IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

Applicant:	Darbee et al.	Universal Remote Control, Inc.
Case No.:	IPR2013-00127	v.
Filing Date:	2/23/2001	Universal Electronics, Inc.
Patent No.:	6,587,067	Trial Paralegal: Andrew Kellog
Title:	Universal Remote Control With Macro Command Capabilities	Attny Doc.: 059489.05US5/IPR

DECLARATION OF RICHARD ELLIS

I, Richard Ellis, hereby declare as follows:

1. I am currently an independent contractor, specializing in embedded system programming and system administration.

2. I held various positions over the years for the Patent Owner, Universal Electronics, Inc. ("UEI"), including senior software engineer. UEI was founded as Protostar Electronics back in 1982 or 1983. My job responsibilities at UEI included, amongst other things, the design and development of universal remote controls and the database for them.

3. In total, I have over 40 years of experience in the electronics industry generally, and over 10 years of experience in designing remote controls specifically.

4. I am a joint inventor of the claims of U.S. Patent No. 6,587,067 (the "'067 patent").

5. The documents attached hereto as Exhibits A-T were prepared by us or under our direct supervision. All work and associated writings were carried out in the United States.

6. In 1986, I, with the help of others, conceived of a universal remote control for operating controlled devices such as television sets, VCRs, cable converters, etc. In the beginning of the development of the universal remote control disclosed and claimed in the '067 patent, our company was named Protostar Electronics, and the remote control was referred to as the Homer, or HCU, and was later named UNiWAND.

7. For the purposes of the '067 patent, the HCU included two key features: (1) the capability for "direct entry" matching of a universal remote control to a plurality of different home appliances of different manufacturers; and (2) the capability for assigning a command macro to a macro pushbutton.

8. First, in the 1986 time frame, there existed certain universal remote controls known as "learners." Those learner remotes necessarily needed to be "taught" the infrared (IR) of the OEM remote it was intended to replace. This typically involved setting the remote into a "learning" mode in which the end-user would use the OEM remote to transmit an IR command to a IR receiver located on the

learner remote. The received command would then be assigned to a specific button on the learner remote. The end-user would then repeat this process for each separate IR command on the OEM remote. Needless to say, that process was extremely tedious and prone to user error. Accordingly, we devised the direct entry technique of matching a universal remote control to a plurality of different home appliances. Under that technique, the HCU would come pre-loaded with a library of known codes and data for certain home appliances. The codes and data for each separate appliance would be assigned a unique identification code which, when entered into the HCU via its pushbuttons, would cause the HCU to be matched to that corresponding appliance.

9. Second, also in the 1986 time frame, the proliferation of the Video Cassette Recorder (VCR) had begun. At the time, in order to play a movie on the VCR, a user would typically need to turn the TV on, tune it to channel 3, turn the VCR on, and activate the VCR's "Play" function. Our technique made it possible to transmit the sequence of operating commands needed to perform all of the foregoing steps with the push of a single button. We referred to these command sequences as either "macros" or "DO commands." These macros could either be preprogrammed or manually programmed via the HCU's keypad.

10. Specifically, the universal remote control that I, with the help of others, conceived of in 1986 included a keyboard having a plurality of pushbuttons

including a macro pushbutton and a library of codes and data for use in transmitting operating commands to a plurality of different home appliances of different manufacturers. The universal remote control included a computer readable medium having instructions for, or was otherwise capable of, performing the steps of: (a) matching the universal remote control to the plurality of different home appliances of different manufacturers such that selected codes and data from the library are used to transmit operating commands to the matched home appliances in response to activation of selected pushbuttons of the keyboard, the pushbuttons of the keyboard being activated to directly identify each of the plurality of different home appliances of different manufacturers to which the universal remote control is to be matched; and (b) assigning to the macro pushbutton a subset of the selected codes and data from the library whereafter activation of the macro pushbutton causes the universal remote control to use the subset of selected codes and data from the library to transmit a plurality of operating commands to one or more of the matched home appliances. (See Claims 1 and 4 of the '067 patent.)

