        jmp     write_screen_ddram_inc_auto
exit_lcd_write_line:    mov     GS:byte ptr [LCD_PROCESSING_FIRST_TIME], TRUE
                        mov     al, 00h
                        jmp     lcd_passing_exit

;*****************************************************************************************************
;*                                                                                                   *
;*                                          EXIT                                                     *
;*                                                                                                   *
;*****************************************************************************************************
lcd_failing_exit:       mov     al, 80h
lcd_passing_exit:       mov     bl, al
                        pop     ax
                        mov     al, bl
                        pop     bx
```

```
                        pop     cx
                        pop     dx
                        pop     si
                        ret
lcd_processing          endp

delay_40us              proc
                        push    cx
                        mov     cx, 0100h
delay_lup:              nop
                        loop    delay_lup
                        pop     cx
                        ret
delay_40us              endp

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
;                           END OF  PROCEDURE   LCD_PROCESSING                                   ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
;   PROCEDURE   SEND_A_FAX                                                                        ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
send_a_fax                      proc
                                ret
send_a_fax                      endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
; END   PROCEDURE   SEND_A_FAX                                                                    ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
;   PROCEDURE   SEND_FAX_INDIRECT                                                                 ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
send_fax_indirect               proc
                                ret
send_fax_indirect               endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
; END   PROCEDURE   SEND_FAX_INDIRECT                                                             ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
;   PROCEDURE   BUILD_FAX_DATABASE                                                                ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
build_fax_database              proc
                                ret
build_fax_database              endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                 ;
; END   PROCEDURE   BUILD_FAX_DATABASE                                                            ;
;                                                                                                 ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


END
```

```
;COPYRIGHT 1995. HAI NGUYEN, HALUK AYTAC, 3TAU.
;vma0c.asm <- vma0b.asm. 10/28/95. make timing signature changes. write LCD area in emit_msg
;vma0b.asm <- vma0a.asm. 10/23/95. final corrections before hooking catbox up.
;vma0a.asm <- haivma09.asm. 7/20/95. take out loading/merging and storing of .que files.
;put them in separate start program steps.
;SUMMARY OF NEW VMA SEQUENCE:
;   1. A START_PROGRAM STEP CHECKS AN AREA IN SYSTEM DATA AREA. THIS IS WHERE WE STORE THE
;      FILENAMES OF CURRENT INDEX FILES THAT ARE BEING MANIPULATED. THERE ARE 5 ENTRIES HERE
;      AS THERE ARE 5 MODEMS AT MOST. 4 CALLERS AND THE CONSOLE MAY ALL BE DOING EITHER
;      GOING THROUGH INDEX FILES FOR EMAIL, FAX OR VOICE.
;           THE NEW VMA SEQUENCE IS AS FOLLOWS:
;                START_PROGRAM (MERGE)
;                VMA PROPER
;                START_PROGRAM (STORE)
;      AT CVBOOT, THIS DATA AREA (CALL IT: DS:LOADED_INDEX_FILE_NAME_0  DB 64 DUP(00H)
;                                          DS:LOADED_INDEX_FILE_NAME_1  DB 64 DUP(00H) ETC.
;haivma09.asm <- haivma08.asm. 6/12/95. catvocl. no other changes expected.
;DO NOT FORGET: FIX EMIT_MSG TO MOVE CURRENT CHS FURTHER OUT FOR PAUSE/RESUME
;               FIX NO_ACTION TO KEEP REPEATING UNTIL DTMF COMES (INSTEAD OF 4 SECS)
;               FIX DI_CUR_STEP FOR EMIT_MSG AND NO_ACTION.
;               ADD TIMEOUT TO EMIT,RECO,NO_ACTION
;               ADD REPEAT TO EMIT,RECO,NO-ACTION OR ANY OTHER ACTION?
;               FEATURE TO FIND SUM OF NEW MESSAGES AND REPORT TO SYSTEM DATA AREA
;               OPTION TO RUN VMA W/O PLAYING MESSAGES TO JUST ADD NUMBER OF MESSAGES FOR MAESTRO
;*****************************************************************************************
;*                                                                                       *
;*      VMA     VOICE_MAIL_ACCESS       EMIT_MSG_INDIRECT                                *
;*      originally written by Hai Nguyen and Haluk Aytac                                 *
;*      updates by Hai Nguyen and Haluk Aytac                                            *
;*      VMA baptized as VMA by Fatih Unal (against Miodrag's objections. he liked        *
;*                                      emit message indirect better).                   *
;*                                                                                       *
;*      VMA has, in addition to its own step table entry, two fixed location step table *
;*      entries:                                                                         *
;*                  1. start_program (program_name: C:\CATBOX\PROGRAMS\MERGEVEF.EXE      *
;*                     operated by VMA level_1 stepper #1. DO_NOT_WAIT_TO_COMPLETE       *
;*                  2. emit_msg (program_name: given by VMA level_1 stepper #2           *
;*                     operated by VMA level_1 stepper #2.                               *
;*                  3. no_action (this was conceived by H. Aytac to solve pause/resume   *
;*                     operated by VMA level_1 stepper #3.                               *
;*                                                                                       *
;*****************************************************************************************


;DTMF review
;       VOICE                       FAX
;       play all messages           print all faxes
;   1. repeat                       print current fax again
;   2. skip                         skip (equivalent to print next fax)
;   3. save                         save
;   4. pause/resume                 stop printing (equivalent to *,0,#)
;   5. erase                        erase
;   6. erase all                    erase all
;   7. toggle first/last            toggle first/last
;   8. toggle new/saved             toggle new/saved
;   9. send a voice message         send a fax message
;   *. return to previous menu      return to previous menu
;   0. hear the options             hear the options
;   #. return to main menu          return to main menu

;haivma07.asm <- haivma06.asm. 5/31/95. handle when merge writes f:f. update qf_ops to 6.2
;HAIVMA06.ASM                  5/27/95.
;haivma03.asm <- haivma02.asm. 5/26/95. more fixes. 02 is not ready to assemble.
;haivma02.asm <- haivma01.asm. 5/23/95. a part of catvoch. should also fix [di + dtmf].
;flow:
;   1. first t2 processing
;   2. start_program (pgm_name: mergevef.exe) DO_NOT_WAIT_TO_COMPLETE
;   3. loop on GS:word ptr [SP_LAUNCHED_PGM_DWORD] = 6666H. if so, read allocated memory segment address
;   4. loop on 8:8. continue once you get it. this means merge opened the files and merged them ready to pro
cess
;   5. process dtmfs and emit messages
```

```
;   6. once done (dtmf_0,*,#) write 9:9
;   7. wait for 0:0. this means merge compacted and stored files
;vma0b.asm change. 10/24/95. b -> e.
INCLUDE CATEQUOE.INC
.MODEL COMPACT
.386P
                        public  voice_mail_access
;sys data
                        extrn   modems_tcb_st_seg_table:far             ;near
;procedures
                        extrn   vcon_start_program:near
                        extrn   vcon_emit_msg:near
                        extrn   vcon_no_action:near
.CODE
ASSUME DS:SEG modems_tcb_st_seg_table
voice_mail_access       proc
                        push    ds
                        push    ax
                        push    bx
                        push    di
                        push    es
                        push    dx
                        push    cx
                        push    si

                        cmp     GS:byte ptr [INDEX_FILE_BUSY], TRUE
                        je      complete_vma

                        cmp     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jne     vma_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                        ;
;   WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                                                     ;
;                                                                                                        ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
            mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
;*******************************************
;*  SETUP VMA                              *
;*******************************************
;set VMA default queue and direction
            mov     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_NEW_QUEUE
;vma0b.asm change. start with backward direction. 10/24/95.
            mov     GS:byte ptr [PLAY_WHICH_DIRECTION], PLAY_BCKWARD_DIRECTION
;vma0b.asm change. 10/24/95. false -> am_null
            mov     GS:byte ptr [VMA_PAUSE], AM_NULL
            mov     GS:byte ptr [VMA_COMPLETE], FALSE
            mov     GS:byte ptr [VMA_STOP], FALSE

            mov     GS:byte ptr [VMA_NO_NEW_MSGS], FALSE
            mov     GS:byte ptr [VMA_NO_OLD_MSGS], FALSE

            mov     GS:byte ptr [VMA_DELETE_QUEUE_COUNTER], 00H
            mov     GS:word ptr [VMA_ISSUED_CNTR], 0000H

;*******************************************
;*  SETUP FOR DTMF INPUTS                  *
;*******************************************
            mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
            mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]                    ;ax=addr of step paramet
ers
            mov     ax, FS:word ptr [bx + OFFSET_TO_INPUTS]                        ;first entry in params:
inputs?
            cmp     ax, EXPECT_DTMF                                                ;inputs?
            jne     vcon_no_inputs
            mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], FALSE
            mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
            mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], DTMF_ANALYZE         ;modify step_status regi
ster
            jmp     voice_mail_access_cont_entry
vcon_no_inputs:
            mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
            mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
            mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
```

```
          mov      FS:word ptr [bx + OFFSET_TO_STEP_STATUS], JUMP_UNCOND          ;modify step_status regi
ster
voice_mail_access_cont_entry:
;*******************************************
;*  GET RESOURCE AND DLE FROM ST ENTRY      *
;*******************************************
          mov      ax, FS:word ptr [bx + VM_OFFSET_TO_VLS]                        ;ax=resource number
          mov      GS:word ptr [DI + VCON_RESOURCE], ax
          mov      ax, FS:word ptr [bx + VM_OFFSET_TO_STOP_ON_DLE]                ;ax=stop_on_dlet
          mov      GS:word ptr [DI + VCON_STOP_ON_DLE], ax

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;       IF DTMF INPUTS EXPECTED, COLLECT DTMF FROM IRQ03                                           ;
;               VMA STOPS ONLY IF DTMF=0,*,#. THE OTHERS CAUSE EMIT_MSG TO STOP                    ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vma_skp_entry:
          cmp      GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
          je       vma_skp_read_buffer
          mov      GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NO_DTMF                 ;in case of no byte
          mov      ax, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]             ;write pointer
          mov      bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR]             ;read pointer
          cmp      ax, bx
          je       vma_skp_read_buffer                                            ;if equal no new DTMF
;if *,#,0 then stop vma (and emit_msg within) else let it go to emit_msg
          mov      al, GS:byte ptr [bx]
          mov      GS:byte ptr [DI + VCON_CUR_STEP_DTMF], al
          cmp      al, DTMF_0                                 ;30H TO 39H
          je       vma_stopping_dtmf
          cmp      al, DTMF_A                                 ;3AH (*)
          je       vma_stopping_dtmf
          cmp      al, DTMF_B                                 ;3BH (#)
          je       vma_stopping_dtmf
          jmp      vma_skp_read_buffer
vma_stopping_dtmf:
;NOTE THAT WE ARE NOT UPDATING DLE_NUMBER_BUFFER_IR00_PTR HERE.
          mov      GS:byte ptr [VMA_STOP], TRUE                                   ;can wrap up now as we g
ot our DTMF
          mov      GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE      ;got our DTMF, lets wrap
 up
                                                                                  ;this action (emit_msg).
 ie
                                                                                  ;close .pcm file, issue
ATH etc.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                  ;
;       IF STOP_ON_DLE ENABLED, CHECK FOR DLE   (HANDSET OFF-HOOK)                                 ;
;                                                                                                  ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
vma_skp_read_buffer:
          cmp      GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLET
          jnz      vma_skp_dlet
          cmp      GS:byte ptr [VCON_DLET_DETECTED], TRUE                         ;set by irq03
          jnz      vma_skp_dlet
          mov      GS:byte ptr [VMA_STOP], TRUE
;***************************************************************************************************
;*                                                                                                 *
;*      BRANCH INTO SECTIONS OF VMA BASED ON VOICE_MAIL_ACCESS_STEP                                *
;*                                                                                                 *
;***************************************************************************************************
vma_skp_dlet:           mov      bx, OFFSET vma_issued_table                     ;issued cntr reset at
                        mov      si, GS:word ptr [VMA_ISSUED_CNTR]               ;boot time and at end of
                        shl      si, 1                                           ;each vma action
                        jmp      cs:word ptr [si+bx]
;***************************************************************************************************
;*                                                                                                 *
;*      HOW THE VMA QUEUE FILE SYSTEM WORKS                                                        *
;*  There are 2 files: vma.que and vma.quf. rmi (reco_msg_indirect) only writes to vma.quf.
;*  vma reads both .que and .quf and updates .que. when fmaestro wishes to find out how many voice
;*  messages there are, it registers a request to TTQ asking it to run a vma without playing messages.
;*  just a version that updates .que with .quf. this vma run registers a count in system data area
;*  that fmaestro writes to LCD.
```

```
;*  for fma, if set to print as faxes arrive, fmaestro calls pfi. pfi always runs updatefq.exe. if not
;*  set to print automatically fmaestro just calls updatefq.exe.
;*
;*  we will not make DOS calls within actions. thus, opening the files vma.que and vma.quf and allocating
;*  space for them must be done by a program. this program is called mergevef.exe.
;*****************************************************************************************************
;*                                                                                                   *
;*  START_PROGRAM (PROGRAM_NAME: C:\CATBOX\PROGRAMS\MERGEVEF.EXE     [in step table entry]            *
;*                 PGM_ARGUMENT: C:\CATBOX\VOICE\VMA06172.QUE & .QUF    GS:word ptr [VMA_FILENAME_PTR]  *
;*                 PGM_PARAMETER_DWORD: -> GS:dword ptr [SP_LAUNCHED_PGM_DWORD] =                    *
;*                                         GS:word ptr [VMA_QUEUE_FILE_SEG])                         *

;*                                                                                                   *
;*****************************************************************************************************
;*****************************************************************************************************
;*                                                                                                   *
;*      PLAY FIRST NEW MESSAGE                                                                       *
;*                                                                                                   *
;*****************************************************************************************************
get_first_new_message:  mov     ax, GS:word ptr [VMA_QUEUE_FILE_SEG]    ;save the segment of the memory addr
ess
                        mov     ES, ax
                        mov     cx, 0000h
;vma0b change. include directionality and queue type. 10/24/95.
                        mov     al, 00h
                        mov     ah, GS:byte ptr [PLAY_WHICH_QUEUE]
                        add     al, ah
                        mov     ah, GS:byte ptr [PLAY_WHICH_DIRECTION]
                        add     al, ah
;                       mov     al, QFOP_NXT_IN_NEW_CHAIN
                        call    qf_ops
                        cmp     cx, 0000h
                        jne     cont_first_new_msg
                        mov     GS:byte ptr [VMA_NO_NEW_MSGS], TRUE
                        mov     cx, QF_NEW_CHAIN_FWD_LNK
;save the current record offset
cont_first_new_msg:     mov     GS:word ptr [VMA_CURRENT_RECORD_OFFSET], cx
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_GOT_FIRST_NEW_MESSAGE
                        jmp     voice_mail_access_exit
;*****************************************************************************************************
;*                                                                                                   *
;*      PLAY MESSAGE                                                                                 *
;*                                                                                                   *
;*****************************************************************************************************
play_message:           mov     ax, GS:word ptr [VMA_QUEUE_FILE_SEG]    ;save the segment of the memory addr
ess
                        mov     ES, ax
;vma0b.asm change. 10/24/95. true -> am_pause. if am_pause then no_action, if am_null, then emit_msg
;if am_resume, then emit_msg also.
                        cmp     GS:byte ptr [VMA_PAUSE], AM_PAUSE
                        je      play_no_action
;*********************************************************
;*      LEVEL_1 STEPPER #2                               *
;*********************************************************

                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jne     vma_em_skp_init
                        mov     bx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     ax, GS:word ptr [VMA_QUEUE_FILE_SEG]
                        PUSH    DS
                        mov     DS, ax
;vma0b.asm correction. next 2 lines.
                        mov     si, bx
                        add     si, QFRV_EVENT_FILENAME
;                       mov     si, DS:word ptr [bx + QFRV_EVENT_FILENAME]          ;DS:si => event_filename
                        mov     bx, VMA_EMIT_MSG_STEP
                        shl     bx, 1
                        mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                        mov     GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR], ax
                        mov     bx, ax
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
```

```
                        mov     bx, FS:word ptr [bx + OFFSET_TO_FILENAME]
                        mov     ax, FS
                        PUSH    ES
                        mov     ES, ax
                        PUSH    DI
                        mov     di,bx                                   ;Es:di => emit_msg ST en
try fn area
cont_copy:              movsb                                           ;copy the file over
                        cmp     DS:byte ptr [si], 00h
                        jne     cont_copy
                        movsb                                           ;copies 00h
                        POP     DI
;vma0c.asm change. 10/28/95.
                        mov     bx, GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        add     bx, OFFSET_TO_EM_LCD_YES_NO + 22

                        mov     si, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     dx, DS:word ptr [si + QFRV_EVENT_DATE]

                        and     dx, 01e0h                               ;isolate 8:5
                        shr     dx, 5
                        mov     al, 4
                        mul     dl
                        mov     si, OFFSET month_table
                        add     si, ax
                        mov     eax, CS:dword ptr [si]
                        mov     FS:dword ptr [bx], eax                  ;month in LCD

                        mov     si, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     dx, DS:word ptr [si + QFRV_EVENT_DATE]

                        and     dx, 001fh                               ;isolate 4:0
                        mov     al, 3
                        mul     dl
                        mov     si, OFFSET day_table
                        add     si, ax
                        mov     ax, CS:word ptr [si]
                        mov     FS:word ptr [bx + 4], ax                ;day in LCD
                        mov     al, CS:byte ptr [si + 2]
                        mov     FS:byte ptr [bx + 6], al                ;- in LCD


                        mov     si, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     dx, DS:word ptr [si + QFRV_EVENT_DATE]

                        and     dx, 0fe00h
                        shr     dx, 9                                   ;isolate 4:0
                        mov     al, 6
                        mul     dl
                        mov     si, OFFSET year_table
                        add     si, ax
                        mov     eax, CS:dword ptr [si]
                        mov     FS:dword ptr [bx + 7], eax              ;year in LCD
                        mov     ax, CS:word ptr [si + 4]
                        mov     FS:word ptr [bx + 11], ax               ;year in LCD


                        mov     si, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     dx, DS:word ptr [si + QFRV_EVENT_TIME]

                        and     dx, 0f800h
                        shr     dx, 11                                  ;isolate 4:0
                        mov     al, 7
                        mul     dl
                        mov     si, OFFSET hour_table
                        add     si, ax
                        mov     eax, CS:dword ptr [si]
                        mov     FS:dword ptr [bx + 13], eax             ;hour in LCD
                        mov     ax, CS:word ptr [si + 4]
                        mov     FS:word ptr [bx + 17], ax               ;hour in LCD

                        mov     al, CS:byte ptr [si + 6]
```

```
                        mov     FS:byte ptr [bx + 19], al                       ;hour in LCD


                        mov     si, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     dx, DS:word ptr [si + QFRV_EVENT_TIME]

                        and     dx, 007e0h
                        shr     dx, 5                                           ;isolate 4:0
                        mov     al, 2
                        mul     dl
                        mov     si, OFFSET minute_table
                        add     si, ax
                        mov     ax, CS:word ptr [si]
                        mov     FS:word ptr [bx + 16], ax                       ;minutes in LCD

                        POP     ES
                        POP     DS
vma_em_skp_init:        call    vcon_emit_msg                                   ;we are now ready to pla
y the message
;if play message is not done then exit this procedure and resume at next timer tick
                        cmp     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        POP     DI                                              ;to level_0
                        jne     voice_mail_access_exit                          ;not complete, resume ne
xt time
;check for dtmf input
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], FALSE
                        mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        cmp     GS:byte ptr [VMA_STOP], TRUE
                        jne     cont_w_no_new_msg_check
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_PLAYED_MESSAGE
                        POP     DI
                        jmp     voice_mail_access_exit
cont_w_no_new_msg_check:cmp     GS:byte ptr [VMA_NO_NEW_MSGS], TRUE
                        jne     cont_w_no_old_msg_check
                        mov     GS:byte ptr [VMA_NO_NEW_MSGS], FALSE
                        mov     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_OLD_QUEUE
                        mov     cx, 0000h
;vma0b.asm change. keep the direction the same. if was latest to earliest then in old chain also
;latest to earliest. 10/24/95.
                        mov     al, 00h
                        mov     ah, GS:byte ptr [PLAY_WHICH_QUEUE]
                        add     al, ah
                        mov     ah, GS:byte ptr [PLAY_WHICH_DIRECTION]
                        add     al, ah
;                       mov     al, QFOP_NXT_IN_OLD_CHAIN
                        call    qf_ops
                        cmp     cx, 0000h
                        jne     there_are_old_msgs
                        mov     cx, QF_OLD_CHAIN_FWD_LNK

                        mov     GS:byte ptr [VMA_NO_OLD_MSGS], TRUE
there_are_old_msgs:     mov     GS:word ptr [VMA_CURRENT_RECORD_OFFSET], cx
                        POP     DI
                        jmp     voice_mail_access_exit

cont_w_no_old_msg_check:cmp     GS:byte ptr [VMA_NO_OLD_MSGS], TRUE
                        jne     cont_w_dtmf_check
                        mov     GS:byte ptr [VMA_NO_OLD_MSGS], FALSE
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_PLAYED_MESSAGE
                        POP     DI
                        jmp     voice_mail_access_exit
cont_w_dtmf_check:      mov     al, GS:byte ptr [di + VCON_CUR_STEP_DTMF]

;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  REPEAT the current message.  At this point, our current record index is the one to be repeated           /
;  so we do not have to change it, the vma issue counter is also the same so we do not have to change that /
;  either.                                                                                                  /
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;play the current next timer tick, record offset still valid
```

```
                        cmp     al, DTMF_2                                      ;repeat message
                        jne     check_for_pause
                        POP     DI
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  PAUSE/RESUME is a toggle command, if pause is detected then we will call VCON_NO_ACTION.  Resume is     /
;  processed when the user presses the same DTMF key during pause period.  To resume, emit_msg will be     /
;  with its issue counter set to AT#CLS=8                                                                   /
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;HOW TO DO PAUSE/RESUME: if dtmf_4 then vma_pause=true and this causes a switch to no_action.
;out of no_action with either any dtmf or none, we reset vma_pause=false. now we reenter emit_msg.
;the task at hand is to reenter with current CHS values and not init from start CHS values.
;note that emit_msg quits with correct current CHS values.
; a. emit_msg gets dtmf_4
; b. vma dtmf checking section sets vma_pause = am_pause (am stands for answering machine)
; c. next pass into vma, no_action takes over
; d. once no_action exits with any/no dtmf, the stepper level_1 for no_action sets vma_pause = am_resume.
; e. now vma reenters to emit_msg and,
; f. emit_msg itself sees vma_pause = am_resume and skips the current CHS = start CHS and right
;    after resets vma_pause = am_null.
check_for_pause:        cmp     al, DTMF_7                                      ;pause message
                        jne     check_for_save
;vma0b.asm change. 10/24/95. true -> am_pause
                        mov     GS:byte ptr [VMA_PAUSE], AM_PAUSE
                        POP     DI
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  SAVE: save the current message to the old queue.  Save is only done for new messages.                    /
;        the record is moved from the new chain to the old chain.                                           /
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;NOTE: we need to decide what to do is we are in old chain already. perhap do nothing.
check_for_save:         cmp     al, DTMF_5                                      ;save message and play ne
xt message
                        jne     check_for_erase
save_message:           mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     bx, cx
;vma0b.asm change. 10/25/95. GS: -> ES:
                        cmp     ES:word ptr [bx + QFR_RECORD_TYPE], OLD_RECORD
                        je      more_messages               ; if user wanted to save an old message
                                                            ; ignore and continue with next msg
;there are a number of problems we need to take care of here.

; 1. before saving this message, we need to get its next message as, in the proces of deleting and
;    adding it to a "to" chain, we will have the next msg in the "to" chain whereas we want the next
;    msg from the "from" chain.
; 2. it may be that user has pressed delete button while the mother message is being played.
;    in this case, the delete will have no effect. the add will really add and it should not.
;    so if cx=mother record, then skip del/add.
; 1.
                        mov     al, 00h
                        mov     ah, GS:byte ptr [PLAY_WHICH_QUEUE]
                        add     al, ah
                        mov     ah, GS:byte ptr [PLAY_WHICH_DIRECTION]
                        add     al, ah
                        call    qf_ops
                        mov     bx, cx                      ; next msg ptr saved in bx
; 2. THIS WAS A FALSE ALARM BECAUSE THE MOTHER RECORD DTMF'S ARE IGNORED. THEY JUST CAUSE EARLY
;    EXIT FROM EMITTING MOTHER RECORD MESSAGE.
                        mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        cmp     cx, QF_NEW_CHAIN_FWD_LNK    ; if new mother record, do not save
                        je      skip_save_message

                        mov     al, QFOP_DEL_FM_NEW_CHAIN
                        call    qf_ops
                        mov     al, QFOP_ADD_TO_OLD_CHAIN
                        call    qf_ops
```

```
skip_save_message:      mov     cx, bx                      ; restore next msg ptr to cx
                        jmp     more_messages_fm_save

;////////////////////////////////////////////////////////////////////////////////////////
;                                                                                      /
;                   SETTING UP FOR NEXT MESSAGE                                        /
;                                                                                      /
;////////////////////////////////////////////////////////////////////////////////////////
more_messages:          mov     al, 00h
                        mov     ah, GS:byte ptr [PLAY_WHICH_QUEUE]
                        add     al, ah
                        mov     ah, GS:byte ptr [PLAY_WHICH_DIRECTION]
                        add     al, ah
                        call    qf_ops
more_messages_fm_save:  cmp     cx, 0000h
                        jne     cont_more_messages
                        cmp     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_NEW_QUEUE
                        jne     not_new_queue
                        mov     GS:byte ptr [VMA_NO_NEW_MSGS], TRUE
                        mov     cx, QF_NEW_CHAIN_FWD_LNK
                        mov     GS:word ptr [VMA_CURRENT_RECORD_OFFSET], cx
                        POP     DI
                        jmp     voice_mail_access_exit
not_new_queue:          mov     GS:byte ptr [VMA_NO_OLD_MSGS], TRUE
                        mov     cx, QF_OLD_CHAIN_FWD_LNK
                        mov     GS:word ptr [VMA_CURRENT_RECORD_OFFSET], cx
                        POP     DI
                        jmp     voice_mail_access_exit
;play the next message
cont_more_messages:     mov     GS:word ptr [VMA_CURRENT_RECORD_OFFSET], cx
                        POP     DI
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                                   /
;  ERASE: deletes the current message from the current queue.                                                       /
;         the record is deleted from the old or new chain                                                           /
;                                                                                                                   /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
;if save is "del fm new + add to old"    delete/erase is "del fm new/old + add to fre"
;again,
; 1. must identify the next one before we erase this one
; 2. if user is pressing erase button during the mother message, we should ignore.
;    I NEED NOT DO ANYTHING HERE AS: OUT OF MOTHER RECORD MESSAGE, THE EMIT_MSG TAIL END
;    PROCESSING IN LEVEL_1 STEPPER IN VMA, WE IGNORE DTMF AND SWITCH QUEUES OR EXIT. SO
;    CODE NEVER GETS HERE IN THESE INSTANCES.
; 3. must add to fre chain.
check_for_erase:
                        cmp     al, dtmf_8
                        jne     check_for_reply
; 1. vma0b.asm change. 10/24/95.
;vma0b.asm change. 10/25/95. add the next line:
                        mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     al, 00h
                        mov     ah, GS:byte ptr [PLAY_WHICH_QUEUE]
                        add     al, ah
                        mov     ah, GS:byte ptr [PLAY_WHICH_DIRECTION]
                        add     al, ah
                        call    qf_ops
                        mov     dx, cx                      ; next msg ptr saved in bx
; 2. nothing to do in this one
                        mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     bx, cx
;vma0b.asm change. 10/25/95. GS: -> ES:
                        mov     ah, ES:byte ptr [bx + QFR_RECORD_TYPE]
                        mov     al, QFOP_DEL_FM_FRE_CHAIN
                        add     al, ah
                        call    qf_ops
; 3.
                        mov     al, QFOP_ADD_TO_FRE_CHAIN
                        call    qf_ops

                        mov     cx, dx
```

```
                        jmp     more_messages_fm_save
;////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                       /
;  REPLY: TO BE IMPLEMENTED LATER                                                                       /
;                                                                                                       /
;////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_reply:
                        cmp al, DTMF_0
;to be implemented. the way it is setup now, it will behave same as NO_DTMF
;////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                       /
;   NEXT                                                                                                /
;   SKIP: skip to the next message.                                                                     /
;        the next record offset is derived from the current message.  The next record is then stored in /
;        stored in the CURRENT_RECORD_OFFSET field.  The next timer tick will play the next message.    /
;        If there are no next next message, "no more message" should be played                          /
;                                                                                                       /
;////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_next:         cmp     al, dtmf_3
                        jne     check_for_previous
                        mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        jmp     more_messages
;////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                       /
;   PREVIOUS                                                                                            /
;   SKIP REALLY MEANS SKIP TO NEXT. THIS COULD MEAN SKIP TO LATER IF DIRECTION IS FROM ERLIER TO LATER  /
;   OR IT COULD MEAN SKIP TO EARLIER IF DIRECTION IS FROM LATER TO EARLIER. SO SHORTEN SKIP TO NEXT TO  /
;   NEXT. THEN SKIP TO PREVIOUS BECOMES PREVIOUS. AGAIN IT MEANS EARLIER IF DIRECTION EARLIER TO LATER  /
;   AND LATER IF DIRECTION IS FROM LATER TO EARLIER.                                                    /
;                                                                                                       /
;////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_previous:     cmp     al, dtmf_1
                        jne     check_for_direction_change
                        mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     ah, GS:byte ptr [PLAY_WHICH_QUEUE]
                        cmp     GS:byte ptr [PLAY_WHICH_DIRECTION], PLAY_FORWARD_DIRECTION
                        jne     previous_backward
                        mov     al, QFOP_PRV_IN_FRE_CHAIN
                        add     al, ah
                        jmp     previous_call
previous_backward:      mov     al, QFOP_NXT_IN_FRE_CHAIN
                        add     al, ah
previous_call:          call    qf_ops
                        jmp     more_messages_fm_save

;////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                       /
;  DIRECTION_CHANGE: play messages from earliest to latest or vice versa.  If the user presses this key /
;                    we will toggle between the two direction.  NOTE:  The default is set from earliest to /
;                    latest during the first entrance to this procedure.                                /
;                                                                                                       /
;////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_direction_change:
                        cmp     al, dtmf_4
                        jne     delete_all_messages
                        cmp     GS:byte ptr [PLAY_WHICH_DIRECTION], PLAY_FORWARD_DIRECTION
                        jne     set_forward_direction
                        mov     GS:byte ptr [PLAY_WHICH_DIRECTION], PLAY_BCKWARD_DIRECTION
;vma0b.asm change. 10/24/94. when switching direction go to the extremity.
;                       mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     cx, 0000h
                        jmp     more_messages
set_forward_direction:
                        mov     GS:byte ptr [PLAY_WHICH_DIRECTION], PLAY_FORWARD_DIRECTION
;vma0b.asm change. 10/24/94. when switching direction go to the extremity.
;                       mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        mov     cx, 0000h
                        jmp     more_messages

;////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                       /
;  DELETE_ALL: deletes all the records(messages) in the current chain.  Should we allow a user to delete /
;         all messages in a new chain?                                                                  /
```

```
;                                                                                                                    /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
delete_all_messages:
                        cmp     al, dtmf_9
                        jne     check_for_switch_queue
                        ;*****************************************************************
                        ;
                        ; update the delete counter, if counter is more than 1
                        ; that means we have deleted the old and new queue, there
                        ; is nothing to do but to exit.  If the counter is 1 then
                        ; we will switch queue
                        ;
                        ;*****************************************************************
                        mov     al, GS:byte ptr [VMA_DELETE_QUEUE_COUNTER]
                        add     al, 1     ;increment the counter by 1
                        mov     GS:byte ptr [VMA_DELETE_QUEUE_COUNTER], al ;put the new value back in storag
e area
                        cmp     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_OLD_QUEUE

                        ;*****************************************************************
                        ;
                        ; start deleting from beginning of queue
                        ;
                        ;*****************************************************************

                        mov     cx, 0000h   ;start from beginning
                        jne     delete_new_queue
                        mov     al, QFOP_NXT_IN_OLD_CHAIN
                        jmp     get_first_record

delete_new_queue:
                        mov     al, QFOP_NXT_IN_NEW_CHAIN

get_first_record:       call    qf_ops
                        ;cx = first record in the queue to be deleted
;vma0b.asm change. 10/24/95. what if cx=0000 then skip deleting. but, if user presses
;delete all while in mother record, nothing will happen. THIS IS NOT RIGHT. THE USER SHOULD BE
;ABLE TO DEL ALL WHILE IN MOTHER RECORD. reason for this problem: out of emit mother msg, we do
;not get to dtmf checking code.
                        cmp     cx, 0000h
                        je      done_deleting
                        mov     bx, cx
;vma0b.asm change. 10/25/95. GS: -> ES:
                        mov     ah, ES:byte ptr [bx+ QFR_RECORD_TYPE]

                        ;*************************************************
                        ;
                        ; now we are ready to delete the first message
                        ;
                        ;*************************************************
; 1. find the next one before deleting this one
; 2. del fm new/old and add to fre.
;vma0b.asm changes. 10/24/95.
cont_to_del:
                        mov     al, QFOP_NXT_IN_FRE_CHAIN
                        add     al, ah
                        call    qf_ops
                        mov     dx, cx

;vma0b.asm change. 10/27/95. add next line
                        mov     cx, bx
                        mov     al, QFOP_DEL_FM_FRE_CHAIN
                        add     al, ah
                        call    qf_ops
                        mov     al, QFOP_ADD_TO_FRE_CHAIN
                        call    qf_ops

;vma0b.asm change. 10/27/95. add next line
                        mov     bx, dx
                        mov     cx, dx
                        cmp     cx, 0000h
                        jne     cont_to_del
                        ;*********************************************************************
```

```
                        ;
                        ; After deleting all messages in a queue, we can go to the other
                        ; queue if we have not already deleted it. The DELETE_QUEUE_COUNTER
                        ; helps us to determine if we have deleted both queues.  If the value
                        ; is set to 1 or less than we must have another queue to go to, else
                        ; we will exit (if value is 2)
                        ;
                        ;*****************************************************************

done_deleting:          cmp     GS:byte ptr [VMA_DELETE_QUEUE_COUNTER], 02h
                        jb      switch_queue
                        mov     GS:byte ptr [VMA_DELETE_QUEUE_COUNTER], 00h ;clear the counter
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_PLAYED_MESSAGE
                        POP     DI
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  SWITCH_QUEUE: toggles between old messages or new messages.                                              /
;                When the queue is switch, the current queue will be switched.  The new queue will be       /
;                played based on the direction flag (from earliest to latest or vice versa).
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_switch_queue:
                        cmp     al, dtmf_6
                        jne     check_for_dtmf_0
switch_queue:           cmp     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_OLD_QUEUE
                        je      set_to_new
                        mov     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_OLD_QUEUE
                        mov     cx, 0000h
                        jmp     more_messages

set_to_new:
                        mov     GS:byte ptr [PLAY_WHICH_QUEUE], PLAY_NEW_QUEUE
                        mov     cx, 0000h
                        jmp     more_messages


;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  Replay options:  Handle by the level_0 stepper                                                           /
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_dtmf_0:
                        cmp     al, dtmf_0
                        jne     check_for_dtmf_a
;we are now done, need to update and close file
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_PLAYED_MESSAGE
                        POP     DI
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  To main menu:  Handle by the level_0 stepper                                                             /
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_dtmf_a:
                        cmp     al, dtmf_a
                        jne     check_for_dtmf_b
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_PLAYED_MESSAGE
                        POP     DI
;vma0b.asm change. 10/24/95.
;                       mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                           /
;  To previous menu:  Handle by the level_0 stepper                                                         /
;                                                                                                           /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////
check_for_dtmf_b:
                        cmp     al, dtmf_b
                        jne     check_for_no_dtmf
```

```
                        mov     GS:word ptr [VMA_ISSUED_CNTR], VMA_PLAYED_MESSAGE
                        POP     DI
;vma0b.asm change. 10/24/95.
;                       mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        jmp     voice_mail_access_exit

;////////////////////////////////////////////////////////////////////////////////////////////////////////////////
;                                                                                                              /
;       no_dtmf                                                                                                /
;                                                                                                              /
;////////////////////////////////////////////////////////////////////////////////////////////////////////////////

check_for_no_dtmf:      cmp     al, NO_DTMF
;irq03 does not let any dtmf go through but these. A,B,C,D are not seen.
                        mov     cx, GS:word ptr [VMA_CURRENT_RECORD_OFFSET]
                        jmp     more_messages

;*****************************************************************
;*                                                               *
;*          NO_ACTION  DUAL TO  EMIT_MSG FOR PAUSE/RESUME        *
;*                                                               *
;*****************************************************************
play_no_action:         PUSH    DI
                        mov     DI, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jne     vma_na_skp_what_action
;vma0b.asm change. 10/26/95. remove next line. no_action will reset it to false.
;                       mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                        mov     bx, VMA_NO_ACTION_STEP
                        shl     bx, 1
                        mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                        mov     GS:word ptr [di+VCON_CUR_STEP_DATA_AREA_ADDR], ax
vma_na_skp_what_action:                                         ;play no action and wait for dtmf
                        call    vcon_no_action
;if play message is not done then exit this procedure and resume at next timer tick
                        cmp     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        POP     DI
                        jne     voice_mail_access_exit          ;not complete, resume next time
;vma0b.asm change. 10/24/95. false -> am_resume
                        mov     GS:byte ptr [VMA_PAUSE], AM_RESUME
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], FALSE
                        mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE

                        POP     DI
                        jmp     voice_mail_access_exit

;*****************************************************************************************************
;*                                                                                                   *
;*      COMPLETE    V M A                                                                            *
;*                                                                                                   *
;*****************************************************************************************************
;now finish off and reset some variables
;DI at LEVEL_0
complete_vma:           mov     GS:word ptr [VMA_ISSUED_CNTR], 0000H                    ;we are done!
                        mov     GS:byte ptr [DI + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        mov     GS:byte ptr [VMA_STOP], FALSE
                        mov     GS:byte ptr [VMA_COMPLETE], TRUE
;vma0b.asm change. 10/26/95. reset index_file_busy byte. mergevef.exe had found it busy
;and it is always preceding vma so it will find it busy again. better yet, I should have
;it so sp(merge) has a return flag which makes code not go to vma at all. it could be
;an emit message. of course, then index_file_busy should be reset within merge after the
;return flag is set to flag = 0. the emit_msg should say: "your voice mail file is being
; accessed by another line... please try again later!"
                        mov     GS:byte ptr [INDEX_FILE_BUSY], FALSE
                        jmp     voice_mail_access_exit


voice_mail_access_exit: pop     si
                        pop     cx
                        pop     dx
                        pop     es
```

```
                        pop     di
                        pop     bx
                        pop     ax
                        pop     ds

                        ret

;*****************************************************************
;*                                                               *
;*      VMA STEPS                                                *
;*                                                               *
;*****************************************************************
vma_issued_table        dw      get_first_new_message
                        dw      play_message
                        dw      complete_vma

voice_mail_access       endp



;*****************************************************************
;*                                                               *
;*      PROCEDURE VMA.QUE FILE OPERATIONS                        *
;*      version 6.2                                              *
;*                                                               *
;*****************************************************************
;the image of fma.que sits in allocated memory. it starts at SEG:0
;This procedure will manipulate the records of the queue files based on the input:
;
;input: ES:cx = segment:offset of record to be changed (all chains for add, new/old for del)
;       al    = specifies action (add/delete record) and chain type (free, new, old)
;output:ES:cx = segment:offset of a record (deleted from free chain or next in chain etc)
;no other registers change.
;
;       al = 00 add to free chain
;            80 del from free chain
;            10 get next in free chain
;            20 get previous in free chain
;
;            01 add to new chain
;            81 del from new chain
;            11 get next in new chain
;            21 get previous in new chain
;
;            02 add to old chain
;            82 del from old chain
;            12 get next in old chain
;            22 get previous in old chain
;
;note:  for first time next in chain, cx=0000h as input
;       if also there are no records in this chain, then cx=0000h as output
;       if also the next record is the mother record, cx=0000h
;
;notes: queue file memory image is in a data segment that starts at 0000h
;       add always to tail end of chain
;       del from anywhere in new/old chains
;       del from head of free chain

qf_ops                  proc
                        push    bx
                        push    dx
                        push    di
                        push    ax

del_record:
;==========
                        test    al, 10000000b
                        jz      prv_record
                        cmp     al, 80h
                        jnz     not_a_del_fm_free_chain         ;ie a record to be deleted exists for sure
;if free chain is empty ie just has a mother record, then cx=queue_file_size and
;queue_file_size=queue_file_size + queue_record_size. free chain is empty if its
;mother record's forward_link = address of mother record.
```

```
;so first test for empty free chain.
                        mov     bx, QF_FRE_CHAIN_FWD_LNK
                        mov     dx, ES:word ptr [bx]            ;forward_link of free mother record
                        cmp     dx, QF_FRE_CHAIN_FWD_LNK        ;if equal then only mother record
                        je      free_record_at_end_of_file
                        mov     cx, dx                          ;points to first record
                        jmp     not_a_del_fm_free_chain
free_record_at_end_of_file:
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        mov     cx, dx
                        add     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK
                        mov     ES:word ptr [bx + QFR_BWD_LNK], QF_FRE_CHAIN_FWD_LNK
not_a_del_fm_free_chain:mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        jmp     qf_op_exit


prv_record:
;==========
                        test    al, 00100000b
                        jz      nxt_record
                        cmp     cx, 0000h
                        je      prv_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
prv_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_BWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

nxt_record:
;==========
                        test    al, 00010000b
                        jz      eli_record
                        cmp     cx, 0000h
                        je      nxt_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
```

```
                        mov     cx, 0000h
                        jmp     qf_op_exit
nxt_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_FWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

eli_record:
;==========
                        test    al, 01000000b
                        jz      add_record
                        mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        sub     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        jmp     qf_op_exit


add_record:
;==========
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     dx, ES:word ptr [di + QFR_BWD_LNK]

                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], di

                        shr     ax, 6                           ; ax = 00h, 01h, 02h
                        mov     ES:byte ptr [bx + QFR_RECORD_TYPE], al

                        mov     bx, dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], cx
                        mov     bx, di
                        mov     ES:word ptr [bx + QFR_BWD_LNK], cx

                        jmp     qf_op_exit

qf_op_exit:             pop     ax
                        pop     di
                        pop     dx
                        pop     bx
                        ret

qf_ops                  endp

;table
year_table      db  "80 at "
                db  "81 at "
                db  "82 at "
                db  "83 at "
                db  "84 at "
                db  "85 at "
```

```
                db   "86 at "
                db   "87 at "
                db   "88 at "
                db   "89 at "
                db   "90 at "
                db   "91 at "
                db   "92 at "
                db   "93 at "
                db   "94 at "
                db   "95 at "
                db   "96 at "
                db   "97 at "
                db   "98 at "
                db   "99 at "
                db   "00 at "
                db   "01 at "
                db   "02 at "
                db   "03 at "
                db   "04 at "
                db   "05 at "
                db   "06 at "
                db   "07 at "
                db   "08 at "
                db   "09 at "
                db   "10 at "
                db   "11 at "
                db   "12 at "
                db   "13 at "
                db   "14 at "
                db   "15 at "
                db   "16 at "
                db   "17 at "
                db   "18 at "
                db   "19 at "
                db   "20 at "
                db   "21 at "
                db   "22 at "
                db   "23 at "
                db   "24 at "
                db   "25 at "
                db   "26 at "
                db   "27 at "

month_table     db   "000-"
                db   "JAN-"
                db   "FEB-"
                db   "MAR-"
                db   "APR-"
                db   "MAY-"
                db   "JUN-"
                db   "JUL-"
                db   "AUG-"
                db   "SEP-"
                db   "OCT-"
                db   "NOV-"
                db   "DEC-"

day_table       db   "00-"
                db   " 1-"
                db   " 2-"
                db   " 3-"
                db   " 4-"
                db   " 5-"
                db   " 6-"
                db   " 7-"
                db   " 8-"
                db   " 9-"
                db   "10-"
                db   "11-"
                db   "12-"
                db   "13-"
                db   "14-"
                db   "15-"
```

```
                db   "16-"
                db   "17-"
                db   "18-"
                db   "19-"
                db   "20-"
                db   "21-"
                db   "22-"
                db   "23-"
                db   "24-"
                db   "25-"
                db   "26-"
                db   "27-"
                db   "28-"
                db   "29-"
                db   "30-"
                db   "31-"

hour_table      db   "12:  AM"
                db   " 1:  AM"
                db   " 2:  AM"
                db   " 3:  AM"
                db   " 4:  AM"
                db   " 5:  AM"
                db   " 6:  AM"
                db   " 7:  AM"
                db   " 8:  AM"
                db   " 9:  AM"
                db   "10:  AM"
                db   "11:  AM"
                db   "12:  PM"
                db   "01:  PM"
                db   "02:  PM"
                db   "03:  PM"
                db   "04:  PM"
                db   "05:  PM"
                db   "06:  PM"
                db   "07:  PM"
                db   "08:  PM"
                db   "09:  PM"
                db   "10:  PM"
                db   "11:  PM"

minute_table    db   "00"
                db   "01"
                db   "02"
                db   "03"
                db   "04"
                db   "05"
                db   "06"
                db   "07"
                db   "08"
                db   "09"
                db   "10"
                db   "11"
                db   "12"
                db   "13"
                db   "14"
                db   "15"
                db   "16"
                db   "17"
                db   "18"
                db   "19"
                db   "20"
                db   "21"
                db   "22"
                db   "23"
                db   "24"
                db   "25"
                db   "26"
                db   "27"
                db   "28"
                db   "29"
                db   "30"
```

```
                db  "31"
                db  "32"
                db  "33"
                db  "34"
                db  "35"
                db  "36"
                db  "37"
                db  "38"
                db  "39"
                db  "40"
                db  "41"
                db  "42"
                db  "43"
                db  "44"
                db  "45"
                db  "46"
                db  "47"
                db  "48"
                db  "49"
                db  "50"
                db  "51"
                db  "52"
                db  "53"
                db  "54"
                db  "55"
                db  "56"
                db  "57"
                db  "58"
                db  "59"
END
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;tmo0b.asm <- tmo0a.asm. 11/4/95. L7 changes.
;there are two issues:
; a. no EM(ringback) in TMO anymore. After n rings, do ATA and go to next step.
;    this is a very easy change: after ATA, VCON goto voice processing and not emit_ringback.
;    also make the section that sends the fake RING a procedure to be called from
;                                    ACD, EM, NA
; b. <dle>t handling.
;tmo0a.asm <- tmo09.asm. 10/12/95. incoming fax change ie if +FKS and we were receiving then
;enable the TTQ entry for the ribbon that will print the incoming fax. It turns out all the
;changes are in ttisr. ie ttisr activates the TTQ entry. Here we just note that incoming_fax=YES
;tmo09.asm <- tmo08.asm. 9/21/95. remove sys_data structure.
;tmo08.asm <- tmo07.asm. 9/17/95. change to using modem_data and sys_data structures.
;also make fixes as per bug report 007.
;tmo07.asm <- tmo06.asm. 8/10/95. add handling of TTQ items resulting from host modem binding
;tmo06.asm <- tmo05.asm. 7/12/95. better AT handling. minimize AT's. 8-95-34.
;tmo05.asm <- tmo04.asm. 6/25/95. 7-95-50 to 55. combine tmo and tmk ie add dtmf to tmo as well
;as various flag values. bottom of page 51 describes what to change in the level_0 steppers.
;tmo04.asm <- tmo03.asm. 6/18/95. f=1 for ttq, f=0 for voice, f=2 for fax. just need to change
;the values of the equ's in catequ.
;TMO03.ASM <- TMO02.ASM. 6/12/95. CATVOCL.
;AT#VBS=8 SURVIVES ATH AND THEN AT#CLS=8.
;AT#VLS=2 DOES NOT SURVIVE ATH AND THEN AT#CLS=8.
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
;\                                                                              \
;\      HOW TO NOT REPEAT CERTAIN MODEM COMMANDS UNNECESSARILY                  \
;\                                                                              \
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
;modem calls take place in voice processing mode. thus we already did the following:
;   AT#CLS=8
;we do not need to repeat this in every action. the exception is when we change resource.
;ie from LINE to HANDSET etc. we must then do ATH and this changes AT#CLS to 0. Also, when
;a phone call ends, either by reco_msg timeout or detection of <DLE>Q or S, then we must
;let the CO have the circuit by issuing ATH and opening the circuit again.
;   so, we need another state machine that keeps track of two commands AT#CLS=8 and ATH.
;Certainly, at the end of rmi we need an ATH. But we do not need one at the end of eahc em.
;the caller might hang up amy where during the interactive voice session. each action must have
;a timeout. and from anywhere in the step table we should come back to tmo.
;so, perhaps any return to tmo must have an ATH. but not certainly any loop in tmo. perhaps any
;timeout originated return to tmo should have an ATH. I think these issues will be much clearer
;when we have the whole step table working.
;
;for the time being we put an AT#CLS=8 inside instal and also set GS:byte ptr [AT_CLS_8_DONE]=TRUE
;then, when we do ATH somewhere, we should set GS:byte ptr [AT_CLS_8_DONE]=FALSE. ATH is required
;only when we are hanging up, or when we are changing resources. so we should have
;GS:word ptr [LAST_RESOURCE] and if the new AT#VLS command does not have this resource in it, then
;we should also do GS:byte ptr [ATH_DONE]=false. when ATH comes it will set at#cls=8 done to false
;also. another solution is to couple the ATH that is due to a change in VLS with VLS:
;   Thus, we have a VLS to do:
;   1. if resource same as GS:word ptr [LAST_RESOURCE], then skip VLS
;   2. else do ATH, AT#CLS=8 and VLS. this covers the ATH needed for resource change.
;   We know the other cases we need ATH for, namely hanging up on timeout or just hanging up.
;   1. after each such ATH, also do AT#CLS=8 and VLS=GS:word ptr [LAST_RESOURCE].
;SUMMARY: *VLS induces ATH, AT#CLS=8, AT#VLS=
;         *ATH induces ATH, AT#CLS=8, AT#VLS=GS:word ptr [LAST_RESOURCE]
;         *at instal issue AT#CLS=8 and set GS:byte ptr [AT_CLS_8_DONE]=TRUE. this way when tmo comes
;          it will check if cls=8 is done and if so will skip it. Indeed, at instal I should set all
;          line modems to VLS=LINE and set baud rates sample rates and so forth. I wonder if baud
;          rates survive ATH? the keypad modem, on the other hand must be set to speaker. as the most
;          likely use will be to retrieve messages.




;NOTES:
;CHANGE EMIT_MSG TO ACCOMMODATE STOP_ON_DLEC
;CHANGE LEVEL_0 STEPPER TO HANDLE F=1, F=0 and F=2
;CHANGE IRQ03
;ADD SETTING OF MODEMS AS DESCRIBED ABOVE TO INSTAL.
;*******************************************************************************
;*                                                                             *
```

```
;*      STEP TABLE ENTRY FOR TMO                                                *
;*                                                                              *
;********************************************************************************
;mother_state                dw  ST_TIMER_TICK_MAESTRO
;                           dw  DTMF_ANALYZE
;                           dw  state_0011_parameters
;state_0011_next_state      dw  0000H                       ;CUR_STEP_STATUS = 0001H TTQ_ITEM
;                                                           ;tmo writes next step entry from ttq info
;                           dw  0000H                       ;CUR_STEP_STATUS = 0000H VOICE
;                                                           ;if cur_dtmf=null, a fixed next step.
;                                                           ;if cur_dtmf=none, then tmo internal
;                                                           ;stepper loops back
;                           dw  0000H                       ;if cur_dtmf=0 level_0 stepper -> this step
;                                                           ;CUR_STEP_STATUS = 0002H FAX
;                                                           ;if cur_dtmf=null, level_0 stepper ignores
;                                                           ;this entry and goes to step 0000h to be
;                                                           ;processed after ret from fax.
;                           dw  0000H                       ;dtmf=1
;                           dw  0000H                       ;dtmf=2
;                           dw  0000H                       ;dtmf=3
;                           dw  0000H                       ;dtmf=4
;                           dw  0000H                       ;dtmf=5
;                           dw  0000H                       ;dtmf=6
;                           dw  0000H                       ;dtmf=7
;                           dw  0000H                       ;dtmf=8
;                           dw  0000H                       ;dtmf=9
;                           dw  0000H                       ;dtmf=*
;                           dw  0000H                       ;dtmf=#
;state_0011_parameters      dw  DO_NOT_EXPECT_DTMF          ;option to see dtmf
;                           dw  0000H                       ;no filename associated with this.
;the following resource parameters are ignored. tmo is setup for line at first irq00 due to AT#CLS=8.
;if dtmf comes, tmo changes the values of modem_resource_in/out/dtmf but the local values stay the
;same. I put these here for explicitness. tmo code does not use these values. AT#CLS=8 automatically
;gives LINE.
;MORE NOTES: tmo starts with line but as long as there is no ring and no ttq, keypad to dle buffer
;link is enabled. when ring comes this link is disabled. also when the dtmf ribbon starts, tmo
;sets the current variables to mic, spkr, keypad.
;                           dw  VCON_LINE                   ;local in resource
;                           dw  VCON_LINE                   ;local out resource
;                           dw  VCON_LINE                   ;local dtmf resource
;                           dw  DO_NOT_STOP_ON_SPECIAL_DLE
;********************************************************************************
;*                                                                              *
;*      EMIT_MSG FOR USE BY TMO                                                 *
;*                                                                              *
;********************************************************************************
;emit_msg_for_tmo           dw  ST_EMIT_MSG
;                           dw  DTMF_ANALYZE
;                           dw  state_0004_parameters
;state_0004_next_state      dw  0fffffh
;state_0004_parameters      dw  DO_NOT_EXPECT_DTMF
;                           dw  vcon_session_constant_0     ;RINGBACK.PCM
;                           dw  VCON_LINE
;                           dw  STOP_ON_DLEC
;********************************************************************************
;*                                                                              *
;*                  T   M   O                                                   *
;*      MODEM MAY STAY IN TMO INDEFINITELY UNLESS RING OR TTQ ITEM              *
;*                                                                              *
;********************************************************************************
;next step scheme: tmo is administered by the level_0 stepper. tmo checks for RING
;and if detected goes through the steps of determining if it is a fax. notes on
;6-95-62 show that it is not good to check for data modem as it makes noises during
;AT#CLS=0. if the caller is a person then this will an unpleasant experience.
;if fax, you go to CASMODEM. if voice, then you go to the first step of voice processing.
;if no RING but a TTQ item, then we go to the step shown by the TTQ item. so we need
;to come up with a way of implementing next step w/o dtmf.
;NEXT STEP PROCEDURE FOR TMO:
;   F=1 for TTQ item. the step number gets written to the F=1 next step entry.
INCLUDE CATEQU0E.INC
.MODEL  COMPACT
.386P
.CODE
```


201

```
ASSUME DS:SEG tmaestro_task_queue
                    public  tmaestro
                    public  sim_ring_to_cas
;procedures
                    extrn   vcon_start_program:near
                    extrn   vcon_emit_msg:near
                    extrn   vcon_issue_class2_cmd:near
;cas related far data
                    extrn   loc1fda:far
                    extrn   loc1fde:far
                    extrn   loc1fe0:far
                    extrn   loc1fd4:far
                    extrn   loc02b6:far
;sys data
                    extrn   tmaestro_task_queue:far                 ;near
                    extrn   tmaestro_task_queue_end:far             ;near
                    extrn   tmaestro_available_resources:far        ;near
                    extrn   timer_tick_count:far                    ;near
                    extrn   vcon_ata:far                            ;near
                    extrn   vcon_at_cls_8:far                       ;near
                    extrn   vcon_ath:far                            ;near
                    extrn   vcon_at_vbs_4:far                       ;near
                    extrn   vcon_at_bdr_16:far                      ;near

                    extrn   vcon_at_vsr:far
                    extrn   vcon_at_vss:far
                    extrn   vcon_at_vsp:far
                    extrn   vcon_at_vsd:far

                    extrn   modems_tcb_st_seg_table:far
                    extrn   number_of_rings_to_answer:far
                    extrn   max_time_between_rings:far

;*****************************************************************************
;*                                                                           *
;*          PROCEDURE   TMO                                                  *
;*          TMO IS CALLED BY THE LEVEL_0 STEPPER                             *
;*                                                                           *
;*****************************************************************************
tmaestro            proc
                    push    ds
                    push    ax
                    push    bx
                    push    di
                    push    es
                    push    dx
                    push    cx
                    push    si
                    cmp     GS:byte ptr [DI].action_level_data.VCON_FIRST_IRQ00_CUR_STEP, TRUE
                    jnz     tmo_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                             ;
;           WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                   ;
;                                                                             ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                    mov     GS:byte ptr [DI].action_level_data.VCON_FIRST_IRQ00_CUR_STEP, FALSE
;*****************************************
;*      SETUP TMO                        *
;*****************************************
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_NO_RESPONSE
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_START
                    mov     GS:byte ptr modem_data.TMO_COMPLETE, FALSE
                    mov     GS:byte ptr modem_data.TMO_STOP, FALSE
;if tmo allows dtmf, then dle buffer is checked. if not it is not. but unlike emit_msg
;for example, the flag is not set to a value. neither do we have to set cur_step_dtmf
;to a value such null or none. if ring, it will be set to null, if ttq request it will also
;be set to null. if we find dtmf, it will bet also. but note this: the standard code to check
;dtmf skips if do_not_load_cur_ste_buffer. this value we will set here.

;if no dtmf, then the value stays null to the level_0 stepper.
                    mov     bx, GS:word ptr [DI].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                    mov     ax, FS:word ptr [bx + OFFSET_TO_INPUTS]
```

```
                    cmp     ax, EXPECT_DTMF
                    jne     tmo_no_inputs
                    mov     GS:byte ptr [DI].action_level_data.VCON_DO_NOT_LOAD_CUR_STEP_BUFFER, FALSE
                    mov     GS:byte ptr modem_data.KEYPAD_TO_DLE_BUFFER_OK, YES
                    jmp     tmo_cont_entry
tmo_no_inputs:
                    mov     GS:byte ptr [DI].action_level_data.VCON_CUR_STEP_DTMF, NULL
                    mov     GS:byte ptr [DI].action_level_data.VCON_DO_NOT_LOAD_CUR_STEP_BUFFER, TRUE
                    mov     GS:byte ptr modem_data.KEYPAD_TO_DLE_BUFFER_OK, NO
tmo_cont_entry:
                    mov     GS:byte ptr modem_data.TMO_ATH_DELAY, 10h
                    mov     GS:word ptr modem_data.TMO_ATH_TO_OK_COUNT, 0000h

tmo_skp_entry:      nop
;*****************************************************************************
;*                                                                           *
;*    BRANCH INTO SECTIONS OF VMA BASED ON TMO_SEQ_PTR AND TMO_RESPONSE_PTR  *
;*                                                                           *
;*****************************************************************************
what_response_to_expect_at_this_timer_tick:
                    mov     bx, OFFSET tmo_response_table
                    mov     si, GS:word ptr modem_data.TMO_RESPONSE_PTR
                    shl     si, 1
                    jmp     cs:word ptr [si + bx]

what_to_do_at_this_timer_tick:
                    mov     bx, OFFSET tmo_seq_table
                    mov     si, GS:word ptr modem_data.TMO_SEQ_PTR
                    shl     si, 1
                    jmp     cs:word ptr [si + bx]
;=================================================================+
;                                                                 |
;       FOR MODEMS 0 AND 1-4, RIGHT OUT OF BOOT:                  |
;           ATH                                                   |
;           AT#CLS=8                                              |
;           AT#VBS=8                                              |
;       AFTERWARDS                                                |
;           DO NOTHING FOR MODEM_0                                |
;           FOR MODEMS 1-4:                                       |
;                   IF ATH WAS ISSUED SINCE LAST TIME AT TMO      |
;                               DO AT#CLS=8                       |
;                   ELSE        DO NOTHING                        |
;   VARIABLES:                                                    |
;GS:byte ptr [MODEM_OUT_OF_CVBOOT]=TRUE out of cvboot             |
;                                 =FALSE at end of out of boot AT's |
;GS:byte ptr [TMO_ATH_ISSUED_IN_RIBBON]=FALSE out of cvboot       |
;                                       =TRUE with any ATH out of TMO|
;since no MODEM_0 ribbon calls ATH, can use same code for 0 and 1-4.|
;                                                                 |
;=================================================================+

;=================================================================+
;       ISSUE ATH                                                 |
;=================================================================+
tmo_issue_ath:      cmp     GS:byte ptr modem_data.MODEM_OUT_OF_CVBOOT, TRUE
                    jne     do_not_do_init_ats
                    dec     GS:byte ptr modem_data.TMO_ATH_DELAY
                    jnz     tmo_exit
                    mov     GS:byte ptr modem_data.TMO_ATH_DELAY, 10h   ;about 1 second delay (10h)
                    mov     cx, lath                                    ;AT#CLS=8 set modem to flexible
                    lea     si, vcon_ath                                ;voice mode
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_ATH_ISSUED
                    jmp     tmo_exit

do_not_do_init_ats: mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_NOT_OUT_OF_BOOT
                    jmp     tmo_exit

;=================================================================+
;       ISSUE AT#CLS=8                                            |
;=================================================================+
```

```
tmo_issue_atcls8:   mov     cx, lat_cls_8                          ;AT#CLS=8 set modem to flexible
                    mov     si, OFFSET vcon_at_cls_8               ;voice mode
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_CLS_ISSUED
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK

                    jmp     tmo_exit

;=====================================================================+
;       ISSUE AT#VBS=8                                                |
;=====================================================================+
tmo_issue_atvbs:    mov     cx, lat_vbs_4
                    mov     si, OFFSET vcon_at_vbs_4
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_VBS_ISSUED
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK

                    jmp     tmo_exit
;=====================================================================+
;       ISSUE AT#VSR=7200                                             |
;=====================================================================+
tmo_issue_atvsr:    mov     cx, lat_vsr
                    mov     si, OFFSET vcon_at_vsr
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_VSR_ISSUED
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK

                    jmp     tmo_exit
;=====================================================================+
;       ISSUE AT#VSS=3                                                |
;=====================================================================+
tmo_issue_atvss:    mov     cx, lat_vss
                    mov     si, OFFSET vcon_at_vss
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_VSS_ISSUED
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK

                    jmp     tmo_exit
;=====================================================================+
;       ISSUE AT#VSP=055                                              |
;=====================================================================+
tmo_issue_atvsp:    mov     cx, lat_vsp
                    mov     si, OFFSET vcon_at_vsp
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_VSP_ISSUED
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK

                    jmp     tmo_exit
;=====================================================================+
;       ISSUE AT#VSD=0                                                |
;=====================================================================+
tmo_issue_atvsd:    mov     cx, lat_vsd
                    mov     si, OFFSET vcon_at_vsd
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_INIT_ATS_DONE
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK

                    jmp     tmo_exit
;=====================================================================+
;       ISSUE AT#CLS=8  NOT OUT OF BOOT                               |
;=====================================================================+
tmo_issue_atcls82:  cmp     GS:byte ptr modem_data.TMO_ATH_ISSUED_IN_RIBBON, TRUE
                    jne     do_not_do_cls_2
                    mov     cx, lat_cls_8
                    mov     si, OFFSET vcon_at_cls_8
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
```

```
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_OK
do_not_do_cls_2:    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_CLS_ISSUED_2
                    jmp     tmo_exit

;////////////////////////////////////////////////////////////////////
;                                                                   /
;           CHANGES TO TMO IN DLET DETECTION CASES                  /
;                                                                   /
;////////////////////////////////////////////////////////////////////
; if no ring and dlet comes, ignore dlet. it could be that the user wishes to make a
; phone call. we wish to provide the following feature:
;   THE USER PICKS UP THE PHONE AND HE PUTS IT DOWN: ALL SHOULD PROCEED AS IF HE
;   HAD NOT PICKED UP THE PHONE. THIS IS SO IF THE TIME FROM PICK UP TO PUT DOWN
;   IS LESS THAN THE LENGTH OF NO_ACTION.
; A FEATURE TO ADVERTISE: for example you receive an unwanted phone call. If you
; put the phone down, the answering machine will come on and get the message. I
; should also incorporate the phone butler feature: ie you can push a keypad button
; and a separate message comes on to say: "Kindly place this number on your do-not-call
; list."
; ANOTHER EXAMPLE: you could talk on the phone a few seconds and then hang up and still
; the answering machine picks up. BUT YOU COULD HAVE ENDED THE CONVERSATION. How do we
; tell the difference? Currently, no_action length is: 30 seconds. Thus any conversation
; that ends in less than 30 seconds will cause a recording once the phone is hung up.
; If this was the end of the conversation then another help is <DLE>s which means
; that no sound ever came. So, if you get <DLE>s, do not even record the call. So, we do
; have a solution.
;
; So: if dlet and no_ring then ignore dlet. if dlet and there was one ring then do ATA (VLS=4).
; But, instead of going to ACD or main_menu, go to no_action to wait for dleh. 10-95-72. Why
; do we do ATA? Because, if the user hangs up at no_action, CO will still think someone has
; the line and not disconnect. 10-95-76.
;
;=====================================================================+
;       TMO_SEQUENCE_ENTRY                                            |
;=====================================================================+
tmo_sequence_entry: cmp     GS:byte ptr modem_data.CAT_RING_DETECTED, TRUE
                    je      set_for_find_call_type
                    call    check_ttq
                    cmp     GS:byte ptr modem_data.TTQ_HAS_ITEM, TRUE
                    je      set_for_process_TTQ
;tmo05.asm change: add dtmf checking. correct some more: mov -> cmp.
                    cmp     GS:byte ptr [DI].action_level_data.VCON_DO_NOT_LOAD_CUR_STEP_BUFFER, TRUE
                    je      tmo_end_big_loop
                    call    check_dtmf
                    cmp     GS:byte ptr [DI].action_level_data.VCON_CUR_STEP_DTMF, NO_DTMF
                    jne     set_for_dtmf
;if neither then keep coming back to this point.
tmo_end_big_loop:   mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_IDLE
                    jmp     tmo_exit

set_for_find_call_type:
;tmo0a.asm change. initialize ring_count and reset ring_detected. also note time_of_this_ring.
;compare to expected number_of_rings if equal go answer if not go loop some more.
                    mov     GS:byte ptr modem_data.CAT_RING_DETECTED, FALSE
                    mov     ax, DS:word ptr timer_tick_count
                    mov     GS:word ptr modem_data.TIME_OF_THIS_RING, ax
                    mov     GS:word ptr modem_data.RING_COUNT, 1
;tmo0b.asm change. 11/5/95. dlet change. 10-95-76.
                    cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE
                    jne     tmo_dlet_not_detected_1
                    mov     bx, GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH
                    mov     ax, GS:word ptr [VCON_STATE]
                    mov     GS:word ptr [VCON_STATE_OLD], ax
                    jmp     tmo_dlet_detected_1
tmo_dlet_not_detected_1:
                    mov     ax, DS:word ptr number_of_rings_to_answer
                    cmp     GS:word ptr modem_data.RING_COUNT, ax
                    jb      need_more_rings_to_answer_1
tmo_dlet_detected_1:
                    mov     GS:word ptr modem_data.RING_COUNT, 0
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_N_RINGS_DETECTED
                    jmp     tmo_exit
```

```
need_more_rings_to_answer_1:
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_RING_DETECTED
                    jmp     tmo_exit
set_for_process_TTQ:
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_TTQ_TASK_DETECTED
                    jmp     tmo_exit
set_for_dtmf:
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_DTMF_DETECTED
                    jmp     tmo_exit

;=================================================================+
;       WAITING TO START THE RING RIBBON                          |
;=================================================================+
;if ring_detected, increment count and compare to number_of_rings_to_answer
;if equal then skip to ata. if less then loop on this location.
;if no ring_detected, check the time elapsed from last ring. if too long, revert to idle
;if not too long, keep looping.
waiting_to_start_ring_ribbon:
;tmo0b.asm change. 11/5/95. dlet change. 10-95-76.
                    cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE
                    jne     tmo_dlet_not_detected_2
                    mov     bx, GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH
                    mov     GS:byte ptr modem_data.CAT_RING_DETECTED, FALSE
                    mov     ax, GS:word ptr [VCON_STATE]
                    mov     GS:word ptr [VCON_STATE_OLD], ax
                    jmp     tmo_dlet_detected_2
tmo_dlet_not_detected_2:
                    cmp     GS:byte ptr modem_data.CAT_RING_DETECTED, TRUE
                    jne     check_time_elapsed
;ring_detected=true
                    mov     GS:byte ptr modem_data.CAT_RING_DETECTED, FALSE
                    mov     ax, DS:word ptr timer_tick_count
                    mov     GS:word ptr modem_data.TIME_OF_THIS_RING, ax
                    inc     GS:word ptr modem_data.RING_COUNT
                    mov     ax, DS:word ptr number_of_rings_to_answer
                    cmp     GS:word ptr modem_data.RING_COUNT, ax
                    jb      need_more_rings_to_answer_2
tmo_dlet_detected_2:
                    mov     GS:word ptr modem_data.RING_COUNT, 0
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_N_RINGS_DETECTED
                    jmp     tmo_exit
need_more_rings_to_answer_2:
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_LOOP_ON_RING_DETECT
                    jmp     tmo_exit
;ring_detected=false
check_time_elapsed: mov     ax, DS:word ptr timer_tick_count
                    sub     ax, GS:word ptr modem_data.TIME_OF_THIS_RING
                    cmp     ax, DS:word ptr max_time_between_rings
                    jae     revert_to_tmo
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_LOOP_ON_RING_DETECT
                    jmp     tmo_exit
revert_to_tmo:      mov     GS:word ptr modem_data.RING_COUNT, 0
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_IDLE
                    jmp     tmo_exit

;=================================================================+
;       RING RIBBON: FIND_CALL_TYPE - I  ISSUE ATA                |
;=================================================================+
issue_answer_cmd:   mov     cx, lata                                ;AT#CLS=8 set modem to flexible
                    mov     si, OFFSET vcon_ata                     ;voice mode
                    call    vcon_issue_class2_cmd
                    jc      tmo_exit
;note: between t2 where we realized we have ring and this t2, any keypad entry will be ignored
;ie it will be in keypad buffer but not in this modem's dle buffer. 10/19/95.
;break the link between keypad and dle buffer.
                    mov     GS:byte ptr modem_data.KEYPAD_TO_DLE_BUFFER_OK, NO
                    mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]   ;bx=address of sess param area
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_IN], VCON_LINE
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_OUT], VCON_LINE
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_DTMF], VCON_LINE

                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_ATA_ISSUED
```

```
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_EXPECT_VCON

                    jmp     tmo_exit

;=================================================================+
;       RING RIBBON: FIND CALL TYPE - II EMIT_MSG WITH EXPECT DLEC  |
;=================================================================+
emit_ringback:
;*********************************************************
;*      LEVEL_1 STEPPER #1                               *
;*********************************************************

                    PUSH    DI
                    mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                    cmp     GS:byte ptr [di].action_level_data.VCON_FIRST_IRQ00_CUR_STEP, TRUE
                    jne     tmo_em_skp_init
                    mov     bx, TMO_EMIT_MSG_STEP
                    shl     bx, 1
                    mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                    mov     GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR, ax
tmo_em_skp_init:    call    vcon_emit_msg                                       ;we are now ready to play th
e message
;if play message is not done then exit this procedure and resume at next timer tick
                    cmp     GS:byte ptr [di].action_level_data.VCON_ACTION_COMPLETE_CUR_STEP, TRUE
                    POP     DI                                                  ;to level_0
                    jne tmo_exit                                                ;not complete, resume next t
ime
;check for dlec detected
                    PUSH    DI
                    mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                    mov     GS:byte ptr [di].action_level_data.VCON_ACTION_COMPLETE_CUR_STEP, FALSE
                    mov     GS:byte ptr [di].action_level_data.VCON_FIRST_IRQ00_CUR_STEP, TRUE
                    POP     DI
                    mov     GS:byte ptr [di].action_level_data.VCON_CUR_STEP_DTMF, NULL         ;level_0

                    cmp     GS:byte ptr modem_data.VCON_DLEC_DETECTED, TRUE
                    jne     voice_processing
fax_processing:
;make tmo exit. set CASMODEM to take over and remember on CASMODEM exit, must come to tmo again.
;                   mov     GS:word ptr [VCON_STATE], 0000H
;tmo must wrap up but next stepper level_0 should not go to another state. the best way to do this is
;to assign F=2 and have the level_0 stepper do this.
;                                       no ring, no ttq item: tmo keeps control
;           tmo_next_step       dw  flag_0  ring and voice
;                               dw  flag_1  no ring and ttq item
;                               dw  flag_2  ring and fax
;                               dw  flag_3  ?
                    mov     GS:byte ptr modem_data.VCON_DLEC_DETECTED, FALSE
                    mov     bx, GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
;there are two places this change can happen: here (receiving fax) and sw_2_fax action (sending fax).

;tmo0b.asm change. 11/04/95. as no ringback here and thus no dlec detect, make the following
;a procedure to be called from ACD, EM, NA
sim_ring_to_cas     PROC
                    mov     GS:byte ptr modem_data.MODEM_MODE, CAS
                    mov     GS:byte ptr modem_data.CAS_FKS_DETECTED, FALSE
                    mov     GS:byte ptr modem_data.CAS_AFTER_FKS, FALSE
                    mov     GS:word ptr modem_data.CAS_TT_COUNT, 0FFFFH
;following line is tmo0a.asm change
                    mov     GS:byte ptr modem_data.INCOMING_FAX, YES
;now write to serial irq cas receive buffer: RING.
                    PUSH    DS
                    PUSH    DI                                          ;DI is sacred in an action (levels)
                    mov     ax, GS:word ptr modem_data.CAS_IRQ03_SEG
                    mov     DS, ax                                      ;now ds->1214. cs=1fb1h.
ASSUME  DS:SEG loc1fe0
;loc1fde = recv_count
;loc1fda = rbuf_ptr
;loc1fe0 = rbuf
;   23e0 = rbuf_end
;WE MAKE THE ASSUMPTION THAT ALTHOUGH THE PTR MAY POINT TOWARDS THE END OF THE RBUF, THE RECV
;COUNT IS NEVER CLOSE TO BUFFER FULL ( IN THIS CASE 400H ). THIS MEANS THAT WE HOPE CASMODEM
```

```
;DOES HOUSE KEEPING AT THE END OF THE PREVIOUS FAX CALL.

                    mov     di, word ptr loc1fda

skip_rbuf_wrap0:    mov     byte ptr [di], 0dh
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap1
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap1:    mov     byte ptr [di], 0ah
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap2
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap2:    mov     byte ptr [di], "R"
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap3
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap3:    mov     byte ptr [di], "I"
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap4
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap4:    mov     byte ptr [di], "N"
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap5
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap5:    mov     byte ptr [di], "G"
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap6
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap6:    mov     byte ptr [di], 0dh
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap7
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap7:    mov     byte ptr [di], 0ah
                    inc     word ptr loc1fde
                    inc     di
                    cmp     di, 23e0h
                    jb      skip_rbuf_wrap8
                    lea     di, word ptr loc1fe0
skip_rbuf_wrap8:    mov     word ptr loc1fda, di
                    mov     byte ptr loc1fd4, 0ah
                    mov     byte ptr loc02b6, 01h

                    POP     DI
                    POP     DS
;tmo0b.asm change. 11/4/95.
                    ret
sim_ring_to_cas     ENDP

ASSUME DS:SEG tmaestro_task_queue
                    jmp     complete_tmo

voice_processing:
;set F=0 and make tmo exit
                    mov     bx, GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    cmp     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH
                    je      complete_tmo
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_VOICE_PROCESSING
;the next step entry is already correct in the step table
                    jmp     complete_tmo
```

```
;=====================================================================+
;       TMO_EXP_OK                                                    |
;=====================================================================+
tmo_exp_ok:
                    cmp     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_ATH_ISSUED
                    jne     tmo_few_counts_or_not_ath
                    inc     GS:word ptr modem_data.TMO_ATH_TO_OK_COUNT
                    cmp     GS:word ptr modem_data.TMO_ATH_TO_OK_COUNT, 0030h
                    jne     tmo_few_counts_or_not_ath
                    mov     GS:word ptr modem_data.TMO_ATH_TO_OK_COUNT, 0000h
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_START
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_NO_RESPONSE
                    jmp     tmo_exit
tmo_few_counts_or_not_ath:
                    cmp     GS:byte ptr modem_data.VCON_3CR_DETECTED, TRUE
                    jnz     tmo_exit

                    cmp     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_INIT_ATS_DONE ; = TMO_CLS_ISSUED_2
                    jne     tmo_exp_ok_cont0
                    mov     GS:byte ptr modem_data.MODEM_OUT_OF_CVBOOT, FALSE
                    mov     GS:byte ptr modem_data.TMO_ATH_ISSUED_IN_RIBBON, FALSE
tmo_exp_ok_cont0:
                    mov     GS:byte ptr modem_data.VCON_3CR_DETECTED, FALSE
                    mov     GS:byte ptr modem_data.VCON_2CR_DETECTED, FALSE
                                        ;here we must check that the response was indeed "ok".
                                        ;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points
 to the last '0ah'
                    mov     bx, GS:word ptr modem_data.VCON_RBF_3CR_DETECTED_PTR
                                        ;OK,'0dh','0ah'
                    sub     bx, 03h     ;now points to OK
                    cmp     GS:word ptr [bx], "KO"
                    jnz     tmo_exit

                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, 0000h
                    mov     GS:word ptr modem_data.VCON_RECV_COUNT, 0000h          ;flush rbuf
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr modem_data.VCON_IRQ03_RBUF_PTR, ax
                    jmp     what_to_do_at_this_timer_tick

;=====================================================================+
;       TMO_EXP_VCON                                                  |
;=====================================================================+
tmo_exp_vcon:
                    cmp     GS:byte ptr modem_data.VCON_3CR_DETECTED, TRUE
                    jnz     tmo_exit
                    mov     GS:byte ptr modem_data.VCON_3CR_DETECTED, FALSE
                    mov     GS:byte ptr modem_data.VCON_2CR_DETECTED, FALSE
                                        ;here we must check that the response was indeed "ok".
                                        ;the relevant pointer is vcon_rbf_3cr_detected_ptr. it points
 to the last '0ah'
                    mov     bx, GS:word ptr modem_data.VCON_RBF_3CR_DETECTED_PTR
                                        ;OK,'0dh','0ah'
                    sub     bx, 05h                                        ;now points to OK
                    cmp     GS:word ptr [bx], "NOCV"
                    jnz     tmo_exit
                                        ;I really do not know what happens if the response is not OK.
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, 0000h
                    mov     GS:word ptr modem_data.VCON_RECV_COUNT, 0000h          ;flush rbuf
                    mov     ax, VCON_IRQ03_RBUF
                    mov     GS:word ptr modem_data.VCON_IRQ03_RBUF_PTR, ax
                    jmp     what_to_do_at_this_timer_tick


;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;+                                                                      +

;+      CHECK_TTQ                                                       +
;+                                                                      +
;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;there is one ttq that sits in system data area. all modems access this queue and receive jobs
;from it. job completion is implicit in getting back to tmo. ie if I am in tmo, the job that
;was started terminated. each modem keeps a pointer value into ttq of the job that was running.
```

```
;so when we hit this point, we either are returning from a completed job or we never left tmo.
;what differentiates the two cases is the value in GS:word ptr [TTQ_RUNNING_PTR].

check_TTQ           proc

                    PUSHF
                    push    ax
                    push    bx
                    push    cx
                    push    si

;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
;$ 0. Current job complete? If so, mark as such and set running_ptr=0                       $
;$    being here means the job has completed
;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
; 0.
                    cmp     GS:word ptr modem_data.TTQ_RUNNING_PTR, 0000h
                    je      tmaestro_no_comp_job
                    mov     bx, GS:word ptr modem_data.TTQ_RUNNING_PTR
;one could read the interval count to a job queue to measure how long this task took.
                    mov     DS:dword ptr [bx + TTICS_STA_INTERVAL_COUNTER], 00000000H
                    mov     DS:byte ptr [bx + TTICS_STA_STATUS], TTICS_STA_STATUS_COMPLETED
                    mov     DS:byte ptr [bx + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
; if permanent with interval_count = 0 then handshake = null else handshake = st_req_made
                    cmp     DS:byte ptr [bx + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                    jne     ttq_task_was_not_permanent
                    cmp     DS:byte ptr [bx + TTICS_STA_TIME_INTERVAL], 0
                    je      ttq_task_was_not_permanent
                    jmp     ttq_task_was_permanent
ttq_task_was_not_permanent:
                    mov     DS:byte ptr [bx + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                    cmp     DS:byte ptr [bx + TTICS_PRIORITY], TTICS_PRIORITY_HOST_DATA_MODEM
                    je      ttq_task_was_permanent
                    cmp     DS:byte ptr [bx + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                    je      ttq_task_was_permanent
                    mov     DS:byte ptr [bx + TTICS_PRIORITY], TTICS_PRIORITY_NULL
                    mov     DS:byte ptr [bx + TTICS_FREE_TO_USE_STATUS], TTICS_FREE_TO_USE

ttq_task_was_permanent:
                    mov     ax, DS:word ptr [bx + TTICS_STA_RESOURCES_REQUIRED]
;see 8-95-26. required resources travle as word. available makes sense as byte.
                    or      DS:byte ptr tmaestro_available_resources, al        ;resource release noted


                    mov     GS:word ptr modem_data.TTQ_RUNNING_PTR, 0000h

tmaestro_no_comp_job:
;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
;$                                                                                            $
;$ 1. tmaestro should check start program requests to see if any is startable by thIs tmaestro. $
;$    remember that there are 4, or possibly 5 tmaestro's (one for each modem and another for   $
;$    the keypad. they all submit requests and each tmaestro can start any one of these requests$
;$    if the resources are available, then this tmaestro should jump to that step table.        $
;$    I see a problem here: the step entry points will not be the same for various step tables  $
;$    for modem_1 step entry number 0045h will be a fax send action but for another modem it    $
;$    will be an emit_msg.                                                                      $
;$    solution: we make a standard dictionary of tasks and these numbers will be fixed          $
;$    thus for example: send voice mail task = 0012h. now each step table will also have a      $
;$    translation table that translates from task numbers to step table step number. for example$
;$    send voice mail task = 0012h and on this step table this task = step number 0035h         $
;$                                                                                            $
;$    at this point, tmaestro will check the resources required against the resources available $
;$    if the task matches the resources then it can start.                                      $
;$    each tmaestro will have its own mask that determines what it does not have. for example   $
;$    the keypad modem does not have a line. on the other hand this modem has the scanner but   $
;$    the other modems do not have it.                                                          $
;$                                                                                            $
;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
                    mov     bx, OFFSET tmaestro_task_queue
tmaestro_st_req_scan:
                    cmp     DS:byte ptr [bx + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
                    jne     tmaestro_st_req_scan_cont0
                    cmp     DS:byte ptr [bx + TTICS_PRIORITY], TTICS_PRIORITY_HOST_DATA_MODEM
```

```
                    jne     tmo_not_host_data_modem_job
                    mov     DS:byte ptr [bx + TTICS_STA_STATUS], TTICS_STA_STATUS_RUNNING
                    mov     GS:word ptr modem_data.TTQ_RUNNING_PTR, bx
                    mov     DS:byte ptr [bx + TTICS_HANDSHAKE], TTICS_HANDSHAKE_TMO_REQ_ACKNOWLEDGED
                    mov     si, DS:word ptr [bx + TTICS_STA_STARTING_STEP_NUMBER]
                    mov     GS:word ptr modem_data.TTQ_CUR_JOB_STARTING_STEP_NUMBER, si
                    jmp     tmo_host_data_modem_job

;resource availability check. see 7-95-111
;                                   WHEN REQUESTING       WHEN RELEASING
;       avl_reg     req_reg     res_reg     new_avl_reg     new_avl_reg
;       =======     =======     =======     ===========     ===========
;          0           1           1             0               1
;          0           0           0             0               0
;          1           1           0             0               1
;          1           0           0             1               1
;                                res_reg = '(avl_reg) *  (req_reg)
;       WHEN REQUESTING:    new_avl_reg =  (avl_reg) * '(req_reg)
;       WHEN RELEASING:     new_avl_reg =  (avl_reg) +  (req_reg)
;       if res_reg = 0000h then we have the resources available
;TMO05.ASM CHANGE. SKIP OVER THE RESOURCES CHECK FOR NOW.
;                   jmp     tmo_interval_check
;see 8-95-26. do resource check in byte.
tmo_not_host_data_modem_job:
                    mov     al, DS:byte ptr [bx + TTICS_STA_RESOURCES_REQUIRED]
                    mov     cl, DS:byte ptr tmaestro_available_resources
                    xor     cl, 0ffh
                    and     cl, al
                    cmp     cl, 00h
                    jne     tmaestro_st_req_scan_cont0
;required modem check. 8-95-26.
                    mov     ah, 0
                    mov     al, DS:byte ptr [bx + TTICS_STA_RESOURCES_REQUIRED + 1]
                    dec     al
                    cmp     al, 0ffh
                    je      tmo_interval_check                  ;which modem is don't care
                    mov     si, OFFSET modems_tcb_st_seg_table
                    mov     cl, 4
                    mul     cl
                    add     si, ax
                    add     si, MODEM_TCB
                    mov     ax, DS:word ptr [si]
                    mov     cx, GS
                    cmp     ax, cx
                    jne     tmaestro_st_req_scan_cont0
;interval check
tmo_interval_check:
                    mov     eax, DS:dword ptr [bx + TTICS_STA_TIME_INTERVAL]
                    cmp     DS:dword ptr [bx + TTICS_STA_INTERVAL_COUNTER], eax
                    jb      tmaestro_st_req_scan_cont0

                    mov     DS:dword ptr [bx + TTICS_STA_INTERVAL_COUNTER], 00000000H
;see 8-95-26.
                    mov     al, DS:byte ptr [bx + TTICS_STA_RESOURCES_REQUIRED]
                    xor     al, 0ffh
                    and     DS:byte ptr tmaestro_available_resources, al

                    mov     DS:byte ptr [bx + TTICS_STA_STATUS], TTICS_STA_STATUS_RUNNING
                    mov     GS:word ptr modem_data.TTQ_RUNNING_PTR, bx
                    mov     DS:byte ptr [bx + TTICS_HANDSHAKE], TTICS_HANDSHAKE_TMO_REQ_ACKNOWLEDGED
                    mov     si, DS:word ptr [bx + TTICS_STA_STARTING_STEP_NUMBER]
                    mov     GS:word ptr modem_data.TTQ_CUR_JOB_STARTING_STEP_NUMBER, si

                    shl     si, 1
                    mov     si, FS:word ptr [si + OFFSET_TO_STEP_ENTRIES]
                    mov     si, FS:word ptr [si + OFFSET_TO_PARAM_ADDR]

                    cmp     DS:word ptr [bx + TTICS_STA_FILENAME], 0000H
                    jne     tmo_ttics_wt_fn
                    mov     bx, 0000H
                    jmp     tmo_ttics_wo_fn

tmo_ttics_wt_fn:    add     bx, TTICS_STA_FILENAME
```

```
tmo_ttics_wo_fn:    mov     FS:word ptr [si + OFFSET_TO_ARGUMENT], bx

tmo_host_data_modem_job:
                    mov     GS:byte ptr modem_data.TTQ_HAS_ITEM, TRUE
                    pop     si
                    pop     cx
                    pop     bx
                    pop     ax
                    POPF
                    ret

tmaestro_st_req_scan_cont0:
                    add     bx, TTQ_ENTRY_DELTA
                    cmp     bx, OFFSET tmaestro_task_queue_end
                    jne     tmaestro_st_req_scan
                    mov     GS:word ptr modem_data.TTQ_RUNNING_PTR, 0000h
                    mov     GS:byte ptr modem_data.TTQ_HAS_ITEM, FALSE

                    pop     si
                    pop     cx
                    pop     bx
                    pop     ax
                    POPF
                    ret

check_TTQ           endp


;=====================================================================+
;       LAUNCH_TTQ_TASK                                               |
;=====================================================================+
;WHEN WE SET TQR FOR A TASK, WE FIX STEP # AND RESOURCES.
;WHEN TQR EXECUTES      FS(TQR) =>  DS:TTQ
;WHEN TMO CHECKS        DS:TTQ  =>  GS:
;WHEN TMO LAUNCHES      GS:     =>  FS(TMO)
;WHEN STEPPER L_0 ACTS  FS(TMO) =>  NEXT STEP
;if ring and ttq_item, then F=1 within tmo and next step entry (second) is written to.
;level_0 stepper then jumps to that location.
launch_TTQ_task:    mov     bx, GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_TTQ_REQUEST  ;flag = 1
                    mov     GS:byte ptr [DI].action_level_data.VCON_CUR_STEP_DTMF, NULL
                    mov     ax, GS:word ptr modem_data.TTQ_CUR_JOB_STARTING_STEP_NUMBER
                    mov     FS:word ptr [bx + OFFSET_TO_NEXT_STEP_AREA + 0], ax
;change resources to VCON_LINE so that emit/reco/rmi in this ribbon reset their VLS to the
;correct value if it is not so. normally, it will be so because tmo does AT#CLS=8. here also we
;break the link between keypad and dle buffer.
                    mov     GS:byte ptr modem_data.KEYPAD_TO_DLE_BUFFER_OK, NO
                    mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]   ;bx=address of sess param area
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_IN], VCON_LINE
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_OUT], VCON_LINE
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_DTMF], VCON_LINE

                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_COMPLETE_TMO
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_NO_RESPONSE
                    jmp     tmo_exit

;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;+                                                                    +
;+      CHECK_DTMF                                                    +
;+                                                                    +
;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
check_dtmf          proc
                    mov     GS:byte ptr [DI].action_level_data.VCON_CUR_STEP_DTMF, NO_DTMF          ;in case
 of no byte
                    mov     ax, GS:word ptr modem_data.VCON_DLE_NUMBER_BUFFER_IRQ03_PTR     ;write pointer
                    mov     bx, GS:word ptr modem_data.VCON_DLE_NUMBER_BUFFER_IRQ00_PTR      ;read pointer
                    cmp     ax, bx
                    jz      check_dtmf_exit                                         ;if equal no new DTMF
                    mov     GS:byte ptr modem_data.TMO_STOP, TRUE                           ;can wrap up now
 as we got our DTMF
                    mov     al, GS:byte ptr [bx]
                    mov     GS:byte ptr [DI].action_level_data.VCON_CUR_STEP_DTMF, al
```

```
                    inc     bx                                                      ;inc read ptr
                    mov     dx, VCON_DLE_NUMBER_BUFFER_END
                    cmp     bx, dx
                    jb      skp_dle_number_buf_end
                    mov     bx, VCON_DLE_NUMBER_BUFFER                              ;set read ptr to begin o
f buffer
skp_dle_number_buf_end:
                    mov     GS:word ptr modem_data.VCON_DLE_NUMBER_BUFFER_IRQ00_PTR, bx
                    mov     GS:byte ptr [DI].action_level_data.VCON_DO_NOT_LOAD_CUR_STEP_BUFFER, TRUE;got ou
r DTMF, lets wrap up
check_dtmf_exit:    ret
check_dtmf          endp

;=================================================================+
;       DTMF_RIBBON_PROCESSING                                    |
;=================================================================+
dtmf_ribbon_processing:
                    mov     bx, GS:word ptr [di].action_level_data.VCON_CUR_STEP_DATA_AREA_ADDR
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_KPAD_DTMF    ;flag = 3
;next stepper level_0 will process dtmf=something. all we needed was F .ne. 1 which it was left at
;after a ttq ribbon. note that dlet also causes status=3 but in that case dtmf=null. in this case
;dtmf=some dtmf and not even no_dtmf. so, as long as status not 1 and dtmf not null we are OK.
;otherwise level_0 next stepper will go to step 58h
                    mov     bx, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_IN], VCON_MICROPHONE
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_OUT], VCON_SPEAKER
                    mov     FS:word ptr [bx + ST_SESS_PARAMS_MODEM_RES_DTMF], VCON_KEYPAD
;note: we could at this point read these items from sysdata. it could read micro/speaker/keypad
;or it could read handset/handset/handset. we could set it so a pushbutton toggles between these two
;alternatives. this could be an sp that writes to sysdata location and compiles with sysdata.

;the only non straightforward thing right now is switch from keypad to dtmf. I guess we could just
;disable the link from keypad to dle buffer.
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_COMPLETE_TMO
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_NO_RESPONSE
                    jmp     tmo_exit

;=================================================================+
;       COMPLETE TMO                                              |
;=================================================================+
;if a fax call, then after wrapping this action up, disable t2 and irq03 for catvoice and enable casmodem's.
;also go and set RING manually in casmodem irq03 to make cas t2 process think it is a fax.
;if a data call, go to the correct step table entry as next step. tmo is like emit_msg_gete_param in the
;sense that it does not accept dtmf inputs. thus the next state is decided based on the step_status value
;ie what we used to call the flag value. for casmodem, we do not even get to next state processing.
;for voice we could set step_status=0000h and for data, we could set step_status=????h. as a matter of fact,
;we could have just as many next steps as single dtmf expecting actions with the distinctor being the value
;in the current step location. so you could have 1 for fax, 2 for voice, 3 for data and many other outcomes.
;so the possible next step actions could be
;               1. switch_to_fax
;               2. the root step for voice (emit_msg_gete_param (type: password)
;               3. receive email, enable TCP/IP TSR etc.
;switch_to_fax will also be necessary when during fax send, the step table's last entry will be: TTQ_request
;when tmo sees this, it then jumps to a step that has as action: switch_to_fax. this is an action that takes
;just one timer tick to execute.
;
;we should find a more generic name for switching between voice and fax: GS:byte ptr [VCON_DETECTED]. this
;reflects the previous game we played where we started with casmodem and detected vcon to swtich.
;               GS:byte ptr [T2_IRQ_MODE] = FAX_MODE
;                                           VOICE_MODE
;                                           DATA_MODE
;one more item: if there is a TTQ request, then the entry point in the step table specified by this request
;must be made the next step for tmo.
;
complete_tmo:
;                   mov     GS:word ptr modem_data.VCON_STATE, 0000H    ;so that from fax, we come straight
to tmo.
;the above line will be taken care of in last execution of next stepper level_0 based on step_status value
                    mov     GS:byte ptr modem_data.TMO_COMPLETE, TRUE
                    mov     GS:byte ptr modem_data.TMO_STOP, FALSE
                    mov     GS:word ptr modem_data.TMO_SEQ_PTR, TMO_START
                    mov     GS:word ptr modem_data.TMO_RESPONSE_PTR, TMO_NO_RESPONSE
                    mov     GS:byte ptr [di].action_level_data.VCON_ACTION_COMPLETE_CUR_STEP, TRUE
```

```
;if to fax, then there were no dtmf coming from the line. if to voice, there will be dtmf and
;we want to look at them at the next voice step perhaps. if ttq request honored, then there were
;no dtmf either. so no need to do anything about dtmf.
                    jmp     tmo_exit

;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;+                                                                      +
;+      TMO EXIT                                                        +
;+                                                                      +
;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

tmo_exit:           pop     si
                    pop     cx
                    pop     dx
                    pop     es
                    pop     di
                    pop     bx
                    pop     ax
                    pop     ds

                    ret


;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;+                                                                      +
;+      TMO SEQUENCE TABLE                                              +
;+                                                                      +
;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

tmo_seq_table       dw      tmo_issue_ath                   ;0
                    dw      tmo_issue_atcls8                ;1
                    dw      tmo_issue_atvbs                 ;2
                    dw      tmo_issue_atcls82               ;3
                    dw      tmo_sequence_entry              ;4
                    dw      issue_answer_cmd                ;5
;tmo0b.asm change. emit_ringback -> voice_processing
;                   dw      emit_ringback                   ;6
                    dw      voice_processing                ;6
                    dw      launch_TTQ_task                 ;7
                    dw      dtmf_ribbon_processing          ;8
                    dw      complete_tmo                    ;9
                    dw      waiting_to_start_ring_ribbon    ;a

                    dw      tmo_issue_atvsr                 ;b
                    dw      tmo_issue_atvss                 ;c
                    dw      tmo_issue_atvsp                 ;d
                    dw      tmo_issue_atvsd                 ;e


;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;+                                                                      +

;+      TMO RESPONSE TABLE                                              +
;+                                                                      +
;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

tmo_response_table  dw      what_to_do_at_this_timer_tick
                    dw      tmo_exp_ok
                    dw      tmo_exp_vcon

tmaestro            endp

;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
;+                                                                      +

;+      TMO EQUS                                                        +
;+                                                                      +
;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
TMO_START                   EQU     0000H
TMO_IDLE                    EQU     0004H
TMO_ATH_ISSUED              EQU     0001H
TMO_CLS_ISSUED              EQU     0002H
```

```
TMO_VBS_ISSUED              EQU     000BH
TMO_VSR_ISSUED              EQU     000CH
TMO_VSS_ISSUED              EQU     000DH
TMO_VSP_ISSUED              EQU     000EH

TMO_NOT_OUT_OF_BOOT         EQU     0003H
TMO_INIT_ATS_DONE           EQU     0004H
TMO_CLS_ISSUED_2            EQU     0004H

;tmo0a.asm change 0005h -> 000ah and add new var: n_rings_detected
TMO_RING_DETECTED           EQU     000AH
TMO_N_RINGS_DETECTED        EQU     0005H
TMO_LOOP_ON_RING_DETECT     EQU     000AH

TMO_ATA_ISSUED              EQU     0006H
TMO_TTQ_TASK_DETECTED       EQU     0007H
TMO_DTMF_DETECTED           EQU     0008H
TMO_COMPLETE_TMO            EQU     0009H

TMO_NO_RESPONSE             EQU     0000H
TMO_EXPECT_OK               EQU     0001H
TMO_EXPECT_VCON             EQU     0002H

END
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*****************************************************************************
;*                                                                           *
;* NAME: ttq_request (ttqreq.asm)                                            *
;* VERSION: 00                                                               *
;* FUNCTION: see write up below                                              *
;* AUTHOR: Haluk Aytac                                                       *
;* DATE CREATED: May 29, 1995                                                *
;* DATE UPDATED:                                                             *
;* INPUT:  N/A                                                               *
;* OUTPUT:  N/A                                                              *
;* REGISTERS CORRUPTED: NONE                                                 *
;* HISTORY:                                                                  *
;*  - initial version created                                                *
;*    H. Aytac, May 29, 1995                                                 *
;*                                                                           *
;*****************************************************************************
;this action places a request in the TTQ ie tmaestro task queue.
;TTICS
;TTICS_STA_STATUS                        EQU     0000H   ;BYTE
;                   - TimertickTaskqueueInfoandControlStructure_StepTableAction_STATUS
;fmaestro launches foreground programs. tmaestro launches timer tick step table entries.
;imagine the step table as an array of steps all hooked up to one another. you come to a point
;where you really cannot ask for the next action because the conditions are not right for it
;to execute. you then make a TTQ request. when the step table returns to 0000 state where tmo
;resides, tmaestro makes the step number for the remainder of the sequence its next state.
;TTICS_STA_STATUS_IDLE                   EQU       00H   ;req submitted, but not running yet
;TTICS_STA_STATUS_RUNNING                EQU       01H
;TTICS_STA_STATUS_COMPLETED              EQU       04H
;
;TTICS_HANDSHAKE                         EQU     0001H   ;BYTE
;TTICS_HANDSHAKE_NULL                    EQU       00H
;TTICS_HANDSHAKE_ST_REQ_MADE             EQU       01H
;TTICS_HANDSHAKE_TMO_REQ_ACKNOWLEDGED    EQU       02H
;
;TTICS_PRIORITY                          EQU     0002H   ;BYTE
;TTICS_PRIORITY_NULL                     EQU       00H
;TTICS_PRIORITY_LO                       EQU       01H
;TTICS_PRIORITY_HI                       EQU       02H
;
;TTICS_FREE_TO_USE_STATUS                EQU     0003H   ;BYTE
;TTICS_FREE_TO_USE                       EQU       00H
;TTICS_NOT_FREE_TO_USE                   EQU       01H
;
;TTICS_STA_START_TIMER_TICKS             EQU     0004H   ;WORD
;TTICS_STA_ENDING_TIMER_TICKS            EQU     0005H   ;WORD
;
;TTICS_STA_STARTING_STEP_NUMBER          EQU     0006H   ;WORD
;
;TTICS_STA_RESOURCES_REQUIRED            EQU     0007H   ;WORD
;TTICS_STA_PRINTER_REQUIRED              EQU     0001H
;TTICS_STA_SCANNER_REQUIRED              EQU     0002H
;TTICS_STA_MODEM_0_REQUIRED              EQU     0004H
;TTICS_STA_MODEM_1_REQUIRED              EQU     0010H
;TTICS_STA_MODEM_2_REQUIRED              EQU     0020H
;TTICS_STA_MODEM_3_REQUIRED              EQU     0040H
;TTICS_STA_MODEM_4_REQUIRED              EQU     0080H
;
;TTICS_STA_FILENAME                      EQU     0008H   ;32 IE 20H BYTES
;
;TTQ_ENTRY_DELTA                         EQU     0040H   ;64 BYTES PER ENTRY
;
;JUST AS EACH START_PROGRAM IN A STEP TABLE requests a specific program or sometimes requests
;a class of programs (eg emit_msg's start_program always performs ldftohdc with a different
;voice file each time), the action TTQ_request, requests a specific entry point each time.
;conversely, for each entry point we require a new TTQ_request.
;
;so, most of the code will come from start_program. no DTMF expected. the next step will be known.
;if will be written in the location where cur_step_status entry is. it will never wait so no need
;to have a wait_to_complete? parameter.
;
;here is the entry for start_program:
;
;*****************************************************************************
;*                                                                           *
;*          TTQ_REQUEST                                                      *
;*                                                                           *
;*****************************************************************************
;ttq_request_example_step   dw      ST_TTQ_REQUEST                  ;action ttq_request=0009h
;                           dw      JUMP_UNCOND                     ;always one next step (0000 ie tmo)
```

```
;                                                                        ;it could be that you place a request
;                                                                        ;and do a few things after
;                               dw      state_00bc_parameters
;state_00bc_next_state          dw      0000h                            ;go to tmo.
;state_00bc_parameters          dw      DO_NOT_EXPECT_DTMF
;                               dw      submit_a_fax                     ;0004h this is the state we want when.
;                                                                        ;tmo takes over
;                               dw      vcon_session_tcf_filename        ;FS:OFF for a filename
;                               dw      TTICS_STA_MODEM_0_REQUIRED
                                                                         ;0003h
;this was a description of the step table entry for this action.


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                              ;
;   PROCEDURE   TTQ_REQUEST                    ;
;                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;description of the procedure:
;this action handshakes with tmaestro to pass to it a request to jmp to a location in the step table.
;
;steps to the action:
; 1. issue TTICS_HANDSHAKE_ST_REQ_MADE
; 2. complete action
;
;note that there is no early completion due to dtmf or dlet but both are noted for setting up the
;next step code.
;

INCLUDE CATEQU0B.INC
.MODEL  COMPACT
.386P
                public  TTQ_request
;sys data
                extrn   tmaestro_task_queue:far                 ;near
                extrn   tmaestro_task_queue_end:far             ;near
                extrn   tmaestro_available_resources:far        ;near
.CODE
ASSUME DS:SEG tmaestro_task_queue

TTQ_request proc
                push    ds
                push    ax
                push    bx
                push    di
                push    es
                push    dx
                push    cx
                push    si
                cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                jnz     tqr_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                          ;
;       WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                                   ;
;                                                                                          ;
;       1. CHECK IF DTMF IS EXPECTED. IF NOT STEP_STATUS=1, IF SO STEP_STATUS=0            ;
;       2. CHECK IF STOP ON DLET. RECORD IT IN LOCAL VARIABLE                              ;
;       3. STATE COUNTER RESET                                                             ;
;                                                                                          ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], FALSE
                mov     GS:byte ptr [TTQ_REQUEST_COMPLETE], FALSE
                mov     bx, GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]          ;ax=addr of step parameters
                mov     ax, FS:word ptr [bx + OFFSET_TO_INPUTS]              ;first entry in params: inp
uts?
                cmp     ax, EXPECT_DTMF                                      ;inputs?
                jnz     tqr_no_inputs
                mov     GS:byte ptr [TTQ_REQUEST_INPUTS_YES], TRUE
                mov     GS:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], FALSE
                mov     bx, GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], DTMF_ANALYZE  ;reset flag register

                jmp     tqr_cont_entry
tqr_no_inputs:
                mov     GS:byte ptr [TTQ_REQUEST_INPUTS_YES], FALSE
                mov     GS:byte ptr [VCON_CUR_STEP_DTMF], NULL
                mov     GS:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                mov     bx, GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
```

```
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], JUMP_UNCOND   ;set flag register
tqr_cont_entry:
                    mov     GS:word ptr [TTQ_REQUEST_STATE_COUNTER], TQR_ISSUE_REQUEST
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       WHAT YOU DO AT ALL TIMER TICKS                                                         ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
tqr_skp_entry:
                    cmp     GS:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                    jz      tqr_skp_buffer
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       IF DTMF EXPECTED, COLLECT DTMF FROM IRQ03                                              ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;here we check the irq03_dle_buffer. circular. keep it large enough so no overwrite. some little brat
;might be pressing all the buttons.
                    mov     GS:byte ptr [VCON_CUR_STEP_DTMF], NO_DTMF               ;in case of no byte
                    mov     ax, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]
                    mov     bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR]
                    cmp     ax, bx
                    jz      tqr_skp_buffer                                          ;if equal no new bytes
                    mov     GS:byte ptr [TTQ_REQUEST_STOP], TRUE                    ;can wrap up now as we got
our byte
                    mov     al, GS:byte ptr [bx]
                    mov     GS:byte ptr [VCON_CUR_STEP_DTMF], al
                    inc     bx
                    lea     dx, GS:word ptr [VCON_DLE_NUMBER_BUFFER_END]
                    cmp     bx, dx
                    jb      skp_dle_number_buf_end
                    lea     bx, GS:word ptr [VCON_DLE_NUMBER_BUFFER]
skp_dle_number_buf_end:
                    mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
                    mov     GS:byte ptr [di + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE     ;got our byte, lets
go.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                              ;
;       START_PROGRAM ACTION TAKES PLACE HERE                                                  ;
;                                                                                              ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
tqr_skp_buffer:
                    mov     si, GS:word ptr [TTQ_REQUEST_STATE_COUNTER]
                    shl     si, 1
                    mov     bx, OFFSET TTQ_request_seq_step
                    jmp     cs:word ptr [bx + si]
;**************************************************
;*                                                *
;*      ISSUE A REQUEST TO TMAESTRO               *
;*                                                *
;**************************************************
;0
issue_request:
                    mov     si, OFFSET tmaestro_task_queue
tqr_issue_req_free_lup:
                    cmp     DS:byte ptr [si + TTICS_FREE_TO_USE_STATUS], TTICS_FREE_TO_USE
                    jz      tqr_issue_req_cont0
                    add     si, TTQ_ENTRY_DELTA
                    cmp     si, OFFSET tmaestro_task_queue_end
                    je      tqr_exit                                                ;ERROR
;if the TTQ is full, this action is stuck at this step.
                    jmp     tqr_issue_req_free_lup

tqr_issue_req_cont0:
                    mov     DS:byte ptr [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
                    mov     DS:byte ptr [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
                    mov     DS:byte ptr [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
                    mov     DS:byte ptr [si + TTICS_PRIORITY], TTICS_PRIORITY_LO
                    mov     bx, GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]             ;ax=address of step paramete
rs
                    mov     ax, FS:word ptr [bx + TQR_OFFSET_TO_STARTING_STEP_NUMBER]
                    mov     DS:word ptr [si + TTICS_STA_STARTING_STEP_NUMBER], ax
                    mov     ax, FS:word ptr [bx + TQR_OFFSET_TO_RESOURCES_REQUIRED]
                    mov     DS:word ptr [si + TTICS_STA_RESOURCES_REQUIRED], ax
;reset interval counter
                    mov     DS:dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H

;now must get the filename dword ptr and transfer actual filename to TTQ, TTICS.
;WE WILL WRITE TO DS AND ES BUT THIS IS OK AS WE ARE ABOUT TO EXIT TQR FOR THIS PASS AND
;ACTION WIDE PUSH/POP WILL RESTORE FOR THE STEPPER.
```

```
;HOWEVER, WE MUST NOT CHANGE DI WITHIN THE ACTION. SO MUST DO A LOCAL PUSH/POP. BUT EVEN
;THIS IS NOT NECESSARY AGAIN BECAUSE WE ARE ABOUT TO EXIT AND POP DI RESTORES.
                    cmp     FS:word ptr [bx + TQR_OFFSET_TO_FILENAME_PTR], 0000H
                    jne     tqr_filename_to_move

                    mov     DS:word ptr [si + TTICS_STA_FILENAME], 0000H
                    jmp     tqr_no_filename_to_move

tqr_filename_to_move:
                    PUSH    DI
                    push    si
                    PUSH    DS

                    mov     di, si                          ;TTICS is destination
                    add     di, TTICS_STA_FILENAME
                    mov     ax, DS                          ;TTICS is in
                    mov     ES, ax                          ;system data segment
                    mov     si, FS:word ptr [bx + TQR_OFFSET_TO_FILENAME_PTR]
                    mov     bx, FS:word ptr [bx + TQR_OFFSET_TO_FILENAME_PTR + 2]
                    mov     ax, FS:word ptr [bx]
                    mov     DS, ax
tqr_move_filename_to_ttq:
                    movsb
                    cmp     DS:byte ptr [si], 00h
                    jne     tqr_move_filename_to_ttq
                    movsb

                    POP     DS
                    pop     si
                    POP     DI

tqr_no_filename_to_move:
                    mov     GS:word ptr [TTQ_REQUEST_STATE_COUNTER], TQR_COMPLETE_TQR
;NOT NEEDED BECAUSE, EACH MODEM MAY HAVE MULTIPLE REQUESTS TO TTQ.
;however, when the designated step gets control, it will know that it is executing
;gs:ttics_running_ptr.
;                   mov     GS:word ptr [TTQ_REQUEST_TTQ_PTR], si
                    jmp     tqr_exit
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                            ;
;       EXIT                                                                                 ;
;                                                                                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
complete_tqr:
                    mov     GS:byte ptr [TTQ_REQUEST_COMPLETE], TRUE
                    mov     GS:byte ptr [TTQ_REQUEST_STOP], FALSE
                    mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                    mov     GS:word ptr [TTQ_REQUEST_STATE_COUNTER], TQR_ISSUE_REQUEST
                    jmp     tqr_exit
tqr_exit:
                    pop     si
                    pop     cx
                    pop     dx
                    pop     es
                    pop     di
                    pop     bx
                    pop     ax
                    pop     ds
                    ret

TTQ_request_seq_step    dw      issue_request           ;0
                        dw      complete_tqr            ;1

TTQ_request             endp
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                            ;
; END   PROCEDURE   VCON_start_program                                                       ;
;                                                                                            ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

END
```

```
;COPYRIGHT 1995. HAI NGUYEN, HALUK AYTAC, 3TAU.
;acd02.asm <- acd01.asm. 11/4/95. incorporate dlet, dlec, dleh.
;acd01.asm <- acd00.asm. 8/19/95. adding faxback doc no.
;acd00.asm <- haivma09.asm. 6/26/95.
;haivma09.asm <- haivma08.asm. 6/12/95. catvocl. no other changes expected.
;DO NOT FORGET: FIX EMIT_MSG TO MOVE CURRENT CHS FURTHER OUT FOR PAUSE/RESUME.          done
;               FIX NO_ACTION TO KEEP REPEATING UNTIL DTMF COMES (INSTEAD OF 4 SECS)
;               FIX DI_CUR_STEP FOR EMIT_MSG AND NO_ACTION.                          done
;               ADD TIMEOUT TO EMIT,RECO,NO_ACTION
;               ADD REPEAT TO EMIT,RECO,NO-ACTION OR ANY OTHER ACTION?
;               FEATURE TO FIND SUM OF NEW MESSAGES AND REPORT TO SYSTEM DATA AREA
;               OPTION TO RUN ACD W/O PLAYING MESSAGES TO JUST ADD NUMBER OF MESSAGES FOR MAESTRO
;*****************************************************************************
;*      7-95-76                                                              *
;*      ACD     ANNOUNCE AND COLLECT DIGITS                                  *
;*      originally conceived by Hai Nguyen (ie like vma with emit_msg and no_action)  *
;*      written by Haluk Aytac                                               *
;*                                                                           *
;*      ACD has, in addition to its own step table entry, two fixed location step table *
;*      entries:                                                             *
;*                  1. emit_msg (program_name: *.PCM)                        *
;*                     operated by ACD level_1 stepper #1.                   *
;*                  2. no_action                                             *
;*                     operated by ACD level_1 stepper #2.                   *
;*                  3. lcd_echo                                              *
;*                     operated by ACD level_1 stepper #3                    *
;*                  4. start_program                                         *
;*                     operated by ACD level_1 stepper #4                    *
;*                                                                           *
;*****************************************************************************
;*                                                                           *
;*  ACD TYPE: GET_NUMBER_OF_COPIES   (changed the rules.. see at copy's pwn section)  *
;*      RULES:      #           gives one copy                               *
;*                  0#          gives zero copies                            *
;*                  00#         gives zero copies                            *
;*                  001#        reject any input with more than two digits   *
;*                  99#         gives 99 copies                              *
;*                  12#         gives 12 copies                              *
;*                  5#          gives one copy                               *
;*                                                                           *
;*  this ACD has two outcomes:  pass / fail                                  *
;*  thus it must be defined as DO_NOT_EXPECT_INPUTS                          *
;*  this way, we will have [di + VCON_CUR_STEP_DTMF] = NULL for level_0 although  *
;*  level_1 will see dtmf inputs. the NULL will help with the next step level_0  *
;*  if the user entered a valid input, we go on to the next step which is SCTOPCL.  *
;*                                                                           *
;*  now, let us look at the various ways no_dtmf could occur.                *
;*  first digit never comes, in which case we redo emit_msg a certain number of times.  *
;*  first digit comes, but # never comes. in this case no_action times out. and you get *
;*  no_dtmf again. now you switch to emit_msg and wait for the dtmf there while emitting*
;*  "please enter the number of copies" message again. now, say, the second digit came  *
;*  but, # never came. again, we switch to emit_msg and do this a number of times.  *
;*  if the number of attempts all fail, then we set F=0 and exit acd. probably a good  *
;*  next step for this case is tmo.                                          *
;*                                                                           *
;*get_number_of_copies      dw  ST_ANNOUNCE_AND_COLLECT_DIGITS               *
;*                          dw  DTMF_ANALYZE                                 *
;*                          dw  step_n_parameters                            *
;*step_n_next_step          dw  xxxxh                   ;RUN SCTOPCL         *
;*                          dw  0000h                   ;tmo: no_dtmf, timeout etc  *
;*step_n_parameters         dw  DO_NOT_EXPECT_DTMF      ;so that F=0 works. always. *
;*                          dw  vcon_session_filename_12    ;file to emit    *
;*                          dw  ACD_GET_NBR_OF_COPIES       ;acd type        *
;*                          dw  vcon_session_acd_repeat_cnt ;rept count for timeout etc *
;*                          dw  DO_NOT_STOP_ON_DLE                           *
;*                          dw  vcon_session_no_of_copies   ;ptr to step table variable *
;*                          dw  LCD_MESSAGE_YES                              *
;*                          db  "please enter number "                       *
;*                          db  "of copies           ", 00h, 00h             *

;*                                                                           *
;*****************************************************************************
INCLUDE CATEQU0e.INC
.MODEL COMPACT
.386P
                        public  announce_and_collect_digits
;procedures
                        extrn   vcon_emit_msg:near
                        extrn   vcon_no_action:near
                        extrn   vcon_start_program:near
```

```
                        extrn   lcd_processing:near
                        extrn   sim_ring_to_cas:near
;sys data
                        extrn   modems_tcb_st_seg_table:far             ;near

.CODE
ASSUME DS:SEG modems_tcb_st_seg_table

announce_and_collect_digits     proc
                        push    ds
                        push    ax
                        push    bx
                        push    di
                        push    es
                        push    dx
                        push    cx
                        push    si

                        cmp     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jne     acd_skp_entry
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                        ;
;   WHAT YOU DO AT FIRST TIMER TICK FOR CURRENT STEP                                                     ;
;                                                                                                        ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
                        mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], FALSE
;*********************************************
;*  SETUP ACD                                *
;*********************************************
                        mov     GS:byte ptr [ACD_ACTION], ACD_ACTION_EMIT_MSG
                        mov     GS:byte ptr [ACD_STOP], FALSE
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_EM_NA_SP_LCD
                        mov     GS:byte ptr [ACD_LCD_FIRST_ECHO], YES
                        mov     GS:byte ptr [ACD_DIGIT_COUNT], 00H
;*********************************************
;*  SET LEVEL_0 DTMF INPUT = NULL            *
;*********************************************
                        mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;*********************************************
;*  GET FILENAME, ACD TYPE, REPEAT COUNT     *
;*********************************************
;we could have multiple types of acd but they can all share one emit_msg and one no_action.
;thus the file name must be with acd.
acd_cont_entry:         mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     ax, FS:word ptr [bx + OFFSET_TO_FILENAME]
                        mov     GS:word ptr [ACD_FILENAME_PTR], ax
                        mov     ax, FS:word ptr [bx + OFFSET_TO_ACD_TYPE]
                        mov     GS:word ptr [ACD_TYPE], ax
                        mov     ax, FS:word ptr [bx + OFFSET_TO_ACD_REPEAT_COUNT]
                        push    bx
                        mov     bx, ax
                        mov     ax, FS:word ptr [bx]
                        mov     GS:word ptr [ACD_REPEAT_COUNT], ax
                        mov     GS:word ptr [ACD_REPEAT_COUNTER], ax
                        pop     bx
;*********************************************
;*  IF LCD, GET ITS ADDRESS, ELSE ADDR=0     *
;*********************************************
                        mov     ax, FS:word ptr [bx + OFFSET_TO_ACD_LCD_YES_NO]
                        cmp     ax, LCD_MESSAGE_YES
                        je      acd_record_lcd_address
                        mov     GS:word ptr [ACD_LCD_MSG_ADDRESS], 0000H
                        jmp     acd_record_dle_behavior
acd_record_lcd_address: mov     ax, OFFSET_TO_ACD_LCD_YES_NO
                        add     ax, bx
                        add     ax, 2                                   ;skip over yes_no.