11. Put differently, the universal remote control included a computer readable medium having instructions for, or was otherwise capable of, performing the steps of: (a) matching the universal remote control to a plurality of different home appliances of different manufacturers such that selected codes and data from the

library are used to transmit operating commands to the matched home appliances in response to activation of selected pushbuttons of the keyboard; (b) using activation of one or more pushbuttons of the keyboard to match the universal remote control to the plurality of different home appliances of different manufacturers; and (c) using activation of one or more of the pushbuttons of the keyboard to directly identify each of the plurality of different home appliances of different manufacturers to which the universal remote control is to be matched. (See Claim 3 of the '067 patent.).

12. Put differently still, the universal remote control included a computer readable medium having instructions for, or was otherwise capable of, performing the steps of: (a) matching the universal remote control to a plurality of different home appliances of different manufacturers such that selected codes and data from the library are used to transmit operating commands to the matched home appliances in response to activation of selected pushbutton of the keyboard; and (b) using activation of one or more pushbuttons of the keyboard to directly identify each of the plurality of different home appliances of different manufacturers to which the universal remote control is to be matched. (See Claim 6 of the '067 patent.).

13. That universal remote control also included additional instructions in the computer readable medium for, or was otherwise capable of, performing the step

of using activation of one or more pushbuttons of the keyboard to assign the subset of the selected codes and data from the library to the macro pushbutton. (See Claims 2 and 5 of the '067 patent.)

14. The above-referenced techniques developed in 1986 for direct entry matching of a universal remote control to a plurality of different home appliances of different manufacturers and for assigning a command macro to a macro pushbutton, which are described in more detail in the '067 patent, remained largely the same throughout the process of developing a final, commercial product, with minor exceptions, such as the form of the code to be entered during direct entry matching. Again, however, the manner in which those techniques were implemented did not change.

15. In the fall of 1986, we made a first prototype of the universal remote control described in Paragraphs 6-13 above, and photographs of the front and back of same are attached hereto as Exhibit A. We tested that prototype of the HCU and found it to be working and suitable for its intended purpose.

16. Attached as Exhibit B hereto is a copy of a circuit diagram for the HCU as it existed on November 11, 1986, and as it appears in the photo of Exhibit A.

17. In the winter of 1986-87, we made a development prototype of such a universal remote control described in Paragraphs 6-13 above, and a photograph of same is attached hereto as Exhibit C. We tested that prototype of the HCU and

found it to be working and suitable for its intended purpose—just as the first prototype was.

18. The circuitry for the prototypes of Exhibits A and C were laid out on stripboards, also known as proto-boards. As a threshold matter, we would not have gone to the time, effort and expense of designing and ordering printed circuit boards (PCBs) for the HCU until we were confident we had working prototypes that were suitable for their intended purpose.

19. Likewise, we would not have gone to the time, effort and expense of drafting user manuals for the HCU until we were confident we had working prototypes that were suitable for their intended purpose.

20. In early 1987, confident that we had successfully implemented our intended design in now multiple prototypes, we began work on designing PCBs and drafting user manuals for the universal remote control.

21. Attached as Exhibit D hereto is a document entitled "Protostar HCU Manual Revision 1.1" and dated February 18, 1987 (hereinafter "Rev. 1.1"). As described on pages 6 and 7 of Rev. 1.1, the HCU was capable of being matched to a plurality of different home appliances of different manufacturers such that selected codes and data from its library could be used to transmit operating commands to the matched home appliances in response to activation of selected pushbuttons of the keyboard, wherein the pushbuttons of the keyboard were activated to directly

identify each of the plurality of different home appliances of different manufacturers to which the HCU is to be matched (see '067 patent Claims 1, 3, 4 and 6). Specifically, Rev. 1.1 states, "Your HCU works with almost all modern TV, VCR and cable systems." Page 6 of Rev. 1.1 describes a "DIRECT LIBRARY ENTRY" method of matching the remote. Under this method, pushbuttons of the HCU (e.g. DO, RECALL, VCR and numerical pushbuttons) are used to directly identify and match the HCU to the target appliance.

22. I understand that the PTAB has questioned the use of the term "probably" in the sentence appearing on page 6 of Rev. 1.1 that reads, "Digits entered will probably reflect the 'search result' playback sequence, i.e. a trinary number sequence," as purportedly suggesting that we did not have a "definite and permanent idea of the complete and operative invention." DECISION – Institution of Inter Partes Review, Paper No. 13 at 11. This could not be farther from the truth, as reflected in the fact that we had already developed working prototypes and begun drafting user manuals. Indeed, as I explained above, the fact that we had gone to the time, trouble and expense to begin drafting user manuals is conclusive of the fact that we had already successfully created working prototypes. The use of "probably" in the subject sentence merely refers to the fact that *provided the HCU has already been successfully matched to an appliance*, it was capable of displaying with its LEDs "blink codes," which informed the user of the unique

identification code corresponding to the appliance. *See* Rev. 1.1 at 4 ("SEARCH RESULTS: ○ [A series of button presses] will initiate flashing sequence indicating the library selection found by the search sequence.") This enabled the user to quickly reprogram the remote without having to look the unique identification code up in a book or table.

23. As described on pages 5 and 6 of Rev. 1.1, the HCU was capable of assigning to a macro pushbutton a subset of the selected codes and data from the library whereafter activation of the macro pushbutton causes the HCU to use the subset of selected codes and data from the library to transmit a plurality of operating commands to one or more of the matched home appliances (see '067 patent Claims 1 and 4). For example, as described on page 5:

> Macro playback will be accomplished by pressing DO and the key defined by the user except in the case of the top DO keys 1-4. The top DO keys have an assumed DO. This will be particularly convenient for powering the system on or off, and for switching from cable A to cable B in some systems.

As even a lay person, much less one of ordinary skill in the art, would readily appreciate, powering an audio/video system off typically requires the transmission of a plurality of operating commands to one or more matched home appliances (e.g. "power off" for a TV and "power off" for a VCR).

24. As described on pages 5 and 6 of Rev. 1.1, the HCU was capable of using activation of one or more pushbuttons of the keyboard to assign the subset of the selected codes and data from the library to the macro pushbutton (see '067 patent Claims 2 and 5). For example, as described on page 5:

- DO and ENTER initiate a macro definition.
- The next key pressed indicates which key is to be assigned the macro definition…

25. Attached as Exhibit E hereto is a copy of a circuit diagram for the HCU as it existed on February 20, 1987.

26. Attached as Exhibit F hereto is a document entitled "Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)" and dated March 8, 1987 (hereinafter "Rev. 1.2"). As described on pages 9 and 12 of Rev. 1.2, the HCU was capable of being matched to a plurality of different home appliances of different manufacturers such that selected codes and data from its library could be used to transmit operating commands to the matched home appliances in response to activation of selected pushbuttons of the keyboard, wherein the pushbuttons of the keyboard were activated to directly identify each of the plurality of different home appliances of different manufacturers to which the HCU is to be matched (see '067 patent Claims 1, 3, 4 and 6). Specifically, Rev. 1.2 states on page 12, "Your HCU works with almost all modern TV, VCR and cable systems." Page 9

of Rev. 1.2 describes a "DIRECT LIBRARY ENTRY" method of matching the remote. Under this method, pushbuttons of the HCU (e.g. DO, RECALL, VCR and numerical pushbuttons) are used to directly identify and match the HCU to the target appliance.

27. As described on pages 8 and 9 of Rev. 1.2, the HCU was capable of assigning to a macro pushbutton a subset of the selected codes and data from the library whereafter activation of the macro pushbutton causes the HCU to use the subset of selected codes and data from the library to transmit a plurality of operating commands to one or more of the matched home appliances (see '067 patent Claims 1 and 4). For example, as described on page 8:

> Macro playback will be accomplished by pressing DO and the key defined by the user except in the case of the top DO keys 1-4. The top DO keys have an assumed DO. This will be particularly convenient for powering the system on or off, and for switching from cable A to cable B in some systems.

Again, most anyone would readily appreciate that powering an audio/video system off typically requires the transmission of a plurality of operating commands to one or more matched home appliances (e.g. "power off" for a TV and "power off" for a VCR).