                        mov     GS:word ptr [ACD_LCD_MSG_ADDRESS], ax
                        jmp     acd_record_dle_behavior

;*********************************************
;*  GET RESOURCE AND DLE FROM ST ENTRY       *
;*********************************************
acd_record_dle_behavior:mov     ax, FS:word ptr [bx + ACD_OFFSET_TO_STOP_ON_DLE]
                        mov     GS:word ptr [DI + VCON_STOP_ON_DLE], ax

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                        ;
;       WHAT YOU DO AT EACH TIMER TICK                                                                   ;
;                                                                                                        ;
```

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;*******************************************
;*  IF STOP_ON_DLE_ENABLED, CHECK FOR DLE    *
;*******************************************
;make ACD capable of stopping at DLET, DLEC but not DLEH. the component actions ie
;EM and NO will not have dle stopping capability. the reason is that some ACD's will not have
;stop on dlet capability and the only way to control it is to have capability at ACD level.
acd_skp_entry:      cmp     GS:word ptr [DI + VCON_STOP_ON_DLE], DO_NOT_STOP_ON_DLE
                    je      acd_skp_dle

acd_dlec_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLEC
                    jz      acd_dlet_check
                    cmp     GS:byte ptr [VCON_DLEC_DETECTED], TRUE          ;set by irq03
                    jne     acd_dlet_check

                    mov     GS:byte ptr [ACD_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;acd02.asm change. 11/4/95.
                    PUSH    DI
                    add     DI, TCB_LEVEL_DB_SIZE
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
                    POP     DI
;action0i.asm change. reset this variable.
;                   mov     GS:byte ptr [VCON_DLEC_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     acd_skp_dle

acd_dlet_check:
                    test    GS:word ptr [DI + VCON_STOP_ON_DLE], STOP_ON_DLET
                    jz      acd_skp_dle
                    cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE          ;set by irq03
                    jne     acd_skp_dle

                    mov     GS:byte ptr [ACD_STOP], TRUE
                    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                    mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH  ; F=3
                    mov     GS:byte ptr [DI + VCON_CUR_STEP_DTMF], NULL
;note: at next t2 w/o next line, dtmf will be loked at.
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
;acd02.asm change. 11/4/95.
                    PUSH    DI
                    add     DI, TCB_LEVEL_DB_SIZE
                    mov     GS:byte ptr [DI + VCON_DO_NOT_LOAD_CUR_STEP_BUFFER], TRUE
                    mov     GS:byte ptr [VCON_NO_ACTION_STOP], TRUE
                    mov     GS:byte ptr [VCON_EMIT_MSG_STOP], TRUE
                    POP     DI
;action0i.asm change. if dlet then store current state
;this will work even when no_action is inside another action because vcon_state refers to level_0
                    mov     ax, GS:word ptr [VCON_STATE]
                    mov     GS:word ptr [VCON_STATE_OLD], ax
;action0i.asm change. reset this variable.
;                   mov     GS:byte ptr [VCON_DLET_DETECTED], FALSE
;action0i.asm change. if dle detected skip checking dtmf.
                    jmp     acd_skp_dle

;*****************************************************************************************************
;*                                                                                                   *
;*      BRANCH INTO SECTIONS OF ACD BASED ON ACD_ISSUED_CNTR                                         *
;*                                                                                                   *
;*****************************************************************************************************
acd_skp_dle:                mov     bx, OFFSET acd_issued_table
                            mov     si, GS:word ptr [ACD_ISSUED_CNTR]
                            shl     si, 1
                            jmp     cs:word ptr [si+bx]

;*****************************************************************************************************
;*                                                                                                   *
;*      MAIN LOOP                                                                                    *
;*                                                                                                   *
;*****************************************************************************************************
do_em_na_sp_lcd:
                            cmp     GS:byte ptr [ACD_ACTION], ACD_ACTION_EMIT_MSG
                            je      do_emit_msg
                            cmp     GS:byte ptr [ACD_ACTION], ACD_ACTION_NO_ACTION
```

```
                        je      do_no_action
                        cmp     GS:byte ptr [ACD_ACTION], ACD_ACTION_START_PROGRAM
                        je      do_start_program
                        cmp     GS:byte ptr [ACD_ACTION], ACD_ACTION_LCD_ECHO
                        je      do_lcd_echo
;*****************************************************************************************************
;*                      LEVEL_1     STEPPER     #1          EMIT_MSG                                  *
;*****************************************************************************************************
do_emit_msg:            PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jne     acd_em_skp_init
;*********************************************************
;       FIRST TT LOAD FILENAME TO EMIT_MSG ST ENTRY        *
;*********************************************************
                        mov     bx, ACD_EMIT_MSG_STEP
                        shl     bx, 1
                        mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                        mov     GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR], ax
                        mov     bx, ax
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     ax, GS:word ptr [ACD_FILENAME_PTR]
                        mov     FS:word ptr [bx + OFFSET_TO_FILENAME], ax
;*********************************************************
;*      MOVE LCD_MESSAGE TO EMIT_MSG LCD MESSAGE AREA     *
;*********************************************************
                        PUSH    DS
                        PUSH    DI
                        mov     ax, GS:word ptr [ACD_LCD_MSG_ADDRESS]
                        cmp     ax, 0000H
                        je      set_em_lcd_msg_no
                        mov     FS:word ptr [bx + OFFSET_TO_EM_LCD_YES_NO], LCD_MESSAGE_YES
                        mov     si, ax
                        mov     ax, FS
                        mov     DS, ax
                        mov     di, bx
                        add     di, OFFSET_TO_EM_LCD_YES_NO
                        add     di, 2
                        mov     ax, FS
                        mov     ES, ax
move_lcd_msg_to_em:     movsb
                        cmp     DS:byte ptr [si], 00H
                        jne     move_lcd_msg_to_em
                        movsb
                        cmp     DS:byte ptr [si], 00H
                        jne     move_lcd_msg_to_em
                        movsb
                        jmp     em_lcd_end
set_em_lcd_msg_no:      mov     FS:word ptr [bx + OFFSET_TO_EM_LCD_YES_NO], LCD_MESSAGE_NO

em_lcd_end:             POP     DI
                        POP     DS
;*********************************************************
;*      CALL EMIT_MSG                                     *
;*********************************************************
acd_em_skp_init:        call    vcon_emit_msg
;if play message is not done then exit this procedure and resume at next timer tick
                        cmp     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        POP     DI
                        jne     acd_exit
;*********************************************************
;*      COMPLETE EM AND CHECK FOR DTMF INPUT AT LEVEL_1    *
;*********************************************************
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], FALSE
                        mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
;acd02.asm change. 11/4/95.
                        POP     DI
                        cmp     GS:byte ptr [ACD_STOP], TRUE
                        je      complete_acd
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     al, GS:byte ptr [DI + VCON_CUR_STEP_DTMF]
                        cmp     al, NO_DTMF
                        POP     DI
                        je      acd_em_no_dtmf
                        cmp     al, DTMF_B
                        jne     do_lcd_echo
                        jmp     process_digits
acd_em_no_dtmf:         dec     GS:word ptr [ACD_REPEAT_COUNTER]
```

```
                        jz      prepare_to_exit_acd
                        jmp     acd_exit

;////////////////////////////////////////////////////////
;*      TIMEOUT. SET F=0 AND EXIT                       *
;////////////////////////////////////////////////////////
prepare_to_exit_acd:    mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], ACD_FAILED    ;ie = 0
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_NEXT_GO_COMPLETE
                        jmp     acd_exit

;*****************************************************************************************************
;*                      LEVEL_1     STEPPER     #2          NO_ACTION                                  *
;*****************************************************************************************************
do_no_action:           PUSH    DI
                        mov     DI, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        cmp     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE
                        jne     acd_na_skp_init
;*********************************************************
;       FIRST TT DO THE MINIMUM TO SET UP                *
;*********************************************************
                        mov     bx, ACD_NO_ACTION_STEP
                        shl     bx, 1
                        mov     ax, FS:word ptr [bx + OFFSET_TO_STEP_ENTRIES]
                        mov     GS:word ptr [di + VCON_CUR_STEP_DATA_AREA_ADDR], ax
;*********************************************************
;*      CALL NO_ACTION                                   *
;*********************************************************
acd_na_skp_init:                                                ;play no action and wait for dtmf
                        call    vcon_no_action
;if play message is not done then exit this procedure and resume at next timer tick
                        cmp     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        POP     DI
                        jne     acd_exit                        ;not complete, resume next time
;*********************************************************
;*      COMPLETE NA AND CHECK FOR DTMF INPUT AT LEVEL_1     *
;*********************************************************
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     GS:byte ptr [di + VCON_ACTION_COMPLETE_CUR_STEP], FALSE
                        mov     GS:byte ptr [di + VCON_FIRST_IRQ00_CUR_STEP], TRUE

;acd02.asm change. 11/4/95.
                        POP     DI
                        cmp     GS:byte ptr [ACD_STOP], TRUE
                        je      complete_acd
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     al, GS:byte ptr [DI + VCON_CUR_STEP_DTMF]
                        cmp     al, NO_DTMF
                        POP     DI
                        je      acd_na_no_dtmf
                        cmp     al, DTMF_B
                        jne     do_lcd_echo
                        jmp     process_digits
acd_na_no_dtmf:         mov     GS:byte ptr [ACD_ACTION], ACD_ACTION_EMIT_MSG
                        mov     ax, GS:word ptr [ACD_REPEAT_COUNT]
                        mov     GS:word ptr [ACD_REPEAT_COUNTER], ax
                        jmp     acd_exit
;*****************************************************************************************************
;*                      LEVEL_1     STEPPER     #3          LCD_PROCESSING                             *
;*****************************************************************************************************
;////////////////////////////////////////////////////////
;*      ECHO DIGIT                                      *
;////////////////////////////////////////////////////////
;store digit somewhere. if need more digits, go to no_action always. if done exit.
;sometimes, the storing wil require checking a hard disk file. then we must issue a
;start program. based on the return from the program we set the flag. thus at this
;point we can either find out correctness of input within timer tick or we go to
;start program. we must also issue LCD feedback.
;
;programs launched by maestro may fail for DOS reasons. in this case maestro can restart
;them. thus, add to maestro the capability to check return code and mark the pgm as not
;complete. in other cases the program will complete but will leave a negative result.
;this can be detected by using the pgm parameter dword. IN THE WORST CASE, THE COMMUNICATION
;BETWEEN THE PROGRAM AND THE ACTION MAY BE HANGING IN THE AIR.
;
;IN ALL CASES, WE MUST REFLECT THE INPUT DIGIT ON THE LCD. THUS, EMIT MESSAGE AND PROCESS
;DIGITS BOTH ARE DRIVING THE LCD. LCD PROCESSING SHOULD ALSO BE CONSIDERED AN ACTION AS
;IT MUST WAIT ETC.
;
```

```
;THE ECHOING WILL TURN THE DISPLAY OFF AND PLACE THE DIGITS STARTING FROM THE LEFT CORNER
;OF THE TOP LINE. # WILL NOT BE ECHOED. THE LONGEST NUMBER TO BE ECHOED IS A LONG DISTANCE
;PHONE CALL TO ANOTHER COUNTRY 011 90 216 302 5869, 19 DIGITS INCLUDING THE BLANKS.
do_lcd_echo:            cmp     GS:byte ptr [ACD_LCD_FIRST_ECHO], YES
                        jne     lcd_echo_not_first_time
                        mov     ah, LCD_CLEAR_SCREEN
                        mov     al, 80h
                        call    lcd_processing
                        cmp     al, 00h
                        jne     lcd_clear_not_done  ;done or not we give clear screen a whole tt.
                        mov     GS:byte ptr [ACD_LCD_FIRST_ECHO], NO
lcd_clear_not_done:     mov     GS:byte ptr [ACD_ACTION], ACD_ACTION_LCD_ECHO
                        mov     GS:byte ptr [ACD_LCD_ECHO_LOCATION], 00H
                        jmp     acd_exit
lcd_echo_not_first_time:PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     cx, di
                        add     cx, VCON_CUR_STEP_DTMF
                        POP     DI
                        mov     ax, GS
                        mov     ES, ax
                        mov     al, 80h
                        or      al, GS:byte ptr [ACD_LCD_ECHO_LOCATION]
                        cmp     GS:word ptr [ACD_TYPE], ACD_GET_PASSWORD
                        je      acd_write_star
                        mov     ah, LCD_WRITE_SCREEN_LINE
                        jmp     acd_set_number_of_characters
acd_write_star:         mov     ah, LCD_WRITE_SCREEN_LINE_STAR

acd_set_number_of_characters:
                        or      ah, 01H
                        call    lcd_processing
                        cmp     al, 80h
                        je      acd_exit
                        inc     GS:byte ptr [ACD_LCD_ECHO_LOCATION]
                        jmp     process_digits

;*****************************************************************************
;*                                                                           *
;*  UP TO HERE, ACD WAS GENERIC. FROM HERE ON, EACH ACD TYPE WILL HAVE ITS OWN PROCESS  *
;*  THUS, PERHAPS THE BEST WAY IS TO CHECK THE TYPE AND THEN CALL A ROUTINE  *
;*                                                                           *
;*****************************************************************************
process_digits:         cmp     GS:word ptr [ACD_TYPE], ACD_GET_NBR_OF_COPIES
                        je      get_nbr_of_copies
                        cmp     GS:word ptr [ACD_TYPE], ACD_GET_PHONE_NUMBER
                        je      get_phone_number
                        cmp     GS:word ptr [ACD_TYPE], ACD_GET_FAXBACK_DOC_NUMBER
                        je      get_faxback_doc_number
                        cmp     GS:word ptr [ACD_TYPE], ACD_GET_VOICE_MAIL_NUMBER
                        je      get_voice_mail_number
                        cmp     GS:word ptr [ACD_TYPE], ACD_GET_PASSWORD
                        je      get_password
                        cmp     GS:word ptr [ACD_TYPE], ACD_CHANGE_PASSWORD
                        je      change_password
                        jmp     acd_exit

;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                 **
;**                      GET     NUMBER      OF      COPIES                                         **
;**                                                                                                 **
;*****************************************************************************************************
;*****************************************************************************************************
;THE PURPOSE HERE IS TO COLLECT DIGITS, EVALUATE THEM AND PASS THEM TO FS:vcon_session_no_of_copies.
;THIS SECTION ALSO SETS THE FLAG=1 IF ALL IS WELL, IF THE NUMBER IS NOT CORRECT THEN F=0 WITH THE
;RESULT THAT ACD'S NEXT STEP IS TMO INSTEAD OF START PROGRAM FOR COPY.
; if digit_count = 1 and digit = # then expect 2 more digits, set acd_action = no_action and exit
;                      digit .ne. # then write digit and terminate acd with flag = 1.
; if digit_count = 2 and digit = # then terminate acd with flag = 0
;                      digit .ne. # then write digit[1], set acd_action = no_action and exit
; if digit_count = 3 and digit = # then terminate with flag = 1
;                      digit .ne. # then write digit[2] and terminate with flag = 1
;THUS WE DO NOT EVER MAKE THE GUY WRONG. THE ONLY CASE IS 1 AND NOTHING: WE TIME OUT TO TMO.
;THERE IS ONLY ONE SINGLE PRESS THAT MAKES SENSE: # AND IT MEANS 1.
;ACTUALLY, I CAN MAKE THE FOLLOWING CHANGE:
;       0       means   1 copy
;       1       means   1 copy
;       9       means   9 copies
;       #1      means   timeout
```

```
;       #1#     means   1 copy
;       #01     means   1 copy
;       #99     means  99 copies
;       * anywhere is interpreted as 0.
get_nbr_of_copies:      inc     GS:byte ptr [ACD_DIGIT_COUNT]
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     al, GS:byte ptr [DI + VCON_CUR_STEP_DTMF]
                        cmp     al, DTMF_A
                        jne     copy_not_star
                        mov     al, DTMF_0
copy_not_star:          POP     DI
                        cmp     GS:byte ptr [ACD_DIGIT_COUNT], 01H
                        jne     copy_second_digit
copy_first_digit:       cmp     al, DTMF_B
                        je      process_digits_cont
                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     FS:byte ptr [bx], 30H
                        mov     FS:byte ptr [bx + 1], al
                        jmp     end_process_digits_pass

copy_second_digit:      cmp     GS:byte ptr [ACD_DIGIT_COUNT], 02H
                        jne     copy_third_digit
                        cmp     al, DTMF_B
                        je      end_process_digits_fail
                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     FS:byte ptr [bx + 1], 30H
                        mov     FS:byte ptr [bx], al
                        jmp     process_digits_cont

copy_third_digit:       cmp     al, DTMF_B
                        jne     copy_third_not_pound
                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     al, FS:byte ptr [bx]
                        mov     FS:byte ptr [bx + 1], al
                        mov     FS:byte ptr [bx], 30H
                        jmp     end_process_digits_pass
copy_third_not_pound:   mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     FS:byte ptr [bx + 1], al
                        jmp     end_process_digits_pass

;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                 **

;**                                  GET     PHONE   NUMBER                                         **
;**                                                                                                 **
;*****************************************************************************************************
;*****************************************************************************************************
;THE PURPOSE HERE IS TO COLLECT HPONE DIGITS UNTIL WE REACH EITHER # OR A COUNT OF 13H (19 DECIMAL)
;when # is encountered, place a 00H in its place in the vcon_session_phone_number. if 19th digit is
;reached, exit.
get_phone_number:       inc     GS:byte ptr [ACD_DIGIT_COUNT]
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     al, GS:byte ptr [DI + VCON_CUR_STEP_DTMF]
                        POP     DI
                        cmp     al, DTMF_B
                        je      get_phone_pound

                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     dl, GS:byte ptr [ACD_DIGIT_COUNT]
                        mov     dh, 0
                        add     bx, dx
                        dec     bx
                        mov     FS:byte ptr [bx], al
                        cmp     GS:byte ptr [ACD_DIGIT_COUNT], 13H
                        je      end_process_digits_pass
                        jmp     process_digits_cont

get_phone_pound:        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
```

```
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     dl, GS:byte ptr [ACD_DIGIT_COUNT]
                        mov     dh, 0
                        add     bx, dx
                        dec     bx
                        mov     FS:byte ptr [bx], 00H
                        jmp     end_process_digits_pass
;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                 **
;**                                  GET    FAXBACK      DOC     NUMBER                             **
;**                                                                                                 **
;*****************************************************************************************************
;*****************************************************************************************************
; we have the following outcomes:
; F=1 if there are 8 or less numbers followed by a pound sign (when # comes count > 1)
; F=0 if timeout ie at any point before #, there was no input within a certain time
; F=3 if * at any point. if in the beginning then OK, but if after some digits, then
;     still OK as next acd resets count, and set F=3.
; F=4 if # and GS:byte ptr [ACD_DIGIT_COUNT]=1 and GS:byte ptr [FBX_ONE_VALID_DOC_NUMBER_EXISTS]=TRUE
; F=5 if # and GS:byte ptr [ACD_DIGIT_COUNT]=1 and GS:byte ptr [FBX_ONE_VALID_DOC_NUMBER_EXISTS]=FALSE
get_faxback_doc_number: inc     GS:byte ptr [ACD_DIGIT_COUNT]
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     al, GS:byte ptr [DI + VCON_CUR_STEP_DTMF]
                        POP     DI
                        cmp     al, DTMF_B
                        je      get_fbx_pound
                        cmp     al, DTMF_A
                        je      exit_with_f3

                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     dl, GS:byte ptr [ACD_DIGIT_COUNT]
                        mov     dh, 0
                        add     bx, dx
                        dec     bx
                        mov     FS:byte ptr [bx], al
                        cmp     GS:byte ptr [ACD_DIGIT_COUNT], 8
                        je      end_process_digits_pass
                        jmp     process_digits_cont

get_fbx_pound:          mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     dl, GS:byte ptr [ACD_DIGIT_COUNT]
                        mov     dh, 0
                        add     bx, dx
                        dec     bx
                        mov     FS:byte ptr [bx], 00H

                        cmp     GS:byte ptr [ACD_DIGIT_COUNT], 1
                        ja      end_process_digits_pass                                 ;F=1

                        cmp     GS:byte ptr [FBX_ONE_VALID_DOC_NUMBER_EXISTS], TRUE
                        jne     exit_with_f5

exit_with_f4:           mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], 4             ;ie = 1
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_NEXT_GO_COMPLETE
                        jmp     acd_exit

exit_with_f5:           mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], 5             ;ie = 1
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_NEXT_GO_COMPLETE
                        jmp     acd_exit

exit_with_f3:           mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], 3             ;ie = 1
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_NEXT_GO_COMPLETE
                        jmp     acd_exit

;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                 **
;**                                  GET    VOICE    MAIL    NUMBER                                 **
;**                                                                                                 **
```

```
;*****************************************************************************************************
;*****************************************************************************************************
get_voice_mail_number:

;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                  **

;**                                  GET    PASSWORD                                               **
;**                                                                                                  **
;*****************************************************************************************************
;*****************************************************************************************************
;here is how it works: password is in .cfg. cvboot reads and loads it to all step tables for modems
;that exist. acd(ACD_GET_PASSWORD) checks against the step table location vcon_session_password and
;decides on the flag value.
get_password:           inc     GS:byte ptr [ACD_DIGIT_COUNT]
                        PUSH    DI
                        mov     di, LEVEL_1 * TCB_LEVEL_DB_SIZE
                        mov     al, GS:byte ptr [DI + VCON_CUR_STEP_DTMF]
                        POP     DI
                        cmp     al, DTMF_B
                        je      get_password_pound

                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     dl, GS:byte ptr [ACD_DIGIT_COUNT]
                        mov     dh, 0
                        add     bx, dx
                        dec     bx
                        mov     FS:byte ptr [bx], al
                        cmp     GS:byte ptr [ACD_DIGIT_COUNT], 20H  ; max. characters to display
                        je      acd_verify_password
                        jmp     process_digits_cont

get_password_pound:     mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     bx, FS:word ptr [bx + OFFSET_TO_PARAM_ADDR]
                        mov     bx, FS:word ptr [bx + ACD_OFFSET_TO_NUMBER_ADDRESS]
                        mov     dl, GS:byte ptr [ACD_DIGIT_COUNT]
                        mov     dh, 0
                        add     bx, dx
                        dec     bx
                        mov     FS:byte ptr [bx], 00H
                        jmp     acd_verify_password

;*****************************************************************************************************
;**                                                                                                  **

;**                                  ACD VERIFY PASSWORD                                             **
;**                                                                                                  **
;*****************************************************************************************************
acd_verify_password:
                        push    di
                        push    si
                        mov     si, FS:word ptr [ST_SESS_PARAMS_PTR_ADDR]
                        mov     di, si
                        add     si, ST_SESS_PARAMS_PASSWORD
                        add     di, ST_SESS_PARAMS_PASSWORD_CHECK
acd_next_char:          cmp     FS:byte ptr [si], 00h
                        je      acd_password_pass
                        mov     al, FS:byte ptr [si]

                        cmp     al, FS:byte ptr [di]
                        jne     acd_password_fail
                        inc     di
                        inc     si
                        jmp     acd_next_char
acd_password_fail:      pop     si
                        pop     di
                        jmp     end_process_digits_fail
acd_password_pass:      pop     si
                        pop     di
                        jmp     end_process_digits_pass

;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                  **

;**                                  CHANGE    PASSWORD                                              **
;**                                                                                                  **
;*****************************************************************************************************
```

```
;*****************************************************************************************************
;change password works like this: once the new password is entered, the user is asked to enter it again.
;this are two GS: locations. if a match then step table entry is updated and start_program is called with
;program name: update.cfg(password). I still need to think multiple passwords. should they be per modem
;or should they be per voice mail access.
change_password:

;*****************************************************************************************************
;*                      LEVEL_1     STEPPER     #4          START_PROGRAM                            *
;*****************************************************************************************************
do_start_program:

;*****************************************************************************
;*                                                                           *
;*                  COMMON TAIL END FOR ALL PROCESS DIGITS BRANCHES          *
;*                                                                           *
;*****************************************************************************
process_digits_cont:    mov     GS:byte ptr [ACD_ACTION], ACD_ACTION_NO_ACTION
                        jmp     acd_exit

end_process_digits_fail:mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], ACD_FAILED    ;ie = 0
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_NEXT_GO_COMPLETE
                        jmp     acd_exit

end_process_digits_pass:mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]     ;LEVEL_0
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], ACD_PASSED    ;ie = 1
                        mov     GS:word ptr [ACD_ISSUED_CNTR], ACD_NEXT_GO_COMPLETE
                        jmp     acd_exit


;*****************************************************************************************************
;*                                                                                                   *
;*                      COMPLETE  A C D                                                              *
;*                                                                                                   *
;*****************************************************************************************************
;DI at LEVEL_0
complete_acd:           mov     GS:byte ptr [DI + VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                        mov     GS:byte ptr [DI + VCON_FIRST_IRQ00_CUR_STEP], TRUE
;acd02.asm change. 11/4/95.
                        cmp     GS:byte ptr [ACD_STOP], TRUE
                        jne     acd_normal_completion
acd_end_check_for_dlec:
                        cmp     GS:byte ptr [VCON_DLEC_DETECTED], TRUE
                        jne     acd_end_check_for_dlet
                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_INCOMING_FAX
                        call    sim_ring_to_cas
                        jmp     acd_normal_completion
acd_end_check_for_dlet:
                        cmp     GS:byte ptr [VCON_DLET_DETECTED], TRUE
                        jne     acd_normal_completion
                        mov     bx, GS:word ptr [DI + VCON_CUR_STEP_DATA_AREA_ADDR]
                        mov     FS:word ptr [bx + OFFSET_TO_STEP_STATUS], GOTO_WAIT_ON_DLEH
                        jmp     acd_normal_completion
acd_normal_completion:
;NOTEZ BIEN: MUST CLEAR THE DLE_BUFFER BY EQUATING IRQ00_PTR = IRQ03_PTR.
;=========================================================================
;THIS IS SO EXTRA DTMF'S THE USER MAY HAVE PRESSED DO NOT POLLUTE THE COMING STEPS.
                        mov     ax, GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR]
                        mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], ax
                        jmp     acd_exit

acd_exit:               pop     si
                        pop     cx
                        pop     dx
                        pop     es
                        pop     di
                        pop     bx
                        pop     ax
                        pop     ds

                        ret

;*****************************************************************
;*                                                               *
;*      ACD STEPS                                                *
;*                                                               *
;*****************************************************************
acd_issued_table        dw      do_em_na_sp_lcd
                        dw      complete_acd
```

```
announce_and_collect_digits     endp

ACD_EM_NA_SP_LCD        EQU     0000H
ACD_NEXT_GO_COMPLETE    EQU     0001H

END
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*******************************************************************************
;*                                                                             *
;* NAME: switch_to_fax                                                         *
;* VERSION: 00                                                                 *
;* FUNCTION: see write up below                                                *
;* AUTHOR: Haluk Aytac                                                         *
;* DATE CREATED: July 10, 1995                                                 *
;* DATE UPDATED:                                                               *
;* INPUT:  N/A                                                                 *
;* OUTPUT:  N/A                                                                *
;* REGISTERS CORRUPTED: NONE                                                   *
;*                                                                             *
;*******************************************************************************
;
;*******************************************************************************
;*                                                                             *
;*          SW_2_FAX                                                           *
;*                                                                             *
;*******************************************************************************
;switch_to_fax_example_step dw      ST_SW_2_FAX
;                           dw      JUMP_UNCOND
;                           dw      state_00bc_parameters
;state_00bc_next_state      dw      0000h                   ;go to tmo after fax send complete.
;state_00bc_parameters      dw      DO_NOT_EXPECT_DTMF


INCLUDE CATEQU0B.INC
.MODEL  COMPACT
.386P
                           extrn   tmaestro_task_queue:far
                           public  sw_2_fax
.CODE
ASSUME DS:SEG tmaestro_task_queue
;always at LEVEL_0
sw_2_fax                   proc
                           mov     GS:byte ptr [MODEM_MODE], CAS
                           mov     GS:byte ptr [CAS_FKS_DETECTED], FALSE
                           mov     GS:byte ptr [CAS_AFTER_FKS], FALSE
                           mov     GS:word ptr [CAS_TT_COUNT], 0FFFFH
                           mov     GS:byte ptr [VCON_FIRST_IRQ00_CUR_STEP], FALSE
                           mov     GS:byte ptr [VCON_ACTION_COMPLETE_CUR_STEP], TRUE
                           ret
sw_2_fax                   endp

END
```

```
;*****************************************************************************************************
;*****************************************************************************************************
;**                                                                                                 **
;**                                                                                                 **
;**            3 T A U     C A T B O X     M U L T I T A S K I N G     S Y S T E M                  **
;**                                                                                                 **
;**                                Written by      Haluk M. Aytac                                   **
;**                                        Confidential                                             **
;**                                Copyright 1995. Haluk M. Aytac                                   **
;**                                                                                                 **
;**                                                                                                 **
;*****************************************************************************************************
;*****************************************************************************************************
;maestrok.asm <- maestroj.asm. 10/12/95. catvocl6. host send fax detect
;maestroj.asm <- maestroi.asm. 10/5/95. int 2f processing (CAS).
;maestroi.asm <- maestroh.asm. 9/21/95. remove sys_data structure.
;MAESTROH.ASM <- MAESTROG.ASM. 9/18/95. after a close file of host_DOS_request, if it was a print
;spool file, then submit this file to PTQ.
;maestrod.asm <- maestroc.asm. 6/12/95. catvocl.
;maestroc.asm <- maestrob.asm. 6/2/95. for integration with haivma. also add remark that brkupdcx.exe
;expects a 20 (blank) between its two arguments. I corrected prnfax to take care of this. must watch
;out for when maestro itself has to launch such a program. currently it is putting 00h in between.
;maestrob.asm <- maestroa.asm. 5/18/95. job history buffer plus correct for start_program
;that does not wait for completion.
;maestroa.asm <- maestro9.asm. 5/16/95. SCAN.EXE. if PGM_ARGUMENT or PGM_PARAMETER = 0000.
;also fix "check for priority HI".
;maestro9.asm <- maestro8.asm. 5/11/95. 5-95-80. multitasking. CATVOC0C-0.
;maestro8.asm <- maestro7.asm. 5/10/95.
;CATVOC0B-1: fix R->CR including other irq's than t2.
;ON ENTRY:
;       t2                                              other irq
;=============================================   ========================================
;       If In_DOS=1 skip all                            If In_DOS=1 skip all
;       If maestro_active=YES skip all                  If maestro_active=YES skip all
;       If In_IRQ=OK call store_to_Client_regs          If In_IRQ=OK call store_to_Client_regs
;       call store_DTA_PSP_to_Client
;       call switch_to_maestro
;skip_all: continue                                     skip_all: continue
;
;ON EXIT:
;       t2                                              other irq
;=============================================   ========================================
;       If In_DOS=1 skip all                            If In_DOS=1 skip all
;       If maestro_active=YES skip all                  If maestro_active=YES skip all
;       call restore_DTA_PSP_fm_Client
;       If In_IRQ=OK call restore_fm_Client_regs        If In_IRQ=OK call restore_fm_Client_regs
;skip_all: continue                                     skip_all: continue
;
;ASSUMPTIONS:   irq, other than t2, do not change PSP, DTA
;               t2, if it changes PSP, DTA, also restores it. I mean casmodem.
;               if we have to change PSP etc within t2, we must also restore it.
;               do not change PSP etc if In_DOS.
;               when irq's envelop t2, at least one irq will have In_IRQ=OK.
;CATVOC0B-2: CHS related changes. 5-95-65.
;maestro6.asm <- maestro5.asm. 5/8/95. fix switch to maestro: add flags xfer.
;maestro5.asm <- maestro4.asm. 5/6/95. fix errors for catvoc06
;maestro4.asm <- maestro3.asm. 5/4/95. fix cmp error for LDFT and LDFF (HDC.EXE).
;maestro3.asm <- maestro2.asm. 5/2/95. more on program launching.
;maestro2.asm <- maestro1.asm. 5/1/95. fixes for launching a program.
;maestro1.asm <- maestro0.asm. 4/29/95. correct errors in store and restore
;CATVOC0B-2. \goodcv06\catequ02.inc -> \goodcv07\catequ03.inc
INCLUDE CATEQU0E.INC
.MODEL  COMPACT
.386P
;sys data
                extrn   maestro_active:far                      ;near
                extrn   maestro_task_queue:far                  ;near
                extrn   maestro_count:far                       ;near
                extrn   timer_tick_count:far                    ;near
                extrn   new_t2_in_maestro:far                   ;near
                extrn   old_t2_in_maestro:far                   ;near
                extrn   mtq_first_hiprio_ptr:far                ;near
                extrn   mtq_first_loprio_ptr:far                ;near
                extrn   mtq_first_suspended_ptr:far             ;near
                extrn   mtq_running_ptr:far                     ;near
                extrn   maestro_task_queue_end:far              ;near
                extrn   maestro_command_tail:far                ;near
                extrn   maestro_load_exec:far                   ;near
                extrn   launch_complete_with_carry:far          ;near
                extrn   launch_complete:far                     ;near
```

```
                extrn   job_number_word:far               ;near
                extrn   job_number_buffer:far            ;near

                extrn   Maestro_AX:far                   ;near
                extrn   Maestro_BX:far                   ;near
                extrn   Maestro_CX:far                   ;near
                extrn   Maestro_DX:far                   ;near
                extrn   Maestro_BP:far                   ;near
                extrn   Maestro_DI:far                   ;near
                extrn   Maestro_SI:far                   ;near
                extrn   Maestro_DS:far                   ;near
                extrn   Maestro_ES:far                   ;near
                extrn   Maestro_FS:far                   ;near
                extrn   Maestro_GS:far                   ;near
                extrn   Maestro_IP:far                   ;near
                extrn   Maestro_CS:far                   ;near
                extrn   Maestro_FLAGS:far                ;near
                extrn   Maestro_PSP:far                  ;near
                extrn   Maestro_DTA_off:far              ;near
                extrn   Maestro_DTA_seg:far              ;near

                extrn   Maestro_SP:far                   ;near
                extrn   Maestro_SS:far                   ;near

                extrn   Client_AX:far                    ;near
                extrn   Client_BX:far                    ;near
                extrn   Client_CX:far                    ;near
                extrn   Client_DX:far                    ;near
                extrn   Client_BP:far                    ;near
                extrn   Client_DI:far                    ;near
                extrn   Client_SI:far                    ;near
                extrn   Client_DS:far                    ;near
                extrn   Client_ES:far                    ;near
                extrn   Client_FS:far                    ;near
                extrn   Client_GS:far                    ;near
                extrn   Client_IP:far                    ;near
                extrn   Client_CS:far                    ;near
                extrn   Client_FLAGS:far                 ;near
                extrn   Client_PSP:far                   ;near
                extrn   Client_DTA_off:far               ;near
                extrn   Client_DTA_seg:far               ;near

                extrn   Client_SP:far                    ;near
                extrn   Client_SS:far                    ;near

                extrn   Saved_AX:far                     ;near
                extrn   Saved_BX:far                     ;near
                extrn   Saved_CX:far                     ;near
                extrn   Saved_DX:far                     ;near
                extrn   Saved_BP:far                     ;near
                extrn   Saved_DI:far                     ;near
                extrn   Saved_SI:far                     ;near
                extrn   Saved_DS:far                     ;near
                extrn   Saved_ES:far                     ;near
                extrn   Saved_FS:far                     ;near
                extrn   Saved_GS:far                     ;near
                extrn   Saved_IP:far                     ;near
                extrn   Saved_CS:far                     ;near
                extrn   Saved_FLAGS:far                  ;near
                extrn   Saved_PSP:far                    ;near
                extrn   Saved_DTA_off:far                ;near
                extrn   Saved_DTA_seg:far                ;near
                extrn   Saved_SP:far                     ;near
                extrn   Saved_SS:far                     ;near

                extrn   vcon_InDOS_flag_off:far          ;near
                extrn   vcon_InDOS_flag_seg:far          ;near

;maestrog.asm variables
                extrn   host_DOS_request_type:far
                extrn   host_DOS_request_fn:far
                extrn   host_DOS_request_resp:far
                extrn   host_CAS_request_type:far
                extrn   host_CAS_request_resp:far
                extrn   ASPI_Entry_off:far
                extrn   ASPI_Entry_seg:far

                extrn   printer_task_queue:far
                extrn   host_print_file_name:far
                extrn   print_two_bit_filename:far
```

```
                extrn   printer_task_queue_end:far
                extrn   host_initiated_send_fax_count:far

                extrn   host_DOS_req_rd_callback_done:far
                extrn   host_CAS_req_rd_callback_done:far

;end maestrog.asm variables

                public  maestro_begin
                public  store_to_Client_regs
                public  switch_to_Maestro
                public  restore_fm_Client_regs
                public  store_DTA_PSP_to_Client
                public  restore_DTA_PSP_fm_Client
.CODE
;************************************************************************
;*                                                                      *
;*      MAESTRO.ASM                                                     *
;*      COPYRIGHT 3TAU 1995                                             *
;*      WRITTEN BY HALUK M. AYTAC                                       *
;*                                                                      *
;************************************************************************
;**************************************************************
;*                                                            *
;*      HEEEEEEEEERE IS MMMMAAAAAEEESSSSTRROOOOOOOO           *
;*                                                            *
;**************************************************************
;MAESTRO MUST BE STACK NEUTRAL FROM MAESTRO_BEGIN TO RESUME/LAUNCH.
                ASSUME  DS:SEG maestro_active
;MUST PREVENT SWITCH TO MAESTRO DURING INSTALL (IRQ00 HOOKED BEFORE MAESTRO CODE)
maestro_begin:
;CATVOC0C-0 the next 5 lines
                PUSH    DS
                PUSH    AX
                PUSH    BX
                MOV     AX, SEG maestro_active
                MOV     DS, AX

                mov     byte ptr maestro_active, YES
                inc     word ptr maestro_count
;maestro5.asm change. see 5-95-51.
                mov     ax, word ptr timer_tick_count
                mov     word ptr new_t2_in_maestro, ax
;end maestro5.asm change.
;*****************************************************************************************************
;*                                                                                                   *
;* 0. Current job complete? If so, mark as such and set running_ptr=0                                *
;*                                                                                                   *
;*****************************************************************************************************
; 0.
                cmp     word ptr mtq_running_ptr, 0000h
                jz      maestro_no_comp_job
                mov     bx, word ptr mtq_running_ptr
;maestro5.asm change
                mov     ax, word ptr timer_tick_count
                mov     cx, word ptr old_t2_in_maestro
                sub     ax, cx
                add     word ptr [bx + MTICS_PGM_RUNNING_TIMER_TICKS], ax
                mov     ax, word ptr new_t2_in_maestro
                mov     word ptr old_t2_in_maestro, ax
;end maestro5.asm change
                cmp     byte ptr launch_complete, YES
                jnz     maestro_no_comp_job
                mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_COMPLETED
                mov     word ptr mtq_running_ptr, 0000h
maestro_no_comp_job:

;*****************************************************************************************************
;*                                                                                                   *
;* 1. At each pass, Maestro should check on MTICS entries that are completed||aborted to see        *
;*    if the handshake acknowledged the complete||abort. If so, then it should note the              *
;*    MTQ entry as free to use. For such entries, it should clear the status bytes of the            *
;*    entry: (PGM_STATUS,HANDSHAKE,PRIORITY,FREE_TO_USE_STATUS).                                     *
;*    NOTE: AS ST MAKES THE ABORT REQUEST AND MAESTRO COMPLIES, WHEN IT COMPLIES, MAESTRO CAN        *
;*          CLEAR THE ENTRY.                                                                         *
;*                                                                                                   *
;*****************************************************************************************************
; 1.
                mov     bx, OFFSET maestro_task_queue
maestro_comp_scan:
                cmp     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_COMPLETED
```

```
                jnz     maestro_comp_scan_cont0
;maestrob.asm change
                cmp     word ptr [bx + MTICS_WAIT_TO_COMPLETE], WAIT_TO_COMPLETE
                jnz     maestro_comp_scan_cont1
                cmp     byte ptr [bx + MTICS_HANDSHAKE], MTICS_HANDSHAKE_ST_COMPLETION_ACKED
                jnz     maestro_comp_scan_cont0
maestro_comp_scan_cont1:
                mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_IDLE
                mov     byte ptr [bx + MTICS_HANDSHAKE], MTICS_HANDSHAKE_NULL
                mov     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_NULL
                mov     byte ptr [bx + MTICS_FREE_TO_USE_STATUS], MTICS_FREE_TO_USE
                mov     si, OFFSET job_number_buffer
                mov     cx, word ptr [bx + MTICS_JOB_NUMBER]
                mov     ax, JOB_ENTRY_DELTA
                mul     cx                              ;answer confined to ax as buffer of 1024B
                add     si, ax                          ;now si -> job entry
                mov     ax, word ptr timer_tick_count
                mov     word ptr [si + JOB_ENDING_T2], ax          ;trace buffer
                mov     word ptr [bx + MTICS_JOB_ENDING_T2], ax    ;maestro task queue
;end maestrob.asm change
maestro_comp_scan_cont0:
                add     bx, MTQ_ENTRY_DELTA
                cmp     bx, OFFSET maestro_task_queue_end
                jne     maestro_comp_scan

;*****************************************************************************************************
;*                                                                                                   *
;* 2. At each pass, Maestro should validate start_program requests. At this point, Maestro           *
;*   should tag the program as HIPRIO or LOPRIO. It should then acknowledge (M_REQ_ACKNOWLEDGED).    *
;*                                                                                                   *
;*****************************************************************************************************
; 2.
                mov     bx, OFFSET maestro_task_queue
maestro_st_req_scan:
                cmp     byte ptr [bx + MTICS_HANDSHAKE], MTICS_HANDSHAKE_ST_REQ_MADE
                jnz     maestro_st_req_scan_cont0
                mov     byte ptr [bx + MTICS_HANDSHAKE], MTICS_HANDSHAKE_M_REQ_ACKNOWLEDGED
                mov     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_LO
;maestro4.asm change
;               cmp     dword ptr [bx + MTICS_PGM_NAME_DWORD_PTR + 13h], "TFDL"
                mov     dx, word ptr [bx + MTICS_PGM_NAME_DWORD_PTR]
                PUSH    DS
                PUSH    BX
                mov     ax, word ptr [bx + MTICS_PGM_NAME_DWORD_PTR + 2]
                mov     DS, ax
                mov     bx, dx
;maestro5.asm change. add the following line.
                add     bx, 0013h
                cmp     DS:dword ptr [bx], "TFDL"
                POP     BX
                POP     DS
;end maestro4.asm change
                jnz     maestro_st_req_scan_cont1
                mov     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_HI
                jmp     maestro_st_req_scan_cont0
maestro_st_req_scan_cont1:
;maestro4.asm change
;               cmp     dword ptr [bx + MTICS_PGM_NAME_DWORD_PTR + 13h], "FFDL"
                mov     dx, word ptr [bx + MTICS_PGM_NAME_DWORD_PTR]
                PUSH    DS
                PUSH    BX
                mov     ax, word ptr [bx + MTICS_PGM_NAME_DWORD_PTR + 2]
                mov     DS, ax
                mov     bx, dx
;maestro5.asm change. add the following line.
                add     bx, 0013h
;maestroa.asm change. next line. "FFDL" => "FFTS"
                cmp     DS:dword ptr [bx], "FFTS"
                POP     BX
                POP     DS
;end maestro4.asm change
                jnz     maestro_st_req_scan_cont0
                mov     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_HI
                jmp     maestro_st_req_scan_cont0
maestro_st_req_scan_cont0:
                add     bx, MTQ_ENTRY_DELTA
                cmp     bx, OFFSET maestro_task_queue_end
                jne     maestro_st_req_scan

;*****************************************************************************************************
;*                                                                                                   *
```

```
;* 3. It should now scan for first HIPRIO job that is not running but is STATUS=IDLE           *
;*                                                                                             *
;***********************************************************************************************
; 3.
                mov     bx, OFFSET maestro_task_queue
maestro_hi_prio_scan:
                cmp     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_HI
                jnz     maestro_hi_prio_scan_cont0
                cmp     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_IDLE
                jnz     maestro_hi_prio_scan_cont0
;not checking for SUSPENDED, because HI jobs will not be suspended.
                mov     word ptr mtq_first_hiprio_ptr, bx
                jmp     maestro_hi_prio_scan_cont1
maestro_hi_prio_scan_cont0:
                add     bx, MTQ_ENTRY_DELTA
                cmp     bx, OFFSET maestro_task_queue_end
                jne     maestro_hi_prio_scan
                mov     word ptr mtq_first_hiprio_ptr, 0000h
maestro_hi_prio_scan_cont1:

;***********************************************************************************************
;*                                                                                             *
;* 4. It should now scan for first LOPRIO job that is not running but is STATUS=IDLE           *
;*                                                                                             *
;***********************************************************************************************
; 4.
                mov     bx, OFFSET maestro_task_queue
maestro_lo_prio_scan:
                cmp     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_LO
                jnz     maestro_lo_prio_scan_cont0
                cmp     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_IDLE
                jnz     maestro_lo_prio_scan_cont0
;not checking for SUSPENDED
                mov     word ptr mtq_first_loprio_ptr, bx
                jmp     maestro_lo_prio_scan_cont1
maestro_lo_prio_scan_cont0:
                add     bx, MTQ_ENTRY_DELTA
                cmp     bx, OFFSET maestro_task_queue_end
                jne     maestro_lo_prio_scan
                mov     word ptr mtq_first_loprio_ptr, 0000h
maestro_lo_prio_scan_cont1:

;***********************************************************************************************
;*                                                                                             *
;* 5. It should now scan for first LOPRIO job that is not running but is STATUS=SUSPENDED      *
;*                                                                                             *
;***********************************************************************************************
; 5.
                mov     bx, OFFSET maestro_task_queue
maestro_suspended_scan:
                cmp     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_LO
                jnz     maestro_suspended_scan_cont0
                cmp     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                jnz     maestro_suspended_scan_cont0
                mov     word ptr mtq_first_suspended_ptr, bx
                jmp     maestro_suspended_scan_cont1
maestro_suspended_scan_cont0:
                add     bx, MTQ_ENTRY_DELTA
                cmp     bx, OFFSET maestro_task_queue_end
                jne     maestro_suspended_scan
                mov     word ptr mtq_first_suspended_ptr, 0000h
maestro_suspended_scan_cont1:
;*****************************************************************************
;*                                                                           *
;*      MAESTRO NEXT PROGRAM DECISION                                        *
;*                                                                           *
;*****************************************************************************
                cmp     word ptr mtq_running_ptr, 0000h
                je      maestro_next_pgm_cont0
                mov     bx, word ptr mtq_running_ptr
                cmp     byte ptr [bx + MTICS_PRIORITY], MTICS_PRIORITY_HI
                jne     maestro_next_pgm_cont1
;*****************************************************************************
;*  THE RUNNING PROGRAM WAS HI-PRIORITY: SO RESUME THIS PROGRAM              *
;*****************************************************************************
                jmp     maestro_resume
maestro_next_pgm_cont1:
                CALL    CHECK_HOST_DOS_REQUEST
                jc      maestro_next_pgm_cont4
                cmp     word ptr mtq_first_hiprio_ptr, 0000h
;*****************************************************************************
```

```
;*  THE RUNNING PROGRAM WAS NOT HI-PRIORITY BUT THERE WAS NO HI-PRIORITY ITEM   *
;*  IN THE QUEUE: SO RESUME THIS PROGRAM                                        *
;*******************************************************************************
                je      maestro_resume
                mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                call    save_suspended_program
                mov     bx, word ptr mtq_first_hiprio_ptr
;*******************************************************************************
;*  THE RUNNING PROGRAM WAS NOT HI-PRIORITY AND THERE WAS A HI-PRIORITY ITEM    *
;*  IN THE QUEUE: SO SUSPEND THIS PROGRAM AND LAUNCH THE HI-PRIORITY ONE        *
;*******************************************************************************
                jmp     maestro_launch
maestro_next_pgm_cont0:
                CALL    CHECK_HOST_DOS_REQUEST
                jc      maestro_next_pgm_cont4
                cmp     word ptr mtq_first_hiprio_ptr, 0000h
                je      maestro_next_pgm_cont2
;*******************************************************************************
;*  THERE WAS NO RUNNING PROGRAM AND THERE WAS A HI-PRIORITY ITEM               *
;*  IN THE QUEUE: SO LAUNCH THE HI-PRIORITY ONE                                 *
;*******************************************************************************
                mov     bx, word ptr mtq_first_hiprio_ptr
                jmp     maestro_launch
maestro_next_pgm_cont2:
                cmp     word ptr mtq_first_suspended_ptr, 0000h
                je      maestro_next_pgm_cont3
;*******************************************************************************
;*  THERE WAS NO RUNNING PROGRAM AND THERE WAS A SUSPENDED ITEM                 *
;*  IN THE QUEUE: SO RESUME THE SUSPENDED ONE                                   *
;*******************************************************************************
                mov     bx, word ptr mtq_first_suspended_ptr
                jmp     maestro_resume
maestro_next_pgm_cont3:
                cmp     word ptr mtq_first_loprio_ptr, 0000h
                je      maestro_next_pgm_cont4
;*******************************************************************************
;*  THERE WAS NO RUNNING PROGRAM AND THERE WAS A LO-PRIORITY ITEM               *
;*  IN THE QUEUE: SO LAUNCH THE LOW-PRIORITY ONE                                *
;*******************************************************************************
                mov     bx, word ptr mtq_first_loprio_ptr
                jmp     maestro_launch

maestro_next_pgm_cont4:
;CATVOCOC-0: cli- pop pop pop -sti. 5/12/95.
                cli
                mov     byte ptr maestro_active, NO
                POP     BX
                POP     AX
                POP     DS
                sti
                jmp     maestro_loop
;MAESTROG.ASM CHANGE
;*******************************************************************************
;*  CHECK THE VARIABLE: host_DOS_request_type == HOST_DOS_REQUEST_TYPE_ENTER    *
;*  if not equal continue. if equal, and the running program is not hi-priority *
;*  then suspend the running program. the points to check are:                  *
;*              maestro_next_pgm_cont1  (suspend) -> maestro_next_pgm_cont4     *
;*      and     maestro_next_pgm_cont0  (       ) -> maestro_next_pgm_cont4     *
;*      set     mtq_running_ptr = 0                                             *
;*      set     host_DOS_request_resp = HOST_DOS_REQUEST_RESP_ENTER_ACK         *
;*      set     InDOS = 1                                                       *
;*      check   s4_callback seg:off == 0:0                                      *
;*      if      non 0:0 then call the callback (callbacks should also do InIRQ) *
;*      reset   s4_callback seg:off = 0:0 when callback over                    *
;*                                                                              *
;*      check   host_DOS_request_type == HOST_DOS_REQUEST_TYPE_EXIT             *
;*      if so   InDOS = 0                                                       *
;*      and     host_DOS_request_type = HOST_DOS_REQUEST_TYPE_NULL              *
;*      and     host_DOS_request_resp = HOST_DOS_REQUEST_RESP_NULL              *
;*******************************************************************************
;*******************************************************************************
;*      PROCEDURE   CHECK_HOST_DOS_REQUEST                                      *
;*******************************************************************************
check_host_DOS_request  proc
                        push    bx
;maestrog.asm change. 8/27/95. the problem this change is attempting to solve is this:
;documented in 8(III)-95-18. suppose before entering this procedure, an exit has come.
;suppose, after the cmp ,ENTER piece of code here, an enter has come before cmp ,EXIT.
;now it will be neither exit not enter and will return with nc. but for sure, pre-read
;will not also come because it takes far longer for scsi to respond. so I do not see
;how this could cause a problem. but I will make the change anyway because, really
```

```
;scsi irq should not come in between code lines here.
;disable the scsi irq
;
;NOTES. 10/6/95. DOS and CAS are slightly different. In DOS, we make INT 13 calls and we
;need to discourage INT 21 callers in CaTbox. We suspend running programs and discourage
;CAS in t2 from making DOS calls by setting InDOS=1. with host_CAS_request, however, we
;need to suspend running programs but we cannot set InDOS=1 as this will prevent INT 2F
;from making INT 21 calls. At least this is what I think. Although, INT 2F calls are made
;from the foreground, they might not be checking for InDOS. Let me assume that they may be.
;As host_CAS_request will make INT 21 calls, this will prevent CAS in t2 from making such
;calls. And if CAS in t2 is making such a call, t2 will not end for INT 2F to start again.
;this situation is equal to INT 2F being a foreground program.
;
;as for ttisr code that ignores InDOS if also DOS_request, we can ignore this for CAS_request
;that is if InDOS set then CAS INT 2F is making an INT 21 call anyway.
        in      al, 0a1h
        or      al, 08h
        out     0a1h, al

                        cmp     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_NULL
                        jne     is_it_dos_enter
                        mov     ax, 0
                        jmp     check_cas
is_it_dos_enter:        cmp     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_ENTER
                        jne     is_it_dos_exit
                        mov     ax, 1
                        jmp     check_cas
is_it_dos_exit:         cmp     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_EXIT
                        jne     ck_host_dos_exit_nc     ; if none then create havoc
                        mov     ax, 2
                        jmp     check_cas
check_cas:              cmp     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_NULL
                        jne     is_it_cas_enter
                        add     ax, 0
                        jmp     check_start
is_it_cas_enter:        cmp     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_ENTER
                        jne     is_it_cas_exit
                        add     ax, 3
                        jmp     check_start
is_it_cas_exit:         cmp     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_EXIT
                        jne     ck_host_dos_exit_nc     ; if none then create havoc
                        add     ax, 6
                        jmp     check_start

check_start:            mov     bx, OFFSET host_req_response_table
                        mov     si, ax
                        shl     si, 1
                        jmp     cs:word ptr [bx + si]
;************************
;* null/null    0+0=0   *
;************************
dos_null_cas_null:      mov     byte ptr host_DOS_req_rd_callback_done, FALSE
                        mov     byte ptr host_CAS_req_rd_callback_done, FALSE
                        je      ck_host_DOS_exit_nc
;************************
;* enter/null   1+0=1   *
;************************
dos_enter_cas_null:     cmp     word ptr mtq_running_ptr, 0000h
                        je      host_DOS_no_running_pgm_1
                        mov     bx, word ptr mtq_running_ptr
                        mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                        call    save_suspended_program
host_DOS_no_running_pgm_1:
                        mov     word ptr mtq_running_ptr, 0000h
;if a call_back was done then send "stall" msg. if cas was callback source, then this rd will take
;place. if dos was callback source, then this rd will not take place because it took place already.
                        mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                        mov     di, word ptr vcon_InDOS_flag_seg
                        mov     ES, di
                        mov     di, word ptr vcon_InDOS_flag_off
                        mov     ES:byte ptr [di], 01h
                        mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S4_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      ck_host_DOS_exit_c

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
```

```
                                                    ; is completed
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S4_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_DOS_req_rd_callback_done, TRUE
                        STI
                        jmp     ck_host_DOS_exit_c
;************************
;* null/enter   0+3=3   *
;************************
dos_null_cas_enter:     cmp     word ptr mtq_running_ptr, 0000h
                        je      host_DOS_no_running_pgm_3
                        mov     bx, word ptr mtq_running_ptr
                        mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                        call    save_suspended_program
host_DOS_no_running_pgm_3:
                        mov     word ptr mtq_running_ptr, 0000h
;if a call_back was done then send "stall" msg. if dos was callback source, then this rd will take
;place. if cas was callback source, then this rd will not take place because it took place already.
                        mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_ENTER_ACK
                        mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S7_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      check_2f_wr_callback_3

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
;in longer words, when you do a callback, you do not want maestro to get control until after
;the call is done. a way to do this is to bracket the call in inc/dec InIRQ (as it is done in a real
;IRQ) so that maestro comes after the IRQ (so to speak). But, in this case, we do not even do R->CR
;because this does not end with iret to manipulate CR. There is a chance that after dec InIRQ, a
;t2 comes in and returns to maestro. But this is taken care of with cli in the call.

                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S7_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_CAS_req_rd_callback_done, TRUE
                        STI

                        nop
                        nop
;now that pre-read callback has executed, do a callback for write of int 2f.
check_2f_wr_callback_3: mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S1_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      ck_host_DOS_exit_c

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
;in longer words, when you do a callback, you do not want maestro to get control until after
;the call is done. a way to do this is to bracket the call in inc/dec InIRQ (as it is done in a real
;IRQ) so that maestro comes after the IRQ (so to speak). But, in this case, we do not even do R->CR
;because this does not end with iret to manipulate CR. There is a chance that after dec InIRQ, a
;t2 comes in and returns to maestro. But this is taken care of with cli in the call.

                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S1_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_CAS_req_rd_callback_done, TRUE
                        STI
                        jmp     ck_host_DOS_exit_c
;************************
;*  exit/null   2+0=2   *
;************************
dos_exit_cas_null:      mov     di, word ptr vcon_InDOS_flag_seg
                        mov     ES, di
                        mov     di, word ptr vcon_InDOS_flag_off
                        mov     ES:byte ptr [di], 00h
                        mov     byte ptr host_DOS_req_rd_callback_done, FALSE
                        mov     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_NULL
```

```
                        mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_NULL
;maestroh.asm change. check for host_DOS_fn. if close and upper byte non zero then submit
;filename to PTQ. filename will be nn.HPR.
                        mov     ax, word ptr host_DOS_request_fn
;maestrok.asm change
                        test    ah, 80h
                        jnz     print_call_2
                        test    ah, 40h
                        jnz     cas_call_2
                        jmp     ck_host_DOS_exit_nc
cas_call_2:             cmp     al, 0bh
                        je      inc_cas_call_count_2
                        cmp     al, 05h
                        jne     ck_host_DOS_exit_nc
inc_cas_call_count_2:   inc     word ptr host_initiated_send_fax_count

                        jmp     ck_host_DOS_exit_nc
print_call_2:           cmp     al, 0bh
;end maestrok.asm change
                        je      add_print_filename_to_ptq_2
                        cmp     al, 05h
                        jne     ck_host_DOS_exit_nc
;ll ADD FILENAME TO PRINTER TASK QUEUE (PTQ)
;maestroh.asm change. win95 does not really let you change the name of a file. we have to do it
;ourselves. CAT.CFG should have an entry that describes the name the user will give to his
;print files. cvboot should remember this name to be used here. catsync.vxd will also need this
;name. I do not know how we can pass the file name to catsync from cat.cfg. perhaps, catsync can
;read this file at some point. ie it can make a file call such as open cat.cfg and read its contents
;to find the name for print spool file name. meanwhile, I will assume that the file is called:
;               C:\CATBOX\PRINT\SPOOL\HALUK.PCL
;BUT, WE NEED TO CHANGE THE NAME OF THIS FILE LEST IT BE OVERWRITTEN.
add_print_filename_to_ptq_2:
                        mov     di, OFFSET printer_task_queue
;search for a free slot to place the filename in
add_filename_to_PTQ_2:
                        cmp     DS:byte ptr [di + PTICS_FREE_TO_USE_STATUS], PTICS_FREE_TO_USE
                        jne     check_next_entry_2
;here we change the name of the file.
                        push    di
                        mov     dx, OFFSET host_print_file_name
                        mov     di, OFFSET print_two_bit_filename
                        mov     ax, DS
                        mov     ES, ax
                        mov     ah, 56h
                        int     21h
                        pop     di
                        mov     DS:byte ptr [di + PTICS_FREE_TO_USE_STATUS], PTICS_NOT_FREE_TO_USE
                        mov     DS:byte ptr [di + PTICS_STATUS], PTICS_STATUS_IDLE
                        mov     DS:byte ptr [di + PTICS_HANDSHAKE], PTICS_HANDSHAKE_REQ_MADE
                        mov     DS:byte ptr [di + PTICS_SOURCE], PTICS_SOURCE_HOST_PC
                        add     di, PTICS_FILENAME
                        mov     ax, DS
                        mov     ES, ax
                        mov     si, OFFSET print_two_bit_filename
move_print_file_name_2:
                        movsb
                        cmp     DS:byte ptr [si], 00h
                        jne     move_print_file_name_2
                        movsb
;here we increment the new name for the file for next time
                        mov     si, OFFSET print_two_bit_filename
                        cmp     byte ptr [si + 17h], "9"
                        jne     file_name_not_9_2
                        mov     byte ptr [si + 17h], "0"
                        jmp     print_filename_increased_2
file_name_not_9_2:
                        inc     byte ptr [si + 17h]
print_filename_increased_2:
                        jmp     ck_host_DOS_exit_nc

check_next_entry_2:
                        add     di, PTQ_ENTRY_DELTA
                        cmp     di, OFFSET printer_task_queue_end
                        jne     add_filename_to_PTQ_2

                        jmp     ck_host_DOS_exit_nc
;************************
;*  null/exit   0+6=6   *
;************************
dos_null_cas_exit:      mov     byte ptr host_CAS_req_rd_callback_done, FALSE
                        mov     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_NULL
```

```
                        mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_NULL
                        jmp     ck_host_DOS_exit_nc
;************************
;*  exit/exit   2+6=8   *
;************************
dos_exit_cas_exit:      mov     di, word ptr vcon_InDOS_flag_seg
                        mov     ES, di
                        mov     di, word ptr vcon_InDOS_flag_off
                        mov     ES:byte ptr [di], 00h
                        mov     byte ptr host_DOS_req_rd_callback_done, FALSE
                        mov     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_NULL
                        mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_NULL
                        mov     byte ptr host_CAS_req_rd_callback_done, FALSE
                        mov     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_NULL
                        mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_NULL
;maestroh.asm change. check for host_DOS_fn. if close and upper byte non zero then submit
;filename to PTQ. filename will be nn.HPR.
                        mov     ax, word ptr host_DOS_request_fn
;maestrok.asm change
                        test    ah, 80h
                        jnz     print_call_8
                        test    ah, 40h
                        jnz     cas_call_8
                        jmp     ck_host_DOS_exit_nc
cas_call_8:             cmp     al, 0bh
                        je      inc_cas_call_count_8
                        cmp     al, 05h
                        jne     ck_host_DOS_exit_nc
inc_cas_call_count_8:   inc     word ptr host_initiated_send_fax_count

                        jmp     ck_host_DOS_exit_nc
print_call_8:           cmp     al, 0bh
;end maestrok.asm change
                        je      add_print_filename_to_ptq_8
                        cmp     al, 05h
                        jne     ck_host_DOS_exit_nc
;ll ADD FILENAME TO PRINTER TASK QUEUE (PTQ)
;maestroh.asm change. win95 does not really let you change the name of a file. we have to do it
;ourselves. CAT.CFG should have an entry that describes the name the user will give to his
;print files. cvboot should remember this name to be used here. catsync.vxd will also need this
;name. I do not know how we can pass the file name to catsync from cat.cfg. perhaps, catsync can
;read this file at some point. ie it can make a file call such as open cat.cfg and read its contents
;to find the name for print spool file name. meanwhile, I will assume that the file is called:
;               C:\CATBOX\PRINT\SPOOL\HALUK.PCL
;BUT, WE NEED TO CHANGE THE NAME OF THIS FILE LEST IT BE OVERWRITTEN.
add_print_filename_to_ptq_8:
                        mov     di, OFFSET printer_task_queue
;search for a free slot to place the filename in
add_filename_to_PTQ_8:
                        cmp     DS:byte ptr [di + PTICS_FREE_TO_USE_STATUS], PTICS_FREE_TO_USE
                        jne     check_next_entry_8
;here we change the name of the file.
                        push    di
                        mov     dx, OFFSET host_print_file_name
                        mov     di, OFFSET print_two_bit_filename
                        mov     ax, DS
                        mov     ES, ax
                        mov     ah, 56h
                        int     21h
                        pop     di
                        mov     DS:byte ptr [di + PTICS_FREE_TO_USE_STATUS], PTICS_NOT_FREE_TO_USE
                        mov     DS:byte ptr [di + PTICS_STATUS], PTICS_STATUS_IDLE
                        mov     DS:byte ptr [di + PTICS_HANDSHAKE], PTICS_HANDSHAKE_REQ_MADE
                        mov     DS:byte ptr [di + PTICS_SOURCE], PTICS_SOURCE_HOST_PC
                        add     di, PTICS_FILENAME
                        mov     ax, DS
                        mov     ES, ax
                        mov     si, OFFSET print_two_bit_filename
move_print_file_name_8:
                        movsb
                        cmp     DS:byte ptr [si], 00h
                        jne     move_print_file_name_8
                        movsb
;here we increment the new name for the file for next time
                        mov     si, OFFSET print_two_bit_filename
                        cmp     byte ptr [si + 17h], "9"
                        jne     file_name_not_9_8
                        mov     byte ptr [si + 17h], "0"
                        jmp     print_filename_increased_8
file_name_not_9_8:
                        inc     byte ptr [si + 17h]
```

```
print_filename_increased_8:
                        jmp     ck_host_DOS_exit_nc

check_next_entry_8:
                        add     di, PTQ_ENTRY_DELTA
                        cmp     di, OFFSET printer_task_queue_end
                        jne     add_filename_to_PTQ_8

                        jmp     ck_host_DOS_exit_nc
;************************
;*  enter/exit  1+6=7   *
;************************
dos_enter_cas_exit:     mov     byte ptr host_CAS_req_rd_callback_done, FALSE
                        mov     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_NULL
                        mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_NULL

                        cmp     word ptr mtq_running_ptr, 0000h
                        je      host_DOS_no_running_pgm_7
                        mov     bx, word ptr mtq_running_ptr
                        mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                        call    save_suspended_program
host_DOS_no_running_pgm_7:
                        mov     word ptr mtq_running_ptr, 0000h
;if a call_back was done then send "stall" msg. if cas was callback source, then this rd will take
;place. if dos was callback source, then this rd will not take place because it took place already.
                        mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                        mov     di, word ptr vcon_InDOS_flag_seg
                        mov     ES, di
                        mov     di, word ptr vcon_InDOS_flag_off
                        mov     ES:byte ptr [di], 01h
                        mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S4_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      ck_host_DOS_exit_c

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S4_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_DOS_req_rd_callback_done, TRUE
                        STI
                        jmp     ck_host_DOS_exit_c
;************************
;*  exit/enter  2+3=5   *
;************************
dos_exit_cas_enter:     mov     di, word ptr vcon_InDOS_flag_seg
                        mov     ES, di
                        mov     di, word ptr vcon_InDOS_flag_off
                        mov     ES:byte ptr [di], 00h
                        mov     byte ptr host_DOS_req_rd_callback_done, FALSE
                        mov     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_NULL
                        mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_NULL
;maestroh.asm change. check for host_DOS_fn. if close and upper byte non zero then submit
;filename to PTQ. filename will be nn.HPR.
                        mov     ax, word ptr host_DOS_request_fn
;maestrok.asm change
                        test    ah, 80h
                        jnz     print_call_5
                        test    ah, 40h
                        jnz     cas_call_5
                        jmp     cas_enter_5
cas_call_5:             cmp     al, 0bh
                        je      inc_cas_call_count_5
                        cmp     al, 05h
                        jne     cas_enter_5
inc_cas_call_count_5:   inc     word ptr host_initiated_send_fax_count

                        jmp     cas_enter_5
print_call_5:           cmp     al, 0bh
;end maestrok.asm change
                        je      add_print_filename_to_ptq_5
                        cmp     al, 05h
                        jne     cas_enter_5
;11 ADD FILENAME TO PRINTER TASK QUEUE (PTQ)
;maestroh.asm change. win95 does not really let you change the name of a file. we have to do it
```

```
;ourselves. CAT.CFG should have an entry that describes the name the user will give to his
;print files. cvboot should remember this name to be used here. catsync.vxd will also need this
;name. I do not know how we can pass the file name to catsync from cat.cfg. perhaps, catsync can
;read this file at some point. ie it can make a file call such as open cat.cfg and read its contents
;to find the name for print spool file name. meanwhile, I will assume that the file is called:
;               C:\CATBOX\PRINT\SPOOL\HALUK.PCL
;BUT, WE NEED TO CHANGE THE NAME OF THIS FILE LEST IT BE OVERWRITTEN.
add_print_filename_to_ptq_5:
                        mov     di, OFFSET printer_task_queue
;search for a free slot to place the filename in
add_filename_to_PTQ_5:
                        cmp     DS:byte ptr [di + PTICS_FREE_TO_USE_STATUS], PTICS_FREE_TO_USE
                        jne     check_next_entry_5
;here we change the name of the file.
                        push    di
                        mov     dx, OFFSET host_print_file_name
                        mov     di, OFFSET print_two_bit_filename
                        mov     ax, DS
                        mov     ES, ax
                        mov     ah, 56h
                        int     21h
                        pop     di
                        mov     DS:byte ptr [di + PTICS_FREE_TO_USE_STATUS], PTICS_NOT_FREE_TO_USE
                        mov     DS:byte ptr [di + PTICS_STATUS], PTICS_STATUS_IDLE
                        mov     DS:byte ptr [di + PTICS_HANDSHAKE], PTICS_HANDSHAKE_REQ_MADE
                        mov     DS:byte ptr [di + PTICS_SOURCE], PTICS_SOURCE_HOST_PC
                        add     di, PTICS_FILENAME
                        mov     ax, DS
                        mov     ES, ax
                        mov     si, OFFSET print_two_bit_filename
move_print_file_name_5:
                        movsb
                        cmp     DS:byte ptr [si], 00h
                        jne     move_print_file_name_5
                        movsb
;here we increment the new name for the file for next time
                        mov     si, OFFSET print_two_bit_filename
                        cmp     byte ptr [si + 17h], "9"
                        jne     file_name_not_9_5
                        mov     byte ptr [si + 17h], "0"
                        jmp     print_filename_increased_5
file_name_not_9_5:
                        inc     byte ptr [si + 17h]
print_filename_increased_5:
                        jmp     cas_enter_5

check_next_entry_5:
                        add     di, PTQ_ENTRY_DELTA
                        cmp     di, OFFSET printer_task_queue_end
                        jne     add_filename_to_PTQ_5

cas_enter_5:            cmp     word ptr mtq_running_ptr, 0000h
                        je      host_DOS_no_running_pgm_5
                        mov     bx, word ptr mtq_running_ptr
                        mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                        call    save_suspended_program
host_DOS_no_running_pgm_5:
                        mov     word ptr mtq_running_ptr, 0000h
;if a call_back was done then send "stall" msg. if dos was callback source, then this rd will take
;place. if cas was callback source, then this rd will not take place because it took place already.
                        mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_ENTER_ACK
                        mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S7_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      check_2f_wr_callback_5

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S7_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_CAS_req_rd_callback_done, TRUE
                        STI

                        nop
                        nop
```

```
;now that pre-read callback has executed, do a callback for write of int 2f.
check_2f_wr_callback_5: mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S1_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      ck_host_DOS_exit_c

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
;in longer words, when you do a callback, you do not want maestro to get control until after
;the call is done. a way to do this is to bracket the call in inc/dec InIRQ (as it is done in a real
;IRQ) so that maestro comes after the IRQ (so to speak). But, in this case, we do not even do R->CR
;because this does not end with iret to manipulate CR. There is a chance that after dec InIRQ, a
;t2 comes in and returns to maestro. But this is taken care of with cli in the call.

                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S1_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_CAS_req_rd_callback_done, TRUE
                        STI
                        jmp     ck_host_DOS_exit_c
;************************
;*  enter/enter 1+3=4   *
;************************
dos_enter_cas_enter:    cmp     word ptr mtq_running_ptr, 0000h
                        je      host_DOS_no_running_pgm_4
                        mov     bx, word ptr mtq_running_ptr
                        mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_SUSPENDED
                        call    save_suspended_program
host_DOS_no_running_pgm_4:
                        mov     word ptr mtq_running_ptr, 0000h
;if a call_back was done then send "stall" msg. if cas was callback source, then this rd will take
;place. if dos was callback source, then this rd will not take place because it took place already.
                        cmp     byte ptr host_CAS_req_rd_callback_done, TRUE
                        jne     a_callback_not_done_40
                        mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_STALL
                        jmp     callback_cont_40
a_callback_not_done_40: mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                        mov     di, word ptr vcon_InDOS_flag_seg
                        mov     ES, di
                        mov     di, word ptr vcon_InDOS_flag_off
                        mov     ES:byte ptr [di], 01h
callback_cont_40:       mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S4_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      cas_enter_4

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S4_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        cmp     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_ENTER_ACK
                        jne     skip_set_DOS_rd_callback_done
                        mov     byte ptr host_DOS_req_rd_callback_done, TRUE
skip_set_DOS_rd_callback_done:
                        STI
                        jmp     cas_enter_4

cas_enter_4:
;if a call_back was done then send "stall" msg. if dos was callback source, then this rd will take
;place. if cas was callback source, then this rd will not take place because it took place already.
                        cmp     byte ptr host_DOS_req_rd_callback_done, TRUE
                        jne     a_callback_not_done_41
                        mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_STALL
                        jmp     callback_cont_41
a_callback_not_done_41: mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_ENTER_ACK
callback_cont_41:       mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S7_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
```

```
                        je      check_2f_wr_callback_4

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S7_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        cmp     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_ENTER_ACK
                        jne     skip_set_CAS_rd_callback_done
                        mov     byte ptr host_CAS_req_rd_callback_done, TRUE
skip_set_CAS_rd_callback_done:
                        STI

                        nop
                        nop
;now that pre-read callback has executed, do a callback for write of int 2f.
check_2f_wr_callback_4: mov     bx, word ptr ASPI_Entry_seg
                        mov     ES, bx
                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S1_CALLBACK_OFF
                        cmp     ES:word ptr [di], 0
                        je      ck_host_DOS_exit_c

                        CLI                                     ; this is so, InIRQ can be raised
                        call    ES:dword ptr [di]               ; in a critical section so that
                                                                ; when maestro comes next, this call
                                                                ; is completed
;in longer words, when you do a callback, you do not want maestro to get control until after
;the call is done. a way to do this is to bracket the call in inc/dec InIRQ (as it is done in a real
;IRQ) so that maestro comes after the IRQ (so to speak). But, in this case, we do not even do R->CR
;because this does not end with iret to manipulate CR. There is a chance that after dec InIRQ, a
;t2 comes in and returns to maestro. But this is taken care of with cli in the call.

                        mov     di, word ptr ASPI_Entry_off
                        sub     di, MASPI_S1_CALLBACK_OFF
                        mov     ES:word ptr [di], 0
                        mov     ES:word ptr [di + 2], 0
                        mov     byte ptr host_CAS_req_rd_callback_done, TRUE
                        STI
                        jmp     ck_host_DOS_exit_c

ck_host_DOS_exit_c:
;enable scsi irq
        in      al, 0a1h
        and     al, 0f7h
        out     0a1h, al
                        stc
                        pop     bx
                        ret
ck_host_DOS_exit_nc:
;enable scsi irq
        in      al, 0a1h
        and     al, 0f7h
        out     0a1h, al
                        clc
                        pop     bx
                        ret

host_req_response_table dw  dos_null_cas_null       ; 0
                        dw  dos_enter_cas_null      ; 1
                        dw  dos_exit_cas_null       ; 2
                        dw  dos_null_cas_enter      ; 3
                        dw  dos_enter_cas_enter     ; 4
                        dw  dos_exit_cas_enter      ; 5
                        dw  dos_null_cas_exit       ; 6
                        dw  dos_enter_cas_exit      ; 7
                        dw  dos_exit_cas_exit       ; 8
check_host_DOS_request  endp

;*****************************************************************************************
;*                                                                                       *
;*   RESUME_PROGRAM                                                                      *
;*       ROUTINE RECOGNIZES RESUME FROM SUSPENDED OR RUNNING                             *
;*       FROM MTICS ENTRY                                                                *
;*       BX => MTICS TO BE LAUNCHED                                                      *
;*                                                                                       *
;*****************************************************************************************
maestro_resume: mov word ptr mtq_running_ptr, bx
```

```
                mov     byte ptr launch_complete, NO
                cmp     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_RUNNING
                jnz     maestro_pgm_suspended
;SR => R
;CATVOC0C-0. this was an error up to now. bx was corrupted 2 lines from now. so I was writing 01 to
;PSP:0. make it same as suspend case.
                mov     cx, bx
                mov     bx, word ptr Saved_PSP
                mov     ah, 50h
                int     21h

;CATVOC0C-0. this was an error up to now. bx was corrupted 2 lines from now. so I was writing 01 to
;PSP:0. make it same as suspend case.
                mov     bx, cx
                mov     dx, word ptr Saved_DTA_off
                mov     ax, word ptr Saved_DTA_seg
                PUSH    DS
                mov     ds, ax
                mov     ah, 1ah
                int     21h
                POP     DS

                mov     cx, word ptr Saved_CX
                mov     dx, word ptr Saved_DX
                mov     bp, word ptr Saved_BP
                mov     di, word ptr Saved_DI
                mov     si, word ptr Saved_SI
                mov     es, word ptr Saved_ES
                mov     fs, word ptr Saved_FS
                mov     gs, word ptr Saved_GS

;CATVOC0C-0
                cli
                mov     ax, word ptr Saved_CS
                mov     cs:word ptr res_pgm_addr_seg, ax
                mov     ax, word ptr Saved_IP
                mov     cs:word ptr res_pgm_addr_off, ax

                mov     byte ptr maestro_active, NO
                mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_RUNNING

                mov     ax, word ptr Saved_SS
                mov     bx, word ptr Saved_SP
                sub     bx, 0006h
                mov     SS, ax                                  ;implicit cli till after mov SP, bx
                mov     SP, bx

                cli
                mov     ax, word ptr Saved_FLAGS
                and     ax, 0fdffh
                PUSH    AX                                      ;borrowing the new stack for a bit
                POPF

                pop     bx
                pop     ax
                pop     ds
                sti
                jmp     cs:dword ptr res_pgm_addr_off

res_pgm_addr_off        dw      ?
res_pgm_addr_seg        dw      ?


maestro_pgm_suspended:
;MTICS => R
                mov     cx, bx
                mov     bx, word ptr [bx + MTICS_PGM_PSP]
                mov     ah, 50h
                int     21h

                mov     bx, cx
                mov     dx, word ptr [bx + MTICS_PGM_DTA_OFF]
                mov     ax, word ptr [bx + MTICS_PGM_DTA_SEG]
                PUSH    DS
                mov     ds, ax
                mov     ah, 1ah
                int     21h
                POP     DS


                mov     cx, word ptr [bx + MTICS_PGM_CX]
```

```
                mov     dx, word ptr [bx + MTICS_PGM_DX]
                mov     bp, word ptr [bx + MTICS_PGM_BP]
                mov     di, word ptr [bx + MTICS_PGM_DI]
                mov     si, word ptr [bx + MTICS_PGM_SI]
                mov     es, word ptr [bx + MTICS_PGM_ES]
                mov     fs, word ptr [bx + MTICS_PGM_FS]
                mov     gs, word ptr [bx + MTICS_PGM_GS]

;CATVOC0C-0
                cli
                mov     ax, word ptr [bx + MTICS_PGM_CS]
                mov     cs:word ptr sus_pgm_addr_seg, ax
                mov     ax, word ptr [bx + MTICS_PGM_IP]
                mov     cs:word ptr sus_pgm_addr_off, ax

                mov     byte ptr maestro_active, NO
                mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_RUNNING

                mov     ax, word ptr [bx + MTICS_PGM_SS]
                mov     bx, word ptr [bx + MTICS_PGM_SP]
                sub     bx, 0006h
                mov     SS, ax                                  ;implicit cli till after mov SP, bx
                mov     SP, bx

                cli
                mov     ax, word ptr [bx + MTICS_PGM_FLAGS]
                and     ax, 0fdffh
                PUSH    AX                                      ;borrowing the new stack for a bit
                POPF

                pop     bx
                pop     ax
                pop     ds
                sti
                jmp     cs:dword ptr sus_pgm_addr_off

sus_pgm_addr_off        dw      ?
sus_pgm_addr_seg        dw      ?

;*****************************************************************
;*                                                               *
;*       LAUNCH_PROGRAM                                          *
;*       BX => MTICS TO BE LAUNCHED                              *
;*                                                               *
;*****************************************************************
maestro_launch: mov     word ptr mtq_running_ptr, bx
                mov     byte ptr launch_complete, NO
;maestrob.asm change
                inc     word ptr job_number_word
                cmp     word ptr job_number_word, JOB_MAX_JOB_NUMBER
                jb      job_number_cont0
                mov     word ptr job_number_word, 0000H
job_number_cont0:
                mov     si, OFFSET job_number_buffer
                mov     cx, word ptr job_number_word
                mov     ax, JOB_ENTRY_DELTA
                mul     cx                              ;answer confined to ax as buffer of 1024B
                add     si, ax                          ;now si -> job entry
                mov     ax, word ptr job_number_word
                mov     word ptr [si + JOB_NUMBER], ax          ;trace buffer
                mov     word ptr [bx + MTICS_JOB_NUMBER], ax    ;maestro task queue
                mov     ax, word ptr timer_tick_count
                mov     word ptr [si + JOB_STARTING_T2], ax     ;trace buffer
                mov     word ptr [bx + MTICS_JOB_STARTING_T2], ax   ;maestro task queue
                mov     eax, dword ptr [bx + MTICS_PGM_NAME_DWORD_PTR]
                mov     dword ptr [si + JOB_PGM_NAME_OFF], eax
;end maestrob.asm change
;maestro5.asm change
                mov     ax, word ptr new_t2_in_maestro
                mov     word ptr old_t2_in_maestro, ax
;end maestro5.asm change
                mov     byte ptr [bx + MTICS_PGM_STATUS], MTICS_PGM_STATUS_RUNNING
                mov     word ptr [bx + MTICS_PGM_RUNNING_TIMER_TICKS], 0000H
;*****************************************************************
;*                                                               *
;*      BUILDING THE COMMAND TAIL                                *
;*      pgm_argument is moved from its location in the step      *
;*      table to the command tail. the zero is also moved. next, *
;*      pgm_parameter dword is moved. the string ends with 0d.   *
;*maestroa.asm change:                                           *
```

```
;*      if either pgm_argument_ptr or pgm_parameter = 00000000h *
;*      , then build the command tail accordingly.              *
;*                                                              *
;****************************************************************
;*                                                              *
;*  NOTE: BRKUPDCX.EXE EXPECTS 20H BETWEEN ITS TWO ARGUMENTS.   *
;*  MAESTRO CURRENTLY PROVIDES 00H. PRNFAX LAUNCHES BRKUPDCX    *
;*  MUST CHANGE MAESTRO WHEN SUCH PROGRAMS HAVE TO BE LAUNCHED  *
;*                                                              *
;****************************************************************
;maestroe.asm change. sp is moving the arg to MTICS so direct move here to command_tail.
                mov     si, bx
                add     si, MTICS_PGM_ARGUMENT
                PUSH    DS                                      ;really DS does not change
                mov     di, OFFSET maestro_command_tail + 2
                mov     cx, bx
                mov     bx, di                                  ;save start value
                mov     ax, SEG maestro_command_tail
                mov     ES, ax                                  ;es:di => maestro_command_tail
                cmp     DS:byte ptr [si], 0000h
                jz      no_pgm_argument
command_tail_loop:
                movsb
                cmp     DS:byte ptr [si], 00h
                jnz     command_tail_loop
                movsb                                           ;increments di. writes 00
no_pgm_argument:POP     DS
                mov     si, cx
                add     si, MTICS_PGM_PARAMETER_DWORD
                cmp     DS:dword ptr [si], 00000000h
                jz      no_pgm_parameter
                movsd
no_pgm_parameter:
                cmp     di, OFFSET maestro_command_tail + 2
                jne     non_trivial_command_tail
                dec     di                                      ;no blank if no tail
non_trivial_command_tail:
                mov     ES:byte ptr [di], 0dh
                inc     di
                sub     di, bx
                mov     ax, di
                sub     bx, 2                                   ;bx => maestro_command_tail
                mov     DS:byte ptr [bx], al                    ;min val al=0
                mov     bx, cx                                  ;bx => MTICS
                mov     dx, word ptr [bx + MTICS_PGM_NAME_DWORD_PTR]
                mov     ax, word ptr [bx + MTICS_PGM_NAME_DWORD_PTR + 2]
                mov     DS, ax
                mov     bx, OFFSET maestro_load_exec            ;es => cs already
                mov     ax, 4b00h
                cli
                mov     ES:byte ptr maestro_active, NO
                int     21h
                cli
                mov     ax, SEG maestro_active
launch_res:     mov     DS, ax
                mov     byte ptr launch_complete, YES
                mov     ax, word ptr Maestro_SP
                mov     SP, ax
                mov     ax, word ptr Maestro_SS
                mov     SS, ax
                jnc     launch_no_carry
                mov     byte ptr launch_complete_with_carry, YES
                sti
                jmp     maestro_loop
launch_no_carry:mov     byte ptr launch_complete_with_carry, NO
                sti
                jmp     maestro_loop
;*****************************************************************************************
;*                                                                                       *
;*       MAESTRO IDLE LOOP                                                               *
;*       WAITING FOR TIMER TICK TO COME                                                  *
;*                                                                                       *
;*****************************************************************************************
maestro_loop:   nop
                jmp     maestro_loop
;*****************************************************************************************
;*                                                                                       *
;*      SAVE_SUSPENDED_PROGRAM                                                           *
;*      BX = MTICS TO BE SUSPENDED                                                       *
;*                                                                                       *
;*****************************************************************************************
```


248

```
;CATVOC0C-0 this still works
save_suspended_program  proc
                push    si
                push    di
                push    ax
                push    es
                push    cx
                mov     si, OFFSET Saved_AX
;maestroa.asm change
                mov     di, bx
                add     di, MTICS_PGM_AX
;               mov     di, word ptr [bx + MTICS_PGM_AX]
;end maestroa.asm change
                mov     ax, DS
                mov     ES, ax
;maestroa.asm change
                mov     cx, MTICS_PGM_SS - MTICS_PGM_AX + 2
;               mov     cx, MTQ_ENTRY_DELTA
;end maestroa.asm change
                rep     movsb
                pop     cx
                pop     es
                pop     ax
                pop     di
                pop     si
                ret
save_suspended_program  endp

;*******************************************************
;*                                                     *
;*       STORE_TO_CLIENT_REGS                          *
;*                                                     *
;*******************************************************
store_to_Client_regs    proc
                mov     word ptr Client_AX, ax
                mov     word ptr Client_BX, bx
                mov     word ptr Client_CX, cx
                mov     word ptr Client_DX, dx
                mov     word ptr Client_BP, bp
;               mov     word ptr Client_SP, sp
                mov     word ptr Client_DI, di
                mov     word ptr Client_SI, si

                push    bp
                push    bx
                push    ax
                push    dx
                push    ds
                push    es

                mov     bx, ES
                mov     word ptr Client_ES, bx

;CATVOC0C-0 next 5 lines
                mov     bx, SS
                mov     word ptr Client_SS, bx

                mov     bx, SP
                add     bx, 0018h                       ;Client_SP=sp at irq or t2
                mov     word ptr Client_SP, bx

                mov     bx, FS
                mov     word ptr Client_FS, bx

                mov     bx, GS
                mov     word ptr Client_GS, bx

                mov     bp, SP  ;stack:  es, ds, dx, ax,    bx,bp,ip,DS,flags,ip,CS,flags

                mov     bx, word ptr [bp + 0eh]
                mov     word ptr Client_DS, bx

                mov     bx, word ptr [bp + 12h]
                mov     word ptr Client_IP, bx

                mov     bx, word ptr [bp + 14h]
                mov     word ptr Client_CS, bx

                mov     bx, word ptr [bp + 16h]
                mov     word ptr Client_FLAGS, bx
;maestro8.asm change. remove DTA etc related code to a separate procedure
```

```
                pop     es
                pop     ds
                pop     dx
                pop     ax
                pop     bx
                pop     bp

                ret
store_to_Client_regs    endp

;*********************************************************
;*                                                       *
;*      STORE DTA PSP TO CLIENT                          *
;*                                                       *
;*********************************************************
store_DTA_PSP_to_Client proc
                push    ax
                push    bx
                push    es

                mov     ah, 51h
                int     21h
                mov     word ptr Client_PSP, bx

                mov     ah, 2fh
                int     21h
                mov     word ptr Client_DTA_off, bx
                mov     word ptr Client_DTA_seg, es

                pop     es
                pop     bx
                pop     ax

                ret
store_DTA_PSP_to_Client endp

;*********************************************************
;*                                                       *
;*      RESTORE DTA PSP FM CLIENT                        *
;*                                                       *
;*********************************************************
restore_DTA_PSP_fm_Client proc
                push    ax
                push    bx
                push    dx

                mov     bx, word ptr Client_PSP
                mov     ah, 50h
                int     21h

                mov     dx, word ptr Client_DTA_off
                mov     ax, word ptr Client_DTA_seg
                PUSH    DS
                mov     ds, ax
                mov     ah, 1ah
                int     21h
                POP     DS

                pop     dx
                pop     bx
                pop     ax

                  ret
restore_DTA_PSP_fm_Client endp

;*********************************************************
;*                                                       *
;*      RESTORE_FM_CLIENT_REGS                           *
;*                                                       *
;*********************************************************
;ss:sp is a problem to restore and yet there is a solution:
;there are two cases: Pgm A irq Pgm A (non t2 irq)
;                     Pgm A t2  Maestro or a variant thereof,
;                     Pgm A irq t2 irq Maestro
;in the first case, ss:sp does not change. This is the agreement
;an irq makes else iret does not make sense. Thus, no sense in
;storing or restoring it. BUT WE STILL HAVE TO STORE IT BECAUSE
;CR => SR => MTICS AND USED WHEN MAESTRO JUMPS TO PROGRAM.
;in the second case, Maestro will restore ss:sp to its own values
;from MR => CR ie it can read them from the CR
```

```
;ss:sp is not restored here. Maestro has to do it.
;CR:    Client Register Set
;R:     Actual Register Set
;MR:    Maestro Register Set
;SR:    Saved Register Set
restore_fm_Client_regs  proc
                mov     ax, word ptr Client_AX
                mov     bx, word ptr Client_BX
                mov     cx, word ptr Client_CX
                mov     dx, word ptr Client_DX
                mov     bp, word ptr Client_BP
                mov     di, word ptr Client_DI
                mov     si, word ptr Client_SI

                push    bp
                push    bx
                push    ax
                push    dx
                push    ds
                push    es

                mov     bx, word ptr Client_ES
                mov     ES, bx

                mov     bx, word ptr Client_FS
                mov     FS, bx

                mov     bx, word ptr Client_GS
                mov     GS, bx

                mov     bp, SP  ;stack: bx,bp,ip,DS,flags,ip,CS,flags

                mov     bx, word ptr Client_DS
                mov     word ptr [bp + 0eh], bx

                mov     bx, word ptr Client_IP
                mov     word ptr [bp + 12h], bx

                mov     bx, word ptr Client_CS
                mov     word ptr [bp + 14h], bx

                mov     bx, word ptr Client_FLAGS
                mov     word ptr [bp + 16h], bx

                pop     es
                pop     ds
                pop     dx
                pop     ax
                pop     bx
                pop     bp

                ret
restore_fm_Client_regs  endp

;*******************************************************
;*                                                     *
;*       SWITCH_TO_MAESTRO                             *
;*                                                     *
;*******************************************************
;       CR => SR
;       MR => CR
;MR is defined during install. It refers to the beginning of
;maestro.
switch_to_Maestro       proc
;maestro3.asm change:   push pop ax
                push    ax

                mov     ax, word ptr Client_AX
                mov     word ptr Saved_AX, ax
;CATVOC0C-0 the next 2 lines removed
;               mov     ax, word ptr Maestro_AX
;               mov     word ptr Client_AX, ax

                mov     ax, word ptr Client_BX
                mov     word ptr Saved_BX, ax
;CATVOC0C-0 the next 2 lines removed
;               mov     ax, word ptr Maestro_BX
;               mov     word ptr Client_BX, ax

                mov     ax, word ptr Client_CX
                mov     word ptr Saved_CX, ax
```

```
                mov     ax, word ptr Maestro_CX
                mov     word ptr Client_CX, ax

                mov     ax, word ptr Client_DX
                mov     word ptr Saved_DX, ax
                mov     ax, word ptr Maestro_DX
                mov     word ptr Client_DX, ax

                mov     ax, word ptr Client_DS
                mov     word ptr Saved_DS, ax
;CATVOC0C-0 the next 2 lines removed
;               mov     ax, word ptr Maestro_DS
;               mov     word ptr Client_DS, ax

                mov     ax, word ptr Client_ES
                mov     word ptr Saved_ES, ax
                mov     ax, word ptr Maestro_ES
                mov     word ptr Client_ES, ax

                mov     ax, word ptr Client_FS
                mov     word ptr Saved_FS, ax
                mov     ax, word ptr Maestro_FS
                mov     word ptr Client_FS, ax

                mov     ax, word ptr Client_GS
                mov     word ptr Saved_GS, ax
                mov     ax, word ptr Maestro_GS
                mov     word ptr Client_GS, ax

                mov     ax, word ptr Client_BP
                mov     word ptr Saved_BP, ax
                mov     ax, word ptr Maestro_BP
                mov     word ptr Client_BP, ax

                mov     ax, word ptr Client_DI
                mov     word ptr Saved_DI, ax
                mov     ax, word ptr Maestro_DI
                mov     word ptr Client_DI, ax

                mov     ax, word ptr Client_SI
                mov     word ptr Saved_SI, ax
                mov     ax, word ptr Maestro_SI
                mov     word ptr Client_SI, ax

                mov     ax, word ptr Client_CS
                mov     word ptr Saved_CS, ax
                mov     ax, word ptr Maestro_CS
                mov     word ptr Client_CS, ax

                mov     ax, word ptr Client_IP
                mov     word ptr Saved_IP, ax
                mov     ax, word ptr Maestro_IP
                mov     word ptr Client_IP, ax

                mov     ax, word ptr Client_FLAGS
                mov     word ptr Saved_FLAGS, ax
                mov     ax, word ptr Maestro_FLAGS
                mov     word ptr Client_FLAGS, ax

                mov     ax, word ptr Client_PSP
                mov     word ptr Saved_PSP, ax
                mov     ax, word ptr Maestro_PSP
                mov     word ptr Client_PSP, ax

                mov     ax, word ptr Client_DTA_off
                mov     word ptr Saved_DTA_off, ax
                mov     ax, word ptr Maestro_DTA_off
                mov     word ptr Client_DTA_off, ax

                mov     ax, word ptr Client_DTA_seg
                mov     word ptr Saved_DTA_seg, ax
                mov     ax, word ptr Maestro_DTA_seg
                mov     word ptr Client_DTA_seg, ax
;CATVOC0C-0 the next 8 lines
                mov     ax, word ptr Client_SS
                mov     word ptr Saved_SS, ax
                mov     ax, word ptr Maestro_SS         ;restore will not restore Client_SS
                mov     word ptr Client_SS, ax          ;we do this anyway

                mov     ax, word ptr Client_SP
                mov     word ptr Saved_SP, ax
```


252

```
                mov     ax, word ptr Maestro_SP         ;restore will not restore Client_SP
                mov     word ptr Client_SP, ax          ;we do this anyway

                pop ax

                        ret
switch_to_Maestro       endp

END
```


253

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;cvboot07.asm <- cvboot06.asm. 10/12/95. place two TTQ entries for print incoming fax
;ribbon and send host fax ribbon. also init modem_data.INCOMING_FAX=NO
;cvboot06.asm <- cvboot05.asm. 10/3/95. add host_CAS_request_off/seg initializing.
;cvboot05.asm <- cvboot04.asm. 9/21/95. remove sys_data structure.
;cvboot04.asm <- cvboot03.asm. 9/18/95. add PTQ related stuff. see print0.txt.
;cvboot03.asm <- cvboot02.asm. 8/25/95. add client_regs_off/seg_ptr for maspi/scsiiss. catvoc12.
;also do the irq vector for scsi during cvboot.
;cvboot02.asm <- cvboot00.asm. 8/7/95. start connecting to the scsi subsystem.
;cvboot00.asm <- instal0b.asm. 6/25/95. change of name.
;instal0b.asm <- instal0a.asm. 6/12/95. catvoc1. add reading of cat.cfg
;instal0a.asm <- instal09.asm. 6/7/95. add modem_mode. must remove modem_state gradually.
;instal09.asm <- instal08.asm. 6/3/95. change .inc as TCB size changed.
;instal08.asm <- instal07.asm. 6/3/95. catvoch. else no changes.
;instal07.asm <- instal06.asm. 5/18/95. job history. in this module just equ version change
;FIX TO THE MISSING SECONDS AND LOOPING IN 8 BIT PCM (AND OTHER BITS PER SAMPLE)
;[VCON_CTSXON] byte gets set by CASMODEM. If CATVOICE takes over from CASMODEM, then its value
;gets set accordingly. In the current step tables, I start directly in CATVOICE so that this
;variable does not acquire a value. It has to be =1 because modem is using XON/XOFF.
;instal06.asm <- instal05.asm. 5/11/95. 5-95-80. multitasking.
;instal05.asm <- instal04.asm. 5/5/95. catvoc06.
;CATVOC0B-4: restore maestro stack after launch complete.
;instal04.asm <- instal03.asm. 5/4/95. add reset for start_program_state_counter
;INSTAL03.ASM <- INSTAL02.ASM. 5/2/95. maestro_PSP -> Maestro_PSP.
;instal01.asm <- instal00.asm. 4/27/95. correct segment for mem allocate.
;CATVOC0B-2. \goodcv06\catequ02.inc -> \goodcv07\catequ03.inc
INCLUDE CATEQU0E.INC
.MODEL  COMPACT
.386P
;sys data
                extrn   Maestro_PSP:far                 ;near
                extrn   next_tcb_st_seg:far             ;near
                extrn   maestro_active:far              ;near
                extrn   maestro_count:far               ;near
                extrn   TIMER_TICK_BUSY:far             ;near
                extrn   timer_tick_count:far            ;near
                extrn   timer_tick_count_all:far        ;near
                extrn   timer_tick_tail_end_count:far   ;near
                extrn   modems_tcb_st_seg_table:far     ;near
                extrn   irq_03_buffer:far               ;near
                extrn   irq_03_buf_ptr:far              ;near
                extrn   vcon_InDOS_flag_seg:far         ;near
                extrn   vcon_InDOS_flag_off:far         ;near

                extrn   Maestro_AX:far                  ;near
                extrn   Maestro_BX:far                  ;near
                extrn   Maestro_CX:far                  ;near
                extrn   Maestro_DX:far                  ;near
                extrn   Maestro_BP:far                  ;near
                extrn   Maestro_DI:far                  ;near
                extrn   Maestro_SI:far                  ;near
                extrn   Maestro_DS:far                  ;near
                extrn   Maestro_IP:far                  ;near
                extrn   Maestro_ES:far                  ;near
                extrn   Maestro_CS:far                  ;near
                extrn   Maestro_FS:far                  ;near
                extrn   Maestro_GS:far                  ;near
                extrn   Maestro_FLAGS:far               ;near

                extrn   Maestro_SP:far                  ;near
                extrn   Maestro_SS:far                  ;near

                extrn   maestro_task_queue:far          ;near
                extrn   mtq_running_ptr:far             ;near
                extrn   Maestro_DTA_off:far             ;near
                extrn   Maestro_DTA_seg:far             ;near

                extrn   catsteps_0:far                  ;near
                extrn   catsteps_1:far                  ;near
                extrn   catsteps_2:far                  ;near
                extrn   catsteps_3:far                  ;near
                extrn   catsteps_4:far                  ;near
                extrn   cat_cfg:far                     ;near
                extrn   cat_cfg_file_handle:far         ;near
                extrn   cat_cfg_buffer:far              ;near

                extrn   smax_usable_cylinder:far        ;near
                extrn   smax_usable_head:far            ;near
                extrn   smax_usable_sector:far          ;near
                extrn   hdc_cylinders:far               ;near
```

```
                extrn   st_modem:far                    ;near
                extrn   c_disk_column:far               ;near
                extrn   cfg_password:far
                extrn   user_password:far
                extrn   LCD_BUSY:far

                extrn   tmaestro_task_queue:far
                extrn   tmaestro_task_queue_end:far

                extrn   email_script_file:far
                extrn   SCSIMgrString:far
                extrn   ASPI_Entry_off:far
                extrn   ASPI_Entry_seg:far
                extrn   host_DOS_request_type:far
                extrn   host_DOS_request_resp:far
                extrn   host_CAS_request_type:far
                extrn   host_CAS_request_resp:far
                extrn   In_IRQ:far

                extrn   ttq_fgprint_ptr:far
                extrn   ttq_send_host_fax_ptr:far
                extrn   ttq_print_in_fax_ptr:far

                extrn   Client_AX:far

                extrn   new_irq00_off:near              ;CS in ACTION.ASM
                extrn   new_irq03_off:near              ;CS
                extrn   new_irq05_off:near              ;CS
                extrn   new_int28_off:near              ;CS
                extrn   new_int13_off:near              ;CS
                extrn   new_int15_off:near              ;CS

                extrn   fake_data_org:far               ;fakedata
                extrn   loc1fc0:far

                extrn   maestro_begin:near              ;CS MAESTRO.ASM

                extrn   lcd_processing:near

                public  dos_irq00_off
                public  dos_int13_off
                public  dos_int28_off
                public  dos_int15_off

                public  match_string

.STACK
.CODE
;4/21/95. tcb related changes.
;*************************************************************************
;*                                                                       *
;*      INSTALL.ASM                                                      *
;*      COPYRIGHT 3TAU 1995                                              *
;*      WRITTEN BY HALUK M. AYTAC                                        *
;*                                                                       *
;*************************************************************************

;***************************************************************
;*                                                             *
;*      STORE PSP. SET DS = MAESTRO_PSP. DELETE FAKE DATA AREA *
;*                                                             *
;***************************************************************
install:        mov     dx, ds                                  ;PSP
                mov     ax, SEG Maestro_PSP
                ASSUME  DS:SEG Maestro_AX
                mov     ds, ax                                  ;near data
                mov     DS:word ptr maestro_PSP, dx
                mov     bx, SEG fake_data_org                   ;far data
                mov     DS:word ptr next_tcb_st_seg, bx         ;note next SEG for TCB,ST.
                sub     bx, dx                                  ;new size in paragraphs
                mov     es, dx
                mov     ah, 4ah
                int     21h
;***************************************************************
;*                                                             *
;*      MAESTRO_ACTIVE=YES                                     *
;*      TO PREVENT IRQ00 FROM SWITCH TO MAESTRO BEFORE         *
;*      END OF INSTALL                                         *
;*                                                             *
;***************************************************************
```

```
                mov     DS:byte ptr maestro_active, YES                 ;so that irq00 code does not switch to
maestro.
;*****************************************************************
;*                                                               *
;*      OPEN AND READ C:\CATBOX\CAT.CFG AND STORE CATSTEPS INTO  *
;*      MEMORY LOCATIONS IN NRDATA                               *
;*                                                               *
;*****************************************************************
                mov     dx, OFFSET cat_cfg                      ;loc of c:\catbox\cat.cfg
                mov     ax, 3d00h                               ;open read only
                int     21h
                mov     word ptr cat_cfg_file_handle, ax
                mov     bx, word ptr cat_cfg_file_handle
                mov     cx, 0400h                               ;1K bytes
                mov     dx, OFFSET cat_cfg_buffer
                mov     ah, 3fh
                int     21h
;now read buffer contents and place filenames into catsteps_n for each modem. it could be that some
;modems do not have a step table. the modem may be there but not the step table. we just need to tell
;the user that there should be an entry in the cat.cfg file. we should have a null step table in the
;catsteps directory. cat.cfg should at least have that entry. nullstep.bin
                mov     cx, 0
                mov     bx, OFFSET catsteps_0
                mov     di, bx
                mov     ax, SEG catsteps_0
                mov     ES, ax
                mov     si, OFFSET cat_cfg_buffer
                mov     dx, si
                add     dx, 0400H

get_step_file_name:
                push    bx
                push    di
                mov     di, OFFSET st_modem
                mov     bx, si
                call    match_string
                cmp     bx, si
                je      get_step_file_name_done
                mov     bx, si
                mov     di, OFFSET c_disk_column
                call    match_string
                cmp     bx, si
                je      get_step_file_name_done
                sub     si, 2
                pop     di
                pop     bx

move_file_name: movsb
                cmp     byte ptr [si], 0dh
                jne     move_file_name
                inc     si
                mov     ES:byte ptr [di], 00h
                add     bx, 64
                mov     di, bx
                inc     cx
                cmp     cx, 5
                je      get_step_file_name_done
                jmp     get_step_file_name