28. As described on pages 8 and 9 of Rev. 1.2, the HCU was capable of using activation of one or more pushbuttons of the keyboard to assign the subset of the selected codes and data from the library to the macro pushbutton (see '067 patent Claims 2 and 5). For example, as described on page 8:

- DO and ENTER initiate a macro definition.
- The next key pressed indicates which key is to be assigned the macro definition…

29. As I mentioned above, we also began designing the PCB for the HCU in the winter and spring of 1987. Typically, this would involve our creation of PCB "artwork" or mock-ups, which we would then send to a PCB fabricator to have samples made. Again, we would not have gone to the time, effort and expense of having printed circuit boards fabricated unless we already produced a working prototype that was suitable for its intended purpose. Attached as Exhibit G are Paul Darbee's handwritten notes, dated March 23, 1987, of revisions that needed to be made to sample PCBs we had already previously received.

30. In March/April of 1987, we made a pre-production model of the universal remote control described in Paragraphs 6-13 above that incorporated a PCB, and photographs of the exterior and PCB of that pre-production model are attached hereto as Exhibit H. We tested that pre-production model and found it to be

working and suitable for its intended purpose—just as the first prototype and development prototype were.

31. Attached as Exhibit I hereto is a copy of a circuit diagram for the HCU as it existed on March 25, 1987.

32. Attached as Exhibit J hereto is a copy of the PCB artwork for the HCU as it existed on March 27, 1987.

33. Attached as Exhibit K hereto is a copy of the PCB artwork for the HCU as it existed on April 29, 1987.

34. Attached as Exhibit L hereto is a copy of assembly language source code for the HCU as it existed on April 30, 1987. As coded on pages 23-24 and 27-29 of the source code, the HCU was capable of being matched to a plurality of different home appliances of different manufacturers such that selected codes and data from its library could be used to transmit operating commands to the matched home appliances in response to activation of selected pushbuttons of the keyboard, wherein the pushbuttons of the keyboard were activated to directly identify each of the plurality of different home appliances of different manufacturers to which the HCU is to be matched (see '067 patent Claims 1, 3, 4 and 6).

35. As coded on page 27 of the source code, the HCU was capable of assigning to a macro pushbutton a subset of the selected codes and data from the library whereafter activation of the macro pushbutton causes the HCU to use the subset of

selected codes and data from the library to transmit a plurality of operating commands to one or more of the matched home appliances (see '067 patent Claims 1 and 4).

36. As coded on pages 31-35 of the source code, the HCU was capable of using activation of one or more pushbuttons of the keyboard to assign the subset of the selected codes and data from the library to the macro pushbutton (see '067 patent Claims 2 and 5).

37. Attached as Exhibit M hereto is a copy of May 18, 1987 memorandum from Paul Darbee to our PCB fabricator, Inkel, requesting minor cosmetic and mechanical modifications to our PCBs.

38. Attached as Exhibit N hereto is a copy of a circuit diagram for the HCU as it existed on May 23, 1987.

39. Attached as Exhibit O hereto is a copy of the PCB artwork for the HCU as it existed on May 29, 1987.

40. Attached as Exhibit P hereto is a document entitled "Universal Electronics UNI-COM Universal Remote Control User's Manual Review Copy" and dated June 8, 1987 (hereinafter "Review Copy"). As described on pages 12 and 13 of the Review Copy, the HCU was capable of being matched to a plurality of different home appliances of different manufacturers such that selected codes and data from its library could be used to transmit operating commands to the matched home

appliances in response to activation of selected pushbuttons of the keyboard, wherein the pushbuttons of the keyboard were activated to directly identify each of the plurality of different home appliances of different manufacturers to which the HCU is to be matched (see '067 patent Claims 1, 3, 4 and 6). Specifically, the Review Copy states on page 2, "Your UNI-COM [also known as HCU] works with almost all modern television, VCR, cable and compact disc (CD) systems." Page 12 of the Review Copy describes a "Quick-Match" method of matching the remote. Under this method, pushbuttons of the HCU (e.g. DO, RECALL, VCR, and the channel up/down pushbuttons) are used to directly identify and match the HCU to the target appliance. In this revision, a combination of eight presses of CH+ and CH- buttons would identify to the HCU a unique binary number corresponding to the library of codes and data to be matched to the target appliance. Although the buttons pressed (number keys vs. CH+/CH-) and the form of the code entered (3-digit decimal vs. 8-bit binary) changed, the core concept—directly identifying the target appliance to the HCU via the pushbuttons—always remained the same.