;takes si, di(pattern). returns si right after the matched string.
;in this case, we assume that the data segment is the same for both strings
;and it is the system data segment. dx is end of string search. if no match
;until the end (dx), then original si is returned.
match_string    proc
                push    cx
                push    bx
                push    ax
                mov     cx, si
                mov     bx, di
                dec     si
                dec     di
restart_matching:
                inc     di
                mov     al, byte ptr [di]
look_for_match_for_char:
                inc     si
                cmp     si, dx
                je      end_match_pattern_fail
                cmp     byte ptr [si], al
                jne     look_for_match_for_char
```

```
keep_matching_pattern:
                inc     di
                mov     al, byte ptr [di]
                inc     si
                cmp     byte ptr [si], al
                je      keep_matching_pattern
                cmp     al, 00H
                je      end_match_pattern_pass
                dec     si
                mov     di, bx
                dec     di
                jmp     restart_matching
end_match_pattern_fail:
                mov     si, cx
end_match_pattern_pass:
                mov     di, bx
                pop     ax
                pop     bx
                pop     cx
                ret
match_string    endp

get_step_file_name_done:
;close cat.cfg
                mov     bx, word ptr cat_cfg_file_handle
                mov     ah, 3eh
                int     21h

;=========================================================================
;*                                                                       *
;*          FIND THE PASSWORD IN CAT_CFG_BUFFER                          *
;*                                                                       *
;=========================================================================
                mov     di, OFFSET cfg_password
                mov     si, OFFSET cat_cfg_buffer
                mov     bx, si
                call    match_string
                cmp     bx, si
                mov     di, OFFSET user_password
                je      NO_PASSWORD
check_for_blanks:
                cmp     byte ptr [si], 20h
                jne     copy_password
                inc     si
                jmp     check_for_blanks

copy_password:  movsb
                cmp     byte ptr [si], 0dh
                jne     copy_password
NO_PASSWORD:    mov     byte ptr [di], 00h


;************************************************************************
;*                                                                      *
;*      LOCATE MODEMS                                                   *
;*      MODEM_1 AT      2E8     IRQ09           INT 2F AH=CB C0         *
;*      MODEM_2 AT      3E8     IRQ10           INT 2F AH=CC C1         *
;*      MODEM_3 AT      2E0     IRQ11           INT 2F AH=CD C2         *
;*      MODEM_4 AT      3E0     IRQ12           INT 2F AH=CE C3         *
;*                                                                      *
;*      LOAD IN AUTOEXEC.BAT IN THE FOLLOWING ORDER:                    *
;*      CASMODEM CAS_4.CFG                                              *
;*      CASMODEM CAS_3.CFG                                              *
;*      CASMODEM CAS_2.CFG                                              *
;*      CASMODEM CAS_1.CFG                                              *
;*                                                                      *
;*      FOR 1 MODEM MODEL, CAS_1 ETC.                                   *
;*                                                                      *
;************************************************************************
;now that this modem is at hand, allocate memory for TCB and bring in the ST.
;to bring in the correct ST, must read C:\CATBOX\CAT.CFG. to allocate the
;correct size for TCB, must know its end. TCB is defined as EQUs. The last
;EQU could be TCB_SIZE. Finally, the segment numbers for TCB and ST must be
;loaded to ds: memory.
;NOTE: IT MAY BE BETTER TO CHECK CAT.CFG FIRST. BECAUSE YOU COULD HAVE AN INDICATION
;THERE THAT A CERTAIN MODEM WILL NOT EVEN BE USED.
;NOTE: BEFORE THIS INSTALL PROGRAM, AUTOEXEC.BAT LOADED ALL FOR CASMODEMS WITH
;STATEMENTS SUCH AS THESE:
;       CASMODEM MODEM_1.CFG    note: loadcas.bat => contains these 4 lines
;       CASMODEM MODEM_2.CFG          to minimize chances of user fooling around with
;       CASMODEM MODEM_3.CFG          CaTbox autoexec.
```

```
;       CASMODEM MODEM_4.CFG
;&&&&&&****** NEED CODE IN BETWEEN THESE TO STORE IRQ00 HOOK VECTOR TO MASPI DATA AREA.
;THERE IS NO OTHER WAY TO EXTRACT IRQ00 VECTOR INFO ONCE CASMODEMS PILE UP.
;SOME OF THESE WILL NOT LOAD AS THERE IS NO MODEM. SOME WILL LOAD AS THERE IS A
;MODEM. IT MAY BE THAT CAT.CFG WILL NOT LOAD AN ST TO THAT MODEM. DO WE REMOVE THE
;CASMODEM FOR THAT MODEM? I WOULD SAY THAT WE SHOULD GIVE THE CHOICE TO THE USER.
;
;THUS,
; 1. CHECK CAT.CFG. FOR ALL MODEMS THAT ARE NOT ASSOCIATED WITH AN ST, REMOVE THE
;    CASMODEM.
;HERE ARE THE HANDLES THE USER HAS:
;       HE CAN EDIT AUTOEXEC.BAT AND SPECIFY CASMODEM'S FOR AS MANY PORTS AS HE WISHES.
;       THESE CASMODEMS WILL INSTALL IF THERE ARE GOOD MODEMS AT THESE LOCATIONS.
;       INSTALL FOR CATVOICE ALSO CHECKS FOR MODEMS. IF THERE IS A MODEM AND IF CAT.CFG
;       HAS AN ST ENTRY FOR THE MODEM, THEN CATVOICE WILL INSTALL TCB AND ST.
;THIS WAY, WE CAN HAVE A SITUATION WHERE THERE IS A CASMODEM BUT NO TCB/ST (NO ENTRY IN CAT.CFG)
;WE CAN ALSO HAVE A SITUATION WHERE THERE IS NO CASMODEM (NOT IN AUTOEXEC.BAT) BUT THERE
;IS A TCB/ST (THERE IS AN ENTRY IN CAT.CFG AND THERE IS A MODEM).
;
;HAVING SAID THAT IT IS POSSIBLE TO BE THIS FLEXIBLE, I WOULD LIKE TO REDUCE THE CASES TO:
;       EITHER THERE IS A MODEM AND THEN THERE IS A CASMODEM + TCB + ST.
;       OR THERE IS NO MODEM AND NOTHING.
;WHAT IF THE CAT.CFG DOES NOT SPECIFY AN ST? THEN WE INSTALL A STANDARD ST.
;
;THUS, AUTOEXEC HAS ALL FOUR CASMODEM STATEMENTS. AND SOME WILL NOT LOAD IF NO MODEM.
;INSTALL FOR CATVOICE WILL CHECK FOR CASMODEM PRESENCE AND LOAD TCB = ST ACCORDING TO CAT.CFG
;AND IF NO CAT.CFG, THEN IT WILL LOAD A STANDARD ST.
;
;SEE 4-95-92.
;*****************************************************************
;*                                                               *
;*      ALLOCATE MEMORY FOR TCB AND ST FOR MODEM_1               *
;*      TCB: TRANSACTION CONTROL BLOCK                           *
;*      ST: STEP TABLE                                           *
;*                                                               *
;*****************************************************************
;*CHECK FOR MODEM_1. MAKE AN INT 2F AH=CB00 CALL. see 4-95-92.
check_for_modem_1:
                mov     ax, 0cb00h
                int     2fh
                cmp     al, 0ffh
                jnz     check_for_modem_2
;ALLOCATE FOR TCB_1
; 1. load segment address to DS: area
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB], cx        ;TCB seg loaded
; 2. compute size of addition, update next segment variable
                mov     bx, TCB_SIZE
                shr     bx, 4                                                 ;get paragraphs
                add     bx, 1                                                 ;add in case of rem
                add     DS:word ptr next_tcb_st_seg, bx
; 3. find new program size in paragraphs and allocate memory
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
                mov     es, ax
                mov     ah, 4ah                                 ;allocate for TCB_1
                int     21h
;ALLOCATE FOR STEP TABLE
; 1. load segment address to DS: area
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_1 + MODEM_ST], cx
; 2. find file and locate its size.
                mov     cx, 0001h                               ;read only
                mov     dx, OFFSET catsteps_1
                mov     ah, 4eh
                int     21h                                     ;FILEINFO in DTA
                push    ds
                mov     dx, DS:word ptr maestro_PSP             ;DS = PSP
                mov     ds, dx
                mov     bx, 009ah                               ;location of filesize in PSP
                mov     eax, DS:dword ptr [bx]                  ;bx=filesize in bytes in dword
                mov     cx, ax                                  ;save for READ. assume size < 64K
; 3. compute size of addition, update next segment variable
                shr     eax, 4                                  ;filesize in paragraphs
                add     eax, 1                                  ;add in case of rem
                pop     ds                                      ;DS = Maestro_PSP
                add     DS:word ptr next_tcb_st_seg, ax         ;assume step table size < 4 * 64K
; 4. find new program size in paragraphs and allocate memory
```

```
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
                mov     es, ax
                mov     ah, 4ah                                 ;allocate for ST_1
                int     21h
; 5. open file and read its contents to allocated area and then close file
                mov     dx, OFFSET catsteps_1
                mov     ax, 3d00h                                ;open read only
                int     21h
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_ST]
                mov     di, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                push    ds
;cvboot00.asm change. write sys_data_seg_number to step table offset 6.
                mov     si, ds
;end of this segment of change
                mov     ds, dx                                  ;DS = ST_0 SEG
                mov     dx, 0000h
                mov     bx, ax                                  ;file handle
                mov     ah, 3fh                                 ;cx from above
                int     21h                                     ;read ST to ST_1 SEG
                mov     ah, 3eh
                int     21h
;cvboot00.asm change
                mov     bx, OFFSET_TO_SYS_DATA_SEG_NUMBER
                mov     ds:word ptr [bx], si
;end of cvboot00.asm change
;cvboot00.asm change. write SEG number to step table offset 2.
                mov     bx, OFFSET_TO_ST_SEG_NUMBER
                mov     ax, ds
                mov     ds:word ptr [bx], ax
                mov     bx, OFFSET_TO_TCB_SEG_NUMBER
                mov     ds:word ptr [bx], di
;cvboot00.asm change. 7/19/95. add modem number to ST
                mov     bx, OFFSET_TO_MODEM_NUMBER
                mov     ds:word ptr [bx], 3130H                 ;ie db "01"
;cvboot00.asm change. store user_password into step table password area.
                mov     di, DS:word ptr [ST_SESS_PARAMS_PTR_ADDR]
                add     di, ST_SESS_PARAMS_PASSWORD
                mov     ax, DS
                mov     ES, ax

                pop     ds                                      ;DS = sys data area

                mov     si, OFFSET user_password
move_password_to_st1:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_password_to_st1


;****************************************************************
;*                                                              *
;*      ALLOCATE MEMORY FOR TCB AND ST FOR MODEM_2              *
;*      TCB: TRANSACTION CONTROL BLOCK                          *
;*      ST: STEP TABLE                                          *
;*                                                              *
;****************************************************************
;*CHECK FOR MODEM_2. MAKE AN INT 2F AH=CC00 CALL. see 4-95-92.
check_for_modem_2:
                mov     ax, 0cc00h
                int     2fh
                cmp     al, 0ffh
                jnz     check_for_modem_3
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB], cx        ;TCB seg loaded
                mov     bx, TCB_SIZE
                shr     bx, 4                                                 ;get paragraphs
                add     bx, 1                                                 ;add in case of rem
                add     DS:word ptr next_tcb_st_seg, bx
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
                mov     es, ax
                mov     ah, 4ah                                 ;allocate for TCB_2
                int     21h

;****************************************************************
;*                                                              *
```

```
;*      ALLOCATE MEMORY FOR TCB AND ST FOR MODEM_3                *
;*      TCB: TRANSACTION CONTROL BLOCK                            *
;*      ST: STEP TABLE                                            *
;*                                                                *
;******************************************************************
;*CHECK FOR MODEM_3. MAKE AN INT 2F AH=CD00 CALL. see 4-95-92.
check_for_modem_3:
                mov     ax, 0cd00h
                int     2fh
                cmp     al, 0ffh
                jnz     check_for_modem_4
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB], cx        ;TCB seg loaded
                mov     bx, TCB_SIZE
                shr     bx, 4                                                 ;get paragraphs
                add     bx, 1                                                 ;add in case of rem
                add     DS:word ptr next_tcb_st_seg, bx
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
                mov     es, ax
                mov     ah, 4ah                                   ;allocate for TCB_3
                int     21h

;******************************************************************
;*                                                                *
;*      ALLOCATE MEMORY FOR TCB AND ST FOR MODEM_4                *
;*      TCB: TRANSACTION CONTROL BLOCK                            *
;*      ST: STEP TABLE                                            *
;*                                                                *
;******************************************************************
;*CHECK FOR MODEM_4. MAKE AN INT 2F AH=CD00 CALL. see 4-95-92.
check_for_modem_4:
                mov     ax, 0ce00h
                int     2fh
                cmp     al, 0ffh
                jnz     check_for_modem_0
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB], cx        ;TCB seg loaded
                mov     bx, TCB_SIZE
                shr     bx, 4                                                 ;get paragraphs
                add     bx, 1                                                 ;add in case of rem
                add     DS:word ptr next_tcb_st_seg, bx
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
                mov     es, ax
                mov     ah, 4ah                                   ;allocate for TCB_4
                int     21h

;******************************************************************
;*                                                                *
;*      ALLOCATE MEMORY FOR TCB AND ST FOR MODEM_0                *
;*      TCB: TRANSACTION CONTROL BLOCK                            *
;*      ST: STEP TABLE                                            *
;*                                                                *
;******************************************************************
check_for_modem_0:
;MODEM 0 IS DRIVEN BY THE KEYPAD. IT HAS ITS OWN IRQ03. DTMF DOES NOT COME FROM THE IRQ03.
;ACTUALLY MODEM 0 CAN BE DRIVEN BY EITHER HANDSET OR KEYPAD. IF HANDSET THEN DTMF DOES COME.
;I NEED A WAY OF IDENTIFYING KEYPAD VS HANDSET.. IF KEYPAD, DTMF GETS WRITTEN TO THE
;VCON_CUR_STEP_DTMF VARIABLE. OR PERHAPS TO THE IRQ03_DLE_NUMBER_BIFFER DIRECTLY. ACTIONS THEN
;READ IT FROM THERE. RESET STARTS WITH KEYPAD. KEYPAD SEQUENCE SWITCHES TO HANDSET. ONCE HANDSET
;HANDS UP, THEN MODEM 0 REVERTS TO KEYPAD.
;*CHECK FOR MODEM_0. MODEM_0 IS ALWAYS THERE.
;ALLOCATE FOR TCB_0
; 1. load segment address to DS: area
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB], cx        ;TCB seg loaded
; 2. compute size of addition, update next segment variable
                mov     bx, TCB_SIZE
                shr     bx, 4                                                 ;get paragraphs
                add     bx, 1                                                 ;add in case of rem
                add     DS:word ptr next_tcb_st_seg, bx
; 3. find new program size in paragraphs and allocate memory
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
```

```
                mov     es, ax
                mov     ah, 4ah                                 ;allocate for TCB_0
                int     21h
;ALLOCATE FOR STEP TABLE
; 1. load segment address to DS: area
                mov     cx, DS:word ptr next_tcb_st_seg
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     DS:word ptr [bx + 4 * MODEM_0 + MODEM_ST], cx
; 2. find file and locate its size.
                mov     cx, 0001h                               ;read only
                mov     dx, OFFSET catsteps_0
                mov     ah, 4eh
                int     21h                                     ;FILEINFO in DTA
                push    ds
                mov     dx, DS:word ptr maestro_PSP             ;DS = PSP
                mov     ds, dx
                mov     bx, 009ah                               ;location of filesize in PSP
                mov     eax, DS:dword ptr [bx]                  ;bx=filesize in bytes in dword
                mov     cx, ax                                  ;save for READ. assume size < 64K
; 3. compute size of addition, update next segment variable
                shr     eax, 4                                  ;filesize in paragraphs
                add     eax, 1                                  ;add in case of rem
                pop     ds                                      ;DS = Maestro_PSP
                add     DS:word ptr next_tcb_st_seg, ax         ;assume step table size < 4 * 64K
; 4. find new program size in paragraphs and allocate memory
                mov     bx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     bx, ax
                mov     es, ax
                mov     ah, 4ah                                 ;allocate for ST_0
                int     21h
; 5. open file and read its contents to allocated area and then close file
                mov     dx, OFFSET catsteps_0
                mov     ax, 3d00h                                 ;open read only
                int     21h
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_ST]
                mov     di, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                push    ds
;cvboot00.asm change. write sys_data_seg_number to step table offset 6.
                mov     si, ds
;end of this segment of change
                mov     ds, dx                                  ;DS = ST_0 SEG
                mov     dx, 0000h
                mov     bx, ax                                  ;file handle
                mov     ah, 3fh                                 ;cx from above
                int     21h                                     ;read ST to ST_0 SEG
                mov     ah, 3eh
                int     21h
;cvboot00.asm change
                mov     bx, OFFSET_TO_SYS_DATA_SEG_NUMBER
                mov     ds:word ptr [bx], si
;end of cvboot00.asm change
;cvboot00.asm change. write SEG number to step table offset 2.
                mov     bx, OFFSET_TO_ST_SEG_NUMBER
                mov     ax, ds
                mov     ds:word ptr [bx], ax
                mov     bx, OFFSET_TO_TCB_SEG_NUMBER
                mov     ds:word ptr [bx], di
;cvboot00.asm change. 7/19/95. add modem number to ST
                mov     bx, OFFSET_TO_MODEM_NUMBER
                mov     ds:word ptr [bx], 3030H                 ;ie db "00"
;cvboot00.asm change. store user_password into step table password area.
                mov     di, DS:word ptr [ST_SESS_PARAMS_PTR_ADDR]
                add     di, ST_SESS_PARAMS_PASSWORD
                mov     ax, DS
                mov     ES, ax

                pop     ds                                      ;DS = sys data area

                mov     si, OFFSET user_password
move_password_to_st0:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_password_to_st0


;*****************************************************************
;*                                                               *
;*      INITIALIZE SYSTEM AREA DIAGNOSTIC BUFFERS                *
```

```
;*                                                                *
;******************************************************************
;set a pointer to beginning of irq_03_buffer.
                mov     bx, OFFSET irq_03_buffer
                mov     DS:word ptr irq_03_buf_ptr, bx
;******************************************************************
;*                                                                *
;*      LOCATE THE INDOS FLAG AND SAVE IN DS: VARIABLE            *
;*                                                                *
;******************************************************************
                mov     ah, 34h
                int     21h
                mov     DS:word ptr vcon_InDOS_flag_seg, es
                mov     DS:word ptr vcon_InDOS_flag_off, bx
;******************************************************************
;*                                                                *
;*              INITIALIZE MODEM MPS_1                            *
;*                                                                *
;******************************************************************
; 1. load GS value from DS: table
init_tcb_1:     mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                mov     GS, dx
;instal0b.asm change
                cmp     dx, 0000h
                je      init_tcb_2

                mov     bx, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], bx
                mov     GS:word ptr [VCON_IRQ00_RBUF_PTR], bx
                mov     bx, VCON_IRQ03_TBUF
                mov     GS:word ptr [VCON_IRQ03_TBUF_PTR], bx
                mov     GS:word ptr [VCON_IRQ00_TBUF_PTR], bx
                mov     GS:word ptr [VCON_IRQ03_TBF_NEWSTR_PTR], 0000h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_0], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_1], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_2], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_3], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_4], 00h
                mov     GS:byte ptr [CAS_RING_DETECTED], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_0], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_1], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_2], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_3], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_4], 00h
                mov     GS:byte ptr [CAT_RING_DETECTED], 00h
                mov     GS:byte ptr [MODEM_MODE], CAT
                mov     GS:byte ptr [VCON_CTSXON], 01H
                mov     GS:byte ptr [VCON_RBUF_3C0], 00H
                mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                mov     GS:byte ptr [VCON_DLE_COUNT_VALID], 00h
                mov     GS:byte ptr [VCON_DLEC_DETECTED], 00h
                mov     GS:byte ptr [VCON_CR_COUNT], 00h
                mov     GS:byte ptr [VCON_EXPECT_VTOF_ANSWER_ECHO], 00h
                mov     GS:byte ptr [VCON_VTOF_A_RECD], 00h
                mov     GS:byte ptr [VCON_VTOF_ACR_RECD], 00h
                mov     GS:byte ptr [VCON_VTOF_ACRLF_RECD], 00h
                mov     GS:word ptr [VCON_XMIT_COUNT], 0000h
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     GS:byte ptr [VCON_DETECT_3CR], 00h
                mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
                mov     GS:byte ptr [VCON_1FA3], 00h
                mov     GS:byte ptr [VCON_TO_FAX_ANSWER], 00h
                mov     GS:byte ptr [VCON_EXPECT_OK], 00h
                mov     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], 00h
                mov     GS:byte ptr [VCON_VTOF_IRQ03_FIRST_SECOND], 00h
                mov     GS:dword ptr [VCON_0040_006C_AT_VCON_4], 00000000h
                mov     GS:dword ptr [VCON_4_SECONDS], 00000050h        ;80d timer ticks
                mov     GS:byte ptr [VCON_EMIT_GREETING], 01h
                mov     GS:byte ptr [VCON_EMITTING_GREETING], 00h
                mov     GS:byte ptr [VCON_IRQ00_SAW_DLEC], 00h
                mov     GS:byte ptr [VCON_COMPLETED_GREETING], 00h
                mov     bx, VCON_DLE_NUMBER_BUFFER
                mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
                mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR], bx
                mov     GS:byte ptr [0 * TCB_LEVEL_DB_SIZE + VCON_FIRST_IRQ00_CUR_STEP], 01h
                mov     GS:byte ptr [0 * TCB_LEVEL_DB_SIZE + VCON_ACTION_COMPLETE_CUR_STEP], 00h
                mov     GS:byte ptr [1 * TCB_LEVEL_DB_SIZE + VCON_FIRST_IRQ00_CUR_STEP], 01h
                mov     GS:byte ptr [1 * TCB_LEVEL_DB_SIZE + VCON_ACTION_COMPLETE_CUR_STEP], 00h
                mov     GS:byte ptr [2 * TCB_LEVEL_DB_SIZE + VCON_FIRST_IRQ00_CUR_STEP], 01h
```

```
                mov     GS:byte ptr [2 * TCB_LEVEL_DB_SIZE + VCON_ACTION_COMPLETE_CUR_STEP], 00h
                mov     GS:word ptr [VCON_STATE], 0000h
                mov     GS:byte ptr [VCON_EMIT_MSG_STOP], 00h
                mov     GS:byte ptr [VCON_RECO_MSG_STOP], 00h
                mov     GS:byte ptr [VCON_NO_ACTION_STOP], 00h
                mov     GS:byte ptr [VCON_DLET_DETECTED], 00h
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_EMIT_MSG_RESRONSE_CNTR], 0000h
                mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
                mov     GS:word ptr [VCON_HANG_UP_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], 0000h
                mov     GS:word ptr [START_PROGRAM_STATE_COUNTER], 0000H
                mov     GS:byte ptr [VCON_EMIT_RINGBACK], 01h
                mov     GS:byte ptr [VCON_COMPLETED_RINGBACK], 00h
                mov     GS:byte ptr [VCON_RECO_MSG_COMPLETE], 00h
                mov     GS:byte ptr [VCON_EMIT_MSG_COMPLETE], 00h
                mov     GS:byte ptr [VCON_NO_ACTION_COMPLETE], 00h
                mov     GS:byte ptr [VCON_DLE_ETX_DETECTED], 00h
                mov     GS:byte ptr [VCON_AT_CLS_2_ISSUED], 00h

                mov     GS:byte ptr [TMO_WAS_ATH_ISSUED], FALSE
                mov     GS:byte ptr [MODEM_OUT_OF_CVBOOT], TRUE
                mov     GS:byte ptr [TMO_ATH_ISSUED_IN_RIBBON], FALSE
;cvboot00.asm change
                mov     GS:byte ptr [TTQ_RUNNING_PTR], 0000H
                mov     GS:byte ptr [CAS_FKS_DETECTED], FALSE
;cvboot00.asm change. 7/18/95.
                mov     GS:byte ptr [VCON_DLEB_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLED_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLEO_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLEU_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLE_CAPT_DETECTED], FALSE
                mov     GS:byte ptr [VCON_XON_DETECTED], FALSE
                mov     GS:byte ptr [VCON_XOFF_DETECTED], FALSE
;cvboot00.asm change. 7/20/95.
                mov     GS:byte ptr [INDEX_FILE_BUSY], FALSE
;cvboot00.asm change. 7/30/95
                mov     bx, EMAIL_SCRIPT_BUFFER
                add     bx, EMAIL_SCRIPT_BUFFER_SIZE
                mov     GS:byte ptr [bx - 1], "]"
                mov     GS:byte ptr [bx - 2], "B"
                mov     GS:byte ptr [bx - 3], "O"
                mov     GS:byte ptr [bx - 4], "E"
                mov     GS:byte ptr [bx - 5], "["
;cvboot07.asm change
                mov     GS:byte ptr [INCOMING_FAX], NO
;cvboot07.asm change. 10/24/95.
                mov     GS:byte ptr [VMA_PAUSE], AM_NULL

;*****************************************************************
;*                                                               *
;*              INITIALIZE MODEM TCB_2                           *
;*                                                               *
;*****************************************************************
; 1. load GS value from DS: table
init_tcb_2:     mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                mov     GS, dx
;instal0b.asm change
                cmp     dx, 0000h
                je      init_tcb_3
;*****************************************************************
;*                                                               *
;*              INITIALIZE MODEM TCB_3                           *
;*                                                               *
;*****************************************************************
; 1. load GS value from DS: table
init_tcb_3:     mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                mov     GS, dx
;instal0b.asm change
                cmp     dx, 0000h
                je      init_tcb_4
;*****************************************************************
;*                                                               *
;*              INITIALIZE MODEM TCB_4                           *
;*                                                               *
;*****************************************************************
; 1. load GS value from DS: table
init_tcb_4:     mov     bx, OFFSET modems_tcb_st_seg_table
```

```
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                mov     GS, dx
;instal0b.asm change
                cmp     dx, 0000h
                je      init_tcb_0
;*************************************************************
;*                                                           *
;*              INITIALIZE MODEM TCB_0                       *
;*                                                           *
;*************************************************************
; 1. load GS value from DS: table
init_tcb_0:     mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                mov     GS, dx

                mov     bx, VCON_IRQ03_RBUF
                mov     GS:word ptr [VCON_IRQ03_RBUF_PTR], bx
                mov     GS:word ptr [VCON_IRQ00_RBUF_PTR], bx
                mov     bx, VCON_IRQ03_TBUF
                mov     GS:word ptr [VCON_IRQ03_TBUF_PTR], bx
                mov     GS:word ptr [VCON_IRQ00_TBUF_PTR], bx
                mov     GS:word ptr [VCON_IRQ03_TBF_NEWSTR_PTR], 0000h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_0], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_1], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_2], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_3], 00h
                mov     GS:byte ptr [CAS_RBUF_WINDOW_4], 00h
                mov     GS:byte ptr [CAS_RING_DETECTED], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_0], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_1], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_2], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_3], 00h
                mov     GS:byte ptr [CAT_RBUF_WINDOW_4], 00h
                mov     GS:byte ptr [CAT_RING_DETECTED], 00h
                mov     GS:byte ptr [MODEM_MODE], CAT
                mov     GS:byte ptr [VCON_CTSXON], 01H
                mov     GS:byte ptr [VCON_RBUF_3C0], 00H
                mov     GS:byte ptr [VCON_DLE_COUNT], 00h
                mov     GS:byte ptr [VCON_DLE_COUNT_VALID], 00h
                mov     GS:byte ptr [VCON_DLEC_DETECTED], 00h
                mov     GS:byte ptr [VCON_CR_COUNT], 00h
                mov     GS:byte ptr [VCON_EXPECT_VTOF_ANSWER_ECHO], 00h
                mov     GS:byte ptr [VCON_VTOF_A_RECD], 00h
                mov     GS:byte ptr [VCON_VTOF_ACR_RECD], 00h
                mov     GS:byte ptr [VCON_VTOF_ACRLF_RECD], 00h
                mov     GS:word ptr [VCON_XMIT_COUNT], 0000h
                mov     GS:word ptr [VCON_RECV_COUNT], 0000h
                mov     GS:byte ptr [VCON_DETECT_3CR], 00h
                mov     GS:byte ptr [VCON_3CR_DETECTED], 00h
                mov     GS:byte ptr [VCON_2CR_DETECTED], 00h
                mov     GS:byte ptr [VCON_1FA3], 00h
                mov     GS:byte ptr [VCON_TO_FAX_ANSWER], 00h
                mov     GS:byte ptr [VCON_EXPECT_OK], 00h
                mov     GS:byte ptr [VCON_VTOF_IRQ03_FIRST], 00h
                mov     GS:byte ptr [VCON_VTOF_IRQ03_FIRST_SECOND], 00h
                mov     GS:dword ptr [VCON_0040_006C_AT_VCON_4], 00000000h
                mov     GS:dword ptr [VCON_4_SECONDS], 00000050h        ;80d timer ticks
                mov     GS:byte ptr [VCON_EMIT_GREETING], 01h
                mov     GS:byte ptr [VCON_EMITTING_GREETING], 00h
                mov     GS:byte ptr [VCON_IRQ00_SAW_DLEC], 00h
                mov     GS:byte ptr [VCON_COMPLETED_GREETING], 00h
                mov     bx, VCON_DLE_NUMBER_BUFFER
                mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ00_PTR], bx
                mov     GS:word ptr [VCON_DLE_NUMBER_BUFFER_IRQ03_PTR], bx
                mov     GS:byte ptr [0 * TCB_LEVEL_DB_SIZE + VCON_FIRST_IRQ00_CUR_STEP], 01h
                mov     GS:byte ptr [0 * TCB_LEVEL_DB_SIZE + VCON_ACTION_COMPLETE_CUR_STEP], 00h
                mov     GS:byte ptr [1 * TCB_LEVEL_DB_SIZE + VCON_FIRST_IRQ00_CUR_STEP], 01h
                mov     GS:byte ptr [1 * TCB_LEVEL_DB_SIZE + VCON_ACTION_COMPLETE_CUR_STEP], 00h
                mov     GS:byte ptr [2 * TCB_LEVEL_DB_SIZE + VCON_FIRST_IRQ00_CUR_STEP], 01h
                mov     GS:byte ptr [2 * TCB_LEVEL_DB_SIZE + VCON_ACTION_COMPLETE_CUR_STEP], 00h
                mov     GS:word ptr [VCON_STATE], 0000h
                mov     GS:byte ptr [VCON_EMIT_MSG_STOP], 00h
                mov     GS:byte ptr [VCON_RECO_MSG_STOP], 00h
                mov     GS:byte ptr [VCON_NO_ACTION_STOP], 00h
                mov     GS:byte ptr [VCON_DLET_DETECTED], 00h
                mov     GS:word ptr [VCON_EMIT_MSG_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_EMIT_MSG_RESPONSE_CNTR], 0000h
                mov     GS:word ptr [VCON_RECO_MSG_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_RECO_MSG_RESPONSE_CNTR], 0000h
                mov     GS:word ptr [VCON_HANG_UP_ISSUED_CNTR], 0000h
                mov     GS:word ptr [VCON_HANG_UP_RESPONSE_CNTR], 0000h
```

```
                mov     GS:word ptr [START_PROGRAM_STATE_COUNTER], 0000H
                mov     GS:byte ptr [VCON_EMIT_RINGBACK], 01h
                mov     GS:byte ptr [VCON_COMPLETED_RINGBACK], 00h
                mov     GS:byte ptr [VCON_RECO_MSG_COMPLETE], 00h
                mov     GS:byte ptr [VCON_EMIT_MSG_COMPLETE], 00h
                mov     GS:byte ptr [VCON_NO_ACTION_COMPLETE], 00h
                mov     GS:byte ptr [VCON_DLE_ETX_DETECTED], 00h
                mov     GS:byte ptr [VCON_AT_CLS_2_ISSUED], 00h

                mov     GS:byte ptr [TMO_WAS_ATH_ISSUED], FALSE
                mov     GS:byte ptr [MODEM_OUT_OF_CVBOOT], TRUE
                mov     GS:byte ptr [TMO_ATH_ISSUED_IN_RIBBON], FALSE
;cvboot00.asm change
                mov     GS:byte ptr [TTQ_RUNNING_PTR], 0000H
                mov     GS:byte ptr [CAS_FKS_DETECTED], FALSE
;cvboot00.asm change. 7/18/95.
                mov     GS:byte ptr [VCON_DLEB_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLED_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLEO_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLEU_DETECTED], FALSE
                mov     GS:byte ptr [VCON_DLE_CAPT_DETECTED], FALSE
                mov     GS:byte ptr [VCON_XON_DETECTED], FALSE
                mov     GS:byte ptr [VCON_XOFF_DETECTED], FALSE
;cvboot00.asm change. 7/20/95.
                mov     GS:byte ptr [INDEX_FILE_BUSY], FALSE
;cvboot00.asm change. 7/30/95
                mov     bx, EMAIL_SCRIPT_BUFFER
                add     bx, EMAIL_SCRIPT_BUFFER_SIZE
                mov     GS:byte ptr [bx - 1], "]"
                mov     GS:byte ptr [bx - 2], "B"
                mov     GS:byte ptr [bx - 3], "O"
                mov     GS:byte ptr [bx - 4], "E"
                mov     GS:byte ptr [bx - 5], "["
;cvboot07.asm change (THIS MAY BE REDUNDANT FOR MODEM_0)
                mov     GS:byte ptr [INCOMING_FAX], NO
;cvboot07.asm change. 10/24/95.
                mov     GS:byte ptr [VMA_PAUSE], AM_NULL

;*****************************************************************
;*                                                               *
;*      HOOK INTERRUPTS AND STORE OLD VECTORS                    *
;*      AT ENTRY: DS = Maestro_PSP                               *
;*                                                               *
;*****************************************************************


;************************
;*                      *
;*      HOOK IRQ 00H    *
;*                      *
;************************
                CLI     ;IRQ00'S KEEP COMING. I WILL CHANGE CLASS2 IRQ00 CODE.
;MODEM_1 IS ALWAYS THERE
hook_irq00_cont1:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_irq00_cont2
;STORE CASMODEM_1 VECTORS IN TCB FOR MODEM_1
                mov     al, 08h                                 ;int 08h for irq00.
                mov     ah, 35h
                int     21h
                mov     GS:word ptr [CAS_IRQ00_OFF], bx
                mov     GS:word ptr [CAS_IRQ00_SEG], ES         ;ES:bx => CASMODEM_1 ISR
                sub     bx, 6
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CLASS2_1 ISR
                mov     ES:byte ptr [bx+0], 90h                 ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;CHECK FOR MODEM_2
```

```
hook_irq00_cont2:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_irq00_cont3
;STORE CASMODEM_2 VECTORS IN TCB FOR MODEM_2
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_IRQ00_OFF], cx
                mov     GS:word ptr [CAS_IRQ00_SEG], ax
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CASMODEM_2 ISR
                sub     bx, 6
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CLASS2_2 ISR
                mov     ES:byte ptr [bx+0], 90h                 ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;CHECK FOR MODEM_3
hook_irq00_cont3:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_irq00_cont4
;STORE CASMODEM_3 VECTORS IN TCB FOR MODEM_3
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_IRQ00_OFF], cx
                mov     GS:word ptr [CAS_IRQ00_SEG], ax
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CASMODEM_3 ISR
                sub     bx, 6
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CLASS2_3 ISR
                mov     ES:byte ptr [bx+0], 90h                 ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;CHECK FOR MODEM_4
hook_irq00_cont4:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_irq00_cont5
;STORE CASMODEM_4 VECTORS IN TCB FOR MODEM_4
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_IRQ00_OFF], cx
                mov     GS:word ptr [CAS_IRQ00_SEG], ax
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CASMODEM_4 ISR
                sub     bx, 6
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
```

```
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CLASS2_4 ISR
                mov     ES:byte ptr [bx+0], 90h                 ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;DOS INT 00H IS LOCATED HERE
hook_irq00_cont5:
                sub     bx, 4                   ;0653h
                mov     ax, ES:word ptr [bx]                    ;0fc2:[0653]=dos_irq00_offset
                mov     CS:word ptr dos_irq00_off, ax
                mov     ax, es:word ptr [bx+2]
                mov     CS:word ptr dos_irq00_seg, ax
;NOW HOOK INT 00H
;write indirectly to 0000:00a0h
;assign new interrupt vector to irq00.
;write 1fb1:0xxx indirectly to 0000:0020h
;here, I am following the example of irq03 but I do not have direct experience of
;int 21/2508 not working.
                push    ds
                mov     ax, cs
                mov     cx, ax          ;cx=cs
                mov     ax, 0000h
                mov     ds, ax          ;now ds=0000h
                mov     bx, 0020h       ;ds:bx->0000:0020 (int08=irq00)
                mov     ax, OFFSET new_irq00_off
;               cli     MOVED TO TOP OF HOOK IRQ00. WRITING TO CLASS2 IRQ00 HOOK AS
;                       IRQ00'S ARE COMING.
                mov     DS:word ptr [bx], ax    ;offset of new irq00.
                mov     DS:word ptr [bx+2], cx  ;segment of new irq00.
                sti
                pop     ds
;************************************
;*                                  *
;*      HOOK IRQ03 FOR MODEM_1      *
;*                                  *
;************************************
hook_irq03_cont1:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx                                  ;HOOK IF THERE IS A MODEM
                pop     dx
                pop     bx
                jz      hook_irq05_cont1
;store current values of interrupt vectors to irq03.
                mov     al, 0bh                                 ;irq03=int0b
                mov     ah, 35h
                int     21h
                mov     GS:word ptr [CAS_IRQ03_OFF], bx
                mov     GS:word ptr [CAS_IRQ03_SEG], es

                push    ds
                mov     ax, cs
                mov     cx, ax                                  ;cx=cs
                mov     ax, 0000h
                mov     ds, ax                                  ;now ds=0000h
                mov     bx, 002ch                               ;ds:bx->0000:002c (int0b=irq03)
                mov     ax, OFFSET new_irq03_off
                cli
                mov     DS:word ptr [bx], ax                    ;offset of new irq03.
                mov     DS:word ptr [bx+2], cx                  ;segment of new irq03.
                sti
                pop     ds
;************************************
;*                                  *
;*      HOOK IRQ05 FOR MODEM_0      *
;*                                  *
;************************************
hook_irq05_cont1:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx                                  ;HOOK IF THERE IS A MODEM
                pop     dx
```

```
                pop     bx
                jz      hook_int28_cont1
;store current values of interrupt vectors to irq03.
                mov     al, 0dh                                 ;irq05=int0d
                mov     ah, 35h
                int     21h
                mov     GS:word ptr [CAS_IRQ03_OFF], bx         ;GS .ne. GS => irq# .ne. irq#
                mov     GS:word ptr [CAS_IRQ03_SEG], es         ;so OK to keep same name though irq05
;in our case, ie modem_0, as we do not have CASMODEM, we get some standard entry point with just a iret
;in it. this is OK as modem_mode=CAT always for keypad modem_0.
                push    ds
                mov     ax, cs
                mov     cx, ax                                  ;cx=cs
                mov     ax, 0000h
                mov     ds, ax                                  ;now ds=0000h
                mov     bx, 0034h                               ;ds:bx->0000:0034 (int0d=irq05)
                mov     ax, OFFSET new_irq05_off
                cli
                mov     DS:word ptr [bx], ax                    ;offset of new irq03.
                mov     DS:word ptr [bx+2], cx                  ;segment of new irq03.
                sti
                pop     ds
;************************
;*                      *
;*      HOOK INT 28H    *
;*                      *
;************************
;MODEM_1 IS ALWAYS THERE
hook_int28_cont1:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int28_cont2
;STORE CASMODEM_1 VECTORS IN TCB FOR MODEM_1
                mov     al, 28h
                mov     ah, 35h
                int     21h
                mov     GS:word ptr [CAS_INT28_OFF], bx
                mov     GS:word ptr [CAS_INT28_SEG], ES         ;ES:bx => CASMODEM_1 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CLASS2_1 ISR
                mov     ES:byte ptr [bx+0], 90h                 ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;CHECK FOR MODEM_2
hook_int28_cont2:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int28_cont3
;STORE CASMODEM_2 VECTORS IN TCB FOR MODEM_2
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT28_OFF], cx
                mov     GS:word ptr [CAS_INT28_SEG], ax
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CASMODEM_2 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CLASS2_2 ISR
                mov     ES:byte ptr [bx+0], 90h                 ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
```


26B

```
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;CHECK FOR MODEM_3
hook_int28_cont3:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int28_cont4
;STORE CASMODEM_3 VECTORS IN TCB FOR MODEM_3
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT28_OFF], cx
                mov     GS:word ptr [CAS_INT28_SEG], ax
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CASMODEM_3 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CLASS2_3 ISR
                mov     ES:byte ptr [bx+0], 90h         ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;CHECK FOR MODEM_4
hook_int28_cont4:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int28_cont5
;STORE CASMODEM_4 VECTORS IN TCB FOR MODEM_4
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT28_OFF], cx
                mov     GS:word ptr [CAS_INT28_SEG], ax
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CASMODEM_2 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CLASS2_2 ISR
                mov     ES:byte ptr [bx+0], 90h         ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+1], 90h
                mov     ES:byte ptr [bx+2], 90h
                mov     ES:byte ptr [bx+3], 90h
                mov     ES:byte ptr [bx+4], 90h
                mov     ES:byte ptr [bx+5], 90h
;DOS INT 28H IS LOCATED HERE
hook_int28_cont5:
                sub     bx, 4                   ;0653h
                mov     ax, ES:word ptr [bx]            ;0fc2:[0653]=dos_int28_offset
                mov     CS:word ptr dos_int28_off, ax
                mov     ax, es:word ptr [bx+2]
                mov     CS:word ptr dos_int28_seg, ax
;NOW HOOK INT 28H
;write indirectly to 0000:00a0h
                push    ds
                mov     ax, cs
                mov     cx, ax          ;cx=cs
                mov     ax, 0000h
                mov     ds, ax          ;now ds=0000h
                mov     bx, 00a0h       ;ds:bx->0000:00a0 (int28)
                mov     ax, OFFSET new_int28_off
                cli
```

```
                mov     word ptr [bx], ax ;offset of new int28.
                mov     word ptr [bx+2], cx ;segment of new int28.
                sti
                pop     ds

;************************
;*                      *
;*      HOOK INT 13H    *
;*                      *
;************************
;MODEM_1 IS ALWAYS THERE
hook_int13_cont1:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int13_cont2
;STORE CASMODEM_1 VECTORS IN TCB FOR MODEM_1
                mov     al, 13h
                mov     ah, 35h
                int     21h
                mov     GS:word ptr [CAS_INT13_OFF], bx
                mov     GS:word ptr [CAS_INT13_SEG], ES   ;ES:bx => CASMODEM_1 ISR
                mov     ES:byte ptr [bx+5], 90h           ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+6], 90h
                mov     ES:byte ptr [bx+7], 90h
                mov     ES:byte ptr [bx+8], 90h
                mov     ES:byte ptr [bx+9], 90h
                mov     ES:byte ptr [bx+0ah], 90h
;CHECK FOR MODEM_2
hook_int13_cont2:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int13_cont3
;STORE CASMODEM_2 VECTORS IN TCB FOR MODEM_2
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT13_OFF], cx
                mov     GS:word ptr [CAS_INT13_SEG], ax
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CASMODEM_2 ISR
                mov     ES:byte ptr [bx+5], 90h           ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+6], 90h
                mov     ES:byte ptr [bx+7], 90h
                mov     ES:byte ptr [bx+8], 90h
                mov     ES:byte ptr [bx+9], 90h
                mov     ES:byte ptr [bx+0ah], 90h
;CHECK FOR MODEM_3
hook_int13_cont3:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int13_cont4
;STORE CASMODEM_3 VECTORS IN TCB FOR MODEM_3
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT13_OFF], cx
                mov     GS:word ptr [CAS_INT13_SEG], ax
                mov     bx, cx
                mov     ES, ax                                  ;ES:bx => CASMODEM_3 ISR
                mov     ES:byte ptr [bx+5], 90h           ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+6], 90h
                mov     ES:byte ptr [bx+7], 90h
                mov     ES:byte ptr [bx+8], 90h
```

```
                mov     ES:byte ptr [bx+9], 90h
                mov     ES:byte ptr [bx+0ah], 90h
;CHECK FOR MODEM_4
hook_int13_cont4:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int13_cont5
;STORE CASMODEM_4 VECTORS IN TCB FOR MODEM_4
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT13_OFF], cx
                mov     GS:word ptr [CAS_INT13_SEG], ax
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CASMODEM_3 ISR
                mov     ES:byte ptr [bx+5], 90h         ;pushf + call => nops. remove nesting.
                mov     ES:byte ptr [bx+6], 90h
                mov     ES:byte ptr [bx+7], 90h
                mov     ES:byte ptr [bx+8], 90h
                mov     ES:byte ptr [bx+9], 90h
                mov     ES:byte ptr [bx+0ah], 90h
;DOS INT 13H IS LOCATED HERE
hook_int13_cont5:
                sub     bx, 4                   ;0653h
                mov     ax, ES:word ptr [bx]          ;0fc2:[0653]=dos_int13_offset
                mov     CS:word ptr dos_int13_off, ax
                mov     ax, es:word ptr [bx+2]
                mov     CS:word ptr dos_int13_seg, ax
;NOW HOOK INT 13H
;write indirectly to 0000:004ch
                push    ds
                mov     ax, cs
                mov     cx, ax          ;cx=cs
                mov     ax, 0000h
                mov     ds, ax          ;now ds=0000h
                mov     bx, 004ch       ;ds:bx->0000:004c (int13)
                mov     ax, OFFSET new_int13_off
                cli
                mov     word ptr [bx], ax   ;offset of new int13.
                mov     word ptr [bx+2], cx ;segment of new int13.
                sti
                pop     ds
;************************
;*                      *
;*      HOOK INT 15H    *
;*                      *
;************************
;MODEM_1 IS ALWAYS THERE
hook_int15_cont1:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int15_cont2
;STORE CASMODEM_1 VECTORS IN TCB FOR MODEM_1
                mov     al, 15h
                mov     ah, 35h
                int     21h
                mov     GS:word ptr [CAS_INT15_OFF], bx
                mov     GS:word ptr [CAS_INT15_SEG], ES   ;ES:bx => CASMODEM_1 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CLASS2_1 ISR
                mov     ES:byte ptr [bx+8], 0cfh        ;jmp => iret. remove nesting.
;CHECK FOR MODEM_2
hook_int15_cont2:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
```


271

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                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int15_cont3
;STORE CASMODEM_2 VECTORS IN TCB FOR MODEM_2
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT15_OFF], cx
                mov     GS:word ptr [CAS_INT15_SEG], ax
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CASMODEM_2 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CLASS2_2 ISR
                mov     ES:byte ptr [bx+8], 0cfh        ;jmp => iret. remove nesting.
;CHECK FOR MODEM_3
hook_int15_cont3:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int15_cont4
;STORE CASMODEM_2 VECTORS IN TCB FOR MODEM_3
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT15_OFF], cx
                mov     GS:word ptr [CAS_INT15_SEG], ax
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CASMODEM_3 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CLASS2_3 ISR
                mov     ES:byte ptr [bx+8], 0cfh        ;jmp => iret. remove nesting.
;CHECK FOR MODEM_4
hook_int15_cont4:
                push    bx
                push    dx
                mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
                pop     dx
                pop     bx
                jz      hook_int15_cont5
;STORE CASMODEM_2 VECTORS IN TCB FOR MODEM_4
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     GS:word ptr [CAS_INT15_OFF], cx
                mov     GS:word ptr [CAS_INT15_SEG], ax
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CASMODEM_2 ISR
                sub     bx, 4
                mov     cx, ES:word ptr [bx]
                mov     ax, ES:word ptr [bx+2]
                mov     bx, cx
                mov     ES, ax                          ;ES:bx => CLASS2_2 ISR
                mov     ES:byte ptr [bx+8], 0cfh        ;jmp => iret. remove nesting.
;DOS INT 15H IS LOCATED HERE
hook_int15_cont5:
                sub     bx, 4                           ;0653h
                mov     ax, ES:word ptr [bx]            ;0fc2:[0653]=dos_int15_offset
                mov     CS:word ptr dos_int15_off, ax
                mov     ax, es:word ptr [bx+2]
                mov     CS:word ptr dos_int15_seg, ax
;NOW HOOK INT 15H
;write indirectly to 0000:0054h
                push    ds
                mov     ax, cs
```

```
                mov     cx, ax          ;cx=cs
                mov     ax, 0000h
                mov     ds, ax          ;now ds=0000h
                mov     bx, 0054h       ;ds:bx->0000:0054 (int15)
                mov     ax, OFFSET new_int15_off
                cli
                mov     word ptr [bx], ax   ;offset of new int15.
                mov     word ptr [bx+2], cx ;segment of new int15.
                sti
                pop     ds
;*****************************************************************************
;*                                                                           *
;*      PATCH CASMODEM                                                       *
;*      EACH MODEM'S CASMODEM GETS THE SAME PATCH                            *
;*                                                                           *
;*****************************************************************************
;FIRST GET THE GS: FOR THIS MODEM
;MODEM_1 IS ALWAYS THERE
patch_modem1:   mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx
;*****************************************************************************
;*edit 1214:1bc7 so as to compare to 1fb1:0013 and not 1214:3062. irq03 patch.     *
;*****************************************************************************
;ds=cs=1fb1
patch_m1_irq03: push    DS
                mov     ax, GS:word ptr [CAS_IRQ03_SEG] ;ax=1214h, ds=1fb1h
                mov     DS, ax              ;ds=1214h
                mov     bx, 1bc7h
                mov     ax, OFFSET new_irq03_off
                mov     DS:word ptr [bx+2], ax      ;it was 3062h -> 0013h(check)
                mov     ax, cs
                mov     DS:word ptr [bx+7], ax      ;it was 1214h -> 1fb1h
                pop     DS
;*****************************************************************************
;*edit 0fc2:09d2 area so as to prevent casmodem fm thinking irq00 was redirected  *
;*actually we are just telling the unload check area -later TSR check- that we did*
;*change the int vector within casmodem and that if vector is equal to this new   *
;*value then it is OK to unload. does not mean later TSR.                         *
;*****************************************************************************
;in 2F entry area, all interrupts are checked and if differences are found, all
;interrupts acquire their old values.here is the code:
;0FC2:09D2 8D0E6E01      LEA     CX,[016E]
;0FC2:09D6 B008          MOV     AL,08
;0FC2:09D8 E89E01        CALL    0B79
;0FC2:0B79 06            PUSH    ES
;0FC2:0B7A B435          MOV     AH,35
;0FC2:0B7C CD21          INT     21
;0FC2:0B7E 3BCB          CMP     CX,BX   ;bx=new_irq00_off
;0FC2:0B80 7506          JNZ     0B88
;0FC2:0B82 8CC3          MOV     BX,ES   ;es=1fb1h => mov bx, cs (8CCB)
;0FC2:0B84 8CC9          MOV     CX,CS   ;cs=0fc2h
;0FC2:0B86 3BCB          CMP     CX,BX
;0FC2:0B88 07            POP     ES
;0FC2:0B89 C3            RET
patch_m1_irq00: push    DS
                mov     ax, GS:word ptr [CAS_IRQ00_SEG] ;0fc2h
                mov     DS, ax              ;ds=0fc2
                mov     bx, 09d2h
                mov     ax, OFFSET new_irq00_off
                mov     DS:word ptr [bx+2], ax      ;0fc2:09d4=new_irq00_off
                mov     bx, 0b82h
                mov     DS:word ptr [bx+1], 0cbh        ;changes mov bx,es to mov bx,cs
                pop     DS
;this way bx=cx for all interrupts this test is being performed for. this is OK as we
;are in an enclosed box. still must be careful about the order in which TSR's are loaded
;here is a list of interrupts for which this test is performed:
;   08  irq00
;   09  keyboard
;   13  hard disk
;   15  system
;   25  absolute disk read
;   26  absolute disk write
;   28  idle int
;   2a  ms network
;   6f  10 net
;   2f
;   21
;does this mean CASMODEM must be the last to hook interrupts? what about PRINT.COM?
;I think the above has to do with removing the casmodem TSR. if any interrupt was
```

```
;already hooked by something else what do we have?
;we know our new irq vector and also stored the previous vector. the next TSR stored
;our vector and knows its own. for us, restoring the vector means the next TSR will
;not be able to do its job. it has not decided to remove itself yet. this is why I
;get the message sometimes that TSR cannot be removed. change a vector as an experi-
;ment in DOS and then ask for remove casmodem.
;I tried this experiment: changed int 13h vector and yes it would not remove it:
;error(10) cannot remove, other TSR installed.
;there are 4 calls to 0506 (int 2f/c0 calls to handle faxes)
;9-94-37 0fc2:0215 irq00    also has call 03dc
;         0501 int 13h  also has call 03dc
;         0689 int 28h
;         06c5 int 15h  also has call 03dc
;thus fax transactions progress through any one of these four interrupts.
;this is different than irq03. irq03 was done in one place. call 0506 is done in irq00
;but also in int 28h, int 13h, and int 15h. all these interrupts must be duplicated
;within casvox13.asm memory space.
;*****************************************************************************
;*int13h patch                                                               *
;*edit 0fc2:09d2 area so as to prevent casmodem fm thinking irq00 was redirected  *
;*actually we are just telling the unload check area -later TSR check- that we did*
;*change the int vector within casmodem and that if vector is equal to this new   *
;*value then it is OK to unload. does not mean later TSR.                    *
;*****************************************************************************
patch_m1_int13: push    DS
                mov     ax, GS:word ptr [CAS_INT13_SEG] ;0fc2h
                mov     DS, ax              ;ds=0fc2
                mov     bx, 09e8h
                mov     ax, OFFSET new_int13_off
                mov     DS:word ptr [bx+2], ax      ;0fc2:09ea=new_int13_off
                pop     DS

;*****************************************************************************
;*int15h patch                                                               *
;*edit 0fc2:09d2 area so as to prevent casmodem fm thinking irq00 was redirected  *
;*actually we are just telling the unload check area -later TSR check- that we did*
;*change the int vector within casmodem and that if vector is equal to this new   *
;*value then it is OK to unload. does not mean later TSR.                    *
;*****************************************************************************
patch_m1_int15: push    DS
                mov     ax, GS:word ptr [CAS_INT15_SEG] ;0fc2h
                mov     DS, ax              ;ds=0fc2
                mov     bx, 09f3h
                mov     ax, OFFSET new_int15_off
                mov     DS:word ptr [bx+2], ax      ;0fc2:09f5=new_int15_off
                pop     DS

;*****************************************************************************
;*int28h patch                                                               *
;*edit 0fc2:09d2 area so as to prevent casmodem fm thinking irq00 was redirected  *
;*actually we are just telling the unload check area -later TSR check- that we did*
;*change the int vector within casmodem and that if vector is equal to this new   *
;*value then it is OK to unload. does not mean later TSR.                    *
;*****************************************************************************
patch_m1_int28: push    DS
                mov     ax, GS:word ptr [CAS_INT28_SEG] ;0fc2h
                mov     DS, ax              ;ds=0fc2
                mov     bx, 0a14h
                mov     ax, OFFSET new_int28_off
                mov     DS:word ptr [bx+2], ax      ;0fc2:0a14=new_int28_off
                pop     DS
;*****************************************************************************
;*                                                                           *
;*              END OF CASMODEM PATCHES                                      *
;*                                                                           *
;*****************************************************************************


;*****************************************************************************************************
;*                                                                                                   *
;*                          UART  PARAMETER FIXING FOR MODEM_1                                       *
;*                                                                                                   *
;*****************************************************************************************************
;*****************************************************************************
;*                                                                           *
;*      GET UART ADDRESSES FROM CAS AREA AND LOAD TCB AREA                   *
;*      PUSH DS GOES WITH POP DS IN SET MODEM UART PARAMETERS BELOW          *
;*      AND GS: GOES WITH NON PARTITION AREAS SECTION TWO SECTIONS HENCE     *
;*                                                                           *
;*****************************************************************************
;get uart register addresses from cas area and load vcon area
```

```
;this section also gets values from cas area such as xon/xoff or hardware etc.
;MODEM_1 IS ALWAYS THERE
uart_addr_m1:   mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h
;cvboot00.asm change. next line.
                je      uart_addr_m0                        ;is there a modem here?
                mov     GS, dx
;set a pointer to beginning of vcon_irq03_tbuf
                mov     bx, OFFSET VCON_REGADD_DATA
                mov     GS:word ptr [VCON_REGADDS_PTR], bx
                push    DS
                mov     ax, GS:word ptr [CAS_IRQ03_SEG]     ;ax=1214h
                mov     DS, ax                  ;ds=1214h
        ASSUME  DS:SEG loclfc0
                mov     ax, DS:word ptr loclfc0     ;ax=02e8h
                pop     DS
        ASSUME  DS:SEG Maestro_PSP
                mov     GS:word ptr [VCON_REGADD_DATA], ax  ;vcon_regadd_data=1214:[1fc0]
                inc     ax
                mov     GS:word ptr [VCON_REGADD_IER], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_IIR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_LCR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_MCR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_LSR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_MSR], ax
;*********************************************************************
;*                                                                   *
;*      SET MODEM UART PARAMETERS                                    *
;*                                                                   *
;*********************************************************************
;NOTE: FATIH AND I DISCUSSED THIS ON APRIL 8, 1995. WE WILL NEED DYNAMIC SETTING OF THIS VALUE.
;BASED ON HOW QUICKLY THE TIMER TICK/IRQ BUFFER IS FILLING UP AND HOW QUICKLY THE ROCKWELL VOICE
;BUFFER IS EMPTYING OUT.
uart_param_m1:  push    dx
                push    ax
                mov     dx, GS:word ptr [VCON_REGADD_LCR]
                in      al, dx
                or      al, 80h         ;dlab=1
                out     dx, al
                mov     dx, GS:word ptr [VCON_REGADD_DATA]
                mov     al, 01h         ;lsr divisor=01
                out     dx, al
                mov     dx, GS:word ptr [VCON_REGADD_IER]
                mov     al, 00h         ;msr divisor=00
                out     dx, al
                mov     dx, GS:word ptr [VCON_REGADD_LCR]
                in      al, dx
                and     al, 7fh         ;dlab=0
                out     dx, al

;cvboot00.asm change. modem_0 does not get set up like modem_1 does because it has a casmodem
;program preceding catvoice.
;enable all irq's but tbuf.
                mov     dx, GS:word ptr [VCON_REGADD_IER]
                mov     al, 0dh
                out     dx, al
;enable fifo with trigger level set at 14 bytes. WARNING!!!!! THIS MAY BE A BIT DANGEREOUS AS IT IS
;ASKING FOR A VERY SHORT RESPONSE TIME IE 2 INCOMING BYTE'S WORTH.
                mov     dx, GS:word ptr [VCON_REGADD_IIR]
                mov     al, 0c1h
                out     dx, al
;now enable the main irq and set RTS, DTR.
                mov     dx, GS:word ptr [VCON_REGADD_MCR]
                mov     al, 0bh
                out     dx, al
;now enable this irq at the level of PIC 8259. unmask bit 3.
                in      al, 21h
                and     al, 0f7h
                out     21h, al

                pop     ax
                pop     dx
;*****************************************************************************************************
;*                                                                                                   *
;*                          UART  PARAMETER FIXING FOR MODEM_0                                       *
```

```
;*                                                                                                    *
;******************************************************************************************************
;*************************************************************************
;*                                                                       *
;*      GET UART ADDRESSES FROM CAS AREA AND LOAD TCB AREA               *
;*      PUSH DS GOES WITH POP DS IN SET MODEM UART PARAMETERS BELOW      *
;*      AND GS: GOES WITH NON PARTITION AREAS SECTION TWO SECTIONS HENCE *
;*                                                                       *
;*************************************************************************
;MODEM_0 IS ALWAYS THERE.
uart_addr_m0:   mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                cmp     dx, 0000h                       ;is there a modem here?
                mov     GS, dx

                mov     bx, OFFSET VCON_REGADD_DATA
                mov     GS:word ptr [VCON_REGADDS_PTR], bx

                mov     ax, 03e8h                       ;MODEM_0 AT COM3/IRQ5
                mov     GS:word ptr [VCON_REGADD_DATA], ax    ;vcon_regadd_data=1214:[1fc0]
                inc     ax
                mov     GS:word ptr [VCON_REGADD_IER], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_IIR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_LCR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_MCR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_LSR], ax
                inc     ax
                mov     GS:word ptr [VCON_REGADD_MSR], ax
;*********************************************************************
;*                                                                   *
;*      SET MODEM UART PARAMETERS                                    *
;*                                                                   *
;*********************************************************************
;NOTE: FATIH AND I DISCUSSED THIS ON APRIL 8, 1995. WE WILL NEED DYNAMIC SETTING OF THIS VALUE.
;BASED ON HOW QUICKLY THE TIMER TICK/IRQ BUFFER IS FILLING UP AND HOW QUICKLY THE ROCKWELL VOICE
;BUFFER IS EMPTYING OUT.
uart_param_m0:  push    dx
                push    ax
                mov     dx, GS:word ptr [VCON_REGADD_LCR]
                in      al, dx
                or      al, 80h         ;dlab=1
                out     dx, al
                mov     dx, GS:word ptr [VCON_REGADD_DATA]
                mov     al, 01h         ;lsr divisor=01
                out     dx, al
                mov     dx, GS:word ptr [VCON_REGADD_IER]
                mov     al, 00h         ;msr divisor=00
                out     dx, al
                mov     dx, GS:word ptr [VCON_REGADD_LCR]
                in      al, dx
                and     al, 7fh         ;dlab=0
                out     dx, al
;cvboot00.asm change. modem_0 does not get set up like modem_1 does because it has a casmodem
;program preceding catvoice.
;enable all irq's but tbuf.
                mov     dx, GS:word ptr [VCON_REGADD_IER]
                mov     al, 0dh
                out     dx, al
;enable fifo with trigger level set at 14 bytes. WARNING!!!!! THIS MAY BE A BIT DANGEREOUS AS IT IS
;ASKING FOR A VERY SHORT RESPONSE TIME IE 2 INCOMING BYTE'S WORTH.
                mov     dx, GS:word ptr [VCON_REGADD_IIR]
                mov     al, 0c1h
                out     dx, al
;now enable the main irq and set RTS, DTR.
                mov     dx, GS:word ptr [VCON_REGADD_MCR]
                mov     al, 0bh
                out     dx, al
;now enable this irq at the level of PIC 8259. unmask bit 5.
                in      al, 21h
                and     al, 0dfh
                out     21h, al
                pop     ax
                pop     dx
;*************************************************************
;*                                                           *
;*      LOCATE NON PARTITION AREAS FOR HARD DISK CACHES      *
;*      ONE FOR EACH MODEM                                   *
```

```
;*                                                                *
;******************************************************************
;in this part of install, catvoice.exe obtains the CHS (cylinder/head/sector) address of
;CaTdisk VoiceBufferArea. There will be one such area for each modem as they can be simultaneously
;handling voice transactions. see \\jon\e:\catbox\docs\desspecs\vsm014.txt and also 4-95-48.
;The bottom line for this code is that during install, the CHS address can be obtained from MBR,
;Master Boot Record.
;BIOS performs a int 13/08 and decides what portion of the CaTdisk is a partition and what will be
;for buffers. It thus generates MBR and writes it to first sector. CATVOICE.EXE can read the MBR
;using int 13 and find out CHS. Here we assume we did all that and the result is values in the
;following variables:
;                       db      start_head_n            for modem n starting head
;                       db      start_sector_n          for modem n starting sector
;                       dw      start_cylinder_n        for modem n starting cylinder
;THE MAIN RULE HERE IS THAT WHAT WE LEAVE OUT OF THE PARTITION FOR HARD DISK AS IT IS SEEN TO THE
;HOST, MUST BE CONSISTENTLY DEFINED. THERE ARE TWO PLACES:
;   1. WHEN HOST ASKS HARD DISK HOW MUCH SPACE IT HAS. MASPI ANSWERS THIS ONE.
;   2. HERE, WHEN WE DEFINE THE HARD DISK CACHE. WE COULD USE THE SAME ALGORITHM BASED ON INT 13/08.
;ALSO NOTE THAT MAX_USABLE_CYLINDER DEFINES THE TOP OF THE HDC FOR EACH MODEM.
;ALGORITHM
;=========
;   AT 11KHZ SAMPLING RATE, 8 BIT PCM, ONE MINUTE OF SPEECH STORES 660KB. THUS ASSIGN 5MB PER MODEM
;   JUST TO BE SAFE. THIS IS ABOUT 8 MINUTES OF SPEECH. CAN DOS OPEN FILES THIS LARGE? 5MB MAKES
;   10K SECTORS. THUS MAX_HEAD * MAX_SECTORS * CYLINDERS = 10,000
;   CYLINDERS = 10,000 / (MAX_HEAD * MAX_SECTORS)
;   MODEM_0 STARTING CYLINDER = MAX_CYLINDER - 5 * CYLINDERS
;   MODEM_1 STARTING CYLINDER = MAX_CYLINDER - 5 * CYLINDERS ETC ETC
;NOTE: MAKE THAT 8192 SECTORS INSTEAD OF 10,000. 8192 DECIMAL = 2000 HEX.

;we do an int 13 / 08 to find out about the max usable values for CHS.
                mov     ah, 08h
                mov     dl, 80h
                int     13h
                mov     ah, 00h
                mov     al, cl
                and     al, 0c0h
                shl     ax, 2

;instal05.asm change. the code worked but is awkward.
                mov     bx, OFFSET smax_usable_cylinder
                mov     DS:byte ptr [bx], ch
                mov     DS:byte ptr [bx+1], ah
                mov     al, cl
                and     al, 3fh
                mov     byte ptr smax_usable_sector, al
                mov     byte ptr smax_usable_head, dh

;now calculate the number of cylinders of hard disk cache to be assigned to each modem
                mul     dh              ; ax = max_sector * max_head
                mov     dx, 0
                mov     bx, ax          ; bx = max_sector * max_head
                mov     ax, 2000h
                div     bx              ; ax = 2000h / (max_sector * max_head)
                mov     word ptr hdc_cylinders, ax

hdc_for_modem_0:mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_0 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
                je      hdc_for_modem_1
                mov     GS, dx

                mov     al, byte ptr smax_usable_sector
                mov     GS:byte ptr [MAX_USABLE_SECTOR], al
                mov     al, byte ptr smax_usable_head
                mov     GS:byte ptr [MAX_USABLE_HEAD], al
                mov     GS:byte ptr [START_HEAD], 00h
                mov     GS:byte ptr [START_SECTOR], 01h      ;00xxxxxx

                mov     ax, word ptr smax_usable_cylinder
                mov     bx, word ptr hdc_cylinders
                sub     ax, bx
                sub     ax, bx
                sub     ax, bx
                sub     ax, bx
                mov     GS:word ptr [MAX_USABLE_CYLINDER], ax
                sub     ax, bx
                mov     GS:word ptr [START_CYLINDER], ax

hdc_for_modem_1:mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_1 + MODEM_TCB]
                cmp     dx, 0000h                               ;is there a modem here?
```

```
                je      hdc_for_modem_2
                mov     GS, dx

                mov     al, byte ptr smax_usable_sector
                mov     GS:byte ptr [MAX_USABLE_SECTOR], al
                mov     al, byte ptr smax_usable_head
                mov     GS:byte ptr [MAX_USABLE_HEAD], al
                mov     GS:byte ptr [START_HEAD], 00h
                mov     GS:byte ptr [START_SECTOR], 01h      ;00xxxxxx

                mov     ax, word ptr smax_usable_cylinder
                mov     bx, word ptr hdc_cylinders
                sub     ax, bx
                sub     ax, bx
                sub     ax, bx
                mov     GS:word ptr [MAX_USABLE_CYLINDER], ax
                sub     ax, bx
                mov     GS:word ptr [START_CYLINDER], ax

hdc_for_modem_2:mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_2 + MODEM_TCB]
                cmp     dx, 0000h                            ;is there a modem here?
                je      hdc_for_modem_3
                mov     GS, dx

                mov     al, byte ptr smax_usable_sector
                mov     GS:byte ptr [MAX_USABLE_SECTOR], al
                mov     al, byte ptr smax_usable_head
                mov     GS:byte ptr [MAX_USABLE_HEAD], al
                mov     GS:byte ptr [START_HEAD], 00h
                mov     GS:byte ptr [START_SECTOR], 01h      ;00xxxxxx

                mov     ax, word ptr smax_usable_cylinder
                mov     bx, word ptr hdc_cylinders
                sub     ax, bx
                sub     ax, bx
                mov     GS:word ptr [MAX_USABLE_CYLINDER], ax
                sub     ax, bx
                mov     GS:word ptr [START_CYLINDER], ax

hdc_for_modem_3:mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_3 + MODEM_TCB]
                cmp     dx, 0000h                            ;is there a modem here?
                je      hdc_for_modem_4
                mov     GS, dx

                mov     al, byte ptr smax_usable_sector
                mov     GS:byte ptr [MAX_USABLE_SECTOR], al
                mov     al, byte ptr smax_usable_head
                mov     GS:byte ptr [MAX_USABLE_HEAD], al
                mov     GS:byte ptr [START_HEAD], 00h
                mov     GS:byte ptr [START_SECTOR], 01h      ;00xxxxxx

                mov     ax, word ptr smax_usable_cylinder
                mov     bx, word ptr hdc_cylinders
                sub     ax, bx
                mov     GS:word ptr [MAX_USABLE_CYLINDER], ax
                sub     ax, bx
                mov     GS:word ptr [START_CYLINDER], ax

hdc_for_modem_4:mov     bx, OFFSET modems_tcb_st_seg_table
                mov     dx, DS:word ptr [bx + 4 * MODEM_4 + MODEM_TCB]
                cmp     dx, 0000h                            ;is there a modem here?
                je      hdc_for_modem_5
                mov     GS, dx

                mov     al, byte ptr smax_usable_sector
                mov     GS:byte ptr [MAX_USABLE_SECTOR], al
                mov     al, byte ptr smax_usable_head
                mov     GS:byte ptr [MAX_USABLE_HEAD], al
                mov     GS:byte ptr [START_HEAD], 00h
                mov     GS:byte ptr [START_SECTOR], 01h      ;00xxxxxx

                mov     ax, word ptr smax_usable_cylinder
                mov     bx, word ptr hdc_cylinders
                mov     GS:word ptr [MAX_USABLE_CYLINDER], ax
                sub     ax, bx
                mov     GS:word ptr [START_CYLINDER], ax

hdc_for_modem_5:
;*****************************************************************
```

```
;*                                                                *
;*      RESET ALL INTERVAL COUNTERS IN TTQ                        *
;*                                                                *
;******************************************************************
                mov     si, OFFSET tmaestro_task_queue
reset_ttq_interval_counters:
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                add     si, TTQ_ENTRY_DELTA
                cmp     si, word ptr tmaestro_task_queue_end
                jb      reset_ttq_interval_counters

;******************************************************************
;*                                                                *
;*      SUBMIT TTQ REQUESTS FOR EMAIL RETRIEVAL  (ENTRY 1)        *
;*                                                                *
;******************************************************************
;TTQ ENTRY WILL CONTAIN THE SCRIPT FILENAME. STEP #. WHEN TO START, HOW OFTEN.
;FOR AS MANY SCRIPTS FILES AS THERE ARE IN THE .CFG FILE.
                mov     si, tmaestro_task_queue
                add     si, TTQ_ENTRY_DELTA
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_ST_REQ_MADE
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
                mov     dword ptr [si + TTICS_STA_TIME_INTERVAL], 00010000H     ;65K timer ticks

                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], 003CH  ;fast print SP entry
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], TTICS_STA_MODEM_1_REQUIRED
                mov     ax, DS
                mov     ES, ax
                mov     di, si
                add     di, TTICS_STA_FILENAME
                mov     si, OFFSET email_script_file
email_file_name_copy:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     email_file_name_copy
                movsb

;******************************************************************
;*                                                                *
;*      SUBMIT TTQ REQUEST FOR FAST PRINT (ENTRY 0)               *
;*                                                                *
;******************************************************************
;EACH STEP TABLE HAS A FAST PRINT START PROGRAM ENTRY AT STEP 23.
;A REQUEST TO LAUNCH THIS ENTRY IS ENTERED. THIS IS THE FIRST ENTRY IN TTQ.
                mov     si, tmaestro_task_queue
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
;cvboot04.asm change. handshake was = req_made => null. THIS MAKES IT SO, FP DOES NOT START
;BUT REMEMBER TIMED PERMANENT TTQ ENTRIES NEED HANDSHAKE = REQ_MADE. WHEN LAUNCHED YOU PUT ACK
;AND WHEN COMPLETE BACK TO REQ_MADE AGAIN.
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
                mov     dword ptr [si + TTICS_STA_TIME_INTERVAL], 00000020H     ;32 timer ticks

                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], 0023H  ;fast print SP entry
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], TTICS_STA_PRINTER_REQUIRED

                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument for SP

;******************************************************************
;*                                                                *
;*      SUBMIT TTQ REQUEST FOR NEW FAST PRINT WITH PTQ            *
;*                          (ENTRY 6)                             *
;*                                                                *
;******************************************************************
;EACH STEP TABLE HAS A FAST PRINT START PROGRAM ENTRY AT STEP 23.
;A REQUEST TO LAUNCH THIS ENTRY IS ENTERED. THIS IS THE FIRST ENTRY IN TTQ.
                mov     si, tmaestro_task_queue
                add     si, 6 * TTQ_ENTRY_DELTA
                mov     DS:word ptr ttq_fgprint_ptr, si
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
;cvboot04.asm change. handshake was = req_made => null
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
                mov     dword ptr [si + TTICS_STA_TIME_INTERVAL], 0
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
```

```
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], 004EH  ;NEW fast print SP entry
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], TTICS_STA_PRINTER_REQUIRED

                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument for SP

;*****************************************************************
;*                                                               *
;*      SUBMIT TTQ REQUEST FOR SEND HOST FAX                     *
;*                        (ENTRY 7)                              *
;*                                                               *
;*****************************************************************
;EACH STEP TABLE HAS A FAST PRINT START PROGRAM ENTRY AT STEP 4F.
;A REQUEST TO LAUNCH THIS ENTRY IS ENTERED. THIS IS THE FIRST ENTRY IN TTQ.
                mov     si, tmaestro_task_queue
                add     si, 7 * TTQ_ENTRY_DELTA
                mov     DS:word ptr ttq_send_host_fax_ptr, si
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
;cvboot04.asm change. handshake was = req_made => null
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
                mov     dword ptr [si + TTICS_STA_TIME_INTERVAL], 0
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], 004FH  ;NEW fast print SP entry
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], TTICS_STA_MODEM_0_REQUIRED

                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument for SP

;*****************************************************************
;*                                                               *
;*      SUBMIT TTQ REQUEST FOR PRINT INCOMING FAX                *
;*                        (ENTRY 8)                              *
;*                                                               *
;*****************************************************************
;EACH STEP TABLE HAS A FAST PRINT START PROGRAM ENTRY AT STEP 50.
;A REQUEST TO LAUNCH THIS ENTRY IS ENTERED. THIS IS THE FIRST ENTRY IN TTQ.
                mov     si, tmaestro_task_queue
                add     si, 8 * TTQ_ENTRY_DELTA
                mov     DS:word ptr ttq_print_in_fax_ptr, si
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
;cvboot04.asm change. handshake was = req_made => null
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_PERMANENT
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
                mov     dword ptr [si + TTICS_STA_TIME_INTERVAL], 0
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], 0050H  ;NEW fast print SP entry
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], TTICS_STA_MODEM_0_REQUIRED

                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument for SP

;*****************************************************************
;*                                                               *
;*              CONNECT TO THE SCSI SUBSYSTEM                    *
;*                                                               *
;*****************************************************************
connect_to_scsi_subsystem:
                mov     ax, 3d00h
                mov     dx, OFFSET SCSIMgrString
                int     21h                             ; open SCSI device
                push    ax
                mov     bx, ax
                mov     ax, 4402h
                mov     dx, OFFSET ASPI_Entry_off
                mov     cx, 4
                int     21h                             ; get ASPI_Entry
                mov     ah, 3eh
                pop     bx
                int     21h                             ; close SCSI device
;now place the InDOS flag seg:off in maspi data area.
fix_maspi_indos_access:
                mov     bx, word ptr ASPI_Entry_seg
                mov     ES, bx
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INDOS_FLAG_OFF
                mov     ax, word ptr vcon_InDOS_flag_off
                mov     ES:word ptr [di], ax
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INDOS_FLAG_SEG
                mov     ax, word ptr vcon_InDOS_flag_seg
                mov     ES:word ptr [di], ax
```

```
;now place the address of host_DOS_request_type (dw) + host_DOS_request_fn (dw) in maspi
fix_maspi_host_dos_req_access:
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_DOS_REQ_OFF
                mov     ax, OFFSET host_DOS_request_type
                mov     ES:word ptr [di], ax
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_DOS_REQ_SEG
                mov     ax, DS
                mov     ES:word ptr [di], ax
;now place the address of host_CAS_request_type (dw) + host_CAS_request_fn (dw) in maspi
fix_maspi_host_cas_req_access:
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_CAS_REQ_OFF
                mov     ax, OFFSET host_CAS_request_type
                mov     ES:word ptr [di], ax
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_CAS_REQ_SEG
                mov     ax, DS
                mov     ES:word ptr [di], ax
;now place the address of In_IRQ
fix_maspi_inirq_access:
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                mov     ax, OFFSET In_IRQ
                mov     ES:word ptr [di], ax
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_SEG
                mov     ax, DS
                mov     ES:word ptr [di], ax
;cvboot03.asm change
;now place the address of Client_AX (sysdata) in maspi's var: client_regs_off/seg_ptr
fix_maspi_client_access:
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 4 * MASPI_DMS_SIZE
                sub     di, MASPI_CLIENT_REGS_OFF_PTR
                mov     ax, OFFSET Client_AX
                mov     ES:word ptr [di], ax
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 4 * MASPI_DMS_SIZE
                sub     di, MASPI_CLIENT_REGS_SEG_PTR
                mov     ax, DS
                mov     ES:word ptr [di], ax


;initialize
                mov     word ptr host_DOS_request_type, HOST_DOS_REQUEST_TYPE_NULL
                mov     word ptr host_DOS_request_resp, HOST_DOS_REQUEST_RESP_NULL
                mov     word ptr host_CAS_request_type, HOST_CAS_REQUEST_TYPE_NULL
                mov     word ptr host_CAS_request_resp, HOST_CAS_REQUEST_RESP_NULL
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_S7_CALLBACK_OFF
                mov     ES:word ptr [di], 0
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_S7_CALLBACK_SEG
                mov     ES:word ptr [di], 0
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_S1_CALLBACK_OFF
                mov     ES:word ptr [di], 0
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_S1_CALLBACK_SEG
                mov     ES:word ptr [di], 0
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_S4_CALLBACK_OFF
                mov     ES:word ptr [di], 0
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_S4_CALLBACK_SEG
                mov     ES:word ptr [di], 0
;cvboot03.asm change
;now hook the scsi irq here instead of at maspi.
;2 reasons:
; 1. DOS hooks after maspi hooks. creates problems with InIRQ scheme
; 2. may get scsi irq between device maspi install and tsr (really a loop) cvboot install
hook_scsi_irq:
                pushf
                pop     bx
                cli

                push    ds
```

```
                push    bx

                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 4 * MASPI_DMS_SIZE
                sub     di, MASPI_SCSI11_ISR_OFF_PTR

                mov     ax, 0000h
                mov     ds, ax
                lea     bx, 01cch               ;hook irq11
                mov     ax, ES:word ptr [di]
                mov     [bx], ax
                add     di, 2
                mov     ax, ES:word ptr [di]
                mov     [bx+2], ax

                pop     bx
                pop     ds

;end set irq vector to scsiisrq code
;now unmask irq11

                mov     dx, 00a1h
                in      al, dx                  ;read mask register
                and     al, 0f7h                ;1111 0111 unmask position 11
                out     dx, al                  ;irq11 unmasked
;now do an eoi for good measure
                mov     a1, 20h
                out     0a0h, al
                jmp     $+2
                out     20h, al

                push    bx
                popf                            ;restore I flag to what it was before

;*****************************************************************
;*                                                               *
;*      SUBMIT FOUR TTQ REQUESTS FOR HMP_TASK_MASTER             *
;*                      (ENTRIES 2-5)                            *
;*                                                               *
;*****************************************************************
;this is a permanent TTQ entry. it does not have a timer. it gets activated by checking
;that the handshake = request_made. once the job is done, handshake = null but it does
;not get dislodged as free_to_use = not_free_to_use. a careful survey of how tmo does
;all this is needed.
ttq_modem_1:    mov     si, tmaestro_task_queue
                add     si, 2 * TTQ_ENTRY_DELTA
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_HOST_DATA_MODEM
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
;find the entry point for the corresponding MASPI_DMS (data_modem_structure)
;the pointer to maspi_dms is for hmp_task_master's use.
                mov     di, word ptr ASPI_Entry_seg
                mov     ES, di
                mov     word ptr [si + TTICS_MASPI_DMS_PTR + 2], di
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 4 *  MASPI_DMS_SIZE
                mov     word ptr [si + TTICS_MASPI_DMS_PTR], di
;also write to the proper entry in maspi_dms, this TTQ entry's pointer.
                add     di, MASPI_DMS_TTQ_ENTRY_PTR
                mov     ax, DS
                mov     ES:word ptr [di + 2], ax
                mov     ES:word ptr [di], si
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], HMP_TASK_MASTER_STEP_NO
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], 0
                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument

ttq_modem_2:    mov     si, tmaestro_task_queue
                add     si, 3 * TTQ_ENTRY_DELTA
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_HOST_DATA_MODEM
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
;find the entry point for the corresponding MASPI_DMS (data_modem_structure)
;the pointer to maspi_dms is for hmp_task_master's use.
                mov     di, word ptr ASPI_Entry_seg
                mov     ES, di
                mov     word ptr [si + TTICS_MASPI_DMS_PTR + 2], di
```

```
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 3 *  MASPI_DMS_SIZE
                mov     word ptr [si + TTICS_MASPI_DMS_PTR], di
;also write to the proper entry in maspi_dms, this TTQ entry's pointer.
                add     di, MASPI_DMS_TTQ_ENTRY_PTR
                mov     ax, DS
                mov     ES:word ptr [di + 2], ax
                mov     ES:word ptr [di], si
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], HMP_TASK_MASTER_STEP_NO
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], 0
                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument

ttq_modem_3:    mov     si, tmaestro_task_queue
                add     si, 4 * TTQ_ENTRY_DELTA
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_HOST_DATA_MODEM
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
;find the entry point for the corresponding MASPI_DMS (data_modem_structure)
;the pointer to maspi_dms is for hmp_task_master's use.
                mov     di, word ptr ASPI_Entry_seg
                mov     ES, di
                mov     word ptr [si + TTICS_MASPI_DMS_PTR + 2], di
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 2 *  MASPI_DMS_SIZE
                mov     word ptr [si + TTICS_MASPI_DMS_PTR], di
;also write to the proper entry in maspi_dms, this TTQ entry's pointer.
                add     di, MASPI_DMS_TTQ_ENTRY_PTR
                mov     ax, DS
                mov     ES:word ptr [di + 2], ax
                mov     ES:word ptr [di], si
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], HMP_TASK_MASTER_STEP_NO
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], 0
                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument

ttq_modem_4:    mov     si, tmaestro_task_queue
                add     si, 5 * TTQ_ENTRY_DELTA
                mov     byte ptr  [si + TTICS_STA_STATUS], TTICS_STA_STATUS_IDLE
                mov     byte ptr  [si + TTICS_HANDSHAKE], TTICS_HANDSHAKE_NULL
                mov     byte ptr  [si + TTICS_PRIORITY], TTICS_PRIORITY_HOST_DATA_MODEM
                mov     byte ptr  [si + TTICS_FREE_TO_USE_STATUS], TTICS_NOT_FREE_TO_USE
;find the entry point for the corresponding MASPI_DMS (data_modem_structure)
;the pointer to maspi_dms is for hmp_task_master's use.
                mov     di, word ptr ASPI_Entry_seg
                mov     ES, di
                mov     word ptr [si + TTICS_MASPI_DMS_PTR + 2], di
                mov     di, word ptr ASPI_Entry_off
                sub     di, MASPI_INIRQ_FLAG_OFF
                sub     di, 1 *  MASPI_DMS_SIZE
                mov     word ptr [si + TTICS_MASPI_DMS_PTR], di
;also write to the proper entry in maspi_dms, this TTQ entry's pointer.
                add     di, MASPI_DMS_TTQ_ENTRY_PTR
                mov     ax, DS
                mov     ES:word ptr [di + 2], ax
                mov     ES:word ptr [di], si
                mov     dword ptr [si + TTICS_STA_INTERVAL_COUNTER], 00000000H
                mov     word ptr  [si + TTICS_STA_STARTING_STEP_NUMBER], HMP_TASK_MASTER_STEP_NO
                mov     word ptr  [si + TTICS_STA_RESOURCES_REQUIRED], 0
                mov     byte ptr  [si + TTICS_STA_FILENAME], 00H                ;no argument

;*****************************************************************
;*                                                               *
;*                  RESET LCD                                    *
;*                                                               *
;*****************************************************************
resetting_lcd:
                mov     ah, LCD_FUNCTION_SET
                call    lcd_processing

                mov     ah, LCD_CLEAR_SCREEN
                call    lcd_processing

                mov     ah, LCD_DISPLAY_OFF
                call    lcd_processing

                mov     byte ptr LCD_BUSY, FALSE
```

```
;*****************************************************************
;*                                                               *
;*      INITIALIZE MAESTRO VARIABLES                             *
;*                                                               *
;*****************************************************************
        ASSUME  DS:SEG  Maestro_AX
                mov     ds:word ptr Maestro_AX, 0000h
                mov     ds:word ptr Maestro_BX, 0000h
                mov     ds:word ptr Maestro_CX, 0000h
                mov     ds:word ptr Maestro_DX, 0000h
                mov     ds:word ptr Maestro_BP, 0000h
                mov     ds:word ptr Maestro_DI, 0000h
                mov     ds:word ptr Maestro_SI, 0000h

                mov     ax, DS                          ;DS = Maestro_PSP
                mov     ds:word ptr Maestro_DS, ax

                mov     ax, ES
                mov     ds:word ptr Maestro_ES, ax


                mov     ax, CS
                mov     ds:word ptr Maestro_CS, ax

                mov     ds:word ptr Maestro_FS, 0000h
                mov     ds:word ptr Maestro_GS, 0000h

                mov     ax, OFFSET maestro_begin
                mov     ds:word ptr Maestro_IP, ax

                mov     ds:word ptr Maestro_FLAGS, 0200h;IF=1

                mov     ax, OFFSET maestro_task_queue
                mov     ds:word ptr mtq_running_ptr, 0000h

                mov     ah, 51h
                int     21h
                mov     ds:word ptr Maestro_PSP, bx

                mov     ah, 2fh
                int     21h
                mov     ds:word ptr Maestro_DTA_off, bx
                mov     ds:word ptr Maestro_DTA_seg, es

                mov     ds:word ptr maestro_count, 0000h
;instal0a.asm change.
                mov     byte ptr TIMER_TICK_BUSY, 00H
                mov     word ptr timer_tick_tail_end_count, 0000h
;end instal0a.asm change
                mov     ds:word ptr timer_tick_count, 0000h
;instal07.asm change
                mov     ds:word ptr timer_tick_count_all, 0000h
;end instal07.asm change
;also a part of CATVOC0C-0
;CATVOC0B-4: store SS:SP
                mov     ax, SP
                mov     ds:word ptr Maestro_SP, ax
                mov     ax, SS
                mov     ds:word ptr Maestro_SS, ax

                jmp     maestro_begin

;*****************************************************************************
;*                                                                           *
;*                      TSR exit... NEVER TAKEN                              *
;*                                                                           *
;*****************************************************************************
                mov     dx, DS:word ptr next_tcb_st_seg
                mov     ax, DS:word ptr maestro_PSP
                sub     dx, ax
                mov     ax, 3100h
                int     21h

;*****************************************************************************
;*                                                                           *
;*      DOS VECTOR STORAGE                                                   *
;*      NEED CS: RELATIVE AS CALLING WITH "CALL DS:DWORD ..." WOULD CHANGE DS *
;*      ENTERING DOS, FROM TRUE VALUE AT ENTRY                               *
;*                                                                           *
;*****************************************************************************
dos_irq00_off                   dw      ?
```

```
dos_irq00_seg                   dw      ?
dos_int13_off                   dw      ?
dos_int13_seg                   dw      ?
dos_int15_off                   dw      ?
dos_int15_seg                   dw      ?
dos_int28_off                   dw      ?
dos_int28_seg                   dw      ?

END     INSTALL
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;sysdata5.asm <- sysdata4.asm. 10/12/95. add 2 variables for print incoming fax
;TTQ entry pointer and send host fax TTQ entry pointer. catvoc16.
;sysdata4.asm <- sysdata3.asm. 10/3/95. add host_CAS_request_type etc.
;sysdata3.asm <- sysdata2.asm. 9/21/95. remove sys_data. add PTQ items.
;sysdata2.asm <- sysdata1.asm. 9/21/95. add PTQ.
;sysdata1.asm <- sysdata0.asm. 8/5/95. connect to the scsi subsystem.
;sysdata0.asm <- nrdata0a.asm. 7/5/95. name change to make it more appropriate. plus other
;changes all marked.
;nrdata0a.asm <- nrdata09.asm. 6/12/95.
;nrdata09.asm <- nrdata08.asm. for catvock.
;nrdata08.asm <- nrdata07.asm. 6/3/95. catvoch. else no changes.
;nrdata07.asm <- nrdata06.asm. 5/18/95. job history buffer. timer_tick_count_all.
;nrdata06.asm <- nrdata05.asm. 5/18/95. add In_INT13H variable.
;add TICK_buffer_end. now that I am covering many timer ticks, TICK_buffer
;without an end crashes the system. also add a few bytes of protection as I do
;not detect crossing end point right away.
;nrdata05.asm <- nrdata04.asm. 5/11/95. 5-95-80. multitasking. CATVOC0C-0.
;nrdata04.asm <- nrdata03.asm. 5/6/95. fix errors for catvoc06
;CATVOC0B-3. 5-95-65.
;nrdata03.asm <- nrdata02.asm. 5/2/95. PSP,DTA.
;nrdata02.asm <- nrdata01.asm. 5/1/95. MTICS details for info.
;further fixes for launching programs.
;nrdata01.asm <- nrdata00.asm. 4/27/95. add keypad code from capvox*.asm
;CATVOC0B-2. \goodcv06\catequ02.inc -> \goodcv07\catequ03.inc
INCLUDE CATEQU0E.INC
.MODEL  COMPACT
.386P
                public  next_tcb_st_seg
                public  maestro_active
                public  maestro_count
                public  timer_tick_count
                public  timer_tick_count_all
                public  timer_tick_tail_end_count
                public  new_t2_in_maestro
                public  old_t2_in_maestro
                public  maestro_command_tail
                public  maestro_load_exec
                public  modems_tcb_st_seg_table
                public  irq_03_buffer
                public  irq_03_buf_ptr
                public  irq_03_buf_end
                public  vcon_InDOS_flag_seg
                public  vcon_InDOS_flag_off
                public  launch_complete_with_carry
                public  launch_complete

                public  Maestro_AX
                public  Maestro_BX
                public  Maestro_CX
                public  Maestro_DX
                public  Maestro_BP
                public  Maestro_DI
                public  Maestro_SI
                public  Maestro_DS
                public  Maestro_IP
                public  Maestro_ES
                public  Maestro_CS
                public  Maestro_FS
                public  Maestro_GS
                public  Maestro_FLAGS
                public  Maestro_PSP
                public  Maestro_DTA_off
                public  Maestro_DTA_seg
;CATVOC0B-4: add variables. see 5-95-66.
                public  Maestro_SP
                public  Maestro_SS

                public  Client_AX
                public  Client_BX
                public  Client_CX
                public  Client_DX
                public  Client_BP
                public  Client_DI
                public  Client_SI
                public  Client_DS
                public  Client_ES
                public  Client_FS
                public  Client_GS
                public  Client_IP
```

```
                public  Client_CS
                public  Client_FLAGS
                public  Client_PSP
                public  Client_DTA_off
                public  Client_DTA_seg
;CATVOC0C-0
                public  Client_SP
                public  Client_SS

                public  Saved_AX
                public  Saved_BX
                public  Saved_CX
                public  Saved_DX
                public  Saved_BP
                public  Saved_DI
                public  Saved_SI
                public  Saved_DS
                public  Saved_ES
                public  Saved_FS
                public  Saved_GS
                public  Saved_IP
                public  Saved_CS
                public  Saved_FLAGS
                public  Saved_PSP
                public  Saved_DTA_off
                public  Saved_DTA_seg
;CATVOC0C-0
                public  Saved_SP
                public  Saved_SS

                public  maestro_task_queue
                public  maestro_task_queue_end
                public  mtq_first_hiprio_ptr
                public  mtq_first_loprio_ptr
                public  mtq_first_suspended_ptr
                public  mtq_running_ptr

                public  tmaestro_task_queue
                public  tmaestro_task_queue_end
                public  tmaestro_available_resources

                public  TIMER_TICK_BUSY
                public  In_IRQ
                public  In_INT13H
                public  LCD_BUSY
                public  LCD_ACCESS_COUNTER
                public  TICK_buffer_ptr
                public  TICK_buffer
                public  TICK_buffer_end

                public  key_value
                public  key_pressed
                public  key_released
                public  irq00_cur_0_keypad_value
                public  irq00_cur_1_keypad_value
                public  irq00_cur_2_keypad_value
                public  keypad_buffer
                public  keypad_buffer_end
                public  keypad_buffer_wr_ptr
                public  keypad_buffer_rd_ptr

                public  vcon_ata
                public  vcon_at_cls_8
                public  vcon_at_vbs_4
                public  vcon_at_bdr_16
                public  vcon_at_vls
                public  vcon_at_vls_ck
                public  vcon_at_vtx
                public  vcon_dle_etx
                public  vcon_dle_can
                public  vcon_ath
                public  vcon_at_vrx
                public  vcon_exclam
                public  vcon_at_vts
                public  vcon_at_vss
                public  vcon_at_vsp
                public  vcon_at_vsd
                public  vcon_at_vsr


                public  job_number_word
```

```
                public  job_number_buffer
                public  job_number_buffer_end

                public  catsteps_0
                public  catsteps_1
                public  catsteps_2
                public  catsteps_3
                public  catsteps_4
                public  cat_cfg
                public  cat_cfg_file_handle
                public  cat_cfg_buffer

                public  smax_usable_cylinder
                public  smax_usable_head
                public  smax_usable_sector
                public  hdc_cylinders

                public  modem_0_get_key_value

                public  st_modem
                public  c_disk_column
                public  cfg_password
                public  user_password

                public  loaded_index_file_name_0
                public  loaded_index_file_name_1
                public  loaded_index_file_name_2
                public  loaded_index_file_name_3
                public  loaded_index_file_name_4

                public  email_script_file
                public  SCSIMgrString
                public  ASPI_Entry_off
                public  ASPI_Entry_seg
                public  host_DOS_request_type
                public  host_DOS_request_fn
                public  host_DOS_request_resp
                public  host_CAS_request_type
                public  host_CAS_request_fn
                public  host_CAS_request_resp


                public  printer_task_queue
                public  printer_task_queue_end
                public  ttq_fgprint_ptr
                public  ttq_send_host_fax_ptr
                public  ttq_print_in_fax_ptr
                public  host_initiated_send_fax_count
                public  incoming_fax_count
                public  print_two_bit_filename
                public  host_print_file_name

                public  host_DOS_req_rd_callback_done
                public  host_CAS_req_rd_callback_done

                public  number_of_rings_to_answer
                public  max_time_between_rings


.FARDATA
                ORG     0000H
                ALIGN   10H
;*************************************************************************
;*                                                                       *
;*      NEARDATA.ASM                                                     *
;*      COPYRIGHT 3TAU 1995                                              *
;*      WRITTEN BY HALUK M. AYTAC                                        *
;*                                                                       *
;*************************************************************************
;sysdata0.asm change. 7/20/95. add index file contention resolution section
;NOTEZ BIEN!! DIKKAT!! ACHTUNG!!@#%&*
;THIS IS THE FIRST INSTANCE OF PROGRAMS ACCESSING SYSDATA AREA.
;THIS IS DONE WITH EQU'S SO THE LOCATION OF THESE NEXT 5 VARIABLES IS TIED TO WHERE
;THEY ARE NOW. IE LOCATION 0. REFERENCE: SYS_DATA_OFFSET_TO_LOADED_INDEX_FILES = 0000H

;*****************************************************************************
;*                                                                           *
;*              CURRENTLY LOADED INDEX FILE LIST                             *
;*                                                                           *
;*****************************************************************************
```

```
;I think the following has to do with vma and that two callers may request the same file.
loaded_index_file_name_0        db      64 dup(00H)     ;initialized to no index file loaded.
loaded_index_file_name_1        db      64 dup(00H)
loaded_index_file_name_2        db      64 dup(00H)
loaded_index_file_name_3        db      64 dup(00H)
loaded_index_file_name_4        db      64 dup(00H)
;***********************************************
;*                                             *
;*      DOS                                    *
;*                                             *
;***********************************************
vcon_InDOS_flag_off         dw  ?
vcon_InDOS_flag_seg         dw  ?
;***********************************************
;*                                             *
;*      TRACE BUFFERS                          *
;*                                             *
;***********************************************
irq_03_buf_ptr                          dw      ?
;cazvox24.asm change. reduce size of irq_03_buffer by 14,000 to give it to TICK_buffer. 28000 -> 14000
irq_03_buffer                           db      12000 dup(00h)
                                                        ;32768=7fffh or 8000h largest number to assemble
                                                        ;w/o error
irq_03_buf_end                          dw      0000h       ;place holder for end of buffer
;cazvox21.asm change, tick, tock codes may overflow buffer. recenter of ptr based on byte write only.
extra                                   db      64 dup(00)  ;buffer for overflow
TICK_buffer_ptr                         dw      TICK_buffer
TICK_buffer                             db      14000 dup("T")
TICK_buffer_end                         dw      0000h
extra_for_TICK                          db      64 dup(00)  ;buffer for overflow

;***********************************************
;*                                             *
;*      MAESTRO                                *
;*                                             *
;***********************************************
;MAESTRO DATA AREA
;=================
maestro_count                           dw      ?
timer_tick_count                        dw      ?
timer_tick_count_all                    dw      ?
timer_tick_tail_end_count               dw      ?
new_t2_in_maestro                       dw      ?
old_t2_in_maestro                       dw      ?
maestro_active                          db      ?
In_IRQ                                  db      ?
In_INT13H                               db      ?
                                        db      ?       ;to make it even
launch_complete_with_carry              db      ?
launch_complete                         db      ?
mtq_running_ptr                         dw      ?
mtq_first_hiprio_ptr                    dw      ?
mtq_first_loprio_ptr                    dw      ?
mtq_first_suspended_ptr                 dw      ?
TIMER_TICK_BUSY                         db      ?
SCSI_ISR_BUSY                           db      ?
IRQ3_BUSY                               db      ?
LCD_BUSY                                db      ?
LCD_ACCESS_COUNTER                      dw      ?

Client_AX                               dw      ?
Client_BX                               dw      ?
Client_CX                               dw      ?
Client_DX                               dw      ?
Client_BP                               dw      ?
Client_DI                               dw      ?
Client_SI                               dw      ?
Client_DS                               dw      ?
Client_ES                               dw      ?
Client_FS                               dw      ?
Client_GS                               dw      ?
Client_IP                               dw      ?
Client_CS                               dw      ?
Client_FLAGS                            dw      ?
Client_PSP                              dw      ?
Client_DTA_off                          dw      ?
Client_DTA_seg                          dw      ?
Client_SP                               dw      ?
Client_SS                               dw      ?

Saved_AX                                dw      ?
```

```
Saved_BX                                dw      ?
Saved_CX                                dw      ?
Saved_DX                                dw      ?
Saved_BP                                dw      ?
Saved_DI                                dw      ?
Saved_SI                                dw      ?
Saved_DS                                dw      ?
Saved_ES                                dw      ?
Saved_FS                                dw      ?
Saved_GS                                dw      ?
Saved_IP                                dw      ?
Saved_CS                                dw      ?
Saved_FLAGS                             dw      ?
Saved_PSP                               dw      ?
Saved_DTA_off                           dw      ?
Saved_DTA_seg                           dw      ?
Saved_SP                                dw      ?
Saved_SS                                dw      ?

Maestro_AX                              dw      ?
Maestro_BX                              dw      ?
Maestro_CX                              dw      ?
Maestro_DX                              dw      ?
Maestro_BP                              dw      ?
Maestro_DI                              dw      ?
Maestro_SI                              dw      ?
Maestro_DS                              dw      ?
Maestro_ES                              dw      ?
Maestro_FS                              dw      ?
Maestro_GS                              dw      ?
Maestro_IP                              dw      ?
Maestro_CS                              dw      ?
Maestro_FLAGS                           dw      ?
Maestro_PSP                             dw      ?
Maestro_DTA_off                         dw      ?
Maestro_DTA_seg                         dw      ?
Maestro_SP                              dw      ?
Maestro_SS                              dw      ?


;MAESTRO QUEUE DATA AREA
;======================
;MTQ    MAESTRO TASK QUEUE
;MTICS  MAESTRO TASK INFORMATION and CONTROL STRUCTURE
;               MTICS_PGM_STATUS        BYTE    0               IDLE
;                                                               RUNNING
;                                                               SUSPENDED
;                                                               ABORTED
;                                                               COMPLETED
;
;               MTICS_HANDSHAKE         BYTE    1               ST_REQ_MADE
;                                                               M_REQ_ACKNOWLEDGED
;                                                               ST_ABORT_REQ_MADE
;                                                               M_ABORT_REQ_ACKED
;                                                               ST_COMPLETION_ACKED
;
;               T2 TICKS COUNT          WORD    02
;               PROGRAM NAME ADDRESS    DWORD   04
;               PROGRAM ARGUMENT ADDR   DWORD   08
;               PROGRAM AX              WORD    0C
;               PROGRAM BX              WORD    0E
;               PROGRAM CX              WORD    10
;               PROGRAM DX              WORD    12
;               PROGRAM BP              WORD    14
;               PROGRAM DI              WORD    16
;               PROGRAM SI              WORD    18
;               PROGRAM DS              WORD    1A
;               PROGRAM ES              WORD    1C
;               PROGRAM FS              WORD    1E
;               PROGRAM GS              WORD    20
;               PROGRAM IP              WORD    22
;               PROGRAM CS              WORD    24
;               PROGRAM FLAGS           WORD    26
;               PROGRAM PSP             WORD    28
;               PROGRAM DTA OFF         WORD    2A
;               PROGRAM DTA SEG         WORD    2C
;maestro writes to this word:
;nrdata0a.asm change. MTQ now has 96 entries. sp also changes. argument is brought in as name.
;nrdata0a.asm change. have the size of entry be expressed as a variable.
maestro_task_queue                      db      16 * MTQ_ENTRY_DELTA dup(00h)           ;16 queue entries.
maestro_task_queue_end                  dw      maestro_task_queue_end                  ;end of q marker
```

```
;NRDATA03.ASM CHANGE. NOW PART OF MR SET.
maestro_load_exec                       dw      0000h                                   ;environment (inherit m
aestro's)
                                        dw      maestro_command_tail
                                        dw      SEG maestro_command_tail                ;cs of maestro at insta
ll
                                        dd      ?                                       ;FCB1
                                        dd      ?                                       ;FCB2
maestro_command_tail                    db      0," "                                   ;first byte 0-255 decim
al
                                        db      126 dup("t")                            ;command tail
;for example, C:\CATBOX\PROGRAMS\COPIER.EXE will be in a step table location called "vcon_session_filename_n".
;this area will be pointed to by the filename word in the start_program step table entry.
;the argument /N5 will be pointed to by the argument word in the start_program step table entry. and the value
/N5
;itself will be contained in "vcon_session_constant_n". As the user goes through the keypad to initiate a copy,
 he will
;fix the number of copies. We must then write to this location. This is an emit_msg_get_param instance. We must
 say that
;when the user changes the number of copies, the input type for the emit_msg_get_param will be "number of copie
s" and
;this will always change the same location in the step table. Thus the constants in the step table must be know
n to
;the emit_msg_get_param.
; 1. start_program ministepper inside emit_msg writes to the argument word in the emit_msg_start_program step t
able
;entry. The argument word equals the value of gs:[VCON_EMIT_MSG_FILENAME_PTR]. It points to the location that h
olds the
;filename for emit_msg inside the step table. maestro reads the argument, adds a header (number of bytes) and a
 tail (0Dh)
;while copying it to ds:maestro_command_tail. load exec will point to this location.
; 2. the start_program entry for COPIER will point to the argument in vcon_session_constant_n. emit_msg_get_par
am will
;change this entry from /N5 to /N25 say. When start program loads this argument to MTQ/MTICS, maestro will read
 it
;and add a header and tail while copying it to maestro_command_tail. load exec will point to this location.


;***********************************************
;*                                             *
;*      TIMER TICK MAESTRO                     *
;*                                             *
;***********************************************
;nrdata0a.asm change. have the size of entry be expressed as a variable.
tmaestro_task_queue             db  NO_OF_TTQ_ENTRIES * TTQ_ENTRY_DELTA dup(00h)    ;1024 bytes
tmaestro_task_queue_end         dw  tmaestro_task_queue_end

tmaestro_available_resources    dw  0ffffh                                          ;all is available at first

;***********************************************
;*                                             *
;*      INSTALL                                *
;*                                             *
;***********************************************
;INSTALL DATA AREA
;=================
;install portion of catvoice.exe (ie this program's final name) checks for modem hardware at the pre allocated
ports.
;       MODEM_1 AT      2E8     IRQ09
;       MODEM_2 AT      3E8     IRQ10
;       MODEM_3 AT      2E0     IRQ11
;       MODEM_4 AT      3E0     IRQ12    (ordinarily allocated to floppy disk. will it work?)
;as install finds modems, it allocates memory and installs TCB's. It writes at the entries below, what the valu
e of
;the segment register is for the particular TCB. If there is no modem 2 for instance, it writes 0000 at the SEG
 entry.
;install also writes the vector for the corresponding irq to the IVT (interrupt vector table). install then che
cks the
;file CAT.CFG for the name of the step table designated to each modem. It reads the step table from hard disk a
nd loads
;it to allocated memory and writes the SEG value to the entry below.
;all segments initialized to 0000h as 0000h means there was no modem.
modems_tcb_st_seg_table                 dw      0000h           ;SEG modem_0_tcb
                                        dw      0000h           ;SEG step_table for Modem 0.
                                        dw      0000h           ;SEG modem_1_tcb
                                        dw      0000h           ;SEG step_table for Modem 1.
                                        dw      0000h           ;SEG modem_2_tcb
                                        dw      0000h           ;SEG step_table for Modem 2.
                                        dw      0000h           ;SEG modem_3_tcb
                                        dw      0000h           ;SEG step_table for Modem 3.
                                        dw      0000h           ;SEG modem_4_tcb
```

```
                                        dw      0000h               ;SEG step_table for Modem 4.
next_tcb_st_seg                         dw      0000h

;***********************************************
;*                                             *
;*      KEYPAD                                 *
;*                                             *
;***********************************************
;KEYPAD DATA AREA START
key_value                       db      00h
                                db      24h  ;just to make it even and for display string
key_pressed                     db      00h
key_released                    db      00h
irq00_cur_0_keypad_value        dw      ?
irq00_cur_1_keypad_value        dw      ?
irq00_cur_2_keypad_value        dw      ?
keypad_buffer                   db      64 dup("k")
keypad_buffer_end               dw      0000h               ;place holder for end of buffer
keypad_buffer_wr_ptr            dw      keypad_buffer
keypad_buffer_rd_ptr            dw      keypad_buffer

modem_0_get_key_value           db      ?
;KEYPAD DATA AREA END
;*************************************************************************
;*                                                                       *
;*      AT COMMANDS USED                                                 *
;*                                                                       *
;*************************************************************************
;CATVOC0B-3 change to 48 x 2400 from 16 x 2400 for 8 bit PCM.
vcon_at_bdr_16              db      "AT#BDR=48", 0dh, 00h
vcon_at_cls_8               db      "AT#CLS=8", 0dh, 00h
;CATVOC0B-3 change to 8 bit PCM from 2 bit ADPCM.
vcon_at_vbs_4               db      "AT#VBS=08", 0dh, 00h
vcon_at_vls                 db      "AT#VLS=0", 0dh, 00h
;nrdata0a.asm change
vcon_at_vls_ck              db      "AT#VLS?", 0dh, 00h
vcon_at_vrx                 db      "AT#VRX", 0dh, 00h
vcon_at_vtx                 db      "AT#VTX", 0dh, 00h
vcon_ath                    db      "ATH", 0dh, 00h
;sysdata5.asm change. 10/27/95. add dle_can
vcon_dle_can                db      10h, 18h, 00h
vcon_dle_etx                db      10h, 03h, 00h
vcon_exclam                 db      "!", 00h
vcon_ata                    db      "ATA", 0dh, 00h
vcon_at_vts                 db      "AT#VTS=[0500,1500,05]", 0dh, 00h
vcon_at_vss                 db      "AT#VSS=3", 0dh, 00h
vcon_at_vsp                 db      "AT#VSP=055", 0dh, 00h
vcon_at_vsd                 db      "AT#VSD=0", 0dh, 00h
vcon_at_vsr                 db      "AT#VSR=7200 ", 0dh, 00h


;*****************************************************
;*                                                   *
;*      JOB_NUMBER_BUFFER                            *
;*                                                   *
;*****************************************************
job_number_word         dw  0000h
job_number_buffer       db  JOB_MAX_JOB_NUMBER * JOB_ENTRY_DELTA dup("j")   ;64 entries and 16B in each entry
job_number_buffer_end   dw  0000h

;*************************************************************************************
;*                                                                                   *
;*              REPRESENTS CONTENTS OF C:\CATBOX\CAT.CFG FILE                        *
;*                                                                                   *
;*************************************************************************************
;WHEN I GET TO READ FROM THE FILE I SHOULD WRITE TO THESE LOCATIONS.
;and that moment has arrived now. June 19, 95.
cat_cfg             db      "C:\CATBOX\CAT.CFG",00H
cat_cfg_file_handle dw      ?
catsteps_0          db      64 dup("0")
catsteps_1          db      64 dup("1")
catsteps_2          db      64 dup("2")
catsteps_3          db      64 dup("3")
catsteps_4          db      64 dup("4")
cat_cfg_buffer      db      1024 dup("b")
st_modem            db      "st_modem_", 00H
c_disk_column       db      "C:", 00H
cfg_password        db      "password =", 00H
user_password       db      32 dup(00h)
;temporary variable for email script file name. eventually cvboot will read cat_cfg_buffer
;find the file name, build a TTQ entry (we are doing this already) and write the file name
```

```
;to that location.
email_script_file   db      "C:\CATBOX\EMAIL\IAP3.SCR",00H

;*****************************************************************************
;*                                                                           *
;*                  CAT DISC PARAMETERS                                      *
;*                                                                           *
;*****************************************************************************
smax_usable_cylinder    dw      ?
smax_usable_head        db      ?
smax_usable_sector      db      ?
hdc_cylinders           dw      ?

;*****************************************************************************
;*                                                                           *
;*                  CONNECT TO THE SCSI SUBSYSTEM                            *
;*                                                                           *
;*****************************************************************************
SCSIMgrString           db      "SCSINCR$"
ASPI_Entry_off          dw      ?
ASPI_Entry_seg          dw      ?
host_DOS_request_type   dw      ?
host_DOS_request_fn     dw      ?
host_DOS_request_resp   dw      ?
host_CAS_request_type   dw      ?
host_CAS_request_fn     dw      ?
host_CAS_request_resp   dw      ?
;*****************************************************************************
;*                                                                           *
;*                  PRINTER QUEUE                                            *
;*                                                                           *
;*****************************************************************************
printer_task_queue              db      NO_OF_PTQ_ENTRIES * PTQ_ENTRY_DELTA dup (00h)
printer_task_queue_end          dw      0000h
ttq_fgprint_ptr                 dw      ?       ; loaded by cvboot with value of ttics for fgprint
ttq_send_host_fax_ptr           dw      ?       ; loaded by cvboot with value of TTICS
ttq_print_in_fax_ptr            dw      ?       ; loaded by cvboot with value of TTICS
host_initiated_send_fax_count   dw      0
incoming_fax_count              dw      0
print_two_bit_filename          db      "C:\CATBOX\PRINT\SPOOL\00.HPR", 00h
;a reference to this name must be in CAT.CFG and cvboot reads it from there.
host_print_file_name            db      "C:\CATBOX\PRINT\SPOOL\HALUK.PCL", 00H
                                db      32 dup(00h)
;*****************************************************************************
;*                                                                           *
;*                  HOST REQ RD CALLBACK                                     *
;*                                                                           *
;*****************************************************************************
host_DOS_req_rd_callback_done   db      0
host_CAS_req_rd_callback_done   db      0

number_of_rings_to_answer       dw      4           ; cvboot should get this from CAT.CFG
max_time_between_rings          dw      180         ; 10 seconds ie 180 timer ticks.
                                                    ; measurements showed 6 seconds
                                                    ; it should be larger than interval but
                                                    ; smaller than last ring from last call
                                                    ; to first ring from this call.


END
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;casmodem fakedata. we keep this segment to get the offsets
;during linking and then discard the segment.
;this is accessed by cd4.asm.
.model      compact
.386P
                public  fake_data_org
                public  loc0006
                public  loc00a0
                public  loc02b6
                public  loc1459
                public  loc19f6
                public  loc1fa3
                public  loc1fa4
                public  loc1fa6
                public  loc1faa
                public  loc1fac
                public  loc1fb6
                public  loc1fc0
                public  loc1fc5
                public  loc1fc6
                public  loc1fce
                public  loc1fcf
                public  loc1fd0
                public  loc1fd1
                public  loc1fd2
                public  loc1fd4
                public  loc1fda
                public  loc1fde
                public  loc1fe0
                public  loc23e7
                public  loc23e9
                public  loc23eb
                public  loc3082
                public  loc37c1
.fardata
;.fardata guarantees that org's are observed
;casmodem_trick segment word private 'far_data'
;this is a ruse to get the correct addresses in the machine code. tsr exit will discard.
                org     93afh
fake_data_org   dw      "HA"
        org 0006h
loc0006     dw  ?
        org 00a0h
loc00a0     dw  ?
        org 02b6h
loc02b6     dw  ?
        org 1459h
loc1459     dw  ?
        org 19f6h
loc19f6     dw  ?
        org 1fa3h
loc1fa3     dw  ?
        org 1fa4h
loc1fa4     dw  ?
        org 1fa6h
loc1fa6     dw  ?
        org 1faah
loc1faa     dw  ?
        org 1fach
loc1fac     dw  ?
        org 1fb6h
loc1fb6     dw  ?
        org 1fc0h
loc1fc0     dw  ?
        org 1fc5h
loc1fc5     dw  ?
        org 1fc6h
loc1fc6     dw  ?
        org 1fceh
loc1fce     dw  ?
        org 1fcfh
loc1fcf     dw  ?
        org 1fd0h
loc1fd0     dw  ?
        org 1fd1h
loc1fd1     dw  ?
        org 1fd2h
loc1fd2     dw  ?
        org 1fd4h
```

```
loc1fd4     dw  ?
        org 1fdah
loc1fda     dw  ?
        org 1fdeh
loc1fde     dw  ?
        org 1fe0h
loc1fe0     dw  ?
        org 23e7h
loc23e7     dw  ?
        org 23e9h
loc23e9     dw  ?
        org 23ebh
loc23eb     dw  ?
        org 3082h
loc3082     dw  ?
        org 37c1h
loc37c1     dw  ?
;casmodem_trick ends
end
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;catequ0e.inc L7 changes. 11/3/95.
;catequ0e.inc <- catequ0d.inc. 9/21/95. remove sys_data structure.
;catequ0d.inc <- catequ0d.inc. 9/14/95. this rev will make the modem data into a structure
;called modem_data. in addition, it will make the sysdata contents into a structure. for a while
;these structures will co exist with the data arrays they are replacing.
;catequ0c.inc <- catequ0b.inc. 6/7/95. add int 21 hook.  note: I have not used rev c at all.
;it is a part of catvocm which also is not used.
;catequ0a.asm <-catequ09.asm. 6/8/95.
;catequ08.inc <- catequ07.inc. 5/1/95. add pfi and rmi related variables and constants.
;catequ07.inc <- catequ06.inc. 5/26/95. implements di addition to cur_step_dtmf.
;also vma variables
;catequ06.inc <- catequ05.inc. 5/18/95. implements job_history buffer and related updates
;to MTICS structure.
;catequ05.inc <- catequ04.inc. 5/13/95. CATVOCD-0
;catequ04.inc <- catequ03.inc. 5/11/95. 5-95-80. multitasking. CATVOC0C-0
;catequ03.inc <- catequ02.inc (version in goodcv07=goodcv06). CATVOC0B-2 changes.
;*****************************************************************************
;* NAME: catequ.asm                                                          *
;* VERSION: 0b                                                               *
;* FUNCTION: contains all equates for the CATVOICE.EXE                       *
;* AUTHOR: Haluk Aytac                                                       *
;* DATE: June 14, 1995                                                       *
;* UPDATED: June 14, 1995                                                    *
;* INPUT:  N/A                                                               *
;* OUTPUT:  N/A                                                              *
;* REGISTERS CORRUPTED: NONE                                                 *
;* PSEUDOCODE: N/A                                                           *
;* NOTES:                                                                    *
;* HISTORY:                                                                  *
;*****************************************************************************
;catequ0d.inc changes

INDEX_FILE_IN_MPS_SIZE                  EQU     1000H
EMAIL_SCRIPT_BUFFER_SIZE                EQU      800H

;=================================
;       DATA EQUS               II
;=================================


CAT                             EQU       01H
CAS                             EQU       02H
CAS_FKS_TO_CAT                  EQU     0100H
YES                             EQU       01H
NO                              EQU       00H
TRUE                            EQU       01H
FALSE                           EQU       00H
VCON_YES                        EQU       01H
VCON_NO                         EQU       00H
ASCII_BASE                      EQU     0030H

;MODEM_0 RELATED
;================
DTMF_SOURCE_KEYPAD              EQU     0005H
DTMF_SOURCE_HANDSET             EQU     0001H

;ACTIONS RELATED
;================
;catequ0b.inc change. see process table at end of emit_msg in action.asm. open file and etx.
;add lcd
VCON_EMIT_MSG_OPENED_FILE               EQU     0001H
VCON_EMIT_MSG_ISSUED_LCD                EQU     0005H
VCON_EMIT_MSG_CLS_ISSUED                EQU     0002H   ;not being done
VCON_EMIT_MSG_VBS_ISSUED                EQU     0003H   ;not being done
VCON_EMIT_MSG_BDR_ISSUED                EQU     0004H   ;not being done
EM_VLS_CK_ISSUED                        EQU     0006H
VCON_EMIT_MSG_VLS_ISSUED                EQU     0007H
VCON_EMIT_MSG_VTX_ISSUED                EQU     0008H
VCON_EMIT_MSG_DATA_ISSUED               EQU     0009H
;CATVOC0B-3: remove closed file and have etx_issued point to next guy and renumber.
VCON_EMIT_MSG_ETX_ISSUED                EQU     000BH
VCON_EMIT_MSG_ATH_ISSUED                EQU     000AH   ;not being done
VCON_EMIT_MSG_CHK_INT13_1               EQU     000CH

EM_OFFSET_TO_VLS                        EQU     0004H
EM_OFFSET_TO_STOP_ON_DLE                EQU     0006H
OFFSET_TO_EM_LCD_YES_NO                 EQU     0008H

NA_OFFSET_TO_STOP_ON_DLE                EQU     0002H
```

```
VCON_EMIT_MSG_EXPECT_OK                 EQU     0001H
VCON_EMIT_MSG_EXPECT_VCON               EQU     0002H
VCON_EMIT_MSG_EXPECT_CONNECT            EQU     0003H
VCON_EMIT_MSG_EXPECT_XMIT_CNT_0         EQU     0004H
VCON_EMIT_MSG_EXPECT_VCON_2             EQU     0005H
EM_EXPECT_NBR_TO_VLS_CK                 EQU     0006H

VCON_RECO_MSG_CLS_ISSUED                EQU     0001H   ;not being done
VCON_RECO_MSG_VBS_ISSUED                EQU     0002H   ;not being done
VCON_RECO_MSG_BDR_ISSUED                EQU     0003H   ;not being done
RM_VLS_CK_ISSUED                        EQU     0004H
;CHANGE. 10/19/95. WAS 0005 -> 000B
VCON_RECO_MSG_VLS_ISSUED                EQU     000BH
;NOTE THIS WILL MAKE IT SO CATEQU0E.INC ONLY WORKS WITH ACTION0H.A$M
VCON_RECO_MSG_VTS_ISSUED                EQU     0005H
VCON_RECO_MSG_VRX_ISSUED                EQU     0006H
VCON_RECO_MSG_DATA_ISSUED               EQU     0007H
VCON_RECO_MSG_EXCLAM_ISSUED             EQU     0008H
;catequ0b.inc change
VCON_RECO_MSG_CLOSED_FILE               EQU     000AH
VCON_RECO_MSG_ATH_ISSUED                EQU     000AH

VCON_RECO_MSG_EXPECT_OK                 EQU     0001H
VCON_RECO_MSG_EXPECT_VCON               EQU     0002H
VCON_RECO_MSG_EXPECT_CONNECT            EQU     0003H
VCON_RECO_MSG_EXPECT_DLE_ETX            EQU     0004H
VCON_RECO_MSG_EXPECT_VCON_2             EQU     0005H
RM_EXPECT_NBR_TO_VLS_CK                 EQU     0006H

RM_OFFSET_TO_VLS                        EQU     0004H
RM_OFFSET_TO_STOP_ON_DLE                EQU     0006H
RM_OFFSET_TO_SESSION_LENGTH_MSG_PTR     EQU     0008H

RMI_EXPECT_OK                           EQU     0001H
RMI_EXPECT_VCON                         EQU     0002H
RMI_EXPECT_CONNECT                      EQU     0003H
RMI_EXPECT_DLE_ETX                      EQU     0004H
RMI_EXPECT_VCON_2                       EQU     0005H
;catequ0b.inc change. 2 lines
RMI_EXPECT_NBR_TO_VLS_CK                EQU     0006H
RMI_SEQ_CNTR_RESET                      EQU     0003H

RMI_CLS_ISSUED                          EQU     0001H
RMI_VBS_ISSUED                          EQU     0002H
RMI_BDR_ISSUED                          EQU     0003H
RMI_VLS_CK_ISSUED                       EQU     0004H
RMI_VLS_ISSUED                          EQU     0005H
RMI_VRX_ISSUED                          EQU     0006H
RMI_DATA_ISSUED                         EQU     0007H
RMI_EXCLAM_ISSUED                       EQU     0008H

RMI_SUBMITTED_MAKFNAME                  EQU     0009H
RMI_MAKFNAME_GOT_11                     EQU     000AH
RMI_MAKFNAME_GOT_33                     EQU     000BH
RMI_MAKFNAME_GOT_55                     EQU     000CH
RMI_MAKFNAME_GOT_77                     EQU     000DH
RMI_SUBMITTED_STFFMHDC                  EQU     000EH
RMI_SUBMITTED_UPDATVQ                   EQU     000FH
;catequ0b.inc change
RMI_UPDATVQ_GOT_00                      EQU     0011H
RMI_ATH_ISSUED                          EQU     0011H

;SEQUENCING THROUGH THE PFI
;==========================
PFI_STARTED_UPDATE_PGM                  EQU     0001H
PFI_MEM_ALLOCATED                       EQU     0002H
PFI_UPDATE_DONE                         EQU     0003H
PFI_GOT_FIRST_NEW_FAX                   EQU     0004H
PFI_PRINTED_FAX                         EQU     0005H
PFI_PRINTED_FAXES_ANNOUNCED             EQU     0006H
PFI_COMPACTING_DONE                     EQU     0007H
PFI_ERASE_ANNOUNCED                     EQU     0008H
PFI_ERASE_ANNOUNCED_ALL                 EQU     0009H

PF_OFFSET_TO_VLS                        EQU     0004H
PF_OFFSET_TO_STOP_ON_DLE                EQU     0006H

;SEQUENCING THROUGH THE VMA
;==========================
VMA_STARTED_MERGE_PGM                   EQU     0001H   ;not used
```

```
VMA_MEM_ALLOCATED                       EQU     0002H   ;not used
VMA_MERGE_DONE                          EQU     0003H   ;not used
VMA_GOT_FIRST_NEW_MESSAGE               EQU     0001H
VMA_PLAYED_MESSAGE                      EQU     0002H
VMA_PLAYED_MSGS_ANNOUNCED               EQU     0006H   ;not used
VMA_COMPACTING_DONE                     EQU     0007H   ;not used
;18 change. 11/12/95. add reply_processing step
VMA_REPLY_PROCESSING                    EQU     0003H

VM_OFFSET_TO_VLS                        EQU     0004H
VM_OFFSET_TO_STOP_ON_DLE                EQU     0006H


SP_ISSUE_REQUEST                        EQU     0000H
SP_WAIT_FOR_ACK                         EQU     0001H
SP_ISSUE_LCD_MSG                        EQU     0002H
SP_WAIT_FOR_COMPLETION                  EQU     0003H
SP_COMPLETE                             EQU     0004H

SP_OFFSET_TO_WAIT_TO_COMPLETE           EQU     000CH


TQR_ISSUE_REQUEST                       EQU     0000H
TQR_COMPLETE_TQR                        EQU     0001H

TQR_OFFSET_TO_STARTING_STEP_NUMBER      EQU     0002H
TQR_OFFSET_TO_FILENAME_PTR              EQU     0004H
TQR_OFFSET_TO_RESOURCES_REQUIRED        EQU     0006H

ACD_ACTION_EMIT_MSG                     EQU     0001H
ACD_ACTION_NO_ACTION                    EQU     0002H
ACD_ACTION_LCD_ECHO                     EQU     0003H
ACD_ACTION_START_PROGRAM                EQU     0004H

OFFSET_TO_ACD_TYPE                      EQU     0004H
OFFSET_TO_ACD_REPEAT_COUNT              EQU     0006H
OFFSET_TO_ACD_LCD_YES_NO                EQU     000CH
ACD_OFFSET_TO_STOP_ON_DLE               EQU     0008H
ACD_OFFSET_TO_NUMBER_ADDRESS            EQU     000AH

ACD_GET_NBR_OF_COPIES                   EQU     0001H
ACD_GET_PHONE_NUMBER                    EQU     0002H
ACD_GET_FAXBACK_DOC_NUMBER              EQU     0003H
ACD_GET_VOICE_MAIL_NUMBER               EQU     0004H
ACD_GET_PASSWORD                        EQU     0005H
ACD_CHANGE_PASSWORD                     EQU     0006H

ACD_PASSED                              EQU     0001H
ACD_FAILED                              EQU     0000H

VCON_HANG_UP_ATH_ISSUED                 EQU     0001H

VCON_HANG_UP_EXPECT_OK                  EQU     0001H

VCON_LINE                               EQU     0000H
VCON_HANDSET                            EQU     0001H
VCON_SPEAKER                            EQU     0002H
VCON_MICROPHONE                         EQU     0003H
VCON_LINE_HANDSET_SPKR                  EQU     0004H
;catequ0b.inc change
VCON_KEYPAD                             EQU     0010H
VCON_RESOURCE_IN_CURRENT                EQU    0FFFFH
VCON_RESOURCE_OUT_CURRENT               EQU    0FFFFH
VCON_RESOURCE_DTMF_CURRENT              EQU    0FFFFH

DOS_FREE                                EQU       00H
DOS_BUSY                                EQU       01H
READ_FILE                               EQU       3FH
OPEN_FILE_RO                            EQU     3D00H
OPEN_FILE_RW                            EQU     3D02H
CREATE_FILE                             EQU       3CH
CLOSE_FILE                              EQU       3EH
DELETE_FILE                             EQU       41H
WRITE_FILE                              EQU       40H
NO_MORE_BYTES                           EQU     0000H


;STEP TABLE AREA
;================
;THESE EQU WILL BE INSIDE CATVOICE.EXE TO HELP IT RECOGNIZE THE STEP TABLE
```

```
EXPECT_DTMF                             EQU 0001H
DO_NOT_EXPECT_DTMF                      EQU 0000H
;catequ0b.inc change
SP_PARAM_2_SEG                          EQU 8000H
RESET_WORD                              EQU 0000H
SET_WORD                                EQU 0001H
NULL                                    EQU   00H
NO_DTMF                                 EQU   01H
PWD_MATCHED                             EQU 0001H
PWD_UNMATCHED                           EQU 0000H
STOP_ON_DLET                            EQU 0001H
;catequ0b.inc changes
STOP_ON_DLEH                            EQU 0002H
STOP_ON_DLES                            EQU 0004H
STOP_ON_DLEQ                            EQU 0008H
STOP_ON_DLEC                            EQU 0010H
;end catequ0b.inc changes
DO_NOT_STOP_ON_DLE                      EQU 0000H
;catequ0b.inc change
OFFSET_TO_ST_SEG_NUMBER                 EQU 0002H
OFFSET_TO_TCB_SEG_NUMBER                EQU 0004H
OFFSET_TO_SYS_DATA_SEG_NUMBER           EQU 0006H
OFFSET_TO_MODEM_NUMBER                  EQU 0008H

OFFSET_TO_NEXT_STEP_AREA                EQU 0006H
ST_SESS_PARAMS_PTR_ADDR                 EQU 0000H
ST_SESS_PARAMS_MODEM_RES_IN             EQU 0002H
ST_SESS_PARAMS_MODEM_RES_OUT            EQU 0004H
ST_SESS_PARAMS_MODEM_RES_DTMF           EQU 0006H
ST_SESS_PARAMS_NO_OF_COPIES             EQU 0008H

ST_SESS_PARAMS_REPEAT_CNT               EQU 000CH
ST_SESS_PARAMS_REPEAT_COUNTER           EQU 000EH
ST_SESS_PARAMS_PHONE_NUMBER             EQU 0010H
ST_SESS_PARAMS_PASSWORD                 EQU 0038H
ST_SESS_PARAMS_PASSWORD_CHECK           EQU 0058H

DTMF_ANALYZE                            EQU     0000H
JUMP_UNCOND                             EQU     0001H
;catequ0b.inc change
GOTO_INCOMING_FAX                       EQU     0002H
GOTO_VOICE_PROCESSING                   EQU     0000H
GOTO_TTQ_REQUEST                        EQU     0001H
GOTO_KPAD_DTMF                          EQU     0003H
;end catequ0b.inc change
;catequ0e.inc change. 11/03/95.
GOTO_WAIT_ON_DLEH                       EQU     0003H   ; upon dlet
GOTO_ATH_OR_PREV_STATE                  EQU     0004H   ; upon dleh

DO_NOT_WAIT_TO_COMPLETE                 EQU     0000H
WAIT_TO_COMPLETE                        EQU     0001H
LCD_MESSAGE_YES                         EQU     0001H
LCD_MESSAGE_NO                          EQU     0000H

;ACTION SPECIFIC, FIXED LOCATION,  STEP TABLE STEPS
;=================================================
;FIXED LOCATION STATES
;=====================
;tmaestro                                               state_0000

;start_program inside emit_msg (program_name: ldftohdc)     state_0001

;start_program inside reco_msg (program_name: stffmhdc)     state_0002

;start_program inside vma      (program_name: mergevef)     state_0003
;emit_msg inside vma                                       state_0004
;no_action inside vma                                      state_0005

;start_program #1 inside rmi   (program_name: makfname)     state_0006
;start_program #2 inside rmi   (program_name: stffmhdc)     state_0007
;start_program #3 inside rmi   (program_name: updatevq)     state_0008

;start_program #1 inside pfi   (program_name: updatefq)     state_0009
;start_program #2 inside pfi   (program_name: printfax)     state_000a
;no_action inside pfi                                      state_000b

;emit_msg_inside_tmo                                       state_000c

;

HMP_TASK_MASTER_STEP_NO                 EQU     0099H   ; need the actual number ???????
```

```
ACD_EMIT_MSG_STEP                       EQU     000DH
ACD_NO_ACTION_STEP                      EQU     000EH
ACD_START_PROGRAM_STEP                  EQU     000FH

TMO_EMIT_MSG_STEP                       EQU     000CH

PFI_START_PROGRAM_STEP_1                EQU     0009H
PFI_START_PROGRAM_STEP_2                EQU     000AH
PFI_NO_ACTION_STEP                      EQU     000BH

RMI_START_PROGRAM_STEP_1                EQU     0006H
RMI_START_PROGRAM_STEP_2                EQU     0007H
RMI_START_PROGRAM_STEP_3                EQU     0008H

VMA_START_PROGRAM_STEP                  EQU     0003H
VMA_EMIT_MSG_STEP                       EQU     0004H
VMA_NO_ACTION_STEP                      EQU     0005H

AM_PAUSE                                EQU     01H
AM_RESUME                               EQU     02H
AM_NULL                                 EQU     00H

RECO_MSG_START_PROGRAM_STEP             EQU     0002H
EMIT_MSG_START_PROGRAM_STEP             EQU     0001H           ;in every step table step 5 is start_program
                                                                ;wish list:     state 0 = no_action
                                                                ;               state 1 = hang_up
                                                                ;               state 2 = start_program emit
                                                                ;               state 3 = start_program reco
;catequ0b.inc change 6 -> 8 now that we have sys_data_seg
;catequ0b.inc change. 7/19/95. 8->A for st_modem_number.
OFFSET_TO_STEP_ENTRIES                  EQU     000AH           ;ptr to sess params + st_seg + tcb_seg + sys_da
ta_seg
OFFSET_TO_PARAM_ADDR                    EQU     0004H
OFFSET_TO_FILENAME                      EQU     0002H
OFFSET_TO_ARGUMENT                      EQU     0004H           ;applies to start_program.
;catequ0b.inc change. argument is now a double word ptr (start_program) 0006H -> 0008H
OFFSET_TO_PGM_PARAMETER                 EQU     0008H           ;applies to start_program
OFFSET_TO_STEP_STATUS                   EQU     0002H           ;applies to start_program
OFFSET_TO_INPUTS                        EQU     0000H
OFF_TO_RESOURCE_IN_VLSSTR               EQU     07H


;INSTALL
;=======
MODEM_TCB                               EQU     0               ;mov    ax, cs
MODEM_ST                                EQU     2               ;mov    ds, ax
MODEM_0                                 EQU     0               ;mov    bx, OFFSET modems_tcb_st_seg_table
MODEM_1                                 EQU     1               ;mov    ax, ds:word ptr [bx + 4 * MODEM_1 + MOD
EM_TCB]
MODEM_2                                 EQU     2               ;mov    gs, ax
MODEM_3                                 EQU     3               ;mov    ax, ds:word ptr [bx + 4 * MODEM_1 + MOD
EM_ST]
MODEM_4                                 EQU     4               ;mov    fs, ax

;MAESTRO
;========
MTICS_PGM_STATUS                        EQU     0000H   ;BYTE
MTICS_PGM_STATUS_IDLE                   EQU       00H
MTICS_PGM_STATUS_RUNNING                EQU       01H
MTICS_PGM_STATUS_SUSPENDED              EQU       02H
MTICS_PGM_STATUS_ABORTED                EQU       03H
MTICS_PGM_STATUS_COMPLETED              EQU       04H

MTICS_HANDSHAKE                         EQU     0001H   ;BYTE
MTICS_HANDSHAKE_NULL                    EQU       00H
MTICS_HANDSHAKE_ST_REQ_MADE             EQU       01H
MTICS_HANDSHAKE_M_REQ_ACKNOWLEDGED      EQU       02H
MTICS_HANDSHAKE_ST_ABORT_REQ_MADE       EQU       03H
MTICS_HANDSHAKE_M_ABORT_REQ_ACKED       EQU       04H
MTICS_HANDSHAKE_ST_COMPLETION_ACKED     EQU       05H
MTICS_HANDSHAKE_ST_ABORTION_ACKED       EQU       06H

MTICS_PRIORITY                          EQU     0002H   ;BYTE
MTICS_PRIORITY_HI                       EQU       02H
MTICS_PRIORITY_LO                       EQU       01H
MTICS_PRIORITY_NULL                     EQU       00H

MTICS_FREE_TO_USE_STATUS                EQU     0003H   ;BYTE
MTICS_FREE_TO_USE                       EQU       00H
MTICS_NOT_FREE_TO_USE                   EQU       01H
```

```
MTICS_PGM_RUNNING_TIMER_TICKS           EQU     0004H   ;WORD
MTICS_PGM_NAME_DWORD_PTR                EQU     0006H   ;DWORD
;catequ0b.inc change. program argument is brought in as body and not pointer. sp also changes. 7-95-91.
MTICS_PGM_ARGUMENT                      EQU     000AH   ;64 BYTES
MTICS_PGM_PARAMETER_DWORD               EQU     004AH   ;DWORD
MTICS_PGM_AX                            EQU     004EH   ;WORD
MTICS_PGM_BX                            EQU     0050H   ;WORD
MTICS_PGM_CX                            EQU     0052H   ;WORD
MTICS_PGM_DX                            EQU     0054H   ;WORD
MTICS_PGM_BP                            EQU     0056H   ;WORD
MTICS_PGM_DI                            EQU     0058H   ;WORD
MTICS_PGM_SI                            EQU     005AH   ;WORD
MTICS_PGM_DS                            EQU     005CH   ;WORD
MTICS_PGM_ES                            EQU     005EH   ;WORD
MTICS_PGM_FS                            EQU     0060H   ;WORD
MTICS_PGM_GS                            EQU     0062H   ;WORD
MTICS_PGM_IP                            EQU     0064H   ;WORD
MTICS_PGM_CS                            EQU     0066H   ;WORD
MTICS_PGM_FLAGS                         EQU     0068H   ;WORD
MTICS_PGM_PSP                           EQU     006AH   ;WORD
MTICS_PGM_DTA_OFF                       EQU     006CH   ;WORD
MTICS_PGM_DTA_SEG                       EQU     006EH   ;WORD
;CATVOC0C-0: next 2 lines
MTICS_PGM_SP                            EQU     0070H   ;WORD
MTICS_PGM_SS                            EQU     0072H   ;WORD
;catequ06.asm change
MTICS_WAIT_TO_COMPLETE                  EQU     0074H   ;WORD start_program loads this
                                                        ;     maestro completion checks it
MTICS_JOB_NUMBER                        EQU     0076H   ;WORD maestro_launch loads this
MTICS_JOB_STARTING_T2                   EQU     0078H   ;WORD maestro_launch loads this
MTICS_JOB_ENDING_T2                     EQU     007AH   ;WORD maestro completion check loads this

MTQ_ENTRY_DELTA                         EQU     0080H   ;128  bytes per queue entry.


;TMAESTRO
;========
TTICS_STA_STATUS                        EQU     0000H   ;BYTE
TTICS_STA_STATUS_IDLE                   EQU       00H
TTICS_STA_STATUS_RUNNING                EQU       01H
TTICS_STA_STATUS_COMPLETED              EQU       04H

TTICS_HANDSHAKE                         EQU     0001H   ;BYTE
TTICS_HANDSHAKE_NULL                    EQU       00H
TTICS_HANDSHAKE_ST_REQ_MADE             EQU       01H
TTICS_HANDSHAKE_TMO_REQ_ACKNOWLEDGED    EQU       02H

TTICS_PRIORITY                          EQU     0002H   ;BYTE
TTICS_PRIORITY_HI                       EQU       02H
TTICS_PRIORITY_LO                       EQU       01H
TTICS_PRIORITY_NULL                     EQU       00H
;catequ0b.inc change for permanent tasks such as fastprint.
TTICS_PRIORITY_PERMANENT                EQU       03H
TTICS_PRIORITY_HOST_DATA_MODEM          EQU       04H

TTICS_FREE_TO_USE_STATUS                EQU     0003H   ;BYTE
TTICS_FREE_TO_USE                       EQU       00H
TTICS_NOT_FREE_TO_USE                   EQU       01H

;catequ0b.inc change. the vars are words so inc by 2 and not 1.
;8-95-10.
;when task is placed in queue, reset the interval counter. when task is started, reset the
;interval counter again. this way when task is completed, you know how long it took. the
;interval counter is incremented at each timer tick. if there are 16 TTQ entries, then
;all 16 interval counters are incremented. for permaent tasks, when task is completed
;reset the counter again. thus this counter measures two things:
;       time between starts
;       length of execution
;division of labor:
;   CVBOOT  places permanent tasks in TTQ and resets all counters
;   TTISR   blindly increments all timers
;   TTQREQ  places a task in TTQ and resets its counter
;   TMO     measures the interval and if large enough, launches the task and resets its counter.
TTICS_STA_TIME_INTERVAL                 EQU     0004H   ;DOUBLE WORD
TTICS_MASPI_DMS_PTR                     EQU     0004H   ;DOUBLE WORD (for type: host_data_modem)
TTICS_STA_INTERVAL_COUNTER              EQU     0008H   ;DOUBLE WORD

TTICS_STA_STARTING_STEP_NUMBER          EQU     000CH   ;WORD

TTICS_STA_RESOURCES_REQUIRED            EQU     000EH   ;WORD
```

```
TTICS_STA_PRINTER_REQUIRED              EQU     0001H
TTICS_STA_SCANNER_REQUIRED              EQU     0002H
TTICS_STA_MODEM_0_REQUIRED              EQU     0100H   ;subtract one to get modem number
TTICS_STA_MODEM_1_REQUIRED              EQU     0200H
TTICS_STA_MODEM_2_REQUIRED              EQU     0300H
TTICS_STA_MODEM_3_REQUIRED              EQU     0400H
TTICS_STA_MODEM_4_REQUIRED              EQU     0500H
TTICS_STA_MODEM_X_REQUIRED              EQU     0000H   ;don't care which modem.

TTICS_STA_FILENAME                      EQU     0010H   ;64 BYTES IE 20H

TTQ_ENTRY_DELTA                         EQU     0050H   ;80 BYTES PER ENTRY

NO_OF_TTQ_ENTRIES                       EQU     16      ;16 ENTRIES


;LCD
;===
FIRST                                   EQU       01H
SECOND                                  EQU       02H
LCD_CLEAR_SCREEN                        EQU       00H
LCD_FUNCTION_SET                        EQU       20H
LCD_DISPLAY_OFF                         EQU       40H
LCD_DISPLAY_ON                          EQU       60H
LCD_SAVE_SCREEN                         EQU       80H
LCD_RESTORE_SCREEN                      EQU      0A0H
LCD_WRITE_SCREEN_LINE                   EQU      0C0H
LCD_WRITE_SCREEN_LINE_STAR              EQU      0E0H

LCD_MAX_STEP_COUNT                      EQU       14H   ;allow 20 lcd operations in a tt


;IRQCOD
;======
XMIT_BUF_SIZE                           EQU     0800H

;AT COMMANDS
;===========
lat_bdr_16          equ   000bh
lat_cls_8           equ   000ah
lat_vbs_4           equ   000bh             ; changed 10/20/95
lat_vls             equ   000ah
;catequ0b.inc
lat_vls_ck          equ   0009h
lat_vrx             equ   0008h
lat_vtx             equ   0008h
lath                equ   0005h
lvcon_dle_etx       equ   0003h
lvcon_exclam        equ   0002h
lata                equ   0005h
lat_vts             equ   0017h
lat_vss             equ   000ah
lat_vsp             equ   000ch
lat_vsd             equ   000ah
lat_vsr             equ   000eh

;JOB NUMBER BUFFER
;=================
JOB_NUMBER          EQU 0000H                           ;WORD
JOB_STARTING_T2     EQU JOB_NUMBER          +   0002H   ;WORD
JOB_ENDING_T2       EQU JOB_STARTING_T2     +   0002H   ;WORD
JOB_PGM_NAME_OFF    EQU JOB_ENDING_T2       +   0002H   ;WORD
JOB_PGM_NAME_SEG    EQU JOB_PGM_NAME_OFF    +   0002H   ;WORD

JOB_ENTRY_DELTA     EQU 10H                             ;16 BYTES FOR EASY READABILITY ON SOFTICE
JOB_MAX_JOB_NUMBER  EQU 40H                             ;64 JOBS


;DTMF
;=====
DTMF_A          EQU     2EH     ;* what comes in is 2a but gets transformed
DTMF_B          EQU     2FH     ;# what comes in is 23 but gets transformed
DTMF_0          EQU     30H     ; for the sake of smoothness in next step calculation.
DTMF_1          EQU     31H
DTMF_2          EQU     32H
DTMF_3          EQU     33H
DTMF_4          EQU     34H
DTMF_5          EQU     35H
DTMF_6          EQU     36H
DTMF_7          EQU     37H
DTMF_8          EQU     38H
```

```
DTMF_9          EQU     39H

;STRUCTURE OF THE FMA QUEUE FILE
;================================
;*****************************************************************
;*                                                               *
;*      PROCEDURE FMA.QUE FILE OPERATIONS  EQUS                  *
;*                                                               *
;*****************************************************************
;define fma header structure
QF_FILE_SIZE                    EQU     0000H
QF_FORWARD_INDEX                EQU     0002H
QF_BCKWARD_INDEX                EQU     0004H
QF_FRE_CHAIN_FWD_LNK            EQU     0010H
QF_FRE_CHAIN_BWD_LNK            EQU     0012H
QF_NEW_CHAIN_FWD_LNK            EQU     0050H
QF_NEW_CHAIN_BWD_LNK            EQU     0052H
QF_OLD_CHAIN_FWD_LNK            EQU     0090H
QF_OLD_CHAIN_BWD_LNK            EQU     0092H

;define the qf record structure
QFR_RECORD_SIZE                 EQU     0040H

QFR_FWD_LNK                     EQU     0000H   ;UNIVERSAL PORTION OF RECORD
QFR_BWD_LNK                     EQU     0002H
QFR_RECORD_TYPE                 EQU     0004H   ;BYTE

QFRF_MODEM_NUMBER               EQU     0005H   ;BYTE
QFRF_EVENT_HANDLE               EQU     0006H   ;WORD
QFRF_EVENT_DATE                 EQU     0008H   ;DWORD
QFRF_EVENT_TIME                 EQU     000CH   ;DWORD
QFRF_MATCHED                    EQU     0010H   ;WORD


;fma operations
QFOP_ADD_TO_FRE_CHAIN           EQU     00H
QFOP_DEL_FM_FRE_CHAIN           EQU     80H
QFOP_NXT_IN_FRE_CHAIN           EQU     10H
QFOP_PRV_IN_FRE_CHAIN           EQU     20H

QFOP_ADD_TO_NEW_CHAIN           EQU     01H
QFOP_DEL_FM_NEW_CHAIN           EQU     81H
QFOP_NXT_IN_NEW_CHAIN           EQU     11H
QFOP_PRV_IN_NEW_CHAIN           EQU     21H

QFOP_ADD_TO_OLD_CHAIN           EQU     02H
QFOP_DEL_FM_OLD_CHAIN           EQU     82H
QFOP_NXT_IN_OLD_CHAIN           EQU     12H
QFOP_PRV_IN_OLD_CHAIN           EQU     22H

QFOP_ELI_ND_ADJ_FSIZE           EQU     40H

ERROR_FILE_NOT_FOUND            EQU     0002H
ERROR_PATH_NOT_FOUND            EQU     0003H
ERROR_TOO_MANY_OPEN_FILES       EQU     0004H
ERROR_ACCESS_DENIED             EQU     0005H

YES                             EQU     01H
NO                              EQU     00H

MATCHED                         EQU     0001H
UNMATCHED                       EQU     0000H

BEGINNING                       EQU     0001H
ENDING                          EQU     0000H

FRE_RECORD                      EQU     00H
NEW_RECORD                      EQU     01H
OLD_RECORD                      EQU     02H

PLAY_NEW_QUEUE                  EQU     01H
PLAY_OLD_QUEUE                  EQU     02H

PLAY_FORWARD_DIRECTION          EQU     10H
PLAY_BCKWARD_DIRECTION          EQU     20H


;STRUCTURE OF THE VMA QUEUE FILE
;================================
;*****************************************************************
```

```
;*                                                                    *
;*      PROCEDURE FMA.QUE FILE OPERATIONS  EQUS                       *
;*                                                                    *
;**********************************************************************

;define the qf record structure

QFRV_EVENT_FILENAME             EQU     0006H   ;20H BYTES
QFRV_EVENT_FILESIZE             EQU     0026H   ;DWORD
QFRV_EVENT_DATE                 EQU     002AH   ;WORD
QFRV_EVENT_TIME                 EQU     002CH   ;WORD
QFRV_RECORD_INFO                EQU     002EH   ;WORD


;FIRST CASE OF A SP PROGRAM ACCESSING SYS_DATA
;=============================================
SYS_DATA_OFFSET_TO_LOADED_INDEX_FILES   EQU     0000H

;HOST_DOS_REQUEST RELATED EQUS
;=============================
HOST_DOS_REQUEST_TYPE_NULL      EQU     0000H
HOST_DOS_REQUEST_TYPE_ENTER     EQU     4949H
HOST_DOS_REQUEST_TYPE_EXIT      EQU     4F4FH
HOST_DOS_REQUEST_RESP_NULL      EQU     0000H
HOST_DOS_REQUEST_RESP_ENTER_ACK EQU     0001H
HOST_DOS_REQUEST_RESP_EXIT_ACK  EQU     0002H
HOST_DOS_REQUEST_RESP_STALL     EQU     0003H
HOST_CAS_REQUEST_TYPE_NULL      EQU     0000H
HOST_CAS_REQUEST_TYPE_ENTER     EQU     4949H
HOST_CAS_REQUEST_TYPE_EXIT      EQU     4F4FH
HOST_CAS_REQUEST_RESP_NULL      EQU     0000H
HOST_CAS_REQUEST_RESP_ENTER_ACK EQU     0001H
HOST_CAS_REQUEST_RESP_EXIT_ACK  EQU     0002H
HOST_CAS_REQUEST_RESP_STALL     EQU     0003H
MASPI_INDOS_FLAG_OFF            EQU     0004H
MASPI_INDOS_FLAG_SEG            EQU     0002H
MASPI_DOS_REQ_OFF               EQU     0008H
MASPI_DOS_REQ_SEG               EQU     0006H
MASPI_CAS_REQ_OFF               EQU     000CH
MASPI_CAS_REQ_SEG               EQU     000AH
MASPI_S7_CALLBACK_OFF           EQU     0014H
MASPI_S7_CALLBACK_SEG           EQU     0012H
MASPI_S1_CALLBACK_OFF           EQU     0018H
MASPI_S1_CALLBACK_SEG           EQU     0016H
MASPI_S4_CALLBACK_OFF           EQU     0010H
MASPI_S4_CALLBACK_SEG           EQU     000EH
MASPI_INIRQ_FLAG_OFF            EQU     001CH
MASPI_INIRQ_FLAG_SEG            EQU     001AH

;MASPI_DATA_MODEM_STRUCTURE
MASPI_DMS_HPORT                         EQU     0
MASPI_DMS_FREE_STATUS                   EQU     4
    MASPI_DMS_FREE_STATUS_FREE          EQU     0
    MASPI_DMS_FREE_STATUS_NOT_FREE      EQU     1
MASPI_DMS_TASK_TYPE                     EQU     6
    MASPI_DMS_TASK_TYPE_PORT_OPEN       EQU     1   ;must equal what serial uses ???
    MASPI_DMS_TASK_TYPE_PORT_WRITE      EQU     2   ;must equal what serial uses ???
    MASPI_DMS_TASK_TYPE_PORT_READ       EQU     3   ;must equal what serial uses ???
MASPI_DMS_TASK_REQUEST                  EQU    0Ah
;   MASPI_DMS_TASK_REQUEST_MADE
;   MASPI_DMS_TASK_REQUEST_ACKNOWLEDGED
MASPI_DMS_TASK_STATUS                   EQU    0Ch
;   MASPI_DMS_TASK_STATUS_NOT_DONE
;   MASPI_DMS_TASK_STATUS_DONE
MASPI_DMS_CALLBACK_REQUEST              EQU    0Eh
    MASPI_DMS_CALLBACK_REQUEST_MADE     EQU     1
;   MASPI_DMS_CALLBACK_REQUEST_ACKNOWLEDGED
MASPI_DMS_CALLBACK_STATUS               EQU    10h
    MASPI_DMS_CALLBACK_STATUS_NOT_DONE  EQU     0
;   MASPI_DMS_CALLBACK_STATUS_DONE
MASPI_DMS_CALLBACK_POINTER              EQU    12h          ; OFF:SEG
MASPI_DMS_TTQ_ENTRY_PTR                 EQU    16h          ; OFF:SEG

MASPI_DMS_ALLOCATED_MEM_PTR             EQU    1Ah          ; OFF:SEG

MASPI_DMS_TASK_SPECIFIC                 EQU    1Eh          ; allocate 16 bytes for this area

MASPI_DMS_SIZE                          EQU    30h          ; 48 bytes for each one of the four entries.


;catvoc12 changes
```

```
MASPI_CLIENT_REGS_OFF_PTR                   EQU    12H
MASPI_CLIENT_REGS_SEG_PTR                   EQU    10H

MASPI_CLIENT_AX_OFFSET                      EQU     0H          ; for scsiiss to write to Client_Regs
MASPI_CLIENT_BX_OFFSET                      EQU     2H
MASPI_CLIENT_CX_OFFSET                      EQU     4H
MASPI_CLIENT_DX_OFFSET                      EQU     6H
MASPI_CLIENT_BP_OFFSET                      EQU     8H
MASPI_CLIENT_DI_OFFSET                      EQU    0AH
MASPI_CLIENT_SI_OFFSET                      EQU    0CH
MASPI_CLIENT_DS_OFFSET                      EQU    0EH
MASPI_CLIENT_ES_OFFSET                      EQU    10H
MASPI_CLIENT_FS_OFFSET                      EQU    12H
MASPI_CLIENT_GS_OFFSET                      EQU    14H
MASPI_CLIENT_IP_OFFSET                      EQU    16H
MASPI_CLIENT_CS_OFFSET                      EQU    18H
MASPI_CLIENT_FLAGS_OFFSET                   EQU    1AH
MASPI_CLIENT_PSP_OFFSET                     EQU    1CH
MASPI_CLIENT_DTA_OFF_OFFSET                 EQU    1EH
MASPI_CLIENT_DTA_SEG_OFFSET                 EQU    20H
MASPI_CLIENT_SP_OFFSET                      EQU    22H
MASPI_CLIENT_SS_OFFSET                      EQU    24H

MASPI_SCSI11_ISR_OFF_PTR                    EQU    16H
MASPI_SCSI11_ISR_SEG_PTR                    EQU    14H


action_level_data       struct
                        VCON_CUR_STEP_DATA_AREA_ADDR                dw  ?
                        VCON_FIRST_IRQ00_CUR_STEP                   db  ?
                                                                    db  ?
                        VCON_DO_NOT_LOAD_CUR_STEP_BUFFER            db  ?
                                                                    db  ?
                        VCON_RESOURCE                               dw  ?
                        VCON_STOP_ON_DLE                            dw  ?
                        VCON_ACTION_COMPLETE_CUR_STEP               db  ?
                                                                    db  ?
                        VCON_CUR_STEP_DTMF                          db  ?
                                                                    db  ?
action_level_data       ends
;=============================================================================+
;                                                                             |
;                       MODEM DATA STRUCTURE                                  |
;       EACH MODEM HAS ONE OF THESE INCLUDING THE MODEM THAT DOES NOT         |
;                           HAVE A MODEM                                      |
;                                                                             |
;=============================================================================+
modem_data              struct
                        action_level_0_data                 action_level_data   <>
                        action_level_1_data                 action_level_data   <>
                        action_level_2_data                 action_level_data   <>
                        VCON_NO_VAR                         dw  ?
                        VCON_DLE_NUMBER_BUFFER_IRQ03_PTR    dw  ?
                        VCON_DLE_NUMBER_BUFFER_IRQ00_PTR    dw  ?
                        VCON_DLE_NUMBER_BUFFER              db  40h dup(00h)
                        VCON_DLE_NUMBER_BUFFER_END          dw  ?

                        VCON_WAIT_TO_COMPLETE               dw  ?

                        LCD_PROCESS_DONE                    db  ?
                        LCD_TAIL_PROCESS_DONE               db  ?
                        LCD_IN_ACTION_IN_PROGRESS           db  ?
                                                            db  ?

                        MPS_STATE                           dw  ?

                        CAS_INT13_OFF                       dw  ?
                        CAS_INT13_SEG                       dw  ?
                        CAS_INT13_R_OFF                     dw  ?
                        CAS_INT13_R_SEG                     dw  ?

                        CAS_INT15_OFF                       dw  ?
                        CAS_INT15_SEG                       dw  ?
                        CAS_INT15_R_OFF                     dw  ?
                        CAS_INT15_R_SEG                     dw  ?

                        CAS_INT21_OFF                       dw  ?
                        CAS_INT21_SEG                       dw  ?

                        CAS_INT28_OFF                       dw  ?
                        CAS_INT28_SEG                       dw  ?
```

```
CAS_INT28_R_OFF                         dw  ?
CAS_INT28_R_SEG                         dw  ?

CAS_IRQ00_OFF                           dw  ?
CAS_IRQ00_SEG                           dw  ?
CAS_IRQ00_R_OFF                         dw  ?
CAS_IRQ00_R_SEG                         dw  ?


CAS_IRQ03_OFF                           dw  ?
CAS_IRQ03_SEG                           dw  ?

CAS_RBUF_WINDOW_0                       db  ?
CAS_RBUF_WINDOW_1                       db  ?
CAS_RBUF_WINDOW_2                       db  ?
CAS_RBUF_WINDOW_3                       db  ?
CAS_RBUF_WINDOW_4                       db  ?

CAT_RBUF_WINDOW_0                       db  ?
CAT_RBUF_WINDOW_1                       db  ?
CAT_RBUF_WINDOW_2                       db  ?
CAT_RBUF_WINDOW_3                       db  ?
CAT_RBUF_WINDOW_4                       db  ?

CAS_RING_DETECTED                       db  ?
CAT_RING_DETECTED                       db  ?
CAS_TT_COUNT                            dw  ?
CAS_SER_IRQ_COUNT                       dw  ?
VCON_0040_006C_AT_VCON_4                dd  ?
VCON_1FA3                               db  ?
VCON_2CR_DETECTED                       db  ?
VCON_3CR_DETECTED                       db  ?
                                        db  ?
VCON_4_SECONDS                          dd  ?
VCON_AT_CLS_2_ISSUED                    db  ?
VCON_EMIT_RINGBACK                      db  ?
VCON_EMIT_GREETING                      db  ?
VCON_EMITTING_GREETING                  db  ?
VCON_COMPLETED_GREETING                 db  ?
VCON_COMPLETED_RINGBACK                 db  ?
VCON_CR_COUNT                           db  ?
VCON_CTSXON                             db  ?
VCON_CUR_0006                           db  ?
VCON_CUR_00A0                           db  ?
VCON_CUR_ACTION_ADDRS_ADDR              dw  ?
VCON_CUR_MSR                            db  ?
VCON_CUR_MSR_DCD                        db  ?
VCON_CUR_STATE_ACTION_NUMBER            dw  ?

VCON_DETECT_3CR                         db  ?
VCON_DETECTED                           db  ?
VCON_DLE_COUNT                          db  ?
VCON_DLE_COUNT_VALID                    db  ?
VCON_DLE_ETX_DETECTED                   db  ?
VCON_DLEC_DETECTED                      db  ?
VCON_IRQ00_SAW_DLEC                     db  ?
VCON_DLET_DETECTED                      db  ?

VCON_EMIT_MSG_COMPLETE                  db  ?
                                        db  ?
VCON_EMIT_MSG_FILENAME_PTR              dw  ?
VCON_EMIT_MSG_HANDLE                    dw  ?
VCON_EMIT_MSG_ISSUED_CNTR               dw  ?
VCON_EMIT_MSG_RESPONSE_CNTR             dw  ?
VCON_EMIT_MSG_STOP                      db  ?

VCON_EXPECT_OK                          db  ?
VCON_EXPECT_VTOF_ANSWER_ECHO            db  ?
                                        db  ?
VCON_HANG_UP_ISSUED_CNTR                dw  ?
VCON_HANG_UP_RESPONSE_CNTR              dw  ?

VCON_LAST_RECV_BYTE                     db  ?
VCON_RBUF_3C0                           db  ?
VCON_RECV_COUNT                         dw  ?

VCON_IRQ00_RBUF_PTR                     dw  ?
VCON_IRQ03_RBUF_PTR                     dw  ?
VCON_IRQ03_RBUF                         db  800h dup(00h)
VCON_IRQ03_RBUF_END                     dw  ?
                                        db  1FEh dup(00h)
```

```
VCON_LAST_XMIT_BYTE                     db  ?
                                        db  ?
VCON_XMIT_COUNT                         dw  ?

VCON_IRQ00_TBUF_PTR                     dw  ?
VCON_IRQ03_TBUF_PTR                     dw  ?
VCON_IRQ03_TBF_NEWSTR_PTR               dw  ?
VCON_IRQ03_TBUF_HEAD_ROOM               dw  ?
VCON_IRQ03_TBUF_LOGICAL_ROOM            dw  ?
VCON_IRQ03_TBUF                         db  800h dup(00h)
VCON_IRQ03_TBUF_END                     dw  ?

VCON_NO_ACTION_COMPLETE                 db  ?
VCON_NO_ACTION_INPUTS_YES               db  ?
VCON_NO_ACTION_TIMER                    dw  ?
VCON_NO_ACTION_STOP                     db  ?

VCON_RECO_MSG_COMPLETE                  db  ?
VCON_RECO_MSG_STOP                      db  ?
                                        db  ?
VCON_RECO_MSG_FILENAME_PTR              dw  ?
VCON_RECO_MSG_HANDLE                    dw  ?
VCON_RECO_MSG_ISSUED_CNTR               dw  ?
VCON_RECO_MSG_LENGTH                    dw  ?
VCON_RECO_MSG_RESPONSE_CNTR             dw  ?

VCON_START_PROGRAM_COMPLETE             db  ?
VCON_START_PROGRAM_INPUTS_YES           db  ?
START_PROGRAM_STATE_COUNTER             dw  ?
VCON_START_PROGRAM_STOP                 db  ?
                                        db  ?
START_PROGRAM_MTQ_PTR                   dw  ?
LCD_TIMER_TICK_COUNTER                  db  ?
                                        db  ?
START_CYLINDER                          dw  ?
START_HEAD                              db  ?
START_SECTOR                            db  ?
MAX_USABLE_CYLINDER                     dw  ?
MAX_USABLE_HEAD                         db  ?
MAX_USABLE_SECTOR                       db  ?
CURRENT_CYLINDER                        dw  ?
CURRENT_HEAD                            db  ?
CURRENT_SECTOR                          db  ?
SECTORS_TO_WRITE                        db  ?
SECTORS_TO_READ                         db  ?

EMIT_MSG_FIRST_DATA                     db  ?
                                        db  ?
VCON_EMIT_MSG_SECTOR_COUNT              dw  ?
VCON_EMIT_MSG_DATA_CNT                  dw  ?

RECO_MSG_FIRST_DATA                     db  ?
                                        db  ?
VCON_RECO_MSG_SECTOR_COUNT              dw  ?
VCON_RECO_MSG_DATA_CNT                  dw  ?

VCON_OE                                 db  ?
VCON_OKTO_XMIT                          db  ?
VCON_OLD_0006                           dw  ?
VCON_OLD_00A0                           db  ?
VCON_OLD_1FD4                           db  ?
VCON_OLD_1FDA                           dw  ?
VCON_OLD_1FDE                           dw  ?

VCON_RBF_2CR_DETECTED_PTR               dw  ?
VCON_RBF_3CR_DETECTED_PTR               dw  ?

VCON_STATE                              dw  ?
MODEM_MODE                              db  ?
                                        db  ?
VCON_TO_FAX_ANSWER                      db  ?
VCON_VTOF_A_RECD                        db  ?
VCON_VTOF_ACR_RECD                      db  ?
VCON_VTOF_ACRLF_RECD                    db  ?
VCON_VTOF_IRQ03_FIRST                   db  ?
VCON_VTOF_IRQ03_FIRST_SECOND            db  ?
VCON_XMIT_FIFO_LD_CNT                   db  ?
                                        db  ?
VCON_REGADD_DATA                        dw  ?
VCON_REGADD_IER                         dw  ?
VCON_REGADD_IIR                         dw  ?
```

```
VCON_REGADD_LCR                 dw  ?
VCON_REGADD_LSR                 dw  ?
VCON_REGADD_MCR                 dw  ?
VCON_REGADD_MSR                 dw  ?
VCON_REGADDS_PTR                dw  ?

LCD_MESSAGE_ADDRESS             dw  ?
                                dw  ?
SAVED_SCREEN_PTR                dw  ?
LCD_WRITE_PTR                   dw  ?
LCD_PROCESSING_FIRST_TIME       db  ?
LCD_STEP_COUNT                  db  ?
SET_DDRAM_ADDRESS               db  ?
SAVE_SCREEN_TOGGLE              db  ?
RESTORE_SCREEN_TOGGLE           db  ?
LCD_WRITE_COUNT                 db  ?
SAVED_SCREEN                    db  28h dup(00h)
PLAY_WHICH_QUEUE                db  ?
PLAY_WHICH_DIRECTION            db  ?
VMA_PAUSE                       db  ?
VMA_COMPLETE                    db  ?
VMA_STOP                        db  ?
VMA_NO_NEW_MSGS                 db  ?
VMA_NO_OLD_MSGS                 db  ?
VMA_DELETE_QUEUE_COUNTER        db  ?
VMA_ISSUED_CNTR                 dw  ?
VMA_FILENAME_PTR                dw  ?
VMA_QUEUE_FILE_SEG              dw  ?
VMA_CURRENT_RECORD_OFFSET       dw  ?
SP_LAUNCHED_PGM_DWORD           dd  ?

PFI_PLAY_WHICH_QUEUE            db  ?
PFI_PLAY_WHICH_DIRECTION        db  ?
PFI_PAUSE                       db  ?
PFI_COMPLETE                    db  ?
PFI_STOP                        db  ?
PFI_NO_NEW_MSGS                 db  ?
PFI_NO_OLD_MSGS                 db  ?
PFI_DELETE_QUEUE_COUNTER        db  ?
PFI_FILENAME_PTR                dw  ?
PFI_ISSUED_CNTR                 dw  ?
PFI_QUEUE_FILE_SEG              dw  ?
PFI_CURRENT_RECORD_OFFSET       dw  ?

RMI_COMPLETE                    db  ?
RMI_STOP                        db  ?
RMI_FILENAME_PTR                dw  ?
RMI_LENGTH                      dw  ?
RMI_SEQ_CNTR                    dw  ?
RMI_RESPONSE_CNTR               dw  ?
RMI_DATA_CNT                    dw  ?
RMI_SECTOR_COUNT                dw  ?
VOICE_MSG_FILENAME              db  20h dup(00h)
EM_ATH_DELAY                    db  ?
                                db  ?
EM_ATH_TO_OK_COUNT              dw  ?
RM_ATH_DELAY                    db  ?
                                db  ?
RM_ATH_TO_OK_COUNT              dw  ?
RMI_ATH_DELAY                   db  ?
                                db  ?
RMI_ATH_TO_OK_COUNT             dw  ?
HUP_ATH_DELAY                   db  ?
                                db  ?
HUP_ATH_TO_OK_COUNT             dw  ?
TMO_ATH_DELAY                   db  ?
                                db  ?
TMO_ATH_TO_OK_COUNT             dw  ?
CAS_FKS_DETECTED                db  ?
                                db  ?
CUR_STEP_STATUS                 dw  ?
VCON_DLEQ_DETECTED              db  ?
                                db  ?
VCON_DLES_DETECTED              db  ?
                                db  ?
TMO_RESPONSE_PTR                dw  ?
TMO_SEQ_PTR                     dw  ?
MODEM_OUT_OF_CVBOOT             db  ?
TMO_ATH_ISSUED_IN_RIBBON        db  ?
TMO_COMPLETE                    db  ?
TMO_STOP                        db  ?
```

```
                        TMO_WAS_ATH_ISSUED                      db  ?
                        TTQ_HAS_ITEM                            db  ?

                        TTQ_RUNNING_PTR                         dw  ?
                        TTQ_CUR_JOB_STARTING_STEP_NUMBER        dw  ?
                        TTQ_REQUEST_STATE_COUNTER               dw  ?
                        TTQ_REQUEST_STOP                        db  ?
                        TTQ_REQUEST_COMPLETE                    db  ?
                        TTQ_REQUEST_INPUTS_YES                  db  ?
                                                                db  ?
                        EMAIL_SCRIPT_BUFFER                     db  EMAIL_SCRIPT_BUFFER_SIZE dup (00h)
                        EMAIL_SCRIPT_FILE_SIZE                  dw  ?

                        KEYPAD_TO_DLE_BUFFER_OK                 db  ?
                                                                db  ?
                        MODEM_VLS_STATE                         dw  ?

                        ACD_ACTION                              db  ?
                        ACD_STOP                                db  ?
                        ACD_ISSUED_CNTR                         dw  ?
                        ACD_LCD_FIRST_ECHO                      db  ?
                        ACD_DIGIT_COUNT                         db  ?
                        ACD_FILENAME_PTR                        dw  ?
                        ACD_TYPE                                dw  ?
                        ACD_REPEAT_COUNT                        dw  ?
                        ACD_REPEAT_COUNTER                      dw  ?
                        ACD_LCD_MSG_ADDRESS                     dw  ?
                        ACD_LCD_ECHO_LOCATION                   db  ?
                        CAS_AFTER_FKS                           db  ?
                        CAS_TT_BEYOND_FKS                       dw  ?
                        VCON_DLEB_DETECTED                      db  ?
                        VCON_DLED_DETECTED                      db  ?
                        VCON_DLEO_DETECTED                      db  ?
                        VCON_DLEU_DETECTED                      db  ?
                        VCON_DLE_CAPT_DETECTED                  db  ?
                        VCON_XON_DETECTED                       db  ?
                        VCON_XOFF_DETECTED                      db  ?

                        INDEX_FILE_BUSY                         db  ?
                        INDEX_FILE_PARAGRAPH_PADDING            db  10h dup(00h)
                        INDEX_FILE_IN_MPS                       db  INDEX_FILE_IN_MPS_SIZE dup(00h)

                        REM_COMPLETE                            db  ?
                        REM_FIRST_DATA                          db  ?
                        REM_RESPONSE_PTR                        dw  ?
                        REM_COMMAND_PTR                         dw  ?
                        EMAIL_SCRIPT_BUFFER_PTR                 dw  ?
                        REM_ATH_TO_OK_COUNT                     dw  ?
                        EMAIL_SCRIPT_BUFFER_ITEM_BYTE_COUNT     dw  ?
                        REM_ATH_DELAY                           db  ?
                                                                db  ?
                        REM_SECTOR_COUNT                        dw  ?
                        REM_DATA_COUNT                          dw  ?

                        MPS_TCF_FILENAME                        db  40h dup(00h)
                        SP_RETURN_FLAGS                         dw  ?
                        FBX_ONE_VALID_DOC_NUMBER_EXISTS         db  ?
                        INCOMING_FAX                            db  ?
                        INCOMING_FAX_FILE_NAME                  db  40h dup(00h)
                        RING_COUNT                              dw  ?
                        TIME_OF_THIS_RING                       dw  ?
                        VCON_STATE_OLD                          dw  ?
                        VCON_DLEH_DETECTED                      db  ?
                                                                db  ?
                        TCB_SIZE                                dw  0000h

modem_data              ends
;*****************************************************************************
;*                                                                           *
;*                  PRINTER QUEUE                                            *
;*                                                                           *
;*****************************************************************************
NO_OF_PTQ_ENTRIES           EQU     16
PTQ_ENTRY_DELTA             EQU     64
;PTQ structure
PTICS_STATUS                EQU     0000H
PTICS_STATUS_IDLE           EQU     00H
PTICS_STATUS_RUNNING        EQU     01H
PTICS_STATUS_COMPLETED      EQU     02H
PTICS_HANDSHAKE             EQU     0001H
PTICS_HANDSHAKE_NULL        EQU     00H
```

```
PTICS_HANDSHAKE_REQ_MADE    EQU     01H
PTICS_HANDSHAKE_REQ_ACKED   EQU     02H
PTICS_FREE_TO_USE_STATUS    EQU     0002H
PTICS_FREE_TO_USE           EQU     00H
PTICS_NOT_FREE_TO_USE       EQU     01H
PTICS_SOURCE                EQU     0003H
PTICS_SOURCE_NOTHING        EQU     00H
PTICS_SOURCE_HOST_PC        EQU     01H
PTICS_SOURCE_COPY           EQU     02H
PTICS_SOURCE_INCOMING_FAX   EQU     03H
PTICS_SOURCE_INCOMING_EMAIL EQU     04H
PTICS_FILENAME              EQU     0004H       ;60 bytes for filename
;================================
;       OFFSET EQUS             II
;================================
;Action and IRQ EQUs
;-------------------

;NOTE: WHEN TCB MIGRATES TO AN INDEPENDENT DATA SEGMENT, THE EQU WILL STILL RESIDE HERE..
;THE BASIC IRQ00 STEPPERS ARE AT LEVEL_0. WHEN VMA CALLS EMIT_MSG, THIS STEPPER IS AT LEVEL_1. WHEN EMIT_MSG CA
LLS
;START_PROGRAM, THEN THE STEPPER HERE IS AT LEVEL_2. NOW, EMIT_MSG CAN BE CALLED FROM A LEVEL_0 STEPPER OR A LE
VEL_1
;STEPPER. THUS THE VARIABLES INSIDE EMIT_MSG DO NOT KNOW WHAT LEVEL THEY ARE AT. HERE I DO NOT MEAN ST VARIABLE
S
;BUT TCB VARIABLES. SOME VARIABLES ARE GENERIC, SUCH AS VCON_CUR_STEP_DATA_AREA_ADDR. FOR EXAMPLE WHEN CALLING
;START_PROGRAM, THREE COPIES OF THIS VARIABLE ARE BEING USED SIMULTANEOUSLY BY START_PROGRAM, EMIT_MSG AND ALSO
 VMA.
;SOME OTHER VARIABLES ARE EMIT_MSG SPECIFIC SUCH AS VCON_EMIT_MSG_RESPONSE_CNTR. THIS LAST GROUP DOES NOT NEED
TO BE
;DUPLICATED AT LEVELS. A THIRD GROUP NEEDS TO BE SHARED. AN EXAMPLE IS VCON_CUR_STEP_DTMF. THUS WE BUILD DUPLIC
ATES
;OF ONLY SOME VARIABLES. ACTUALLY TRIPLICATES.


LEVEL_0                             EQU      00H
LEVEL_1                             EQU      01H
LEVEL_2                             EQU      02H

TCB_LEVEL_DB_SIZE                   EQU     000EH

VCON_CUR_STEP_DATA_AREA_ADDR        EQU     0000H           ;level sensitive variables
VCON_FIRST_IRQ00_CUR_STEP           EQU     VCON_CUR_STEP_DATA_AREA_ADDR        + 0002H
VCON_DO_NOT_LOAD_CUR_STEP_BUFFER    EQU     VCON_FIRST_IRQ00_CUR_STEP           + 0002H

VCON_RESOURCE                       EQU     VCON_DO_NOT_LOAD_CUR_STEP_BUFFER    + 0002H
VCON_STOP_ON_DLE                    EQU     VCON_RESOURCE                       + 0002H
VCON_ACTION_COMPLETE_CUR_STEP       EQU     VCON_STOP_ON_DLE                    + 0002H
VCON_CUR_STEP_DTMF                  EQU     VCON_ACTION_COMPLETE_CUR_STEP       + 0002H
;FILLER VARIABLE BELOW:
VCON_NO_VAR                         EQU     3 * TCB_LEVEL_DB_SIZE               ;BYTE. next field align
ed to word

VCON_DLE_NUMBER_BUFFER_IRQ03_PTR    EQU     VCON_NO_VAR                         + 0002H ;WORD
VCON_DLE_NUMBER_BUFFER_IRQ00_PTR    EQU     VCON_DLE_NUMBER_BUFFER_IRQ03_PTR    + 0002H ;WORD
VCON_DLE_NUMBER_BUFFER              EQU     VCON_DLE_NUMBER_BUFFER_IRQ00_PTR    + 0002H ;64 BYTES
VCON_DLE_NUMBER_BUFFER_END          EQU     VCON_DLE_NUMBER_BUFFER              + 0040H ;WORD

VCON_WAIT_TO_COMPLETE               EQU     VCON_DLE_NUMBER_BUFFER_END          + 0002H ;WORD

LCD_PROCESS_DONE                    EQU     VCON_WAIT_TO_COMPLETE               + 0002H ;BYTE
LCD_TAIL_PROCESS_DONE               EQU     LCD_PROCESS_DONE                    + 0001H ;BYTE
LCD_IN_ACTION_IN_PROGRESS           EQU     LCD_TAIL_PROCESS_DONE               + 0001H ;BYTE

MPS_STATE                           EQU     LCD_IN_ACTION_IN_PROGRESS           + 0002H ;WORD

CAS_INT13_OFF                       EQU     MPS_STATE                           + 0002H ;WORD
CAS_INT13_SEG                       EQU     CAS_INT13_OFF                       + 0002H ;WORD
CAS_INT13_R_OFF                     EQU     CAS_INT13_SEG                       + 0002H ;WORD
CAS_INT13_R_SEG                     EQU     CAS_INT13_R_OFF                     + 0002H ;WORD

CAS_INT15_OFF                       EQU     CAS_INT13_R_SEG                     + 0002H ;WORD
CAS_INT15_SEG                       EQU     CAS_INT15_OFF                       + 0002H ;WORD
CAS_INT15_R_OFF                     EQU     CAS_INT15_SEG                       + 0002H ;WORD
CAS_INT15_R_SEG                     EQU     CAS_INT15_R_OFF                     + 0002H ;WORD

CAS_INT21_OFF                       EQU     CAS_INT15_R_SEG                     + 0002H ;WORD
CAS_INT21_SEG                       EQU     CAS_INT21_OFF                       + 0002H ;WORD

CAS_INT28_OFF                       EQU     CAS_INT21_SEG                       + 0002H ;WORD
CAS_INT28_SEG                       EQU     CAS_INT28_OFF                       + 0002H ;WORD
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CAS_INT28_R_OFF                 EQU     CAS_INT28_SEG                   + 0002H ;WORD
CAS_INT28_R_SEG                 EQU     CAS_INT28_R_OFF                 + 0002H ;WORD

CAS_IRQ00_OFF                   EQU     CAS_INT28_R_SEG                 + 0002H ;WORD
CAS_IRQ00_SEG                   EQU     CAS_IRQ00_OFF                   + 0002H ;WORD
CAS_IRQ00_R_OFF                 EQU     CAS_IRQ00_SEG                   + 0002H ;WORD
CAS_IRQ00_R_SEG                 EQU     CAS_IRQ00_R_OFF                 + 0002H ;WORD

CAS_IRQ03_OFF                   EQU     CAS_IRQ00_R_SEG                 + 0002H ;WORD
CAS_IRQ03_SEG                   EQU     CAS_IRQ03_OFF                   + 0002H ;WORD

CAS_RBUF_WINDOW_0               EQU     CAS_IRQ03_SEG                   + 0002H ;BYTE
CAS_RBUF_WINDOW_1               EQU     CAS_RBUF_WINDOW_0               + 0001H ;BYTE
CAS_RBUF_WINDOW_2               EQU     CAS_RBUF_WINDOW_1               + 0001H ;BYTE
CAS_RBUF_WINDOW_3               EQU     CAS_RBUF_WINDOW_2               + 0001H ;BYTE
CAS_RBUF_WINDOW_4               EQU     CAS_RBUF_WINDOW_3               + 0001H ;BYTE

CAT_RBUF_WINDOW_0               EQU     CAS_RBUF_WINDOW_4               + 0001H ;BYTE
CAT_RBUF_WINDOW_1               EQU     CAT_RBUF_WINDOW_0               + 0001H ;BYTE
CAT_RBUF_WINDOW_2               EQU     CAT_RBUF_WINDOW_1               + 0001H ;BYTE
CAT_RBUF_WINDOW_3               EQU     CAT_RBUF_WINDOW_2               + 0001H ;BYTE
CAT_RBUF_WINDOW_4               EQU     CAT_RBUF_WINDOW_3               + 0001H ;BYTE

CAS_RING_DETECTED               EQU     CAT_RBUF_WINDOW_4               + 0001H ;BYTE
CAT_RING_DETECTED               EQU     CAS_RING_DETECTED               + 0001H ;BYTE
CAS_TT_COUNT                    EQU     CAT_RING_DETECTED               + 0001H ;WORD
CAS_SER_IRQ_COUNT               EQU     CAS_TT_COUNT                    + 0002H ;WORD
VCON_0040_006C_AT_VCON_4        EQU     CAS_SER_IRQ_COUNT               + 0002H ;DWORD
VCON_1FA3                       EQU     VCON_0040_006C_AT_VCON_4        + 0004H ;BYTE
VCON_2CR_DETECTED               EQU     VCON_1FA3                       + 0001H ;BYTE
VCON_3CR_DETECTED               EQU     VCON_2CR_DETECTED               + 0001H ;BYTE
VCON_4_SECONDS                  EQU     VCON_3CR_DETECTED               + 0002H ;DWORD
VCON_AT_CLS_2_ISSUED            EQU     VCON_4_SECONDS                  + 0004H ;BYTE
VCON_EMIT_RINGBACK              EQU     VCON_AT_CLS_2_ISSUED            + 0001H ;BYTE
VCON_EMIT_GREETING              EQU     VCON_EMIT_RINGBACK              + 0001H ;BYTE
VCON_EMITTING_GREETING          EQU     VCON_EMIT_GREETING              + 0001H ;BYTE
VCON_COMPLETED_GREETING         EQU     VCON_EMITTING_GREETING          + 0001H ;BYTE
VCON_COMPLETED_RINGBACK         EQU     VCON_COMPLETED_GREETING         + 0001H ;BYTE
VCON_CR_COUNT                   EQU     VCON_COMPLETED_RINGBACK         + 0001H ;BYTE
VCON_CTSXON                     EQU     VCON_CR_COUNT                   + 0001H ;BYTE
VCON_CUR_0006                   EQU     VCON_CTSXON                     + 0001H ;BYTE
VCON_CUR_00A0                   EQU     VCON_CUR_0006                   + 0001H ;BYTE
VCON_CUR_ACTION_ADDRS_ADDR      EQU     VCON_CUR_00A0                   + 0001H ;WORD
VCON_CUR_MSR                    EQU     VCON_CUR_ACTION_ADDRS_ADDR      + 0002H ;BYTE
VCON_CUR_MSR_DCD                EQU     VCON_CUR_MSR                    + 0001H ;BYTE
VCON_CUR_STATE_ACTION_NUMBER    EQU     VCON_CUR_MSR_DCD                + 0001H ;WORD

VCON_DETECT_3CR                 EQU     VCON_CUR_STATE_ACTION_NUMBER    + 0002H ;BYTE
VCON_DETECTED                   EQU     VCON_DETECT_3CR                 + 0001H ;BYTE
VCON_DLE_COUNT                  EQU     VCON_DETECTED                   + 0001H ;BYTE
VCON_DLE_COUNT_VALID            EQU     VCON_DLE_COUNT                  + 0001H ;BYTE
VCON_DLE_ETX_DETECTED           EQU     VCON_DLE_COUNT_VALID            + 0001H ;BYTE
VCON_DLEC_DETECTED              EQU     VCON_DLE_ETX_DETECTED           + 0001H ;BYTE
VCON_IRQ00_SAW_DLEC             EQU     VCON_DLEC_DETECTED              + 0001H ;BYTE
VCON_DLET_DETECTED              EQU     VCON_IRQ00_SAW_DLEC             + 0001H ;BYTE

VCON_EMIT_MSG_COMPLETE          EQU     VCON_DLET_DETECTED              + 0001H ;BYTE
VCON_EMIT_MSG_FILENAME_PTR      EQU     VCON_EMIT_MSG_COMPLETE          + 0002H ;WORD
VCON_EMIT_MSG_HANDLE            EQU     VCON_EMIT_MSG_FILENAME_PTR      + 0002H ;WORD
VCON_EMIT_MSG_ISSUED_CNTR       EQU     VCON_EMIT_MSG_HANDLE            + 0002H ;WORD
VCON_EMIT_MSG_RESPONSE_CNTR     EQU     VCON_EMIT_MSG_ISSUED_CNTR       + 0002H ;WORD
VCON_EMIT_MSG_STOP              EQU     VCON_EMIT_MSG_RESPONSE_CNTR     + 0002H ;BYTE

VCON_EXPECT_OK                  EQU     VCON_EMIT_MSG_STOP              + 0001H ;BYTE
VCON_EXPECT_VTOF_ANSWER_ECHO    EQU     VCON_EXPECT_OK                  + 0001H ;BYTE

VCON_HANG_UP_ISSUED_CNTR        EQU     VCON_EXPECT_VTOF_ANSWER_ECHO    + 0002H ;WORD
VCON_HANG_UP_RESPONSE_CNTR      EQU     VCON_HANG_UP_ISSUED_CNTR        + 0002H ;WORD

VCON_LAST_RECV_BYTE             EQU     VCON_HANG_UP_RESPONSE_CNTR      + 0002H ;BYTE
VCON_RBUF_3C0                   EQU     VCON_LAST_RECV_BYTE             + 0001H ;BYTE
VCON_RECV_COUNT                 EQU     VCON_RBUF_3C0                   + 0001H ;WORD
VCON_IRQ00_RBUF_PTR             EQU     VCON_RECV_COUNT                 + 0002H ;WORD
VCON_IRQ03_RBUF_PTR             EQU     VCON_IRQ00_RBUF_PTR             + 0002H ;WORD
VCON_IRQ03_RBUF                 EQU     VCON_IRQ03_RBUF_PTR             + 0002H ;2048 BYTES
VCON_IRQ03_RBUF_END             EQU     VCON_IRQ03_RBUF                 + 0800H ;WORD
;                                                                       + 0002H ;510 BYTES OF E
XTRA BUFFER

VCON_LAST_XMIT_BYTE             EQU     VCON_IRQ03_RBUF_END             + 0200H ;BYTE
VCON_XMIT_COUNT                 EQU     VCON_LAST_XMIT_BYTE             + 0002H ;WORD
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VCON_IRQ00_TBUF_PTR                 EQU     VCON_XMIT_COUNT                 + 0002H ;WORD
VCON_IRQ03_TBUF_PTR                 EQU     VCON_IRQ00_TBUF_PTR             + 0002H ;WORD
VCON_IRQ03_TBF_NEWSTR_PTR           EQU     VCON_IRQ03_TBUF_PTR             + 0002H ;WORD
VCON_IRQ03_TBUF_HEAD_ROOM           EQU     VCON_IRQ03_TBF_NEWSTR_PTR       + 0002H ;WORD
VCON_IRQ03_TBUF_LOGICAL_ROOM        EQU     VCON_IRQ03_TBUF_HEAD_ROOM       + 0002H ;WORD
VCON_IRQ03_TBUF                     EQU     VCON_IRQ03_TBUF_LOGICAL_ROOM    + 0002H ;2048 BYTES
VCON_IRQ03_TBUF_END                 EQU     VCON_IRQ03_TBUF                 + 0800H ;WORD

VCON_NO_ACTION_COMPLETE             EQU     VCON_IRQ03_TBUF_END             + 0002H ;BYTE
VCON_NO_ACTION_INPUTS_YES           EQU     VCON_NO_ACTION_COMPLETE         + 0001H ;BYTE
VCON_NO_ACTION_TIMER                EQU     VCON_NO_ACTION_INPUTS_YES       + 0001H ;WORD
VCON_NO_ACTION_STOP                 EQU     VCON_NO_ACTION_TIMER            + 0002H ;BYTE

VCON_RECO_MSG_COMPLETE              EQU     VCON_NO_ACTION_STOP             + 0001H ;BYTE
VCON_RECO_MSG_STOP                  EQU     VCON_RECO_MSG_COMPLETE          + 0001H ;BYTE
VCON_RECO_MSG_FILENAME_PTR          EQU     VCON_RECO_MSG_STOP              + 0002H ;WORD
VCON_RECO_MSG_HANDLE                EQU     VCON_RECO_MSG_FILENAME_PTR      + 0002H ;WORD
VCON_RECO_MSG_ISSUED_CNTR           EQU     VCON_RECO_MSG_HANDLE            + 0002H ;WORD
VCON_RECO_MSG_LENGTH                EQU     VCON_RECO_MSG_ISSUED_CNTR       + 0002H ;WORD
VCON_RECO_MSG_RESPONSE_CNTR         EQU     VCON_RECO_MSG_LENGTH            + 0002H ;WORD

VCON_START_PROGRAM_COMPLETE         EQU     VCON_RECO_MSG_RESPONSE_CNTR     + 0002H ;BYTE
VCON_START_PROGRAM_INPUTS_YES       EQU     VCON_START_PROGRAM_COMPLETE     + 0001H ;BYTE
START_PROGRAM_STATE_COUNTER         EQU     VCON_START_PROGRAM_INPUTS_YES   + 0001H ;WORD
VCON_START_PROGRAM_STOP             EQU     START_PROGRAM_STATE_COUNTER     + 0002H ;BYTE
START_PROGRAM_MTQ_PTR               EQU     VCON_START_PROGRAM_STOP         + 0002H ;WORD
LCD_TIMER_TICK_COUNTER              EQU     START_PROGRAM_MTQ_PTR           + 0002H ;BYTE

START_CYLINDER                      EQU     LCD_TIMER_TICK_COUNTER          + 0002H ;WORD
START_HEAD                          EQU     START_CYLINDER                  + 0002H ;BYTE
START_SECTOR                        EQU     START_HEAD                      + 0001H ;BYTE
MAX_USABLE_CYLINDER                 EQU     START_SECTOR                    + 0001H ;WORD
MAX_USABLE_HEAD                     EQU     MAX_USABLE_CYLINDER             + 0002H ;BYTE
MAX_USABLE_SECTOR                   EQU     MAX_USABLE_HEAD                 + 0001H ;BYTE
CURRENT_CYLINDER                    EQU     MAX_USABLE_SECTOR               + 0001H ;WORD
CURRENT_HEAD                        EQU     CURRENT_CYLINDER                + 0002H ;BYTE
CURRENT_SECTOR                      EQU     CURRENT_HEAD                    + 0001H ;BYTE
SECTORS_TO_WRITE                    EQU     CURRENT_SECTOR                  + 0001H ;BYTE
SECTORS_TO_READ                     EQU     SECTORS_TO_WRITE                + 0001H ;BYTE

EMIT_MSG_FIRST_DATA                 EQU     SECTORS_TO_READ                 + 0001H ;BYTE
VCON_EMIT_MSG_SECTOR_COUNT          EQU     EMIT_MSG_FIRST_DATA             + 0002H ;WORD
VCON_EMIT_MSG_DATA_CNT              EQU     VCON_EMIT_MSG_SECTOR_COUNT      + 0002H ;WORD

RECO_MSG_FIRST_DATA                 EQU     VCON_EMIT_MSG_DATA_CNT          + 0002H ;BYTE
;free byte here .....
VCON_RECO_MSG_SECTOR_COUNT          EQU     RECO_MSG_FIRST_DATA             + 0002H ;WORD
VCON_RECO_MSG_DATA_CNT              EQU     VCON_RECO_MSG_SECTOR_COUNT      + 0002H ;WORD

VCON_OE                             EQU     VCON_RECO_MSG_DATA_CNT          + 0002H ;BYTE
VCON_OKTO_XMIT                      EQU     VCON_OE                         + 0001H ;BYTE
VCON_OLD_0006                       EQU     VCON_OKTO_XMIT                  + 0001H ;WORD
VCON_OLD_00A0                       EQU     VCON_OLD_0006                   + 0002H ;BYTE
VCON_OLD_1FD4                       EQU     VCON_OLD_00A0                   + 0001H ;BYTE
VCON_OLD_1FDA                       EQU     VCON_OLD_1FD4                   + 0001H ;WORD
VCON_OLD_1FDE                       EQU     VCON_OLD_1FDA                   + 0002H ;WORD

VCON_RBF_2CR_DETECTED_PTR           EQU     VCON_OLD_1FDE                   + 0002H ;WORD
VCON_RBF_3CR_DETECTED_PTR           EQU     VCON_RBF_2CR_DETECTED_PTR       + 0002H ;WORD

VCON_STATE                          EQU     VCON_RBF_3CR_DETECTED_PTR       + 0002H ;WORD
MODEM_MODE                          EQU     VCON_STATE                      + 0002H ;BYTE

VCON_TO_FAX_ANSWER                  EQU     MODEM_MODE                      + 0002H ;BYTE
VCON_VTOF_A_RECD                    EQU     VCON_TO_FAX_ANSWER              + 0001H ;BYTE
VCON_VTOF_ACR_RECD                  EQU     VCON_VTOF_A_RECD                + 0001H ;BYTE
VCON_VTOF_ACRLF_RECD                EQU     VCON_VTOF_ACR_RECD              + 0001H ;BYTE
VCON_VTOF_IRQ03_FIRST               EQU     VCON_VTOF_ACRLF_RECD            + 0001H ;BYTE
VCON_VTOF_IRQ03_FIRST_SECOND        EQU     VCON_VTOF_IRQ03_FIRST           + 0001H ;BYTE

VCON_XMIT_FIFO_LD_CNT               EQU     VCON_VTOF_IRQ03_FIRST_SECOND    + 0001H ;BYTE

VCON_REGADD_DATA                    EQU     VCON_XMIT_FIFO_LD_CNT           + 0002H ;WORD
VCON_REGADD_IER                     EQU     VCON_REGADD_DATA                + 0002H ;WORD
VCON_REGADD_IIR                     EQU     VCON_REGADD_IER                 + 0002H ;WORD
VCON_REGADD_LCR                     EQU     VCON_REGADD_IIR                 + 0002H ;WORD
VCON_REGADD_LSR                     EQU     VCON_REGADD_LCR                 + 0002H ;WORD
VCON_REGADD_MCR                     EQU     VCON_REGADD_LSR                 + 0002H ;WORD
VCON_REGADD_MSR                     EQU     VCON_REGADD_MCR                 + 0002H ;WORD
VCON_REGADDS_PTR                    EQU     VCON_REGADD_MSR                 + 0002H ;WORD
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LCD_MESSAGE_ADDRESS                 EQU     VCON_REGADDS_PTR                    + 0002H ;DWORD
SAVED_SCREEN_PTR                    EQU     LCD_MESSAGE_ADDRESS                 + 0004H ;WORD
LCD_WRITE_PTR                       EQU     SAVED_SCREEN_PTR                    + 0002H ;WORD
LCD_PROCESSING_FIRST_TIME           EQU     LCD_WRITE_PTR                       + 0002H ;BYTE
LCD_STEP_COUNT                      EQU     LCD_PROCESSING_FIRST_TIME           + 0001H ;BYTE
SET_DDRAM_ADDRESS                   EQU     LCD_STEP_COUNT                      + 0001H ;BYTE
SAVE_SCREEN_TOGGLE                  EQU     SET_DDRAM_ADDRESS                   + 0001H ;BYTE
RESTORE_SCREEN_TOGGLE               EQU     SAVE_SCREEN_TOGGLE                  + 0001H ;BYTE
LCD_WRITE_COUNT                     EQU     RESTORE_SCREEN_TOGGLE               + 0001H ;BYTE
SAVED_SCREEN                        EQU     LCD_WRITE_COUNT                     + 0001H ;40 BYTES

PLAY_WHICH_QUEUE                    EQU     SAVED_SCREEN                        + 0028H ;BYTE
PLAY_WHICH_DIRECTION                EQU     PLAY_WHICH_QUEUE                    + 0001H ;BYTE
VMA_PAUSE                           EQU     PLAY_WHICH_DIRECTION                + 0001H ;BYTE
VMA_COMPLETE                        EQU     VMA_PAUSE                           + 0001H ;BYTE
VMA_STOP                            EQU     VMA_COMPLETE                        + 0001H ;BYTE
VMA_NO_NEW_MSGS                     EQU     VMA_STOP                            + 0001H ;BYTE
VMA_NO_OLD_MSGS                     EQU     VMA_NO_NEW_MSGS                     + 0001H ;BYTE
VMA_DELETE_QUEUE_COUNTER            EQU     VMA_NO_OLD_MSGS                     + 0001H ;BYTE
VMA_ISSUED_CNTR                     EQU     VMA_DELETE_QUEUE_COUNTER            + 0001H ;WORD
VMA_FILENAME_PTR                    EQU     VMA_ISSUED_CNTR                     + 0002H ;WORD
VMA_QUEUE_FILE_SEG                  EQU     VMA_FILENAME_PTR                    + 0002H ;WORD
VMA_CURRENT_RECORD_OFFSET           EQU     VMA_QUEUE_FILE_SEG                  + 0002H ;WORD
SP_LAUNCHED_PGM_DWORD               EQU     VMA_CURRENT_RECORD_OFFSET           + 0002H ;DWORD

PFI_PLAY_WHICH_QUEUE                EQU     SP_LAUNCHED_PGM_DWORD               + 0004H ;BYTE
PFI_PLAY_WHICH_DIRECTION            EQU     PFI_PLAY_WHICH_QUEUE                + 0001H ;BYTE
PFI_PAUSE                           EQU     PFI_PLAY_WHICH_DIRECTION            + 0001H ;BYTE
PFI_COMPLETE                        EQU     PFI_PAUSE                           + 0001H ;BYTE
PFI_STOP                            EQU     PFI_COMPLETE                        + 0001H ;BYTE
PFI_NO_NEW_MSGS                     EQU     PFI_STOP                            + 0001H ;BYTE
PFI_NO_OLD_MSGS                     EQU     PFI_NO_NEW_MSGS                     + 0001H ;BYTE
PFI_DELETE_QUEUE_COUNTER            EQU     PFI_NO_OLD_MSGS                     + 0001H ;BYTE
PFI_FILENAME_PTR                    EQU     PFI_DELETE_QUEUE_COUNTER            + 0001H ;WORD
PFI_ISSUED_CNTR                     EQU     PFI_FILENAME_PTR                    + 0002H ;WORD
PFI_QUEUE_FILE_SEG                  EQU     PFI_ISSUED_CNTR                     + 0002H ;WORD
PFI_CURRENT_RECORD_OFFSET           EQU     PFI_QUEUE_FILE_SEG                  + 0002H ;WORD

RMI_COMPLETE                        EQU     PFI_CURRENT_RECORD_OFFSET           + 0002H ;BYTE
RMI_STOP                            EQU     RMI_COMPLETE                        + 0001H ;BYTE
RMI_FILENAME_PTR                    EQU     RMI_STOP                            + 0001H ;WORD
RMI_LENGTH                          EQU     RMI_FILENAME_PTR                    + 0002H ;WORD
RMI_SEQ_CNTR                        EQU     RMI_LENGTH                          + 0002H ;WORD
RMI_RESPONSE_CNTR                   EQU     RMI_SEQ_CNTR                        + 0002H ;WORD
RMI_DATA_CNT                        EQU     RMI_RESPONSE_CNTR                   + 0002H ;WORD
RMI_SECTOR_COUNT                    EQU     RMI_DATA_CNT                        + 0002H ;WORD
VOICE_MSG_FILENAME                  EQU     RMI_SECTOR_COUNT                    + 0002H ;20 BYTES
EM_ATH_DELAY                        EQU     VOICE_MSG_FILENAME                  + 0020H ;BYTE
EM_ATH_TO_OK_COUNT                  EQU     EM_ATH_DELAY                        + 0002H ;WORD
RM_ATH_DELAY                        EQU     EM_ATH_TO_OK_COUNT                  + 0002H ;BYTE
RM_ATH_TO_OK_COUNT                  EQU     RM_ATH_DELAY                        + 0002H ;WORD
RMI_ATH_DELAY                       EQU     RM_ATH_TO_OK_COUNT                  + 0002H ;BYTE
RMI_ATH_TO_OK_COUNT                 EQU     RMI_ATH_DELAY                       + 0002H ;WORD
;catequ0b.inc change
HUP_ATH_DELAY                       EQU     RMI_ATH_TO_OK_COUNT                 + 0002H ;BYTE
HUP_ATH_TO_OK_COUNT                 EQU     HUP_ATH_DELAY                       + 0002H ;WORD
TMO_ATH_DELAY                       EQU     HUP_ATH_TO_OK_COUNT                 + 0002H ;BYTE
TMO_ATH_TO_OK_COUNT                 EQU     TMO_ATH_DELAY                       + 0002H ;WORD
;catequ0b.inc change
CAS_FKS_DETECTED                    EQU     TMO_ATH_TO_OK_COUNT                 + 0002H ;BYTE
CUR_STEP_STATUS                     EQU     CAS_FKS_DETECTED                    + 0002H ;WORD
VCON_DLEQ_DETECTED                  EQU     CUR_STEP_STATUS                     + 0002H ;BYTE
VCON_DLES_DETECTED                  EQU     VCON_DLEQ_DETECTED                  + 0002H ;BYTE

TMO_RESPONSE_PTR                    EQU     VCON_DLES_DETECTED                  + 0002H ;WORD
TMO_SEQ_PTR                         EQU     TMO_RESPONSE_PTR                    + 0002H ;WORD
MODEM_OUT_OF_CVBOOT                 EQU     TMO_SEQ_PTR                         + 0002H ;BYTE
TMO_ATH_ISSUED_IN_RIBBON            EQU     MODEM_OUT_OF_CVBOOT                 + 0001H ;BYTE
TMO_COMPLETE                        EQU     TMO_ATH_ISSUED_IN_RIBBON            + 0001H ;BYTE
TMO_STOP                            EQU     TMO_COMPLETE                        + 0001H ;BYTE
TMO_WAS_ATH_ISSUED                  EQU     TMO_STOP                            + 0001H ;BYTE
TTQ_HAS_ITEM                        EQU     TMO_WAS_ATH_ISSUED                  + 0001H ;BYTE

TTQ_RUNNING_PTR                     EQU     TTQ_HAS_ITEM                        + 0001H ;WORD
TTQ_CUR_JOB_STARTING_STEP_NUMBER    EQU     TTQ_RUNNING_PTR                     + 0002H ;WORD
TTQ_REQUEST_STATE_COUNTER           EQU     TTQ_CUR_JOB_STARTING_STEP_NUMBER    + 0002H ;WORD
TTQ_REQUEST_STOP                    EQU     TTQ_REQUEST_STATE_COUNTER           + 0002H ;BYTE
TTQ_REQUEST_COMPLETE                EQU     TTQ_REQUEST_STOP                    + 0001H ;BYTE
TTQ_REQUEST_INPUTS_YES              EQU     TTQ_REQUEST_COMPLETE                + 0001H ;BYTE

EMAIL_SCRIPT_BUFFER                 EQU     TTQ_REQUEST_INPUTS_YES              + 0002H ;2048 BYTES
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EMAIL_SCRIPT_FILE_SIZE                  EQU     EMAIL_SCRIPT_BUFFER + EMAIL_SCRIPT_BUFFER_SIZE  ;WORD
;EMAIL_SCRIPT_FILE_SIZE                 EQU     EMAIL_SCRIPT_BUFFER + 800H                      ;WORD

KEYPAD_TO_DLE_BUFFER_OK                 EQU     EMAIL_SCRIPT_FILE_SIZE                  + 0002H ;BYTE
MODEM_VLS_STATE                         EQU     KEYPAD_TO_DLE_BUFFER_OK                 + 0002H ;WORD

ACD_ACTION                              EQU     MODEM_VLS_STATE                         + 0002H ;BYTE
ACD_STOP                                EQU     ACD_ACTION                              + 0001H ;BYTE
ACD_ISSUED_CNTR                         EQU     ACD_STOP                                + 0001H ;WORD
ACD_LCD_FIRST_ECHO                      EQU     ACD_ISSUED_CNTR                         + 0002H ;BYTE
ACD_DIGIT_COUNT                         EQU     ACD_LCD_FIRST_ECHO                      + 0001H ;BYTE
ACD_FILENAME_PTR                        EQU     ACD_DIGIT_COUNT                         + 0001H ;WORD
ACD_TYPE                                EQU     ACD_FILENAME_PTR                        + 0002H ;WORD
ACD_REPEAT_COUNT                        EQU     ACD_TYPE                                + 0002H ;WORD
ACD_REPEAT_COUNTER                      EQU     ACD_REPEAT_COUNT                        + 0002H ;WORD
ACD_LCD_MSG_ADDRESS                     EQU     ACD_REPEAT_COUNTER                      + 0002H ;WORD
ACD_LCD_ECHO_LOCATION                   EQU     ACD_LCD_MSG_ADDRESS                     + 0002H ;BYTE
CAS_AFTER_FKS                           EQU     ACD_LCD_ECHO_LOCATION                   + 0001H ;BYTE
CAS_TT_BEYOND_FKS                       EQU     CAS_AFTER_FKS                           + 0001H ;WORD
;catequ0b.inc change. 7/18/95.
VCON_DLEB_DETECTED                      EQU     CAS_TT_BEYOND_FKS                       + 0002H ;BYTE
VCON_DLED_DETECTED                      EQU     VCON_DLEB_DETECTED                      + 0001H ;BYTE
VCON_DLEO_DETECTED                      EQU     VCON_DLED_DETECTED                      + 0001H ;BYTE
VCON_DLEU_DETECTED                      EQU     VCON_DLEO_DETECTED                      + 0001H ;BYTE
VCON_DLE_CAPT_DETECTED                  EQU     VCON_DLEU_DETECTED                      + 0001H ;BYTE
VCON_XON_DETECTED                       EQU     VCON_DLE_CAPT_DETECTED                  + 0001H ;BYTE
VCON_XOFF_DETECTED                      EQU     VCON_XON_DETECTED                       + 0001H ;BYTE

INDEX_FILE_BUSY                         EQU     VCON_XOFF_DETECTED                      + 0001H ;BYTE
INDEX_FILE_PARAGRAPH_PADDING            EQU     INDEX_FILE_BUSY                         + 0001H ;16 BYTES
INDEX_FILE_IN_MPS                       EQU     INDEX_FILE_PARAGRAPH_PADDING            + 0010H ;4096 BYTES


REM_COMPLETE                            EQU     INDEX_FILE_IN_MPS + INDEX_FILE_IN_MPS_SIZE      ;BYTE
REM_FIRST_DATA                          EQU     REM_COMPLETE                            + 0001H ;BYTE
REM_RESPONSE_PTR                        EQU     REM_FIRST_DATA                          + 0001H ;WORD
REM_COMMAND_PTR                         EQU     REM_RESPONSE_PTR                        + 0002H ;WORD
EMAIL_SCRIPT_BUFFER_PTR                 EQU     REM_COMMAND_PTR                         + 0002H ;WORD
REM_ATH_TO_OK_COUNT                     EQU     EMAIL_SCRIPT_BUFFER_PTR                 + 0002H ;WORD
EMAIL_SCRIPT_BUFFER_ITEM_BYTE_COUNT     EQU     REM_ATH_TO_OK_COUNT                     + 0002H ;WORD

REM_ATH_DELAY                           EQU     EMAIL_SCRIPT_BUFFER_ITEM_BYTE_COUNT     + 0002H ;BYTE
REM_SECTOR_COUNT                        EQU     REM_ATH_DELAY                           + 0002H ;WORD
REM_DATA_COUNT                          EQU     REM_SECTOR_COUNT                        + 0002H ;WORD


MPS_TCF_FILENAME                        EQU     REM_DATA_COUNT                          + 0002H ;64 BYTES
SP_RETURN_FLAGS                         EQU     MPS_TCF_FILENAME                        + 0040H ;WORD
FBX_ONE_VALID_DOC_NUMBER_EXISTS         EQU     SP_RETURN_FLAGS                         + 0002H ;BYTE
INCOMING_FAX                            EQU     FBX_ONE_VALID_DOC_NUMBER_EXISTS         + 0001H ;BYTE
INCOMING_FAX_FILE_NAME                  EQU     INCOMING_FAX                            + 0001H ;64 BYTES
RING_COUNT                              EQU     INCOMING_FAX_FILE_NAME                  + 0040H ;WORD
TIME_OF_THIS_RING                       EQU     RING_COUNT                              + 0002H ;WORD
VCON_STATE_OLD                          EQU     TIME_OF_THIS_RING                       + 0002H ;WORD
VCON_DLEH_DETECTED                      EQU     VCON_STATE_OLD                          + 0002H ;BYTE

;SIZE OF THIS ARRAY
TCB_SIZE                                EQU     VCON_DLEH_DETECTED                      + 0002H


;11/5/95. came from catstp19.asm
;THESE NUMBERS MUST MATCH THE ORDERING IN ACTION TABLE IN
;THESE EQU DO NOT SHOW UP IN CATEQU00.INC
ST_NO_ACTION                            EQU     0000H
ST_EMIT_MSG                             EQU     0001H
ST_VOICE_MAIL_ACCESS                    EQU     0002H
ST_ANNOUNCE_AND_COLLECT_DIGITS          EQU     0003H
ST_RECO_MSG                             EQU     0004H
ST_HANG_UP                              EQU     0005H
ST_RECO_MSG_INDIRECT                    EQU     0006H
ST_START_PROGRAM                        EQU     0007H
ST_WAIT_FOR_PGM_TO_COMPLETE             EQU     0008H
ST_PRINT_FAX_INDIRECT                   EQU     0009H
ST_TIMER_TICK_MAESTRO                   EQU     000AH
ST_SEND_A_FAX                           EQU     000BH
ST_RETRIEVE_EMAIL                       EQU     000CH
ST_SEND_FAX_INDIRECT                    EQU     000DH
ST_BUILD_FAX_DATABASE                   EQU     000EH
ST_TTQ_REQUEST                          EQU     000FH
ST_SWITCH_TO_FAX                        EQU     0010H
```

```
ST_HPM_TASK_MASTER              EQU     0011H
```

```
PROJ = CATVOCL7
PROJFILE = CATVOCL7.MAK
DEBUG = 1

PWBRMAKE  = pwbrmake
NMAKEBSC1  = set
NMAKEBSC2  = nmake
BRFLAGS  = /o $(PROJ).bsc
BROWSE  = 1
ASM  = ml
AFLAGS_G  = /W2 /WX /FR$*.sbr
AFLAGS_D  = /Zi /Fl
AFLAGS_R  = /nologo
CC  = cl
CFLAGS_G  = /W2 /BATCH /FR$*.sbr
CFLAGS_D  = /Gi$(PROJ).mdt /Zi /Od
CFLAGS_R  = /Ot /Oi /Ol /Oe /Og /Gs
MAPFILE_D  = $(PROJ).map
MAPFILE_R  = NUL
LFLAGS_G  = /NOI  /BATCH
LFLAGS_D  = /CO /M /NOF /NOP
LFLAGS_R  = /NOF /NOP
LINKER  = link
ILINK  = ilink
LRF  = echo > NUL

OBJS  = TTISR00F.obj SERISR06.obj ACTION0I.obj VMA0C.obj HAIRMI05.obj\
    PFI03.obj TMO0B.obj TTQREQ2.obj ACD02.obj SW2FAX0.obj REM002.obj\
    MAESTROK.obj CVBOOT07.obj SYSDATA5.obj FAKEDATA.obj

all: $(PROJ).exe

.SUFFIXES:
.SUFFIXES: .obj .asm

TTISR00F.obj : TTISR00F.ASM CATEQU0E.INC

SERISR06.obj : SERISR06.ASM CATEQU0B.INC

ACTION0I.obj : ACTION0I.ASM CATEQU0E.INC

VMA0C.obj : VMA0C.ASM CATEQU0E.INC

HAIRMI05.obj : HAIRMI05.ASM CATEQU0B.INC

PFI03.obj : PFI03.ASM CATEQU0B.INC

TMO0B.obj : TMO0B.ASM CATEQU0E.INC

TTQREQ2.obj : TTQREQ2.ASM CATEQU0B.INC

ACD02.obj : ACD02.ASM CATEQU0E.INC

SW2FAX0.obj : SW2FAX0.ASM CATEQU0B.INC

REM002.obj : REM002.ASM CATEQU0B.INC

MAESTROK.obj : MAESTROK.ASM CATEQU0E.INC

CVBOOT07.obj : CVBOOT07.ASM CATEQU0E.INC

SYSDATA5.obj : SYSDATA5.ASM CATEQU0E.INC

FAKEDATA.obj : FAKEDATA.ASM


$(PROJ).bsc :

$(PROJ).exe : $(OBJS)
!IF $(DEBUG)
    $(LRF) @<<$(PROJ).lrf
$(RT_OBJS: = +^
) $(OBJS: = +^
)
$@
$(MAPFILE_D)
$(LLIBS_G: = +^
) +
$(LLIBS_D: = +^
) +
```

```
$(LIBS: = +^
)
$(DEF_FILE) $(LFLAGS_G) $(LFLAGS_D);
<<
!ELSE
    $(LRF) @<<$(PROJ).lrf
$(RT_OBJS: = +^
) $(OBJS: = +^
)
$@
$(MAPFILE_R)
$(LLIBS_G: = +^
) +
$(LLIBS_R: = +^
) +
$(LIBS: = +^
)
$(DEF_FILE) $(LFLAGS_G) $(LFLAGS_R);
<<
!ENDIF
    $(LINKER) @$(PROJ).lrf
    $(NMAKEBSC1) MAKEFLAGS=
    $(NMAKEBSC2) $(NMFLAGS) -f $(PROJFILE) $(PROJ).bsc

.asm.obj :
!IF $(DEBUG)
    $(ASM) /c $(AFLAGS_G) $(AFLAGS_D) /Fo$@ $<
!ELSE
    $(ASM) /c $(AFLAGS_G) $(AFLAGS_R) /Fo$@ $<
!ENDIF


run: $(PROJ).exe
    $(PROJ).exe $(RUNFLAGS)

debug: $(PROJ).exe
    CV $(CVFLAGS) $(PROJ).exe $(RUNFLAGS)
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;THIS PROGRAM SITS ON 75MHZ MACHINE C:\MASM60\SAMPLES\CATVOICE\PROGRAMS\
;ldftohd6.asm <- ldftohd5.asm. 7/15/95. as I extended buffer size to larger than what
;can be contained in a head, the algorithm did not work anymore.
;ldftohd5.asm <- ldftohd4.asm. 7/4/95. with multiple modems, we cannot just give start chs
;and expect an int 13h call to tell us what the max chs is as there a multiple mas chs.
;so this program gets GS:0 as parameter. and figures the rest out. Of course, must include
;catequ0b.inc in here.
;ldftohd4.asm <- ldftohd3.asm. 5/11/95. diagnostic writes to 3ff. increasing numbers.
;and also to data_area.
;ldftohd3.asm <- ldftohdd.asm. 5/10/95.
;CATVOC0B-2. 5-95-65.
;*******************************************************
;*                                                     *
;*      WRITTEN BY HALUK M. AYTAC                      *
;*      MAY 5, 1995                                    *
;*                                                     *
;*******************************************************
;C:\CATBOX\PROGRAMS\LDFTOHDC
; 0. get hard disk info ie max_usable numbers
; 1. get filename from PSP (one blank)
; 2. get file size and write to first sector
; 3. open file
; 4. read file to buffer
; 5. write to hard disk area
; 6. close file
; 7. exit
;at this point, we will get the start_disk address from a memory area
;within this file. eventually, we must get it from 0040:xxxx address.
;
;FINAL PRODUCT:
;==============
; BIOS + SCSI ISR TOGETHER.
; FDISK (OR ASPI EQUIVALENT) MAKES MASTER BOOT RECORD.
; SCSI ISR CAN ALSO LOAD THE FIRST SECTOR WITH THE MASTER BOOT RECORD. THIS IS AN EVEN BETTER
; SOLUTION BECAUSE IT GETS DONE UPON RESET. IE SCSI ISR CAN CHECK THIS SECTOR AND IF IT DOES
; NOT HAVE A MASTER BOOT SECTOR, IT CAN LOAD ONE.
; SCSI ISR CAN ALSO FORMAT THE CATDISC. IT CAN CHECK IF IT IS FORMATTED AND THEN IT CAN FORMAT
; IT.
; BUT DOS MUST BE LOADED FROM FLOPPY.
; THESE NEED TO BE WORKED OUT.

;FILE SIZE / HDC SIZE ISSUES.
;============================
;
;LDFTOHDC READS THE FILE SIZE, TRANSLATES IT TO SECTOR COUNT AND WRITES THIS NUMBER TO THE
;FIRST SECTOR IN HDC.
;EMIT_MSG GET FILE TO HDC SECTION READS THIS AND LOADS THE VALUE TO GS:NUMBER OF SECTORS
;PARAMETER.
;EMIT_MSG DATA SECTION DECREMENTS THIS NUMBER FOR EACH SECTOR READ.
;
;RECO_MSG DATA SECTION COUNTS THE NUMBER OF SECTORS IT WRITES. IT STARTS WRITING FROM THE
;SECOND SECTOR ON.
;RECO_MSG MAKE FILE SECTION WRITES THE COUNT TO FIRST SECTOR.
;LDFFMHDC READS THE FIRST SECTOR AND BUILD FILE SIZE ACCORDINGLY.

;ldftohd5.asm change. include
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
                mov     ax, SEG data_area       ;set DS
                mov     DS, ax
;2###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0e2h
                out     dx, al
                mov     word ptr data_area, 0002h
;###########################################################################
; 1. get PSP to access file name.
                mov     ah, 51h
                int     21h
                mov     word ptr current_PSP, bx
;filename is of the form: byte count, blank, filename, 0dh
;need it in the form:     filename , 00h
                PUSH    DS
                mov     ax, word ptr current_PSP
```

```
                mov     DS, ax

                mov     dx, 0080h                       ;SET DTA redundant
                mov     ah, 1ah
                int     21h

                mov     bx, 0080h
                mov     al, DS:byte ptr [bx]
                mov     ah, 00h
                add     bx, ax
                inc     bx                              ;now pointing to 0dh
                mov     DS:byte ptr [bx], ah            ;ASCIIZ filename. starts at 82h
;now, move filename to our data area as we will use the DTA=PSP:80 for other purposes.
                mov     si, 0082h
                mov     di, OFFSET filename
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00h
                jnz     move_filename
;ldftohd3.asm change. mov ES:byte ptr [di], 00h  =>  movsb to increment si to point to CHS
                movsb
;ldftohd5.asm change. skip over 0 to get to GS:
                movsw
                mov     di, OFFSET mps_seg_number
                movsw                                   ;got GS:
                POP     DS
                mov     ax, word ptr mps_seg_number
                mov     GS, ax
;maestro8.asm mov current = start from its previous location
;reset current values
                mov     ax, GS:word ptr [START_CYLINDER]
                mov     word ptr fg_current_cylinder, ax
                mov     al, GS:byte ptr [START_HEAD]
                mov     byte ptr fg_current_head, al
                mov     al, GS:byte ptr [START_SECTOR]
                inc     al                              ;first sector has file size
                mov     byte ptr fg_current_sector, al

;3###########################################################################
                mov     dx, 02efh                       ;for diagnostic purpose.
                mov     al, 0e3h
                out     dx, al
                mov     word ptr data_area, 0003h
;###########################################################################
; 2. get file size and write to first sector.
                mov     cx, 0000h
                mov     dx, OFFSET filename
                mov     ah, 4eh
                int     21h
                mov     ax, word ptr current_PSP
                mov     ES, ax
                mov     bx, 009ah
                mov     eax, ES:dword ptr [bx]
;    change filesize to number of sectors
                shr     eax, 9
                mov     word ptr filesize, ax                   ;largest file 32MB
;    write this value to the first sector
;FORMAT OF THE FIRST SECTOR IN HDC
;=================================
;       BYTE 0  FILESIZE IN SECTORS     WORD
;       BYTE 2  FILENAME                64 BYTES
                mov     ax, SEG filesize
                mov     ES, ax
                mov     bx, OFFSET filesize
                mov     dl, 80h
                mov     dh, GS:byte ptr [START_HEAD]
                mov     cx, GS:word ptr [START_CYLINDER]
                shr     cx, 2
                and     cl, 0c0h
                or      cl, GS:byte ptr [START_SECTOR]
                mov     ch, GS:byte ptr [START_CYLINDER]
                mov     al, 01h                                 ;write 1 sector
                mov     ah, 03h
                int     13h
;4###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0e4h
                out     dx, al
                mov     word ptr data_area, 0004h
;###########################################################################
```

```
; 3. open file
                mov     dx, OFFSET filename                     ;byte count byte, blank, filename
                mov     ax, 3d00h
                int     21h
                mov     word ptr file_handle, ax
;5#############################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0e5h
                out     dx, al
                mov     word ptr data_area, 0005h
;#############################################################################
; 4. read file to buffer.
file_to_hdc_loop:
                mov     bx, word ptr file_handle
                mov     cx, word ptr buffer_size
                mov     dx, OFFSET buffer
                mov     ah, 3fh
                int     21h
                mov     word ptr actual_bytes, ax
                cmp     ax, 0000h
                jz      end_of_game
;6#############################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0e6h
                out     dx, al
                mov     word ptr data_area, 0006h
;#############################################################################
; 5. write to hard disk cache
;THIS PROGRAM HAS TWO ARGUMENTS IN ITS PSP:80 LOCATION.
;       1. FILENAME TO LOAD TO HARD DISK CACHE (HDC)
;       2. STARTING SECTOR, HEAD, CYLINDER (SHC) VALUES
;MASPI DID AN INT 13/08 TO GET DISK PARAMETERS. IT ALSO DECIDED WHAT OF IT IS FOR
;CATBOX USE OUT OF THE PARTITION. WHEN ASPI2DOS OR ASPIDISK ASK ABOUT IT, IT GIVES
;SMALLER NUMBERS. MASTER BOOT RECORD AND BOOT RECORD ARE ALSO DONE ACCORDINGLY.
;INSTAL HAS THE SAME LOGIC AS MASPI SO IT KNOWS WHERE OUR HDC IS.
;THUS IT LOADS
;       GS:byte ptr [START_SECTOR]
;       GS:byte ptr [START_HEAD]
;       GS:word ptr [START_CYLINDER]
;EMIT_MSG STEPPER LOADS THESE VALUES TO FIXED START_PROGRAM STEP TABLE ENTRY ARGUMENT 2
;PTR POINTED LOCATION IN BYTE-BYTE-WORD-00H FORM.
;START_PROGRAM, TRANSFERS THESE POINTERS TO THE MTICS ENTRIES.
;LAUNCH PROGRAM ROUTINE IN MAESTRO READS ARGUMENT_1 AND IF NON ZERO PROCESSES IT.
;THEN IT PROCESSES ARGUMENT_2 LIKEWISE IF IT ALSO IS NON ZERO. NOW THE ARGUMENTS ARE
;A PART OF THE COMMAND TAIL LINE REFERED TO BY LOAD EXEC WITHIN MAESTRO NRDATA AREA
;DOS INT 21/4B00 MOVES THE ARGUMENT TO PSP:80
;LDFTOHDC FINDS IT THERE.
                mov     ax, SEG buffer
                mov     ES, ax
                mov     bx, OFFSET buffer
                mov     ax, word ptr actual_bytes
                shr     ax, 9                   ;ignore portion of sector (< 70ms)
                mov     dl, 80h
                mov     dh, byte ptr fg_current_head
                mov     cx, word ptr fg_current_cylinder
                shr     cx, 2
                and     cl, 0c0h
                or      cl, byte ptr fg_current_sector
                mov     ch, byte ptr fg_current_cylinder
                mov     byte ptr actual_sectors, al
                mov     ah, 03h
                int     13h
;    update current values
                mov     al, byte ptr actual_sectors
                add     byte ptr fg_current_sector, al
                mov     bl, GS:byte ptr [MAX_USABLE_SECTOR]
                cmp     byte ptr fg_current_sector, bl
                jbe     no_inc_head_or_cyl

sectors_more_than_in_a_head:
                sub     byte ptr fg_current_sector, bl
                inc     byte ptr fg_current_head
                cmp     byte ptr fg_current_sector, bl
                ja      sectors_more_than_in_a_head

;assume number of heads added is less than those in a cylinder.
                mov     bl, GS:byte ptr [MAX_USABLE_HEAD]
                cmp     byte ptr fg_current_head, bl
                jbe     no_inc_head_or_cyl
                sub     byte ptr fg_current_head, bl
                dec     byte ptr fg_current_head
```

```
                inc     word ptr fg_current_cylinder
                mov     bx, GS:word ptr [MAX_USABLE_CYLINDER]
                cmp     word ptr fg_current_cylinder, bx
                jbe     no_inc_head_or_cyl
                mov     bx, GS:word ptr [START_CYLINDER]
                mov     word ptr fg_current_cylinder, bx
no_inc_head_or_cyl:
                jmp     file_to_hdc_loop
;7#########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0e7h
                out     dx, al
                mov     word ptr data_area, 0007h
;#########################################################################
; 6. close file
end_of_game:    mov     bx, word ptr file_handle
                mov     ah, 3eh
                int     21h
;8#########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0e8h
                out     dx, al
                mov     word ptr data_area, 0008h
;#########################################################################
; 7. exit
.EXIT
.FARDATA
                ORG     0000H
                ALIGN   10H
data_area               dw      ?
current_PSP             dw      ?
actual_bytes            dw      ?
                        db      ?
actual_sectors          db      ?
mps_seg_number          dw      ?
fg_current_cylinder     dw      ?       ;mps already has this variable so our version
fg_current_head         db      ?       ;is tagged fg (foreground)
fg_current_sector       db      ?
file_handle             dw      ?
filesize                dw      ?
filename                db      64 dup ("f")
;ldftohd5.asm change. increase buffer size to 32K = IDE buffer size for speed. (fm 4K)
buffer_size             dw      8000h
buffer                  db      32768 dup (00h) ;32 sectors < 26H=38 sectors
;60 second message at @ 7KHz, 8 bit PCM = 420 KB = 840 sectors
;buffer_size = 16,384 B = 32 sectors
END             start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;THIS PROGRAM SITS ON 75MHZ MACHINE (MARMARIS) C:\MASM60\SAMPLES\CATVOICE\PROGRAMS\
;stffmhd6.asm <- stffmhd5.asm. 7/18/95. buffer size was extended to beyond what can be
;contained in a head. so need to change the update chs algorithm.
;stffmhd5.asm <- stffmhd4.asm. 7/4/95. with multiple modems, we cannot just give start chs
;and expect an int 13h call to tell us what the max chs is as there a multiple mas chs.
;so this program gets GS:0 as parameter. and figures the rest out. Of course, must include
;catequ0b.inc in here.
;stffmhd4.asm <- ldftohd4.asm. 5/12/95.
;ldftohd4.asm <- ldftohd3.asm. 5/11/95. diagnostic writes to 3ff. increasing numbers.
;and also to data_area.
;ldftohd3.asm <- ldftohdd.asm. 5/10/95.
;CATVOC0B-2. 5-95-65.
;*******************************************************
;*                                                     *
;*      WRITTEN BY HALUK M. AYTAC                      *
;*      MAY 5, 1995                                    *
;*                                                     *
;*******************************************************
;C:\CATBOX\PROGRAMS\STFFMHDC
; 0. get hard disk info ie max_usable numbers
; 1. get filename from PSP (one blank)
; 2. read first sector to get file size in sectors
; 3. open file
; 4. read sectors to buffer
; 5. write buffer to file
; 6. close file
; 7. exit
;
;this function has two inputs for arguments:
;       1. command tail: filename and CHS start locations.
;       2. HDC first sector for filesize in sectors.
;
;FINAL PRODUCT:
;==============
; BIOS + SCSI ISR TOGETHER.
; FDISK (OR ASPI EQUIVALENT) MAKES MASTER BOOT RECORD.
; SCSI ISR CAN ALSO LOAD THE FIRST SECTOR WITH THE MASTER BOOT RECORD. THIS IS AN EVEN BETTER
; SOLUTION BECAUSE IT GETS DONE UPON RESET. IE SCSI ISR CAN CHECK THIS SECTOR AND IF IT DOES
; NOT HAVE A MASTER BOOT SECTOR, IT CAN LOAD ONE.
; SCSI ISR CAN ALSO FORMAT THE CATDISC. IT CAN CHECK IF IT IS FORMATTED AND THEN IT CAN FORMAT
; IT.
; BUT DOS MUST BE LOADED FROM FLOPPY.
; THESE NEED TO BE WORKED OUT.

;FILE SIZE / HDC SIZE ISSUES.
;============================
;
;LDFTOHDC READS THE FILE SIZE, TRANSLATES IT TO SECTOR COUNT AND WRITES THIS NUMBER TO THE
;FIRST SECTOR IN HDC.
;EMIT_MSG GET FILE TO HDC SECTION READS THIS AND LOADS THE VALUE TO GS:NUMBER OF SECTORS
;PARAMETER.
;EMIT_MSG DATA SECTION DECREMENTS THIS NUMBER FOR EACH SECTOR READ.
;
;RECO_MSG DATA SECTION COUNTS THE NUMBER OF SECTORS IT WRITES. IT STARTS WRITING FROM THE
;SECOND SECTOR ON.
;RECO_MSG MAKE FILE SECTION WRITES THE COUNT TO FIRST SECTOR.
;LDFFMHDC READS THE FIRST SECTOR AND BUILD FILE SIZE ACCORDINGLY.

;stffmhd5.asm change. include
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
                mov     ax, SEG data_area       ;set DS
                mov     DS, ax
;2###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0f2h
                out     dx, al
                mov     word ptr data_area, 0002h
;###########################################################################
; 1. get PSP to access file name.
                mov     ah, 51h
                int     21h
                mov     word ptr current_PSP, bx
;filename is of the form: byte count, blank, filename, 0dh
```

```
;need it in the form:     filename , 00h
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax

                mov     dx, 0080h                       ;SET DTA redundant
                mov     ah, 1ah
                int     21h

                mov     bx, 0080h
                mov     al, DS:byte ptr [bx]
                mov     ah, 00h
                add     bx, ax
                inc     bx                              ;now pointing to 0dh
                mov     DS:byte ptr [bx], ah            ;ASCIIZ filename. starts at 82h
;now, move filename to our data area as we will use the DTA=PSP:80 for other purposes.
                mov     si, 0082h
                mov     di, OFFSET filename
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00h
                jnz     move_filename
;ldftohd3.asm change. mov ES:byte ptr [di], 00h  =>  movsb to increment si to point to CHS
                movsb
;stffmhd5.asm change. skip over 0 to get to GS:
                movsw
                mov     di, OFFSET mps_seg_number
                movsw                                   ;got GS:
                POP     DS
                mov     ax, word ptr mps_seg_number
                mov     GS, ax
;maestro8.asm mov current = start from its previous location
;reset current values
                mov     ax, GS:word ptr [START_CYLINDER]
                mov     word ptr fg_current_cylinder, ax
                mov     al, GS:byte ptr [START_HEAD]
                mov     byte ptr fg_current_head, al
                mov     al, GS:byte ptr [START_SECTOR]
                inc     al                              ;first sector has file size
                mov     byte ptr fg_current_sector, al

;3###########################################################################
                mov     dx, 02efh                       ;for diagnostic purpose.
                mov     al, 0f3h
                out     dx, al
                mov     word ptr data_area, 0003h
;###########################################################################
; 2. read first sector to get file size in sectors
;FORMAT OF THE FIRST SECTOR IN HDC
;=================================
;       BYTE 0  FILESIZE IN SECTORS     WORD
                mov     ax, SEG buffer
                mov     ES, ax
                mov     bx, OFFSET buffer
                mov     dl, 80h
                mov     dh, GS:byte ptr [START_HEAD]
                mov     cx, GS:word ptr [START_CYLINDER]
                shr     cx, 2
                and     cl, 0c0h
                or      cl, GS:byte ptr [START_SECTOR]
                mov     ch, GS:byte ptr [START_CYLINDER]
                mov     al, 01h                                 ;read 1 sector
                mov     ah, 02h
                int     13h
                mov     bx, OFFSET buffer
                mov     ax, ES:word ptr [bx]
                mov     word ptr filesize, ax                   ;in sectors
;4###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0f4h
                out     dx, al
                mov     word ptr data_area, 0004h
;###########################################################################
; 3. open file
                mov     dx, OFFSET filename                     ;byte count byte, blank, filename
                mov     cx, 0000h
                mov     ax, 3c00h
                int     21h
                mov     word ptr file_handle, ax
;5###########################################################################
```

```
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0f5h
                out     dx, al
                mov     word ptr data_area, 0005h
;###########################################################################
; 4. read sectors to buffer
hdc_to_file_loop:
                mov     ax, SEG buffer
                mov     ES, ax
                mov     bx, OFFSET buffer
                mov     ax, word ptr buffer_size
                shr     ax, 9                   ;ignore portion of sector (< 70ms)
                cmp     word ptr filesize, ax
                jbe     last_read
                sub     word ptr filesize, ax
                jmp     continue
last_read:      mov     ax, word ptr filesize
                cmp     ax, 0000h
                je      end_of_game
                sub     word ptr filesize, ax
                jmp     continue
continue:       mov     dl, 80h
                mov     dh, byte ptr fg_current_head
                mov     cx, word ptr fg_current_cylinder
                shr     cx, 2
                and     cl, 0c0h
                or      cl, byte ptr fg_current_sector
                mov     ch, byte ptr fg_current_cylinder
                mov     byte ptr actual_sectors, al
                mov     ah, 02h
                int     13h
;    update current values
                mov     al, byte ptr actual_sectors
                add     byte ptr fg_current_sector, al
                mov     bl, GS:byte ptr [MAX_USABLE_SECTOR]
                cmp     byte ptr fg_current_sector, bl
                jbe     no_inc_head_or_cyl

sectors_more_than_in_a_head:
                sub     byte ptr fg_current_sector, bl
                inc     byte ptr fg_current_head
                cmp     byte ptr fg_current_sector, bl
                ja      sectors_more_than_in_a_head

;assume number of heads is less than those in a cylinder.
                mov     bl, GS:byte ptr [MAX_USABLE_HEAD]
                cmp     byte ptr fg_current_head, bl
                jbe     no_inc_head_or_cyl
                sub     byte ptr fg_current_head, bl
                dec     byte ptr fg_current_head

                inc     word ptr fg_current_cylinder
                mov     bx, GS:word ptr [MAX_USABLE_CYLINDER]
                cmp     word ptr fg_current_cylinder, bx
                jbe     no_inc_head_or_cyl
                mov     bx, GS:word ptr [START_CYLINDER]
                mov     word ptr fg_current_cylinder, bx
no_inc_head_or_cyl:
                mov     ah, 00h
                shl     ax, 9
                mov     cx, ax
;6###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0f6h
                out     dx, al
                mov     word ptr data_area, 0006h
;###########################################################################
; 5. write buffer to file
;THIS PROGRAM HAS TWO ARGUMENTS IN ITS PSP:80 LOCATION.
;       1. FILENAME TO LOAD TO HARD DISK CACHE (HDC)
;       2. STARTING SECTOR, HEAD, CYLINDER (SHC) VALUES
;MASPI DID AN INT 13/08 TO GET DISK PARAMETERS. IT ALSO DECIDED WHAT OF IT IS FOR
;CATBOX USE OUT OF THE PARTITION. WHEN ASPI2DOS OR ASPIDISK ASK ABOUT IT, IT GIVES
;SMALLER NUMBERS. MASTER BOOT RECORD AND BOOT RECORD ARE ALSO DONE ACCORDINGLY.
;INSTAL HAS THE SAME LOGIC AS MASPI SO IT KNOWS WHERE OUR HDC IS.
;THUS IT LOADS
;       GS:byte ptr [START_SECTOR]
;       GS:byte ptr [START_HEAD]
;       GS:word ptr [START_CYLINDER]
;EMIT_MSG STEPPER LOADS THESE VALUES TO FIXED START_PROGRAM STEP TABLE ENTRY ARGUMENT 2
;PTR POINTED LOCATION IN BYTE-BYTE-WORD-00H FORM.
```

```
;START_PROGRAM, TRANSFERS THESE POINTERS TO THE MTICS ENTRIES.
;LAUNCH PROGRAM ROUTINE IN MAESTRO READS ARGUMENT_1 AND IF NON ZERO PROCESSES IT.
;THEN IT PROCESSES ARGUMENT_2 LIKEWISE IF IT ALSO IS NON ZERO. NOW THE ARGUMENTS ARE
;A PART OF THE COMMAND TAIL LINE REFERED TO BY LOAD EXEC WITHIN MAESTRO NRDATA AREA
;DOS INT 21/4B00 MOVES THE ARGUMENT TO PSP:80
;LDFTOHDC FINDS IT THERE.
                mov     bx, word ptr file_handle
                mov     dx, OFFSET buffer
                mov     ah, 40h
                int     21h
                mov     word ptr actual_bytes, ax
        jmp hdc_to_file_loop
;7###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0f7h
                out     dx, al
                mov     word ptr data_area, 0007h
;###########################################################################
; 6. close file
end_of_game:    mov     bx, word ptr file_handle
                mov     ah, 3eh
                int     21h
;8###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0f8h
                out     dx, al
                mov     word ptr data_area, 0008h
;###########################################################################
; 7. exit
.EXIT
.FARDATA
                ORG     0000H
                ALIGN   10H
data_area               dw      ?
current_PSP             dw      ?
actual_bytes            dw      ?
                        db      ?
actual_sectors          db      ?
mps_seg_number          dw      ?
fg_current_cylinder     dw      ?       ;mps has similar name so we add fg (foreground)
fg_current_head         db      ?
fg_current_sector       db      ?
file_handle             dw      ?
filesize                dw      ?
filename                db      64 dup ("f")
;ldftohd5.asm change. increase buffer size to 32K = IDE buffer size for speed. (fm 4K)
buffer_size             dw      8000h
buffer                  db      32768 dup (00h)
;60 second message at @ 7KHz, 8 bit PCM = 420 KB = 840 sectors
;buffer_size = 16,384 B = 32 sectors
END             start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;mergvef7.asm <- mergvef6.asm. 10/22/95. fix errors in concatenate.
;reset .que ptr before final write. if .que created then ptr at begin. if existed then
;it is read which moves the pointer. reset in either case.
;mergvef6.asm <- mergvef5.asm.        . fix errors in compactify.
;mergvef5.asm <- mergvef4.asm. 9/30/95. fix concatenate
;mergvef4.asm <- mergvef3.asm. 7/20/95. complete revamp.
;mergvef3.asm <- mergvef2.asm. 5/30/95. fix error in eliminate (change file size). swap write 6 and write seg.
;mergvef1.asm <- mergvef0.asm. 5/26/95. add compact.
;mergvef0.asm. 5/25/95.
;works with vma action.
;    0. GET PSP
;    1. GET FILE NAME
;    2. CHECK FILE NAME AGAINST THE SYSDATA LIST OF ACTIVE FILES
;    3. IF MATCH, SET GS:INDEX_FILE_BUSY AND EXIT
;    4. IF NO MATCH, WRITE OVER THE FILENAME IN THE APPROPRIATE AREA FOR THIS MODEM
;    5. OPEN .QUF. IF IT DOES NOT EXIST, THEN SKIP OVER THIS STEP. IT COULD BE THAT THE USER
;       IS DOING TWO VMA'S BACK TO BACK. AND NO NEW MESSAGES IN BETWEEN.
;       GET FILE INFO ON .QUF
;    6. OPEN .QUE. IF IT DOES NOT EXIST, THEN CREATE IT.
;       GET FILE INFO ON .QUE
;    7. MOVE FILES TO MPS MEM AREA. if one or both were just created, give them form (format them)
;    8. CONCATENATE
;    9. COMPACTIFY
;   10. DELETE .quf.
;   11. WRITE INDEX_FILE_IN_MPS CONTENTS TO .QUE.
;   12. EXIT
;*****************************************************************
;*                                                               *
;*      INPUTS:                                                  *
;*      FILENAME IN PSP:82 -QUE AND QUF-                         *
;*                                                               *
;*****************************************************************
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
;1###############################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 39h
                out     dx, al
                mov     word ptr data_area, 0001h
;###############################################################################

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET FILE NAME
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET filename_quf_version
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                movsb
                mov     di, OFFSET st_seg_zero_offset
                movsd
                POP     DS

                mov     si, OFFSET filename_quf_version
                mov     di, OFFSET filename_que_version
move_to_que_version:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_to_que_version
                movsb
                sub     di, 2
                mov     ES:byte ptr [di], "E"

; 2. CHECK FILE NAME AGAINST THE SYSDATA LIST OF ACTIVE FILES
```

```
                mov     ax, word ptr st_seg_number
                mov     FS, ax
                mov     ax, FS:word ptr [OFFSET_TO_MODEM_NUMBER]    ;eg 3130h for modem_1
                and     ah, 00001111b
                mov     al, ah
                mov     ah, 0
                mov     word ptr fg_modem_number, ax                ;now we have 0001h

                mov     ax, FS:word ptr [OFFSET_TO_TCB_SEG_NUMBER]
                mov     word ptr fg_mps_seg_number, ax
                mov     GS, ax

                mov     ax, FS:word ptr [OFFSET_TO_SYS_DATA_SEG_NUMBER]
                mov     word ptr fg_sys_data_seg_number, ax
                mov     ES, ax
                mov     cx, 0
                mov     di, SYS_DATA_OFFSET_TO_LOADED_INDEX_FILES
                mov     si, OFFSET filename_quf_version
fg_compare_filenames:
                cmp     DS:byte ptr [si], "."
                je      fg_compare_pass                             ;assumes all index filenames 8.3
                cmpsb
                je      fg_compare_filenames
fg_compare_fail:
                inc     cx
                cmp     cx, 5
                je      go_ahead_with_index

                mov     di, SYS_DATA_OFFSET_TO_LOADED_INDEX_FILES
                mov     si, OFFSET filename_quf_version
                mov     al, 40H                                     ;size of sysdata filename entry
                mul     cl
                add     di, ax
                jmp     fg_compare_filenames
fg_compare_pass:                                                    ;comp passes but we cannot do vma

; 3. IF MATCH, SET GS:INDEX_FILE_BUSY AND EXIT
                mov     GS:byte ptr [INDEX_FILE_BUSY], TRUE         ;vma will now exit.
                jmp     program_exit
go_ahead_with_index:
                mov     GS:byte ptr [INDEX_FILE_BUSY], FALSE

; 4. IF NO MATCH, WRITE OVER THE FILENAME IN THE APPROPRIATE AREA FOR THIS MODEM
;now we need to register our own filename with the sysdata structure entry for this modem.

                mov     si, OFFSET filename_quf_version
                mov     di, SYS_DATA_OFFSET_TO_LOADED_INDEX_FILES
                mov     ax, word ptr fg_modem_number
                mov     bl, 40H
                mul     bl
                add     di, ax
move_filename_to_sysdata:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename_to_sysdata
                movsb

; 5. OPEN .QUF. IF IT DOES NOT EXIST, THEN SKIP OVER THIS STEP. IT COULD BE THAT THE USER
;    IS DOING TWO VMA'S BACK TO BACK. AND NO NEW MESSAGES IN BETWEEN.
;    GET FILE INFO ON .QUF
                mov     dx, OFFSET filename_quf_version
                mov     ax, 3d02h                                   ;open to rd/wr
                int     21h
                jc      file_open_error_quf
                mov     word ptr file_handle_quf, ax
                mov     byte ptr there_was_quf_file, TRUE
                jmp     get_file_info_quf

file_open_error_quf:
                cmp     ax, ERROR_FILE_NOT_FOUND
                jne     program_exit                                ;we do not expect this case
                mov     dword ptr file_size_quf, 00000000H
                mov     byte ptr there_was_quf_file, FALSE
                jmp     open_file_que

;2*****************************************************************
;*                                                               *
;*      GET FILE INFO ON C:\CATBOX\VOICE\VMA06172.QUF            *
;*                                                               *
;*****************************************************************
get_file_info_quf:
```

```
                mov     cx, 0000h
                mov     dx, OFFSET filename_quf_version
                mov     ah, 4eh
                int     21h
                PUSH    DS
                mov     bx, word ptr current_PSP
                mov     DS, bx
                mov     bx, 009ah
                mov     eax, DS:dword ptr [bx]
                POP     DS
                mov     dword ptr file_size_quf, eax
                jmp     open_file_que

; 6. OPEN .QUE. IF IT DOES NOT EXIST, THEN CREATE IT.
;    GET FILE INFO ON .QUE
;3*************************************************************
;*                                                           *
;*      OPEN C:\CATBOX\VOICE\VMA06172.QUF RD/WR              *
;*      if file does not exist, then create it               *
;*                                                           *
;*************************************************************
open_file_que:  mov     dx, OFFSET filename_que_version
                mov     ax, 3d02h
                int     21h
                jc      file_open_error_que
                mov     word ptr file_handle_que, ax
                jmp     get_file_info_que

file_open_error_que:
                cmp     ax, ERROR_FILE_NOT_FOUND
                jne     close_quf_and_program_exit
                mov     dx, OFFSET filename_que_version
                mov     cx, 0000h
                mov     ah, 3ch
                int     21h
                mov     word ptr file_handle_que, ax
                mov     byte ptr new_file_created_que, YES
                mov     dword ptr file_size_que, 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK
                jmp     allocate_memory

;4*************************************************************
;*                                                           *
;*      GET FILE INFO ON C:\CATBOX\VOICE\VMA06172.QUF        *
;*      especially filesize. if we just created this file then *
;*      no need to get file info                             *
;*                                                           *
;*************************************************************
get_file_info_que:
                mov     cx, 0000h
                mov     dx, OFFSET filename_que_version
                mov     ah, 4eh
                int     21h
get_file_info_cont_que:
                PUSH    DS
                mov     bx, word ptr current_PSP
                mov     DS, bx
                mov     bx, 009ah
                mov     eax, DS:dword ptr [bx]
                POP     DS
                mov     dword ptr file_size_que, eax
                mov     byte ptr new_file_created_que, NO
                jmp     allocate_memory

; 7. MOVE FILES TO MPS MEM AREA. if one or both were just created, give them form (format them)
;5*************************************************************
;*                                                           *
;*      ALLOCATE MEMORY FOR C:\CATBOX\VOICE\VMA06172.QUF & .QUE *
;*      allocate memory for both files. plus                 *
;*                                                           *
;*************************************************************
allocate_memory: mov    eax, dword ptr file_size_que        ;assume filesize < 64KB
                 add    eax, dword ptr file_size_quf        ;duplicates the first 10h
                 sub    eax, 10h                            ;subtract the first 10h
;NOTE: if no .quf file then it is wrong to subtract 10h but this is harmless here
;as it is just used to size the combined size.
                 cmp    ax, INDEX_FILE_IN_MPS_SIZE
                 ja     close_quf_que_and_program_exit
                 mov    word ptr total_new_que_file_size, ax

;6*************************************************************
;*                                                           *
```

```
;*      MOVE C:\CATBOX\VOICE\VMA06172.QUE TO ALLOCATED AREA     *
;*      if first time, then build file in allocated area        *
;*      if not first time, then read file to this area          *
;*      MOVE C:\CATBOX\VOICE\VMA06172.QUF TO ALLOCATED AREA     *
;*      move from 10H on. if there was no .quf file, do not     *
;*      add any bytes for it.                                   *
;*                                                              *
;****************************************************************
;first we must turn the entry point of the INDEX_FILE_IN_MPS to a segment value.
;but we do not know if this data starts at a paragraph boundary. thius add a 16 byte
;padding to the MPS structure before this data area. then we can start even earlier.
                mov     bx, INDEX_FILE_IN_MPS
                shr     bx, 4                                   ;zero out last 4 bits. we are padded
                mov     ax, GS                                  ;below by 16 bytes.
                add     ax, bx
                mov     word ptr index_image_seg_number, ax
                mov     GS:word ptr [VMA_QUEUE_FILE_SEG], ax
                mov     ES, ax

                cmp     byte ptr new_file_created_que, YES
                jne     read_file_que

;building the vma.que file.
                mov     ES:word ptr [QF_FILE_SIZE], 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK

                mov     bx, QF_FRE_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_BWD_LNK], QF_FRE_CHAIN_FWD_LNK
                mov     di, QF_FRE_CHAIN_FWD_LNK + QFRV_EVENT_FILENAME
                mov     si, OFFSET fre_chain_emit_filename
cont_write_fre_filename:
                movsb
                cmp     DS:byte ptr [si], 00h
                jne     cont_write_fre_filename
                movsb

                mov     bx, QF_NEW_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_NEW_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_BWD_LNK], QF_NEW_CHAIN_FWD_LNK
                mov     di, QF_NEW_CHAIN_FWD_LNK + QFRV_EVENT_FILENAME
                mov     si, OFFSET new_chain_emit_filename
cont_write_new_filename:
                movsb
                cmp     DS:byte ptr [si], 00h
                jne     cont_write_new_filename
                movsb

                mov     bx, QF_OLD_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_OLD_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_BWD_LNK], QF_OLD_CHAIN_FWD_LNK
                mov     di, QF_OLD_CHAIN_FWD_LNK + QFRV_EVENT_FILENAME
                mov     si, OFFSET old_chain_emit_filename
cont_write_old_filename:
                movsb
                cmp     DS:byte ptr [si], 00h
                jne     cont_write_old_filename
                movsb

                jmp     move_file_quf

read_file_que:  mov     bx, word ptr file_handle_que
                mov     cx, word ptr file_size_que              ;assume file_size < 64KB ie 1,000 records
                mov     dx, 0
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                mov     ah, 3fh
                int     21h
                POP     DS
                mov     word ptr actual_bytes, ax
                mov     ES:word ptr [QF_FILE_SIZE], cx

move_file_quf:  cmp     byte ptr there_was_quf_file, TRUE
                je      read_file_quf
                jmp     write_que                               ;if no .quf then we are done
                                                                ;do not even have to write .que
read_file_quf:
;now move pointer 10h up.
                mov     bx, word ptr file_handle_quf
                mov     cx, 0000h
                mov     dx, 0010h
```

```
                mov     ax, 4200h
                int     21h
                mov     bx, word ptr file_handle_quf
                mov     cx, word ptr file_size_quf              ;assume file_size < 64KB ie 1,000 records
                sub     cx, 0010h                               ;subtract header
                mov     dx, ES:word ptr [QF_FILE_SIZE]
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                mov     ah, 3fh
                int     21h
                POP     DS
                mov     word ptr actual_bytes, ax
update_file_size:
                add     ES:word ptr [QF_FILE_SIZE], cx
                jmp     concatenate

; 8. CONCATENATE
;*****************************************************************
;*                                                               *
;*      CONCATENATE                                              *
;*      at this point we have .que and .quf                      *
;*                                                               *
;*****************************************************************
;concatenate: you bring .quf in. all its forward and backward references have 2 problems:
; 1. all offsets are off by a fixed amount equal to (.que file size - 10h). in other words add this
;    quantity to all forward and backward indexes.
; 2. .quf file does not contain any free/old records other than the mother ones. these two mother
;    records must be made a part of the free chain in .que.
; 3. the first record of the new chain in .quf must be tied to the last record of new chain in .que
;    the last record of the new chain in .quf must be tied to the mother record in .que.
;the order of doing these things is important.
;we should probably do (1) first. after this, we will know that all pointers are correct offsets and
;the only thing to fix is the chain items in .quf belong to.
; 1. all offsets are off by a fixed amount equal to (.que file size - 10h). in other words add this
;    quantity to all forward and backward indexes.
concatenate:    mov     cx, word ptr file_size_que
                sub     cx, 10h
                mov     bx, word ptr file_size_que
fix_quf_offsets:add     ES:word ptr [bx + 0], cx
                add     ES:word ptr [bx + 2], cx
                cmp     bx, ES:word ptr [QF_FILE_SIZE]
                jae     done_fix_quf_offsets
                add     bx, QFR_RECORD_SIZE
                jmp     fix_quf_offsets
done_fix_quf_offsets:
; 2. .quf file does not contain any free/old records other than the mother ones. these two mother
;    records must be made a part of the free chain in .que.
                mov     cx, word ptr file_size_que              ;cx points to mother free record in .quf
;.quf has no free elements other than mother free record
                mov     al, QFOP_ADD_TO_FRE_CHAIN
                call    qf_ops
;.quf has no old elements other than mother old record
                add     cx, 2 * QFR_RECORD_SIZE                 ;cx points to mother old record in .quf
                mov     al, QFOP_ADD_TO_FRE_CHAIN
                call    qf_ops
; 3. the first record of the new chain in .quf must be tied to the last record of new chain in .que
;    the last record of the new chain in .quf must be tied to the mother record in .que.
;add .quf new chain to .que new chain
                mov     cx, word ptr file_size_que
                add     cx, QFR_RECORD_SIZE                     ; cx -> mother new record in .quf
                mov     bx, cx                                  ; bx -> mother new record in .quf
                mov     cx, ES:word ptr [bx + QFR_FWD_LNK]      ; cx -> first new record in .quf
                mov     dx, ES:word ptr [QF_FRE_CHAIN_FWD_LNK + QFR_RECORD_SIZE + QFR_BWD_LNK]
                                                                ; dx -> last new record in .que
                mov     bx, dx                                  ; bx -> last new record in .que
                mov     ES:word ptr [bx + QFR_FWD_LNK], cx      ; next in fwd link with last new
                                                                ; record in .que is first new in .quf
                mov     bx, cx                                  ; bx -> first new record in .quf
                mov     ES:word ptr [bx + QFR_BWD_LNK], dx      ; next in bwd link with first new in .quf
                                                                ; is last new in .que

                mov     cx, word ptr file_size_que
                add     cx, QFR_RECORD_SIZE                     ; cx -> mother new record in .quf
                mov     bx, cx                                  ; bx -> mother new record in .quf
                mov     cx, ES:word ptr [bx + QFR_BWD_LNK]      ; cx -> last new record in .quf
                mov     bx, cx                                  ; bx -> last new record in .quf
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK + QFR_RECORD_SIZE
                mov     ES:word ptr [QF_FRE_CHAIN_FWD_LNK + QFR_RECORD_SIZE + QFR_BWD_LNK], bx

;delete .quf mother new record
```

```
                mov     cx, word ptr file_size_que
                add     cx, QFR_RECORD_SIZE                     ;cx points to mother new record in .quf
                mov     al, QFOP_ADD_TO_FRE_CHAIN
                call    qf_ops

; 9. COMPACTIFY
;*****************************************************************
;*                                                               *
;*      COMPACTIFY                                               *
;*                                                               *
;*****************************************************************
;descend with si. if si =< 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK exit.
;else if this record is free, eliminate record and adjust file size.
;repeat the last 2 lines until record is not free. then remember the record address

;ascend with di. if di = file_size exit.
;if this record is not free, repeat the last line
;when record is free, move record from descent into this record. delete this record from free and
;add to new or old. where this record came from, delete it from new or old and adjust the file size.
;THIS CODE WORKED. 9/30/95.
;DESCRIPTION OF WHAT IT DOES:
; In rough outline, we start from the end to locate non-free records. Until we find one, we eliminate
;and adjust file size for all free records. This is compactify_lup1. Once we encounter a non-free
;record, we move to compactify_lup2. Here, we try to locate a free record. Until we see one, we ignore
;the non-free ones. Once we locate a free record, we eliminate it and adjust the file size. The non-free
;record we got from compactify_lup1, we delete from the new/old chain. This same non-free record we move
;(with movsb) to the slot freed from eliminating the free record from compactify_lup1. We now add the
;new location of the non-free record to the new/old chain.
;repeat the whole loop.

                mov     di, 2 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK

                mov     si, ES:word ptr [QF_FILE_SIZE]

compactify_lup1:
                sub     si, QFR_RECORD_SIZE
                cmp     si, 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK
                jb      compactify_done
                cmp     ES:byte ptr [si + QFR_RECORD_TYPE], FRE_RECORD
                jne     compactify_lup2
                mov     cx, si
                mov     al, QFOP_ELI_ND_ADJ_FSIZE
                call    qf_ops
                jmp     compactify_lup1
;remember si. it has a non free record.
compactify_lup2:
                add     di, QFR_RECORD_SIZE
                cmp     di, si
                jae     compactify_done
                cmp     ES:byte ptr [di + QFR_RECORD_TYPE], FRE_RECORD
                jne     compactify_lup2
                mov     cx, di
                mov     al, QFOP_ELI_ND_ADJ_FSIZE
                call    qf_ops
                mov     cx, QFR_RECORD_SIZE
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                CLD
                rep     movsb
                POP     DS
                sub     di, QFR_RECORD_SIZE
                sub     si, QFR_RECORD_SIZE
                mov     cx, si
                mov     al, ES:byte ptr [si + QFR_RECORD_TYPE]
                add     al, QFOP_DEL_FM_FRE_CHAIN
                call    qf_ops
                mov     cx, di
                mov     al, ES:byte ptr [si + QFR_RECORD_TYPE]
                add     al, QFOP_ADD_TO_FRE_CHAIN
                call    qf_ops
                jmp     compactify_lup1
compactify_done:

; 10. DELETE .quf.
delete_quf:     mov     dx, OFFSET filename_quf_version
                mov     ah, 41h
                INT     21H

; 11. WRITE INDEX_FILE_IN_MPS CONTENTS TO .QUE.
;10*************************************************************
```

```
;*                                                                *
;*      WRITE ALLOCATED AREA TO C:\CATBOX\VOICE\VMA06172.QUE      *
;*                                                                *
;******************************************************************
write_que:
;mergvef7.asm change. 10/25/95. reset pointer
                mov     bx, word ptr file_handle_que
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4200h                       ; from begin of file
                INT     21H

                mov     bx, word ptr file_handle_que
                mov     cx, ES:word ptr [QF_FILE_SIZE]
                mov     dx, 0000h
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                mov     ah, 40h
                int     21h
                POP     DS
; 12. EXIT
;12**************************************************************
;*                                                                *
;*      EXIT                                                      *
;*                                                                *
;******************************************************************

close_quf_que_and_program_exit:
                mov     bx, word ptr file_handle_que
                mov     ah, 3eh
                int     21h


close_quf_and_program_exit:
                mov     bx, word ptr file_handle_quf
                mov     ah, 3eh
                int     21h

program_exit:
;1################################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0b9h
                out     dx, al
                mov     word ptr data_area, 0001h
;################################################################################

.EXIT


;******************************************************************
;*                                                                *
;*      PROCEDURE VMA.QUE FILE OPERATIONS                         *
;*      version 6.2                                               *
;*                                                                *
;******************************************************************
;the image of fma.que sits in allocated memory. it starts at SEG:0
;This procedure will manipulate the records of the queue files based on the input:
;
;input: ES:cx = segment:offset of record to be changed (all chains for add, new/old for del)
;       al    = specifies action (add/delete record) and chain type (free, new, old)
;output:ES:cx = segment:offset of a record (deleted from free chain or next in chain etc)
;no other registers change.
;
;       al = 00 add to free chain
;            80 del from free chain
;            10 get next in free chain
;            20 get previous in free chain
;
;            01 add to new chain
;            81 del from new chain
;            11 get next in new chain
;            21 get previous in new chain
;
;            02 add to old chain
;            82 del from old chain
;            12 get next in old chain
;            22 get previous in old chain
;
;note:  for first time next in chain, cx=0000h as input
;       if also there are no records in this chain, then cx=0000h as output
```

```
;       if also the next record is the mother record, cx=0000h
;
;notes: queue file memory image is in a data segment that starts at 0000h
;       add always to tail end of chain
;       del from anywhere in new/old chains
;       del from head of free chain

qf_ops                  proc
                        push    bx
                        push    dx
                        push    di
                        push    ax

del_record:
;==========
                        test    al, 10000000b
                        jz      prv_record
                        cmp     al, 80h
                        jnz     not_a_del_fm_free_chain         ;ie a record to be deleted exists for sure
;if free chain is empty ie just has a mother record, then cx=queue_file_size and
;queue_file_size=queue_file_size + queue_record_size. free chain is empty if its
;mother record's forward_link = address of mother record.
;so first test for empty free chain.
                        mov     bx, QF_FRE_CHAIN_FWD_LNK
                        mov     dx, ES:word ptr [bx]            ;forward_link of free mother record
                        cmp     dx, QF_FRE_CHAIN_FWD_LNK        ;if equal then only mother record
                        je      free_record_at_end_of_file
                        mov     cx, dx                          ;points to first record
                        jmp     not_a_del_fm_free_chain
free_record_at_end_of_file:
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        mov     cx, dx
                        add     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK
                        mov     ES:word ptr [bx + QFR_BWD_LNK], QF_FRE_CHAIN_FWD_LNK
not_a_del_fm_free_chain:mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        jmp     qf_op_exit


prv_record:
;==========
                        test    al, 00100000b
                        jz      nxt_record
                        cmp     cx, 0000h
                        je      prv_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
prv_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_BWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

nxt_record:
```

```
;==========
                        test    al, 00010000b
                        jz      eli_record
                        cmp     cx, 0000h
                        je      nxt_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
nxt_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_FWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

eli_record:
;==========
                        test    al, 01000000b
                        jz      add_record
                        mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        sub     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        jmp     qf_op_exit


add_record:
;==========
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     dx, ES:word ptr [di + QFR_BWD_LNK]

                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], di

                        shr     ax, 6                           ; ax = 00h, 01h, 02h
                        mov     ES:byte ptr [bx + QFR_RECORD_TYPE], al

                        mov     bx, dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], cx
                        mov     bx, di
                        mov     ES:word ptr [bx + QFR_BWD_LNK], cx

                        jmp     qf_op_exit

qf_op_exit:             pop     ax
                        pop     di
                        pop     dx
                        pop     bx
                        ret

qf_ops                  endp
```

```
.FARDATA
ORG     0000H
ALIGN   10H
;*****************************************************************
;*                                                               *
;*      DATA AREA                                                *
;*                                                               *
;*****************************************************************
data_area               dw      ?
current_PSP             dw      ?
st_seg_zero_offset      dw      ?
st_seg_number           dw      ?
fg_modem_number         dw      ?
fg_sys_data_seg_number  dw      ?
fg_mps_seg_number       dw      ?
index_image_seg_number  dw      ?

filename_quf_version    db      64 dup ("f")                    ;came in PSP:82h
filename_que_version    db      64 dup ("e")
new_chain_emit_filename db      "C:\CATBOX\VOICE\NONEWMSG.PCM", 00H
old_chain_emit_filename db      "C:\CATBOX\VOICE\NOOLDMSG.PCM", 00H
fre_chain_emit_filename db      "C:\CATBOX\VOICE\INDEXBSY.PCM", 00H
file_handle_que         dw      ?
file_handle_quf         dw      ?
file_size_que           dd      ?
file_size_quf           dd      ?
new_file_created_que    db      ?
there_was_quf_file      db      ?
total_new_que_file_size dw      ?
actual_bytes            dw      ?


END     start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*************************************************
;*                                               *
;*                                               *
;*          SCFTOPCL.EXE                         *
;*          written by Haluk Aytac               *
;*          started June 21, 1995                *
;*                                               *
;*          assume 300x300                       *
;*                                               *
;*************************************************
;sctopcl4.asm <- sctopcl3.asm. 9/27/95. instead of writing to a file, write to printer.
;the hope is that copying will get faster. each scan reads 15,000 bytes.at 200,000 cps
;print speed, this would take 75ms per band. there are 64 such bands, which makes
;4.8 seconds to print. if writing to file took more than this, we have a deal. I think
;it did because when I reduce the number of file writes, the time went down by 4 seconds.
;sctopcl3.asm <- sctopcl2.asm. 9/22/95. remove sys_data.
;sctopcl2.asm <- sctopcl1.asm. 9/14/95. catvocl3 will have a printer task queue (PTQ).
;all programs creating printable files, will also add the files' names to PTQ.
;sctopcl1.asm <- sctopcl0.asm. 9/1/95. add diagnostic write to 2efh.
;SCTOPCL0.ASM <- pcx2pcl5.asm. 6/21/95.
;first argument is not needed, second argument is number of copies.

include     ..\catvocl\catequ0e.inc

LINES_PER_PAGE              EQU     3200
LINES_PER_READ              EQU     20      ; was 50: 20 secs to scan
BYTES_PER_LINE              EQU     300     ; 100: 16 seconds. 10 CAUSED IMAGE PROBLEMS

.MODEL  SMALL
.386P
.STACK
.CODE


ASSUME DS:SEG data_area
start:
;*************************************************************************
                mov     dx, 02efh                   ;COM4 scratch register
                mov     al, 26h
                out     dx, al
;*************************************************************************
; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx
; 1 GET NUMBER OF COPIES AND SYS_DATA SEG NUMBER
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET number_of_copies
                mov     ax, SEG data_area
                mov     ES, ax
                movsw                               ; lower word is number of copies
;note: when you try this program from C:> prompt do: C:> SCTOPCL0 4100 for 14 copies
                add     si, 3                       ; si -> seg number
                mov     di, OFFSET fg_sysdata_seg
                movsw
                POP     DS
; 2 OPEN INPUT FILE. GET DEVICE DATA. SET DEVICE DATA.
                mov     dx, OFFSET input_filename
                mov     ax, 3d02h
                int     21h
                mov     word ptr input_file_handle, ax
                mov     bx, word ptr input_file_handle
                mov     ax, 4400h
                int     21h
                mov     word ptr device_status, dx
                mov     bx, word ptr input_file_handle
                mov     dx, 00e0h
                mov     ax, 4401h
                int     21h
; 3 SETUP THE SCANNER
                mov     bx, word ptr input_file_handle
                mov     cx, 2
                mov     dx, OFFSET scanner_string_E
                mov     ah, 40h
                int     21h
```

```
mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0T
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0J
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0B
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0M
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0I
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0L
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 5
mov     dx, OFFSET scanner_string_a0K
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 7
mov     dx, OFFSET scanner_string_a300R
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 7
mov     dx, OFFSET scanner_string_a300S
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 7
mov     dx, OFFSET scanner_string_a100E
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 7
mov     dx, OFFSET scanner_string_a100F
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 6
mov     dx, OFFSET scanner_string_f75X
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 6
mov     dx, OFFSET scanner_string_f50Y
mov     ah, 40h
int     21h

mov     bx, word ptr input_file_handle
mov     cx, 8
```

```
                mov     dx, OFFSET scanner_string_f2400P
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_f3200Q
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_s1025E
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 12
                mov     dx, OFFSET return_string_s1025E
                mov     ah, 3fh
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_s1026E
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 13
                mov     dx, OFFSET return_string_s1026E
                mov     ah, 3fh
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_f0S
                mov     ah, 40h
                int     21h
; 4 SETUP PRINTER AND 0334 SUPER I/O.
;***********************************************
;       initialize the printer                  *
;***********************************************
                        mov     dx, 0000h
                        mov     ah, 01h
                        int     17h
;***********************************************
;*      parallel FIFO mode                      *
;***********************************************
                        mov     dx, 03beh               ;CTR
                        mov     al, 0ech                ;irq disable, select, no strobe
                        out     dx, al                  ;need bit_0=0 to get ECP started
                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        mov     al, 04h                 ;ECP bit set
                        out     dx, al
                        out     dx, al
                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        in      al, dx                  ;is ECP bit set?
pcr_value_in_l:         mov     byte ptr pcr_value, al
                        mov     dx, 07beh               ;ECR
                        in      al, dx                  ;=15 ie std mode, no irq, no dma
;in this mode, you can do software driven writes
ecr_value_in:           mov     byte ptr ecr_value, al
                        mov     al, 55h                 ;010 1 0101. // fifo mode. no irq. no dma.
                        out     dx, al                  ;now in parallel fifo mode.
;in this mode, you can do hardware driven writes
;***************************************************
;*      check for printer not busy and fifo empty  *
;***************************************************
                        mov     dx, 03bdh
print_byte_test_loop_s: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_s
                        mov     dx, 07beh
fifo_empty_loop_s:      in      al, dx
```

```
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_s
;***********************************************
;   WRITE RESET TO PRINTER                      *
;***********************************************
                        mov     cx, 2
                        mov     si, OFFSET reset_string
stuff_fifo_0:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_0: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_0
                        loop    stuff_fifo_0
;***********************************************
;   WRITE THE NUMBER OF COPIES TO PRINTER       *
;***********************************************
                        mov     cx, 6
                        mov     si, OFFSET no_of_copies_string
stuff_fifo_1:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_1: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_1
                        loop    stuff_fifo_1
;***********************************************
;   WRITE INIT STRING TO PRINTER                *
;***********************************************
                        mov     dx, 07beh
fifo_empty_loop_2:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_2
                        mov     cx, 12
                        mov     si, OFFSET init_string
stuff_fifo_2:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_2: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_2
                        loop    stuff_fifo_2
;*****************************************************************************
;*                                                                           *
;*          THE     GRAND       LOOP                                         *
;*                                                                           *
;*****************************************************************************
                        mov     dx, 07beh
fifo_empty_loop_3:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_3
;   REPEAT THE LOOP 3200 / 50 = 64 TIMES  =  LINES_PER_PAGE / LINES_PER_READ
                        mov     word ptr grand_loop_counter, LINES_PER_PAGE / LINES_PER_READ
grand_loop:             cmp     word ptr grand_loop_counter, 0
                        je      end_of_game
; 3 READ INPUT FILE TO BUFFER
                        mov     bx, word ptr input_file_handle
                        mov     cx, LINES_PER_READ * BYTES_PER_LINE
                        mov     dx, OFFSET input_buffer
                        mov     ah, 3fh
                        int     21h
                        jc      pgm_exit
                        mov     word ptr input_actual_bytes, ax
;   PROCESS INPUT BUFFER AND WRITE TO PRINTER
                        mov     word ptr input_buffer_ptr, OFFSET input_buffer
                        mov     cx, LINES_PER_READ          ;processing 50 lines
;***********************************************
;*      PETIT LOOP DOES ONE LINE               *
;***********************************************
petit_loop:
                        mov     dx, 07beh
fifo_empty_loop_4:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_4
                        mov     di, cx                      ;cx=50
                        mov     cx, 12                      ;cx=12
                        mov     si, OFFSET raster_command
stuff_fifo_3:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_3: in      al, dx
```

```
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_3
                        loop    stuff_fifo_3
                        mov     cx, di                      ;cx=50

                        mov     bx, cx                      ;cx=50
                        mov     cx, BYTES_PER_LINE          ;cx=300
                        mov     si, word ptr input_buffer_ptr
;************************************************
;*      PLUS PETIT LOOP DOES ONE FIFO LOAD      *
;************************************************
plus_petit_loop:        mov     dx, 07beh
fifo_empty_loop_5:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_5

keep_loading_fifo:      mov     di, cx                      ;cx=300
                        mov     cx, 16                      ;cx=16

stuff_fifo_4:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_4: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_4
                        loop    stuff_fifo_4
                        mov     dx, 07beh
fifo_empty_loop_6:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_6
                        mov     cx, di                      ;cx=<300
                        sub     cx, 16
                        cmp     cx, 16
                        ja      keep_loading_fifo
stuff_fifo_5:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_5: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_5
                        loop    stuff_fifo_5

                        mov     cx, bx                      ;cx=50
                        add     word ptr input_buffer_ptr, BYTES_PER_LINE
                        loop    petit_loop

;   GRAND LOOP TAIL END
                        dec     word ptr grand_loop_counter
                        jmp     grand_loop
;*****************************************************************************
;*                                                                           *
;*          THE     GRAND       LOOP    TAIL                                 *
;*                                                                           *
;*****************************************************************************
; 9 WRITE TAIL END STRING
end_of_game:            mov     dx, 07beh
fifo_empty_loop_7:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_7
                        mov     cx, 5
                        mov     si, OFFSET term_string
stuff_fifo_6:           mov     dx, 07bch
                        outsb                               ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_6: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_6
                        loop    stuff_fifo_6
;10 CLOSE INPUT FILE
                        mov     bx, word ptr input_file_handle
                        mov     ah, 3eh
                        int     21h
                        jc      pgm_exit
;12 EXIT PROGRAM
pgm_exit:
;************************************************
;*      return 332 to std mode                  *
;************************************************
                        mov     dx, 03beh               ;CTR
                        mov     al, 0ech                ;irq disable, select, no strobe
                        out     dx, al                  ;need bit_0=0 to get ECP started
```

```
                        mov     dx, 07beh               ;ECR
                        in      al, dx                  ;=55
                        mov     al, 15h                 ;000 1 0101. std mode. no irq. no dma.
                        out     dx, al                  ;now in std fifo mode.

                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        mov     al, 00h                 ;ECP bit reset
                        out     dx, al
                        out     dx, al
                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        in      al, dx                  ;is ECP bit reset?
pcr_value_in_2:         mov     byte ptr pcr_value, al
;*************************************************************************
                mov     dx, 02efh                   ;COM4 scratch register
                mov     al, 0a6h
                out     dx, al
;*************************************************************************
.EXIT


.FARDATA
ORG         0000H
ALIGN       10H
data_area                   dw      ?
current_PSP                 dw      ?

;BUFFERS
input_buffer                db      LINES_PER_READ * BYTES_PER_LINE dup ("S")
input_buffer_ptr            dw      ?
grand_loop_counter          dw      LINES_PER_PAGE / LINES_PER_READ
                            db      ?               ;for dword alignment
;FILES
input_file_handle           dw      ?
input_actual_bytes          dw      ?
input_filename              db      "HPSCAN", 00H
device_status               dw      ?

;SCANNER COMMANDS
scanner_string_E            db      1bh, "E"        ;reset
scanner_string_a0T          db      1bh, "*a0T"     ;data type: B/W thresholded
scanner_string_a0J          db      1bh, "*a0J"     ;B/W dither pattern: coarse fatting
scanner_string_a0B          db      1bh, "*a0B"     ;auto background control feature off
scanner_string_a0M          db      1bh, "*a0M"     ;mirror image: off
scanner_string_a0I          db      1bh, "*a0I"     ;inverse image: off
scanner_string_a0L          db      1bh, "*a0L"     ;intensity level: normal
scanner_string_a0K          db      1bh, "*a0K"     ;contrast level: normal
scanner_string_a300R        db      1bh, "*a300R"   ;X resolution: 300 dpi
scanner_string_a300S        db      1bh, "*a300S"   ;Y resolution: 300 dpi
scanner_string_a100E        db      1bh, "*a100E"   ;X scale factor: 100
scanner_string_a100F        db      1bh, "*a100F"   ;Y scale factor: 100
scanner_string_f75X         db      1bh, "*f75X"    ;X origin: 75 300dpi pixels ie 0.25 inch
scanner_string_f50Y         db      1bh, "*f50Y"    ;Y origin: 50 300dpi pixels ie 0.17 inch
scanner_string_f2400P       db      1bh, "*f2400P"  ;X extent: 2400 300dpi pixels ie 8 inches
scanner_string_f3200Q       db      1bh, "*f3200Q"  ;Y extent: 3200 300dpi pixels ie 10.66 inches
scanner_string_s1025E       db      1bh, "*s1025E"  ;inquire bytes per scan line
return_string_s1025E        db      12 dup("r")
scanner_string_s1026E       db      1bh, "*s1026E"  ;inquire number of scan lines
return_string_s1026E        db      13 dup("r")
scanner_string_f0S          db      1bh, "*f0S"     ;SCAN WINDOW

;PRINTER COMMANDS
reset_string                db      1bh, "E"
no_of_copies_string         db      1bh, "&l"
number_of_copies            db      "12"            ;lower word in PSP
no_of_copies_tail           db      "X"
init_string                 db      1bh, "*t300R"   ;total of 12 bytes (0ch)
                            db      1bh, "*r1A"     ;start raster graphics.
raster_command              db      1bh, "*b0300W"
term_string                 db      1bh, "*rB", 0ch

;PRINTER QUEUE RELATED
fg_sysdata_seg              dw      ?
pcr_value                   db      ?
ecr_value                   db      ?
```

```
END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*************************************************
;*                                               *
;*                                               *
;*          SCFTOPCX.EXE                         *
;*          written by Haluk Aytac               *
;*          started June 21, 1995                *
;*  VERSION SCTOPCX5.ASM WORKS BY ITSELF         *
;*  VERSION SCTOPCX6.ASM WORKS WITH CATSTPL2.ASM *
;*                                               *
;*          assume 200x200                       *
;*                                               *
;*************************************************
;sctopcx7.asm <- sctopcx6.asm. 10/1/95. STILL NEED TO MAKE THE CHANGES!!!
;          CHANGE THE INVERSION TO ON. SO FAXES DO NOT INVERT.
;sctopcx5.asm <- sctopcx4.asm. 6/23/95. add 4 bytes per line. WORKS!!!!!!!
;sctopcx4.asm <- sctopcx3.asm. 6/23/95. version 3 works. scanner 3p only allows
;212 bytes per line. so I can view the .pcx on paintbrush but I cannot print it
;to .pcl because my pcx2pcl works with 216 byte per line. version 4 will annotate
;version 3 with no changes. version 5 will make changes to append 4 bytes to each
;also in version 4 we add a separate write tail end for the case equal, count=63,
;>1 away from boundary because in version 5, we will add 4 more bytes. this change
;ie adding a separate tail end worked.
;line so that we can fax this thing.
;SCTOPCX0.ASM <- SCTOPCL0.ASM. 6/21/95.
;SCTOPCL0.ASM <- pcx2pcl5.asm. 6/21/95.
;BFD/START_PROGRAM:
;first argument is the file name needed, parameter is not needed.
;SFX/START_PROGRAM:
;first argument is not needed. parameter needed to return filename.
;RESOLUTION:
;USE PARAMETER BOTH CASES. IF BFD CASE, GET FILENAME FROM PARAMETER SEG:OFF.
;IF SFX CASE, RETURN FILENAME TO PARAMETER SEG:OFF.
;this program will get a document number, it will scan a document and will
;write it in DX format to a file name with that document number. For
;example, if the document number is 4112, the file name will be
;   C:\CATBOX\FAXBACK\4112.DCX
;there is the question of the number of pages in the document. the program
;can put a message on the LCD asking the user to insert more pages for the
;document. the same will apply during sfx.
;
;TO SUMMARIZE:
;   0. GET A DOCUMENT NUMBER. ACD SEPARATE FROM BFD.
;   1. SCAN A PAGE AND SAVE IN .PCX FORMAT. THIS PORTION IS A START PROGRAM.
;   2. ASK ON LCD FOR MORE PAGES (PRESS 1 IF MORE PAGES OR # IF DONE). THIS
;      PORTION IS AN ACTION SUCH AS EMIT_MSG.
;   3. IF MORE PAGES, GOTO 2. IF DONE MAKEUPDCX. OR MY VERSION OF IT.
;fine resolution output ie 200x200. 1728 dots per line ie 216 Bytes
;
;WHILE I AM AT IT, SFX:
;   1. SCAN A PAGE AND SAVE IN .PCX FORMAT.              START_PROGRAM. NO ARG. PARAM EXCH LOC. RET FN.
;   2. ASK IF LAST PAGE ETC.                             EMIT_MSG.      FILENAME FOR MESSAGE
;   3. GOTO 2 OR MAKEUP DCX.                             START_PROGRAM. ARG=FN FROM STEP 1. RET FN.
;   4. BUILD .TCF FILE.                                  START_PROGRAM. ARG=FN FROM STEP 3.
;   5. TTQREQ                                            TTQREQ       . .TCF FN IN TTQ. STEP NO.
;
;   6. SUBMIT .TCF                                       START_PROGRAM
;   7. SWITCH TO FAX                                     SWITCH TO FAX

LINES_PER_PAGE              EQU     2200
LINES_PER_READ              EQU     100
BYTES_PER_LINE              EQU     212

.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area
start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = 2CH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 2Ch
                out     dx, al
;=============================================================

; 0 GET PSP
```

```
                mov     bx, DS                          ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx
; 1 GET DWORD PARAMETER = FS:[VCON_SESSION_FAX_FILENAME]
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET st_fax_filename_off
                mov     ax, SEG data_area
                mov     ES, ax
                movsd
                POP     DS
; 2 OPEN INPUT FILE. GET DEVICE DATA. SET DEVICE DATA.
                mov     dx, OFFSET input_filename
                mov     ax, 3d02h
                int     21h
                mov     word ptr input_file_handle, ax
                mov     bx, word ptr input_file_handle
                mov     ax, 4400h
                int     21h
                mov     word ptr device_status, dx
                mov     bx, word ptr input_file_handle
                mov     dx, 00e0h
                mov     ax, 4401h
                int     21h
; 3 SETUP THE SCANNER

                mov     bx, word ptr input_file_handle
                mov     cx, 2
                mov     dx, OFFSET scanner_string_E
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0T
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0J
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0B
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0M
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0I
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0L
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_a0K
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 7
                mov     dx, OFFSET scanner_string_a300R
                mov     ah, 40h
```

```
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 7
                mov     dx, OFFSET scanner_string_a300S
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 7
                mov     dx, OFFSET scanner_string_a100E
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 7
                mov     dx, OFFSET scanner_string_a100F
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 6
                mov     dx, OFFSET scanner_string_f75X
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 6
                mov     dx, OFFSET scanner_string_f50Y
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_f2400P
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_f3200Q
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_s1025E
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 12
                mov     dx, OFFSET return_string_s1025E
                mov     ah, 3fh
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 8
                mov     dx, OFFSET scanner_string_s1026E
                mov     ah, 40h
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 13
                mov     dx, OFFSET return_string_s1026E
                mov     ah, 3fh
                int     21h

                mov     bx, word ptr input_file_handle
                mov     cx, 5
                mov     dx, OFFSET scanner_string_f0S
                mov     ah, 40h
                int     21h
; 4 MAKE OUTPUT FILENAME
;   write file to *.pcl output file. since we are printing,
;   the name of the output file is not important.
;   we write it to C:\CATBOX\PRINT\SPOOL\*.PCL.
;   It is certain that a new output file will not be
;   generated more often than a second, it is a safe bet to give
;   these output files names hhmmss.pcl based on the time of the day.
                mov     ah, 2ch     ;ch=hour, cl=minutes, dh=seconds
```

```
                int     21h
                mov     bx, OFFSET output_filename
                mov     al, ch
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     al, cl
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     al, dh
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
; 5. CREATE OUTPUT FILE.
                mov     dx, OFFSET output_filename_path
                mov     cx, 0
                mov     ah, 3ch
                int     21h
                jc      pgm_exit
                mov     output_file_handle, ax
; 4 WRITE PCX FILE HEADER TO OUTPUT FILE
                mov     bx, word ptr output_file_handle
                mov     cx, 128
                mov     dx, OFFSET PCX_file_header
                mov     ah, 40h
                int     21h
                jc      pgm_exit
                mov     word ptr output_actual_bytes, ax
;*****************************************************************************
;*                                                                           *
;*          THE     GRAND       LOOP                                         *
;*                                                                           *
;*****************************************************************************
;   REPEAT THE LOOP 2200 / 100 = 22 TIMES  =  LINES_PER_PAGE / LINES_PER_READ
                mov     byte ptr grand_loop_counter, LINES_PER_PAGE / LINES_PER_READ
grand_loop:     cmp     byte ptr grand_loop_counter, 0
                je      end_of_game
; 3 READ INPUT FILE TO BUFFER
readto_inb:     mov     bx, word ptr input_file_handle
                mov     cx, LINES_PER_READ * BYTES_PER_LINE
                mov     dx, OFFSET input_buffer
                mov     ah, 3fh
                int     21h
                jc      pgm_exit
                mov     word ptr input_actual_bytes, ax
; 6 DO THE CONVERSION LOOP
                mov     bx, OFFSET output_buffer
                mov     si, OFFSET input_buffer
                mov     dx, si
                add     dx, LINES_PER_READ * BYTES_PER_LINE
                mov     di, si
                inc     di
                mov     ch, 1
                mov     bp, OFFSET input_buffer
                add     bp, BYTES_PER_LINE
                mov     byte ptr line_byte_cnt, 0
;*********************************************************
;*      INNER LOOP STARTS HERE                           *
;*********************************************************
inner_loop:     mov     cl, byte ptr [si]
;*********************************************************
;*      ARE WE AT BOUNDARY? IF SO AH=1 ELSE AH=0         *
;*********************************************************
                inc     di
                cmp     di, bp
                jb      not_at_boundary
                dec     di
                mov     ah, 1
                jmp     skip_boundary
not_at_boundary:dec     di
                mov     ah, 0
;*********************************************************
;*      GET SECOND BYTE AND COMPARE TO FIRST             *
;*********************************************************
skip_boundary:  mov     al, byte ptr [di]
```

```
                cmp     cl, al
                jne     skip_inc_ch
;*******************************************************
;*      CASE OF BYTES EQUAL                            *
;*******************************************************
                inc     ch
                cmp     ch, 63
                jne     ch_not_63
;*******************************************************
;*      EQUAL, COUNT = 63                              *
;*******************************************************
                mov     si, di
                inc     si
                add     di, 2
                cmp     ah, 1
                jne     ch_63_not_boundary_p
                add     bp, BYTES_PER_LINE
                jmp     ch_63_not_boundary
ch_63_not_boundary_p:
                inc     si
                cmp     si, bp
                jne     dec_si_and_cont
;*******************************************************
;*      EQUAL, COUNT = 63, 1 AWAY FROM BOUNDARY        *
;*******************************************************
                dec     si
                add     byte ptr line_byte_cnt, ch
                inc     byte ptr line_byte_cnt
                cmp     byte ptr line_byte_cnt, BYTES_PER_LINE
                ja      error
                je      reset_line_byte_cnv
                jmp     cont23
reset_line_byte_cnv:
                mov     byte ptr line_byte_cnt, 0
cont23:         cmp     ch, 1
                jne     write_ch4
                test    cl, 10000000b
                jz      skip_ch4
                test    cl, 01000000b
                jz      skip_ch4
write_ch4:      or      ch, 0c0h
                mov     byte ptr [bx], ch
                inc     bx
skip_ch4:       mov     byte ptr [bx], cl
                inc     bx
                mov     cl, byte ptr [si]
                test    cl, 10000000b
                jz      skip_ch5
                test    cl, 01000000b
                jz      skip_ch5
                mov     ch, 0c1h
                mov     byte ptr [bx], ch
                inc     bx
skip_ch5:       mov     byte ptr [bx], cl
                inc     bx
                inc     si
                inc     di
                add     bp, BYTES_PER_LINE

                mov     byte ptr [bx], 0c4h
                inc     bx
                mov     byte ptr [bx], 0ffh
                inc     bx

                cmp     di, dx
                ja      write_outb_and_readto_inb
                mov     ch, 1
                jmp     inner_loop
;*******************************************************
;*      EQUAL, COUNT = 63, >1 AWAY FROM BOUNDARY       *
;*******************************************************
dec_si_and_cont:dec     si
                add     byte ptr line_byte_cnt, ch
                cmp     byte ptr line_byte_cnt, BYTES_PER_LINE
                ja      error
                je      reset_line_byte_cnx
                jmp     cont27
reset_line_byte_cnx:
                mov     byte ptr line_byte_cnt, 0
cont27:         cmp     ch, 1
                jne     write_ch7
```

```
                test    cl, 10000000b
                jz      skip_ch7
                test    cl, 01000000b
                jz      skip_ch7
write_ch7:      or      ch, 0c0h
                mov     byte ptr [bx], ch
                inc     bx
skip_ch7:       mov     byte ptr [bx], cl
                inc     bx
                cmp     di, dx
                ja      write_outb_and_readto_inb
                mov     ch, 1
                jmp     inner_loop
;*********************************************************
;*      EQUAL, COUNT = 63, 1 ON BOUNDARY                 *
;*********************************************************
ch_63_not_boundary:
                add     byte ptr line_byte_cnt, ch
                cmp     byte ptr line_byte_cnt, BYTES_PER_LINE
                ja      error
                je      reset_line_byte_cnt
                jmp     cont21
reset_line_byte_cnt:
                mov     byte ptr line_byte_cnt, 0
cont21:         cmp     ch, 1
                jne     write_ch1
                test    cl, 10000000b
                jz      skip_ch1
                test    cl, 01000000b
                jz      skip_ch1
write_ch1:      or      ch, 0c0h
                mov     byte ptr [bx], ch
                inc     bx
skip_ch1:       mov     byte ptr [bx], cl
                inc     bx

                mov     byte ptr [bx], 0c4h
                inc     bx
                mov     byte ptr [bx], 0ffh
                inc     bx

                cmp     di, dx
                ja      write_outb_and_readto_inb
                mov     ch, 1
                jmp     inner_loop
;*********************************************************
;*      EQUAL, COUNT NOT 63                              *
;*********************************************************
ch_not_63:      cmp     ah, 1
                jne     ch_not_63_not_boundary
;*********************************************************
;*      EQUAL, COUNT NOT 63, BOUNDARY                    *
;*********************************************************
                mov     si, di
                inc     si
                add     di, 2
                add     bp, BYTES_PER_LINE
                jmp     ch_63_not_boundary
;*********************************************************
;*      EQUAL, COUNT NOT 63, AWAY FROM BOUNDARY          *
;*********************************************************
ch_not_63_not_boundary:
                add     di, 1
                cmp     di, dx
                je      write_outb_and_readto_inb   ;this is redundant as input buffer
                jmp     inner_loop                  ;boundary is also line boundary
;*********************************************************
;*      NOT EQUAL                                        *
;*********************************************************
skip_inc_ch:    cmp     ah, 1
                jne     not_eq_not_boundary
;*********************************************************
;*      NOT EQUAL, ON BOUNDARY                           *
;*********************************************************
                mov     si, di
                inc     si
                add     di, 2
                add     bp, BYTES_PER_LINE

                add     byte ptr line_byte_cnt, ch
                inc     byte ptr line_byte_cnt
```

```
                cmp     byte ptr line_byte_cnt, BYTES_PER_LINE
                ja      error
                je      reset_line_byte_cnu
                jmp     cont22
reset_line_byte_cnu:
                mov     byte ptr line_byte_cnt, 0
cont22:         cmp     ch, 1
                jne     write_ch2
                test    cl, 10000000b
                jz      skip_ch2
                test    cl, 01000000b
                jz      skip_ch2
write_ch2:      or      ch, 0c0h
                mov     byte ptr [bx], ch
                inc     bx
skip_ch2:       mov     byte ptr [bx], cl
                inc     bx
                test    al, 10000000b
                jz      skip_ch3
                test    al, 01000000b
                jz      skip_ch3
                mov     byte ptr [bx], 0c1h
                inc     bx
skip_ch3:       mov     byte ptr [bx], al
                inc     bx

                mov     byte ptr [bx], 0c4h
                inc     bx
                mov     byte ptr [bx], 0ffh
                inc     bx

                cmp     di, dx
                ja      write_outb_and_readto_inb
                mov     ch, 1
                jmp     inner_loop
;*****************************************************
;*      NOT EQUAL, AWAY FROM BOUNDARY                *
;*****************************************************
not_eq_not_boundary:
                mov     si, di
                inc     di

                add     byte ptr line_byte_cnt, ch
                cmp     byte ptr line_byte_cnt, BYTES_PER_LINE
                ja      error
                je      reset_line_byte_cnz
                jmp     cont29
reset_line_byte_cnz:
                mov     byte ptr line_byte_cnt, 0
cont29:         cmp     ch, 1
                jne     write_ch9
                test    cl, 10000000b
                jz      skip_ch9
                test    cl, 01000000b
                jz      skip_ch9
write_ch9:      or      ch, 0c0h
                mov     byte ptr [bx], ch
                inc     bx
skip_ch9:       mov     byte ptr [bx], cl
                inc     bx

                cmp     di, dx
                ja      write_outb_and_readto_inb
                mov     ch, 1
                jmp     inner_loop


; 7 WRITE TO OUTPUT FILE
write_outb_and_readto_inb:
                mov     ax, OFFSET output_buffer
                sub     bx, ax
                mov     cx, bx
                mov     bx, word ptr output_file_handle
                mov     dx, OFFSET output_buffer
                mov     ah, 40h
                int     21h
                jc      pgm_exit
                mov     word ptr output_actual_bytes, ax
;   GRAND LOOP TAIL END
                dec     byte ptr grand_loop_counter
                jmp     grand_loop
```

```
;*****************************************************************************
;*                                                                           *
;*          THE     GRAND       LOOP    TAIL                                 *
;*                                                                           *
;*****************************************************************************
;10 CLOSE BOTH FILES
end_of_game:    mov     bx, word ptr input_file_handle
                mov     ah, 3eh
                int     21h
                jc      pgm_exit
                mov     bx, word ptr output_file_handle
                mov     ah, 3eh
                int     21h
                jc      pgm_exit
;11 WRITE PCX FILENAME TO ALLOCATED AREA IN STEP TABLE
                mov     si, OFFSET output_filename_path
                mov     di, word ptr st_fax_filename_seg
                mov     ES, di
                mov     di, word ptr st_fax_filename_off
move_pcx_filename_to_st:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_pcx_filename_to_st
                movsb
;12 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = ACH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0ACh
                out     dx, al
;=============================================================

.EXIT

error:          jmp     error

;this procedure takes al and turns it into 2 asci bytes in ax
;(ah=higher nibble, al=lower nibble)
;if nibble 0h to 9h then add 30h to get a number,
;if above subtract ah and add 41h to get a letter.
byte_to_asci    proc
                PUSHF
                push    cx

                mov     cl, al
                and     cl, 0f0h        ;upper nibble
                shr     cl, 4           ;to lower nibble area
                cmp     cl, 09h
                ja      must_be_letter_u
                add     cl, 30h
                mov     ah, cl
                jmp     lower_nibble
must_be_letter_u:
                sub     cl, 0ah
                add     cl, 41h
                mov     ah, cl
                jmp     lower_nibble
lower_nibble:   and     al, 0fh
                cmp     al, 09h
                ja      must_be_letter_l
                add     al, 30h
                jmp     return
must_be_letter_l:
                sub     al, 0ah
                add     al, 41h
                jmp     return

return:         pop     cx
                POPF

                ret
byte_to_asci    endp


.FARDATA
ORG         0000H
ALIGN       10H
data_area                   dw      ?
```

```
current_PSP                dw      ?
st_fax_filename_off        dw      ?
st_fax_filename_seg        dw      ?

;BUFFERS
input_buffer               db      LINES_PER_READ * BYTES_PER_LINE dup ("S")        ;21,600
input_buffer_ptr           dw      ?
grand_loop_counter         db      LINES_PER_PAGE / LINES_PER_READ
                           db      ?               ;for dword alignment
                                                   ;worst case .PCX = 2 * .BMP
output_buffer              db      2 * LINES_PER_READ * BYTES_PER_LINE dup ("P")    ;43,200
                                                                                    ;64,800
line_byte_cnt              db      ?

;FILES
input_file_handle          dw      ?
input_actual_bytes         dw      ?
input_filename             db      "HPSCAN", 00H
device_status              dw      ?

output_file_handle         dw      ?
output_actual_bytes        dw      ?
output_filename_path       db      "C:\CATBOX\FAXBACK\QUEUE\"
output_filename            db      6 dup("o")
output_filename_type       db      ".PCX", 00H     ;in memory: LCP.SSMMHH

;SCANNER COMMANDS
scanner_string_E           db      1bh, "E"        ;reset
scanner_string_a0T         db      1bh, "*a0T"     ;data type: B/W thresholded
scanner_string_a0J         db      1bh, "*a0J"     ;B/W dither pattern: coarse fatting
scanner_string_a0B         db      1bh, "*a0B"     ;auto background control feature off
scanner_string_a0M         db      1bh, "*a0M"     ;mirror image: off
;sctopcx7.asm change
scanner_string_a0I         db      1bh, "*a1I"     ;inverse image: off
scanner_string_a0L         db      1bh, "*a0L"     ;intensity level: normal
scanner_string_a0K         db      1bh, "*a0K"     ;contrast level: normal
scanner_string_a300R       db      1bh, "*a200R"   ;X resolution: 200 dpi
scanner_string_a300S       db      1bh, "*a200S"   ;Y resolution: 200 dpi
scanner_string_a100E       db      1bh, "*a100E"   ;X scale factor: 100
scanner_string_a100F       db      1bh, "*a100F"   ;Y scale factor: 100
scanner_string_f75X        db      1bh, "*f00X"    ;X origin: 00 300dpi pixels ie 0.00 inch
scanner_string_f50Y        db      1bh, "*f00Y"    ;Y origin: 00 300dpi pixels ie 0.00 inch
scanner_string_f2400P      db      1bh, "*f2592P"  ;X extent: 1728 * (3/2) = 2592 300dpi pixels
scanner_string_f3200Q      db      1bh, "*f3300Q"  ;Y extent: 2200 * (3/2) = 3300 300dpi pixels
scanner_string_s1025E      db      1bh, "*s1025E"  ;inquire bytes per scan line
return_string_s1025E       db      12 dup("r")
scanner_string_s1026E      db      1bh, "*s1026E"  ;inquire number of scan lines
return_string_s1026E       db      13 dup("r")
scanner_string_f0S         db      1bh, "*f0S"     ;SCAN WINDOW

;PCX FILE HEADER
PCX_file_header            db      0ah                     ;PCX file ID
version_info               db      2
encoding_method            db      1
bits_per_pixel             db      1
x_position                 dw      0
y_position                 dw      0
x_max                      dw      1727
y_max                      dw      2199
horz_res                   dw      0
vert_res                   dw      0
palette                    db      48 dup(00h)
reserved                   db      0
number_of_color_planes     db      1
line_width_in_bytes        dw      216
more_reserved              db      60 dup (00h)

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*************************************************
;*                                               *
;*                                               *
;*          OPENTCF.EXE                          *
;*          written by Haluk Aytac               *
;*          started July 7, 1995                 *
;*                                               *
;*                                               *
;*************************************************
;get the name of the .tcf file and the phone number's address from PSP:80, create the file
;and write 512 bytes of tcf file format to it. then place the hpone number where appropriate.
;at the end, the tcf will contain info for one file that contains a blank PCX page. we are
;not sending a cover sheet. the user can make one for himself and send it each time just as
;we now do with commercial fax machines.
; 0. GET PSP
; 1. GET .TCF FILE NAME AND DWORD PARAMETER (ADDRESS OF PHONE NUMBER) FROM PSP:80
; 2. GET PHONE NUMBER  AND WRITE IT IN TWO PLACES IN MEMORY IMAGE OF .TCF
; 3. CREATE .TCF FILE
; 4. WRITE TO FILE THE FIRST 512 BYTES
; 5. CLOSE THE FILE
; 6. EXIT
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = 2AH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 2Ah
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET .TCF FILE NAME AND DWORD PARAMETER (ADDRESS OF PHONE NUMBER) FROM PSP:80
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET tcf_file_name
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                movsb
                mov     di, OFFSET pgm_session_phone_numbr_ptr
                movsd
                POP     DS

; 2. GET PHONE NUMBER AND PLACE IT IN TWO PLACES IN MEMORY IMAGE OF .TCF FILE.
                PUSH    DS
                mov     ax, DS
                mov     ES, ax
                mov     ax, word ptr st_segment
                mov     si, word ptr pgm_session_phone_numbr_ptr
                mov     cx, si
                mov     DS, ax
                mov     di, OFFSET tcf_file_phone_number
move_ph_numbr_1:movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_ph_numbr_1
                movsb
                mov     si, cx
                mov     di, OFFSET tcf_file_destination_name
move_ph_numbr_2:movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_ph_numbr_2
                movsb
```

```
                POP     DS

; 3. CREATE .TCF FILE
                mov     dx, OFFSET tcf_file_name
                mov     cx, 0
                mov     ah, 3ch
                int     21h
                mov     word ptr tcf_file_handle, ax

; 4. WRITE TO FILE THE FIRST 512 BYTES
                mov     bx, word ptr tcf_file_handle
                mov     cx, 512
                mov     dx, OFFSET tcf_file_event_type
                mov     ah, 40h
                int     21h

; 5. CLOSE THE FILE
                mov     bx, word ptr tcf_file_handle
                mov     ah, 3eh
                int     21h

; 6 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = AAH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0AAh
                out     dx, al
;=============================================================

.EXIT


;=============================================================
;*                    DATA    AREA                          *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

;TCF FILE FORMAT
;THERE REALLY ARE ONLY 383 ELEMENTS HERE. SO INSERT ONE BYTE AT THE END AND FILE OFFSET IF 180H
tcf_file_event_type         db      00H                     ; ++  0 send
tcf_file_transfer_type      db      00H                     ; ++  1 200x200
tcf_file_status_of_event    dw      0000H                   ;     2 successfully completed
tcf_file_time_to_send       dw      0000H                   ; ++  4 send immediately
tcf_file_date_to_send       dw      0000H                   ; ++  6 send immediately
tcf_file_number_of_files    dw      0001H                   ;*++  8 in case of abort send one blank page
tcf_file_off_of_first_ftr   dw      0180H                   ; ++ 10 offset to first FTR. no cover page
tcf_file_phone_number       db     "011 90 216 302 5869",00H;*++ 12 phone number in ASCIIZ (47 bytes)
                            db     "                     "
                            db     "    "
tcf_file_app_specific       db      64 dup (00H)            ;    59 64 bytes
tcf_file_reserved_1         db      00H                     ;   123
tcf_file_phone_connect_scs  db      00H                     ;   124
tcf_file_phone_connect_mns  db      00H                     ;   125
tcf_file_phone_connect_hrs  db      00H                     ;   126
tcf_file_total_pages        dd      00000000H               ;   127
tcf_file_no_of_xmited_pages dd      00000000H               ;   131
tcf_file_no_of_xmited_files dw      0000H                   ;   135
tcf_file_cover_page_flag    db      00H                     ; ++137 DO NOT SEND COVER PAGE
tcf_file_no_of_xmit_errors  dw      0000H                   ;   138
tcf_file_del_files_flag     db      02H                     ; ++140 ALWAYS DELETE FILES AFTER EVENT
tcf_file_parnt_event_handle dw      0000H                   ;   141
tcf_file_reserved_2         db      53 dup (00H)            ;   143
tcf_file_int_use            db      20 dup (00H)            ;   196
tcf_file_cover_page_rd_flag db      00H                     ;   216
tcf_file_suppress_page_hdrs db      00H                     ; ++217 DO NOT SUPPRESS PAGE HEADERS
tcf_file_remote_csid        db      21 dup (00H)            ;   218
tcf_file_destination_name   db      32 dup (00H)            ;*++239 PUT PHONE NUMBER HERE ALSO
tcf_file_sender_name        db     "Haluk Aytac, 3Tau", 00H ;*++271 CAT.CFG([FAX]sender_name = H. Aytac, 3T)
                            db     "                 "      ;       ADD A 00H TO THE END OF TEXT STRING.

tcf_file_pcx_logo_path      db     "C:\CATBOX\FAXBACK\FAXABLTY.PCX"
                            db      50 dup (00H)

                            db      00H

;FTR FORMAT
```

```
ftr_stub_file_type          db      01H                     ; ++  0 PCX FILE
ftr_stub_text_size          db      00H                     ; ++  1 used for file xfers only
ftr_stub_status_of_file     db      00H                     ;     2 file untouched
ftr_stub_bytes_xmited       dd      00000000H               ;     3
ftr_stub_bytes_in_file      dd      00000000H               ;     7 no need to enter
ftr_stub_pages_xmited       dw      0000H                   ;    11
ftr_stub_pages_in_file      dw      0000H                   ;    13
ftr_stub_path_of_file       db    "C:\CATBOX\FAXBACK\QUEUE\BLANK.PCX",00H
                                                            ;*++ 15 THE ONLY PART TO BE FILLED HERE
                            db      46 dup (00H)
ftr_stub_eighth_inches      db      00H                     ; ++ 95
ftr_stub_page_length        db      00H                     ; ++ 96 PAGE IS 11 INCHES
ftr_stub_reserved           db      31 dup (00H)            ;    97


;DATA
data_area                   dw      ?
current_PSP                 dw      ?
pgm_session_phone_numbr_ptr dw      ?
st_segment                  dw      ?

;FILES
tcf_file_handle             dw      ?
tcf_file_actual_bytes       dw      ?
tcf_file_name               db      64 dup ("f")



END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, HAI NGUYEN, 3TAU.
;*************************************************
;*                                               *
;*                                               *
;*          INCBDTCF.EXE                         *
;*          written by Haluk Aytac               *
;*          started July 8, 1995                 *
;*                                               *
;*                                               *
;*************************************************
;get the name of the .tcf file and the ptr to .PCX file from PSP:80, open the file.
;read the first 512 bytes to tcf_file_event_type.
; 0. GET PSP
; 1. GET .TCF FILE NAME AND DWORD PARAMETER (ADDRESS OF PCX FILE NAME) FROM PSP:80
; 2. OPEN THE .TCF FILE
; 3. READ THE FIRST 512 BYTES TO TCF_FILE_EVENT_TYPE.
; 4. IF TCF_NUMBER_OF_FILES=1 CHECK FILENAME IN FIRST FTR. IF = BLANK.PCX, THEN YOU WILL
;    WRITE OVER THIS FTR AND NOT INCREMENT. IF NOT YOU WILL WRITE THE NEXT FTR AND INCREMENT.
; 5. GET PCX FILE NAME AND WRITE IT IN THE PROPER FTR.
; 6. IF CASE OF NO INCREMENT, WRITE 512 BYTES FROM BEGIN FILE. IF CASE OF INCREMENT THEN WRITE
;    128 BYTES OF STUB2 (FTR) FROM END OF FILE.
; 7. CLOSE THE FILE
; 8. EXIT
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area
start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = 2DH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 2Dh
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx


; 1. GET .TCF FILE NAME AND DWORD PARAMETER (ADDRESS OF PCX FILE NAME) FROM PSP:80
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET tcf_file_name
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                movsb
                mov     di, OFFSET pgm_fax_file_name_ptr
                movsd
                POP     DS


; 2. OPEN .TCF FILE
                mov     dx, OFFSET tcf_file_name
                mov     ax, 3d02h
                int     21h
                mov     word ptr tcf_file_handle, ax


; 3. READ THE FIRST 512 BYTES TO TCF_FILE_EVENT_TYPE.
                mov     bx, word ptr tcf_file_handle
                mov     cx, 512
                mov     dx, OFFSET tcf_file_event_type
                mov     ah, 3fh
                int     21h
                mov     word ptr tcf_file_actual_bytes, ax


; 4. IF TCF_NUMBER_OF_FILES=1 CHECK FILENAME IN FIRST FTR. IF = BLANK.PCX, THEN YOU WILL
```

```
;    WRITE OVER THIS FTR AND NOT INCREMENT. IF NOT YOU WILL WRITE THE NEXT FTR AND INCREMENT.
;to find the value of first_true_ftr (byte)
                cmp     word ptr tcf_file_number_of_files, 0001H
                jne     cont_to_5
                mov     bx, OFFSET ftr_stub_path_of_file
                cmp     dword ptr [bx + 24], "NALB"
                jne     cont_to_5
                mov     byte ptr first_true_ftr, 01H


; 5. GET PCX FILE NAME AND WRITE IT IN THE PROPER FTR.
cont_to_5:      cmp     byte ptr first_true_ftr, 01H
                jne     not_first_t_ftr
yes_first_t_ftr:mov     di, OFFSET ftr_stub_path_of_file
                jmp     start_move_fn
not_first_t_ftr:mov     di, OFFSET ftr_stub2_path_of_file
                inc     word ptr tcf_file_number_of_files
                jmp     start_move_fn

start_move_fn:  PUSH    DS
                mov     ax, DS
                mov     ES, ax
                mov     ax, word ptr st_segment
                mov     si, word ptr pgm_fax_file_name_ptr
                mov     DS, ax
move_file_name: movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_file_name
                movsb
                POP     DS


; 6. IF CASE OF NO INCREMENT, WRITE 512 BYTES FROM BEGIN FILE. IF CASE OF INCREMENT THEN WRITE
;    128 BYTES OF STUB2 (FTR) FROM END OF FILE.
                cmp     byte ptr first_true_ftr, 01H
                jne     not_first_t_ftr2

yes_first_t_ftr2:
                mov     bx, word ptr tcf_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4200H
                int     21h

                mov     dx, OFFSET tcf_file_event_type
                mov     cx, 512
                jmp     write_to_tcf

not_first_t_ftr2:
                mov     bx, word ptr tcf_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4202H
                int     21h

                mov     dx, OFFSET ftr_stub2_file_type
                mov     cx, 128
                jmp     write_to_tcf

write_to_tcf:   mov     bx, word ptr tcf_file_handle
                mov     ah, 40h
                int     21h


; 7. CLOSE THE FILE
                mov     bx, word ptr tcf_file_handle
                mov     ah, 3eh
                int     21h


; 8 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = ADH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0ADh
                out     dx, al
;=============================================================
```

```
.EXIT


;=============================================================
;*                   DATA    AREA                             *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

;TCF FILE FORMAT
tcf_file_event_type          db      00H                     ; ++  0 send
tcf_file_transfer_type       db      00H                     ; ++  1 200x200
tcf_file_status_of_event     dw      0000H                   ;     2 successfully completed
tcf_file_time_to_send        dw      0000H                   ; ++  4 send immediately
tcf_file_date_to_send        dw      0000H                   ; ++  6 send immediately
tcf_file_number_of_files     dw      0001H                   ;*++  8 in case of abort send one blank page
tcf_file_off_of_first_ftr    dw      0180H                   ; ++ 10 offset to first FTR. no cover page
tcf_file_phone_number        db     "011 90 216 302 5869",00H;*++ 12 phone number in ASCIIZ (47 bytes)
                             db     "                     "
                             db     "    "
tcf_file_app_specific        db      64 dup (00H)            ;    59 64 bytes
tcf_file_reserved_1          db      00H                     ;   123
tcf_file_phone_connect_scs   db      00H                     ;   124
tcf_file_phone_connect_mns   db      00H                     ;   125
tcf_file_phone_connect_hrs   db      00H                     ;   126
tcf_file_total_pages         dd      00000000H               ;   127
tcf_file_no_of_xmited_pages  dd      00000000H               ;   131
tcf_file_no_of_xmited_files  dw      0000H                   ;   135
tcf_file_cover_page_flag     db      00H                     ; ++137 DO NOT SEND COVER PAGE
tcf_file_no_of_xmit_errors   dw      0000H                   ;   138
tcf_file_del_files_flag      db      02H                     ; ++140 ALWAYS DELETE FILES AFTER EVENT
tcf_file_parnt_event_handle  dw      0000H                   ;   141
tcf_file_reserved_2          db      53 dup (00H)            ;   143
tcf_file_int_use             db      20 dup (00H)            ;   196
tcf_file_cover_page_rd_flag  db      00H                     ;   216
tcf_file_suppress_page_hdrs  db      00H                     ; ++217 DO NOT SUPPRESS PAGE HEADERS
tcf_file_remote_csid         db      21 dup (00H)            ;   218
tcf_file_destination_name    db      32 dup (00H)            ;*++239 PUT PHONE NUMBER HERE ALSO
tcf_file_sender_name         db     "Haluk Aytac, 3Tau", 00H ;*++271 CAT.CFG([FAX]sender_name = H. Aytac, 3T)
                             db     "                   "    ;       ADD A 00H TO THE END OF TEXT STRING.

tcf_file_pcx_logo_path       db     "C:\CATBOX\FAXBACK\FAXABLTY.PCX"
                             db      50 dup (00H)

                             db      00H

;FTR FORMAT
ftr_stub_file_type           db      01H                     ; ++  0 PCX FILE
ftr_stub_text_size           db      00H                     ; ++  1 used for file xfers only
ftr_stub_status_of_file      db      00H                     ;     2 file untouched
ftr_stub_bytes_xmited        dd      00000000H               ;     3
ftr_stub_bytes_in_file       dd      00000000H               ;     7 no need to enter
ftr_stub_pages_xmited        dw      0000H                   ;    11
ftr_stub_pages_in_file       dw      0000H                   ;    13
ftr_stub_path_of_file        db     "C:\CATBOX\FAXBACK\QUEUE\BLANK.PCX",00H
                                                             ;*++ 15 THE ONLY PART TO BE FILLED HERE
                             db      46 dup (00H)
ftr_stub_eighth_inches       db      00H                     ; ++ 95
ftr_stub_page_length         db      00H                     ; ++ 96 PAGE IS 11 INCHES
ftr_stub_reserved            db      31 dup (00H)            ;    97


;FTR FORMAT SECOND .PCX FILE AND UP
ftr_stub2_file_type          db      01H                     ; ++  0 PCX FILE
ftr_stub2_text_size          db      00H                     ; ++  1 used for file xfers only
ftr_stub2_status_of_file     db      00H                     ;     2 file untouched
ftr_stub2_bytes_xmited       dd      00000000H               ;     3
ftr_stub2_bytes_in_file      dd      00000000H               ;     7 no need to enter
ftr_stub2_pages_xmited       dw      0000H                   ;    11
ftr_stub2_pages_in_file      dw      0000H                   ;    13
ftr_stub2_path_of_file       db     "C:\CATBOX\FAXBACK\QUEUE\BLANK.PCX",00H
                                                             ;*++ 15 THE ONLY PART TO BE FILLED HERE
                             db      46 dup (00H)
ftr_stub2_eighth_inches      db      00H                     ; ++ 95
ftr_stub2_page_length        db      00H                     ; ++ 96 PAGE IS 11 INCHES
ftr_stub2_reserved           db      31 dup (00H)            ;    97


;DATA
```

```
data_area                   dw      ?
current_PSP                 dw      ?
pgm_fax_file_name_ptr       dw      ?
st_segment                  dw      ?
first_true_ftr              db      00H
                            db      ?

;FILES
tcf_file_handle             dw      ?
tcf_file_actual_bytes       dw      ?
tcf_file_name               db      64 dup ("f")




END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, JON AYTAC, 3TAU.

BUFFER_SIZE                 EQU     4000H           ;400h to 4000h 280KB file 5sec -> 4sec
                                                    ;diminishing returns after 4000h buffer.
;fp41.asm <- fstprnt4.asm. 7/5/95. turns it into a spool printer ie it scans the directory
;C:\CATBOX\PRINT\SPOOL for files and prints one and returns after deleting the file.
;fstprnt4.asm <- fstprnt2.asm. 6/6/95. in line code.
;fstprnt2.asm <- fstprnt1.asm. 6/4/95. fstprnt1.asm worked great.
;280K byte file printed on CATBOX1 in 11 min 30 secs using print.com
;with fstprnt0.exe (fstprnt1.asm) it took: 2 min and 15 secs. a whopping 5x improvement
;for Jon's first rprogramming job.
;This revision will use Haluk's int 17 substitute- we shall see whether Bios incurs any
;inefficiencies
;*****************************************************************************
;*                                                                           *
;*                  FSTPRNT2.ASM                                             *
;*                  Written By Jon Aytac and Haluk M. Aytac                  *
;*                  June 2, 1995                                             *
;*                                                                           *
;*****************************************************************************
;CaTbox affords us to run print jobs in the foreground. Because we have complete control over it.
;this way, things will go faster. we also bypass BIOS.
;STAGE 1:
;bypass BIOS and use basic printer i/o
;STAGE 2:
;use 332 capability that gives you automatic pulsing
;STAGE 3:
;use 332 capability that gives you FIFO.
;C:> FSTPRNT C:\CATBOX\PRT\TOPRN002.PCL
;
; 1. get file name from int 21/4e call
; 2. open file
; 3. read file to buffer. if nothing to read jmp to 6.
; 4. print buffer (built with Haluk's code)
; 5. jmp to 3
; 6  close file
; 7. delete file
; 8. exit
;
;later on, can experiment with dual buffers.
;*****************************************************************************
;*                                                                           *
;*          INPUTS:                                                          *
;*          FILENAME TO PRINT IN PSP:82                                      *
;*                                                                           *
;*****************************************************************************
.MODEL  SMALL
.386P
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
;initialize the printer
                        mov     dx, 0000h
                        mov     ah, 01h
                        int     17h
;get PSP value and store it
                        mov     bx, DS
                        mov     ax, SEG data_area
                        mov     DS, ax
                        mov     word ptr PSP_seg, bx
;1****************************************************************************
;*                                                                           *
;*          GET FILE NAME FROM SEARCHING C:\CATBOX\PRINT\SPOOL\*.*           *
;*                                                                           *
;*****************************************************************************
                        mov     cx, 0
                        mov     dx, OFFSET file_name
                        mov     ah, 4eh
                        int     21h
                        jc      program_exit
                        mov     bx, word ptr PSP_seg
                        mov     di, OFFSET pcl_file_to_print
                        mov     si, 009eh
                        PUSH    DS
                        mov     DS, bx
                        mov     ax, SEG data_area
                        mov     ES, ax
get_file_name:          movsb
                        cmp     DS:byte ptr [si], 00h
```

```
                        jne     get_file_name
                        mov     ES:byte ptr [di], 00h
                        POP     DS
;2*************************************************************************
;*                                                                       *
;*      OPEN FILE                                                        *
;*                                                                       *
;*************************************************************************
                        mov     dx, OFFSET file_name
                        mov     ax, 3d00h
;                       mov     ax, 3d10h                               ;deny share rd/wr
                        int     21h
                        jnc     open_file_cont
                        jmp     program_exit
open_file_cont:         mov     word ptr pcl_file_handle, ax
;3*************************************************************************
;*                                                                       *
;*      READ FILE                                                        *
;*                                                                       *
;*************************************************************************
read_file:              mov     bx, word ptr pcl_file_handle
                        mov     cx, BUFFER_SIZE
                        mov     dx, OFFSET print_buffer
                        mov     ah, 3fh
                        int     21h
                        jnc     read_file_cont
                        jmp     close_and_program_exit
read_file_cont:         mov     word ptr actual_bytes, ax
                        cmp     ax, 0000h
                        je      issue_ff_close_and_program_exit
;4*************************************************************************
;*                                                                       *
;*      PRINT BUFFER                                                     *
;*                                                                       *
;*************************************************************************
print_from_buffer:      mov     bx, OFFSET print_buffer
                        mov     ax, word ptr actual_bytes
                        add     word ptr print_buffer_effective_end, ax
                        mov     cx, word ptr print_buffer_effective_end

print_byte_loop:        mov     dx, 03bdh
print_byte_test_loop:   in      al, dx
                        test    al, 80h
                        jz      print_byte_test_loop
                        mov     al, byte ptr [bx]
                        mov     dx, 03bch
                        out     dx, al
                        mov     al, 0dh
                        mov     dx, 03beh
                        cli
                        out     dx, al
;                       jmp     $+2             ;removing this 280KB file 6secs -> 5secs
;                       jmp     $+2
                        mov     al, 0ch
                        out     dx, al
                        sti
                        inc     bx
                        cmp     bx, cx
                        jne     print_byte_loop

                        mov     ax, OFFSET print_buffer
                        mov     word ptr print_buffer_effective_end, ax
                        jmp     read_file
issue_ff_close_and_program_exit:
                        mov     dx, 0000h
                        mov     ah, 02h
                        int     17h
                        test    ah, 80h
                        jz      issue_ff_close_and_program_exit
                        mov     al, 0ch
                        mov     dx, 0000h
                        mov     ah, 00h
                        int     17h
;this is the best exit: close file, delete it and then exit
                        mov     bx, word ptr pcl_file_handle
                        mov     ah, 3eh
                        int     21h
                        mov     dx, OFFSET file_name
                        mov     ah, 41h
                        int     21h
                        jmp     program_exit
```

```
close_and_program_exit:
                        mov     bx, word ptr pcl_file_handle
                        mov     ah, 3eh
                        int     21h

program_exit:
.EXIT


.FARDATA
ORG     0000H
ALIGN   10H
;*****************************************************************
;*                                                               *
;*      DATA AREA                                                *
;*                                                               *
;*****************************************************************
data_area                   dw      ?
PSP_seg                     dw      ?
pcl_file_size               dd      ?
pcl_file_handle             dw      ?
actual_bytes                dw      ?
print_buffer_effective_end  dw      print_buffer
file_name                   db      "C:\CATBOX\PRINT\SPOOL\"
pcl_file_to_print           db      "*.*",00H
                            db      60 dup("f")
print_buffer                db      BUFFER_SIZE dup ("b")
print_buffer_end            dw      0000h

END start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*************************************************
;*                                               *
;*                                               *
;*          MAKTCFN.EXE                          *
;*          written by Haluk Aytac               *
;*          started July 7, 1995                 *
;* rev.1    July 19, 1995. add modem_number to fn *
;*          (add include .inc)                   *
;*************************************************
;make a fle name for a .tcf file. write the file name to FS:vcon_session_tcf_filename
; 0. GET PSP
; 1. GET DWORD PARAMETER FROM PSP:80
; 2. MAKE FILENAME .TCF
; 3. WRITE IT TO FS:VCON_SESSION_TCF_FILENAME
;maktcfn1.asm change. 7/19/95. add include.
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = 29H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 29h
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                          ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1 GET DWORD PARAMETER FROM PSP:80
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET pgm_session_tcf_fname_ptr
                mov     ax, SEG data_area
                mov     ES, ax
                movsd
                POP     DS

; 2 MAKE OUTPUT FILENAME
                mov     ah, 2ch                         ;ch=hour, cl=minutes, dh=seconds
                int     21h
                mov     bx, OFFSET output_filename
                mov     al, ch
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     al, cl
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     al, dh
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     ax, word ptr st_segment
                mov     ES, ax
                mov     si, OFFSET_TO_MODEM_NUMBER          ;in the step table
                mov     ax, ES:word ptr [si]
                mov     word ptr [bx], ax

; 3 WRITE FILENAME TO FS:VCON_SESSION_TCF_FILENAME
```

```
                mov     si, OFFSET output_filename_path
                mov     di, pgm_session_tcf_fname_ptr
                mov     ax, word ptr st_segment
                mov     ES, ax
move_filename:  movsb
                cmp     byte ptr [si], 00H
                jne     move_filename
                movsb

; 4 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = A9H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0A9h
                out     dx, al
;=============================================================

.EXIT

;=============================================================
;*              PROCEDURE   BYTE_TO_ASCI                     *
;=============================================================
;this procedure takes al and turns it into 2 asci bytes in ax
;(ah=higher nibble, al=lower nibble)
;if nibble 0h to 9h then add 30h to get a number,
;if above subtract ah and add 41h to get a letter.
byte_to_asci    proc
                PUSHF
                push    cx

                mov     cl, al
                and     cl, 0f0h        ;upper nibble
                shr     cl, 4           ;to lower nibble area
                cmp     cl, 09h
                ja      must_be_letter_u
                add     cl, 30h
                mov     ah, cl
                jmp     lower_nibble
must_be_letter_u:
                sub     cl, 0ah
                add     cl, 41h
                mov     ah, cl
                jmp     lower_nibble
lower_nibble:   and     al, 0fh
                cmp     al, 09h
                ja      must_be_letter_l
                add     al, 30h
                jmp     return
must_be_letter_l:
                sub     al, 0ah
                add     al, 41h
                jmp     return

return:         pop     cx
                POPF

                ret
byte_to_asci    endp

;=============================================================
;*                  DATA    AREA                             *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H
data_area                   dw      ?
current_PSP                 dw      ?
pgm_session_tcf_fname_ptr   dw      ?
st_segment                  dw      ?

;FILES
output_file_handle          dw      ?
output_actual_bytes         dw      ?
;maktcfnl.asm change. 7/19/95. add two chars to filename for modem number (next to .TCF). 01 for modem_1.
output_filename_path        db      "C:\CATBOX\FAXBACK\QUEUE\"
output_filename             db      8 dup("o")
output_filename_type        db      ".TCF", 00H             ;in memory: LCP.SSMMHH
```

```
END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;*************************************************
;*                                               *
;*                                               *
;*          SUBMITCF.EXE                         *
;*          written by Haluk Aytac               *
;*          started July 8, 1995                 *
;*                                               *
;*                                               *
;*************************************************
;submit a task: int 2f ax=cb01
;get the name of the .tcf file from PSP:80. submit the file to CASMODEM
; 0. GET PSP
; 1. GET .TCF FILE NAME FROM PSP:80
; 2. SUBMIT THE .TCF FILE
; 3. EXIT
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area
start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = 33H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 33h
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx


; 1. GET .TCF FILE NAME FROM PSP:80
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET tcf_file_name
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 0DH       ;you get 0dh from DOS here.
                jne     move_filename
                mov     ES:byte ptr [di], 00H
                POP     DS


; 2. SUBMIT THE .TCF FILE TO CASMODEM
                mov     dx, OFFSET tcf_file_name
                mov     ax, 0CB01h
                int     2Fh
                mov     word ptr tcf_event_handle_err_code, ax


; 3 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = B3H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0B3h
                out     dx, al
;=============================================================

.EXIT


;=============================================================
;*                  DATA    AREA                            *
;=============================================================
.FARDATA
ORG         0000H
```

```
ALIGN       10H
data_area                   dw      ?
current_PSP                 dw      ?

;FILES
tcf_file_name               db      64 dup ("f")
tcf_event_handle_err_code   dw      ?

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, HAI NGUYEN, 3TAU.
;*****************************************************************************
;*                                                                           *
;*          MAKRMIFN                                                         *
;*          WRITTEN BY   HALUK AYTAC                                         *
;*          BASED ON CODE BY  HAI NGUYEN                                     *
;*          It assigns a filename to the current voice message file          *
;*          based on  YMDDMMSS.PCX where X=0,1,2,3,4 ie the modem number     *
;*                                                                           *
;*****************************************************************************
;*                                                                           *
;*          INPUTS:                                                          *
;*                  DWORD -> FS:vcon_session_rmi_filename                    *
;*                  FS also used to pass the Modem Number                    *
;*          C:\CATBOX\VOICE\DDHHMMSS.YMX                                     *
;*                                                                           *
;*****************************************************************************
;makfnam0.asm and maktcfn0.asm combined to give this file. naming algorithm from
;makfnam0.asm. how to get the modem number and pass fn back from maktcfn.asm
; 0. GET PSP
; 1. GET DWORD PARAMETER FROM PSP:80
; 2. MAKE FILENAME for voice file
; 3. WRITE IT TO FS:VCON_SESSION_RMI_FILENAME
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = 35H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 35h
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                          ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1 GET DWORD PARAMETER FROM PSP:80
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET pgm_session_rmi_fname_ptr
                mov     ax, SEG data_area
                mov     ES, ax
                movsd
                POP     DS

; 2 MAKE OUTPUT FILENAME
;*****************************************************************************
;*                                                                           *
;*      COMPUTE THE FILENAME                                                 *
;*                                                                           *
;*****************************************************************************
;hai-022395  We can proceed, we will now create a file for the message.
;The format of the file will be as follows:  DDHHMMSS.YMX
;format XYMDDHHM.MSS
;get the date and time, should never fail
                mov     bx, OFFSET fg_voice_msg_filename
                mov     byte ptr [bx +  8], "."                 ; .
                mov     byte ptr [bx + 12], 00h                 ; Z

                mov     ax, word ptr st_segment
                mov     ES, ax
                mov     si, OFFSET_TO_MODEM_NUMBER              ;in the step table
                mov     ax, ES:word ptr [si]
                mov     byte ptr [bx + 0], ah                   ; X

                mov     ah, 2ah                                 ;get date
                int     21h                                     ;cx=year, dh=month, dl=day
```

```
;year
                and     cx, 000fh                               ;get lowest nibble
                mov     al, cl
                call    convert_to_asci
                mov     byte ptr [bx + 1], al                   ; Y
;month
                mov     al, dh                                  ;get the month information
                and     al, 0fh
                call    convert_to_asci
                mov     byte ptr [bx + 2], al                   ; M
;day
                mov     al, dl
                and     al, 0fh
                call    convert_to_asci
                mov     byte ptr [bx + 4], al                   ; D  .x
                mov     al, dl
                and     al, 0f0h
                shr     al, 4
                call    convert_to_asci
                mov     byte ptr [bx + 3], al                   ; D  x.

                mov     ah, 2ch
                int     21h
;hours
                mov     al, ch
                and     al, 0fh
                call    convert_to_asci
                mov     byte ptr [bx + 6], al                   ; H  .x
                mov     al, ch
                and     al, 0f0h
                shr     al, 4
                call    convert_to_asci
                mov     byte ptr [bx + 5], al                   ; H  x.
;minutes
                mov     al, cl
                and     al, 0fh
                call    convert_to_asci
                mov     byte ptr [bx + 9], al                   ; M  .x
                mov     al, cl
                and     al, 0f0h
                shr     al, 4
                call    convert_to_asci
                mov     byte ptr [bx + 7], al                   ; M  x.
;seconds
                mov     al, dh
                and     al, 0fh
                call    convert_to_asci
                mov     byte ptr [bx + 11], al                  ; S  .x
                mov     al, dh
                and     al, 0f0h
                shr     al, 4
                call    convert_to_asci
                mov     byte ptr [bx + 10], al                  ; S  x.

; 3 WRITE FILENAME TO FS:VCON_SESSION_RMI_FILENAME
                mov     si, OFFSET fg_voice_msg_path
                mov     di, pgm_session_rmi_fname_ptr
                mov     ax, word ptr st_segment
                mov     ES, ax
move_filename:  movsb
                cmp     byte ptr [si], 00H
                jne     move_filename
                movsb

; 4 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 2EF = B5H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0B5h
                out     dx, al
;=============================================================

.EXIT

;=============================================================
;*              PROCEDURE   CONVERT_TO_ASCI                  *
;=============================================================
;if nibble 0h to 9h then add 30h to get a number,
```

```
;if above subtract 0ah and add 41h to get a letter.
convert_to_asci     proc
                    cmp     al, 09h
                    ja      letter
number:             add     al, 30h
                    jmp     convert_exit
letter:             sub     al, 09h
                    add     al, 40h
                    jmp     convert_exit
convert_exit:       ret
convert_to_asci     endp

;=============================================================
;*                  DATA    AREA                             *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H
data_area                   dw      ?
current_PSP                 dw      ?
pgm_session_rmi_fname_ptr   dw      ?
st_segment                  dw      ?

;FILES
fg_voice_msg_path           db      "C:\CATBOX\VOICE\"
fg_voice_msg_filename       db      32 dup("f")

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;updatvq5.asm <- updatvq4.asm. 7/19/95. change the communication a bit and reflect that
;we now build rmi from steps.
;updatvq2.asm <- updatvq1.asm. 5/27/95. minor changes to qf to make it same as vma's.
;also cli/sti to open not found to create.
;also when creating anew, add file NONEWMSG.PCM and NOOLDMSG.PCM to mother records' filenames.
;
;updatvq1.asm <- updatvq0.asm
;updatvq0.asm <- mergvef0.asm. 5/24/95. .quf program.
;mergvef0.asm <- updatevq.asm. 5/24/95. even better conceptual understanding.
;       mergvef0.asm opens .que and .quf and combines them. (called by emi ie vma)
;       updatvq0.asm works on vma.quf file. (called by rmi)
;updatevq.asm <- ldftome0.asm. 5/24/95. result of better conceptual understanding.
;ldftome0.asm <- ldftohd4.asm. 5/24/95. load to memory version for vma. stffmmem also to be used in vma.
;*****************************************************
;*                                                   *
;*      WRITTEN BY HALUK M. AYTAC                    *
;*      MAY 24 1995                                  *
;*      updated July 19, 1995                        *
;*                                                   *
;*****************************************************
;**********************0038*************************************************************
;RECORD MESSAGE INDIRECT (IV)
;sp_updatevq_for_rmi        dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_0038_parameters            ;offset to parameters
;step_0038_next_step        dw  0000h                           ;back to tmo
;step_0038_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_D         ;pgm name = UPDATEVQ
;                           dw  voice_index_tag_filename
;                           dw  step_table_seg_number
;                           dw  vcon_session_rmi_filename       ;argument_2. SEG:OFF of fn to be
;                           dw  step_table_seg_number           ;used by makfname.exe. (FS)
;                           dw  WAIT_TO_COMPLETE                ;hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message

;*****************************************************************************************************
;*                    FIGURING IT OUT                                                                *
;*****************************************************************************************************
;program used inside vma. vma supplies filename and dword address where allocated mem address is loaded.
;C:\CATBOX\PROGRAMS\LDFTOMEM
; 0. before launching this program, fmaestro checks the filename. if another vma called it, then
;    fmaestro aborts it and writes ffff:ffff to the address pointed to by dword parameter area.
;    vma acknowledges the abort,
;    calls an emit_msg with the message "voice mail file is busy... try later...". same message also
;    appears on LCD. (Note: change start_program to manage aborts and also to give completed with abort
;    byte in MPS.). vma's start_program step table entry has DO_NOT_WAIT_FOR_COMPLETION.
;               wait_for_ack
; 1. get filename from PSP (one blank). also get dword parameter ie address in MPS for allocated memory.
; 2. get file size for both .que and .quf files
; 3. allocate memory. allow a little extra. write memory address to area pointed to by dword parameter
;       and write (.quf + .que) as file size for .que to 1st word
;       if fmaestro aborts this, then this location will have ffff:ffff in it. if so, then vma ends
;       with a message "vma busy, please try later"
; 4. open the files
; 5. read files to allocated memory. this is really where memory address should be written to the place
;    pointed to by the dword parameter. vma keeps checking this dword for non 0000:0000 values or for
;    ffff:ffff. if ffff:ffff it quits, if non 0000:0000 it proceeds.
; 6. empty and close .quf to free it for use by rmi's. at this point .quf is bare bones.
; 7. vma now makes .quf records a part of .que records in memory image.
; 8. after vma is done, it signals it by setting dword pointed to by dword parameter to ffff:ffff
; 8. the program mergvef then proceeds to write allocated memory to .que file.
; 9. write to system data area: number of messages
; A. close .que file
; B. exit
;
;we made a policy decision (6-95-8) as follows:
;               rmi  -> .quf
;         (vma) emi <-  .quf
;                   <-  .que
;                    -> .que
;IMPORTANT SENTENCE:
;fmaestro calls a non_playing version of vma just to integrate .quf and get the number of voice messages
;in addition, fmaestro must have a byte in there that says a ldftomem took place with vma.que files.
;any other modem that requests a vma that opens the same vma.que must stall. vma places a request to
;run ldftomem to fmaestro. the filename will be a pointer to a vma*.que. fmaestro can determine if this
;file name is the same one as that of another ldftomem that is running. if so, fmaestro writes ffff:ffff
;to the location given as parameter in the submission. this dword was intended for allocated memory
;address. when the calling vma sees ffff:ffff it emits a message saying, "there is another call accessing
;the same vma*.que... please try again." this vma then terminates.
```

```
;thus within this program, there is nothing to do concerning multiple accesses.
;another option would have been not to close the .que but as this program terminates, it will also clear
;all open memory allocations.
;
;one more idea: keep ldftomem proceeding throughout the duration of vma. vma waits for a non zero
;value in the dword address it supplied to start_program. if this value is ffff:ffff, fmaestro says
;another vma is accessing the same vma*.que. if this value is non-zero as vma keeps checking at each
;timer tick, then vma proceeds. ldftomem is still active, waiting to see ffff:ffff in that location.
;
;VALID STATEMENTS FROM HERE ON DOWN:
;sequence of what happens:
;.quf is synchronized because when it is open with share deny/read/write, no other process can access it.
;.que synchronization will follow the same scheme: keep it open. but to keep it open, we also must keep
;the program that opened it active for PSP purposes. also we must keep this program alive as it called
;and allocated memory.
;
;IN SUMMARY THIS IS WHAT UNDERSTANDING IS EMERGING:
;       UNLIKE LDFTOHDC/STFFMHDC WE CANNOT HAVE A PROGRAM ALLOCATE MEMORY AND THEN TERMINATE THE PROGRAM.
;       ALL ALLOCATED MEMORY WILL ALSO DISAPPEAR. THUS THERE CANNOT BE A LDFTOMEM AND STFFMMEM. THERE
;       MUST BE ONE PROGRAM THAT IS NOT TERMINATED THROUGH THE LIFE OF THE VMA ACTION. LIKEWISE, THROUGH
;       THE LIFE OF PFI (PRINT FAX INDIRECT) THE PROGRAM THAT UPDATES FMA.QUE MUST STAY ACTIVE. THIS IS
;       NO SURPRISE AS HAI'S VMA OPENS THE QUE FILE AND KEEPS IT OPEN THROUGHOUT VMA. FORTUNATELY WE HAVE
;       A MECHANISM IN PLACE TO HAVE VMA AND THE FOREGROUND PROGRAM BE WORKING AT THE SAME TIME. THE
;       TECHNOLOGY IS IN PLACE. THE FOREGROUND PROGRAM WILL BE LOW PRIORITY AND WILL BE INTERRUPTED FOR
;       EMITTING MESSAGES (LDFTOHDC) BUT THE ALLOCATED MEMORY WILL STAY ALLOCATED.
;
;ACTION: CHANGE UPDATEFQ.EXE SO THAT IT STAYS ALIVE DURING PFI. PFI AND UPDATEFQ.EXE WILL KEEP ONE ANOTHER
;INFORMED. BUT, NOW, BACK TO VMA. NAME OF PROGRAM: UPDATEVQ.EXE. SO GO AND CHANGE IT NOW.
;
;messaging between vma and updatevq.asm:
;A BETTER NAME YET: MERGVEF0.ASM. IE MERGE VOICE .QUE AND .QUF FILES. UPDATEVQ.ASM IS MORE APPROPRIATE FOR
;THE FILE THAT IS CALLED BY RMI (RECO_MSG_INDIRECT) AND THAT WRITES TO VMA.QUF.
;
;the messages in .quf are the unread messages. once vma is activated, .quf items are processed. they may
;still go unread and go to new queue etc. what the LCD shows is the number of new queue elements. this
;number is provided by vma. sometimes fmaestro runs vma w/o playing the messages, just to get this number.
;it then has LCD display it. I STILL HAVE TO FIGURE OUT HOW TO DO THIS.
;*****************************************************************************************************
;*          END OF FIGURING IT OUT                                                                   *
;*****************************************************************************************************
;
; 1. open C:\CATBOX\VOICE\VMA06172.QUF. if file does not exist, create it.
;    you get the filename from PSP:82h. the dword parameter points to a dword in GS: that contains
;    a pointer to FS:ssttmm.vox filename. if file exists and not accessible, then write to GS:dword
;    pointed to by the dword parameter. then exit the program.
; 2. get file info on VMA06172.QUF. especially file size.
; 3. allocate memory for VMA06172.QUF.
; 4. move .quf to allocated area.
; 5. add the record for the last call to .quf memory image using que file manipulation code. update
;    file size to first location of allocated memory.
; 6. write allocated area to VMA06172.QUF.
; 7. write 0000:0000 to GS:[SP_LAUNCHED_PGM_DWORD]. at start of program this location contains a ptr
;    to FS:voice message file name. But we store it in local memory so we can use this location for
;    message passing.
; 8. EXIT
;
;*************************************************************
;*                                                           *
;*      INPUTS:                                              *
;*   1. FILENAME IN PSP:82 -QUEUE FILE- example: VMA06172.QUF*
;*   2. FS:vcon_session_rmi_filename                         *
;*      ACTION:                                              *
;*      WRITE FILENAME IN ITEM 2. TO FILE IN ITEM 1.         *
;*                                                           *
;*************************************************************
;can .quf file be already opened by another rmi sequence?
;yes but this instance of the program will not be running then.
;there may be up to 4 instances of this program queued in maestro_task_queue.
;but only one will run at a time and there will be no time slicing.
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
;1#########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 38h
                out     dx, al
                mov     word ptr data_area, 0001h
```

```
;#########################################################################

                mov     bx, DS
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr PSP_seg, bx

;  . SET MEMORY BLOCK SIZE
                mov     ax, OFFSET data_area_end
                shr     ax, 4
                add     ax, 1                   ;how many paragraphs in data area
                mov     bx, DS
                add     bx, ax                  ;first free segment
                mov     ax, word ptr PSP_seg
                sub     bx, ax
                mov     ES, ax
                mov     ah, 4ah
                int     21h

;1*************************************************************
;*                                                           *
;*      GET FILENAMES AND OPEN THE .QUF FILE, IF NO EXIST    *
;*      THEN CREATE IT                                       *
;*                                                           *
;*************************************************************
                PUSH    DS
                mov     ax, word ptr PSP_seg
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET rmi_index_tag_filename
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                movsb
                mov     di, OFFSET rmi_voice_filename_ptr
                movsd
                POP     DS

                PUSH    DS
                mov     si, word ptr rmi_voice_filename_ptr
                mov     ax, word ptr st_seg_number
                mov     DS, ax
                mov     di, OFFSET fg_voice_msg_filename
                mov     ax, SEG data_area
                mov     ES, ax
move_voice_filename:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_voice_filename
                movsb
                POP     DS

                mov     dx, OFFSET rmi_index_tag_filename
                mov     ax, 3d02h
                int     21h
                jc      check_access_error
                mov     word ptr file_handle, ax
                mov     byte ptr new_file_created, NO
                jmp     get_file_info
check_access_error:
                cmp     ax, ERROR_FILE_NOT_FOUND
                jne     program_exit
                mov     dx, OFFSET rmi_index_tag_filename
                mov     cx, 0
                mov     ah, 3ch
                int     21h
                mov     word ptr file_handle, ax
                mov     byte ptr new_file_created, YES
                mov     dword ptr file_size, 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK
                jmp     allocate_memory

;2*************************************************************
;*                                                           *
;*      GET FILE INFO ON C:\CATBOX\VOICE\VMA06172.QUF        *
;*      especially filesize. if we just created this file then *
;*      no need to get file info                             *
;*                                                           *
;*************************************************************
get_file_info:  mov     cx, 0000h
```

```
                mov     dx, OFFSET rmi_index_tag_filename
                mov     ah, 4eh
                int     21h
                PUSH    DS
                mov     bx, word ptr PSP_seg
                mov     DS, bx
                mov     bx, 009ah
                mov     eax, DS:dword ptr [bx]
                POP     DS
                mov     dword ptr file_size, eax
                jmp     allocate_memory

;3*************************************************************
;*                                                           *
;*      ALLOCATE MEMORY FOR C:\CATBOX\VOICE\VMA06172.QUF     *
;*      if first time, then allocate minimum size            *
;*      to file size or min size add 1 record                *
;*                                                           *
;*************************************************************
;this will work because even if there is a ldftohdc loaded after this was launched,
;that program will either be launched before or after memory allocation. if launched
;before, it will also end before memory is allocated. if it starts after allocation
;then we have what we need again.
allocate_memory:
                mov     ebx, dword ptr file_size              ;assume filesize < 64KB
                add     bx, QFR_RECORD_SIZE                   ;allocate 1 record for new voice mail
                shr     bx, 4                                 ;get paragraphs
                add     bx, 4   ; alloc size = file size/4 + 4 paragraphs
                mov     word ptr alloc_mem_size_in_pars, bx
                mov     ah, 48h
                int     21h
                mov     alloc_mem_seg, ax
                mov     ES, ax
;4*************************************************************
;*                                                           *
;*      MOVE C:\CATBOX\VOICE\VMA06172.QUF TO ALLOCATED AREA  *
;*      if first time, then build file in allocated area     *
;*      if not first time, then read file to this area       *
;*                                                           *
;*************************************************************
                cmp     byte ptr new_file_created, YES
                jne     fg_read_file
;building the fax.que file.
                mov     ES:word ptr [QF_FILE_SIZE], 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK
;delete item from free chain will increase file size to alloc size.
                mov     bx, QF_FRE_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_BWD_LNK], QF_FRE_CHAIN_FWD_LNK
                mov     di, QF_FRE_CHAIN_FWD_LNK + QFRV_EVENT_FILENAME
                mov     si, OFFSET fre_chain_emit_filename
cont_write_fre_filename:
                movsb
                cmp     DS:byte ptr [si], 00h
                jne     cont_write_fre_filename
                movsb

                mov     bx, QF_NEW_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_NEW_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_BWD_LNK], QF_NEW_CHAIN_FWD_LNK
                mov     di, QF_NEW_CHAIN_FWD_LNK + QFRV_EVENT_FILENAME
                mov     si, OFFSET new_chain_emit_filename
cont_write_new_filename:
                movsb
                cmp     DS:byte ptr [si], 00h
                jne     cont_write_new_filename
                movsb

                mov     bx, QF_OLD_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_FWD_LNK], QF_OLD_CHAIN_FWD_LNK
                mov     ES:word ptr [bx + QFR_BWD_LNK], QF_OLD_CHAIN_FWD_LNK
                mov     di, QF_OLD_CHAIN_FWD_LNK + QFRV_EVENT_FILENAME
                mov     si, OFFSET old_chain_emit_filename
cont_write_old_filename:
                movsb
                cmp     DS:byte ptr [si], 00h
                jne     cont_write_old_filename
                movsb

                jmp     add_last_call

fg_read_file:   mov     bx, word ptr file_handle
```

```
                mov     cx, word ptr file_size                  ;assume file_size < 64KB ie 1,000 records
                mov     dx, 0000h
                PUSH    DS
                mov     ax, word ptr alloc_mem_seg
                mov     DS, ax
                mov     ah, 3fh
                int     21h
                POP     DS
                mov     word ptr actual_bytes, ax
                mov     ax, word ptr file_size
                mov     ES:word ptr [QF_FILE_SIZE], ax

                jmp     add_last_call

;5*************************************************************
;*                                                           *
;*      ADD LAST CALL                                        *
;*                                                           *
;*************************************************************
add_last_call:  mov     ax, word ptr alloc_mem_seg
                mov     ES, ax
                mov     al, QFOP_DEL_FM_FRE_CHAIN               ;delete a record from free chain
                call    qf_ops
                mov     al, QFOP_ADD_TO_NEW_CHAIN               ;add it to new chain
                call    qf_ops
                mov     di, cx
;write filename of last voice message to record
                add     di, QFRV_EVENT_FILENAME
                mov     si, OFFSET fg_voice_msg_filename
move_file_name: movsb
                cmp     DS:byte ptr [si], 00h
                jne     move_file_name
                movsb
;write filesize of last voice message to record
                mov     di, cx
                mov     cx, 0000h
                mov     dx, OFFSET fg_voice_msg_filename
                mov     ah, 4eh
                int     21h
                PUSH    DS
                mov     bx, word ptr PSP_seg
                mov     DS, bx
                mov     bx, 009ah
                mov     eax, DS:dword ptr [bx]
                mov     ES:dword ptr [di + QFRV_EVENT_FILESIZE], eax
;get date of event
                mov     bx, 0098h
                mov     ax, DS:word ptr [bx]
                mov     ES:word ptr [di + QFRV_EVENT_DATE], ax          ;year
;get time of event
                mov     bx, 0096h
                mov     ax, DS:word ptr [bx]
                mov     ES:word ptr [di + QFRV_EVENT_TIME], ax          ;hour-minute
                POP     DS


;6*************************************************************
;*                                                           *
;*      WRITE ALLOCATED AREA TO C:\CATBOX\VOICE\VMA06172.QUF *
;*                                                           *
;*************************************************************
                mov     bx, word ptr file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4200h
                INT     21H
                mov     dx, 0000h
                PUSH    DS
                mov     cx, ES:word ptr [QF_FILE_SIZE]
                mov     ax, ES
                mov     DS, ax
                mov     ah, 40h
                INT     21H
                POP     DS

;8#########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0B8h
                out     dx, al
                mov     word ptr data_area, 0008h
;#########################################################################
```

```
; 8. exit
close_and_program_exit:
                mov     bx, word ptr file_handle
                mov     ah, 3eh
                int     21h
program_exit:
.EXIT

;*****************************************************************
;*                                                               *
;*      PROCEDURE VMA.QUE FILE OPERATIONS                        *
;*      version 6.2                                              *
;*                                                               *
;*****************************************************************
;the image of fma.que sits in allocated memory. it starts at SEG:0
;This procedure will manipulate the records of the queue files based on the input:
;
;input: ES:cx = segment:offset of record to be changed (all chains for add, new/old for del)
;       al    = specifies action (add/delete record) and chain type (free, new, old)
;output:ES:cx = segment:offset of a record (deleted from free chain or next in chain etc)
;no other registers change.
;
;       al = 00 add to free chain
;            80 del from free chain
;            10 get next in free chain
;            20 get previous in free chain
;
;            01 add to new chain
;            81 del from new chain
;            11 get next in new chain
;            21 get previous in new chain
;
;            02 add to old chain
;            82 del from old chain
;            12 get next in old chain
;            22 get previous in old chain
;
;note:  for first time next in chain, cx=0000h as input
;       if also there are no records in this chain, then cx=0000h as output
;       if also the next record is the mother record, cx=0000h
;
;notes: queue file memory image is in a data segment that starts at 0000h
;       add always to tail end of chain
;       del from anywhere in new/old chains
;       del from head of free chain

qf_ops                  proc
                        push    bx
                        push    dx
                        push    di
                        push    ax

del_record:
;==========
                        test    al, 10000000b
                        jz      prv_record
                        cmp     al, 80h
                        jnz     not_a_del_fm_free_chain         ;ie a record to be deleted exists for sure
;if free chain is empty ie just has a mother record, then cx=queue_file_size and
;queue_file_size=queue_file_size + queue_record_size. free chain is empty if its
;mother record's forward_link = address of mother record.
;so first test for empty free chain.
                        mov     bx, QF_FRE_CHAIN_FWD_LNK
                        mov     dx, ES:word ptr [bx]            ;forward_link of free mother record
                        cmp     dx, QF_FRE_CHAIN_FWD_LNK        ;if equal then only mother record
                        je      free_record_at_end_of_file
                        mov     cx, dx                          ;points to first record
                        jmp     not_a_del_fm_free_chain
free_record_at_end_of_file:
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        mov     cx, dx
                        add     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK
                        mov     ES:word ptr [bx + QFR_BWD_LNK], QF_FRE_CHAIN_FWD_LNK
not_a_del_fm_free_chain:mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
```

```
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        jmp     qf_op_exit


prv_record:
;==========
                        test    al, 00100000b
                        jz      nxt_record
                        cmp     cx, 0000h
                        je      prv_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
prv_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_BWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

nxt_record:
;==========
                        test    al, 00010000b
                        jz      eli_record
                        cmp     cx, 0000h
                        je      nxt_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
nxt_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_FWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

eli_record:
;==========
                        test    al, 01000000b
                        jz      add_record
                        mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
```

```
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        sub     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        jmp     qf_op_exit


add_record:
;==========
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     dx, ES:word ptr [di + QFR_BWD_LNK],

                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], di

                        shr     ax, 6                           ; ax = 00h, 01h, 02h
                        mov     ES:byte ptr [bx + QFR_RECORD_TYPE], al

                        mov     bx, dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], cx
                        mov     bx, di
                        mov     ES:word ptr [bx + QFR_BWD_LNK], cx

                        jmp     qf_op_exit

qf_op_exit:             pop     ax
                        pop     di
                        pop     dx
                        pop     bx
                        ret

qf_ops                  endp


.FARDATA
ORG     0000H
ALIGN   10H
;****************************************************************
;*                                                              *
;*      DATA AREA                                               *
;*                                                              *
;****************************************************************
data_area               dw      ?
PSP_seg                 dw      ?
rmi_voice_filename_ptr  dw      ?
st_seg_number           dw      ?

rmi_index_tag_filename  db      64 dup ("f")    ;eg C:\CATBOX\VOICE\VMA06172.QUF
fg_voice_msg_filename   db      64 dup ("v")    ;eg C:\CATBOX\VOICE\23456467.PCM
new_chain_emit_filename db      "C:\CATBOX\VOICE\NONEWMSG.PCM", 00H
old_chain_emit_filename db      "C:\CATBOX\VOICE\NOOLDMSG.PCM", 00H
fre_chain_emit_filename db      "C:\CATBOX\VOICE\INDEXBSY.PCM", 00H
file_handle             dw      ?
file_size               dd      ?
new_file_created        db      ?
                        db      ?
alloc_mem_seg           dw      ?
alloc_mem_size_in_pars  dw      ?
actual_bytes            dw      ?
data_area_end           dw      0000H           ;place holder

END     start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;stindex6.asm <- stindex5.asm. 10/24/95. delete voice files that are pointed to from free records.
;stindex5.asm <- stindex4.asm. 10/23/95. make compactify same as in mergevef.
;stindex4.asm <- mergvef4.asm. 7/21/95. stindex uses much of mergevef
;mergvef4.asm <- mergvef3.asm. 7/20/95. complete revamp.
;mergvef3.asm <- mergvef2.asm. 5/30/95. fix error in eliminate (change file size). swap write 6 and write seg.
;mergvef1.asm <- mergvef0.asm. 5/26/95. add compact.
;mergvef0.asm. 5/25/95.
;works with vma action.
;   0. GET PSP
;   1. GET FILE NAME
;   2. WRITE OVER THE FILENAME IN THE APPROPRIATE AREA FOR THIS MODEM THE BYTE 00H AT BEGINNING.
;   6. DELETE ALL FILES POINTED TO BY FREE CHAIN.
;   3. COMPACTIFY
;   4. WRITE INDEX_FILE_IN_MPS CONTENTS TO .QUE.
;   5. EXIT
;note that we unregister this voice mail number's .que/.quf files before we update the .que file
;contents. if we did time slicing of foreground programs this would have caused problems. but here
;it will not because the next merge will not execute until this stindex has completed.
;*************************************************************
;*                                                           *
;*      INPUTS:                                              *
;*      FILENAME IN PSP:82 -QUE AND QUF-                     *
;*                                                           *
;*************************************************************
INCLUDE ..\CATVOCL\CATEQU0B.INC
.MODEL  SMALL
.386P
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
;1###########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 3bh
                out     dx, al
                mov     word ptr data_area, 0001h
;###########################################################################

; 0. GET PSP
                mov     bx, DS                  ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET FILE NAME
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET filename_quf_version
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                movsb
                mov     di, OFFSET st_seg_zero_offset
                movsd
                POP     DS

                mov     si, OFFSET filename_quf_version
                mov     di, OFFSET filename_que_version
move_to_que_version:
                movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_to_que_version
                movsb
                sub     di, 2
                mov     ES:byte ptr [di], "E"

; 2. WRITE OVER THE FILENAME IN THE APPROPRIATE AREA FOR THIS MODEM THE BYTE 00H AT BEGINNING.
                mov     ax, word ptr st_seg_number
                mov     FS, ax
                mov     ax, FS:word ptr [OFFSET_TO_MODEM_NUMBER]    ;eg 3130h for modem_1
                and     ah, 00001111b
                mov     al, ah
                mov     ah, 0
                mov     word ptr fg_modem_number, ax                ;now we have 0001h
```

```
                mov     ax, FS:word ptr [OFFSET_TO_TCB_SEG_NUMBER]
                mov     word ptr fg_mps_seg_number, ax
                mov     GS, ax

                mov     ax, FS:word ptr [OFFSET_TO_SYS_DATA_SEG_NUMBER]
                mov     word ptr fg_sys_data_seg_number, ax
                mov     ES, ax

;now we need to UNregister our own filename with the sysdata structure entry for this modem.

                mov     di, SYS_DATA_OFFSET_TO_LOADED_INDEX_FILES
                mov     ax, word ptr fg_modem_number
                mov     bl, 40H
                mul     bl
                add     di, ax
                mov     ES:byte ptr [di], 00H

                mov     ax, GS:word ptr [VMA_QUEUE_FILE_SEG]
                mov     ES, ax

;   6. DELETE ALL FILES POINTED TO BY FREE CHAIN.
                mov     cx, 0000h
fg_find_next_free_record:
                mov     al, QFOP_NXT_IN_FRE_CHAIN
                call    qf_ops
                cmp     cx, 0000h
                je      fg_compactify
                mov     dx, cx
                add     dx, QFRV_EVENT_FILENAME
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                mov     ah, 41h                                 ; delete .pcm file
                INT     21H
                POP     DS
                jmp     fg_find_next_free_record


fg_compactify:
; 9. COMPACTIFY
;*****************************************************************
;*                                                               *
;*      COMPACTIFY                                               *
;*                                                               *
;*****************************************************************
;descend with si. if si =< 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK exit.
;else if this record is free, eliminate record and adjust file size.
;repeat the last 2 lines until record is not free. then remember the record address

;ascend with di. if di = file_size exit.
;if this record is not free, repeat the last line
;when record is free, move record from descent into this record. delete this record from free and
;add to new or old. where this record came from, delete it from new or old and adjust the file size.
;THIS CODE WORKED. 9/30/95.
;DESCRIPTION OF WHAT IT DOES:
; In rough outline, we start from the end to locate non-free records. Until we find one, we eliminate
;and adjust file size for all free records. This is compactify_lup1. Once we encounter a non-free
;record, we move to compactify_lup2. Here, we try to locate a free record. Until we see one, we ignore
;the non-free ones. Once we locate a free record, we eliminate it and adjust the file size. The non-free
;record we got from compactify_lup1, we delete from the new/old chain. This same non-free record we move
;(with movsb) to the slot freed from eliminating the free record from compactify_lup1. We now add the
;new location of the non-free record to the new/old chain.
;repeat the whole loop.

                mov     di, 2 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK

                mov     si, ES:word ptr [QF_FILE_SIZE]

compactify_lup1:
                sub     si, QFR_RECORD_SIZE
                cmp     si, 3 * QFR_RECORD_SIZE + QF_FRE_CHAIN_FWD_LNK
                jb      compactify_done
                cmp     ES:byte ptr [si + QFR_RECORD_TYPE], FRE_RECORD
                jne     compactify_lup2
                mov     cx, si
                mov     al, QFOP_ELI_ND_ADJ_FSIZE
                call    qf_ops
                jmp     compactify_lup1
;remember si. it has a non free record.
compactify_lup2:
                add     di, QFR_RECORD_SIZE
```

```
                cmp     di, si
                jae     compactify_done
                cmp     ES:byte ptr [di + QFR_RECORD_TYPE], FRE_RECORD
                jne     compactify_lup2
                mov     cx, di
                mov     al, QFOP_ELI_ND_ADJ_FSIZE
                call    qf_ops
                mov     cx, QFR_RECORD_SIZE
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                CLD
                rep     movsb
                POP     DS
                sub     di, QFR_RECORD_SIZE
                sub     si, QFR_RECORD_SIZE
                mov     cx, si
                mov     al, ES:byte ptr [si + QFR_RECORD_TYPE]
                add     al, QFOP_DEL_FM_FRE_CHAIN
                call    qf_ops
                mov     cx, di
                mov     al, ES:byte ptr [si + QFR_RECORD_TYPE]
                add     al, QFOP_ADD_TO_FRE_CHAIN
                call    qf_ops
                jmp     compactify_lup1
compactify_done:


; 11. WRITE INDEX_FILE_IN_MPS CONTENTS TO .QUE.
;10*************************************************************
;*                                                           *
;*      WRITE ALLOCATED AREA TO C:\CATBOX\VOICE\VMA06172.QUE    *
;*                                                           *
;*************************************************************
write_que:      mov     dx, OFFSET filename_que_version
                mov     ax, 3d02h
                INT     21H
                mov     word ptr file_handle_que, ax

                mov     bx, word ptr file_handle_que
                mov     cx, ES:word ptr [QF_FILE_SIZE]
                mov     dx, 0000h
                PUSH    DS
                mov     ax, ES
                mov     DS, ax
                mov     ah, 40h
                INT     21H
                mov     cx, 0
                mov     ah, 40h
                INT     21H                             ; to truncate file at this point
                POP     DS
; 12. EXIT
;12*************************************************************
;*                                                           *
;*      EXIT                                                 *
;*                                                           *
;*************************************************************

close_que_and_program_exit:
                mov     bx, word ptr file_handle_que
                mov     ah, 3eh
                int     21h

program_exit:
;1#########################################################################
                mov     dx, 02efh               ;for diagnostic purpose.
                mov     al, 0bbh
                out     dx, al
                mov     word ptr data_area, 0001h
;#########################################################################


.EXIT


;*************************************************************
;*                                                           *
;*      PROCEDURE VMA.QUE FILE OPERATIONS                    *
;*      version 6.2                                          *
;*                                                           *
;*************************************************************
```

```
;the image of fma.que sits in allocated memory. it starts at SEG:0
;This procedure will manipulate the records of the queue files based on the input:
;
;input: ES:cx = segment:offset of record to be changed (all chains for add, new/old for del)
;       al    = specifies action (add/delete record) and chain type (free, new, old)
;output:ES:cx = segment:offset of a record (deleted from free chain or next in chain etc)
;no other registers change.
;
;       al = 00 add to free chain
;            80 del from free chain
;            10 get next in free chain
;            20 get previous in free chain
;
;            01 add to new chain
;            81 del from new chain
;            11 get next in new chain
;            21 get previous in new chain
;
;            02 add to old chain
;            82 del from old chain
;            12 get next in old chain
;            22 get previous in old chain
;
;note:  for first time next in chain, cx=0000h as input
;       if also there are no records in this chain, then cx=0000h as output
;       if also the next record is the mother record, cx=0000h
;
;notes: queue file memory image is in a data segment that starts at 0000h
;       add always to tail end of chain
;       del from anywhere in new/old chains
;       del from head of free chain

qf_ops                  proc
                        push    bx
                        push    dx
                        push    di
                        push    ax

del_record:
;==========
                        test    al, 10000000b
                        jz      prv_record
                        cmp     al, 80h
                        jnz     not_a_del_fm_free_chain         ;ie a record to be deleted exists for sure
;if free chain is empty ie just has a mother record, then cx=queue_file_size and
;queue_file_size=queue_file_size + queue_record_size. free chain is empty if its
;mother record's forward_link = address of mother record.
;so first test for empty free chain.
                        mov     bx, QF_FRE_CHAIN_FWD_LNK
                        mov     dx, ES:word ptr [bx]            ;forward_link of free mother record
                        cmp     dx, QF_FRE_CHAIN_FWD_LNK        ;if equal then only mother record
                        je      free_record_at_end_of_file
                        mov     cx, dx                          ;points to first record
                        jmp     not_a_del_fm_free_chain
free_record_at_end_of_file:
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        mov     cx, dx
                        add     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], QF_FRE_CHAIN_FWD_LNK
                        mov     ES:word ptr [bx + QFR_BWD_LNK], QF_FRE_CHAIN_FWD_LNK
not_a_del_fm_free_chain:mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        jmp     qf_op_exit


prv_record:
;==========
                        test    al, 00100000b
                        jz      nxt_record
```

```
                        cmp     cx, 0000h
                        je      prv_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
prv_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ;,ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_BWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

nxt_record:
;==========
                        test    al, 00010000b
                        jz      eli_record
                        cmp     cx, 0000h
                        je      nxt_record_first
                        mov     bx, cx
                        mov     cx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit
nxt_record_first:       mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
                        mov     cx, ES:word ptr [di + QFR_FWD_LNK]
                        cmp     cx, di
                        jne     qf_op_exit
                        mov     cx, 0000h
                        jmp     qf_op_exit

eli_record:
;==========
                        test    al, 01000000b
                        jz      add_record
                        mov     bx, cx
                        mov     dx, ES:word ptr [bx + QFR_FWD_LNK]
                        mov     ES:word ptr [QF_FORWARD_INDEX], dx
                        mov     dx, ES:word ptr [bx + QFR_BWD_LNK]
                        mov     ES:word ptr [QF_BCKWARD_INDEX], dx
;now can change the link contents
                        mov     bx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     dx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     bx, ES:word ptr [QF_BCKWARD_INDEX]
                        mov     dx, ES:word ptr [QF_FORWARD_INDEX]
                        mov     ES:word ptr [bx + QFR_FWD_LNK], dx
                        mov     dx, ES:word ptr [QF_FILE_SIZE]
                        sub     dx, QFR_RECORD_SIZE
                        mov     ES:word ptr [QF_FILE_SIZE], dx
                        jmp     qf_op_exit


add_record:
;==========
                        mov     dl, QFR_RECORD_SIZE             ; 40h
                        mul     dl                              ; ax = 40h x al
                        mov     ah, 00h                         ;
                        add     ax, QF_FRE_CHAIN_FWD_LNK        ; ax = 10h, 50h, 90h
                        mov     di, ax
```

```
                        mov     dx, ES:word ptr [di + QFR_BWD_LNK]

                        mov     bx, cx
                        mov     ES:word ptr [bx + QFR_BWD_LNK], dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], di

                        shr     ax, 6                           ; ax = 00h, 01h, 02h
                        mov     ES:byte ptr [bx + QFR_RECORD_TYPE], al

                        mov     bx, dx
                        mov     ES:word ptr [bx + QFR_FWD_LNK], cx
                        mov     bx, di
                        mov     ES:word ptr [bx + QFR_BWD_LNK], cx

                        jmp     qf_op_exit

qf_op_exit:             pop     ax
                        pop     di
                        pop     dx
                        pop     bx
                        ret

qf_ops                  endp


.FARDATA
ORG     0000H
ALIGN   10H
;*****************************************************************
;*                                                               *
;*      DATA AREA                                                *
;*                                                               *
;*****************************************************************
data_area               dw      ?
current_PSP             dw      ?
st_seg_zero_offset      dw      ?
st_seg_number           dw      ?
fg_modem_number         dw      ?
fg_sys_data_seg_number  dw      ?
fg_mps_seg_number       dw      ?
index_image_seg_number  dw      ?

filename_quf_version    db      64 dup ("f")                    ;came in PSP:82h
filename_que_version    db      64 dup ("e")
new_chain_emit_filename db      "C:\CATBOX\VOICE\NONEWMSG.PCM", 00H
old_chain_emit_filename db      "C:\CATBOX\VOICE\NOOLDMSG.PCM", 00H
fre_chain_emit_filename db      "C:\CATBOX\VOICE\INDEXBSY.PCM", 00H
file_handle_que         dw      ?
file_handle_quf         dw      ?
file_size_que           dd      ?
file_size_quf           dd      ?
new_file_created_que    db      ?
there_was_quf_file      db      ?
total_new_que_file_size dw      ?
actual_bytes            dw      ?


END     start
```

```
;COPYRIGHT 1995. HALUK AYTAC, HAI NGUYEN, 3TAU.
;*****************************************************************************
;* NAME: FBXBDTCF.EXE                                                        *
;* FUNCTION: SEE BELOW                                                       *
;* AUTHOR: Hai Nguyen, Haluk Aytac                                           *
;* DATE: August 12, 1995                                                     *
;* INPUT:    PSP:82H is filename                                             *
;*           PSP:dword is SEG:OFF for memory area to load file to.           *
;* OUTPUT:   N/A                                                             *
;* REGISTERS CORRUPTED: N/A (DOS TAKES CARE OF THIS)                         *
;* PSEUDOCODE:                                                               *
;*  0. GET PSP                                                               *
;*  1. GET DOC NUMBER FROM PSP:82H                                           *
;*  2. GET SEG(GS:):MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP             *
;*  3. SET MEMORY BLOCK SIZE                                                 *
;*  4. GET THE FILE SIZE FOR C:\CATBOX\FAXBACK\FAXBACK.IDX                   *
;*  5. ALLOCATE MEMORY FOR .IDX FILE                                         *
;*  6. OPEN C:\CATBOX\FAXBACK\FAXBACK.IDX                                    *
;*  7. READ .IDX FILE TO MEMORY                                              *
;*  8. SEARCH FOR (DOC NO) INSIDE THE ALLOCATED MEMORY UP TO FILE SIZE       *
;*      IF (DOC NO) FOUND GOTO 9                                             *
;*      IF (DOC NO) NOT FOUND GOTO D                                         *
;*  9. CHECK GS:[FBX_ONE_VALID_DOC_NUMBER_EXISTS]                            *
;*      IF TRUE GOTO A                                                       *
;*      IF FALSE GOTO B                                                      *
;*  A. GET FILENAME FOR THIS DOC NO, OPEN .TCF FILE AND APPEND TO IT GOTO C  *
;*  B. MAKE A .TCF FILENAME BASED ON TIME/DATE, WRITE THE NAME TO GS:MPS_TCF_ *
;*     _FILENAME, CREATE THIS FILE, APPEND                                   *
;*     THE FILENAME TO (DOC NO) TO THE NEWLY CREATED .TCF FILE.              *
;*     SET GS:[FBX_ONE_VALID_DOC_NUMBER_EXISTS] = TRUE GOTO C                *
;*  C. SET GS:[SP_RETURN_FLAGS]=1                                            *
;*     CLOSE .TCF FILE                                                       *
;*     CLOSE .IDX FILE                                                       *
;*      GOTO EXIT                                                            *
;*  D. SET GS:[SP_RETURN_FLAGS]=0                                            *
;*     CLOSE .IDX FILE                                                       *
;*      GOTO EXIT                                                            *
;*  E. EXIT                                                                  *
;*                                                                           *
;*****************************************************************************
;**********************0042*************************************************
;FAX BACK (III)
;sp_ver_docno_bd_tcf        dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0042_parameters          ;offset to parameters
;step_0042_next_step        dw  0043h                         ;F=1 match goto get_ph_number
;                           dw  004ah                         ;F=0 no match/no file retry
;                           dw  0000h                         ;F=2 tmo needs this for incoming fax
;                           dw  004bh                         ;F=3 no match/no file no more retries
;step_0042_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_J       ;pgm name = FBXBDTCF
;                           dw  vcon_session_faxback_doc_number
;                           dw  step_table_seg_number         ;argument_1. not used.
;                           dw  MPS_TCF_FILENAME              ;argument_2. SEG:OFF of fn to be
;                           dw  mps_seg_number                ;returned/used by FBXBDTCF
;                           dw  WAIT_TO_COMPLETE              ;hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message
;**********************0042*************************************************

INCLUDE ..\catvocl\catequ0b.inc
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 34H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 42h
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
```

```
                mov     DS, ax
                mov     word ptr current_PSP, bx

;  1. GET DOC NUMBER FROM PSP:82H
;  2. GET SEG(GS:):MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET document_number
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                mov     ES:byte ptr [di], ")"
                inc     di
                movsb                                   ; makes ASCIIZ
                movsw                                   ; read of the OFFSET. available to us
                mov     ax, DS:word ptr [si]            ; anyway (.inc) as long as we have GS:
                mov     GS, ax
                POP     DS

; 3. SET MEMORY BLOCK SIZE
                mov     ax, OFFSET data_area_end
                shr     ax, 4
                add     ax, 1                   ;how many paragraphs in data area
                mov     bx, DS
                add     bx, ax                  ;first free segment
                mov     ax, word ptr current_PSP
                sub     bx, ax
                mov     ES, ax
                mov     ah, 4ah
                int     21h

; 4. GET THE FILE SIZE FOR C:\CATBOX\FAXBACK\FAXBACK.IDX
                mov     cx, 0000h
                mov     dx, OFFSET fbx_index_file_name
                mov     ah, 4eh
                int     21h
                mov     ax, word ptr current_PSP
                mov     ES, ax
                mov     bx, 009ah
                mov     eax, ES:dword ptr [bx]
                mov     word ptr fbx_index_file_size, ax
; 5. ALLOCATE MEMORY FOR .IDX FILE
                mov     bx, word ptr fbx_index_file_size
                shr     bx, 4
                inc     bx
                mov     ah, 48h
                int     21h
                mov     allocated_mem_seg, ax
; 6. OPEN C:\CATBOX\FAXBACK\FAXBACK.IDX
                mov     dx, OFFSET fbx_index_file_name
                mov     ax, OPEN_FILE_RO
                int     21h
                mov     word ptr fbx_index_file_handle, ax
; 7. READ .IDX FILE TO MEMORY
                mov     bx, word ptr fbx_index_file_handle
                mov     cx, word ptr fbx_index_file_size
                PUSH    DS
                mov     ax, word ptr allocated_mem_seg
                mov     DS, ax
                mov     dx, 0
                mov     ah, READ_FILE
                int     21h
                POP     DS
; 8. SEARCH FOR (DOC NO) INSIDE THE ALLOCATED MEMORY UP TO FILE SIZE
;       IF (DOC NO) FOUND GOTO 9 (Z=1)  (pattern_matched:)
;       IF (DOC NO) NOT FOUND GOTO D (Z=0)
                mov     dx, word ptr fbx_index_file_size
                mov     ax, DS
                mov     ES, ax
                mov     di, OFFSET pattern_to_match
                mov     si, 0
                PUSH    DS
                mov     ax, word ptr allocated_mem_seg
                mov     DS, ax
                call    match_string
                POP     DS
                mov     word ptr doc_no_filename_ptr, si
```

```
                jnz     pattern_not_matched
                jmp     pattern_matched

; 9. CHECK GS:[FBX_ONE_VALID_DOC_NUMBER_EXISTS]
;           IF TRUE GOTO A
;           IF FALSE GOTO B
pattern_matched:
                cmp     GS:byte ptr [FBX_ONE_VALID_DOC_NUMBER_EXISTS], TRUE
                jne     point_B
                jmp     point_A

; A. GET FILENAME FOR THIS DOC NO, OPEN .TCF FILE   AND APPEND IT TO IT. GOTO C
point_A:
;    OPEN .TCF
                PUSH    DS
                mov     ax, GS
                mov     DS, ax
                mov     dx, MPS_TCF_FILENAME
                mov     ax, OPEN_FILE_RW
                int     21h
                POP     DS
                mov     word ptr tcf_file_handle, ax
;    READ THE FIRST 512 BYTES TO TCF_FILE_EVENT_TYPE.
common_entry_point:
                mov     bx, word ptr tcf_file_handle
                mov     cx, 512
                mov     dx, OFFSET tcf_file_event_type
                mov     ah, 3fh
                int     21h
                mov     word ptr tcf_file_actual_bytes, ax
;    IF TCF_NUMBER_OF_FILES=1 CHECK FILENAME IN FIRST FTR. IF = BLANK.PCX, THEN YOU WILL
;    WRITE OVER THIS FTR AND NOT INCREMENT. IF NOT YOU WILL WRITE THE NEXT FTR AND INCREMENT.
;to find the value of first_true_ftr (byte)
                cmp     word ptr tcf_file_number_of_files, 0001H
                jne     cont_to_5
                mov     bx, OFFSET ftr_stub_path_of_file
                cmp     dword ptr [bx + 24], "NALB"
                jne     cont_to_5
                mov     byte ptr first_true_ftr, 01H
;    GET PCX FILE NAME AND WRITE IT IN THE PROPER FTR.
cont_to_5:      cmp     byte ptr first_true_ftr, 01H
                jne     not_first_t_ftr
yes_first_t_ftr:mov     di, OFFSET ftr_stub_path_of_file
                jmp     start_move_fn
not_first_t_ftr:mov     di, OFFSET ftr_stub2_path_of_file
                inc     word ptr tcf_file_number_of_files
                jmp     start_move_fn

start_move_fn:
;FIND THE FIRST QUOTATION. OUR FILE NAME BEGINS WITH THE NEXT BYTE.
                PUSH    DS
                mov     ax, word ptr allocated_mem_seg
                mov     si, word ptr doc_no_filename_ptr
                mov     DS, ax
                dec     si
look_for_first_quote:
                inc     si
                cmp     DS:byte ptr [si], 22H               ; "
                jne     look_for_first_quote
                inc     si
                mov     ax, SEG data_area
                mov     ES, ax
move_file_name: movsb
                cmp     DS:byte ptr [si], 22H
                jne     move_file_name
                mov     ES:byte ptr [di], 00H
                POP     DS
;  IF CASE OF NO INCREMENT, WRITE 512 BYTES FROM BEGIN FILE. IF CASE OF INCREMENT THEN WRITE
;  128 BYTES OF STUB2 (FTR) FROM END OF FILE.
                cmp     byte ptr first_true_ftr, 01H
                jne     not_first_t_ftr2

yes_first_t_ftr2:
                mov     bx, word ptr tcf_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4200H
                int     21h

                mov     dx, OFFSET tcf_file_event_type
                mov     cx, 512
```

```
                mov     bx, word ptr tcf_file_handle
                mov     ah, 40h
                int     21h
                jmp     point_C

not_first_t_ftr2:
                inc     word ptr tcf_file_number_of_files
                mov     bx, word ptr tcf_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4200H
                int     21h

                mov     dx, OFFSET tcf_file_event_type
                mov     cx, 512
                mov     bx, word ptr tcf_file_handle
                mov     ah, 40h
                int     21h

                mov     bx, word ptr tcf_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4202H
                int     21h

                mov     dx, OFFSET ftr_stub2_file_type
                mov     cx, 128
                mov     bx, word ptr tcf_file_handle
                mov     ah, 40h
                int     21h
                jmp     point_C
; B. MAKE A .TCF FILENAME BASED ON TIME/DATE, WRITE THE NAME TO GS:MPS_TCF_FILENAME,
;    CREATE THIS FILE, APPEND
;    THE FILENAME TO (DOC NO) TO THE NEWLY CREATED .TCF FILE.
;    SET GS:[FBX_ONE_VALID_DOC_NUMBER_EXISTS] = TRUE GOTO C
point_B:
;    MAKE OUTPUT FILENAME
                mov     ah, 2ch                     ;ch=hour, cl=minutes, dh=seconds
                int     21h
                mov     bx, OFFSET output_filename
                mov     al, ch
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     al, cl
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al
                inc     bx
                mov     al, dh
                call    byte_to_asci
                mov     byte ptr [bx], ah
                inc     bx
                mov     byte ptr [bx], al

;   WRITE FILENAME TO FS:VCON_SESSION_TCF_FILENAME
                mov     si, OFFSET output_filename_path
                mov     di, MPS_TCF_FILENAME
                mov     ax, GS
                mov     ES, ax
move_filenam:   movsb
                cmp     byte ptr [si], 00H
                jne     move_filenam
                movsb
;  CREATE .TCF
                PUSH    DS
                mov     ax, GS
                mov     DS, ax
                mov     dx, MPS_TCF_FILENAME
                mov     cx, 0
                mov     ah, CREATE_FILE
                int     21h
                POP     DS
                mov     word ptr tcf_file_handle, ax
                jmp     common_entry_point

; D. CLOSE THE FILES
```

```
pattern_not_matched:
point_D:
                mov     GS:word ptr [SP_RETURN_FLAGS], 0
                mov     bx, word ptr fbx_index_file_handle
                mov     ah, CLOSE_FILE
                int     21h
                jmp     pgm_exit

; C. CLOSE THE FILES
point_C:
                mov     GS:word ptr [SP_RETURN_FLAGS], 1
                mov     bx, word ptr tcf_file_handle
                mov     ah, CLOSE_FILE
                int     21h
                mov     bx, word ptr fbx_index_file_handle
                mov     ah, CLOSE_FILE
                int     21h

; 4 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = B4H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0a2h
                out     dx, al
;=============================================================
.EXIT

;=============================================================
;*              PROCEDURE   MATCH_STRING                     *
;=============================================================
match_string    proc
;*****************************************************************************
;* PROCEDURE NAME: MATCH_STRING                                                *
;* FUNCTION: Searches a ASCIIZ string (00H=null byte at the end) in a buffer  *
;* AUTHOR: Fatih Unal, Haluk Aytac                                             *
;* DATE: August 5, 1995                                                        *
;* UPDATED ON: August 6, 1995                                                  *
;* INPUT:  ES:DI ptr to ASCIIZ  string                                         *
;*         DS:SI ptr to the beginning of buffer in which string is searched    *
;*         DX    ptr to the end of the buffer                                  *
;*                                                                             *
;* OUTPUT: SI  points to the char following the string                         *
;*         ZF = 1                                      if string is found      *
;*                                                                             *
;*         SI  original value                                                  *
;*         ZF =0                                       if string is NOT found *
;*                                                                             *
;* REGISTERS CORRUPTED:                                                        *
;* PSEUDOCODE:                                                                 *
;*                                                                             *
;* NOTES:                                                                      *
;*       Assumptions:                                                          *
;*                  1. length of string <= size of the buffer (< 64K)          *
;*                                                                             *
;*****************************************************************************

LOCAL      found:WORD               ; found flag is local to this procedure

; save registers
                push    AX
                push    BX
                push    CX
                push    DI

                mov     BX,SI       ; save original SI in BX

; calculate the length of the ASCIIZ string
                cld                 ; DI will increment w/ scas
                mov     CX,DX
                sub     CX,SI       ; max length = size of the buffer
                push    CX          ; save size of buffer
                push    DI
                xor     AL, AL      ; AL = null char
        repne   scasb               ; search ES:[DI] -> string for char in AL
                pop     DI          ; restore ptr to beginning of string
                pop     AX          ; AX = size of buf (stack ok for push CX)
                sub     AX,CX
                dec     AX          ; adjust length for null
```

```
                mov     CX,AX       ; CX = length of the string (exclude null)

; search for string in the buffer
                mov     found,-1    ; assume string is not found
                mov     AH,ES:[DI]  ; 1st char of string
                .WHILE  DX > SI     ; while not end of buffer

; search 1st char in the remaining buffer
                    push    CX      ; save length of str
                    mov     CX,DX
                    sub     CX,SI
                    .REPEAT
                        mov     AL,ES:[DI]          ; char of string
                        .BREAK .IF AH == DS:[SI]    ; break if equal
                        inc     SI
                    .UNTILCXZ
                    pop     CX      ; restore length of str

                    push    CX      ; save length of string
                    push    DI      ; save ptr to beg of string
                    dec     CX      ; no need to compare 1st char
                    .REPEAT
                        inc     SI
                        inc     DI
                        mov     AL,ES:[DI]          ; char of string
                        .BREAK .IF AL != DS:[SI]    ; break if not equal
                    .UNTILCXZ
                    pop     DI      ; restore ptr to beg of string
                    pop     CX      ; restore length of string
                    .IF ZERO?       ; string found ?
                        mov     found,0     ; YES
                        mov     BX,SI       ; save the ptr within buffer
                        inc     BX  ; BX was pointing to the last matched char
                        .BREAK              ; break the while loop
                    .ENDIF
                .ENDW

                mov     SI,BX   ; original SI (if string is not found)

; restore registers
                pop     DI
                pop     CX
                pop     BX
                pop     AX
                cmp     found, 0    ; set ZF if string matched
                ret
match_string    endp

;=================================================================
;*              PROCEDURE   BYTE_TO_ASCI                         *
;=================================================================
;this procedure takes al and turns it into 2 asci bytes in ax
;(ah=higher nibble, al=lower nibble)
;if nibble 0h to 9h then add 30h to get a number,
;if above subtract ah and add 41h to get a letter.
byte_to_asci    proc
                PUSHF
                push    cx

                mov     cl, al
                and     cl, 0f0h        ;upper nibble
                shr     cl, 4           ;to lower nibble area
                cmp     cl, 09h
                ja      must_be_letter_u
                add     cl, 30h
                mov     ah, cl
                jmp     lower_nibble
must_be_letter_u:
                sub     cl, 0ah
                add     cl, 41h
                mov     ah, cl
                jmp     lower_nibble
lower_nibble:   and     al, 0fh
                cmp     al, 09h
                ja      must_be_letter_l
                add     al, 30h
                jmp     return
must_be_letter_l:
                sub     al, 0ah
                add     al, 41h
```

```
                jmp     return

return:         pop     cx
                POPF

                ret
byte_to_asci    endp

;=============================================================
;*                  DATA    AREA                             *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

;TCF FILE FORMAT
tcf_file_event_type         db      00H                     ; ++  0 send
tcf_file_transfer_type      db      00H                     ; ++  1 200x200
tcf_file_status_of_event    dw      0000H                   ;     2 successfully completed
tcf_file_time_to_send       dw      0000H                   ; ++  4 send immediately
tcf_file_date_to_send       dw      0000H                   ; ++  6 send immediately
tcf_file_number_of_files    dw      0001H                   ;*++  8 in case of abort send one blank page
tcf_file_off_of_first_ftr   dw      0180H                   ; ++ 10 offset to first FTR. no cover page
tcf_file_phone_number       db     "011 90 216 302 5869",00H;*++ 12 phone number in ASCIIZ (47 bytes)
                            db     "                    "
                            db     "    "
tcf_file_app_specific       db      64 dup (00H)            ;    59 64 bytes
tcf_file_reserved_1         db      00H                     ;   123
tcf_file_phone_connect_scs  db      00H                     ;   124
tcf_file_phone_connect_mns  db      00H                     ;   125
tcf_file_phone_connect_hrs  db      00H                     ;   126
tcf_file_total_pages        dd      00000000H               ;   127
tcf_file_no_of_xmited_pages dd      00000000H               ;   131
tcf_file_no_of_xmited_files dw      0000H                   ;   135
tcf_file_cover_page_flag    db      00H                     ; ++137 DO NOT SEND COVER PAGE
tcf_file_no_of_xmit_errors  dw      0000H                   ;   138
tcf_file_del_files_flag     db      00H                     ; ++140 DON'T DELETE FILES AFTER EVENT
tcf_file_parnt_event_handle dw      0000H                   ;   141
tcf_file_reserved_2         db      53 dup (00H)            ;   143
tcf_file_int_use            db      20 dup (00H)            ;   196
tcf_file_cover_page_rd_flag db      00H                     ;   216
tcf_file_suppress_page_hdrs db      00H                     ; ++217 DO NOT SUPPRESS PAGE HEADERS
tcf_file_remote_csid        db      21 dup (00H)            ;   218
tcf_file_destination_name   db      32 dup (00H)            ;*++239 PUT PHONE NUMBER HERE ALSO
tcf_file_sender_name        db     "Haluk Aytac, 3Tau", 00H ;*++271 CAT.CFG([FAX]sender_name = H. Aytac, 3T)
                            db     "                "       ;       ADD A 00H TO THE END OF TEXT STRING.

tcf_file_pcx_logo_path      db     "C:\CATBOX\FAXBACK\FAXABLTY.PCX"
                            db      50 dup (00H)

                            db      00H

;FTR FORMAT
ftr_stub_file_type          db      01H                     ; ++  0 PCX FILE
ftr_stub_text_size          db      00H                     ; ++  1 used for file xfers only
ftr_stub_status_of_file     db      00H                     ;     2 file untouched
ftr_stub_bytes_xmited       dd      00000000H               ;     3
ftr_stub_bytes_in_file      dd      00000000H               ;     7 no need to enter
ftr_stub_pages_xmited       dw      0000H                   ;    11
ftr_stub_pages_in_file      dw      0000H                   ;    13
ftr_stub_path_of_file       db     "C:\CATBOX\FAXBACK\QUEUE\BLANK.PCX",00H
                                                            ;*++ 15 THE ONLY PART TO BE FILLED HERE
                            db      46 dup (00H)
ftr_stub_eighth_inches      db      00H                     ; ++ 95
ftr_stub_page_length        db      00H                     ; ++ 96 PAGE IS 11 INCHES
ftr_stub_reserved           db      31 dup (00H)            ;    97


;FTR FORMAT SECOND .PCX FILE AND UP
ftr_stub2_file_type         db      01H                     ; ++  0 PCX FILE
ftr_stub2_text_size         db      00H                     ; ++  1 used for file xfers only
ftr_stub2_status_of_file    db      00H                     ;     2 file untouched
ftr_stub2_bytes_xmited      dd      00000000H               ;     3
ftr_stub2_bytes_in_file     dd      00000000H               ;     7 no need to enter
ftr_stub2_pages_xmited      dw      0000H                   ;    11
ftr_stub2_pages_in_file     dw      0000H                   ;    13
ftr_stub2_path_of_file      db     "C:\CATBOX\FAXBACK\QUEUE\BLANK.PCX",00H
                                                            ;*++ 15 THE ONLY PART TO BE FILLED HERE
                            db      46 dup (00H)
ftr_stub2_eighth_inches     db      00H                     ; ++ 95
ftr_stub2_page_length       db      00H                     ; ++ 96 PAGE IS 11 INCHES
```

```
ftr_stub2_reserved          db      31 dup (00H)            ;    97


data_area                   dw      ?

current_PSP                 dw      ?
pattern_to_match            db      "("
document_number             db      8 dup(00h)
                            dw      ?
doc_no_filename_ptr         dw      ?
fbx_index_file_handle       dw      ?
fbx_index_file_name         db      "C:\CATBOX\FAXBACK\FAXBACK.IDX", 00H
fbx_index_file_size         dw      ?
allocated_mem_seg           dw      ?
tcf_file_handle             dw      ?
tcf_file_actual_bytes       dw      ?
first_true_ftr              db      ?
                            db      ?
output_filename_path        db      "C:\CATBOX\FAXBACK\QUEUE\"
output_filename             db      6 dup("o")
output_filename_type        db      ".TCF", 00H             ;in memory: LCP.SSMMHH

data_area_end               dw      0000H                   ;place holder

END         start
```