41. As described on pages 9-11 of the Review Copy, the HCU was capable of assigning to a macro pushbutton a subset of the selected codes and data from the library whereafter activation of the macro pushbutton causes the HCU to use the subset of selected codes and data from the library to transmit a plurality of

operating commands to one or more of the matched home appliances (see '067 patent Claims 1 and 4). For example, as described on pages 9-10:

> Before sitting down to watch your favorite show there are certain things you might have to do. For example, you may have to turn your TV, VCR and cable converter on, get your VCR ready to record, and set the cable converter to your favorite station. Normally with your old remote controls, it took a lot of button pressing, not to mention having to find the right remote control. With UNI-COM [HCU] you can do all this and more with the push of just one or two buttons!

42. As described on pages 10 and 11 of the Review Copy, the HCU was capable of using activation of one or more pushbuttons of the keyboard to assign the subset of the selected codes and data from the library to the macro pushbutton (see '067 patent Claims 2 and 5). For example, as described on page 11:

- First press Do, then Recall to let UNI-COM [HCU] know you are going to set-up a DO command…
- Select a button you want to use to perform the DO command you are setting up…
- Press the buttons you would normally press to do what you want.

- When you are finished setting up UNI-COM [HCU], press Do, then Recall.

43. Attached as Exhibit Q hereto is a copy of a circuit diagram for the HCU as it existed on July 2, 1987.

44. Attached as Exhibit R hereto is a copy of a circuit diagram for the HCU as it existed on July 14, 1987.

45. Attached as Exhibit S hereto is a copy of the PCB artwork for the HCU as it existed on July 24, 1987.

46. Attached as Exhibit T hereto is a copy of the PCB artwork for the HCU as it existed on August 6, 1987.

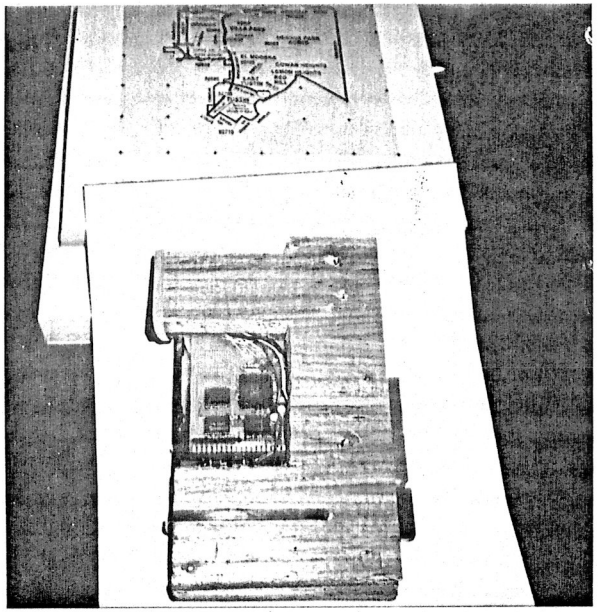
47. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the '067 patent.

48. I declare under penalty of perjury that the foregoing is true and correct.

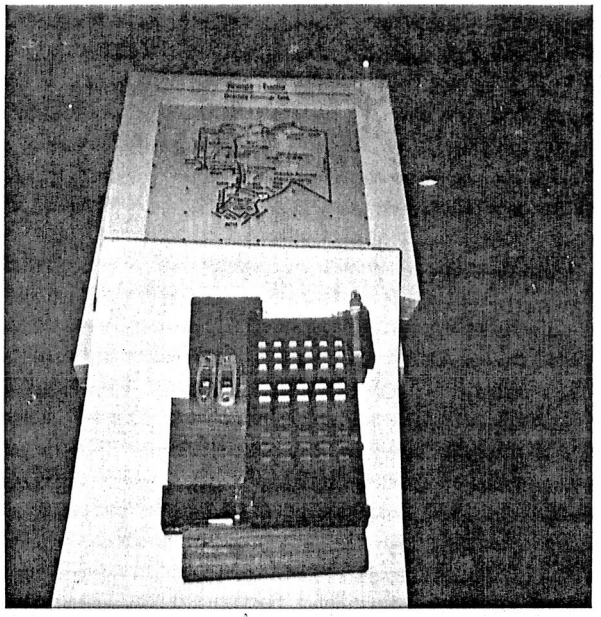
Dated: 10/4/13

Richard Ellis

Exhibit A



Early prototype, Fall 1986
Exhibit 1



Early prototype, Fall 1986
Ex 1

Exhibit B

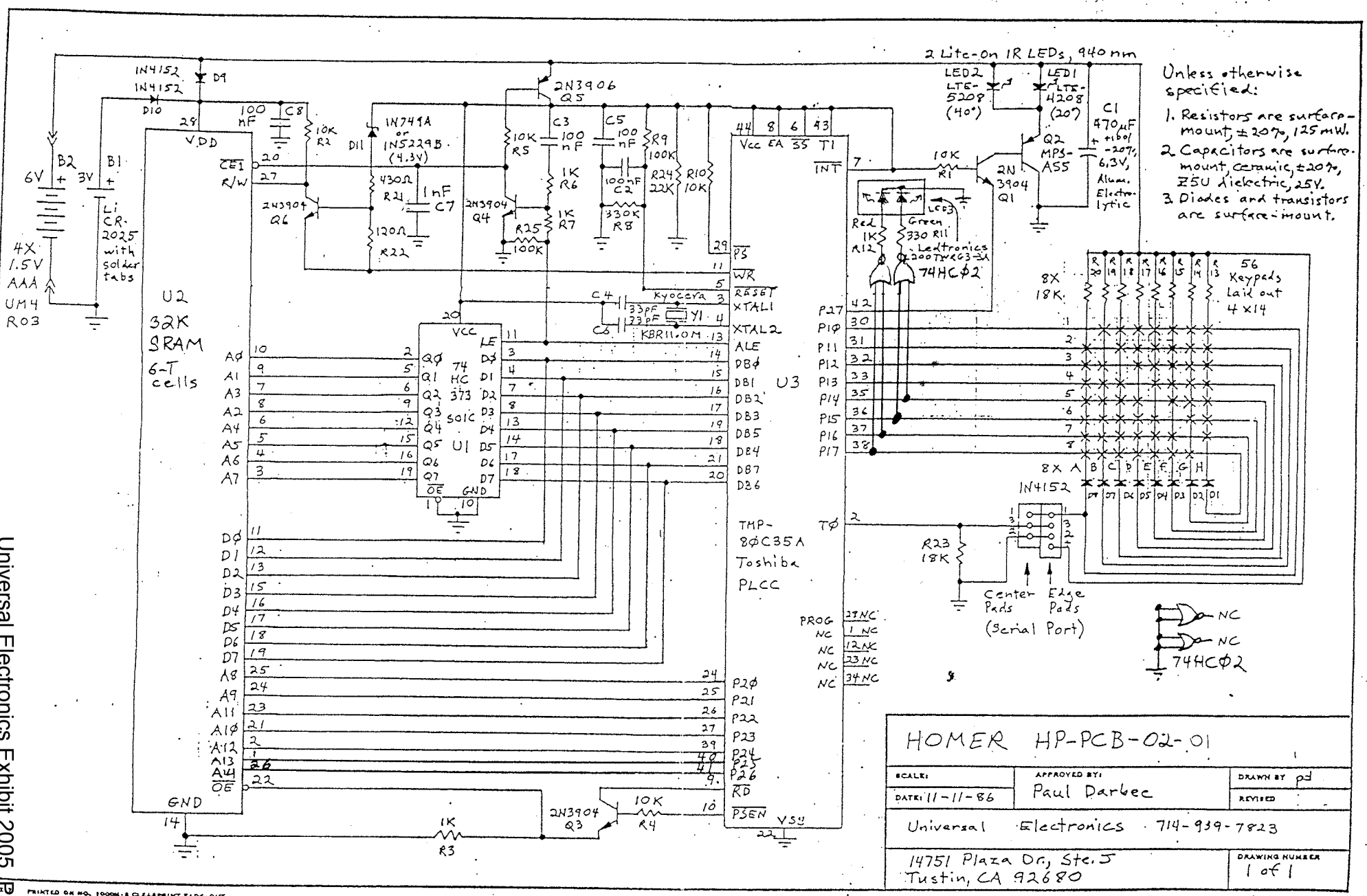
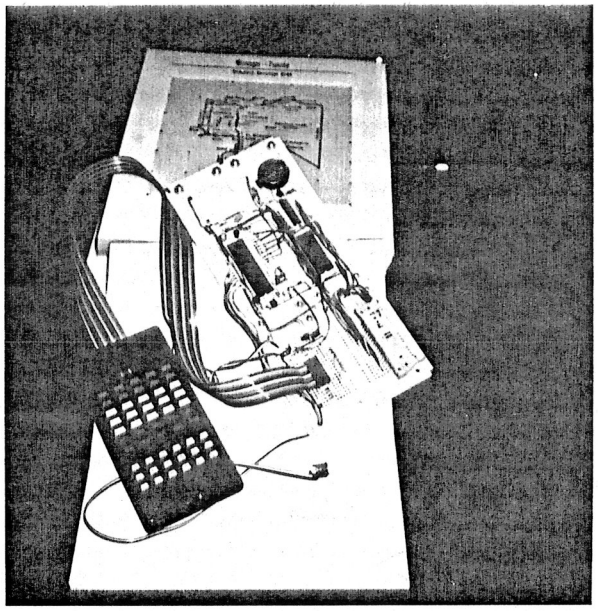