391

```
;COPYRIGHT 1995. HALUK AYTAC, HAI NGUYEN, 3TAU.
;*****************************************************************************
;* NAME: FBXUPTCF.EXE                                                        *
;* FUNCTION: SEE BELOW                                                       *
;* AUTHOR: Hai Nguyen, Haluk Aytac                                           *
;* DATE: August 19, 1995                                                     *
;* INPUT:    PSP:82H is filename                                             *
;*           PSP:dword is SEG:OFF for memory area to load file to.           *
;* OUTPUT:   N/A                                                             *
;* REGISTERS CORRUPTED: N/A (DOS TAKES CARE OF THIS)                         *
;* PSEUDOCODE:                                                               *
;*   0. GET PSP                                                              *
;*   1. GET PHONE NUMBER FROM PSP:82H                                        *
;*   2. GET SEG(GS:):MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP            *
;*   3. OPEN .TCF FILE AND APPEND PHONE NUMBER TO IT                         *
;*   4. CLOSE .TCF FILE                                                      *
;*   5. EXIT                                                                 *
;*                                                                           *
;*****************************************************************************
;***********************0044*************************************************
;FAX BACK (V)
;sp_ver_docno_bd_tcf        dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_0044_parameters            ;offset to parameters
;step_0044_next_step            dw  0045h                           ;F=1 match goto get_ph_number
;step_0044_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_K         ;pgm name = FBXUPTCF
;                           dw  vcon_session_phone_number
;                           dw  step_table_seg_number           ;argument_1. not used.
;                           dw  MPS_TCF_FILENAME                ;argument_2. SEG:OFF of fn to be
;                           dw  mps_seg_number                  ;returned/used by FBXBDTCF
;                           dw  WAIT_TO_COMPLETE                ;hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message
;***********************0044*************************************************

INCLUDE ..\catvoc1\catequ0b.inc
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 34H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 44h
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

;  1. GET PHONE NUMBER FROM PSP:82H
;  2. GET SEG(GS:):MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET phone_number
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                movsb

                movsw                                   ; read of the OFFSET. available to us
                mov     ax, DS:word ptr [si]            ; anyway (.inc) as long as we have GS:
                mov     GS, ax
                POP     DS

; 3. OPEN .TCF FILE AND APPEND PHONE NUMBER TO IT
point_A:
```

```
;    OPEN .TCF
                PUSH    DS
                mov     ax, GS
                mov     DS, ax
                mov     dx, MPS_TCF_FILENAME
                mov     ax, OPEN_FILE_RW
                int     21h
                POP     DS
                mov     word ptr tcf_file_handle, ax
;    READ THE FIRST 384 BYTES TO TCF_FILE_EVENT_TYPE.
common_entry_point:
                mov     bx, word ptr tcf_file_handle
                mov     cx, 384
                mov     dx, OFFSET tcf_file_event_type
                mov     ah, 3fh
                int     21h
                mov     word ptr tcf_file_actual_bytes, ax
; MOVE PHONE NUMBER TO PHONE AREAS
                mov     ax, DS
                mov     ES, ax

                mov     si, OFFSET phone_number
                mov     di, OFFSET tcf_file_phone_number
move_ph_no_1:   movsb
                cmp     DS:byte ptr [si], 00h
                jne     move_ph_no_1
                movsb

                mov     si, OFFSET phone_number
                mov     di, OFFSET tcf_file_destination_name
move_ph_no_2:   movsb
                cmp     DS:byte ptr [si], 00h
                jne     move_ph_no_2
                movsb
;reset file pointer to the beginning
                mov     bx, word ptr tcf_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4200h
                int     21h
;write back
                mov     dx, OFFSET tcf_file_event_type
                mov     cx, 384
                mov     bx, word ptr tcf_file_handle
                mov     ah, 40h
                int     21h

; 4. CLOSE THE .TCF FILE
point_C:
                mov     bx, word ptr tcf_file_handle
                mov     ah, CLOSE_FILE
                int     21h

; 4 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = B4H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0a4h
                out     dx, al
;=============================================================
.EXIT

;=============================================================
;*                  DATA    AREA                             *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

;TCF FILE FORMAT
tcf_file_event_type         db      00H                     ; ++  0 send
tcf_file_transfer_type      db      00H                     ; ++  1 200x200
tcf_file_status_of_event    dw      0000H                   ;     2 successfully completed
tcf_file_time_to_send       dw      0000H                   ; ++  4 send immediately
tcf_file_date_to_send       dw      0000H                   ; ++  6 send immediately
tcf_file_number_of_files    dw      0001H                   ;*++  8 in case of abort send one blank page
tcf_file_off_of_first_ftr   dw      0180H                   ; ++ 10 offset to first FTR. no cover page
tcf_file_phone_number       db     "011 90 216 302 5869",00H;*++ 12 phone number in ASCIIZ (47 bytes)
```

```
                                db      "                       "
                                db      "    "
tcf_file_app_specific           db       64 dup (00H)             ;    59 64 bytes
tcf_file_reserved_1             db       00H                      ;   123
tcf_file_phone_connect_scs      db       00H                      ;   124
tcf_file_phone_connect_mns      db       00H                      ;   125
tcf_file_phone_connect_hrs      db       00H                      ;   126
tcf_file_total_pages            dd       00000000H                ;   127
tcf_file_no_of_xmited_pages     dd       00000000H                ;   131
tcf_file_no_of_xmited_files     dw       0000H                    ;   135
tcf_file_cover_page_flag        db       00H                      ; ++137 DO NOT SEND COVER PAGE
tcf_file_no_of_xmit_errors      dw       0000H                    ;   138
tcf_file_del_files_flag         db       02H                      ; ++140 ALWAYS DELETE FILES AFTER EVENT
tcf_file_parnt_event_handle     dw       0000H                    ;   141
tcf_file_reserved_2             db       53 dup (00H)             ;   143
tcf_file_int_use                db       20 dup (00H)             ;   196
tcf_file_cover_page_rd_flag     db       00H                      ;   216
tcf_file_suppress_page_hdrs     db       00H                      ; ++217 DO NOT SUPPRESS PAGE HEADERS
tcf_file_remote_csid            db       21 dup (00H)             ;   218
tcf_file_destination_name       db       32 dup (00H)             ;*++239 PUT PHONE NUMBER HERE ALSO
tcf_file_sender_name            db      "Haluk Aytac, 3Tau", 00H ;*++271 CAT.CFG([FAX]sender_name = H. Aytac, 3T)
                                db      "                "       ;       ADD A 00H TO THE END OF TEXT STRING.

tcf_file_pcx_logo_path          db      "C:\CATBOX\FAXBACK\FAXABLTY.PCX"
                                db       50 dup (00H)


                                db       00H

data_area                       dw       ?

current_PSP                     dw       ?
pattern_to_match                db       "("
phone_number                    db       32 dup(00h)
tcf_file_handle                 dw       ?
tcf_file_actual_bytes           dw       ?

data_area_end                   dw       0000H                   ;place holder

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, HAI NGUYEN, 3TAU.
;*****************************************************************************
;* NAME: BLDFBXDB.EXE                                                        *
;* FUNCTION: SEE BELOW                                                       *
;* AUTHOR: Hai Nguyen, Haluk Aytac                                           *
;* DATE: August 19, 1995                                                     *
;* INPUT:    PSP:82H is filename                                             *
;*           PSP:dword is SEG:OFF for memory area to load file to.           *
;* OUTPUT:  N/A                                                              *
;* REGISTERS CORRUPTED: N/A (DOS TAKES CARE OF THIS)                         *
;* PSEUDOCODE:                                                               *
;*  0. GET PSP                                                               *
;*  1. GET DOC NUMBER FROM PSP:82H                                           *
;*  2. GET FS:vcon_session_fax_filename DWORD PARAMETER IN PSP               *
;*  3. OPEN C:\CATBOX\FAXBACK\FAXBACK.IDY IF 'NOT_FOUND' ERROR CREATE IT     *
;*  4. MOVE POINTER TO END OF FILE                                           *
;*  5. APPEND DOC NUMBER AND FILENAME AND <CR><LF>                           *
;*  6. CLOSE .IDY FILE                                                       *
;*  7. EXIT                                                                  *
;*                                                                           *
;*****************************************************************************
;**********************0049*************************************************
;BUILD FAX DATA BASE (IV)
;sp_bdfbx_incbdfbx          dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_0049_parameters            ;offset to parameters
;step_0049_next_step        dw  0046h                           ;F=1
;step_0049_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_L         ;pgm name = BLDFBXDB
;                           dw  vcon_session_faxback_doc_number
;                           dw  step_table_seg_number           ;argument_1. not used.
;                           dw  vcon_session_fax_filename       ;argument_2. SEG:OFF of fn to be
;                           dw  step_table_seg_number           ;returned/used by FBXBDTCF
;                           dw  WAIT_TO_COMPLETE                ;hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message
;**********************0049*************************************************

INCLUDE ..\catvocl\catequ0b.inc
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 34H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 3ch
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

;  1. GET DOC NUMBER FROM PSP:82H
;  2. GET SEG(GS:):MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     di, OFFSET document_number
                mov     ax, SEG data_area
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00H
                jne     move_filename
                mov     ES:byte ptr [di], ")"
                inc     di
                mov     ES:byte ptr [di], " "
                inc     di
                mov     ES:byte ptr [di], 22h
                inc     si                                  ; makes ASCIIZ
                mov     di, OFFSET fbx_filename_ptr
```

```
                movsd                                   ; read of the OFFSET. available to us
                POP     DS

; 3. OPEN C:\CATBOX\FAXBACK\FAXBACK.IDX
                mov     dx, OFFSET fbx_index_file_name
                mov     ax, OPEN_FILE_RW
                int     21h
                jc      create_fbxdb_file
                mov     word ptr fbx_index_file_handle, ax
                jmp     point_4

create_fbxdb_file:
                mov     dx, OFFSET fbx_index_file_name
                mov     cx, 0
                mov     ah, CREATE_FILE
                int     21h
                mov     word ptr fbx_index_file_handle, ax
                jmp     point_4

; 4. MOVE POINTER TO END OF FILE
point_4:        mov     word ptr fbx_index_file_handle, ax
                mov     bx, word ptr fbx_index_file_handle
                mov     cx, 0
                mov     dx, 0
                mov     ax, 4202h
                int     21h

; 5. APPEND DOC NUMBER AND FILENAME AND <CR><LF>
                mov     cx, 0
                mov     si, OFFSET doc_no_with_p
                dec     si
count_doc_no:   inc     si
                inc     cx
                cmp     DS:byte ptr [si], 22h
                jne     count_doc_no

                mov     dx, OFFSET doc_no_with_p
                mov     bx, word ptr fbx_index_file_handle
                mov     ah, WRITE_FILE
                int     21h

                mov     cx, 0
                mov     di, word ptr fbx_index_file_handle
                PUSH    DS
                mov     bx, OFFSET fbx_filename_ptr
                mov     ax, word ptr [bx + 2]
                mov     si, word ptr [bx]
                mov     dx, word ptr [bx]
                mov     DS, ax
                dec     si
count_fil_name: inc     si
                inc     cx
                cmp     DS:byte ptr [si], 00h
                jne     count_fil_name
                dec     cx
                mov     bx, di
                mov     ah, WRITE_FILE
                int     21h
                POP     DS

                mov     cx, 3
                mov     bx, word ptr fbx_index_file_handle
                mov     dx, OFFSET cr_lf
                mov     ah, WRITE_FILE
                int     21h


; 6. CLOSE .IDY FILE
                mov     bx, word ptr fbx_index_file_handle
                mov     ah, CLOSE_FILE
                int     21h

; 4 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                             *
;*  WRITE TO 3FF = B4H IE STEP NUMBER CALLING THIS PROGRAM  *
;=============================================================
                mov     dx, 02efh
                mov     al, 0bch
                out     dx, al
```

```
;=============================================================
.EXIT

;=============================================================
;*                    DATA    AREA                           *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

data_area                   dw      ?

current_PSP                 dw      ?
doc_no_with_p               db      "("
document_number             db      16 dup(00h)             ; 8 chars + ) + 00h
fbx_filename_ptr            dd      ?

fbx_index_file_handle       dw      ?
fbx_index_file_name         db      "C:\CATBOX\FAXBACK\FAXBACK.IDY", 00H
cr_lf                       db      22h,0dh, 0ah

data_area_end               dw      0000H                   ;place holder

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, HAI NGUYEN, 3TAU.
;*****************************************************************************
;* NAME: FBXDLTCF.EXE                                                        *
;* FUNCTION: SEE BELOW                                                       *
;* AUTHOR: Hai Nguyen, Haluk Aytac                                           *
;* DATE: August 19, 1995                                                     *
;* INPUT:   PSP:82H is filename                                              *
;* OUTPUT:  N/A                                                              *
;* REGISTERS CORRUPTED: N/A (DOS TAKES CARE OF THIS)                         *
;* PSEUDOCODE:                                                               *
;*  0. GET PSP                                                               *
;*  1. GET SEG(GS:):MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP             *
;*  2. DELETE .TCF FILE IF GS:byte ptr [FBX_ONE_VALID_DOC_NUMBER_EXISTS]     *
;*  3. EXIT                                                                  *
;*                                                                           *
;*****************************************************************************
;**********************004C************************************************************
;FAX BACK (V)
;sp_ver_docno_bd_tcf        dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_004c_parameters          ;offset to parameters
;step_004c_next_step        dw  0025h                         ;F=1 match goto get_ph_number
;step_004c_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_?       ;pgm name = FBXDLTCF
;                           dw  0000H
;                           dw  0000H                         ;argument_1. not used.
;                           dw  MPS_TCF_FILENAME              ;argument_2. SEG:OFF of fn to be
;                           dw  mps_seg_number                ;returned/used by FBXBDTCF
;                           dw  WAIT_TO_COMPLETE              ;hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message
;**********************0044************************************************************

INCLUDE ..\catvocl\catequ0b.inc
.MODEL  SMALL
.386P
.STACK
.CODE

ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 34H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 3ch
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET SEG(GS:): MPS_TCF_FILENAME FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     ax, DS:word ptr [si]            ; anyway (.inc) as long as we have GS:
                mov     GS, ax
                POP     DS


; 2. DELETE THE .TCF FILE
                mov     ax, GS
                mov     DS, ax
                mov     dx, MPS_TCF_FILENAME
                mov     ah, DELETE_FILE
                int     21h

; 3 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = B4H IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
```

```
                mov     al, 0bch
                out     dx, al
;=============================================================
.EXIT

;=============================================================
;*                    DATA    AREA                           *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

;TCF FILE FORMAT
tcf_file_event_type         db      00H                     ; ++  0 send
tcf_file_transfer_type      db      00H                     ; ++  1 200x200
tcf_file_status_of_event    dw      0000H                   ;     2 successfully completed
tcf_file_time_to_send       dw      0000H                   ; ++  4 send immediately
tcf_file_date_to_send       dw      0000H                   ; ++  6 send immediately
tcf_file_number_of_files    dw      0001H                   ;*++  8 in case of abort send one blank page
tcf_file_off_of_first_ftr   dw      0180H                   ; ++ 10 offset to first FTR. no cover page
tcf_file_phone_number       db     "011 90 216 302 5869",00H;*++ 12 phone number in ASCIIZ (47 bytes)
                            db     "                     "
                            db     "    "
tcf_file_app_specific       db      64 dup (00H)            ;    59 64 bytes
tcf_file_reserved_1         db      00H                     ;   123
tcf_file_phone_connect_scs  db      00H                     ;   124
tcf_file_phone_connect_mns  db      00H                     ;   125
tcf_file_phone_connect_hrs  db      00H                     ;   126
tcf_file_total_pages        dd      00000000H               ;   127
tcf_file_no_of_xmited_pages dd      00000000H               ;   131
tcf_file_no_of_xmited_files dw      0000H                   ;   135
tcf_file_cover_page_flag    db      00H                     ; ++137 DO NOT SEND COVER PAGE
tcf_file_no_of_xmit_errors  dw      0000H                   ;   138
tcf_file_del_files_flag     db      02H                     ; ++140 ALWAYS DELETE FILES AFTER EVENT
tcf_file_parnt_event_handle dw      0000H                   ;   141
tcf_file_reserved_2         db      53 dup (00H)            ;   143
tcf_file_int_use            db      20 dup (00H)            ;   196
tcf_file_cover_page_rd_flag db      00H                     ;   216
tcf_file_suppress_page_hdrs db      00H                     ; ++217 DO NOT SUPPRESS PAGE HEADERS
tcf_file_remote_csid        db      21 dup (00H)            ;   218
tcf_file_destination_name   db      32 dup (00H)            ;*++239 PUT PHONE NUMBER HERE ALSO
tcf_file_sender_name        db     "Haluk Aytac, 3Tau", 00H ;*++271 CAT.CFG([FAX]sender_name = H. Aytac, 3T)
                            db     "                 "      ;       ADD A 00H TO THE END OF TEXT STRING.

tcf_file_pcx_logo_path      db     "C:\CATBOX\FAXBACK\FAXABLTY.PCX"
                            db      50 dup (00H)

                            db      00H

data_area                   dw      ?

current_PSP                 dw      ?
pattern_to_match            db      "("
phone_number                db      32 dup(00h)
tcf_file_handle             dw      ?
tcf_file_actual_bytes       dw      ?

data_area_end               dw      0000H                   ;place holder

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, JON AYTAC, 3TAU.

BUFFER_SIZE                 EQU     4000H           ;400h to 4000h 280KB file 5sec -> 4sec
                                                    ;diminishing returns after 4000h buffer.
;fp441.asm <- fp440.asm. 9/26/95. bug in 334. need to do busy check after each byte.
;Franco will do DMA for us and it will get done in the background. Meanwhile, we reinsert
;the check
;fp440.asm <- fp44.asm. 9/26/95. add parallel fifo mode after fp410.asm model.
;fp43.asm <- fp41.asm. 9/18/95. change to incorporate PTQ.
;fp41.asm <- fstprnt4.asm. 7/5/95. turns it into a spool printer ie it scans the directory
;C:\CATBOX\PRINT\SPOOL for files and prints one and returns after deleting the file.
;fstprnt4.asm <- fstprnt2.asm. 6/6/95. in line code.
;fstprnt2.asm <- fstprnt1.asm. 6/4/95. fstprnt1.asm worked great.
;280K byte file printed on CATBOX1 in 11 min 30 secs using print.com
;with fstprnt0.exe (fstprnt1.asm) it took: 2 min and 15 secs. a whopping 5x improvement
;for Jon's first rprogramming job.
;This revision will use Haluk's int 17 substitute- we shall see whether Bios incurs any
;inefficiencies
;*****************************************************************************
;*                                                                           *
;*                  FSTPRNT2.ASM                                             *
;*                  Written By Jon Aytac and Haluk M. Aytac                  *
;*                  June 2, 1995                                             *
;*                                                                           *
;*****************************************************************************
;CaTbox affords us to run print jobs in the foreground. Because we have complete control over it.
;this way, things will go faster. we also bypass BIOS.
;STAGE 1:
;bypass BIOS and use basic printer i/o
;STAGE 2:
;use 332 capability that gives you automatic pulsing
;STAGE 3:
;use 332 capability that gives you FIFO.
;C:> FSTPRNT C:\CATBOX\PRT\TOPRN002.PCL
;
; 1. get file name from int 21/4e call
; 2. open file
; 3. read file to buffer. if nothing to read jmp to 6.
; 4. print buffer (built with Haluk's code)
; 5. jmp to 3
; 6  close file
; 7. delete file
; 8. exit
;
;NEW ALGORITHM (WITH PTQ):
;=========================
;NOTE: SO FAR SCTOPCL2 AND TIMER TICK ARE SUPPLYING ENTRIES TO PTQ. AS FGPRINT.EXE
;AND SCTOPCL2.EXE ARE BOTH LOW PRIORITY PROGRAMS, SCTOPCL2.EXE DOES NOT GET TO
;PRESENT NEW PTQ ENTRIES AS FGPRINT.EXE IS PRINTING THEM. HOWEVER, HOST PC SUBMISSIONS
;ARE SUBMITTED DURING TIMER TICK. THUS FGPRINT.EXE MAY FIND MORE PRINT JOBS THAN WHEN
;IT FIRST STARTED. THUS, FGPRINT.EXE MUST HAVE SOME CRITICAL SECTIONS. OR WHAT TO WATCH
;OUT FOR IS THIS: MAKE THE PTQ ENTRY FREE ONLY AFTER ITS FILE HAS BEEN PRINTED.
;REMEMBER! THIS IS THE ONLY PLACE WHERE PTQ ENTRIES ARE BEING FREED.
;revised algorithm:
; 1. get PSP and sys_data_seg_number from PSP:82h
; 2. search PTQ and get the first entry that can be printed.
;
;later on, can experiment with dual buffers.
;*****************************************************************************
;*                                                                           *
;*          INPUTS:                                                          *
;*          FILENAME TO PRINT IN PSP:82                                      *
;*                                                                           *
;*****************************************************************************
INCLUDE ..\CATVOCL\CATEQU0E.INC
.MODEL  SMALL
.386P
                        extrn   printer_task_queue:far
                        extrn   printer_task_queue_end:far
.STACK
.CODE
ASSUME  DS:SEG data_area                        ;to compute offsets the way we want them
start:
;***********************************************
;       DIAGNOSTIC                              *
;***********************************************
                mov     dx, 02efh               ;COM4 scratch register
                mov     al, 4eh
                out     dx, al
;***********************************************
```