Exhibit C



Development Model
Winter 1986-87

Serial port

EX 2

Exhibit D

Protostar ~~HCU~~ Manual
Revision 1.1

HCU 1 MANUAL DOCUMENTATION:

REVISION: 1.2
2-16-87

CONTENTS:

REVISION NOTES:

Rev 1.2 (2/18/87)
- o Keypad layout
  - o Added as new section.

Rev 1.1 (2/16/87)
- o Table of contents.
  - o Added.
- o Revision notes.
  - o Added.
- o General notes.
  - o Added.
- o Synopsis.
  - o Added.
- o User Manual.
  - o Revised to reflect synopsis.

Protostar HCU Manual
Revision 1.1

GENERAL NOTES:

o Color scheme.
  o "Keys" refer to labels and/or surrounding background color.

  o Red keys refer to TV functions. These have been defined as TV, VOLume UP, VOLume DOWN and MUTE.

  o Green keys refer to VCR functions. These include the VCR key and the 8 key "mechanical transport" block.

  o The yellow key refers to CABLE functions. The CABLE key is the only dedicated key for cable functions.

  o The white keys refer to DO functions. The DO keys are DO, DO 1, DO 2, DO 3, and DO 4. (DO keys are mode independent.)

  o The remaining keys are blue. Their use depends on the mode.

  o The numeric keypad (digits 0-9) will be outlined or otherwise visually separated from the rest of the layout.

  x It may be best to swap the white and blue color schemes.

o ~~Renaming the HCU.~~

  o Need something ~~snappy that reflects~~ the functions.

  o DoIt!

o Multi-lingual manual?

  o English and Spanish appear mandatory.

  o Japanese.

  o Translations should be independently retranslated back into English by two or three sources to check for accuracy.

o Easy to use manual.

  o Use of graphics

  o User manual must be easily understood by "average" customer. "Mode" is a word that probably should be avoided.

o Creating index of TV sets and brands supported, plus exception listing (odd ball commands) for the user. (Or at least distributor.)

o Stick on labels for reminders?

KEYPAD LAYOUT:

Color legend: B=blue, G=green, R=red, W=white, Y=yellow

VCR	CABLE	TV	POWER	G	Y	R	B
DO 1	DO 2	DO 3	DO 4	W	W	W	W
REC	TV/VCR	STOP	PAUSE	G	G	G	G
<<	<	>	>>	G	G	G	G
			MUTE				R
1	2	3	VOL +	B	B	B	R
4	5	6	VOL -	B	B	B	R
7	8	9		B	B	B	
	0	ENTER	CH +		B	B	B
		RECALL	CH -			B	B
DO				W			
A	B	C	D	B	B	B	B
E	F	G	H	B	B	B	B

SYNOPSIS:

SEARCH FUNCTION:

- o DO, ENTER, <TV or VCR or CABLE>, and CHannel UP are to begin search sequence.
- o CHannel UP to terminate search.