1 400

```
;       get PSP value and store it              *
;*********************************************
                        mov     bx, DS
                        mov     ax, SEG data_area
                        mov     DS, ax
                        mov     word ptr PSP_seg, bx
;*********************************************
;       get sys_data_seg_number                 *
;*********************************************
                        PUSH    DS
                        mov     ax, DS
                        mov     ES, ax
                        mov     ax, word ptr PSP_seg
                        mov     DS, ax
                        mov     si, 84h
                        mov     di, OFFSET fg_sys_data_seg_number ,
                        movsw
                        POP     DS
;*********************************************
;       initialize the printer                  *
;*********************************************
                        mov     dx, 0000h
                        mov     ah, 01h
                        int     17h
;*********************************************
;*      parallel FIFO mode                      *
;*********************************************
                        mov     dx, 03beh               ;CTR
                        mov     al, 0ech                ;irq disable, select, no strobe
                        out     dx, al                  ;need bit_0=0 to get ECP started
                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        mov     al, 04h                 ;ECP bit set
                        out     dx, al
                        out     dx, al
                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        in      al, dx                  ;is ECP bit set?
pcr_value_in_1:         mov     byte ptr pcr_value, al
                        mov     dx, 07beh               ;ECR
                        in      al, dx                  ;=15 ie std mode, no irq, no dma
;in this mode, you can do software driven writes
ecr_value_in:           mov     byte ptr ecr_value, al
                        mov     al, 55h                 ;010 1 0101. // fifo mode. no irq. no dma.
                        out     dx, al                  ;now in parallel fifo mode.
;in this mode, you can do hardware driven writes
;*********************************************
;*      check for printer not busy              *
;*********************************************
                        mov     dx, 03bdh
print_byte_test_loop_0: in      al, dx
                        test    al, 10000000b           ;printer busy?
                        jz      print_byte_test_loop_0

;1*************************************************************************
;*                                                                       *
;*          GET FIRST FILE NAME FROM PTQ AND SEARCH FOR IT               *
;*                                                                       *
;*************************************************************************
;note: all submissions to PTQ provide the full path name ie C:\CATBOX\PRINT\SPOOL\.
;scan from beginning each time as during timer tick, new entries may go before the current
;one being processed.
big_loop:               PUSH    DS
                        mov     ax, DS
                        mov     ES, ax
                        mov     ax, word ptr fg_sys_data_seg_number
                        mov     DS, ax
                        mov     si, OFFSET printer_task_queue
check_PTQ:              cmp     DS:byte ptr [si + PTICS_HANDSHAKE], PTICS_HANDSHAKE_REQ_MADE
                        jne     check_next_PTQ_entry
                        mov     ES:word ptr current_PTQ_entry, si
                        add     si, PTICS_FILENAME
                        mov     di, OFFSET file_name
move_file_name:         movsb
                        cmp     DS:byte ptr [si], 00h
                        jne     move_file_name
                        movsb
```

```
                        jmp     check_PTQ_entry_cont0
check_next_PTQ_entry:
                        add     si, PTQ_ENTRY_DELTA
                        cmp     si, OFFSET printer_task_queue_end
                        jne     check_PTQ
                        POP     DS
                        jmp     program_exit            ; no files to print

check_PTQ_entry_cont0:
                        POP     DS

                        mov     cx, 0
                        mov     dx, OFFSET file_name
                        mov     ah, 4eh
                        int     21h
                        jc      program_exit            ; something wrong. exit w/o looking to
                                                        ; other PTQ entries.
                        mov     bx, word ptr PSP_seg
                        mov     di, OFFSET pcl_file_to_print
                        mov     si, 009eh
                        PUSH    DS
                        mov     DS, bx
                        mov     ax, SEG data_area
                        mov     ES, ax
get_file_name:          movsb
                        cmp     DS:byte ptr [si], 00h
                        jne     get_file_name
                        mov     ES:byte ptr [di], 00h
                        POP     DS
;2*************************************************************************
;*                                                                       *
;*      OPEN FILE                                                        *
;*                                                                       *
;*************************************************************************
                        mov     dx, OFFSET file_name
                        mov     ax, 3d00h
;                       mov     ax, 3d10h                               ;deny share rd/wr
                        int     21h
                        jnc     open_file_cont
                        jmp     program_exit                            ;should not happen, exit
open_file_cont:         mov     word ptr pcl_file_handle, ax
;3*************************************************************************
;*                                                                       *
;*      READ FILE                                                        *
;*                                                                       *
;*************************************************************************
read_pcl_file:          mov     bx, word ptr pcl_file_handle
                        mov     cx, BUFFER_SIZE
                        mov     dx, OFFSET print_buffer
                        mov     ah, 3fh
                        int     21h
                        jnc     read_file_cont
                        jmp     close_and_program_exit              ; should not happen, exit
read_file_cont:         mov     word ptr actual_bytes, ax
                        cmp     ax, 0000h
                        je      issue_ff_close_and_program_exit
;4*************************************************************************
;*                                                                       *
;*      PRINT BUFFER                                                     *
;*                                                                       *
;*************************************************************************
print_from_buffer:      mov     si, OFFSET print_buffer
                        mov     ax, word ptr actual_bytes
                        mov     dx, 0
                        div     word ptr fifo_length        ;divide by 16
                        mov     cx, ax                      ;quotient  -> cx
                        mov     bx, dx                      ;remainder -> bx
;the buffer contents must be divided in two parts: an integer number of fifo fills
;and the remainder. in this section, assume we know the number of fifo fills.
;say fifo fills is in cx register.

                        mov     dx, 03bdh
print_byte_test_loop_1: in      al, dx
                        test    al, 10000000b               ;printer busy?
                        jz      print_byte_test_loop_1

                        mov     dx, 07beh
fifo_empty_loop_0:      in      al, dx
                        test    al, 00000001b               ;fifo empty?
                        jz      fifo_empty_loop_0
```

```
;uses si, dx, ds, cx
print_byte_loop:        mov     di, cx
                        mov     cx, 16
stuff_fifo:             mov     dx, 07bch
                        outsb                                   ;load fifo with Bs
                        mov     dx, 03bdh
print_byte_test_loop_n: in      al, dx
                        test    al, 10000000b                   ;printer busy?
                        jz      print_byte_test_loop_n
                        loop    stuff_fifo
                        mov     cx, di
                        mov     dx, 07beh
fifo_empty_loop_1:      in      al, dx
                        test    al, 00000001b                   ;fifo empty?
                        jz      fifo_empty_loop_1
                        loop    print_byte_loop

;now print the remainder
                        mov     cx, bx
                        mov     dx, 07bch
                        rep     outsb
                        mov     dx, 07beh
fifo_empty_loop_2:      in      al, dx
                        test    al, 00000001b                   ;fifo empty?
                        jz      fifo_empty_loop_2

                        jmp     read_pcl_file

;***********************************************
;*      issue ff_close_and_program_exit        *
;***********************************************
issue_ff_close_and_program_exit:
                        mov     dx, 03bdh
print_byte_test_loop_2: in      al, dx
                        test    al, 10000000b                   ;printer busy?
                        jz      print_byte_test_loop_2
                        mov     dx, 07bch
                        mov     al, 0ch
                        out     dx, al
                        mov     dx, 07beh
fifo_empty_loop_3:      in      al, dx
                        test    al, 00000001b                   ;fifo empty?
                        jz      fifo_empty_loop_3
;************************************************************
;this is the best exit: close file, delete it and then exit *
;************************************************************
                        mov     bx, word ptr pcl_file_handle
                        mov     ah, 3eh
                        int     21h
                        mov     dx, OFFSET file_name
                        mov     ah, 41h
                        int     21h

                        PUSH    DS
                        mov     si, current_PTQ_entry
                        mov     ax, word ptr fg_sys_data_seg_number
                        mov     DS, ax
;*********************************************************************
;begin critical section. tt can come in here. it really would be OK. *
;*********************************************************************
                        cli
                        mov     DS:byte ptr [si + PTICS_HANDSHAKE], PTICS_HANDSHAKE_NULL
                        mov     DS:byte ptr [si + PTICS_FREE_TO_USE_STATUS], PTICS_FREE_TO_USE
                        mov     DS:byte ptr [si + PTICS_STATUS], PTICS_STATUS_IDLE
;**********************
;end critical section *
;**********************
                        sti
                        POP     DS
                        jmp     big_loop
;***********************************************
;*      close_and_program_exit                 *
;***********************************************
close_and_program_exit:
                        mov     bx, word ptr pcl_file_handle
                        mov     ah, 3eh
                        int     21h

program_exit:
;***********************************************
;*      return 332 to std mode                 *
```

```
;***********************************************
                        mov     dx, 03beh               ;CTR
                        mov     al, 0ech                ;irq disable, select, no strobe
                        out     dx, al                  ;need bit_0=0 to get ECP started
                        mov     dx, 07beh               ;ECR
                        in      al, dx                  ;=55
                        mov     al, 15h                 ;000 1 0101. std mode. no irq. no dma.
                        out     dx, al                  ;now in std fifo mode.

                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        mov     al, 00h                 ;ECP bit reset
                        out     dx, al
                        out     dx, al
                        mov     dx, 0398h               ;INDEX
                        mov     al, 04h                 ;->PCR
                        out     dx, al
                        mov     dx, 0399h               ;DATA
                        in      al, dx                  ;is ECP bit reset?
pcr_value_in_2:         mov     byte ptr pcr_value, al
;***********************************************
;       DIAGNOSTIC                              *
;***********************************************
                mov     dx, 02efh               ;COM4 scratch register
                mov     al, 0ceh
                out     dx, al
;***********************************************
;       program_exit                            *
;***********************************************
.EXIT


.FARDATA
ORG     0000H
ALIGN   10H
;*****************************************************************
;*                                                               *
;*      DATA AREA                                                *
;*                                                               *
;*****************************************************************
data_area                   dw      ?
PSP_seg                     dw      ?
fg_sys_data_seg_number      dw      ?
current_PTQ_entry           dw      ?
pcl_file_size               dd      ?
pcl_file_handle             dw      ?
actual_bytes                dw      ?
file_name                   db      "C:\CATBOX\PRINT\SPOOL\"
pcl_file_to_print           db      "*.*",00H
                            db      60 dup("f")
pcr_value                   db      ?
ecr_value                   db      ?
print_buffer                db      BUFFER_SIZE dup ("b")
print_buffer_end            dw      0000h
fifo_length                 dw      16

END start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;hostsfx0.asm. 10/12/95. written by Haluk Aytac
;program steps
;   1. GET PSP AND ALSO GET MDS_SEG_NUMBER
;           mds_seg_number will have two functions:
;               A. return code for sp
;           XXX B. number of outgoing faxes. we just do one fax.
;   2. GET THE FIRST (LAST) EVENT IN TASK QUEUE. IF NO EVENT EXIT WITH RETURN CODE = 0(?)
;   3. CONVERT THE PATH REFERENCES TO C:\ IN THE .TCF FILE. EXIT WITH RET = 1.

;here is the problem I am grappling with
; problem solved. see 16.txt
;   suppose the user submitted a fax to send. this caused a write'to super.que and we
;   captured it. at maestro, this will cause an activation of TTQ entry for this ribbon.
;   a free TMO will start this ribbon. this will cause the fixing of the .tcf and the
;   switch to fax so CASMODEM can do its job.
;   how long will all this take? 50ms to first maestro if not busy with DOS.
;   so there is a chance that before the first request is handled a second one might come.
;   I THINK EACH TIME WE SEE A WRITE TO SUPER.QUE, WE SHOULD INCREMENT A COUNTER AT
;   MAESTRO LEVEL. AND EACH TIME MAESTRO ACTIVATES THE TTQ FOR THE RIBBON, IT SHOULD
;   DECREMENT THIS COUNTER. YOU SEE, IT COULD BE THAT THE TTQ ENTRY IS BUSY THAT IS
;   IT IS RUNNING, THEN INCREMENT THE COUNTER.
;       So MAESTRO code goes like this:
;           (cvboot resets this counter: host_initiated_send_fax_count)
;           I.  upon seeing another write to super.que:
;               inc count
;               if TTQ entry for this ribbon is not busy, activate it and
;                                                               dec count
;               if TTQ entry for this ribbon is busy exit
;       TTISR code looks like this:
;               check the count if >0 and TTQ entry for this ribbon is not busy,
;               activate the TTQ entry and decrement the count. if TTQ entry is busy
;               let it be. (this is similar to what was done for printing).
;       SO PERHAPS, WE NEED NOT ACTIVATE TTQ WITH MAESTRO BUT WITH TTISR. MAESTRO JUST
;       INCREMENTS ANY TIME IT SEES A WRITE TO SUPER.QUE.
;       THIS SIMPLIFIES THE RIBBON TOO. THE RIBBON NOW HAS TO HANDLE ONE OUTGOING FAX
;       AND NOT MORE. AS WE RETURN FROM +FKS, THERE WILL NOT BE ANOTHER FAX SEND. UNLESS
;       CASMODEM GETS IN THE ACT VERY QUICKLY.
;
;*****************************************************************************
;*      SEND A FAX FROM HOST                                                 *
;**********************004F***************************************************
;fix_host_fax_tcf           dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_004f_parameters            ;offset to parameters
;step_004f_next_step        dw  0034h                           ;go to "switch to fax" if all went well
;                           dw  0000h                           ;to tmo if no inc fax found
;step_004f_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_0         ;C:\CATBOX\PROGRAMS\HOSTSFX.EXE
;                           dw  0000H                           ;argument_1. not used
;                           dw  0000H
;                           dw  0000h
;                           dw  step_table_seg_number           ;DS: for In_IRQ
;                                                               ;GS: to register return code
;                           dw  WAIT_TO_COMPLETE                ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message


INCLUDE ..\catvocl\catequ0E.inc
.MODEL  SMALL
.386P
.STACK
.CODE
                extrn   In_IRQ:far
;NOTE: COMPILE THIS WITH SYSDATA*.ASM BECAUSE WE CHECK IN_IRQ FLAG VALUE IN INT 21H HOOK.
ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 4FH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 4fh
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
                mov     ax, SEG data_area
```

```
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET SEG(FS:): FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     ax, DS:word ptr [si]
                mov     FS, ax
                mov     si, 0
                mov     ax, FS:word ptr [si + 4]
                mov     GS, ax
                mov     ax, FS:word ptr [si + 6]
                POP     DS
                mov     word ptr fg_sys_data_seg_number, ax
                mov     cs:word ptr fg_sys_data_seg_number_cs, ax

; 2. GET LATEST TASK QUEUE ENTRY AND RECORD ITS EVENT HANDLE
                mov     ax, 0cb05h
                mov     cx, 0001h       ;waiting to be processed
                mov     dx, 0100h       ;latest in task queue
                int     2fh
                cmp     ax, 0
                je      fg_found_event
                mov     GS:word ptr [SP_RETURN_FLAGS], 0    ; F=0 ie second entry in step table
                jmp     pgm_exit
fg_found_event: mov     word ptr fg_event_handle, bx
                mov     GS:word ptr [SP_RETURN_FLAGS], 1    ; F=1 ie first entry in script table


; 3. OPEN TASK CONTROL FILE AND GET ITS DOS HANDLE
;this is complicated because, normally, this function opens in read only mode. we must
;hook int 21
                mov     al, 21h
                mov     ah, 35h
                int     21h
                mov     cs:word ptr fg_dos_int21_off_cs, bx
                mov     cs:word ptr fg_dos_int21_seg_cs, es
                push    DS
                mov     ax, CS
                mov     cx, ax
                mov     ax, 0000h
                mov     DS, ax
                mov     bx, 0084h
                lea     ax, word ptr fg_int_213d_hook
                PUSHF
                CLI
                mov     word ptr [bx], ax               ;set new vector
                mov     word ptr [bx+2], cx
                POPF
                pop     DS
;end hooking int 21/3d
                mov     ax, 0cb07h
                mov     bx, word ptr fg_event_handle
                mov     cx, 0                           ;redundant
                mov     dl, 0                           ;task queue
                int     2fh
                mov     word ptr tcf_file_handle, bx
;the file was opened read only. close it.
                mov     ah, 3eh                         ;bx=handle
                int     21h
                PUSH    DS
                mov     ax, CS
                mov     DS, ax
                lea     dx, cs:fg_tcf_filename_cs       ;file name is here
                mov     ax, 3d02h                       ;read/write
                int     21h
                POP     DS
                mov     bx, ax                          ;handle for read/write but same file
                mov     word ptr tcf_file_handle, bx
                mov     al, 00h                         ;go to C:\ in this case
                call    fix_task_control_file           ;bx=handle already.
;now close the file. the handle is in bx and this is where int 21 3e wants it.
                mov     ah, 3eh
                int     21h
;unhook int 21
                PUSH    DS
                mov     ax, 0000h
                mov     DS, ax
                mov     bx, 0084h
```

```
                mov     ax, cs:word ptr fg_dos_int21_off_cs
                mov     cx, cs:word ptr fg_dos_int21_seg_cs
                PUSHF
                cli
                mov     word ptr [bx], ax              ;set old vector
                mov     word ptr [bx+2], cx
                POPF
                POP     DS

; 3 EXIT PROGRAM
pgm_exit:
;=========================================================
;*  DIAGNOSTIC:                                          *
;*  WRITE TO 3FF = CFH IE STEP NUMBER CALLING THIS PROGRAM  *
;=========================================================
                mov     dx, 02efh
                mov     al, 0cfh
                out     dx, al
;=========================================================
.EXIT

;========================================================+
;                                                        |
;           INT 21 3D HOOK                               |
;                                                        |
;========================================================+
;the following is the int 21 hook
fg_int_213d_hook:
                PUSHF
                cmp     ah, 3dh                         ;is it open file?
                jnz     pass_to_previous_21_handler     ;if not let go
;the following could happen:
;   while I am in INT 2F but not in InDOS, t2 might come and CAS in there might make
;   an INT 2F call. Or at least it might make an INT 21 call. This could be a file
;   open too. The way to eliminate getting this result is by requiring that In_IRQ=0
                PUSH    DS
                push    ax
                mov     ax, cs:word ptr fg_sys_data_seg_number
                mov     DS, ax
                cmp     byte ptr In_IRQ, 0
                pop     ax
                POP     DS
                jne     pass_to_previous_21_handler
;if there is any other int 21/3d before this one we will know about it as
                push    di
                push    si
                push    ax
                push    ES
                lea     di, cs:word ptr fg_tcf_filename_cs
                mov     ax, CS
                mov     ES, ax
                mov     si, dx                  ;DS:dx -> filename ASCIIZ
fg_move_filename:
                movsb
                cmp     byte ptr [si], 00h
                jnz     fg_move_filename
                movsb                           ;move Z of ASCIIZ also.
                pop     ES
                pop     ax
                pop     si
                pop     di
pass_to_previous_21_handler:
                POPF
                jmp     cs:dword ptr fg_dos_int21_off_cs

fg_sys_data_seg_number_cs    dw      ?
fg_dos_int21_off_cs          dw      ?
fg_dos_int21_seg_cs          dw      ?
fg_tcf_filename_cs           db      64 dup("f")

;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;  this version somewhat different than one in scsiissi                                 ;
;       PROCEDURE FIX_TASK_CONTROL_FILE                                                 ;
;                                                                                       ;
;THIS PROCEDURE FIXES THE PATHNAME FOR TASK CONTROL FILES                               ;
;       INPUTS  BX = FILE HANDLE                                                        ;
;               AL = 00 IF TO C:, 01 IF TO CAT_DISK_LETTER:                             ;
;               CAT_DISK_LETTER (byte in maspi)                                         ;
;AT START, THE FILE IS OPEN. AT END, THE FILE IS STILL OPEN AND POINTER AT BEGINNING    ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&;
```

```
fix_task_control_file   proc    far
                push    ax
                push    bx
                push    cx
                push    dx
                PUSH    DS
                cmp     al, 00h
                jnz     direction_cat_disk_letter
                mov     ah, "C"
                mov     byte ptr tcf_path_drv, ah
                jmp     fix_tcf_cont0
direction_cat_disk_letter:
;we remove this option as it entails checking a var in scsi isr space
;               mov     ah, byte ptr cat_disk_letter
;               mov     byte ptr tcf_path_drv, ah
                jmp     fix_tcf_cont0
fix_tcf_cont0:  mov     cx, 0000h
                mov     dx, 012fh               ;offset of PCX file directory from file start
                mov     al, 00h                 ;start at begin of file
                mov     ah, 42h                 ;move file pointer
                int     21h                     ;now pointer is at offset 010fh
                mov     cx, 0001h               ;one byte to write
                mov     dx, OFFSET tcf_path_drv
                mov     ah, 40h                 ;write file or device
                int     21h                     ;now drive letter fixed for .PCX file
                mov     cx, 0000h
                mov     dx, 0008h               ;offset of number of FTR's from file start
                mov     al, 00h                 ;start at begin of file
                mov     ah, 42h                 ;move file pointer
                int     21h                     ;now pointer is at offset 0008h
                mov     cx, 0002h               ;two bytes to read
                mov     dx, OFFSET tcf_number_of_FTR
                mov     ah, 3fh                 ;read file or device
                int     21h                     ;number of FTR's is at tcf_number_of_FTR
                mov     ax, word ptr tcf_number_of_FTR
                cmp     ax, 0000h               ;no FTR's? ie just a cover sheet
                jz      fix_tcf_cont1           ;if none then we are done
                mov     cx, 0002h               ;pointer already at offset of first ftr
                mov     dx, OFFSET tcf_offset_of_first_FTR
                mov     ah, 3fh                 ;read the offset
                int     21h                     ;offset of first FTR at tcf_offset_of_first_FTR
;now move file pointer to first FTR filename location. increment by 80h (128decimal)
                mov     dx, word ptr tcf_offset_of_first_FTR
                add     dx, 000fh               ;dx = offset of first file to send
                mov     word ptr tcf_offset_FTR_filename, dx
fix_tcf_loop0:
;in this loop, move file pointer to tcf_offset_FTR_filename. change the byte and loop until #=0
                mov     cx, 0000h
                mov     dx, word ptr tcf_offset_FTR_filename
                mov     al, 00h                 ;start at begin of file
                mov     ah, 42h
                int     21h                     ;file pointer at drive letter
                mov     cx, 0001h               ;one byte to write
                mov     dx, OFFSET tcf_path_drv
                mov     ah, 40h                 ;write file or device
                int     21h                     ;now drive letter fixed for .PCX file
                mov     dx, word ptr tcf_offset_FTR_filename
                add     dx, 0080h               ;length of one FTR
                mov     word ptr tcf_offset_FTR_filename, dx
                mov     cx, word ptr tcf_number_of_FTR
                dec     cx
                mov     word ptr tcf_number_of_FTR, cx
                cmp     cx, 0000h
                jnz     fix_tcf_loop0
fix_tcf_cont1:
                pop     ds
                pop     dx
                pop     cx
                pop     bx
                pop     ax
                retf
fix_task_control_file   endp
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
;                                                                                      ;
;       END PROCEDURE FIX_TASK_CONTROL_FILE                                            ;
;                                                                                      ;
;&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&;

;=========================================================
;*                  DATA    AREA                        *
;=========================================================
```

```
.FARDATA
ORG         0000H
ALIGN       10H

data_area                   dw      ?

current_PSP                 dw      ?
fg_sys_data_seg_number      dw      ?
fg_event_handle             dw      ?
tcf_file_handle             dw      ?
tcf_file_actual_bytes       dw      ?
tcf_path_drv                db      ?
                            db      ?
tcf_number_of_FTR           dw      ?
tcf_offset_of_first_FTR     dw      ?
tcf_offset_FTR_filename     dw      ?

data_area_end               dw      0000H               ;place holder

END                         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;infaxid0.asm. 10/14/95. written by Haluk Aytac
;flow of work. at this point we know that a fax has arrived. it might not have been
;successful. anyway, we need to identify this fax, break it into .pcx files and then
;convert each to a .pcl file and print it.
;   50. identify the fax (int 2f/cb05 latest received)
;       open the received data files (int 2f/cb07 cx=1..N)
;       now we have one or more .dcx files (assume there is one now. perhaps after a
;       certain number of pages it divides them into multiple .dcx files)
;       store the name of this file in modem_data_structure (from hooking int 21)
;   51. brkupdcx (write our own version)
;   52. pcx2pcl on all .pcx files and submit them to PTQ.

;*****************************************************************************
;*      PRINT INCOMING FAXES                                                 *
;**********************0050*****************************************************
;check_for_inc_faxes        dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_0050_parameters            ;offset to parameters
;step_0050_next_step        dw  0052h                           ;switch to fax if all went well
;                           dw  0000h                           ;to tmo if no inc fax found
;step_0050_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_P         ;C:\CATBOX\PROGRAMS\INFAXID.EXE
;                           dw  0000H                           ;argument_1. not used
;                           dw  0000H
;                           dw  0000H                           ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number           ;to register return code
;                           dw  WAIT_TO_COMPLETE                ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message

;**********************0052*****************************************************
;brkup_dcx_inc_fax          dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_0052_parameters            ;offset to parameters
;step_0052_next_step        dw  0051h                           ;back to tmo in all cases.
;step_0052_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_Q         ;C:\CATBOX\PROGRAMS\BRKUPDCX.EXE
;                           dw  0000H                           ;argument_1. not used
;                           dw  0000H
;                           dw  0000h                           ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number           ;to register return code
;                           dw  WAIT_TO_COMPLETE                ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message

;**********************0051*****************************************************
;inc_fax_pcx_pcl            dw  ST_START_PROGRAM                ;action start_program=0007h
;                           dw  JUMP_UNCOND                     ;flags register for this step
;                           dw  step_0051_parameters            ;offset to parameters
;step_0051_next_step        dw  0000h                           ;back to tmo in all cases.
;step_0051_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_Q         ;C:\CATBOX\PROGRAMS\PCX2PCL.EXE
;                           dw  0000H                           ;argument_1. not used
;                           dw  0000H
;                           dw  0000h                           ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number           ;to register return code
;                           dw  WAIT_TO_COMPLETE                ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                  ;no LCD message


INCLUDE ..\catvocl\catequ0e.inc
.MODEL  SMALL
.386P
.STACK
.CODE
                extrn   In_IRQ:far
;NOTE: COMPILE THIS WITH SYSDATA*.ASM BECAUSE WE CHECK IN_IRQ FLAG VALUE IN INT 21H HOOK.
ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 4FH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 4fh
                out     dx, al
;=============================================================

; 0 GET PSP
                mov     bx, DS                      ;PSP
```

```
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET SEG(FS:): FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     ax, DS:word ptr [si]
                mov     FS, ax
                mov     si, 0
                mov     ax, FS:word ptr [si + 4]
                mov     GS, ax
                mov     ax, FS:word ptr [si + 6]
                POP     DS
                mov     word ptr fg_sys_data_seg_number, ax
                mov     cs:word ptr fg_sys_data_seg_number_cs, ax

; 2. GET LATEST RECEIVE QUEUE ENTRY AND RECORD ITS EVENT HANDLE
                mov     ax, 0cb05h
                mov     cx, 0000h       ;received successfully
                mov     dx, 0101h       ;latest in receive queue
                int     2fh
                cmp     ax, 0
                je      fg_found_event
                mov     GS:word ptr [SP_RETURN_FLAGS], 0    ; F=0 ie second entry in step table
                jmp     pgm_exit
fg_found_event: mov     word ptr fg_event_handle, bx
                mov     GS:word ptr [SP_RETURN_FLAGS], 1    ; F=1 ie first entry in script table


; 3. OPEN RECEIVE FILE SO IT TURNS INTO .PCX FILE
;this is complicated because, normally, this function opens in read only mode. we must
;hook int 21
                mov     al, 21h
                mov     ah, 35h
                int     21h
                mov     cs:word ptr fg_dos_int21_off_cs, bx
                mov     cs:word ptr fg_dos_int21_seg_cs, es
                push    DS
                mov     ax, CS
                mov     cx, ax
                mov     ax, 0000h
                mov     DS, ax
                mov     bx, 0084h
                lea     ax, word ptr fg_int_213d_hook
                PUSHF
                CLI
                mov     word ptr [bx], ax               ;set new vector
                mov     word ptr [bx+2], cx
                POPF
                pop     DS
;end hooking int 21/3d
                mov     ax, 0cb07h
                mov     bx, word ptr fg_event_handle
                mov     cx, 1                           ;first received file
                mov     dl, 1                           ;task queue
                int     2fh
                mov     word ptr fax_file_handle, bx
;we have file name now. move to modem_data_structure. also close the file.
                mov     ah, 3eh                         ;bx=handle
                int     21h
                lea     si, cs:fg_tcf_filename_cs       ;file name is here
                mov     di, INCOMING_FAX_FILE_NAME
                PUSH    DS
                mov     ax, CS
                mov     DS, ax
                mov     ax, GS
                mov     ES, ax
move_filename:  movsb
                cmp     DS:byte ptr [si], 00h
                jne     move_filename
                movsb
                POP     DS

;unhook int 21
                PUSH    DS
                mov     ax, 0000h
                mov     DS, ax
                mov     bx, 0084h
```

```
                mov     ax, cs:word ptr fg_dos_int21_off_cs
                mov     cx, cs:word ptr fg_dos_int21_seg_cs
                PUSHF
                cli
                mov     word ptr [bx], ax               ;set old vector
                mov     word ptr [bx+2], cx
                POPF
                POP     DS


; 3 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = CFH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0cfh
                out     dx, al
;=============================================================
.EXIT

;=============================================================+
;                                                            |
;           INT 21 3D HOOK                                   |
;                                                            |
;=============================================================+
;the following is the int 21 hook
fg_int_213d_hook:
                PUSHF
                cmp     ah, 3dh                         ;is it open file?
                jnz     pass_to_previous_21_handler     ;if not let go
;the following could happen:
;   while I am in INT 2F but not in InDOS, t2 might come and CAS in there might make
;   an INT 2F call. Or at least it might make an INT 21 call. This could be a file
;   open too. The way to eliminate getting this result is by requiring that In_IRQ=0
                PUSH    DS
                push    ax
                mov     ax, cs:word ptr fg_sys_data_seg_number
                mov     DS, ax
                cmp     byte ptr In_IRQ, 0
                pop     ax
                POP     DS
                jne     pass_to_previous_21_handler
;if there is any other int 21/3d before this one we will know about it as
                push    di
                push    si
                push    ax
                push    ES
                lea     di, cs:word ptr fg_tcf_filename_cs
                mov     ax, CS
                mov     ES, ax
                mov     si, dx                  ;DS:dx -> filename ASCIIZ
fg_move_filename:
                movsb
                cmp     byte ptr [si], 00h
                jnz     fg_move_filename
                movsb                           ;move Z of ASCIIZ also.
                pop     ES
                pop     ax
                pop     si
                pop     di
pass_to_previous_21_handler:
                POPF
                jmp     cs:dword ptr fg_dos_int21_off_cs

fg_sys_data_seg_number_cs   dw      ?
fg_dos_int21_off_cs         dw      ?
fg_dos_int21_seg_cs         dw      ?
fg_tcf_filename_cs          db      64 dup("f")


;=============================================================
;*                  DATA    AREA                            *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

data_area                   dw      ?
```

```
current_PSP                 dw      ?
fg_sys_data_seg_number      dw      ?
fg_event_handle             dw      ?
fax_file_handle             dw      ?

data_area_end               dw      0000H                   ;place holder

END                         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;************************************************
;*                                              *
;*                                              *
;*          PCX2PCL.EXE                         *
;*          written by Haluk Aytac              *
;*          started June 16, 1995               *
;*                                              *
;*          assume 200x200                      *
;*                                              *
;************************************************
;pcx2pcl6.asm <- pcx2pcl5.asm. 10/15/95.
;*****************************************************************************
;*      PRINT INCOMING FAXES                                                 *
;**********************0050*************************************************
;check_for_inc_faxes        dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0050_parameters          ;offset to parameters
;step_0050_next_step        dw  0052h                         ;switch to fax if all went well
;                           dw  0000h                         ;to tmo if no inc fax found
;step_0050_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_P       ;C:\CATBOX\PROGRAMS\INFAXID.EXE
;                           dw  0000H                         ;argument_1. not used
;                           dw  0000H
;                           dw  0000H                         ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number         ;to register return code
;                           dw  WAIT_TO_COMPLETE              ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message

;**********************0052*************************************************
;brkup_dcx_inc_fax          dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0052_parameters          ;offset to parameters
;step_0052_next_step        dw  0051h                         ;back to tmo in all cases.
;step_0052_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_R       ;C:\CATBOX\PROGRAMS\BRKUPDCX.EXE
;                           dw  0000H                         ;argument_1. not used
;                           dw  0000H
;                           dw  0000h                         ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number         ;to register return code
;                           dw  WAIT_TO_COMPLETE              ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message

;**********************0051*************************************************
;inc_fax_pcx_pcl            dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0051_parameters          ;offset to parameters
;step_0051_next_step        dw  0000h                         ;back to tmo in all cases.
;step_0051_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_Q       ;C:\CATBOX\PROGRAMS\PCX2PCL.EXE
;                           dw  0000H                         ;argument_1. not used
;                           dw  0000H
;                           dw  0000h                         ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number         ;to register return code
;                           dw  WAIT_TO_COMPLETE              ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message

;pcx2pcl5.asm <- pcx2pcl4.asm. 6/17/95. exactly the same except that
;version 4 just did not compile.
;pcx2pcl4.asm <- pcx2pcl3.asm. 6/17/95. pcx2pcl3.asm works well.
;out of a 120kB .pcx it creates a 470kB .pcl file.
;with this version, I attempt to reduce .pcl file size by
;checking for clear_line at the beginning of a line.
;also it prints reverse video right now. so introduce xor ff.
;also output buffer full checking was not being done at
;begin raster line command.
;CAN I GO FASTER THAN THE PROGRAM I HAVE?
;read byte. if starts with 11.. .... then it must be a count.
;write that many to output buffer.
;once I have a line, I must dress it up with pcl commands.
;1728 pixels
;1728 / 8 = 216 bytes. 8.5 x 200 = 1700. this is a bit larger
;2200 rows.
;skip the PCX header (128 bytes)
;first argument is input filename. second argument is not needed.
;=============================================================================+
;                                                                             |
;                           CHANGES IN REV .6                                 |
;                                                                             |
;=============================================================================+
```

```
;in the current implementation this program takes a file name as input. it converts this
;file and writes a spool .pcl file as output.
;in this version, we get a filename from modem data structure. this is truly the name of the
;fax file. the brkup program, however, separated this into a bunch of .PCX files and wrote
;them into files in the same directory (C:\CATBOX\FAXBACK\QUEUE\).
;we thus search files like 000B0000.000, 001, 002, 003 etc. we need to turn them into .PCL
;files to be printed. I should keep the name but move it into the spool directory.
;finally, after the conversion, each file name should go into the PTQ.
;=============================================================================================+
;                                                                                             |
;=============================================================================================+
INCLUDE ..\CATVOCL\CATEQU0E.INC
.MODEL  SMALL
.386P
.STACK
.CODE


ASSUME DS:SEG data_area
start:

; 0 get PSP
                mov     bx, DS                          ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET SEG(FS:): FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     ax, DS:word ptr [si]
                mov     FS, ax
                mov     si, 0
                mov     ax, FS:word ptr [si + 4]
                mov     GS, ax
                POP     DS

; 2 MOVE INPUT FILENAME FROM GS: TO LOCAL DS:
                PUSH    DS
                mov     ax, GS
                mov     DS, ax
                mov     si, INCOMING_FAX_FILE_NAME
                mov     di, OFFSET input_filename
                mov     ax, SEG data_area
                mov     ES, ax
move_input_filename:
                movsb
                cmp     DS:byte ptr [si], "."
                jne     move_input_filename
                mov     word ptr input_file_suffix_ptr, di  ; -> .
                inc     word ptr input_file_suffix_ptr      ; ->  0
                movsb
                mov     ES:byte ptr [di + 0], "0"
                mov     ES:byte ptr [di + 1], "0"
                mov     ES:byte ptr [di + 2], "0"
                POP     DS
;now, move the filename (8 chars) to output file name
                sub     di, 9
                mov     si, di
                mov     di, OFFSET output_filename
                mov     cx, 8
                rep     movsb

; 3 open input file
big_loop:       mov     dx, OFFSET input_filename
                mov     ax, 3d00h
                int     21h
                jc      pgm_exit                        ; file.00N does not exist.
                mov     word ptr input_file_handle, ax
;   set pointer to after PCX file header
                mov     bx, word ptr input_file_handle
                mov     cx, 0
                mov     dx, 128
                mov     ax, 4200h
                int     21h
                jc      pgm_exit

; 5. create output file.
                mov     dx, OFFSET output_filename_path
```

```
                mov     cx, 0
                mov     ah, 3ch
                int     21h
                jc      pgm_exit
                mov     output_file_handle, ax
;   write init string to output file
                mov     bx, word ptr output_file_handle
                mov     cx, 12
                mov     dx, OFFSET init_string
                mov     ah, 40h
                int     21h
                jc      pgm_exit
                mov     word ptr output_actual_bytes, ax

; 6 read input file to buffer.
                mov     bx, 0
                mov     dx, 1

                mov     di, OFFSET output_buffer


                call    read_some_more
                je      end_of_game

one_line_done:  mov     bp, 0
;pcx2pcl4.asm change
                cmp     dword ptr [bx], 0ffffffffh
                jne     conta
                cmp     dword ptr [bx + 4], 0ffdbffffh
                jne     conta

                push    di
                add     di, 8
                cmp     di, OFFSET output_buffer_end
                pop     di
                jbe     contb
                call    obuf_to_file
                jmp     one_line_done

contb:          mov     si, OFFSET clear_line_command
                mov     eax, dword ptr [si]
                stosd
                add     si, 4
                mov     eax, dword ptr [si]
                stosd

                add     bx, 8
                cmp     bx, dx
                jb      one_line_done
                call    read_some_more
                je      end_of_game
                jmp     one_line_done

conta:          push    di
                add     di, 8
                cmp     di, OFFSET output_buffer_end
                pop     di
                jbe     cont9
                call    obuf_to_file
                jmp     conta
;end pcx2pcl4.asm change
cont9:          mov     si, OFFSET raster_command
                mov     eax, dword ptr [si]
                stosd
                add     si, 4
                mov     eax, dword ptr [si]
                stosd

process_byte_pair:
                mov     al, byte ptr [bx]
                mov     ah, byte ptr [bx + 1]
                mov     c1, al
                and     c1, 0c0h
                cmp     cl, 0c0h
                je      compressed_data

non_compressed_data:
                push    di
                add     di, 1
                cmp     di, OFFSET output_buffer_end
                pop     di
```

```
                jbe     cont3
                call    obuf_to_file
                jmp     process_byte_pair
cont3:          add     bx, 1
                add     bp, 1
;pcx2pcl4.asm change
                xor     al, 0ffh
                stosb
                cmp     bx, dx
                jb      cont5
                call    read_some_more
                je      end_of_game
cont5:          cmp     bp, 216
                je      one_line_done
                jmp     process_byte_pair

compressed_data:mov     ch, 0
                mov     cl, al
                and     cl, 3fh
                mov     al, ah
;pcx2pcl4.asm change
                xor     ax, 0ffffh
                push    di
                add     di, cx
                cmp     di, OFFSET output_buffer_end
                pop     di
                jbe     cont4
                call    obuf_to_file
                jmp     process_byte_pair
cont4:          add     bx, 2
                add     bp, cx
;pcx2pcl3.asm change
                cmp     cx, 1
                je      just_one
                test    cx, 0001h
                jz      even_count
odd_count:      shr     cx, 1
                rep     stosw
just_one:       stosb
                jmp     cont7
even_count:     shr     cx, 1
                rep     stosw
;               rep     stosb
;end pcx2pcl3.asm change
cont7:          cmp     bx, dx
                jb      cont6
                call    read_some_more
                je      end_of_game
cont6:          cmp     bp, 216
                je      one_line_done
                jmp     process_byte_pair


; 9 write tail end string
end_of_game:    call    obuf_to_file
                mov     bx, word ptr output_file_handle
                mov     cx, 4
                mov     dx, OFFSET term_string
                mov     ah, 40h
                int     21h
                jc      pgm_exit
                mov     word ptr output_actual_bytes, ax

;10 close both files
                mov     bx, word ptr input_file_handle
                mov     ah, 3eh
                int     21h
                jc      pgm_exit
                mov     bx, output_file_handle
                mov     ah, 3eh
                int     21h
                jc      pgm_exit

;11 here increment input/output suffixes. and return to big_loop
                mov     di, 2
small_loop:     mov     bx, word ptr input_file_suffix_ptr
                cmp     byte ptr [bx + di], 39h
                jae     trouble_case
                inc     byte ptr [bx + di]
                mov     al, byte ptr [bx + di]
                mov     bx, OFFSET output_filename_suffix
```

```
                mov     byte ptr [bx + di], a1
                jmp     big_loop
trouble_case:
                cmp     byte ptr [bx + di], 39h
                jne     another_trouble_case
                mov     byte ptr [bx + di], 41h
                mov     bx, OFFSET output_filename_suffix
                mov     byte ptr [bx + di], 41h
                jmp     big_loop
another_trouble_case:
                cmp     byte ptr [bx + di], 46h
                jne     further_trouble_case
                mov     byte ptr [bx + di], 30h
                mov     bx, OFFSET output_filename_suffix
                mov     byte ptr [bx + di], 30h
                dec     di
                cmp     di, -1
                je      pgm_exit
                jmp     small_loop
further_trouble_case:
                inc     byte ptr [bx + di]
                mov     bx, OFFSET output_filename_suffix
                inc     byte ptr [bx + di]
                jmp     big_loop


;12 exit program
pgm_exit:
.EXIT


read_some_more  proc
                push    ax
                push    cx
                cmp     bx, dx
                jne     cont1
                mov     bx, word ptr input_file_handle
                mov     cx, 0ffffh
                mov     dx, 0ffffh
                mov     ax, 4201h
                int     21h
                jc      pgm_exit
cont1:          mov     bx, word ptr input_file_handle
                mov     cx, word ptr input_buffer_size
                mov     dx, OFFSET input_buffer
                mov     ah, 3fh
                int     21h
                jc      pgm_exit
                mov     word ptr input_actual_bytes, ax

                mov     bx, OFFSET input_buffer
                mov     dx, bx
                add     dx, ax          ;if ax=buffer_size, then dx=buffer_end
                dec     dx
                cmp     ax, 0000h
                pop     cx
                pop     ax
                ret
read_some_more  endp


;this procedure writes output_buffer to file and resets the di ptr to begin of buffer.
obuf_to_file    proc
                PUSHF
                push    ax
                push    bx
                push    cx
                push    dx
                mov     ax, OFFSET output_buffer
                sub     di, ax
                mov     cx, di
                mov     bx, word ptr output_file_handle
                mov     dx, OFFSET output_buffer
                mov     ah, 40h
                int     21h
                jc      pgm_exit
                mov     word ptr output_actual_bytes, ax
                mov     di, OFFSET output_buffer
                pop     dx
                pop     cx
                pop     bx
```

```
                pop     ax
                POPF
                ret
obuf_to_file    endp


.FARDATA
ORG         0000H
ALIGN       10H
data_area                   dw      ?
current_PSP                 dw      ?
init_string                 db      1bh, "*t200R"   ;total of 12 bytes (0ch)
                            db      1bh, "*r1A"     ;start raster graphics.
input_file_handle           dw      ?
input_actual_bytes          dw      ?
input_filename              db      64 dup("i")     ;C:\CATBOX\FAXBACK\QUEUE\000B0000.000
input_file_suffix_ptr       dw      ?
output_file_handle          dw      ?
output_actual_bytes         dw      ?
output_filename_path        db      "C:\CATBOX\PRINT\SPOOL\"
output_filename             db      8 dup("o")
output_filename_suffix      db      ".000", 00h     ;in memory: LCP.SSMMHH
input_buffer_size           dw      2000h
clear_line_command          db      1bh, "*b", "0000", "W"
raster_command              db      1bh, "*b", "0216", "W"
input_buffer                db      8192 dup ("b")
input_buffer_end            dw      0000h
term_string                 db      1bh, "*rB"
output_buffer               db      32768 dup ("o")
output_buffer_end           dw      0000h

END         start
```

```
;COPYRIGHT 1995. HALUK AYTAC, 3TAU.
;BRKUPDC0.ASM. 10/14/95. written by Haluk Aytac. GS:INCOMING_FAX_FILE_NAME has file name
;of latest incoming fax. we now need to break it up into .PCX files. I think the file
;name will have .QUE suffix. I could just do .000, .001, .002 etc added to the filename.
;this way, the next step knows what to do.
;infaxid0.asm. 10/14/95. written by Haluk Aytac
;flow of work. at this point we know that a fax has arrived. it might not have been
;successful. anyway, we need to identify this fax, break it into .pcx files and then
;convert each to a .pcl file and print it.
;   50. identify the fax (int 2f/cb05 latest received)
;       open the received data files (int 2f/cb07 cx=1..N)
;       now we have one or more .dcx files (assume there is one now. perhaps after a
;       certain number of pages it divides them into multiple .dcx files)
;       store the name of this file in modem_data_structure (from hooking int 21)
;   51. brkupdcx (write our own version)
;   52. pcx2pcl on all .pcx files and submit them to PTQ.

;*****************************************************************************
;*      PRINT INCOMING FAXES                                                 *
;**********************0050***************************************************
;check_for_inc_faxes        dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0050_parameters          ;offset to parameters
;step_0050_next_step        dw  0052h                         ;switch to fax if all went well
;                           dw  0000h                         ;to tmo if no inc fax found
;step_0050_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_P       ;C:\CATBOX\PROGRAMS\INFAXID.EXE
;                           dw  0000H                         ;argument_1. not used
;                           dw  0000H
;                           dw  0000H                         ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number         ;to register return code
;                           dw  WAIT_TO_COMPLETE              ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message

;**********************0052***************************************************
;brkup_dcx_inc_fax          dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0052_parameters          ;offset to parameters
;step_0052_next_step        dw  0051h                         ;back to tmo in all cases.
;step_0052_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_R       ;C:\CATBOX\PROGRAMS\BRKUPDCX.EXE
;                           dw  0000H                         ;argument_1. not used
;                           dw  0000H
;                           dw  0000h                         ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number         ;to register return code
;                           dw  WAIT_TO_COMPLETE              ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message

;**********************0051***************************************************
;inc_fax_pcx_pcl            dw  ST_START_PROGRAM              ;action start_program=0007h
;                           dw  JUMP_UNCOND                   ;flags register for this step
;                           dw  step_0051_parameters          ;offset to parameters
;step_0051_next_step        dw  0000h                         ;back to tmo in all cases.
;step_0051_parameters       dw  DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
;                           dw  vcon_session_constant_Q       ;C:\CATBOX\PROGRAMS\PCX2PCL.EXE
;                           dw  0000H                         ;argument_1. not used
;                           dw  0000H
;                           dw  0000h                         ;INCOMING_FAX_FILE_NAME
;                           dw  step_table_seg_number         ;to register return code
;                           dw  WAIT_TO_COMPLETE              ;do not hold up the step table
;                           dw  LCD_MESSAGE_NO                ;no LCD message


INCLUDE ..\catvocl\catequ0e.inc
.MODEL  SMALL
.386P
.STACK
.CODE
;NOTE: COMPILE THIS WITH SYSDATA*.ASM BECAUSE WE CHECK IN_IRQ FLAG VALUE IN INT 21H HOOK.
ASSUME DS:SEG data_area

start:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = 4FH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 4fh
                out     dx, al
;=============================================================
```

```
; 0 GET PSP
                mov     bx, DS                          ;PSP
                mov     ax, SEG data_area
                mov     DS, ax
                mov     word ptr current_PSP, bx

; 1. GET SEG(FS:): FROM DWORD PARAMETER IN PSP
                PUSH    DS
                mov     ax, word ptr current_PSP
                mov     DS, ax
                mov     si, 0082h
                mov     ax, DS:word ptr [si]
                mov     FS, ax
                mov     si, 0
                mov     ax, FS:word ptr [si + 4]
                mov     GS, ax
                POP     DS

; 2. MOVE FILENAME FROM GS:INCOMING_FAX_FILE_NAME TO LOCAL DATA SEGMENT TO MANIPULATE
; while moving filename, change to .000
                PUSH    DS
                mov     di, OFFSET fax_file_name
                mov     ax, DS
                mov     ES, ax
                mov     si, INCOMING_FAX_FILE_NAME
                mov     ax, GS
                mov     DS, ax
move_file_name: movsb
                cmp     DS:byte ptr [si], "."
                jne     move_file_name
                movsb
                mov     ES:byte ptr [di + 0], "0"
                mov     ES:byte ptr [di + 1], "0"
                mov     ES:byte ptr [di + 2], "0"
                mov     ES:byte ptr [di + 3], 00h
                POP     DS


; 3. GET FILENAME FROM GS:INCOMING_FAX_FILE_NAME AND OPEN THIS FILE TO READ THE FIRST
;    DOUBLE WORD TO SEE IF IT IS A .DCX FILE. If this is a .PCX file, we need not touch
;    it except for changing the name to filename.000. If a .DCX file, then we get
;    filename.000 and others. In all cases we get a filename.000 file to start from.

                PUSH    DS
                mov     dx, INCOMING_FAX_FILE_NAME
                mov     ax, GS
                mov     DS, ax
                mov     ax, 3d02h
                int     21h
                POP     DS
                mov     word ptr fax_file_handle, ax

                mov     bx, word ptr fax_file_handle
                mov     cx, 1024
                mov     dx, OFFSET dcx_file_header_buffer
                mov     ah, 3fh
                int     21h
                mov     word ptr actual_bytes_read, ax
                cmp     dword ptr file_transfer_buffer, 987654321
;if not a .DCX then assume it is a .PCX, change the suffix to .000 and exit.
;if a .DCX then go and break it up.
                je      break_it_up
                mov     bx, word ptr fax_file_handle
                mov     ah, 3eh
                int     21h
                PUSH    DS
                mov     ax, DS
                mov     ES, ax
                mov     di, OFFSET fax_file_name
                mov     ax, GS
                mov     DS, ax
                mov     dx, INCOMING_FAX_FILE_NAME
                mov     ah, 56h
                int     21h
                POP     DS
                jmp     pgm_exit

break_it_up:
;at this point the .DCX file is open and the pointer is at 0th .PCX file offset
;flow of work:
```

```
;   1. find the last non-zero double word entry, counting from 000. the count and the
;      file suffix will be hex. "pcx_file_count" "pcx_in_dcx_pointer" "dcx_file_header_pointer"
;   2. create a filename concatenating the pre-dot portion of fax file name with the
;      hex number suffix. "pcx_file_name" "pcx_file_name_suffix". create this file.
;   3. move bytes from .DCX file into .PCX file via "file_transfer_buffer".
;   4. close .PCX file.
;   5. if "pcx_file_count" was 0 exit. else decrement count and set "pcx_in_dcx_pointer"
;   6. goto 2.

;   1. find the last non-zero double word entry, counting from 000. the count and the
;      file suffix will be hex. "pcx_file_count" "pcx_in_dcx_pointer"
                mov     bx, OFFSET dcx_file_header_buffer
                mov     word ptr pcx_file_count, 0
                dec     word ptr pcx_file_count ;count = 0ffffh
                add     bx, 4                   ;point to first offset
find_last_entry:add     bx, 4                   ;point to second offset (first possible 0)
                inc     word ptr pcx_file_count
                cmp     dword ptr [bx], 0
                jne     find_last_entry
                sub     bx, 4
                mov     eax, dword ptr [bx]
                mov     word ptr dcx_file_header_pointer, bx
                mov     dword ptr pcx_in_dcx_pointer, eax

;   2. create a filename concatenating the pre-dot portion of fax file name with the
;      hex number suffix. "pcx_file_name" "pcx_file_name_suffix". create this file.
point_2:        mov     bx, OFFSET pcx_file_name_suffix

suffix_1:       mov     ax, word ptr pcx_file_count
                and     ax, 0f00h
                shr     ax, 8
                cmp     ax, 000ah
                jb      was_a_number_1
                add     ax, 0040h
                mov     byte ptr [bx + 0], al
                jmp     suffix_2
was_a_number_1: add     ax, 0030h
                mov     byte ptr [bx + 0], al

suffix_2:       mov     ax, word ptr pcx_file_count
                and     ax, 00f0h
                shr     ax, 4
                cmp     ax, 000ah
                jb      was_a_number_2
                add     ax, 0040h
                mov     byte ptr [bx + 1], al
                jmp     suffix_3
was_a_number_2: add     ax, 0030h
                mov     byte ptr [bx + 1], al

suffix_3:       mov     ax, word ptr pcx_file_count
                and     ax, 000fh
                cmp     ax, 000ah
                jb      was_a_number_3
                add     ax, 0040h
                mov     byte ptr [bx + 2], al
                jmp     suffix_4
was_a_number_3: add     ax, 0030h
                mov     byte ptr [bx + 2], al

suffix_4:       mov     si, OFFSET fax_file_name
                mov     di, OFFSET pcx_file_name
                mov     ax, DS
                mov     ES, ax
make_pcx_file_name:
                movsb
                cmp     DS:byte ptr [si], "."
                jne     make_pcx_file_name
                movsb
                mov     si, OFFSET pcx_file_name_suffix
                movsb
                movsb
                movsb
                mov     ES:byte ptr [di], 00h

                mov     dx, OFFSET pcx_file_name
                mov     cx, 0
                mov     ah, 3ch
                INT     21H                     ;create file
                mov     word ptr pcx_file_handle, ax
```

```
;   3. move bytes from .DCX file into .PCX file via "file_transfer_buffer".
                mov     bx, OFFSET pcx_in_dcx_pointer
                mov     cx, word ptr [bx + 2]
                mov     dx, word ptr [bx + 0]
                mov     bx, word ptr fax_file_handle
                mov     ax, 4200h
                INT     21H

write_to_pcx_file:
                mov     bx, word ptr fax_file_handle
                mov     cx, 32768
                mov     dx, OFFSET file_transfer_buffer
                mov     ah, 3fh
                INT     21H
                mov     word ptr actual_bytes, ax
                cmp     ax, 0
                je      done_write_to_pcx_file

                mov     bx, word ptr fax_file_handle
                mov     cx, word ptr actual_bytes
                mov     dx, OFFSET file_transfer_buffer
                mov     ah, 40h
                INT     21H

                jmp     write_to_pcx_file

done_write_to_pcx_file:

;   4. close .PCX file.
                mov     bx, word ptr pcx_file_handle
                mov     ah, 3eh
                INT     21H

;   5. if "pcx_file_count" was 0 exit. else decrement count and set "pcx_in_dcx_pointer"
                cmp     word ptr pcx_file_count, 0
                jne     more_pcx_files
                mov     bx, word ptr fax_file_handle
                mov     ah, 3eh
                INT     21H
                jmp     pgm_exit

more_pcx_files: dec     word ptr pcx_file_count
                mov     bx, word ptr dcx_file_header_pointer
                sub     bx, 4
                mov     word ptr dcx_file_header_pointer, bx
                mov     eax, dword ptr [bx]
                mov     dword ptr pcx_in_dcx_pointer, eax


;   6. goto 2.
                jmp     point_2


; 4 EXIT PROGRAM
pgm_exit:
;=============================================================
;*  DIAGNOSTIC:                                              *
;*  WRITE TO 3FF = CFH IE STEP NUMBER CALLING THIS PROGRAM   *
;=============================================================
                mov     dx, 02efh
                mov     al, 0cfh
                out     dx, al
;=============================================================
.EXIT


;=============================================================
;*                  DATA    AREA                             *
;=============================================================
.FARDATA
ORG         0000H
ALIGN       10H

data_area                   dw      ?

current_PSP                 dw      ?
fax_file_handle             dw      ?
fax_file_name               db      64 dup (00h)
actual_bytes_read           dw      ?
```

4 4/23

```
pcx_file_count              dw      0
pcx_in_dcx_pointer          dd      0
pcx_file_handle             dw      ?
actual_bytes                dw      ?
pcx_file_name               db      64 dup (00h)
pcx_file_name_suffix        db      "000"
                            db      ?

dcx_file_header_pointer     dw      dcx_file_header_buffer
dcx_file_header_buffer      db      1024 dup (00h)

file_transfer_buffer        db      32768 dup (00h)

data_area_end               dw      0000H                   ;place holder

END                         start
```

```
;*****************************************************************
;*                                                               *
;*                   FILE I/O SYNCHRONIZATION VXD                *
;*                       Copyright 1995, 1996                    *
;*                           Haluk M. Aytac                      *
;*                                                               *
;*****************************************************************
;catsyncj.asm <- catsynci.asm. 10/11/95. catches writes to c:\catbox\faxback\queue\
;super.que. I am assuming that the write to super.que takes place after
;the data file and .tcf file are all ready and written to this directory.
;catsynci.asm <- catsyncg.asm. 10/8/95. g version is the current working
;model. It has been stable for a couple of weeks. I do not know what I
;did with h rev so I am skipping it. i rev adds loop on pre-read if the
;response value is stall.
;catsyncg.asm <- catsyncf.asm. 9/11/95. I have a problem with print.
;fp.exe prints when host PC opens a file and there is nothing in it.
;whereas it should wait for the file to close.
;what does this change do in this file?
;   check for disk=5, fn=24 (open), and filename=c:\catbox\print\spool\*.*
;   if so, then make note of file handle (this var initialized to 0)
;   check for disk=5, fn=05,0b, and file handle = var file handle
;   if so, send 8005 or 800b as function number.
;catsyncf.asm <- catsyncb.asm. 8/24/95. rev E worked with all file i/o
;calls. the problem was that I was calling aspi code in 32 bit mode
;sometimes.
;catsyncb.asm <- catsynca.asm. 8/22/95. version a made an aspi call that
;maspi0v and scsiissc successfully implemented and returned from.
;so version a was pre-write. now, inversion b, we add pre-read and post-
;-write.
;catsynca.asm <- catsync9.asm. 8/17/95. version 9 showed that you can
;make ring 0 api calls from within catsync.vxd and still achieve
;volume flush. I could see that when a file is created on catbox, it
;would show up in the host pc dir right away. version 10 will attempt
;to send aspi notifications to catbox.
;catsync9.asm <- catsync8.asm. 8/16/95. now that host can see new
;files on cat right away, we go to notification phase. try aspi first.
;the manual says that almost all ring-0 api will work. Kyle Sparks also
;told me that aspi calls should work. if not, I have to use absolute
;disk write to fixed sectors.
;catsync8.asm <- catsync7.asm. 8/16/95. here we introduce _volflush
;in case it is drive 5. _VOLFLUSH WORKS. The problem was that when we
;called IFSMgr, it called us back and each time we entered _VolFlush
;and an infinite loop resulted from this. introducing the variable
;in_file_hook solved this problem.
;catsync7.asm <- catsync5.asm. 8/16/95. in version 5 we had spelled out
;the code in bytes. this was to make sure that we had an exact copy
;of the mother hook w95 uses. here, in version 7, we check that the
;assembler delivers the same code. and it works.
;catsync5.asm. 8/15/95. works in the sense that the system does not crash.
;one can also see what is happening with softice for Windows.
;---------------------------------------------------------------|
;                                                               |
;Haluk M. Aytac, 3Tau                                           |
;                                                               |
;08/03/95                                                       |
;---------------------------------------------------------------|
.386p

;---------------------------------------------------------------
;include files                                                  |
;---------------------------------------------------------------
include             vmm.inc
include             ifsmgr.inc
include             ifs.inc

CATSYNC_VER_HI              EQU     1
CATSYNC_VER_LO              EQU     0

CAT_DISC_FILE_IO_ENTER      EQU     4949H       ; II
CAT_DISC_FILE_IO_EXIT       EQU     4F4FH       ; OO

HOST_DOS_REQUEST_RESP_ENTER_ACK     EQU     1
HOST_DOS_REQUEST_RESP_STALL         EQU     3

SDB_SIZE                    EQU     100H


;---------------------------------------------------------------
;    Virtual Device Declaration                                 |
;                                                               |
;---------------------------------------------------------------
Declare_Virtual_Device CATSYNC, CATSYNC_VER_HI, CATSYNC_VER_LO, CATSYNC_Control, Undefined_Device_ID, \
                    FSD_Init_Order,0,0

;---------------------------------------------------------------
;    Local Data                                                 |
;                                                               |
;---------------------------------------------------------------
VxD_LOCKED_DATA_SEG                                             1
```

425

```
Locked_Data  -      db              "Loc    Data Area"              ;exactly 16 byt
ppPrevHook          dd              0
in_file_hook        dd              0
ASPI_Ent_Locked     dd              0
                    dd              0
SRB_ptr_off         dd              0
SRB_ptr_seg         dd              0
SRB_ptr_VM_lin      dd              0
SRB_ptr_VXD_lin     dd              0
SDB_ptr_VXD_lin     dd              0
cur_vm_handle       dd              0
print_file_handle   dd              0
print_post_write    dd              0
super_file_handle   dd              0
super_post_write    dd              0
VxD_LOCKED_DATA_ENDS

;--------------------------------------------------------------
;    Initialization  Code                                      |
;                                                              |
;--------------------------------------------------------------
VxD_ICODE_SEG

BeginProc           CATSYNC_Crit_Init
                    int             3                           ;check edx value

;vrio009d.asm change
;store edx value in a locked data segment variable called ASPI_Ent_Locked
;note that this will be my first 32 bit code. 02/21/95.
                    mov             ebx, OFFSET32 ASPI_Ent_Locked
                    mov             dword ptr [ebx], edx        ;store ASPI_Entry point in cs:ip format
                    mov             dword ptr [ebx+2], edx      ;0000025d01420142
                    mov             word ptr [ebx+2], 0000h     ;0000025d00000142

                    clc
                    ret

EndProc             CATSYNC_Crit_Init


BeginProc           CATSYNC_Device_Init
                    int             3
;   ALLOCATE MEMORY WITHIN 1MB OF EVERY VIRTUAL MACHINE
;catsyncf.asm change: ask for paragraph alignment as we do shr,4 later.
                    VMMcall         _Allocate_Global_V86_Data_Area, <1000h, GVDAZeroInit,GVDAParaAlign>
                    or              eax, eax
                    jz              device_init_failed
                    mov             SRB_ptr_VM_lin, eax
;   HOOK FILE I/O
                    mov             eax, OFFSET32 FileHook
                    push            eax
                    VXDcall         IFSMgr_InstallFileSystemAPIHook
                    add             esp, 4
                    mov             ppPrevHook, eax

                    cmp             eax, 0
                    je              device_init_failed

device_init_passed: clc
                    ret

device_init_failed: stc
                    ret

EndProc             CATSYNC_Device_Init

VxD_ICODE_ENDS

;--------------------------------------------------------------
;    Locked Code                                               |
;                                                              |
;--------------------------------------------------------------
VxD_LOCKED_CODE_SEG
BeginProc           CATSYNC_Control

                    Control_Dispatch Sys_Critical_Init, CATSYNC_Crit_Init
                    Control_Dispatch Device_Init, CATSYNC_Device_Init

                    clc
                    ret
EndProc             CATSYNC_Control

VxD_LOCKED_CODE_ENDS

;--------------------------------------------------------------
;    Code Segment                                              |
;                                                              |
;--------------------------------------------------------------
VxD_LOCKED_CODE_SEG
;--------------------------------------------------------------2.
```

426

```
;    File System API Hook                                          |
;                                                                  |
;------------------------------------------------------------------
;INT
;FileSystemApiHookFunction(
;   pIFSFunc    FSDnAddr,
;   int         FunctionNum,
;   int         Drive,
;   int         ResourceFlags,
;   int         CodePage,
;   int         pioreq pir
;   )
FileHook            Proc
                    int             3
;*****************************************************************************
;*                      BEGIN OUR CODE PRE-FILE I/O                          *
;*****************************************************************************
;must preserve stack, registers, and flags.
                    inc         in_file_hook

                    push        ebp
                    mov         ebp, esp

                    pushf
                    push        eax

                    mov         eax, dword ptr [ebp + 10h],
                    cmp         eax, 5
                    jne         not_cat_disc

                    cmp         in_file_hook, 1
                    ja          not_cat_disc
;notification must take precedence over cache disabling.
;       NOTIFY CATBOX       PRE-WRITE AND PRE-READ
                    push        eax
                    push        ebx
                    push        ecx
                    push        edx
;catsyncg.asm change
;   check for disk=5, fn=24 (open), and filename=c:\catbox\print\spool\*.*
;   if so, then make note of file handle (this var initialized to 0)
;   check for disk=5, fn=05,0b, and file handle = var file handle
;   if so, send 8005 or 800b as function number.
                    mov         eax, dword ptr [ebp + 0ch]
                    cmp         eax, 24h                        ; is fn = open file
                    jne         not_fileopen_fn
                    mov         ebx, dword ptr [ebp + 1ch]      ; get pir address
                    mov         ebx, dword ptr [ebx + 0ch]      ; path name start point
                    cmp         byte ptr [ebx + 14h], "P"
                    jne         not_fileopen_print
                    cmp         byte ptr [ebx + 16h], "R"
                    jne         not_fileopen_print
                    cmp         byte ptr [ebx + 18h], "I"
                    jne         not_fileopen_print
                    cmp         byte ptr [ebx + 1Ah], "N"
                    jne         not_fileopen_print
                    cmp         byte ptr [ebx + 1Ch], "T"
                    jne         not_fileopen_print
                    mov         ebx, dword ptr [ebp + 1ch]      ; get pir address
                    mov         ebx, dword ptr [ebx + 1ch]      ; file handle
                    mov         dword ptr print_file_handle, ebx    ; save file handle
                    jmp         cont_fm_print_stuff
not_fileopen_print: mov         ebx, dword ptr [ebp + 1ch]      ; get pir address
                    mov         ebx, dword ptr [ebx + 0ch]      ; path name start point
                    cmp         byte ptr [ebx + 30h], "S"
                    jne         not_fileopen_fn
                    cmp         byte ptr [ebx + 32h], "U"
                    jne         not_fileopen_fn
                    cmp         byte ptr [ebx + 34h], "P"
                    jne         not_fileopen_fn
                    cmp         byte ptr [ebx + 36h], "E"
                    jne         not_fileopen_fn
                    cmp         byte ptr [ebx + 38h], "R"
                    jne         not_fileopen_fn
                    mov         ebx, dword ptr [ebp + 1ch]      ; get pir address
                    mov         ebx, dword ptr [ebx + 1ch]      ; file handle
                    mov         dword ptr super_file_handle, ebx    ; save file handle
                    jmp         cont_fm_print_stuff
not_fileopen_fn:
                    mov         eax, dword ptr [ebp + 0ch]
                    cmp         eax, 05h                        ; is fn = open file
                    je          print_file_close_fn
                    cmp         eax, 0bh
                    jne         cont_fm_print_stuff
print_file_close_fn:
                    mov         ebx, dword ptr [ebp + 1ch]      ; get pir address
                    mov         ebx, dword ptr [ebx + 1ch]      ; file handle

                    cmp         dword ptr print_file_handle, ebx    ; save file handle
```


427

```
                jne         cont_fm_    nt_close
                mov         dword ptr print_file_handle, 0
                mov         dword ptr print_post_write, 1
                jmp         cont_fm_print_stuff
ont_fm_print_close:
                cmp         dword ptr super_file_handle, ebx    ; save file handle

                jne         cont_fm_print_stuff
                mov         dword ptr super_file_handle, 0
                mov         dword ptr super_post_write, 1
                jmp         cont_fm_print_stuff
ont_fm_print_stuff:
       NOTIFY CATBOX       PRE-WRITE
 translate SRB linear address to current VM ds:(e)dx format
                VMMcall     Get_Cur_VM_Handle
                mov         cur_vm_handle, ebx
                mov         eax, SRB_ptr_VM_lin
                add         eax, [ebx.CB_High_Linear]
                mov         SRB_ptr_VXD_lin, eax
                mov         SDB_ptr_VXD_lin, eax
                add         SDB_ptr_VXD_lin, 58h
                mov         ecx, 58h + SDB_SIZE
                VMMcall     Map_Lin_To_VM_Addr
                mov         word ptr SRB_ptr_seg, cx
                mov         SRB_ptr_off, edx
;catsyncf.asm change. ignore the map. just divide by 16 and get seg:0 as we will ask for V86 mode.
                mov         eax, SRB_ptr_VM_lin
                shr         eax, 4
                mov         SRB_ptr_off, 0
                mov         word ptr SRB_ptr_seg, ax            ; convert to seg:off as we force V86 mode
; clear SRB
                mov         ebx, SRB_ptr_VXD_lin
                mov         ecx, 00000016h
clear_SRB_V:    mov         dword ptr [ebx], 00000000h
                add         ebx, 4
                loop        clear_SRB_V
; write a word to SCSI Data Buffer (ENTER)
                mov         ebx, SDB_ptr_VXD_lin
                mov         word ptr [ebx], CAT_DISC_FILE_IO_ENTER
;catsyncb.asm change
                mov         eax, dword ptr [ebp + 0ch]
                mov         word ptr [ebx + 2], ax              ;function number
;end catsyncb.asm change
; now make SRB
                mov         ebx, SRB_ptr_VXD_lin
                mov         byte ptr [ebx], 02h                 ;execute SCSI_IO SRB
                mov         byte ptr [ebx+03h],   00h           ;flags. post disabled
                mov         byte ptr [ebx+08h],   05h           ;target SCSI ID
                mov         byte ptr [ebx+09h],   04h           ;LUN=04 File I/O synchronization
;catsyncb.asm change. change data alloc length to 4 bytes
                mov         word ptr [ebx+0ah], 0004h           ;data allocation length: 2B
                mov         word ptr [ebx+0ch], 0000h           ;           "
                mov         byte ptr [ebx+0eh],   00h           ;sense allocation length
                mov         eax, SRB_ptr_off                    ;
                add         ax, 58h
                mov         word ptr [ebx+0fh],   ax            ;data offset
                mov         ax, word ptr SRB_ptr_seg
                mov         word ptr [ebx+11h],   ax            ;data segment
                mov         byte ptr [ebx+17h],  0ah            ;10B write
                mov         byte ptr [ebx+40h],  2ah            ;cdb0, write_10 cdb
                mov         byte ptr [ebx+41h],  80h            ;cdb1, LUN=04h
                mov         byte ptr [ebx+47h],  00h
;catsyncb.asm change. change data alloc length to 4 bytes
                mov         byte ptr [ebx+48h],  04h            ;transfer length
;now we do the fancy stuff. in VM it should look like this:
;               push        ds      ...SRB segment
;               push        bx  ...SRB offset
;               call        dword ptr [ASPI_Entry]
;               add         sp, 4
;thus SRB must be in a VM area. this program does a buffer allocate. it uses it to store
;information. I could use some of this space.
                Push_Client_State
;catsyncf.asm change ask for V86 mode.
                VMMcall     Begin_Nest_V86_Exec
                mov         eax, SRB_ptr_seg
                VMMcall     Simulate_Push
                mov         eax, SRB_ptr_off
                VMMcall     Simulate_Push
                mov         ebx, OFFSET32 ASPI_Ent_Locked
                mov         cx, word ptr [ebx+4]
                mov         edx, dword ptr [ebx]
;for now we try SRB=0 ie HA Inquiry
                VMMcall     Simulate_Far_Call
                VMMcall     Resume_Exec
                VMMcall     Simulate_Pop
                VMMcall     Simulate_Pop
                VMMcall     Resume_Exec
                VMMcall     End_Nest_Exec
                Pop_Client_State
;at this point, SRB was executed by ASPI and we get results
```

```
;check that it completed normally
                    mov         ebx, SRB_ptr_VXD_lin
pre_write_status_loop:
                    mov         al, byte ptr [ebx+1]
                    cmp         al, 01h                         ;has SRB executed normally?
                    jne         pre_write_status_loop
;catsyncb.asm change
;       NOTIFY CATBOX       PRE-READ
; clear SRB
pre_read:           mov         ebx, SRB_ptr_VXD_lin
                    mov         ecx, 00000016h
clear_SRB_VI:       mov         dword ptr [ebx], 00000000h
                    add         ebx, 4
                    loop        clear_SRB_VI
; now make SRB
                    mov         ebx, SRB_ptr_VXD_lin
                    mov         byte ptr [ebx], 02h             ;execute SCSI_IO SRB
                    mov         byte ptr [ebx+03h],   00h       ;flags. post disabled
                    mov         byte ptr [ebx+08h],   05h       ;target SCSI ID
                    mov         byte ptr [ebx+09h],   04h       ;LUN=04 File I/O synchronization
                    mov         word ptr [ebx+0ah], 0004h       ;data allocation length: 2B
                    mov         word ptr [ebx+0ch], 0000h       ;           "
                    mov         byte ptr [ebx+0eh],   00h       ;sense allocation length
                    mov         eax, SRB_ptr_off                ;
                    add         ax, 58h
                    mov         word ptr [ebx+0fh],   ax        ;data offset
                    mov         ax, word ptr SRB_ptr_seg
                    mov         word ptr [ebx+11h],   ax        ;data segment
                    mov         byte ptr [ebx+17h],  0ah        ;10B read
                    mov         byte ptr [ebx+40h],  28h        ;cdb0, read_10 cdb
                    mov         byte ptr [ebx+41h],  80h        ;cdb1, LUN=04h
                    mov         byte ptr [ebx+47h],  00h
                    mov         byte ptr [ebx+48h],  04h        ;transfer length
;now we do the fancy stuff. in VM it should look like this:
;                   push        ds      ...SRB segment
;                   push        bx  ...SRB offset
;                   call        dword ptr [ASPI_Entry]
;                   add         sp, 4
;thus SRB must be in a VM area. this program does a buffer allocate. it uses it to store
;information. I could use some of this space.
                    Push_Client_State
;catsyncf.asm change ask for V86 mode.
                    VMMcall     Begin_Nest_V86_Exec
                    mov         eax, SRB_ptr_seg
                    VMMcall     Simulate_Push
                    mov         eax, SRB_ptr_off
                    VMMcall     Simulate_Push
                    mov         ebx, OFFSET32 ASPI_Ent_Locked
                    mov         cx, word ptr [ebx+4]
                    mov         edx, dword ptr [ebx]
;for now we try SRB=0 ie HA Inquiry
                    VMMcall     Simulate_Far_Call
                    VMMcall     Resume_Exec
                    VMMcall     Simulate_Pop
                    VMMcall     Simulate_Pop
                    VMMcall     Resume_Exec
                    VMMcall     End_Nest_Exec
                    Pop_Client_State
;at this point, SRB was executed by ASPI and we get results
;check that it completed normally
                    mov         ebx, SRB_ptr_VXD_lin
pre_read_status_loop:
                    mov         al, byte ptr [ebx+1]
                    cmp         al, 01h                         ;has SRB executed normally?
                    jne         pre_read_status_loop
;now check the data area and make sure that the response we got is HOST_DOS_REQUEST_RESP_ENTER_ACK
;before that make sure that the function number matches
;       function number (word)
;       response (word)
                    mov         ebx, SDB_ptr_VXD_lin
                    mov         eax, dword ptr [ebp + 0ch]
                    cmp         word ptr [ebx], ax              ;function number same?
;catsynci.asm change: if stall then redo.
                    cmp         word ptr [ebx + 2], HOST_DOS_REQUEST_RESP_STALL
                    je          pre_read
;end catsyncb.asm change
                    pop         edx
                    pop         ecx
                    pop         ebx
                    pop         eax
;       FLUSH CACHE
                    push        VOL_DISCARD_CACHE
                    dec         eax                             ;0-based drive number
                    push        eax
                    VXDcall     _VolFlush
                    pop         eax
                    pop         eax

not_cat_disc:
                    pop         eax
```


4/29

```
                popf

                pop         ebp
;*****************************************************************************
                    END OUR CODE PRE-FILE I/O                                 *
;*****************************************************************************
                push        ebp
                mov         ebp, esp
                push        dword ptr [ebp + 1ch]
                call        dword ptr [ebp + 08h]
                leave
;*****************************************************************************
                    BEGIN OUR CODE POST-FILE I/O                              *
;*****************************************************************************
                push        ebp
                mov         ebp, esp

                pushf
                push        eax

                mov         eax, dword ptr [ebp + 10h]
                cmp         eax, 5
                jne         not_cat_disc2

                cmp         in_file_hook, 1
                ja          not_cat_disc2
catsyncf.asm change. no need to flush afterwards as we always flush before.
       FLUSH CACHE
                push        VOL_DISCARD_CACHE
                dec         eax                                   ;0-based drive number
                push        eax
                VXDcall     _VolFlush
                pop         eax
                pop         eax
post notification must be done after cache disabling.
       NOTIFY CATBOX       POST-WRITE
                push        eax
                push        ebx
                push        ecx
                push        edx

 clear SRB
                mov         ebx, SRB_ptr_VXD_lin
                mov         ecx, 00000016h
lear_SRB_VII:   mov         dword ptr [ebx], 00000000h
                add         ebx, 4
                loop        clear_SRB_VII
 write a word to SCSI Data Buffer (ENTER)
                mov         ebx, SDB_ptr_VXD_lin
                mov         word ptr [ebx], CAT_DISC_FILE_IO_EXIT
catsyncb.asm change
                mov         eax, dword ptr [ebp + 0ch]
catsyncg.asm change
                cmp         dword ptr print_post_write, 1
                jne         maybe_a_super_close
                mov         dword ptr print_post_write, 0
                or          ax, 8000h
                jmp         not_a_print_close
aybe_a_super_close:
                cmp         dword ptr super_post_write, 1
                jne         not_a_print_close
                mov         dword ptr super_post_write, 0
                or          ax, 4000h
                jmp         not_a_print_close
ot_a_print_close:
                mov         word ptr [ebx + 2], ax                ;function number
;end catsyncb.asm change
; now make SRB
                mov         ebx, SRB_ptr_VXD_lin
                mov         byte ptr [ebx], 02h                   ;execute SCSI_IO SRB
                mov         byte ptr [ebx+03h],   00h             ;flags. post disabled
                mov         byte ptr [ebx+08h],   05h             ;target SCSI ID
                mov         byte ptr [ebx+09h],   04h             ;LUN=04 File I/O synchronization
                mov         word ptr [ebx+0ah], 0004h             ;data allocation length: 4B
                mov         word ptr [ebx+0ch], 0000h             ;           "
                mov         byte ptr [ebx+0eh],   00h             ;sense allocation length
                mov         eax, SRB_ptr_off                      ;
                add         ax, 58h
                mov         word ptr [ebx+0fh],   ax              ;data offset
                mov         ax, word ptr SRB_ptr_seg
                mov         word ptr [ebx+11h],   ax              ;data segment
                mov         byte ptr [ebx+17h],  0ah              ;10B write
                mov         byte ptr [ebx+40h],  2ah              ;cdb0, write_10 cdb
                mov         byte ptr [ebx+41h],  80h              ;cdb1, LUN=04h
                mov         byte ptr [ebx+47h],  00h
                mov         byte ptr [ebx+48h],  04h              ;transfer length
;now we do the fancy stuff. in VM it should look like this:
;               push        ds      ...SRB segment
;               push        bx  ...SRB offset
;               call        dword ptr [ASPI_Entry]
```


430

```
;                   add         sp, 4
;thus SRB must be in a VM area. this program does a buffer allocate. it uses it to store
;information. I could use some of this space.
                    Push_Client_State
;catsyncf.asm change ask for V86 mode.
                    VMMcall     Begin_Nest_V86_Exec
                    mov         eax, SRB_ptr_seg
                    VMMcall     Simulate_Push
                    mov         eax, SRB_ptr_off
                    VMMcall     Simulate_Push
                    mov         ebx, OFFSET32 ASPI_Ent_Locked
                    mov         cx, word ptr [ebx+4]
                    mov         edx, dword ptr [ebx]
;for now we try SRB=0 ie HA Inquiry
                    VMMcall     Simulate_Far_Call
                    VMMcall     Resume_Exec
                    VMMcall     Simulate_Pop
                    VMMcall     Simulate_Pop
                    VMMcall     Resume_Exec
                    VMMcall     End_Nest_Exec
                    Pop_Client_State
;at this point, SRB was executed by ASPI and we get results
;check that it completed normally
                    mov         ebx, SRB_ptr_VXD_lin
post_write_status_loop:
                    mov         al, byte ptr [ebx+1]
                    cmp         al, 01h                         ;has SRB executed normally?
                    jne         post_write_status_loop

                    pop         edx
                    pop         ecx
                    pop         ebx
                    pop         eax
not_cat_disc2:
                    pop         eax
                    popf

                    pop         ebp
                    dec         in_file_hook
;*****************************************************************************
;*                     END OUR CODE POST-FILE I/O                            *
;*****************************************************************************
                    ret
;                   db          55h,8bh,0ech,0ffh,75h,1ch,0ffh,55h,08h,0c9h,0c3h

FileHook            endp

VxD_LOCKED_CODE_ENDS


;------------------------------------------------------------
;    Real Mode Initialization  Code                         |
;                                                           |
;------------------------------------------------------------
VxD_REAL_INIT_SEG
BeginProc           realinit
                    int             3                       ;check ax: version no of VMM, bx: already loaded
                    mov             ax, 3d00h
                    lea             dx, word ptr SCSIMgrString
                    int             21h
                    jc              short NoASPIManager
                    push            ax
                    mov             bx, ax
                    mov             ax, 4402h
                    lea             dx, word ptr ASPI_Entry
                    mov             cx, 4
                    int             21h
                    mov             ah, 3eh
                    pop             bx
                    int             21h
                    push            ds
                    lea             bx, word ptr SRB
                    push            bx
                    lea             bx, word ptr ASPI_Entry
                    call            dword ptr [bx]
                    add             sp, 4
                    mov             al, byte ptr SRB+1
                    cmp             al, 01h
                    jz              short go_on1
                    lea             dx, word ptr Host_Ad_Inq_Prb
                    mov             ah, 09h
                    int             21h
                    xor             edx, edx
                    mov             ax, Abort_Device_Load
                    jmp             short cont_fm_ASPI
go_on1:             lea             bx, word ptr SRB
                    mov             cx, 0058h
clear_SRB:          mov             byte ptr [bx], 00h
                    inc             bx
                    loop            clear_SRB
```


431

```
                lea             dx,     l ptr Host_Ad_Inq_Suc
                mov             ah, 09h
                int             21h
                lea             bx, word ptr ASPI_Entry
                mov             edx, dword ptr [bx]
                mov             ax, Device_Load_Ok
                jmp             short cont_fm_ASPI
loASPIManager:  lea             dx, word ptr No_ASPI_Mgr
                mov             al, 09h
                int             21h
                xor             edx, edx
                mov             ax, Abort_Device_Load
cont_fm_ASPI:
tail end processing
                xor             bx, bx                          ;no pages
                xor             si, si                          ;do not instance data
                clc                                             ;without this does not work?? and yet carry was 0.

                ret
data area
SCSIMgrString   db              "SCSIMGR$"
                dw              0
ASPI_Entry      db              4 dup(?)
SRB             db              58h dup(0)                      ;initialize for host adapter inquiry
Host_Ad_Inq_Prb db              "Host Adapter Inquiry ASPI Failed$"
Host_Ad_Inq_Suc db              "Host Adapter Inquiry ASPI Call Successful$"
No_ASPI_Mgr     db              "ASPI Manager was not installed$"
EndProc         realinit
VxD_REAL_INIT_ENDS

END
```


432

CAT.CFG

```
[PASSWORD]
password = 9133


[STEP_TABLE_ASSIGNMENTS]
st_modem_0 = C:\CATBOX\CATSTEPS\CATSTPL9.BIN
st_modem_1 = C:\CATBOX\CATSTEPS\CATSTPL9.BIN
st_modem_2 = C:\CATBOX\CATSTEPS\FAXBACK.BIN
st_modem_3 = C:\CATBOX\CATSTEPS\NULLSTEP.BIN
st_modem_4 = C:\CATBOX\CATSTEPS\NULLSTEP.BIN



[FAX]
sender_name = HALUK AYTAC @3TAU


[PHONE_NUMBERS]
ph_nbr_modem_0 = 0
ph_nbr_modem_1 = 408 253 6172
ph_nbr_modem_2 = 408 255 5869
ph_nbr_modem_3 = 0
ph_nbr_modem_4 = 0


[FAXBACK]
file_name = C:\CATBOX\FAXBACK\QUEUE\FAXBACK.IDX


[PRINTER]
number_of_attempts = 5
interval_of_attempt = 5 minutes


[SCANNER]
copy_dpi = 300
```

```
;************************************  ***********************;
;COPYRIGHT 1994, 1995 by Haluk Aytac. 3Tau                     ;
;*************************************************************;
catpat03.asm <- catpat02.asm. 10/6/95. add multitasking features. maspi1b,scsiissi,catsyncg(?)
catpat02.asm <- catpat01.asm. 03/19/95. same but casvox parts removed.
caspat01.asm <- caspat00.asm = casvox26.asm. goes with scsiiss9.asm and maspi0s.asm.
casvox26.asm was compiled with a small change to 2FCB0E and shown to work. caspat01.asm
implements all the changes originally prescribed for casvox26.asm.
;ALL PATH DRIVE LETTER CHANGES ARE MADE AT CATPATCH. ALL TCF EDITS FOR PATH DRIVE LETTER
;ARE MADE AT SCSIISR. THESE ARE CHANGES TO MAKE HOST PC GUI WORK.
;MAESTRO WILL HAVE TO MAKE CHANGES TOO: IT WILL EDIT TCF FOR PATH DRIVE LETTER BACK TO C:.
;MAESTRO WILL NOT NEED PATH DRIVE LETTER CHANGES DURING INT 2F CALLS. IF THESE CALLS GET
;INFORMATION FROM CASMODEM, THEY WILL BE REFERING TO C: (SUCH AS CB07, CB0E, CB10). IF THESE
;CALLS BRING INFO FROM MAESTRO TO CASMODEM, MAESTRO WILL MAKE THE CORRECT PATH DRIVE LETTER
;PLACEMENT IE C: (SUCH AS IN CB01, CB15). SO MAESTRO JUST MAKES FIX_TASK_CONTROL_FILE CALLS
;DURING CB07, TO EDIT TCF FOR PATH DRIVE LETTER, DURING A PRINT. DURING A SEND, IT WILL
;GENERATE THE CORRECT PATH DRIVE LETTER. MAESTRO MIGHT WANT TO FORWARD A FAX THAT WAS READ
;BY THE GUI. IN THIS CASE IT WILL HAVE TO FIX THE TCF AFTER IT MAKES A COPY OF IT.
;casvox26.asm <- casvox25.asm. goes with scsiiss9.asm and maspi0s.asm. 03/17/95.
;change 2f cb0e so that the path name refers to e: and not c:. when host PC GUI, in this case
;Faxablty, is building a task file, it gets the path for the file from 2f cb0e.
;this version attempts to fix all such problems of filepaths and references to filepaths
;inside control files. so I provide a summary:
;CB14. change file path drive to C:. this is used to give a familiar name to an incoming
;fax file. file is not moved but only renamed.
;CB01.submit a task. maestro will use this one and so will host PC GUI. When maestro uses it,
;it will give the TASK.TCF, the path C:\FAXHOST\TASK.TCF. In addition, inside TASK.TCF, the
;reference to the path names will be C:. When GUI uses this, it will have gotten the path
;for TASK.TCF from 2FCB0E. Thus, as we will see later on, we must fix the result host PC
;gets for 2FCB0E so that it reads E: and not C:. This is so GUI can open TASK.TCF at all.
;But when GUI has written to the TASK.TCF file, for example the name of the cover page,
;such as E:\FAXHOST\FAXABLTY.PCX, and it is time to submit, then as input to 2FCB01, we
;must have TASK.TCF refering to C:\FAXHOST\TASK.TCF. In addition, the references inside
;the TASK.TCF must be to C:. Thus THERE ARE TWO FIXES IN THIS CASE:
;upon initiation of submit from host PC:
;               1. fix the reference to TASK.TCF in ds:dx so that path is C:
;               2. fix the file itself so that all references inside are to C:
;the second entails making an int 21 call within an int 2F call. we could do this on the
;host side or CaTbox side. On the host side we are at the top level and inside any number
;of flavors of Windows/DOS. On the CaTbox side, we are inside the scsi isr so that there may
;be other DOS calls in progress. The easiest would be to open the scsi isr to irq's and
;to keep checking for DOS busy flag. Thus the decision is to do it on CaTbox side.
;When later on, this task file becomes a part of the log queue, host can retrieve it with
;CB07 and then the path of the file and its references will be changed back to E: with CB07.
;what if, afterwards, we wish to forward this? as long as we do it from the host side we
;will be OK. If we do it from CaTbox side, we will refer to the task file correctly but
;we must change the references inside. maestro can do this.
;upon initiation of submit (during a resubmit of a successful task viewed by the host PC)
;from CaTbox side:
;               3. check and fix the references inside the task file before issuing 2FCB01.
;                  indeed for all cases of already existing faxes, perform this check.
;WEIRD CASE #4576: I am viewing my faxes on GUI. This means that all queue files have
;been identified with CB05,06 and all queue files have been read with CB07, ie now all
;references inside task files are to E:. Now a phone call comes in and it is my partner
;in New York. He wants to forward some faxes. Now maestro will change the references inside
;that task file back to C:. Now, the GUI wants to see that same file again. NOTE: for us
;to resubmit a file, we must open it (ie the data file) so that it is of PCX format. If the
;GUI references the actual file name, then it can read it. But if it references the task
;file each time, then we are foutus. But, not too bad really because when you forward a
;fax, you open another task file for it although the data reference is still the same. Thus
;the original still refrences the E: as GUI was reading it.
;Anytime, GUI opens up, all queue files will have their references changed to E:. What does
;maestro need to do with these queue files? We might want to print them. We might want to
;forward them.
;GOOD NOTE: when GUI is viewing and forwarding etc. It uses CB07 and then all paths and
;references are changed to E:. With CB01 all references and paths are changed back to C:
;While a file is being viewed, a phone call comes in and the caller wants to forward the
;same fax to his hotel lobby. maestro copies the queue file for the fax, changes the
;reference on the new copy, perhaps it should also copy the data file itself so that
;while the GUI is doing edits, he can send the original. I am thinking now that if GUI
;sends a copy also is it also would not make a copy of the fax file.????
;               4. maestro to make a copy of the data file during resubmit.
;CB07. open file. this is the opposite path from submit a task. Here also there are two
;clients for this call. GUI and CaTbox. CaTbox caters to handset, keypad, remote.
;when GUI initiates a 2FCB07, CaTbox SCSI ISR hooks the int 21 3D and reads the filename
;it then passes this filename to host which opens with this filename. All this takes place
;inside the 2FCB07 call. I have done this already. Also inside the CaTbox int 21 3D call,
;I must go and edit the references to C: in the queue file. This completes the GUI side.
;On the CaTbox side, if the file I want to print has been viewed already, then the
;queue file has references to E:. Thus the read associated with maestro has to make sure all
;references are to C:.
;               1. During host 2FCB07 call, hook int 21 3D to get the name of the requested
;                  and then reflect this same name with E: in pathname to host 2F processor.
;                  this processor reissues another int 21 3D to get a handle for host DOS.
;               2. during CaTbox hooked int 21 3D call, edit the file before closing to
;                  change all references to E:
;               3. when maestro makes the call 2FCB07, while opening the queue file,
;                  record the handle and make changes to the references to read C:
;CB0E. when used by GUI, change C: to E: as pathname. This is used to find the path for
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CATCAS

434

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TASK.TCF that is being created.
CB10. when called by GUI, edit FTR area to read E: (call progress)
CB15. when called by GUI, edit data area to read E: -> C:

so all this is pretty straightforward except for playing with the insides of files.
there are two cases we do this and we do both inside CaTbox. thus one procedure should
take care of it.

during submit, we know tha name of the file from the int 2F call
parameters in case of GUI. In case of maestro we know the name also because we wrote the
program. Thus, before really submitting, we can change the references inside the file.
;
during open file (CB07), hook int 21 3D to get the file name. after 2F CB07 completes,
this file is open. Now go and edit the file before either (maestro goes on) or (scsi isr
is completed). In case of maestro, reset the pointer to beginning. In case of GUI,
close the file (as I have already done) and pass on the filename to host with C:->E:.
;
;ONE MORE ISSUE: somehow, as the host PC is starting, there must be a way of identifying
;the lable of the CaTdisk wrt host PC. This could be a very simple program that looks for
;a certain file that is only on the CaTbox. This file name will be used by the INT 2F
;stub on host PC. It will also be used by the casvox and scsiisr on CaTbox. I think I
;could use the same channel I use for DOS synchronization for this purpose.
;I should also rename casvox26.asm now that casvox is really not there anymore.
;new name iiiiiiiiiissssssssssss:     CASPATCH.EXE. this will be the final name. But
;still I should have a name like caspatch and quite unlike casvox. so then the name is
;       CASPAT00.ASM <- CASVOX26.ASM. the final version will be called CASPATCH.EXE.
;CASPATCH would be in AUTOEXEC.BAT and as a part of installing itself would also find
;out where ?:\CATBOX\CATVOICE.EXE was.
;
;casvox25.asm <- casvox24.asm. 02/15/95. there remains a problem with transmit. gives:
;unable to create task control file message. first step: remove necessity to load casmodem
;by removing all hooks during install other than int 2f.
;casvox24.asm <- casvox23.asm. 02/10/95. attempt to fix the cb07 problem. see notes at the header of
;scsiiss6.asm.
;casvox23.asm <- casvox22.asm. 02/07/95. this program will work with maspi0n.asm and scsiiss4.asm
;on the CATBOX side to implement int 2f translation fully. currently only 2f/cb00 works with
;casvox22, maspi0m, scsiiss3.
;casvox22.asm <- casvox21.asm. 02/05/95. with 21, I am able to see the write for cb00 happen.
;the correct data (al=ff) is on the out buffer. It also writes 9 bytes upon the posted read cdb,
;but somehow at 499:label go_fmi_t_llun01_28 ie mov al, 24; out dx, al; do not see the correct
;interrupt reg value of 28 (disconnect) and seq step of 010b. I am attributing this to the fact
;that I am doing posting. ASPI at host is stuck at looking for 29h at register 34c, meaning
;disconnect (just one of bits in 29 be 1). I think NCR cannot disconnect because it sees ATN
;from ADAPTEC.
;02/06/95. also corrected SRB 58 dup(0). not enough space and so it goes into a message so that
;the last byte of CDB is 71 which enables linking which is why ASPI issued ATN and did not
;disconnect after the read extended for cb00. It also appears that the dll or virtual device
;driver for cas issues 2f/cb00 as windows is coming up.
;one more correction on SRB data area. Upon install, HA Inquiry fills the SRB area so that it is not
;all zeroes. Add zeroing of all bytes of SRB. If it does not help, I could prune some of it or
;put it at one place right after the install. As a matter of fact, this is where I will put it.
;casvox21.asm <- casvox20.asm. 02/04/95. this version will attempt getting int 2f/cb00 response
;from the CATBOX via SCSI. Once this is done, the rest will follow. Host will have softicew and the
;CATBOX will have softiced.
;casvox20.asm <- casvox1z.asm. 01/31/95. this version will implement getting response to int 2f/cb00
;from CATBOX1. First make a fake response to int 2f/cb00 call ie make ah=ff and return.
;NB: casvox1z.asm works undwer Windows 3.1 and 3.11.
;casvox1z.asm <- casvox1y.asm. 01/31/95. Add writing all 2f calls to int2f_buffer. this way I
;know the calls Windows is making. Windows 3.11 did not accept casdrv06.asm which is same as this
;program in so far as what it does with int 2f.must exclude int 2f/1681,2 and int 2f/c0 as they
;come quite often with irq00.
;casvox1y.asm worked on CATBOX1 and Windows 3.10. That is Intel Faxability s/w came up and did
;what it was supposed to do in terms of using int 2f calls. I still have to fix some bugs to get
;this to a place where it can receive faxes. I have tried this on CATBOX0 and it worked sporadically
;there. So this has to get fixed. But at least I have a laboratory to fix the bugs in 2f -> SCSI
;translation.
;casvox1y.asm <- casvox1w.asm. 01/30/95.
;there are three major areas of change in this revision. I am not sure I will implement all
;these changes all at once as they realize different goals.
;0. fix the errors I found in casvox for voice processing such as not next action but next state etc.
;A. incorporate the fixes that made casvox1w.asm work at CATBOX1. these were simply, disabling of
;   the int 15h ie as I hook it, I do not pass it on to the DOS, or whatever, int 15h, I just
;   iret. I also made some filename changes to make things fit CATBOX1 ie filenames for ringback etc.
;B. again, in line with voice processing, I need to make it work with just the handset. ie the basic
;   state machine that emits a message and then record one and emits this one. I should work it
;   neatly and quickly from the handset. This will be useful in the future when we have to implement
;   the user recording messages on the microphone. This same change should also enable the microphone.
;   in other words, I should have:      "record now"
;                                       record the voice from the microphone.
;                                       play it back.
;   this way I could experiment with 16 bit PCM etc, and find the edge of the envelope.
;C. this is a bit of an indirect use of this program. as casvox installs on top of casmodem in a way
;   that is acceptable to casmodem, I could change it to hook int 2F, also in a way acceptable to cas-
;   modem and also to Windows, I have a way of snooping on what Faxability s/w asks from casmodem.
;   the goal being to implement the 2F -> SCSI change. it is desirable to have a switch setting to
;   either receive and implement int 2f calls locally or translate them into scsi calls.
;NB: the one I will first try to implement on casvox1y.asm is item C. The task is similar to what I
;   went through with casvox1w.asm ie to gradually take away int functions (in this case irq 00 and irq 03)
;   so that in the end, I could be independent of casmodem. Here the idea is to first acquire int 2F
;   function CB00 ie check install for casmodem. I need to hook this in a way that does not upset Windows
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;   and also in a way that helps Faxabil    s/w to install, thinking casmodem is th     I have done this
;   to a degreewith casdrv06.asm. In Windows 3.11, casdrv06.asm does not install as a TSR. Windows does
;   not start. This puzzles me as I think I display the same behavior as casmodem in regards int 2f
;   function 1605. It may be that Win3.11 is making another int 2f call that I am not handling properly.
;   But, with Win3.10 things work just fine with casdrv06.asm. That is Win3.10 does come up. But then, when
;   I click on Faxability icon, I get "unknown error class:52, subcode:251"
;
;for Hai, use casvox1w.exe but edit so int 15h is just a return and file names for ringback etc point
;to the correct directory.
.model      small
.386P
.stack
;.data
.code
;data portion
;*********************************************************************************************
;DATA RELATED TO ASPI ENTRY POINT, HOOKING INT 2F
;*********************************************************************************************

;################start casvox21.asm changes
SCSIMgrString   db  "SCSIMGR$"
                dw  0                       ;null terminate string
ASPI_Entry      db  4 dup(?)
;casvox22.asm change. ADAPTEC manual has 58 dup(0) but their compiler sees it as hex.
;mine sees it as decimal. change from decimal to hex.
SRB             db  58h dup (0)             ;initialize for host adapter inquiry
Host_Ad_Inq_Prb db  "Host Adapter Inquiry ASPI Call Failed$"
Host_Ad_Inq_Suc db  "Host Adapter Inquiry ASPI Call Successful$"
No_ASPI_Mgr     db  "ASPI Manager is not Installed$"
cb_function     db  00h
cb11_subfn      db  00h
file_name_len   db  00h                     ;assume filename is less than 256 characters
ax_reg          dw  0000h
ds_reg          dw  0000h
dx_reg          dw  0000h
cx_reg          dw  0000h
bx_reg          dw  0000h
;*********************************************
;DATA OUT BUFFER, DATA IN BUFFER for SRB
;*********************************************
data_out        db  522 dup(00h)
data_in         db  522 dup(00h)
;################end casvox21.asm related changes

;this is where we store the old irq address.
;start casvox1y change
cas_int2f_off   dw  ?
cas_int2f_seg   dw  ?
int2f_buf_ptr   dw  ?
int2f_buffer    db  8196 dup(99h)
int2f_buf_end   dw  0000h
;end casvox1y change
ds_PSP          dw  ?
;equs
CAT_CAS_ENTER               EQU     4949H   ; II
CAT_CAS_EXIT                EQU     4F4FH   ; OO
CAT_CAS_RESP_NULL           EQU     0000H
CAT_CAS_RESP_ENTER_ACK      EQU     0001H
CAT_CAS_RESP_STALL          EQU     0003H

start:          jmp     install
;start casvox1s.asm changes
;*********************************************************************************************
;new_int2f_off
;*********************************************************************************************
;start casvox1y change
new_int2f_off:
                pushf
                cmp     ah, 0cbh
                jz      cas_call
                popf
                jmp     cs:dword ptr cas_int2f_off
cas_call:       push    ax                                  ;RECORD THE INT 2F/CB CALL
                push    bx
                mov     bx, cs:word ptr int2f_buf_ptr
                mov     cs:word ptr [bx], ax
                inc     bx
                inc     bx
                lea     ax, cs:word ptr int2f_buf_end
                cmp     ax, bx
                jnz     no_2f_buf_end
                lea     bx, cs:word ptr int2f_buffer
no_2f_buf_end:  mov     cs:word ptr int2f_buf_ptr, bx
                pop     bx
                pop     ax
;               popf
;               jmp     cs:dword ptr cas_int2f_off
;               cmp     al, 00h
;               jnz     cas_call_cont
;################start casvox21.asm changes
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436

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the change is to replace the instructi    n the next line:
                mov     al, 0ffh
with a SCSI call to CATBOX with a non zero LUN to retrieve the answer from the CASMODEM on CATBOX
I will put all of int 2f/cb processing here from casdrv06.asm.
                push    ax
                push    dx
                push    ds
                push    bx
                push    si
                push    di
                push    es
                push    cx
from here on, can change register values within push/pop.
                mov     cs:byte ptr cb_function, al
                mov     cs:byte ptr cb11_subfn, dl
                mov     cs:word ptr ax_reg, ax                  ;REGS -> IX_REGS
                mov     cs:word ptr bx_reg, bx
                mov     cs:word ptr cx_reg, cx
                mov     cs:word ptr dx_reg, dx
                mov     cs:word ptr ds_reg, ds
;remember that this is an isr and thus ds, ss are unknown to us
                mov     ax, cs
                mov     ds, ax                          ;now all isr data is available to us
;************************************************
;*      PRE-WRITE                                   *
;************************************************
;now make SRB for execute_scsi_i/o for LUN=7 pre-write
;load data out buffer
                mov     bx, OFFSET data_out
                mov     word ptr [bx], CAT_CAS_ENTER
                mov     al, byte ptr cb_function
                mov     byte ptr [bx + 2], al       ;function number
                mov     al, byte ptr cb11_subfn
                mov     byte ptr [bx + 3], al       ;sub function number for cb 11
pre_write:      lea     bx, word ptr SRB            ;CLEAR SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRBprewr: mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRBprewr
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5. DO INQUIRY AT INSTALL TO FIND 5
                mov     byte ptr [bx+09h], 07h      ;LUN=07
                mov     word ptr [bx+0ah], 0004h    ;data allocation length: "II", fn, subfn
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_out
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte write
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 2ah      ;cdb0, write_10 cdb
                mov     byte ptr [bx+41h], 0e0h     ;cdb1, lun=7
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 04h      ;transfer length
;SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
;by this time the write_10 has completed
ASPI_done_prewr:mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done_prewr

;************************************************
;*      PRE-READ                                    *
;************************************************
;now load the SRB for read_10
pre_read:       lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRBprerd: mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRBprerd
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 07h      ;LUN=01
                mov     word ptr [bx+0ah], 0004h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_in
                mov     word ptr [bx+0fh], ax       ;data offset
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437

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                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte read
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 28h      ;cdb0, read_10 cdb
                mov     byte ptr [bx+41h], 0e0h     ;cdb1, lun=1
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 04h      ;transfer length
SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
SPI_done_prerd:mov      al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done_prerd
load data in buffer
                mov     bx, OFFSET data_in
                cmp     word ptr [bx + 2], CAT_CAS_RESP_ENTER_ACK
                je      go_ahead_w_2f
if stall, could insert some delay. I am afraid, Windows95 will give this code all the time
as this is TSR code. If so, ASPI would just execute this and not any of FILE I/O. Now, I see
why OS/2 is so good. Because I could pass the thread to the OS and place a callback.
                cmp     word ptr [bx + 2], CAT_CAS_RESP_STALL
                je      pre_read

go_ahead_w_2f:  cmp     byte ptr cb_function, 01h   ;case of file name send
                jz      yes_cb01
                cmp     byte ptr cb_function, 0eh   ;case of data return
                jz      yes_cb0e
                cmp     byte ptr cb_function, 10h   ;case of data return
                jz      yes_cb0e
                cmp     byte ptr cb_function, 12h   ;case of data return
                jz      yes_cb0e
                cmp     byte ptr cb_function, 14h   ;case of file name send
                jz      yes_cb01
                cmp     byte ptr cb_function, 15h   ;case of data send
                jz      yes_cb15
;casvox24.asm change. separate cb07 case
                cmp     byte ptr cb_function, 07h   ;case of file handle reflection
                jz      yes_cb07
;if none of the above, then it must be the following:
;see notebook 7-94, p.41
;*************************************************************************************************
;PROCESSING FOR CB00,02,05,06,[[[07.. removed with casvox24.asm]]],08,09,0A,0B,0C,0D,0F,11,13,16,17
;*************************************************************************************************
;load data_out buffer
                lea     bx, word ptr data_out
                mov     byte ptr [bx], 2fh
                mov     ax, word ptr ax_reg         ;IX_REGS -> DATA_OUT
                mov     word ptr [bx+1], ax
                mov     ax, word ptr bx_reg
                mov     word ptr [bx+3], ax
                mov     ax, word ptr cx_reg
                mov     word ptr [bx+5], ax
                mov     ax, word ptr dx_reg
                mov     word ptr [bx+7], ax
;now make SRB for execute_scsi_i/o
cb00_write:     lea     bx, word ptr SRB            ;CLEAR SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB00:    mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB00
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5. DO INQUIRY AT INSTALL TO FIND 5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0009h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh],   00h    ;sense allocation length
                lea     ax, word ptr data_out
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte write
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 2ah      ;cdb0, write_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
```


438

```
                add     sp, 4
;by this time the write_10 has completed
ASPI_done1:     mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done1

;now load the SRB for read_10
cb00_read:      lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB001:   mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB001
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0009h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_in
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte read
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 28h      ;cdb0, read_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
ASPI_done2:     mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done2
                lea     bx, word ptr data_in        ;DATA_IN -> IX_REG
                mov     ax, word ptr [bx+1]
                mov     word ptr ax_reg, ax
                mov     ax, word ptr [bx+3]
                mov     word ptr bx_reg, ax
                mov     ax, word ptr [bx+5]
                mov     word ptr cx_reg, ax
                mov     ax, word ptr [bx+7]
                mov     word ptr dx_reg, ax

                call    lun7_post_write

                pop     cx
                pop     es
                pop     di
                pop     si
                pop     bx
                pop     ds
                pop     dx
                pop     ax
cb_00:          cmp     byte ptr cb_function, 00h
                jnz     cb_02
                mov     al, byte ptr ax_reg
                popf
                iret                                ;int 2f iret
cb_02:          cmp     byte ptr cb_function, 02h
                jnz     cb_05
                mov     ax, word ptr ax_reg
                popf
                iret                                ;int 2f iret
cb_05:          cmp     byte ptr cb_function, 05h
                jnz     cb_06
                mov     ax, word ptr ax_reg
                mov     bx, word ptr bx_reg
                popf
                iret                                ;int 2f iret
cb_06:          cmp     byte ptr cb_function, 06h
;               jnz     cb_07
;casvox24.asm change.
                jnz     cb_08
                mov     ax, word ptr ax_reg
                mov     bx, word ptr bx_reg
                popf
                iret                                ;int 2f iret
;casvox24.asm change.
;cb_07:         cmp     byte ptr cb_function, 07h
;               jnz     cb_08
;               mov     ax, word ptr ax_reg
;               mov     bx, word ptr bx_reg
```


439

```
                popf
                iret                                    ;int 2f iret
b_08:           cmp     byte ptr cb_function, 08h
                jnz     cb_09
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
b_09:           cmp     byte ptr cb_function, 09h
                jnz     cb_0a
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
b_0a:           cmp     byte ptr cb_function, 0ah
                jnz     cb_0b
                mov     ax, word ptr ax_reg
                mov     cx, word ptr cx_reg
                mov     dx, word ptr dx_reg
                popf
                iret                                    ;int 2f iret
b_0b:           cmp     byte ptr cb_function, 0bh
                jnz     cb_0c
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
b_0c:           cmp     byte ptr cb_function, 0ch
                jnz     cb_0d
                mov     ax, word ptr ax_reg
                mov     cx, word ptr cx_reg
                mov     dx, word ptr dx_reg
                popf
                iret                                    ;int 2f iret
b_0d:           cmp     byte ptr cb_function, 0dh
                jnz     cb_0f
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
b_0f:           cmp     byte ptr cb_function, 0fh
                jnz     cb_11
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
b_11:           cmp     byte ptr cb_function, 11h
                jnz     cb_13
                mov     ax, word ptr ax_reg
                mov     bx, word ptr bx_reg
                cmp     byte ptr cb11_subfn, 03h
                jz      cb11_skip
                cmp     byte ptr cb11_subfn, 04h
                jz      cb11_skip
                mov     cx, word ptr cx_reg
cb11_skip:      popf
                iret                                    ;int 2f iret
cb_13:          cmp     byte ptr cb_function, 13h
                jnz     cb_16
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
cb_16:          cmp     byte ptr cb_function, 16h
                jnz     cb_17
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
cb_17:          cmp     byte ptr cb_function, 17h
                jnz     cb_ff                           ;this should not happen
                mov     ax, word ptr ax_reg
cb_ff:          popf
                iret                                    ;int 2f iret
;*************************************************************************************
;PROCESSING FOR CB01,14
;*************************************************************************************
yes_cb01:
;load data_out buffer
                lea     bx, word ptr data_out
                mov     byte ptr [bx], 2fh
                mov     ax, word ptr ax_reg
                mov     word ptr [bx+1], ax
                mov     ax, word ptr bx_reg
                mov     word ptr [bx+3], ax
                mov     ax, word ptr cx_reg
                mov     word ptr [bx+5], ax
                mov     ax, word ptr dx_reg
                mov     word ptr [bx+7], ax
;next we get the filename at ds_reg:dx_reg, find its tail end and place it in data_out buffer
;must keep current ds value which equals cs. xfer ds:si -> es:di  with movsb.
                push    ds
                mov     ax, cs:word ptr ds_reg
                mov     ds, ax
                mov     dx, cs:word ptr dx_reg
                mov     si, dx
                mov     ax, cs
```


440

```
                mov     es, ax
                add     bx, 0009h
                mov     di, bx
                mov     bx, 0009h                   ;9 bytes already
                cld
catpat01.asm change.
b14. we constrain filename change to catbox directory. this is not a restriction
ctually, as the CASMODEM only makes a name change ie changes the name of the file
nd also its pointer in the relevant tcf but does not move the file.
                cmp     byte ptr cb_function, 01h
                jnz     file_name_iter
                mov     es:byte ptr [di], "C"
                inc     si
                inc     di
                inc     bx
nd catpat01.asm change.
le_name_iter: movsb
                inc     bx
                cmp     byte ptr [si], 00h          ;Z of ASCIIZ
                jz      file_name_done
                jmp     file_name_iter
ile_name_done: movsb                                ;include 00h
                inc     bx                          ;and count it
                mov     si, bx                      ;save number of bytes for SRB
                pop     ds
now make SRB for execute_scsi_i/o
b01_write:      lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
lear_SRB010:    mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB010
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], si       ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_out
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte write
                mov     word ptr [bx+1ah], 0000h    ;no post return offset
                mov     word ptr [bx+1ch], 0000h    ;no post return segment
                mov     byte ptr [bx+40h], 2ah      ;cdb0, write_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     ax, si
                mov     byte ptr [bx+47h], ah       ;
                mov     byte ptr [bx+48h], al       ;transfer length
SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
;by this time the write_10 has completed
ASPI_done11:    mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done11

cb01_read:      lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB011:   mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB011
                mov     bx, ax
;now load the SRB for read_10
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0009h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_in
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte read
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 28h      ;cdb0, read_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
```


441

```
                push    ds                              ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASI    ıtry
                call    dword ptr [bx]
                add     sp, 4
ASPI_done12:    mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done12
                lea     bx, word ptr data_in
                mov     ax, word ptr [bx+1]
                mov     word ptr ax_reg, ax
                mov     ax, word ptr [bx+3]
                mov     word ptr bx_reg, ax
                mov     ax, word ptr [bx+5]
                mov     word ptr cx_reg, ax
                mov     ax, word ptr [bx+7]
                mov     word ptr dx_reg, ax

                call    lun7_post_write

                pop     cx
                pop     es
                pop     di
                pop     si
                pop     bx
                pop     ds
                pop     dx
                pop     ax
cb_01:          cmp     byte ptr cb_function, 01h
                jnz     cb_14
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
cb_14:          cmp     byte ptr cb_function, 14h
                jnz     cb_ee
                mov     ax, word ptr ax_reg
cb_ee:          popf
                iret                                    ;int 2f iret

;*********************************************************************************************
;PROCESSING FOR CB0E,10,12
;*********************************************************************************************
yes_cb0e:
;load data_out buffer
                lea     bx, word ptr data_out
                mov     byte ptr [bx], 2fh
                mov     ax, word ptr ax_reg
                mov     word ptr [bx+1], ax
                mov     ax, word ptr bx_reg
                mov     word ptr [bx+3], ax
                mov     ax, word ptr cx_reg
                mov     word ptr [bx+5], ax
                mov     ax, word ptr dx_reg
                mov     word ptr [bx+7], ax
;now make SRB for execute_scsi_i/o
cb0e_write:     lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB0e0:   mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB0e0
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0009h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_out
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte write
                mov     word ptr [bx+1ah], 0000h    ;no post return offset
                mov     word ptr [bx+1ch], 0000h    ;no post return segment
                mov     byte ptr [bx+40h], 2ah      ;cdb0, write_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
;by this time the write_10 and read_10 have both completed
ASPI_done0e1:   mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done0e1
```


442

```
:his is the second leg of int 2f/cb01 processing.
>0e_read:       lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
lear_SRB0e1:    mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB0e1
                mov     bx, ax
now load the SRB for read_10
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0209h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_in
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte read
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 28h      ;cdb0, read_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 02h      ;209h is 521 bytes
                mov     byte ptr [bx+48h], 09h      ;transfer length
SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
\SPI_done0e2:   mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done0e2
                lea     bx, word ptr data_in
                mov     ax, word ptr [bx+1]
                mov     word ptr ax_reg, ax
                mov     ax, word ptr [bx+3]
                mov     word ptr bx_reg, ax
                mov     ax, word ptr [bx+5]
                mov     word ptr cx_reg, ax
                mov     ax, word ptr [bx+7]
                mov     word ptr dx_reg, ax         ;this value must have come back
                                                    ;UNCHANGED!!!!!!!!!!!!!!!!!!!!
                                                    ;if a reg value is not a part of the
                                                    ;cas call, xfer directly from scsi_in_buf
                                                    ;to scsi_out_buf. I break this rule with cb11
                                                    ;but at tail end of casvox processing I do
                                                    ;not update the CPU register.
                mov     di, word ptr dx_reg         ;hopefully its value did not change!!!!!
                mov     ax, word ptr ds_reg
                mov     es, ax                      ;es:di -> int 2f buffer location
                add     bx, 9h
                mov     si, bx
cc_0e:          cmp     byte ptr cb_function, 0eh
                jnz     cc_10
;casvox26.asm change. change offset ds:dx+2 from "c" to "e"
;currently si is pointing to the beginning of source data and
;bx is equal to it.
                add     bx, 0002h                   ;we are not using bx anymore
                mov     byte ptr [bx], "E"          ;host PC's view of CaTbox.
;end casvox26.asm change
;now move 256 bytes     data_in -> ds_reg:dx_reg
                mov     cx, 0100h
cc_10:          cmp     byte ptr cb_function, 10h
                jnz     cc_12
;catpat01.asm change. change offset ds:dx+2 from "c" to "e"
;currently si is pointing to the beginning of source data and
;bx is equal to it.
                add     bx, 012fh                   ;we are not using bx anymore
                mov     byte ptr [bx], "E"          ;host PC's view of CaTbox.
                add     bx, 005fh                   ;12f+5f=18e=17f+f
                mov     byte ptr [bx], "E"
;end catpat01.asm change
;now move 512 bytes     data_in -> ds_reg:dx_reg
                mov     cx, 0200h
cc_12:          cmp     byte ptr cb_function, 12h
                jnz     cc_dd
;now move 128 bytes     data_in -> ds_reg:dx_reg
                mov     cx, 0080h
cc_dd:          rep     movsb

                call    lun7_post_write

                pop     cx
                pop     es
                pop     di
```


444

```
                pop     si
                pop     bx
                pop     ds
                pop     dx
                pop     ax
cb_0e:          cmp     byte ptr cb_function, 0eh
                jnz     cb_10
                mov     ax, word ptr ax_reg
                popf
                iret                                    ;int 2f iret
cb_10:          cmp     byte ptr cb_function, 10h
                jnz     cb_12
                mov     ax, word ptr ax_reg
                mov     bx, word ptr bx_reg
                popf
                iret
cb_12:          cmp     byte ptr cb_function, 12h
                jnz     cb_dd
                mov     ax, word ptr ax_reg
cb_dd:          popf
                iret                                    ;int 2f iret

;*************************************************************************************************
;PROCESSING FOR CB15
;*************************************************************************************************
yes_cb15:
;load data_out buffer
                lea     bx, word ptr data_out
                mov     byte ptr [bx], 2fh
                mov     ax, word ptr ax_reg
                mov     word ptr [bx+1], ax
                mov     ax, word ptr bx_reg
                mov     word ptr [bx+3], ax
                mov     ax, word ptr cx_reg
                mov     word ptr [bx+5], ax
                mov     ax, word ptr dx_reg
                mov     word ptr [bx+7], ax
;here we transfer data from  ds_reg:dx_reg -> data_out
;ds:si->es:di with movsb
                push    ds
                mov     ax, cs:word ptr ds_reg
                mov     ds, ax
                mov     si, cs:word ptr dx_reg
                mov     ax, cs
                mov     es, ax
                add     bx, 0009h
                mov     di, bx
                mov     bx, 0009h
                cld
;catpat01.asm change. make path drive letter C:.
                mov     cx, 0026h
                rep     movsb
                add     bx, 0026h
                mov     byte ptr [si], "C"              ;change path drive letter to C:
                mov     cx, 00c0h
                rep     movsb
                add     bx, 00c0h
;               mov     cx, 0e6h
;               rep     movsb
;               add     bx, 0e6h
;end catpat01.asm change.
                cmp     byte ptr [si], 01h              ;is there a cover page?
                jz      cover_page
                mov     cx, 18h
                rep     movsb
                add     bx, 18h
                mov     si, bx
                jmp     cb15_p_write
cover_page:     mov     cx, 18h
                rep     movsb
                add     bx, 18h
cover_page_iter:movsb
                inc     bx
                cmp     byte ptr [si], 00h
                jz      cover_page_done
                jmp     cover_page_iter
cover_page_done:movsb
                inc     bx
                mov     si, bx
cb15_p_write:   pop     ds
;now make SRB for execute_scsi_i/o
cb15_write:     lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB150:   mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB150
                mov     bx, ax
                mov     byte ptr [bx], 02h              ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h          ;SCSI req flags. post disabled
```

445

```
            mov     byte ptr [bx+08h    05h     ;target SCSI id=5
            mov     byte ptr [bx+09h], 01h      ;LUN=01
            mov     word ptr [bx+0ah], si       ;data allocation length: 2F,CB,00
            mov     word ptr [bx+0ch], 0000h    ; "       "
            mov     byte ptr [bx+0eh], 00h      ;sense allocation length
            lea     ax, word ptr data_out
            mov     word ptr [bx+0fh], ax       ;data offset
            mov     ax, cs
            mov     word ptr [bx+11h], ax       ;data segment
            mov     byte ptr [bx+17h], 0ah      ;10 byte write
            mov     word ptr [bx+1ah], 0000h    ;no post return offset
            mov     word ptr [bx+1ch], 0000h    ;no post return segment
            mov     byte ptr [bx+40h], 2ah      ;cdb0, write_10 cdb
            mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
            mov     ax, si
            mov     byte ptr [bx+47h], ah       ;
            mov     byte ptr [bx+48h], al       ;transfer length
;SRB is ready. call ASPI
            push    ds                          ;stack has ds:bx->SRB
            push    bx
            lea     bx, word ptr ASPI_Entry
            call    dword ptr [bx]
            add     sp, 4
;by this time the write_10 and read_10 have both completed
ASPI_done151:   mov al, byte ptr SRB+1
            cmp     al, 01h
            jnz     ASPI_done151

cb15_read:
;this is the second leg of int 2f/cb00 processing.
            lea     bx, word ptr SRB
            mov     ax, bx
            mov     cx, 0058h
clear_SRB151:   mov     byte ptr [bx], 00h
            inc     bx
            loop    clear_SRB151
            mov     bx, ax
;now load the SRB for read_10
            mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
            mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
            mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
            mov     byte ptr [bx+09h], 01h      ;LUN=01
            mov     word ptr [bx+0ah], 0009h    ;data allocation length: 2F,CB,00
            mov     word ptr [bx+0ch], 0000h    ; "       "
            mov     byte ptr [bx+0eh], 00h      ;sense allocation length
            lea     ax, word ptr data_in
            mov     word ptr [bx+0fh], ax       ;data offset
            mov     ax, cs
            mov     word ptr [bx+11h], ax       ;data segment
            mov     byte ptr [bx+17h], 0ah      ;10 byte read
            mov     word ptr [bx+1ah], 00h      ;zero out post return offset
            mov     word ptr [bx+1ch], 00h      ;zero out post return segment
            mov     byte ptr [bx+40h], 28h      ;cdb0, read_10 cdb
            mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
            mov     byte ptr [bx+47h], 00h      ;
            mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
            push    ds                          ;stack has ds:bx->SRB
            push    bx
            lea     bx, word ptr ASPI_Entry
            call    dword ptr [bx]
            add     sp, 4
ASPI_done152:   mov     al, byte ptr SRB+1
            cmp     al, 01h
            jnz     ASPI_done152
            lea     bx, word ptr data_in
            mov     ax, word ptr [bx+1]
            mov     word ptr ax_reg, ax
            mov     ax, word ptr [bx+3]
            mov     word ptr bx_reg, ax
            mov     ax, word ptr [bx+5]
            mov     word ptr cx_reg, ax
            mov     ax, word ptr [bx+7]
            mov     word ptr dx_reg, ax

            call    lun7_post_write

            pop     cx
            pop     es
            pop     di
            pop     si
            pop     bx
            pop     ds
            pop     dx
            pop     ax
cb_15:      cmp     byte ptr cb_function, 15h
            jnz     cb_bb
            mov     ax, word ptr ax_reg
cb_bb:      popf
            iret                                ;int 2f ir12
```

446

```
;*************************************  ***************************************  *******
;PROCESSING FOR CB07
;*************************************************************************************************
;casvox24.asm change. Action plan:
;1. write 9 bytes of 2f and registers.
;2. read 209h bytes. this includes 9 bytes and the filename
;3. change the disk label in the filename from c: to e:
;4. perform an int 21 3d. the handle must be passed to bx.
;5. update registers for 2f and return.
yes_cb07:
;load data_out buffer
                lea     bx, word ptr data_out
                mov     byte ptr [bx], 2fh
                mov     ax, word ptr ax_reg
                mov     word ptr [bx+1], ax
                mov     ax, word ptr bx_reg
                mov     word ptr [bx+3], ax
                mov     ax, word ptr cx_reg
                mov     word ptr [bx+5], ax
                mov     ax, word ptr dx_reg
                mov     word ptr [bx+7], ax
;now make SRB for execute_scsi_i/o
cb07_write:     lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB070:   mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB070
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0009h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_out
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte write
                mov     word ptr [bx+1ah], 0000h    ;no post return offset
                mov     word ptr [bx+1ch], 0000h    ;no post return segment
                mov     byte ptr [bx+40h], 2ah      ;cdb0, write_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 00h      ;
                mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4
;by this time the write_10 and read_10 have both completed
ASPI_done071:   mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done071

;this is the second leg of int 2f/cb07 processing.
cb07_read:      lea     bx, word ptr SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRB071:   mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB071
                mov     bx, ax
;now load the SRB for read_10
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5
                mov     byte ptr [bx+09h], 01h      ;LUN=01
                mov     word ptr [bx+0ah], 0209h    ;data allocation length: 2F,CB,00
                mov     word ptr [bx+0ch], 0000h    ; "       "
                mov     byte ptr [bx+0eh], 00h      ;sense allocation length
                lea     ax, word ptr data_in
                mov     word ptr [bx+0fh], ax       ;data offset
                mov     ax, cs
                mov     word ptr [bx+11h], ax       ;data segment
                mov     byte ptr [bx+17h], 0ah      ;10 byte read
                mov     word ptr [bx+1ah], 0000h    ;zero out post return offset
                mov     word ptr [bx+1ch], 0000h    ;zero out post return segment
                mov     byte ptr [bx+40h], 28h      ;cdb0, read_10 cdb
                mov     byte ptr [bx+41h], 20h      ;cdb1, lun=1
                mov     byte ptr [bx+47h], 02h      ;209h is 521 bytes
                mov     byte ptr [bx+48h], 09h      ;transfer length
;SRB is ready. call ASPI
                push    ds                          ;stack has ds:bx->SRB
                push    bx
                lea     bx, word ptr ASPI_Entry
```


447

```
                call    dword ptr [bx]
                add     sp, 4
ASPI_done072:   mov     al, byte ptr SRB+1
                cmp     al, 01h
                jnz     ASPI_done072
                lea     bx, word ptr data_in
                mov     ax, word ptr [bx+1]
                mov     word ptr ax_reg, ax
                mov     ax, word ptr [bx+3]
                mov     word ptr bx_reg, ax
                mov     ax, word ptr [bx+5]
                mov     word ptr cx_reg, ax
                mov     ax, word ptr [bx+7]
                mov     word ptr dx_reg, ax
;now we have the filename back in data_in buffer starting from location 9.
;we now need to change the disk label from c: to e:. I need to generalize this procedure.
;=============================================================================
;SCSI_ID to DISK LABEL RELATIONSHIP
;when the host PC comes up, it has aspi2dos.sys in its config.sys. This checks all scsi ports
;and LUNs (as we put /L for aspi2dos.sys) for devices. ASPI makes a table of these items but we
;do not have access. Later aspidisk.sys makes calls and helps DOS build a file system.
;how can I find out where my disk(s) is(are)? In this case, I need to know what disk the GUI
;is accessing. I also have the problem of determining which scsi id. this is needed when
;preparing the SRB. Thus I need to know three things:
;       A. the disk label CAS S/W is accessing (this is in casmodem.cfg if I know which directory
;          the correct casmodem.cfg is)
;       B. the scsi_id for this disk label.
;=============================================================================
;we issue an int 21 3d from host PC this time to get the handle that we can use.
;ds:dx -> filename. ds is already pointing locally.

;clear int 2f so int 21 can proceed.
                call    lun7_post_write

                lea     dx, word ptr data_in
                add     dx, 0009h
                mov     bx, dx
                mov     byte ptr [bx], 45h          ;change disk label to e: from c:
                mov     ax, 3d00h
                int     21h
;get a handle to bx_reg, only if there is a file to open. let CaT 2f decide on it by
;checking the value of ax_reg. else skip the effort.
                cmp     word ptr ax_reg, 0000h
                jnz     no_handle
                mov     word ptr bx_reg, ax
no_handle:
;               call    lun7_post_write
;causes a lockup here as an int 21 will wait for int 2f to finish.
                pop     cx
                pop     es
                pop     di
                pop     si
                pop     bx
                pop     ds
                pop     dx
                pop     ax

cb_07:          cmp     byte ptr cb_function, 07h
                jnz     cb_hh
                mov     ax, word ptr ax_reg
                mov     bx, word ptr bx_reg
cb_hh:          popf
                iret                                ;int 2f iret
;               popf
;               iret
;################end casvox21.asm changes
;end casvox1y change

;*************************************************
;*      POST-WRITE                               *
;*************************************************
;now make SRB for execute_scsi_i/o for LUN=7 post-write
;load data out buffer
lun7_post_write:mov     bx, OFFSET data_out
                mov     word ptr [bx], CAT_CAS_EXIT
                mov     al, byte ptr cb_function
                mov     byte ptr [bx + 2], al       ;function number
                mov     al, byte ptr cb11_subfn
                mov     byte ptr [bx + 3], al       ;sub function number for cb 11
post_write:     lea     bx, word ptr SRB            ;CLEAR SRB
                mov     ax, bx
                mov     cx, 0058h
clear_SRBpostwr:mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRBpostwr
                mov     bx, ax
                mov     byte ptr [bx], 02h          ;execute_scsi_i/o SRB
                mov     byte ptr [bx+03h], 00h      ;SCSI req flags. post disabled
                mov     byte ptr [bx+08h], 05h      ;target SCSI id=5. DO INQUIRY AT INSTALL TO FIND 5
                mov     byte ptr [bx+09h], 07h      ;LUN=07
```


448

```
        mov     word ptr [bx+0a]    0004h      ;data allocation length: "II",      subfn
        mov     word ptr [bx+0ch],, 0000h      ; "            "
        mov     byte ptr [bx+0eh], 00h         ;sense allocation length
        lea     ax, word ptr data_out
        mov     word ptr [bx+0fh], ax          ;data offset
        mov     ax, cs
        mov     word ptr [bx+11h], ax          ;data segment
        mov     byte ptr [bx+17h], 0ah         ;10 byte write
        mov     word ptr [bx+1ah], 0000h       ;zero out post return offset
        mov     word ptr [bx+1ch], 0000h       ;zero out post return segment
        mov     byte ptr [bx+40h], 2ah         ;cdb0, write_10 cdb
        mov     byte ptr [bx+41h], 0e0h        ;cdb1, lun=7
        mov     byte ptr [bx+47h], 00h         ;
        mov     byte ptr [bx+48h], 04h         ;transfer length
;SRB is ready. call ASPI
        push    ds                             ;stack has ds:bx->SRB
        push    bx
        lea     bx, word ptr ASPI_Entry
        call    dword ptr [bx]
        add     sp, 4
;by this time the write_10 has completed
ASPI_done_poswr:mov     al, byte ptr SRB+1
        cmp     al, 01h
        jnz     ASPI_done_poswr

        ret

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                   ;
;                                                                                                   ;
;   END   TSR   PROPER.   NO DOS INT'S USED                                                         ;
;                                                                                                   ;
;                                                                                                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
tsr_end         dw      0000h                  ;place holder for TSR end.



;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;                                                                                                   ;
;                                                                                                   ;
;   INSTALL SECTION                                                                                 ;
;                                                                                                   ;
;                                                                                                   ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;install section will store old vectors and restore new vectors.
;changing interrupt vectors. while doing it an interrupt may come. thus the segment
;must be protected with cli/sti. this happens during autoexec.bat. I will assume that
;we were in sti state at the time.
;NBthere is another question: an interrupt may come and try to do the checks we are
;patching for here.I know that for irq03, the check only comes with a fax request.
;how is it with irq00?
install:        mov     ax, ds                 ;get PSP for TSR length calculation.
                mov     cs:word ptr ds_PSP, ax
                mov     ax, cs                 ;cs for casvox00.asm
                mov     ds, ax                 ;ds=cs (1fb1)

;############start casvox21.asm changes=============get ASPIEntry address
                mov     ax, 3d00h              ;open file or device
;note that the aspi manager is already in memory. its device name is different than its
;hard disk file name. so int 21 finds it in memory.
                lea     dx, word ptr SCSIMgrString
                int     21h
                jc      NoASPIManager          ;branch if none found
                push    ax                     ;save ASPI device handle
                mov     bx, ax                 ;bx=device handle
                mov     ax, 4402h
                lea     dx, word ptr ASPI_Entry
                                               ;int 21h will store entry point here
                mov     cx, 4                  ;four bytes to transfer. I think this is how the
                                               ;IOCTL knows what info to transfer
                int     21h                    ;get ASPI Entry point
                mov     ah, 3eh
                pop     bx                     ;bx=device handle
                int     21h                    ;close ASPI Manager. I do not know what this means
                                               ;for a device. It is still in memory.
                push    ds                     ;push SRB's segment
                lea     bx, word ptr SRB       ;by convention SRB dword address is on stack
                push    bx                     ;when ASPI manager is called

;SRB area is already initialized to 0 for ASPI host adapter inquiry.

                lea     bx, word ptr ASPI_Entry
                call    dword ptr [bx]
                add     sp, 4                  ;clear the stack from SRB pointer
;check to see if it completed normally
                mov     al, byte ptr SRB+1
                cmp     al, 01h
                jz      go_on1
```

```
                lea     dx, word ptr Host_Ad_Inq_Prb
                mov     ah, 09h
                int     21h
                jmp     cont_fm_ASPI
go_on1:
;clear the SRB area if all went well with HA Inquiry. In the final product I should of course
;not install if there are problems. either with ASPI manager or card. In the final product there
;may not be a voice component as this sits on the host. this is a casvox22.asm change.
                lea     bx, word ptr SRB
                mov     cx, 0058h
clear_SRB:      mov     byte ptr [bx], 00h
                inc     bx
                loop    clear_SRB
                lea     dx, word ptr Host_Ad_Inq_Suc
                mov     ah, 09h
                int     21h
                jmp     cont_fm_ASPI
NoASPIManager:  lea     dx, word ptr No_ASPI_Mgr    ;bh=00 a must
                mov     ah, 09h
                int     21h
;##############end   casvox21.asm changes
cont_fm_ASPI:
;start casvox1y change
;set a pointer to beginning of int_2f_buffer
                mov     bx, offset int2f_buffer
                mov     word ptr int2f_buf_ptr, bx
;store current values of interrupt vectors to int2f.
                mov     al, 2fh                     ;int2f
                mov     ah, 35h
                int     21h
                mov     word ptr cas_int2f_off, bx  ;
                mov     word ptr cas_int2f_seg, es  ;
;write indirectly to 0000:00bch
                push    ds
                mov     ax, cs
                mov     cx, ax                      ;cx=cs
                mov     ax, 0000h
                mov     ds, ax                      ;now ds=0000h
                mov     bx, 00bch                   ;ds:bx->0000:00a0 (int2f)
                lea     ax, word ptr new_int2f_off
                cli
                mov     word ptr [bx], ax           ;offset of new int2f.
                mov     word ptr [bx+2], cx         ;segment of new int2f.
                sti
                pop     ds
;end casvox1y change
;*****************************************************************************
;TSR exit
;*****************************************************************************
;               mov     dx, 950h
;how about a good TSR length calculation!!!!!!!!
;       cs - ds + (tsr_end)/16 is how many paragraphs to allocate
                mov     ax, word ptr ds_PSP
                mov     dx, cs
                sub     dx, ax
                mov     bx, OFFSET tsr_end
                shr     bx, 0004h                   ;divide by 16
                add     dx, bx                      ;number of paragraphs to keep
                inc     dx                          ;add one more for chopping
;there is no limit to what value dx can take. start from original ds value (usually -10
;paragraphs from cs value) and include resident code.
                mov     ax, 3100h
                int     21h
.data
END start
```


450

NO Paper #2

#3
7-13-96
M.L

In the United States Patent and Trademark Office

Serial Number: 08 / 569 846

Application Filed: December 8, 1995

Applicant: Haluk M. Aytac

Application Title: A computing and communications transmitting, receiving system, with a push-button interface, that is continuously on, that pairs up with a personal computer and carries out mainly communications related routine tasks.

Mailed 1996, February 24, Saturday
Cupertino, CA

Information Disclosure Statement

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

Attached is a completed Form PTO-1449 (4 pages), copies (67 pages) of the of the 11 references cited thereon, and a discussion (7 pages) of their relevance to the invention.

Very respectfully,

Haluk M. Aytac
Applicant

Haluk M. Aytac
March 7, 96

10270 Parkwood Dr. 8
Cupertino, CA 95014
408 253 6172

This is a resend.
Previous attempt was
on Feb 24, 96
Express Mail # was
EH 320698522US

#3

Sheet 1 of 4

FORM PTO-1449 (REV. 7-80) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

SERIAL NO. 08/569,846

RECEIVED JUL 22 97 GROUP 2600

APPLICANT Haluk M. Aytac

FILING DATE 1995 December 8

GROUP

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
DV	AA	4,994,963	2/1991	Rorden et al.	~~364~~	~~200~~	395/309
DV	AB	4,982,324	1/1991	McConaughy et al.	~~364~~	~~200~~	395/200.09
DV	AC	4,974,192	11/1990	Face et al.	~~364~~	~~900~~	395/821
DV	AD	5,361,134	11/1994	Hu et al.	~~358~~	~~296~~	358/296
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

D	AR	AT&T Computer Telephone 8130
D	AS	Zyxel Elite 2864 Modem

EXAMINER D DINH

DATE CONSIDERED 7/29/97

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

USCOMM-DC 80-3985

Form 10-6

FORM PTO-1449 (REV. 7-80) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

SERIAL NO. 08/569846

LIST OF PRIOR ART CITED BY APPLICANT

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APPLICANT Haluk M. Aytac

FILING DATE 1995 December 8

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U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
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	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							

OTHER PRIOR ART *(Including Author, Title, Date, Pertinent Pages, Etc.)*

✓	AR	IBM Soho Assistant, 7852001
✓	AS	Brooktrout Quadrafax 2.0 fax on Demand System

EXAMINER D DINH

DATE CONSIDERED 7/22/97

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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Form 10-6

FORM PTO-1449 (REV. 7-80) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

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APPLICANT Haluk M. Aytac	
FILING DATE 1995 December 8	GROUP

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
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	AI						
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FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							

OTHER PRIOR ART *(Including Author, Title, Date, Pertinent Pages, Etc.)*

DV	AR	Canon Multipass 1000 Multifunction Peripheral
DV	AS	Lumina Series 2000 Multifunction Peripheral w/o printer

EXAMINER	DATE CONSIDERED
D DINH	7/29/97

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FORM PTO-1449 (REV. 7-80) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

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APPLICANT Haluk M. Aytac	
FILING DATE 1995 December 8	GROUP

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
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FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							

OTHER PRIOR ART *(Including Author, Title, Date, Pertinent Pages, Etc.)*

SV	AR		Pacific Image Electronics Scan Media Multifunction peripheral without a printer
	AS		

EXAMINER	DATE CONSIDERED
D. DANN	7/29/97

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

USCOMM-DC 80-3985

Form 10-6

#13

Patent Number: 4,994,963

Date: Feb. 19, 1991

Name: Rorden, Arthur, Rex, Stewart, Muhlstein, Fairclough

Discussion: This invention is a description of a method to connect two computers and have one of them (server) share its resources, such as hard disks, with the other (client). It is a hardware oriented method. This method is different than what we utilize, namely the SCSI connection, although the intent is about the same. The main difference is that in a file server, the server does not utilize its hard disks frequently; it merely makes them available to remote computers (clients). The common method of connecting the resources of two computers is Ethernet. SCSI is mainly used to attach CD-ROM devices, scanners, and hard disk devices to a computer. In SCSI, only the computer is accessing the device in question. In our case, both the computer and our device are accessing the hard disk that is inside our device. This is also the situation for the Ethernet connection i.e. both computers are accessing their own and the other's devices. Thus, one might say that we utilized the SCSI connection to establish a connection similar to the one that obtains with the Ethernet connection, namely that both computers can asynchronously access the same hard disk in one of the computers. To achieve this functionality in a reliable way, we used the LUN (logical unit number) facility in the SCSI protocol.

In addition, we have changed the interface and the operating system of one of the computers so that it could be driven via a push-button interface. This computer also had low power consumption requirements so that it could be operated continuously (without a fan). The utility is that we combine the good properties of a telephone, answering machine, fax machine, copier, i.e. push-button interface and continuous availability with the good property of a computer, i.e. the property of being a software platform where new programs can continuously be added for added functionality.

Patent Number: 4,982,324

Date: Jan. 1, 1991

Name: McConaughy, Pancoast

Discussion: This invention is a description of a method to have two computers share their hard disks via a communication link. The significance of this invention is that it describes a method whereby a remote computer's hard disk is assigned a letter as if it is a hard disk of the local computer. The local computer, from then on, may access this remote hard disk as if it were a local disk. This is the same method by which our device's hard disk is given a drive letter by the computer it is attached to. This invention encompasses any connection, including SCSI and Ethernet. This invention does not address the problem of two computers accessing the same hard disk in a reliable fashion so that the file system on the disk is not corrupted. This problem however, is routinely addressed in Ethernet connections between two computers such as two PC's equipped with the Windows 95 operating system. Our device achieves the same functionality via the SCSI interface. The novelty in our work, from this point of view is the use of LUN (logical unit number) property of a SCSI connection for the purpose of achieving file system integrity.

In addition, we have changed the interface and the operating system of one of the computers so that it could be driven via a push-button interface. This computer also had low power consumption requirements so that it could be operated continuously (without a fan). The utility is that we combine the good properties of a telephone, answering machine, fax machine, copier, i.e. push-button interface and continuous availability with the good property of a computer, i.e. the property of being a software platform where new programs can continuously be added for added functionality.

Patent Number: 4,974,192

Date: Nov. 27, 1990

Name: Face, Barnich

Discussion: This invention describes a personal computer communications card that has its own power supply connection so that this card may be receiving inputs from telecommunications lines while the personal computer has its power turned off. It addresses one of the problems we also have addressed in our invention, namely, the problem of continuous availability. It is different in three important ways:

1. This communications card does not have its own interface to the user. It utilizes the interface of the computer it is housed in. Our device has its own push-button interface.
2. The storage for incoming data is a RAM block on the communications card. The user may then transfer this data to the hard disk of the computer housing the card. In our case, our device has its own hard disk where data can be stored indefinitely.
3. This communications card is not a software platform. Our device is a software platform in the sense that it is an embedded computer with its own operating system that can acquire new features via new programs loaded to it via the computer it is attached to.

Patent Number: 5,361,134

Date: Nov. 1, 1994

Name: Hu, Ring

Discussion: This invention describes a scanner and a printer pair, housed in a computer, connected to it possibly via SCSI, and driven by this computer to achieve fax, copy, scan, and print functions. It is a different configuration than our device. Our device does not include the printer and scanner and it does not have a keyboard, monitor interface. This device is a standalone device. Our device pairs up with a computer and makes its own hard disk accessible to this computer for purposes of downloading new programs, editing configuration files, and making incoming data available to this computer. This device is more like a "multifunctional peripheral" device such as the OfficeJet by Hewlett-Packard. It is also different than the OfficeJet in that it has a monitor and a keyboard as an interface.

Product: AT&T Computer Telephone
Model: 8130

Discussion: This product supports our thesis that telephony does not belong on the PC because a communications appliance has to be continuously available and the PC is turned off when not in use. It also supports our thesis that routine functions are best driven via a push-button interface. However, this device is not a software platform. It does what it is designed to do out of the factory and no more. However, the data it makes available to the PC can be manipulated in different ways as the PC is a software platform.

Product: Zyxel Modem
Model: Elite 2864

Discussion: This modem has a printer connection. Incoming faxes can be printed directly. The PC does not need to be on. It also receives voice messages. It does not have a scanner connection to send faxes, although faxes can be sent via the PC. It does not have an interface to allow the user to initiate functions separately from the PC. It is also not programmable and therefore not a software platform. Its storage is RAM. With this modem, users do not need a fax machine. Its link to PC is parallel.

Product: IBM SOHO Assistant
Model: 7852001

Discussion: This box receives voice and fax messages and stores them in RAM. PC needs to be on to view the faxes. It seems to play voice messages. Its link to PC is serial. This box is not programmable and therefore not a software platform. One cannot send faxes with it. Its user interface is too simple. Its storage is RAM.

Product: Brooktrout Faxback

Model: QuadraFax 2.0

Discussion: This device is connected to a PC via serial interface. Fax files can be downloaded to its hard disk. The device can do call processing and deliver faxes. The required voice announcements can also be downloaded from PC to its hard disk. This hard disk, however, is not recognized by the operating system on the PC. For this reason, only the manufacturer's programs can access this hard disk. In our case, however, downloading a file to CaTbox PT's hard disk can be done by copying a file to this disk using the DOS copy command. Likewise, configuration parameters can be changed by editing CaTbox hard disk files using the DOS edit command, or any editor in Windows on PC. In addition, new programs can be loaded to CaTbox PT by copying them to appropriate directories on CaTdisc.

This product is not an open software platform with a keypad driven user interface that pairs up with a PC to offload its mainly communications related routine tasks. It is a dedicated server for faxes, whose voice files can be downloaded into its hard disk from a PC using this manufacturer's own programs over a serial link as this hard disk is not available to the operating system on the PC.

Product: Canon Multifunction Peripheral

Model: Multipass1000

Discussion: This device is similar to many others such as HP's OfficeJet, and offerings from Xerox, Brother etc. The generic name is a multifunction peripheral. The concept is a precursor to our invention. It sees correctly that there needs to be a locus of many functions outside of a PC. But stops short of saying that this locus can be an independent physical entity that is a software platform i.e. new functions can be brought to it via new programs beyond what is programmed in at the factory. Incidentally, these devices appeared after our first disclosure in August 1994.

Product: Lumina Multifunction Peripheral without a printer

Model: Series 2000

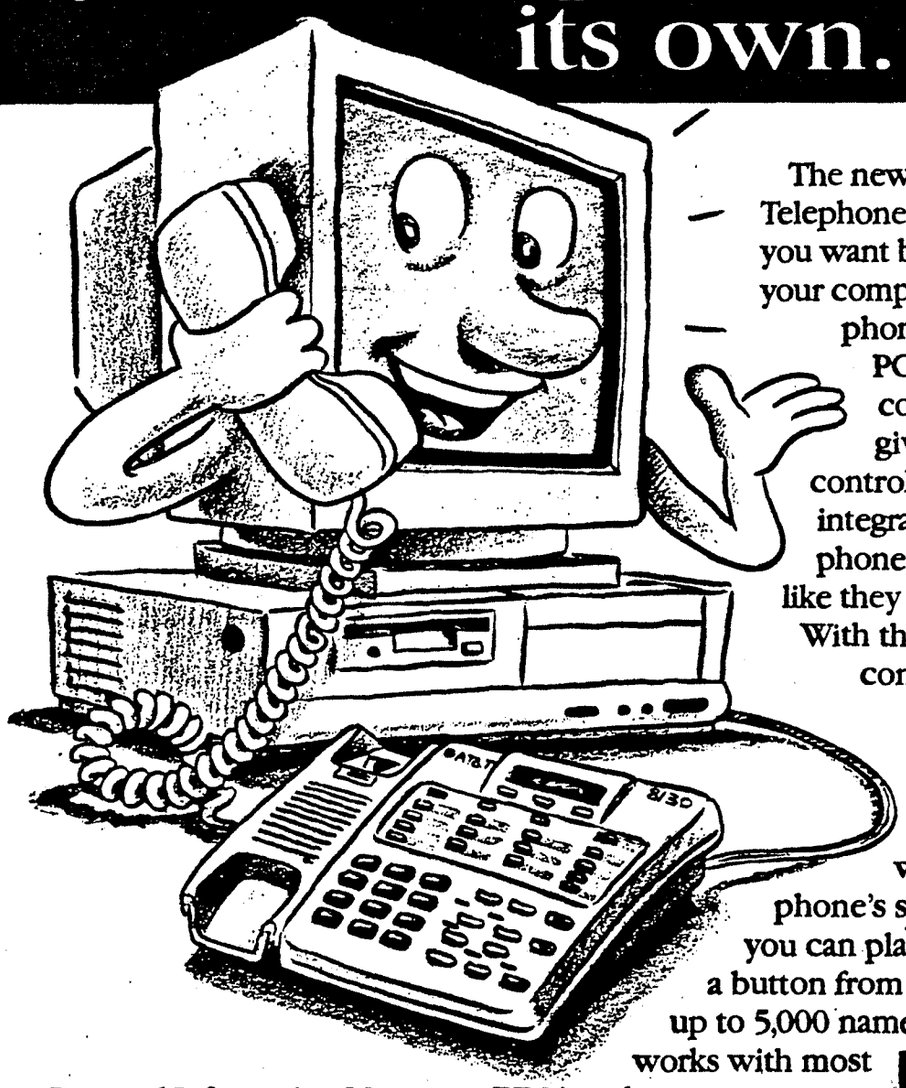
Discussion: This is a multifunction peripheral without a printer. This device was introduced in December of 1995. It attempts to solve a problem users have with multifunction peripherals: users have better printers attached to the PC's parallel port. They do not wish to attach a multifunction device to the same port. This is why multifunction devices have not done well in the marketplace. But, this device does not go further to shed the scanner also and make what remains a software platform. Also, in this device and the other multifunction peripherals, there is no hard disk inside.

Product: Pacific Image Electronics Inc. Multifunction Peripheral without a printer.

Model: ScanMedia

Discussion: This device is like Lumina above except that its link to the PC is SCSI. This is a step in the right direction. SCSI is faster than parallel port to import scanned images to PC. It will also print to a parallel port. The same arguments apply here: this device does not have a SCSI disk, is not programmable beyond the factory, the programming core is not separated from the scanner device.

At last, a telephone your computer can call its own.



The new AT&T Computer Telephone 8130 gives you the link you want between your phone and your computer. A two-line speakerphone connects right to your PC. It comes with Windows†-compatible software that gives you the power to control your computer-phone integration. Suddenly, your phone and your computer act like they were made for each other. With the 8130, data about your contacts that you've stored in your computer automatically appears on your computer screen during your call (and with Caller I.D.*, while the phone's still ringing!). What's more, you can place a call with the click of a button from a software directory of up to 5,000 names and numbers. The 8130 works with most Personal Information Managers (PIMs) and contact management software applications.** The integration is seamless, giving you greater control and faster access to data so your communication becomes more productive.

To see the AT&T Computer Telephone 8130, visit your participating AT&T Phone Center or select retailer. Or call 1 800 233-2650, ext. 304.

† Windows is a registered trademark of the Microsoft Corporation.
* You must subscribe to the local telephone company's caller identification service; there are fees for this service and such service is not available in all areas.
** Supports Microsoft® TAPI specification.

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61

Punk Me Up

Cyberpunk – the dreaded C-word. We've all read it, maybe you've lived it, and some of us (trust me) have spent a few days in jail as a consequence of it. And now the basics – or at least how to bs your way through them – have been thoughtfully compiled, by the very people who should know better. Spare, dead-on accurate, and at times hysterically funny, the *Cyberpunk Handbook* lays it all out.

In 192 pages, *Cyberpunk Handbook* offers the ABCs of the cyberpunk attitude ("Quiet assurance. Subdued swashbuckling. Maybe a little menace.") and the telltale signs of whether people you know and otherwise trust are

dOOds and grrrls unite!

cyberpunks, be they goths, d00ds, grrrls, deep geeks, sci-fi writers, or just sneering, leather-jacketed wannabes. Sneering wannabeism, in fact, is where the book really shines. Check out the handy guide to cyber word power and the terminal-velocity crash course in seminal works (*Neuromancer*, *Tetsuo*, *Videodrome*, and anything by Bruce Sterling).

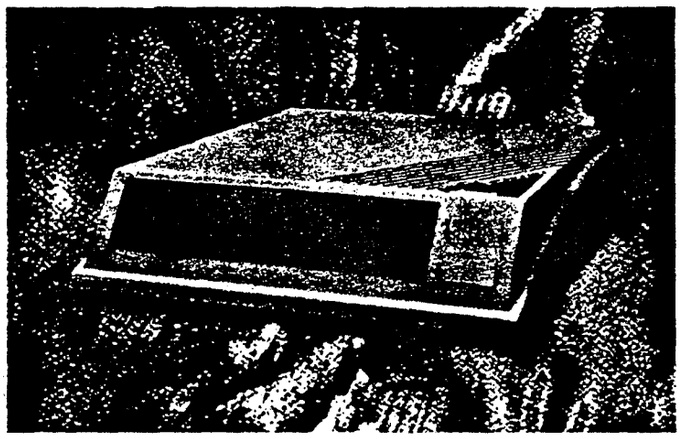
"St. Jude" Milhon, R. U. Sirius, and Bart Nagel of *Mondo 2000* infamy pull this off with a perfect mix of humor, insight, self-effacement, and jovial nasty-mindedness. I give the *Cyberpunk Handbook* a four-shuriken rating. – *Chris Hudak*

berpunk Handbook: US$9.95. Random House: +1 (212) 751 2600.

Modems with a Future

Why pay US$549 for a high-speed modem when some brands are selling for under $200? That's the riddle of Zyxel's Elite 2864 modem. Zyxel bills its box as the "Modem of the Millennium." Packaged in a sleek white case, the Elite will happily zoom along at V.34 speeds of 28.8 Kbps. The real selling point, though, is its upgradability to ISDN, which lets you speed up to 64 or 128 Kbps without using compression. Cost of the upgrade is $249, and you can do it yourself.

Zyxel has earned a reputation in the modem industry by making hardware that's technologically advanced, rock-solid reliable, and incredibly expensive. The Elite carries on this tradition. Not satisfied with fax-modem software, which is frequently buggy and requires that your computer be left on to receive faxes, Zyxel has equipped this top-of-the-line modem with a parallel port that connects directly to your



Unpuzzle the riddle of Zyxel's latest Elite modem.

laser printer. You can program the modem to print faxes as they arrive or to store them in memory until you ask to dump them. You can also connect the computer to the modem through a parallel port, allowing the two to converse at speeds up to 460 Kbps.

On the Elite's side, you'll find jacks for a microphone and speaker. Use them, along with the Elite's capabilities for voice compression, to set up your own digital answering machine. Now, you can advertise your modem's telephone number as your universal mailbox for voice, fax, and data calls.

Is it worth the money? Depends on your needs. If you're going to upgrade to ISDN within the next year, then the Elite wouldn't be a stupid purchase. But if you can wait a few years before upgrading, you'll probably be able to purchase ISDN modems for what an off-the-shelf 28.8 modem costs today. – *Simson Garfinkel*

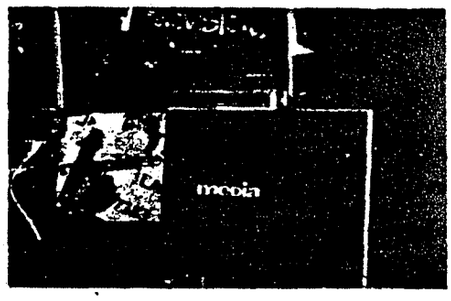
Elite 2864: US$549. Zyxel: +1 (714) 693 0808, e-mail *sales@zyxel.com*, via the Web at *http://www.zyxel.com/zyxel/*.

I Want My M(edia)TV!

If, in the words of Marshall McLuhan, the medium is the message, then what is the message of a medium that explores this idea? Such was the conundrum I faced when I first watched *Media Television*. Airing on the upscale cable network Bravo, this 30-minute show profiles "the art and science of persuasion," cutting-edge examples of new media, and new ways of using established media.

Stories take place in hip locales around the planet. In San Francisco and Toronto, we're introduced to a company that projects filmed advertising against buildings at night – "architectural media," the purveyors term it. Though these animated billboards are meant to convey a sales pitch, the artistic possibilities are obvious: In other footage, the same technology heightens the multimedia intensity of an outdoor concert by Jean-Michel Jarre.

Computers and their role in our zeitgeist receive generous amounts of attention. However, *Media*



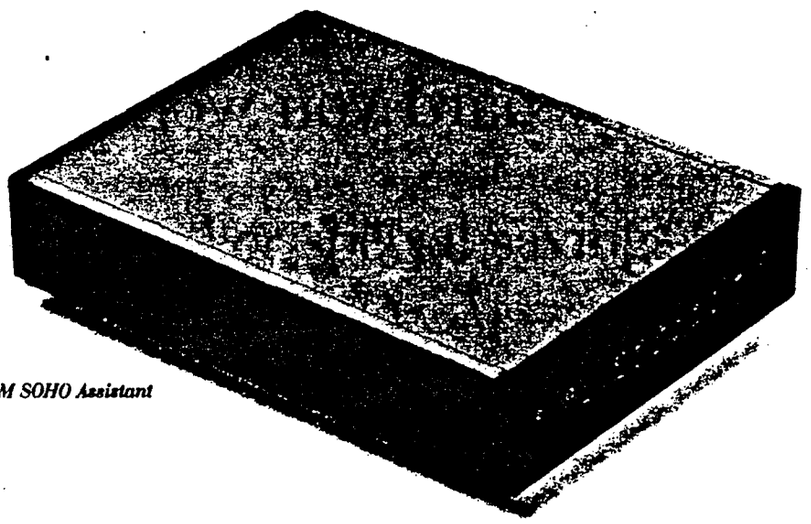
The art and science of media persuasion.

***Television* falters in providing the bigger picture on squishy trends such as virtual reality. One segment profiles a researcher in Austin, Texas, who creates surreal virtual worlds. OK, but what's the *point*? The producers have better luck when they focus on more concrete topics such as technology in advertising.**

Unlike most reporting shows, *Media Television* forgoes booming narrations. Instead, brief explanations occasionally scroll across the screen. An intimate, slightly voyeuristic feeling characterizes the show. You are a witness to the stories rather than a viewer who's merely being told something and shown examples.

So, what's the message behind this show? Well, naturally the medium (whichever that may be) – duh! *Media Television* explores this McLuhanism week after week in a visually compelling format. It's a romp through information-age pop culture that will delight those who are fascinated by media and their message. – *Howard Wen*

Media Television: Bravo Network. Check local cable TV listings for air times.



IBM SOHO Assistant

Introducing the IBM SOHO Assistant: The ultimate tool for any small office.
Call it a staff-in-the-box. This revolutionary product enables a small office to perform functions not found in other external modems. Into a package no larger than a phone answering machine, our engineers have carefully integrated the following:

- A 14.4Kbps fax/modem that can turn itself on for transmission during cheapest telephone times, and store or forward faxes with virtually no image degradation
- A digital phone answering machine that can also forward calls and messages, and provide up to 9 additional password-protected voice mailboxes.
- The means to turn an existing fax machine into a scanner

To top it off, although SOHO Assistant attaches to your PC through its serial port, the PC doesn't have to be powered or even connected to perform its wonders.

SOHO Assistant (7852001).....**$379**
SOHO 1MB Upgrade (13H6681).....**$56**
SOHO 4MB Upgrade (13H6682).....**$182**

Modem options from IBM.
IBM *PC Direct* offers a comprehensive selection of quality tested data/fax modems, including internal modems for ISA, Micro Channel, and PCMCIA architectures and external modems for any system with a serial port. Two support the new ultra-fast V.34 28.8Kbps standard, making them among the most advanced modems available. Some even support Wake-Up-On-Ring in our Aptiva™, PC 300, and PC 700 products. For added value, fax software and/or communications applications are included with every IBM modem we sell.

IBM MODEMS

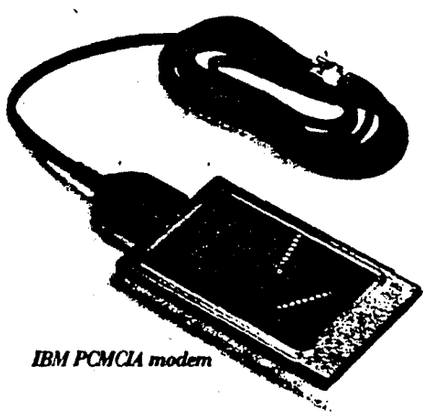
PART NUMBER	DESCRIPTION	PRICE
3324[1]	ISA 14.4Kbps data/fax modem with Wake-Up-On-Ring and 16550 UART	$90
7851002[2]	External 14.4Kbps data/fax modem with V.42/V.42bis, MNP-5, MNP-10	$115
92G7448[2]	ISA 28.8Kbps data/fax modem with Wake-Up-On-Ring and 16550 UART	$225
92G7449[2]	External 28.8Kbps data/fax modem with V.42/V.42bis, MNP-5, MNP-10	$255
92G7498	Micro Channel 14.4Kbps data/fax modem with V.42/V.42bis and 16550 UART	$305

[1] Manufactured in Canada. [2] Manufactured in Singapore.

PCMCIA Modems.
All the modems below can help mobile professionals be more productive. Two transmit at the new V.34 28.8Kbps standard, making them especially economical with phone bills. Our selection also includes a modem that can operate in different geographies, as well as modems that can directly attach to your cellular phone.

PCMCIA MODEMS

PART NUMBER	DESCRIPTION	PRICE
10H9355	IBM 14.4Kbps data/fax modem (optional international DAAs)[2]	$445
73G7097	IBM 14.4Kbps data/fax modem MNP-10, V.42/V.42bis, 16550[2]	$180
MM68315	Apex 14.4Kbps data/fax modem can directly attach to cell phone using optional cables	$299
MM01456	Apex 28.8Kbps data/fax modem can directly attach to cell phone using optional cables	$429
MM08477	Megahertz XJ2144 14.4Kbps data/fax modem, XJACK, MNP-10	$225
MM18189	Megahertz XJ2288 28.8Kbps data/fax modem, XJACK	$399



IBM PCMCIA modem

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Within seconds of calling the number below, you'll get a demo. Within minutes, you'll have hard copy in your hands

But the really amazing thing is, within hours, you could be doing the same thing for your customers.

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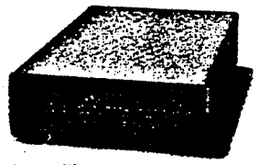

Amazing. That's the word that best describes QuadraFax™ 2.0 from Brooktrout Technology. That's because it's unlike any Fax-On-Demand or Fax Broadcast System you've ever seen before. QuadraFax is easy to set up, incredibly affordable to own and as small as a laptop. And thanks to its PC-based Windows administration software, you'll have your Fax-On-Demand and Fax Broadcast services up and running in a matter of hours. Plus, priced at $2,995 for two-port systems and $3,995 for four-port systems, no business can afford to be without QuadraFax — the fax and voice system that's simply amazing. See this small wonder for yourself. For a demo and more information, just call the number above.

Brooktrout TECHNOLOGY
Shaping the Future of Fax & Voice

$595 FAX BROADCAST APPLICATION FREE! Purchase a QuadraFax system by July 31, 1995 and get Fax Broadcast application software free-a $595 value. For more information call (617) 449-4100, ext. 262.

64


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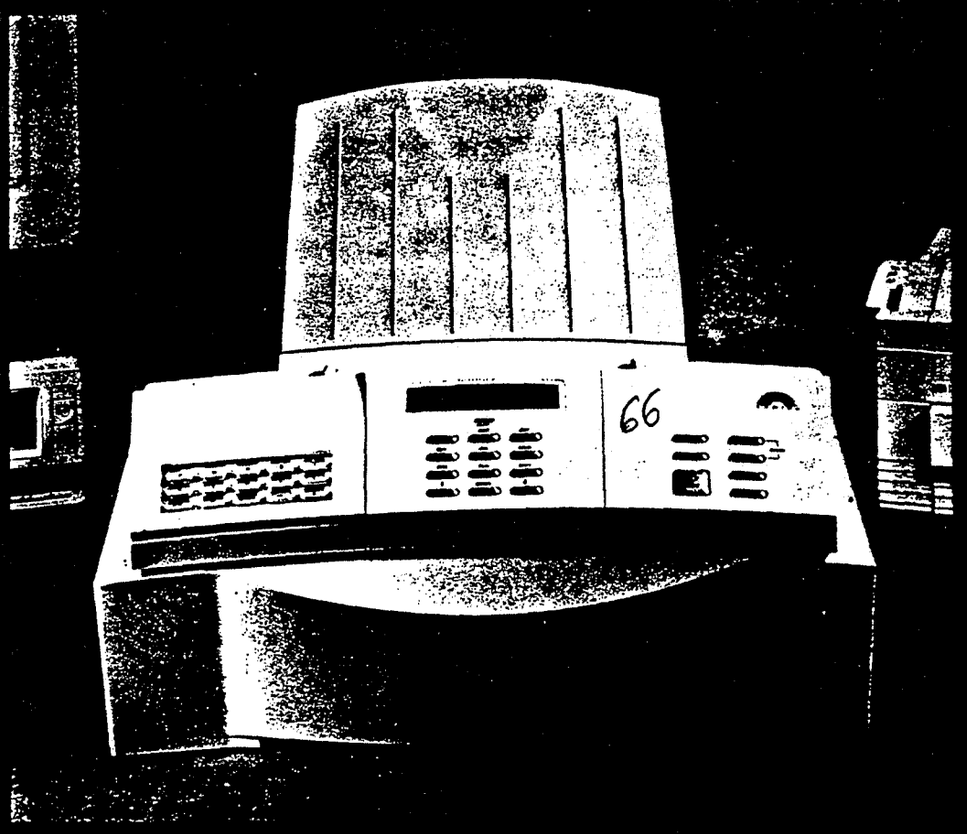
7 REASONS WHY THE LUMINA SERIES 2000

Is the Best Multi-Function Product

FOR YOUR GROWING BUSINESS

It's a full-featured, stand-alone, plain-paper fax machine.

It has complete copier capabilities, including collation, enlargement, and reduction.



You can use it to scan documents into your PC for easy storage and retrieval.

Its built-in fax modem lets you send and receive faxes using your PC

You can access all the features from the alpha-numeric keyboard or from your PC using Windows™ based software.

It easily connects to your printer to output crisp, clean, plain-paper faxes and copies.

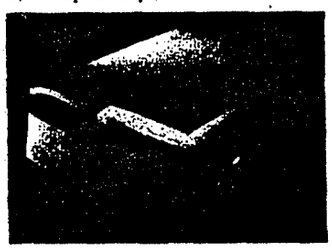
LUMINA

Specialists in Multi Function Office Products

Scanner with a Twist

AT A QUICK FIRST GLANCE, PACIFIC IMAGE ELECTRONICS' $895 **ScanMedia** might *look* like an ordinary, garden-variety flatbed scanner. But look again: This versatile multifunction device doubles as a plain-paper fax and a copier, too.

Fundamentally, the ScanMedia is a single-pass 30-bit flatbed scanner that supports 300- by 600-dot-per-inch (dpi) opticals and 2,400- by 2,400-dpi interpolated resolutions of letter-size and legal-size documents. If you're using the ScanMedia as a standalone unit, the printer pass-through port doubles as a way for you to copy documents at resolutions up to 300 dpi and at sizes ranging from 50 percent to 200 percent of the original image. There's a built-in 14.4-Kbps Group III–compatible fax so that you can fax hard copies of documents via your computer. The integrated 20-key keypad means that the unit can be operated as a standalone, or you can use the included SCSI-2 board to operate the unit from your PC.



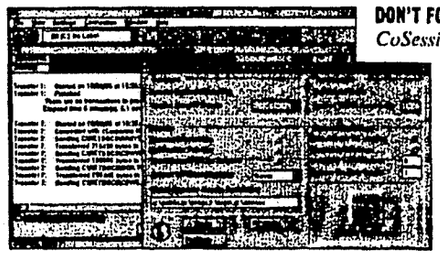
MULTIFUNCTION SCANNER: *The ScanMedia is also a fax and a copier.*

Pacific Image Electronics Inc., Torrance, CA; 310-214-5281; fax, 310-214-5282. *Circle 409 on reader service card.*

A Light Touch

FOR AN ALTERNATIVE INput device, consider FTG Data Systems' $458 **FT-2257 Light Pen Pack**, which now supports Windows 95, Windows NT, and NeXT, in addition to Windows 3.1 and DOS. The sleek light pen works with any CRT monitor, providing precise cursor control for everything from drawing and annotation to general on-screen navigation. The pen now features an extra button on the side that emulates the right-mouse button. An interface card is also included.

FTG Data Systems, Stanton, CA; 800-962-3900, 714-995-3900; fax, 714-995-3989. *Circle 407 on reader service card.*



DON'T FORGET THAT REMOTE: *CoSession for Windows 6.0 provides flexibility when accessing remote PCs.*

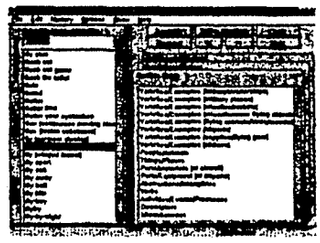
Remotely Controlled

TRITON TECHNOLOGIES' $80 **CoSession for Windows 6.0** upgrades the popular 16-bit remote-control software to provide compatibility with Windows 95 in both host and viewer modes. This version offers Winsock support, the elimination of a DOS TSR when running in Windows on a host PC, file synchronization and cloning, and failed transfer recovery so that you can resume interrupted file transfers.

CoSession also has an "intelligent transfer" feature, which offers the ability to transfer only the portion of a given file that has changed since the last transfer, thereby reducing transfer times. **Triton Technologies Inc.**, Iselin, NJ; 800-322-9440, 908-855-9440; fax, 908-855-9608. *Circle 413 on reader service card.*

Gaining the Writer's Edge

FOR THE ULTIMATE WRITer's companion, consider IdeaFisher Systems' **Writer's Edge**, a $39.95 reference package that goes well beyond the functionality of the standard thesaurus that's included with your Windows word processor. Writer's Edge packs over a million and a half linked entries, providing you with countless ways to search for the word, phrase, or concept that will add just the right tone and meaning to your written work.



WRITING COMPANION: *Writer's Edge is more than just a thesaurus.*

IdeaFisher Systems Inc., Irvine, CA; 800-289-4332, 714-474-8111; fax, 714-474-1778. *Circle 410 on reader service card.*

BRIEFS

Books

So much new software, so little time. A new series of books designed specifically for busy people will have you learning Windows 95 on your lunch break. The series includes ***Windows 95 for Busy People, Word for Windows 95 for Busy People, Excel for Windows 95 for Busy People,*** and ***The Internet for Busy People*** ($22.95, Osborne/McGraw-Hill, 800-227-0900) .... The Internet has exploded into a graphical phenomenon, and ***Internet Graphics Gallery,*** by Paul DeGroot and Dick Oliver, shows you how to sample and download the best graphics on the Web. An included CD-ROM provides image processing and viewing utilities, as well as HTML editors ($39.99, Que Corp., 800-428-5331) .... For aspiring Webmasters, the 1996 ***World Wide Web Directory*** covers more than 8,000 Web sites. A bundled CD-ROM works with your browser to provide dynamic links to all the sites in the catalog ($29.99, New Riders, 800-428-5331).

Internet

MegaZine's $19.95 **Internet Address Book** features a directory to popular Web sites and the ability to drag-and-drop URLs so that the program can create an HTML page of your favorite links (*megazine@usa.net*) .... The **$79 InContext Spider Version 1.1** improves on InContext Systems' first version by including 28 predesigned Web-page templates and support for the Netscape and Microsoft Internet Explorer extensions (416-922-0087) .... Skeleton Development Corp.'s **$495 Skeleton Storefront Kit 2.0** offers potential Internet shopkeepers a way to create a virtual storefront on the Web for online catalogs and shopping sites (800-787-3374).

UNITED STATES DEPARTMENT OF COMMERCE
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SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/569,846	12/08/95	AYTAC	H

B3M1/0801

HALUK M AYTAC
10270 PARKWOOD DR 8
CUPERTINO CA 95014

EXAMINER	
ART UNIT	PAPER NUMBER
2317	4

DATE MAILED: 08/01/97

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), 0 days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892.
2. ☒ Notice of Draftsman's Patent Drawing Review, PTO-948.
3. ☒ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____.

Part II SUMMARY OF ACTION

1. ☒ Claims 1-11 are pending in the application.

   Of the above, claims _____ are withdrawn from consideration.

2. ☐ Claims _____ have been cancelled.
3. ☒ Claims 1-10 are allowed.
4. ☒ Claims 11 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____. has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved; ☐ disapproved (see explanation).
12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____ ; filed on _____.
13. ☐ Since this application apppears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

EXAMINER'S ACTION

PTOL-326 (Rev. 2/93)

Part III DETAILED ACTION

The abstract of the disclosure is objected to because it is more than 250 word in length . Correction is required. See MPEP § 608.01(b).

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 250 words. It is important that the abstract not exceed 250 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:
(1) if a machine or apparatus, its organization and operation;
(2) if an article, its method of making;
(3) if a chemical compound, its identity and use;
(4) if a mixture, its ingredients;
(5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Grehan "Share your IBM PC hard disk drive with a Mac", Byte February 1988 v13 n2.

As per claim 11, Grehan discloses a second computer (IBM PC) comprising

an operating system (DOS),

a plurality of hard disks and means by which said hard disks are recognized by the operating system (inherent in the IBM PC),

a cable (SCSI connection the PC to the Mac) whereby the second computer (IBM PC) is connected to a first computer (Mac),

a first programming means (TSR) at said second computer whereby said second computer in target mode and said first computer in initiator mode communicate utilizing a protocol and said first programming means operates the second computer in either target or initiator mode (inherent in operation of QuickShare in communication over the SCSI interface).

a second programming means (Installation program) at said second computer whereby an operating system at said first computer recognize said hard disks of said second computer as hard disk of said first computer ("the Macintosh sees as its hard disk volume"),

said second programming means, a third programming means (PCTransfer program), and a first programming means at the first computer (Mac's applications) whereby reliable access by said operating system at the first computer and by said operating system at the second computer to said hard disks at the second computer is achieved.

Claims 1-10 are allowable over the prior art of record.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung Dinh whose telephone number is (703) 305-9655. The examiner can

normally be reached on Monday-Thursday from 7:00 AM - 4:30 PM. The examiner can also be reached on alternate Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Lee can be reached at (703) 305-9717.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-9600.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, DC 20231

or faxed to:

(703) 308-9051, (for formal communications intended for entry)

(703) 308-5359 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Dung Dinh
Patent Examiner
July 29, 1997

Form PTO 948 (Rev. 10-94) U.S. DEPARTMENT OF COMMERCE - Patent and Trademark Office Application No. 569846

NOTICE OF DRAFTSPERSON'S PATENT DRAWING REVIEW

PTO Draftspersons review all originally filed drawings regardless of whether they are designated as formal or informal. Additionally, patent Examiners will review the drawings for compliance with the regulations. Direct telephone inquiries concerning this review to the Drawing Review Branch, 703-305-8404.

The drawings filed (insert date) 12/8/95, are
A. ___ not objected to by the Draftsperson under 37 CFR 1.84 or 1.152.
B. X objected to by the Draftsperson under 37 CFR 1.84 or 1.152 as indicated below. The Examiner will require submission of new, corrected drawings when necessary. Corrected drawings must be submitted according to the instructions on the back of this Notice.

1. DRAWINGS. 37 CFR 1.84(a): Acceptable categories of drawings: Black ink. Color.
   - ___ Not black solid lines. Fig(s)_____
   - ___ Color drawings are not acceptable until petition is granted. Fig(s) _____
2. PHOTOGRAPHS. 37 CFR 1.84(b)
   - ___ Photographs are not acceptable until petition is granted. Fig(s) _____
   - ___ Photographs not properly mounted (must use brystol board or photographic double-weight paper). Fig(s)_____
   - ___ Poor quality (half-tone). Fig(s)_____
3. GRAPHIC FORMS. 37 CFR 1.84 (d)
   - ___ Chemical or mathematical formula not labeled as separate figure. Fig(s)_____
   - ___ Group of waveforms not presented as a single figure, using common vertical axis with time extending along horizontal axis. Fig(s)_____
   - ___ Individuals waveform not identified with a separate letter designation adjacent to the vertical axis. Fig(s)_____
4. TYPE OF PAPER. 37 CFR 1.84(c)
   - ___ Paper not flexible, strong, white, smooth, nonshiny, and durable. Sheet(s)_____
   - ___ Erasures, alterations, overwritings, interlineations, cracks, creases, and folds copy machine marks not accepted. Fig(s) _____
   - ___ Mylar, velum paper is not acceptable (too thin). Fig(s) _____
5. SIZE OF PAPER. 37 CFR 1.84(f): Acceptable sizes:
   - 21.6 cm. by 35.6 cm. (8 1/2 by 14 inches)
   - 21.6 cm. by 33.1 cm. (8 1/2 by 13 inches)
   - 21.6 cm. by 27.9 cm. (8 1/2 by 11 inches)
   - 21.0 cm. by 29.7 cm. (DIN size A4)
   - ___ All drawing sheets not the same size. Sheet(s)_____
   - ___ Drawing sheet not an acceptable size. Sheet(s) _____
6. MARGINS. 37 CFR 1.84(g): Acceptable margins:

Paper size

	21.6 cm. X 35.6 cm. (8 1/2 X 14 inches)	21.6 cm X 33.1 cm. (8 1/2 X 13 inches)	21.6 cm. X 27.9 cm. (8 1/2 X 11 inches)	21.0 cm. X 29.7 cm. (DIN Size A4)
T	5.1 cm. (2")	2.5 cm. (1")	2.5 cm. (1")	2.5cm.
L	.64 cm. (1/4")	.64 cm. (1/4")	.64 cm. (1/4")	2.5 cm.
R	.64 cm. (1/4")	.64 cm. (1/4")	.64 cm. (1/4")	1.5 cm.
B	.64 cm. (1/4")	.64 cm. (1/4")	.64 cm. (1/4")	1.0 cm.

Margins do not conform to chart above.
Sheet(s)_____
___Top (T) ___Left (L) ___Right (R) ___Bottom (B)

7. VIEWS. 37 CFR 1.84(h)
   REMINDER: Specification may require revision to correspond to drawing changes.
   - ___ All views not grouped together. Fig(s)_____
   - ___ Views connected by projection lines or lead lines. Fig(s)_____

   Partial views. 37 CFR 1.84(h) 2
   - ___ View and enlarged view not labled separatly or properly. Fig(s)_____

   Sectional views. 37 CFR 1.84 (h) 3
   - ___ Hatching not indicated for sectional portions of an object. Fig(s)_____
   - ___ Cross section not drawn same as view with parts in cross section with regularly spaced parallel oblique strokes. Fig(s)_____
8. ARRANGEMENT OF VIEWS. 37 CFR 1.84(i)
   - ___ Words do not appear on a horizontal, left-to-right fashion when page is either upright or turned so that the top becomes the right side, except for graphs. Fig(s)_____
9. SCALE. 37 CFR 1.84(k)
   - ___ Scale not large enough to show mechanism with crowding when drawing is reduced in size to two-thirds in reproduction. Fig(s)_____
   - ___ Indication such as "actual size" or scale 1/2" not permitted. Fig(s)_____
10. CHARACTER OF LINES, NUMBERS, & LETTERS. 37 CFR 1.84(l)
    - ___ Lines, numbers & letters not uniformly thick and well defined, clean, durable, and black (except for color drawings). Fig(s)_____
11. SHADING. 37 CFR 1.84(m)
    - ___ Solid black shading areas not permitted. Fig(s)_____
    - ___ Shade lines, pale, rough and blurred. Fig(s)_____
12. NUMBERS, LETTERS, & REFERENCE CHARACTERS. 37 CFR I.84(p)
    - ___ Numbers and reference characters not plain and legible. 37 CFR 1.84(p)(l) Fig(s)_____
    - ___ Numbers and reference characters not oriented in same direction as the view. 37 CFR 1.84(p)(l) Fig(s)_____
    - X English alphabet not used. 37 CFR 1.84(p)(2) Fig(s)_____
    - ___ Numbers, letters, and reference characters do not measure at least .32 cm. (1/8 inch) in height. 37 CFR(p)(3) Fig(s)_____
13. LEAD LINES. 37 CFR 1.84(q)
    - ___ Lead lines cross each other. Fig(s)_____
    - ___ Lead lines missing. Fig(s)_____
14. NUMBERING OF SHEETS OF DRAWINGS. 37 CFR 1.84(t)
    - ___ Sheets not numbered consecutively, and in Arabic numerals, beginning with number 1. Sheet(s)_____
15. NUMBER OF VIEWS. 37 CFR 1.84(u)
    - ___ Views not numbered consecutively, and in Arabic numerals, beginning with number 1. Fig(s)_____
    - ___ View numbers not preceded by the abbreviation Fig. Fig(s)_____
16. CORRECTIONS. 37 CFR 1.84(w)
    - ___ Corrections not made from prior PTO-948. Fig(s)_____
17. DESIGN DRAWING. 37 CFR 1.152
    - ___ Surface shading shown not appropriate. Fig(s)_____
    - ___ Solid black shading not used for color contrast. Fig(s)_____

COMMENTS:

ATTACHMENT TO PAPER NO. _____ REVIEWER _____ DATE 3/14/96

#4

Notice of References Cited

Application No.	Applicant(s)		
08/569,846	Haluk M. Aytac		
Examiner		Group Art Unit	Page 1 of 1
Dung Dinh		2317	

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	4,839,802	06/13/89	Wonak et al.	395	834
B	5,577,205	11/19/96	Hwang et al.	395	200.01
C	5,590,339	12/31/96	Chang	395	838
D	4,688,171	08/18/87	Selim et al.	395	200.02
E	4,878,196	10/31/89	Rose	395	750
F	5,530,894	06/25/96	Farrell et al.	395	800
G	5,239,632	08/24/93	Larner	395	306
H	5,367,647	11/22/94	Coulson et al.	395	285
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U	Grehan, Rick "Share your IBM PC hard disk drive with a Mac." BYTE, Feb. 1988 v13 n2 p.89	2/88
V		
W		
X		

MISSING PAGE(S)

FROM THE U.S. PATENT OFFICE

OFFICIAL FILE WRAPPER

Publication(s) missing from the PTO file.

#5

OFFICIAL

FAX RECEIVED

OCT 24 1997

GROUP 2600

To: Commissioner of Patents and Trademarks
Fax No: 703 308 ~~9051~~ 5359

From: Haluk M. Aytac
Serial Number: 08/569,846

Examiner: Dung Dinh
GAU 2317

Attached please find 9 pages of Amendment A and 2 pages of Information Disclosure Statement. In addition to faxing, the applicant will mail the same document via Express Mail by US Postal Service today, October 24, 1997.

12 pages including cover page.

04/09/1995 23:01 4082555869 PAGE 01

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OCT 2 4 1997

GROUP 2600

#5/A

BH

10-29-97

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial Number:	08/569,846
Filing Date:	1995-12-08
Applicant:	Aytac, Haluk M.
Appn. Title:	A COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS
Examiner:	Dung Dinh/GAU: 2317

Mailed 1997 October 24
At Cupertino, California

AMENDMENT A

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

In response to the Office letter mailed 08/01/97, kindly amend the above application as follows:

ABSTRACT

Replace the abstract of record with the following:

An embedded computer, CaTbox, is connected to a PC via SCSI cable, and to a telecommunications switch. CaTbox runs an operating system, CaTOS, and contains a hard disk accessible to PC as a SCSI disk called CaTdisc. Print jobs issued from PC are transferred as files to CaTdisc, queued by CaTOS and driven in the foreground to a printer attached to CaTbox. CaTbox has an LCD screen, keypad, and is connected to telephone handsets. While PC and printer are off, CaTbox receives faxes, voicemail, email and stores them on CaTdisc. It delivers HTML pages stored on CaTdisc. Keypad directed, CaTbox plays voicemail and prints faxes or email. Modems on CaTbox, CaTmodems, are available for data,

N.E. Not on Separate Sheet

voice, fax communications from PC. A scanner on SCSI bus may be driven by CaTbox via keypad to scan documents to store on CaTdisc, print or send as faxes. CaTOS has step tables for each modem, actions, foreground programs, configuration files, and queues. Steps hold actions that execute within a time slice for a modem during timer tick. Actions emit, record messages, queue foreground program requests, queue requests for another step, call other actions, idle, answer a call etc. Steppers within each time slice move execution from step to step based on keypad inputs, events, conditions, and contents of step tables. Foreground programs move files to, from memory, print, scan etc. Idle actions check a queue for steps to execute. A scheduler runs after timer ticks to choose the next foreground program.

CLAIMS

Cancel Claim 11 of record and substitute new Claims 12, 13, 14, 15 as follows:

12. An arrangement of two computers wherein:

a second computer is connected to telecommunications lines,

said second computer has a push button user interface,

said second computer is continuously on and available,

said second computer has an operating system,

said second computer has a plurality of hard disks and means whereby said hard disks are recognized by said operating system at said second computer,

a first computer has a monitor,

said first computer has a graphical user interface,

said first computer is sometimes on and available,

said second computer and said first computer are connected by a cable,

said second computer has a programming means and said first computer has a programming means whereby said first computer recognizes said hard disks of said second computer as hard disks of said first computer,

whereby, telecommunications related routine tasks initiated by manipulating said push button interface are carried out by said second computer,

whereby, said telecommunications related routine tasks initiated periodically are carried out by said second computer,

whereby, said telecommunications related routine tasks initiated by signals from said telecommunications lines are carried out by said second computer,

whereby, said telecommunications related routine tasks initiated by said first computer are carried out by said second computer,

whereby, tasks requiring said monitor of said first computer are supported by said first computer,

whereby, complex tasks requiring said graphical user interface of said first computer are carried out by said first computer.

a1

12 11

13. The arrangement of two computers in accordance with Claim ~~12~~ wherein:

said second computer comprises a multiplicity of modems,

said second computer comprises a programming system means,

said programming system means having

a step table file for each said modem

each said step table file having a multiplicity of step table entries,

a stepper program means that operates during timer tick interrupt and reads one of said step table entries in a memory image of said step table for each said modem to identify an action to call for each said modem, and calls said actions, and keeps calling said actions at each timer tick until each said action is completed in turn, and based on said step table entry and DTMF, keypad inputs and return codes, determines a next one of said step table entries for each said modem,

said actions comprising their own version of said stepper whereby said actions can call other said actions in turn,

38

a first one of said actions whereby a request to execute foreground programs residing on said hard disks can be placed in a first queue,

a program means that is activated after the end of the timer tick, as conditions permit, that reads said first queue and chooses one of said foreground programs on said first queue to run,

a second one of said actions whereby a sequence of said step table entries may terminate in a request to a second queue

said second queue having entries wherein each one of said entries points to one of said step table entries,

a third one of said actions associated with a beginning one of said step table entries that examines said second queue and finding a request in a said entry there jumps to one of said step table entries noted in said second queue entry,

said third one of said actions associated with said beginning one of said step table entries that examines an incoming phone call and determines if said phone call is a fax, voice or data call and jumps to one of said step table entries based on said determination,

said third one of said actions associated with said beginning one of said step table entries that examines a buffer for said keypad inputs and jumps to one of said step table entries based on said keypad input,

whereby, a multiplicity of modems, scanners, printers may be controlled to implement telephony, voice, fax, data applications in a push button driven, user friendly manner, independent of said first computer.

13 11

14. The arrangement of two computers in accordance with Claim 12 wherein:

a first component of an application program runs on said first computer,

a second component of said application program runs on said second computer,

said first component of said application program and said second component of said application program share a directory on said hard disks of said second computer,

whereby said first component of said application program may access a first file received by said second component of said application program from said telecommunications lines and deposited on said directory,

whereby said second component of said application program may send, over said telecommunications lines, a second file deposited on said directory by said first component of said application program.

14 12

15. The arrangement of two computers in accordance with Claim 13 wherein:

new said actions may be created,

new said step table entries may be created containing said new actions or said previously created actions,

new said foreground programs may be created that are called from said first one of said actions within said new step table entries,

whereby components of application programs for said second computer may be developed and added to said programming system means at said second computer.

40

REMARKS

1. The abstract has been shortened to fewer than 250 words in response to the examiner's objection.

2. The objection to the drawings has been noted; new drawings will be filed after allowance.

3. Pages 5 and 6 are added to PTO-1449 to include references uncovered by the examiner and shown on PTO-892.

4. Claim 11 of record has been replaced with new Claim 12 and its dependent Claims 13 to 15 in order to define the contents of Claim 11 more particularly over the cited references. These Claims are all submitted to be patentable over the cited references because (I) they recite novel structure and thus distinguish physically over the reference (Sec. 102), (ii) they recite new use and thus are novel over the reference (Sec. 102), (iii) these distinctions effect new and unexpected results, thereby indicating unobviousness under Sec. 103.

The Claims All Distinguish Over The References Under Sec. 102

5. The independent Claim 12 and hence all Claims distinguish physically over the references under Sec. 102 because they recite a second computer with a push button user interface.

6. The cited and relied-upon Grehan article (Grehan) shows two computers (MAC and PC) with keyboards and mouse driven graphical user interfaces.

7. The other cited but not relied-upon references are also deficient in one or more of the above-discussed physical features of the independent claim.

8. Since the independent Claim 12 recites physical features which are not present in any reference, applicant submits that this claim and hence all of the dependent Claims 13 to 15, clearly recite novel physical features which distinguish over any and all references under Sec. 102.

9. The independent Claim 12 and hence all Claims distinguish in novelty of use over the references under Sec. 102 because they recite a pair of computers where one may be off whereas the other consumes low enough power to be always on for telecommunications related input/output similar to telecommunications equipment, such as telephones and answering machines, that are continuously on.

10. The cited and relied-upon Grehan article (Grehan) shows two computers (MAC and PC) where common practice is to turn them off when not in use.

11. The other cited but not relied-upon references are also deficient in one or more of the above-discussed novelty of use features of the independent claim.

12. Since the independent Claim 12 recites novelty of use features which are not present in any reference, applicant submits that this claim and hence all of the dependent Claims 13 to 15, clearly recite novel uses which distinguish over any and all references under Sec. 102.

Novel Physical Features and Novelty of Use of Claims 12 to 15 Provide New and Unexpected Results And Hence Should be Considered Unobvious, Making the Claims Patentable under Sec. 103

13. Applicant submits that the above recited novel physical features and novelty of use in the independent Claim 12, and hence in all claims, provide new and unexpected results and hence should be considered unobvious, making the claims patentable under Sec. 103.

14. Specifically, replacing the monitor, keyboard, and mouse on a second computer with an LCD display and keypad, and having its power consumption low to enable it to be continuously on, we have the new and unexpected result in a software platform next to a PC for routine, mainly telecommunications related tasks.

15. None of the prior art can provide these new and unexpected results:

> Grehan's second computer, like the first one, is usually turned off when not in use and has a graphical user interface, keyboard, and mouse for user interaction. This makes it unsuitable to use in routine telecommunications related tasks. Computers are not typically used as answering machines or fax machines at homes and small businesses.
>
> Today, there are a number of special purpose devices sitting next to a PC or telephone: answering machine, fax machine, multifunction peripheral (scan, print, copy, fax), external modem, faxback box etc. These devices are not a software platform The second computer described in this invention can duplicate the functions of each, be as user friendly with a push button interface, and be left continuously on. Moreover, as it is a software platform, further applications are possible such as a WEB server.

16. Since the above novel physical features and novelty of use of applicant's device provide these new and unexpected results over any reference, applicant submits that these new results indicate unobviousness and hence patentability. Accordingly, applicant respectfully requests consideration and allowance of Claims 12 to 15 substituting for Claim 11.

Additional Reasons Militate In Favor of Unobviousness

17. In addition to the above new and unexpected results, applicant submits that additional reasons militate in favor of patentability, as follows:

18. **Unrecognized Problem:** Up to now, insofar as applicant is aware, the art contained no indication of the desirability of providing a software platform next to a PC, that is continuously on, that has a simple LCD, keypad interface, that is connected to the PC, to carry out routine telecommunications functions. The discovery of this problem, as well as the concomitant solution to it, is submitted to be an important one, worthy of patent protection.

19. **Long-Felt But Unsolved Need:** The present invention solves a long-existing but unsolved (and unrecognized) need and therefore is submitted to be worthy of patent protection. Specifically, there have been numerous attempts to bring PC computers and telephony together. AT&T Computer Telephone 8130 is an example. These solutions have been special purpose devices. As they have not been forward looking, flexible devices, they have not been commercially successful. The present invention separates the computing core of these devices and makes it into a software platform.

The Dependent Claims 13-15 Are A-fortiori Patentable

20. The dependent Claims 13-15 add additional novel features and thus are submitted to be a-fortiori patentable. Claim 13 recites that the second computer supports a programming system. Claim 14 recites that applications programs written for the pair of computers in this invention communicate via files in a directory of the second computer's hard disk. Claim 15 recites that further applications for this invention may be written and added to the programming system on the second computer, by writing new foreground programs, possibly new actions, and by adding steps to the step tables. .

The Cited But Non-Applied References

21. These subsidiary references have been studied, but are submitted to be less relevant than the relied upon reference.

Request For Constructive Assistance

22. The undersigned has made a diligent effort to amend Claim 11 of this application into Claims 12 to 15 in a way to define novel structure and novel use which are also submitted to render the new Claims unobvious because they produce new and unexpected results. If, for any reason, Claims 12 to 15 are not believed to be in full condition for allowance, applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims pursuant to MPEP 707.07(j) or in making constructive suggestions pursuant to MPEP 706.03(d) in order that this application can be placed in allowable condition as soon as possible and without the need for further prosecution.

Very respectfully,

Haluk M. Aytac
Applicant Pro Se

10270 Parkwood Dr 8
Cupertino, CA 95014
phone: 408 253 6172
fax: 408 253 2994

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/569,846	12/08/95	AYTAC	H

LM21/1224

HALUK M AYTAC
10270 PARKWOOD DR 8
CUPERTINO CA 95014

EXAMINER	
DINH, D	
ART UNIT	**PAPER NUMBER**
2756	6

DATE MAILED: 12/24/97

NOTICE OF ALLOWABILITY

PART I.

1. ☒ This communication is responsive to amend filed 10-24-97.
2. ☒ All the claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice Of Allowance And Issue Fee Due or other appropriate communication will be sent in due course.
3. ☒ The allowed claims are 1-10, 12-15.
4. ☐ The drawings filed on _____ are acceptable.
5. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [_] been received. [_] not been received. [_] been filed in parent application Serial No. _____, filed on _____.
6. ☐ Note the attached Examiner's Amendment.
7. ☐ Note the attached Examiner Interview Summary Record, PTOL-413.
8. ☐ Note the attached Examiner's Statement of Reasons for Allowance.
9. ☒ Note the attached NOTICE OF REFERENCES CITED, PTO-892.
10. ☐ Note the attached INFORMATION DISCLOSURE CITATION, PTO-1449.

PART II.

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" indicated on this form. Failure to timely comply will result in the ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

1. ☐ Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
2. ☒ APPLICANT MUST MAKE THE DRAWING CHANGES INDICATED BELOW IN THE MANNER SET FORTH ON THE REVERSE SIDE OF THIS PAPER.
   a. ☒ Drawing informalities are indicated on the NOTICE RE PATENT DRAWINGS, PTO-948, attached hereto or to Paper No. 4. CORRECTION IS REQUIRED.
   b. ☐ The proposed drawing correction filed on _____ has been approved by the examiner. CORRECTION IS REQUIRED.
   c. ☐ Approved drawing corrections are described by the examiner in the attached EXAMINER'S AMENDMENT. CORRECTION IS REQUIRED.
   d. ☒ Formal drawings are now REQUIRED.

Any response to this letter should include in the upper right hand corner, the following information from the NOTICE OF ALLOWANCE AND ISSUE FEE DUE: ISSUE BATCH NUMBER, DATE OF THE NOTICE OF ALLOWANCE, AND SERIAL NUMBER.

Attachments:

- _ Examiner's Amendment
- _ Examiner Interview Summary Record, PTOL-413
- _ Reasons for Allowance
- X Notice of References Cited, PTO-892
- _ Information Disclosure Citation, PTO-1449
- _ Notice of Informal Application, PTO-152
- _ Notice re Patent Drawings, PTO-948
- _ Listing of Bonded Draftsmen
- _ Other

DINH C. DUNG
PATENT EXAMINER
GROUP 2300

PTOL-37 (REV. 4-89) ★

Notice of References Cited

Application No.	Applicant(s)		
08/569,846	Haluk M. Aytac		
Examiner		Group Art Unit	Page 1 of 1
Dung Dinh		2756	

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	4,974,192	11/27/90	Face et al.	395	821
B					
C					
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U		
V		
W		
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UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

LM21/1224

HALUK M AYTAC
10270 PARKWOOD DR 8
CUPERTINO CA 95014

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
08/569,846	12/08/95	014	DINH, D	2756	12/24/97

First Named Applicant	AYTAC,	HALUK M.

TITLE OF INVENTION: COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	395-200.410	V77	UTILITY	YES	$660.00	03/24/98

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.
If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is changed, pay twice the amount of the FEE DUE shown above and notify the Patent and Trademark Office of the change in status, or
B. If the status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:

A. Pay FEE DUE shown above, or

B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

II. Part B-Issue Fee Transmittal should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by charge to deposit account, Part B Issue Fee Transmittal should be completed and returned. If you are charging the ISSUE FEE to your deposit account, section "4b" of Part B-Issue Fee Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give application number and batch number.
Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (REV. 10-96) Approved for use through 06/30/99. (0651-0033) PATENT AND TRADEMARK OFFICE COPY
☆U.S.GOVERNMENT PRINTING OFFICE 1997-433-221/62716

Serial Number: 08/569,846
Filing Date: 1995-12-08
Issue Batch Number: V77
Date of Notice of Allowance: 1997-12-24
Applicant: Aytac, Haluk M.
Appn. Title: A COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS
Examiner: Dung Dinh
GAU: 2756

Crystal Park III
Room 922
Bldg. 2231
Crystal Drive
Arlington, Virginia 22202

Attn: Son Lam

Sir:

Copies of new drawing sheets 1/16 to 16/16 (Figures 1-12) for the above application are enclosed, corrected as necessary. Originals have been formally submitted to the Patent Office (please see copies of the letters).

Your comments on the correctness of these drawings are appreciated.

Very respectfully,

Haluk M. Aytac

Haluk M. Aytac
Applicant Pro Se

10270 Parkwood Dr 8
Cupertino, CA 95014
phone: 408 253 6172
fax: 408 253 2994

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial Number: 08/569,846
Filing Date: 1995-12-08
Issue Batch Number: V77
Date of Notice of Allowance: 1997-12-24
Applicant: Aytac, Haluk M.
Appn. Title: A COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS
Examiner: Dung Dinh
GAU: 2756

Mailed 1998 March 11
At Cupertino, California

Submission of Corrected Drawings

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Attn: Chief Draftsperson

Sir:

New drawing sheets 1/16 to 16/16 (Figures 1-12) for the above application are enclosed, corrected as necessary. Please substitute these for the corresponding sheets on file.

Very respectfully,

Haluk M. Aytac
Applicant Pro Se

10270 Parkwood Dr 8
Cupertino, CA 95014
phone: 408 253 6172
fax: 408 253 2994

Certification of Mailing

I certify that this correspondence will be deposited with the United States Postal Service as first class mail with proper postage affixed in an envelope addressed to "Commissioner of Patents and Trademarks, Washington, DC 20231" on the date below.

Date: 1998 March 11 _____ Haluk M. Aytac, Applicant Pro Se

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial Number: 08/569,846
Filing Date: 1995-12-08
Issue Batch Number: V77
Date of Notice of Allowance: 1997-12-24
Applicant: Aytac, Haluk M.
Appn. Title: A COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS
Examiner: Dung Dinh
GAU: 2756

Mailed 1998 March 11
At Cupertino, California

Request for Approval of Proposed Drawing Amendment

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

Applicant respectfully requests permission to amend the drawings of the above application after allowance. The proposed change is to break down Figure 11 into four figures called Figures 11A, 11B, 11C, 11D. This is to ensure 3.2 mm minimum size lettering.

Very respectfully,

Haluk M. Aytac
Applicant Pro Se

10270 Parkwood Dr 8
Cupertino, CA 95014
phone: 408 253 6172
fax: 408 253 2994

Certification of Mailing

I certify that this correspondence will be deposited with the United States Postal Service as first class mail with proper postage affixed in an envelope addressed to "Commissioner of Patents and Trademarks, Washington, DC 20231" on the date below.

Date: 1998 March 11 _____ Haluk M. Aytac, Applicant Pro Se

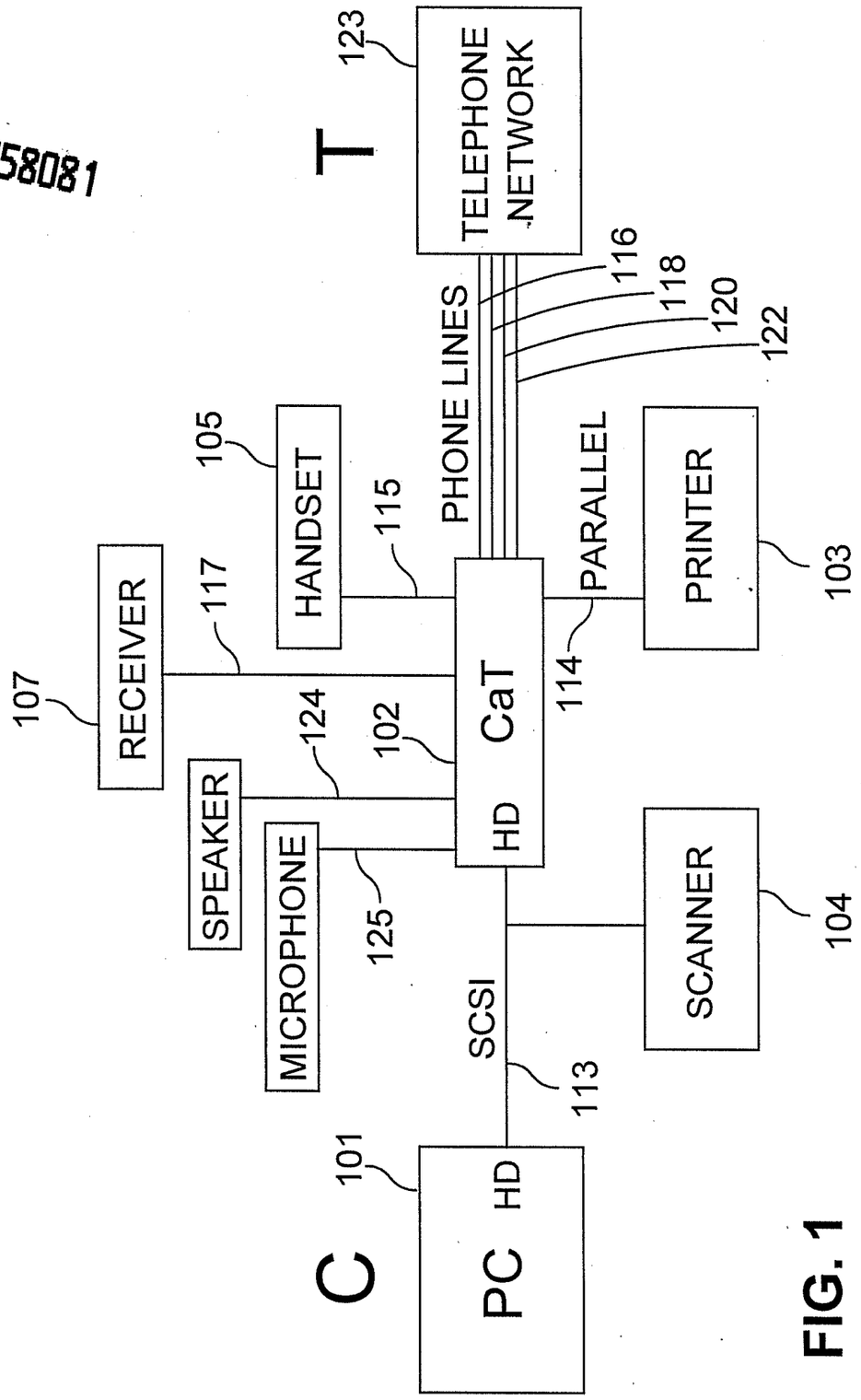

FIG. 1

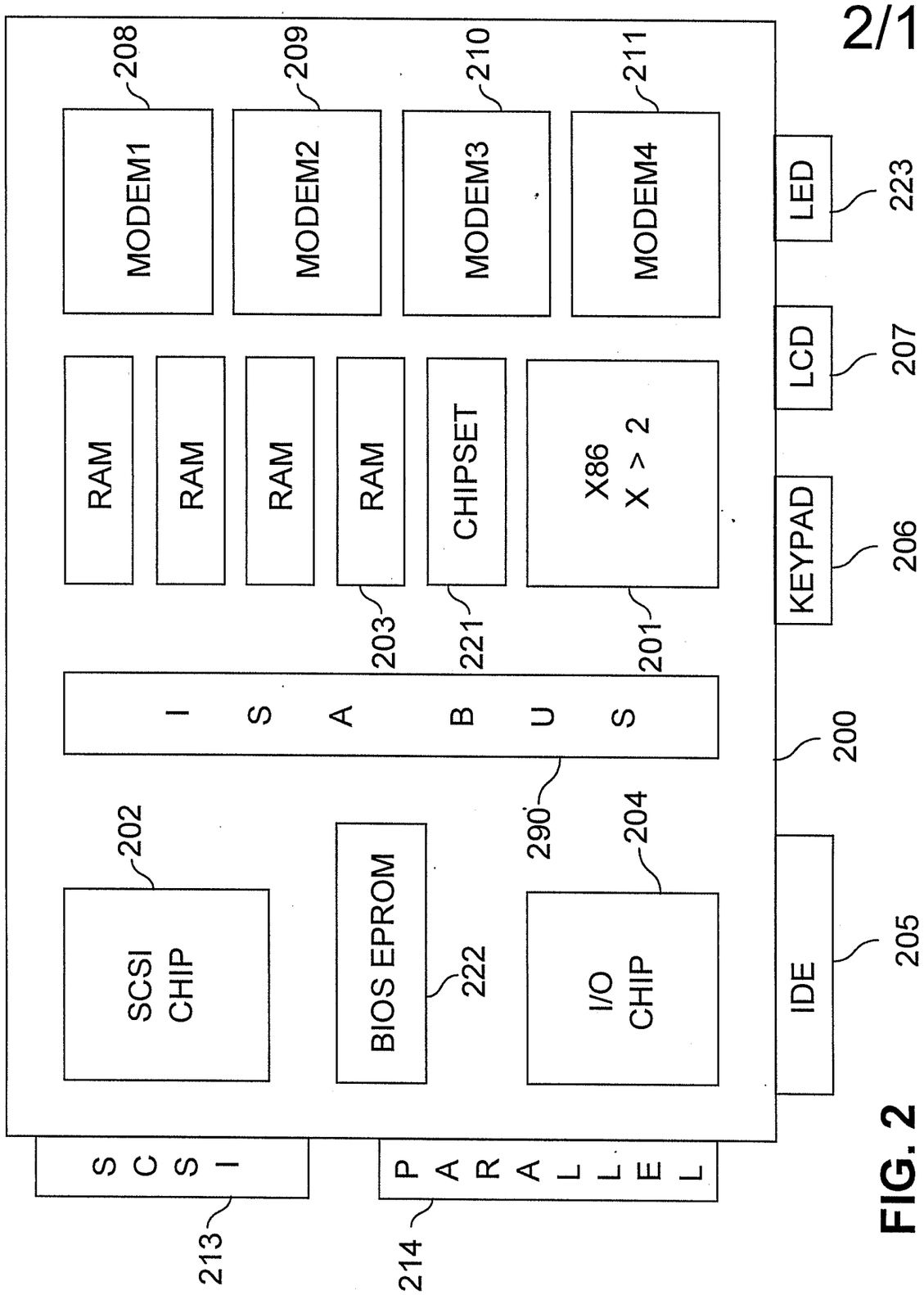

FIG. 2

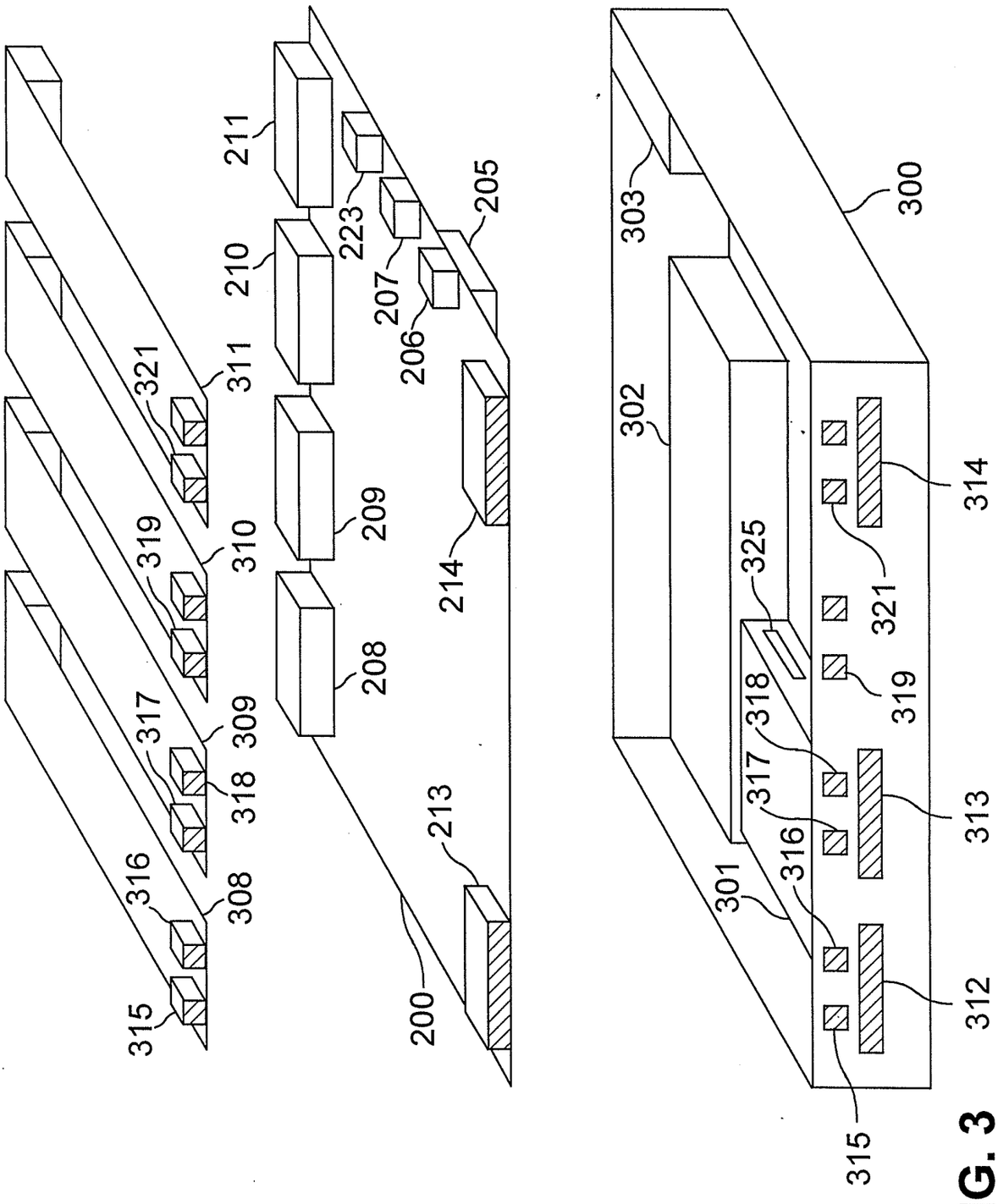

FIG. 3

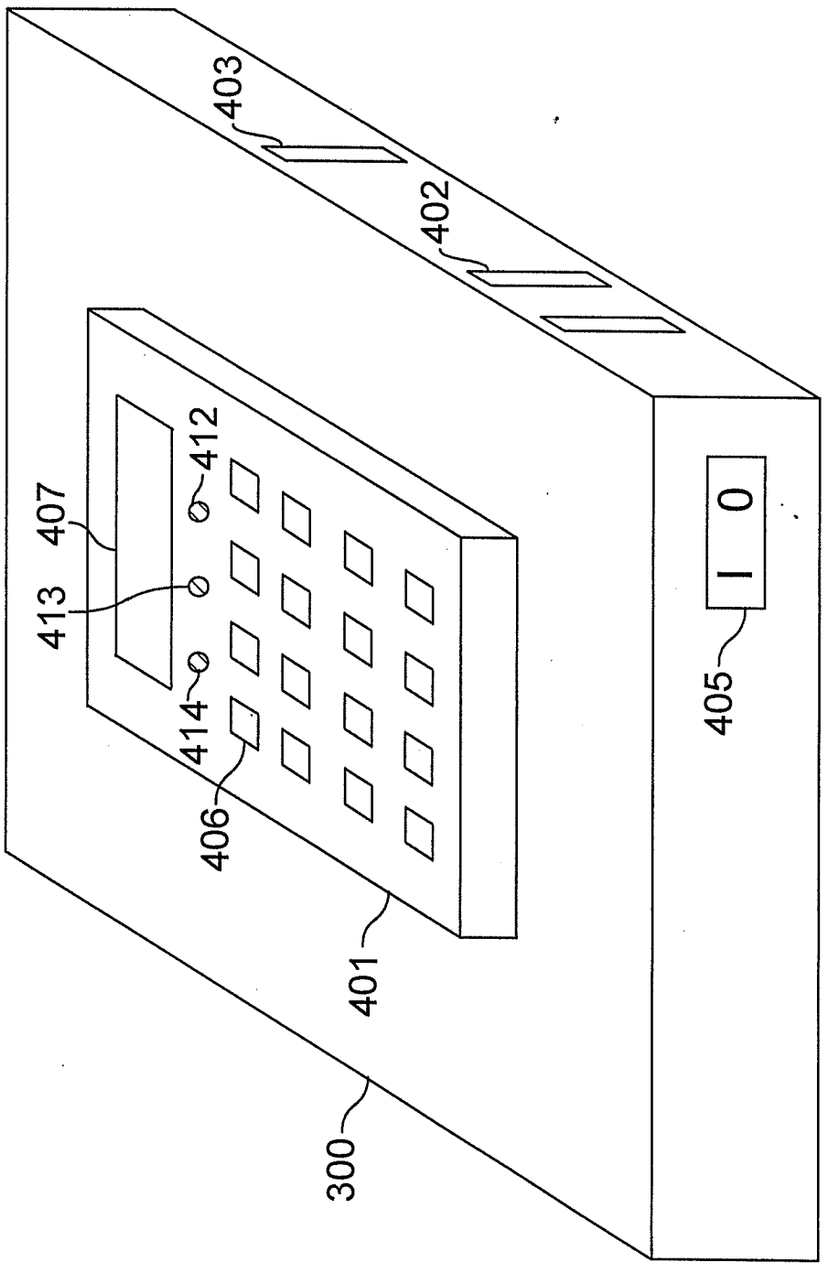

FIG. 4

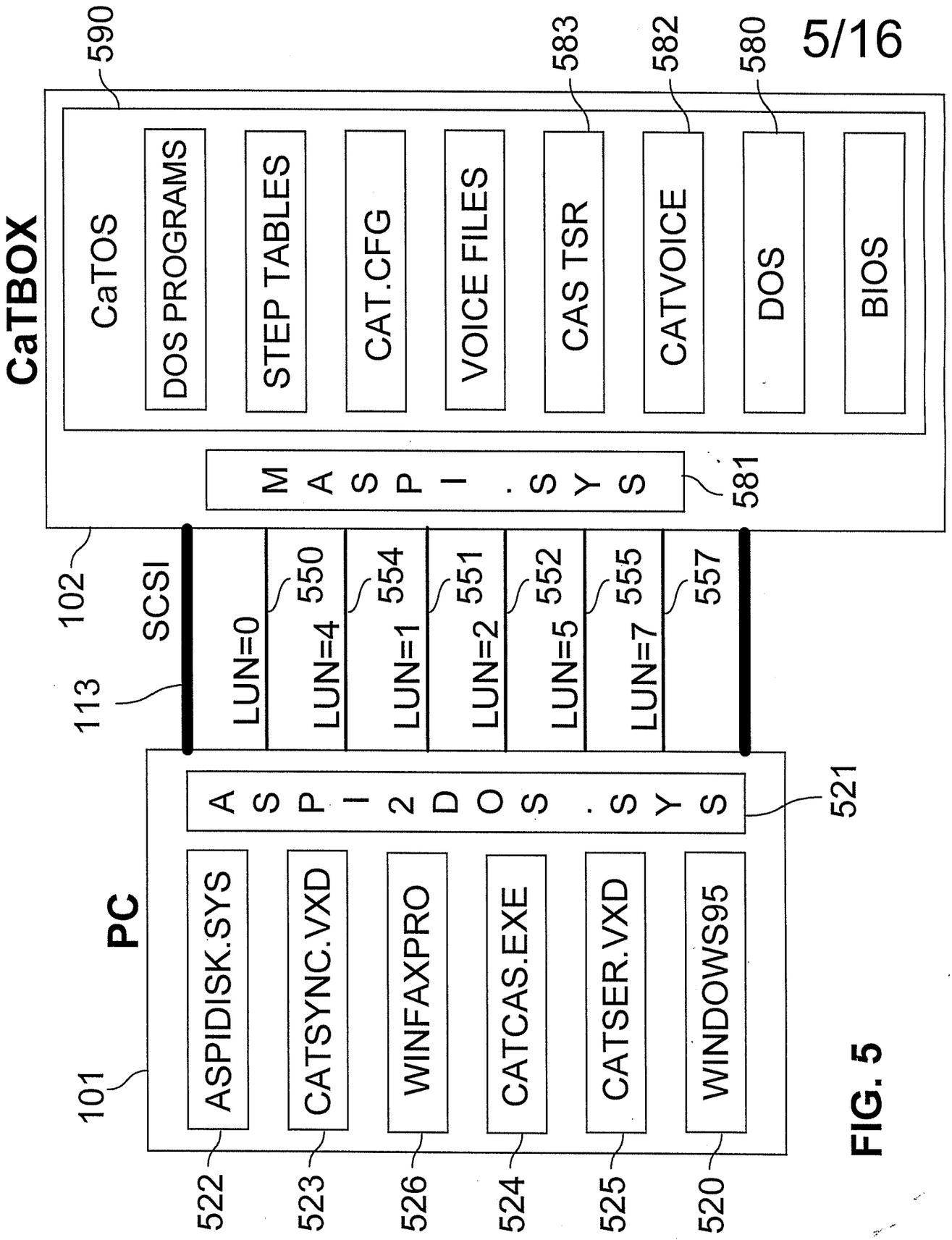

FIG. 5

```
;*****************************************************
;*              BUILD FAXBACK DATA BASE              *
;*****************************************************
; BUILD FAXBACK DATA BASE (1)
acd_bdfbx_get_doc_no    dw      ST_ANNOUNCE_AND_COLLECT_DIGITS
                        dw      JUMP_UNCOND
step_0046_next_step     dw      0047h           ; if all goes well
                        dw      0000h           ; tmo, no dtmf, timeout etc
                        dw      0000h           ; tmo for in coming fax
                        dw      0046h           ; * goto emit_doc_list
                        dw      0000h           ; # and non NULL doc no
                        dw      0000h           ; # and NULL doc no
step_0046_parameters    dw      DO_NOT_EXPECT_DTMF
                        dw      vcon_session_filename_H
                        dw      ACD_GET_FAXBACK_DOC_NUMBER
                        dw      vcon_session_repeat_count
                        dw      DO_NOT_STOP_ON_DLE
                        dw      vcon_session_faxback_doc_number
                        dw      LCD_MESSAGE_YES
                        db      "please enter faxback"
                        db      "document number and ", 00h
                        db      "press #                "
                        db      "thank you!             ", 00h, 00h
```

FIG. 6

6/16

APPROVED | O.G. FIG.
BY | CLASS | SUBCLASS
DRAFTSMAN

step table next step word	dtmf value if expect dtmf	return flag value if do not expect dtmf
0	flag = 1	flag = 1
1	no dtmf	flag = 0
2	dtmf = *	flag = 2
3	dtmf = #	flag = 3
4	dtmf = 0	flag = 4
5	dtmf = 1	flag = 5
6	dtmf = 2	flag = 6
7	dtmf = 3	flag = 7
8	dtmf = 4	flag = 8
9	dtmf = 5	flag = 9
10	dtmf = 6	flag = A
11	dtmf = 7	flag = B
12	dtmf = 8	flag = C
13	dtmf = 9	flag = D

FIG. 7

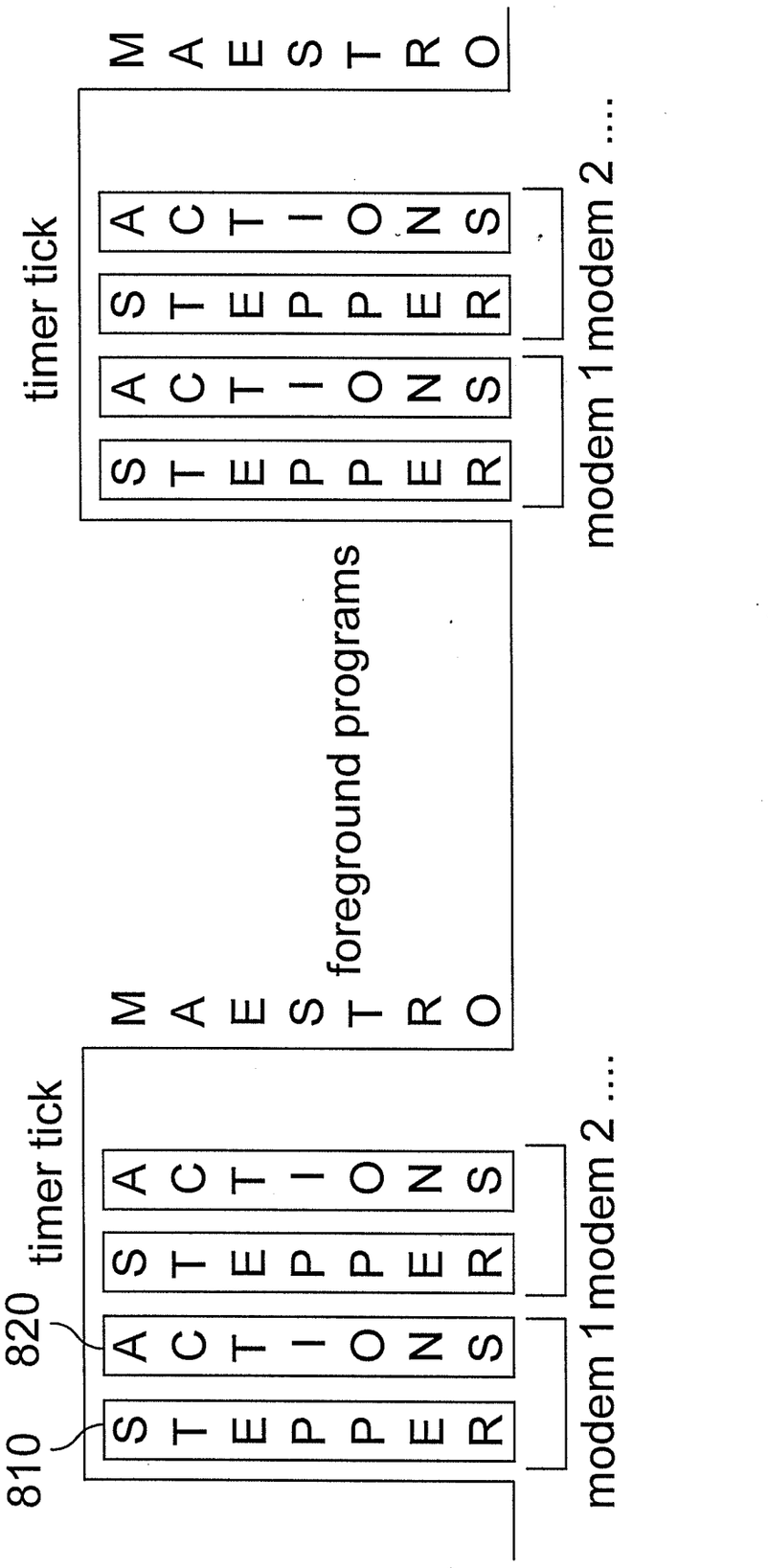

FIG. 8

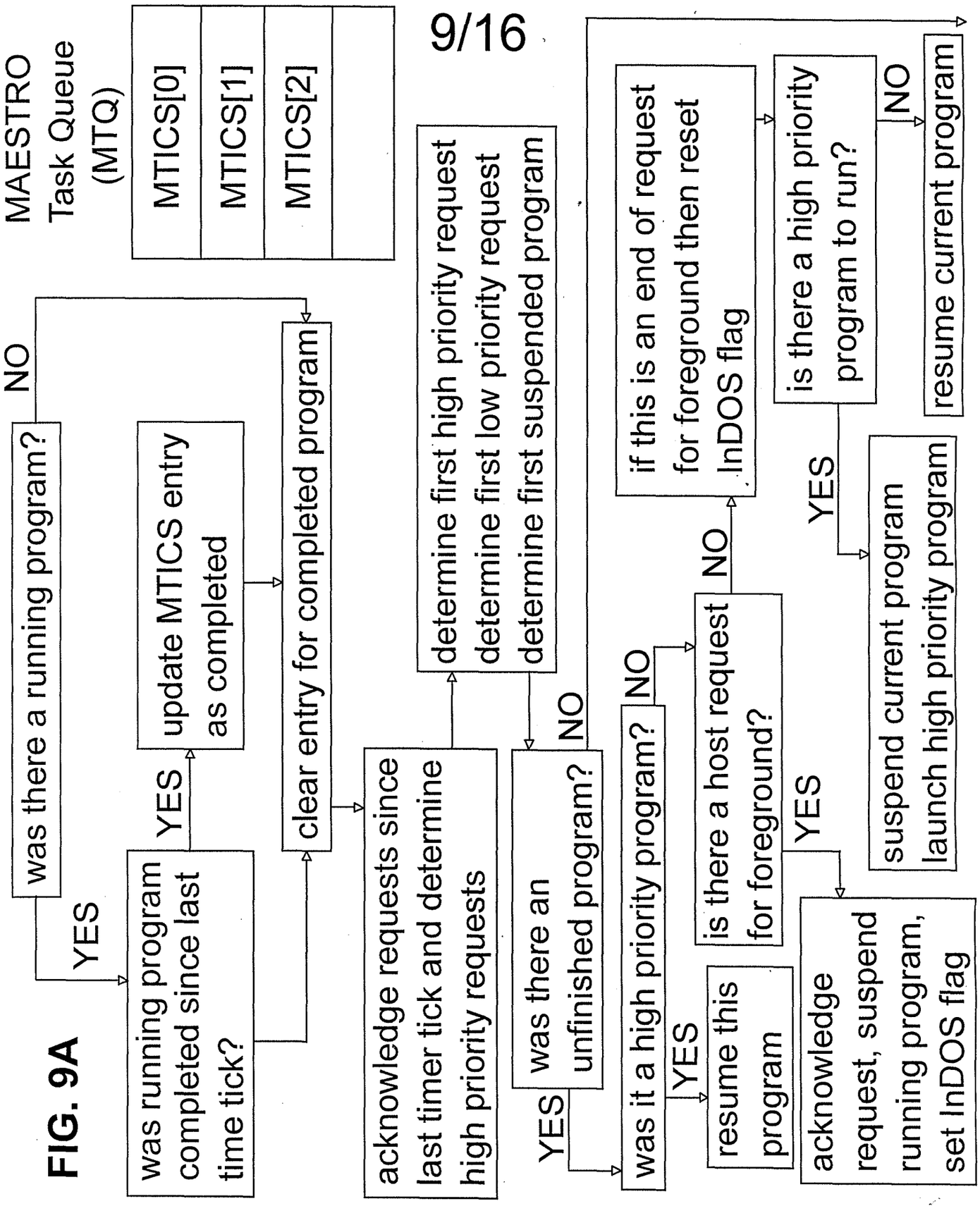

FIG. 9A

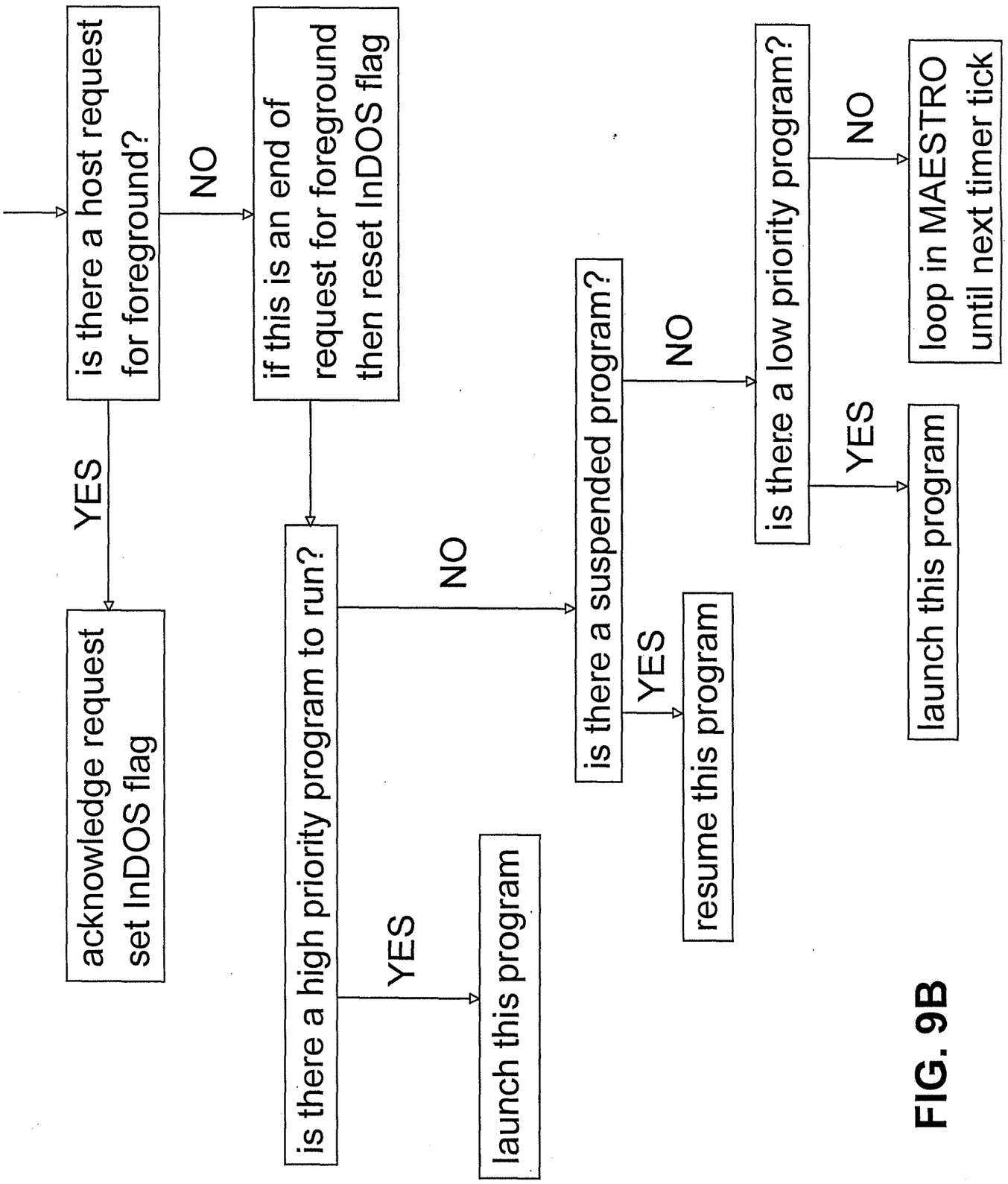

FIG. 9B

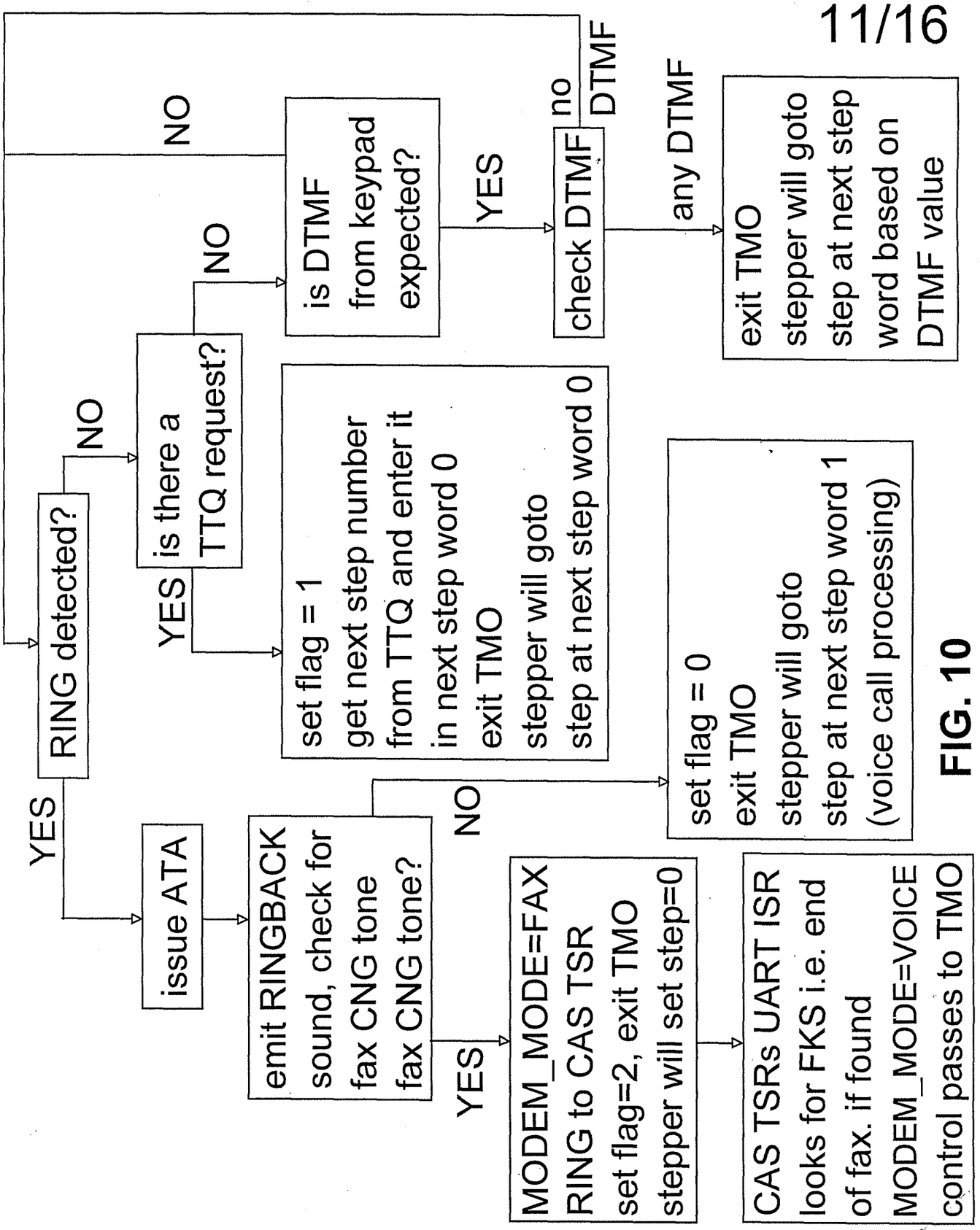

FIG. 10

```
;*****************************************************
;*              BUILD FAXBACK DATA BASE              *
;*************************0046*************************
acd_bdfbx_get_doc_no    dw      ST_ANNOUNCE_AND_COLLECT_DIGITS
                        dw      JUMP_UNCOND
                        dw      step_0046_parameters
step_0046_next_step     dw      0047h           ; make file name for tcf file
                        dw      0000h           ; tmo, no dtmf, timeout etc
                        dw      0000h           ; tmo needs this for incoming fax
                        dw      0046h           ; * goto emit_doc_list
                        dw      0000h           ; # and non NULL doc number
                        dw      0000h           ; # and NULL doc number
step_0046_parameters    dw      DO_NOT_EXPECT_DTMF ; F=0 works
                        dw      vcon_session_filename_H  ; FBXBLD.PCM
                        dw      ACD_GET_FAXBACK_DOC_NUMBER
                        dw      vcon_session_repeat_count
                        dw      DO_NOT_STOP_ON_DLE
                        dw      vcon_session_faxback_doc_number
                        dw      LCD_MESSAGE_YES
                        db      "please enter faxback"
                        db      "document number and ", 00h
                        db      "press #              "
                        db      "thank you!           ", 00h, 00h
```

FIG. 11A

12/16

APPROVED BY DRAFTSMAN | O.G. FIG. | GLASS | SUBCLASS

```
;**********0047**********
em_bdfbx_data_base      dw      ST_EMIT_MSG
                        dw      DTMF_ANALYZE
                        dw      step_0047_parameters
step_0047_next_step     dw      0048h                   ;
                        dw      0000h                   ; no dtmf, repeat first
                        dw      0000h                   ; dtmf_*
                        dw      0000h                   ; dtmf_# = ttq_req
                        dw      0000h                   ; dtmf_0 =
                        dw      0048h                   ; dtmf_1 = scan to pcx
step_0047_parameters    dw      EXPECT_DTMF
                        dw      vcon_session_filename_7  ; SFXMSG.PCM
                        dw      VCON_SPEAKER
                        dw      DO_NOT_STOP_ON_DLE
                        dw      LCD_MESSAGE_YES
                        db      "place page to fax on"
                        db      "scanner and press 1 ", 00h
                        db      "press # if no more  "
                        db      "pages to scan       ", 00h, 00h
```

FIG. 11B

13/16

APPROVED BY DRAFTSMAN | O.G. FIG. CLASS SUBCLASS

```
;*************************0048**************************
;
sp_bdfbx_sctopcx        dw      ST_START_PROGRAM
                        dw      JUMP_UNCOND     ; flags register for this step
                        dw      step_0048_parameters
step_0048_next_step     dw      0049h           ;
                        dw      0000h           ; in case scanner is off etc.
step_0048_parameters    dw      DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw      vcon_session_constant_7  ; SCTOPCX.EXE
                        dd      00000000h       ;argument_1 not used
                        dw      vcon_session_fax_filename ;argument_2 SEG:OFF
                        dw      step_table_seg_number ; of fn to be returned by
                        dw      WAIT_TO_COMPLETE ; sctopcx.exe (FS)
                        dw      LCD_MESSAGE_NO   ; no LCD message
```

FIG. 11C

```
;*************************0049*************************
sp_bdfbx_incbdfbx       dw      ST_START_PROGRAM
                        dw      JUMP_UNCOND     ; flags register for this step
                        dw      step_0049_parameters
step_0049_next_step     dw      0047h           ;
                        dw      0000h           ; in case scanner is off etc.
step_0049_parameters    dw      DO_NOT_EXPECT_DTMF + SP_PARAM_2_SEG
                        dw      vcon_session_constant_L  ; BLDFBXDB.EXE
                        dw      vcon_session_faxback_doc_number ; argument_1
                        dw      step_table_seg_number
                        dw      vcon_session_fax_filename ; argument_2 SEG:OFF
                        dw      step_table_seg_number    ; of fn to be returned by
                        dw      WAIT_TO_COMPLETE         ; sctopcx.exe (FS).
                        dw      LCD_MESSAGE_NO
```

FIG. 11D

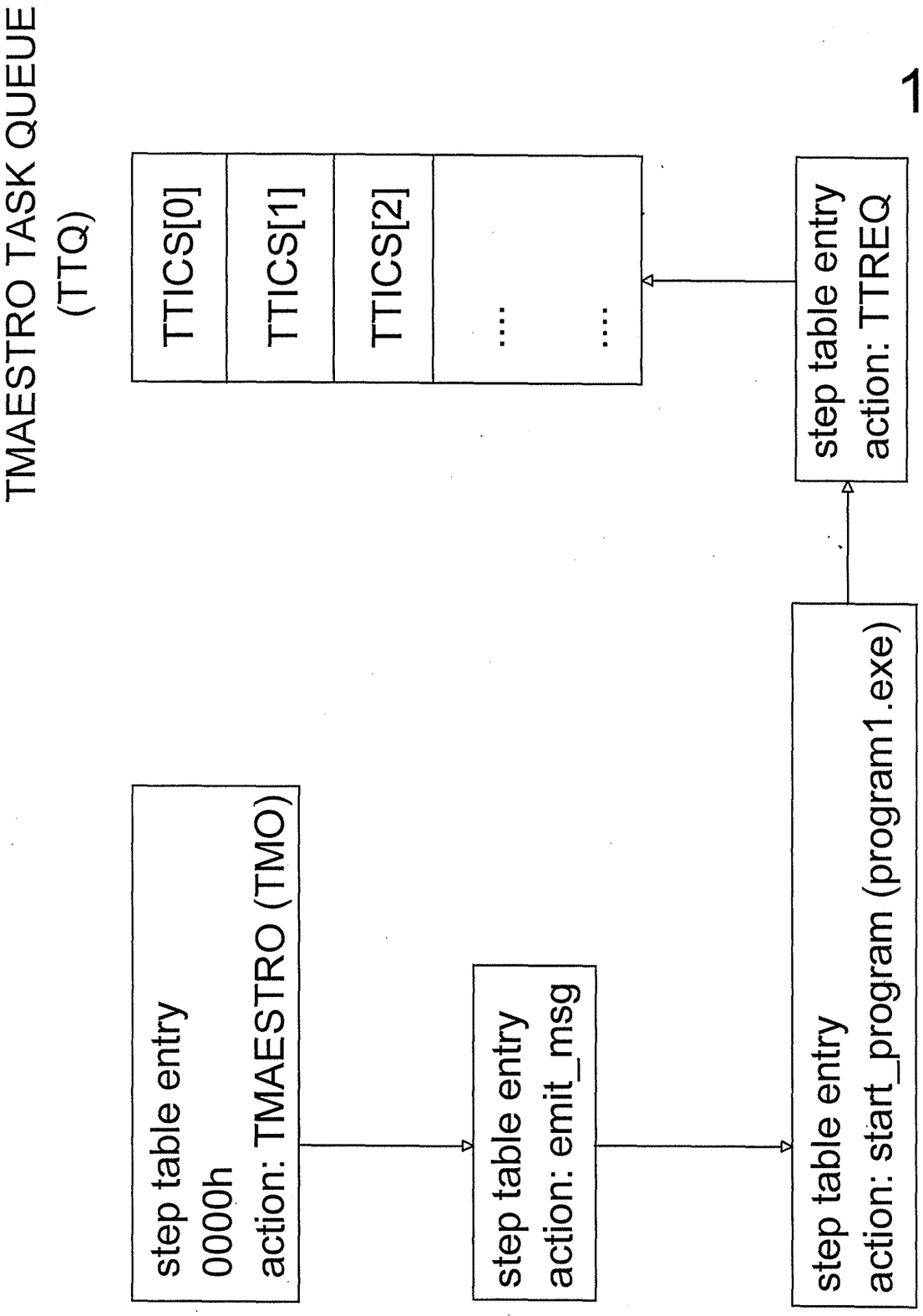

FIG. 12

PART B—ISSUE FEE TRANSMITTAL

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Assistant Commissioner for Patents
Washington, D.C. 20231

242-660

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RENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 4):

LM21/1224
MAR 17 1998

HALUK M AYTAC
10270 PARKWOOD DR 8
CUPERTINO CA 95014

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I hereby certify that this Issue Fee Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above on the date indicated below.

Haluk Aytac (Depositor's name)
Haluk M. Aytac (Signature)
March 17, 98 (Date)

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
08/569,846	12/08/95	014	DINH, D	2756	12/24/97

First Named Applicant: AYTAC, HALUK M.

TITLE OF INVENTION: COMPUTING AND COMMUNICATIONS TRANSMITTING, RECEIVING SYSTEM, WITH A PUSH BUTTON INTERFACE, THAT IS CONTINUOUSLY ON, THAT PAIRS UP WITH A PERSONAL COMPUTER AND CARRIES OUT MAINLY COMMUNICATIONS RELATED ROUTINE TASKS

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	395-200.410	V77	UTILITY	YES	$660.00	03/24/98

1. Change of correspondence address or indication of " Fee Address" (37 CFR 1.363). Use of PTO form(s) and Customer Number are recommended, but not required.

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47) attached.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

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2 _____
3 _____

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PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropiate when an assignment has been previously submitted to the PTO or is being submitted under separate cover. Completion of this form is NOT a subsitiute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY & STATE OR COUNTRY)

Please check the appropriate assignee category indicated below (will not be printed on the patent)

☐ individual ☐ corporation or other private group entity ☐ government

4a. The following fees are enclosed (make check payable to Commissioner of Patents and Trademarks):

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The COMMISSIONER OF PATENTS AND TRADEMARKS IS requested to apply the Issue Fee to the application identified above.

(Authorized Signature) Haluk M. Aytac Haluk M. Aytac (Date) 3-1-98

NOTE; The Issue Fee will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the Patent and Trademark Office.

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03/24/1998 LBERGER 00000071 08569846
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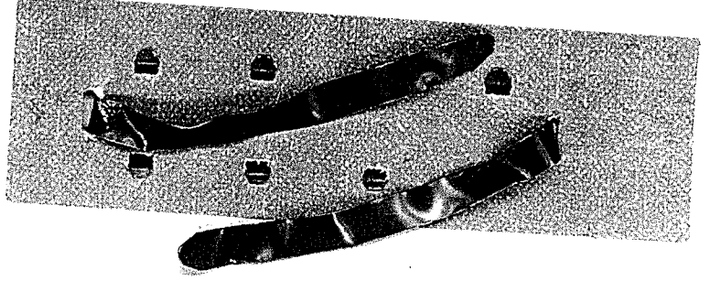

PTO UTILITY GRANT

Paper Number 7

The United States of America

The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to an statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

Bruce Lehman
Commissioner of Patents and Trademarks

Sandra Morton
Attest

Form PTO-1584 (Rev. 2/97)

COMPLETED

fax to ~~703~~ ~~305~~ ~~2777~~

PTO/SB/123 (09-04)
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Patent

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Patent Number	5758081
Issue Date	5-26-1998
Application Number	08569846
Filing Date	12-08-1995
First Named Inventor	Haluk M. Aytac
Attorney Docket Number	

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☒ **Firm or Individual Name** Haluk M. Aytac

Address 1867 Maple Grove Lane

City Lincoln **State** CA **ZIP** 95648

Country USA

Telephone 916 408 2594 **Fax**

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This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the:

☒ Patentee.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☐ Attorney or agent of record. Registration Number _____.

Signature Haluk M. Aytac

Typed or Printed Name Haluk M. Aytac

Date May 15, 2005 Telephone 916 408 2594

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Post Issue, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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PTO/SB/123 (06-04)
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CHANGE OF CORRESPONDENCE ADDRESS
Patent

Address to: **Mail Stop Post Issue**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Patent Number	5,758,081
Issue Date	05-26-1998
Application Number	08/569,846
Filing Date	12-08-1995
First Named Inventor	Haluk M. Aytac
Attorney Docket Number	—

Please change the Correspondence Address for the above-identified patent to:

☐ Customer Number: [ ]

OR

☒ Firm or Individual Name	Haluk Aytac				
Address	1867 Maple Grove Lane				
Address					
City	Lincoln	State	CA	ZIP	95648
Country	USA				
Telephone	916 408 2594	Fax	—		

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

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I am the:

☒ Patentee.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☐ Attorney or agent of record. Registration Number _____.

Typed or Printed Name	Haluk Aytac		
Signature	Haluk Aytac		
Date	Jan 11, 2006	Telephone	916 408 2594

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Post Issue, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

main 571 273 8300

PAGE 1/1 * RCVD AT 1/12/2006 12:23:27 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/27 * DNIS:2738300 * CSID:4085428601 * DURATION (mm-ss):00-54

MISCELLANEOUS PAGE(S)

FROM THE U.S. PATENT OFFICE

OFFICIAL FILE WRAPPER

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ÜLog Screen ôôôôôôôô Computer Library Periodicals, Jan 1989 ôôôôôôôôôôô F1:HelpÜ
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  #2 scsi and (shared or sharing or shares)
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     (FILE 'USPAT' ENTERED AT 07:11:18 ON 29 JUL 1997)
L1         14960 S (DISK OR HARD) (W) DRIVE#
L2           820 S (MAP? OR SHARE#) (P) L1
L3           165 S SCSI AND L2
L4            52 S L2/AB
L5            22 S SCSI AND L4
L6            13 S 4727475/PN OR 4773005/PN OR 4783730/PN OR 4821170/PN OR
486
L7             3 S 5239632/PN OR 5283872/PN OR 5293624/PN
L8            16 S L7 OR L6
L9            12 S 4228496/PN OR 4380052/PN OR 4408300/PN OR 4412286/PN OR
461
L10           13 S 4967155/PN OR 4979909/PN OR 5016162/PN OR 5072370/PN OR
511
L11            8 S 5211459/PN OR 5229926/PN OR 5247427/PN OR 5274800/PN OR
528
L12           33 S L9 OR L10 OR L11
L13            1 S 08110533/AP

     FILE 'JPOABS' ENTERED AT 08:35:47 ON 29 JUL 1997
L14           26 S L2
L15            0 S 4974192/UREF

     FILE 'USPAT' ENTERED AT 08:55:45 ON 29 JUL 1997
L16            5 S 4974192/UREF
L17           13 S 4730312/PN OR 4839802/PN OR 4866703/PN OR 4893326/PN OR
490
L18            6 S 5117452/PN OR 5134611/PN OR 5164982/PN OR 5199062/PN OR
520
L19           19 S L17 OR L18
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Staple to Front of ...cation

U.S. DEPARTMENT ... PATENT & TRA...

APPLICATION TRANSFER REQUEST

Section I. APPLICATION TRANSFER REQUEST Date 4/15/96 S.N. 08/598,416

TO: Receiving A.U. _____ Class/sub _____ Examiner _____

FROM: Originating A.U. 2411 Class/sub ? Examiner Thomas

REASON: ☒ Request for Reconsideration (Return to Classification)

to business, linguistics, or earth sciences.
for 2411
Telecommunications tasks

Section II. DISPOSITION BY RECEIVING A.U. Date _____ Ex'r _____

☐ **Accepted (keep in receiving A.U.)**

Not Accepted ☐ Forward to _____ Classification Group

☐ Return to Originating A.U. _____ Nonclassification issue only:

REASON:

☐ Restriction
☐ Other

Section III. DISPOSITION BY Elec Classification Group. Date 4-25-96

☒ Transfer Approved–Forward to A.U. 2608 Class/sub 379/90+ Classifier W Davis

☐ Transfer Disapproved–Forward to Originating A.U. _____ Concurring N. Nguyen

Classifier _____

REASON: Nonclasssification issue raised: ☐ Restriction ☐ Other

the invention is a combination of computer and telephone. class 379 is superior to class 364, see claim 4

FORM PTO-~~447A~~ (Rev. 2-95) 7/16/97

Staple to Front of Application

U.S. DEPARTMENT OF COMMERCE PATENT & TRADEMARK OFFICE

APPLICATION TRANSFER REQUEST

Section I. APPLICATION TRANSFER REQUEST Date _____ S.N. 08/569846

TO: Receiving A.U. _____ Class/sub _____ Examiner _____

FROM: Originating A.U. _____ Class/Sub _____ Examiner _____

REASON:

☐ Request for Reconsideration (Return to Classification)

Section II. DISPOSITION BY RECEIVING A.U. Date 7/1/97 Ex'r A. Hutte

☐ **Accepted (keep in receiving A.U.)**

Not Accepted ☑ Forward to chem/Elec Classification Group

☐ Return to Originating A.U. _____ Nonclassification issue only:

REASON: Clm 4 recites combination of computers and DTMF and examining of incoming phone call to determine if phone call is fax, voice or data call ⇒ more than nominal telephone recitation ⇒ 379/93.01+(AU2605)

☐ Restriction

☐ Other

Section III. DISPOSITION BY Elec Classification Group. Date 7-17-97

☑ Transfer Approved-Forward to A.U. 2317 Class/sub 395=821+ Classifier Davis

☐ Transfer Disapproved-Forward to Originating A.U. _____ Concurring _____

Classifier _____

REASON: OK to 395/821

Nonclassification issue raised: ☐ Restriction ☐ Other

DD 09/17/97

Accepted by Examiner D. Dinh

★ U.S. GPO: 1996-420-308

Form PTO 1130
(REV 2/94)

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

PACE DATA ENTRY CODING SHEET

1ST EXAMINER 56

2ND EXAMINER

APPLICATION NUMBER	TYPE APPL	FILING DATE MONTH DAY YEAR	SPECIAL HANDLING	GROUP ART UNIT	CLASS
08/569846	1	12 08 95	0	2411	364

TOTAL CLAIMS	INDEPENDENT CLAIMS	SMALL ENTITY?	FILING FEE	FOREIGN LICENSE	ATTORNEY DOCKET NUMBER
11	4	2	414	Y	

CONTINUITY DATA

CONT CODE	STATUS CODE	PARENT APPLICATION SERIAL NUMBER	PCT APPLICATION SERIAL NUMBER	PARENT PATENT NUMBER	PARENT FILED MONTH
			PCT/		
			PCT/		
			PCT/		
			PCT/		
			PCT/		

PCT/FOREIGN APPLICATION DATA

FOREIGN PRIORITY CLAIMED	COUNTRY CODE	PCT/FOREIGN APPLICATION SERIAL NUMBER	FOREIGN FILING DATE MONTH DAY YEAR

PATENT NUMBER

APPLICATION SERIAL NUMBER

08/569,846

APPLICANT'S NAME (PLEASE PRINT)

AYIAC

IF REISSUE, ORIGINAL PATENT NUMBER

INTERNATIONAL CLASSIFICATION

G	0	6	F		1/32

ORIGINAL CLASSIFICATION

CLASS	SUBCLASS
395	200.41

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)			
395	821			

GROUP ART UNIT: 2756

ASSISTANT EXAMINER (PLEASE STAMP OR PRINT FULL NAME)

PRIMARY EXAMINER (PLEASE STAMP OR PRINT FULL NAME)

DUNG C DINH

KIMLO DUNG
PATENT EXAMINER
GROUP 2300

PTO 270
(REV. 5-91)

ISSUE CLASSIFICATION SLIP

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 1995

Application or Docket Number: 5698446

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)	SMALL ENTITY RATE	SMALL ENTITY FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY FEE
FOR	NUMBER FILED	NUMBER EXTRA					
BASIC FEE				375.00	OR		750.00
TOTAL CLAIMS	11 minus 20 =	*	x$11=		OR	x$22=	
INDEPENDENT CLAIMS	4 minus 3 =	* 1	x39=	39	OR	x78=	
MULTIPLE DEPENDENT CLAIM PRESENT			+125=		OR	+250=	
			TOTAL	414	OR	TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=		OR	x$22=	
x39=		OR	x78=	
+125=		OR	+250=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
x$11=		OR	x$22=	
x39=		OR	x78=	
+125=		OR	+250=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
x$11=		OR	x$22=	
x39=		OR	x78=	
+125=		OR	+250=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

FORM PTO-875
(Rev. 10/95)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

SEARCHED

Class	Sub.	Date	Exmr.
395	821	7/29/97	[illegible]
	474		
	200.01		
	200.05		
	281		
	306		
	309		
	822		
	892		
	882		
	285		
345	156		
395	500		
395	200.41	12/17/97	

SEARCH NOTES

	Date	Exmr.
APS JPOABS Comp Select Dr Dobb Journ. CO	7/29/97	[illegible]
update	12/17/97	[illegible]

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
395	200.41 821	12/17/97	[illegible]

Staple Issue Slip Here

U-351 2-27-96

POSITION		ID NO.	DATE
CLASSIFIER		43	2/1/96
EXAMINER		56	2-23-96
TYPIST		340	2-27-96
VERIFIER			
CORPS CORR.			
SPEC. HAND			
FILE MAINT.			
DRAFTING			

2-28-96

INDEX OF CLAIMS

Claim		Date							
Final	Original	7/2/97	12/1/97						
3	1	=	=						
1	2								
2	3								
4	4								
5	5								
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SYMBOLS

- ✓ .... Rejected
- = ... Allowed
- \- (Through numberal) Canceled
- \+ .... Restricted
- N .... Non-elected
- I .... Interference
- A .... Appeal
- O .... Objected

Claim		Date							
Final	Original								
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08/569846

APPROVED ~~FOR LICENSE~~ ☐

INITIALS* ZA

PATENT APPLICATION

08569846

Date Entered or Counted		Date Received or Mailed
	1. Application Prts papers.	
	2. Disclosure Document Reference Letter	12-8-95
	3. Information Disclosure Statement	3-7-96
7-29	4. (re) 3mos w/ AH	8/11/97
	5. Amdt A	10-24-97
12/29	6. Notice of Allow	12-24-97
	7. PTO GRANT MAY 26 1998	
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