SEARCH RESULTS:

- o ~~DO~~ and <TV or VCR or CABLE> will initiate flashing sequence indicating the library selection found by the search sequence.

STANDARD FUNCTIONS:

- o Dedicated keys
  - o VOLume UP, VOLume DOWN and MUTE will be mapped from the TV library.
  - o The 8 "tape transport" keys will be mapped from the VCR library.
  - o Dedicated keys work irrespective of mode.
- o Mode dependent keys
  - o CHannel UP, CHannel DOWN, RECALL, the numeric keys 0-9, and ENTER are mode dependent. That is, the function executed depends on whether the user last pressed TV, VCR or CABLE.
  - o If a function is not available for a particular device in that mode, the HCU will not send any command. There is no "default" to another device type.
  - o Keys A-H are assigned additional functions for the target device (if any).
  - o These functions will be documented for the user in the manual.
  - o These functions may be changed through the use of custom macros. These functions are, in fact, predefined custom macros.

SPECIAL FUNCTIONS:

- o Special functions provide a means for accessing more than the 8 (A-H) functions we have pre-programmed.
- o All functions in the library for a particular device are available to the user.
- o Functions may be accessed by pressing DO and two digits on the numeric keypad.
- o Special functions are mode dependent.
- o Special functions may be included in macros, standard or custom.

STANDARD MACROS:

- o DO and ENTER initiate a macro definition.
- o The next key pressed indicates which key is to be assigned the macro definition. Keys excluded from macro definition are TV, VCR, CABLE, ENTER, and the numeric keys, 0-9.
- o DO and ENTER terminate the macro definition.
- o In the event insufficient space exists for the macro, a repeating flashing sequence of green, yellow and red will be sent to notify the user. The macro space used will be recovered.
- o User macro erasure is accomplished by defining an empty sequence for a key definition.
- o All macros will be erased by a master reset.
- o Macros calling is mode independent (although it may contain mode dependent sequences).
- x Macros calling macros could lock-up the device and may be an illegal entry.
- o Macro playback will be accomplished by pressing DO and the key defined by the user except in the case of the top DO keys 1-4. The top DO keys have an assumed DO. This will be particularly convenient for powering the system on or off, and for switching from cable A to cable B in some systems.
- o Key functions DO 1 through DO 4 are an added feature for this version only. Future models may use these keys for additional modes such as audio.

CUSTOM MACROS:

o ~~DO,~~ DO, ENTER and ENTER initiate a custom macro definition.

o The next key pressed indicates which key will be assigned the custom definition. The only keys allowed are those labeled A-H.

o DO and ENTER terminate the custom macro definition.

o Calling custom macros is mode dependent.

MASTER RESET:

o DO, RECALL, ENTER, DO, RECALL, ENTER initiate a master reset.

o Master reset will not change the searched library.

o Master reset will erase both standard and custom macros. Mode dependent key definitions A-H will be reset to their defaults.

DIRECT LIBRARY ENTRY:

o Direct library entry is intended for distributor use and will not be documented in the user manual.

o DO, RECALL, <VCR, CABLE or TV>, a number of digits, and RECALL will specify which library to use.

o Digits entered will probably reflect the "search result" playback sequence, i.e. a trinary number sequence.

o Direct library entry is an alternative to using the library search sequence. A user will still be able to use the search sequence. I.E. direct library entry does not "lock" the HCU on the entered device.

SERIAL COMMUNICATION MODE:

o Serial communication mode is intended for manufacturing and distributor use and will not be documented in the user manual.

o DO, 5 ~~ENTER, STOP,~~ PAUSE, ~~and ENTER~~ will activate serial communication mode.

o If communication is not established within 10 seconds the HCU will time out.

Protostar HCU Manual
Revision 1.1

USER MANUAL:

HCU Model 1

BASIC INSTRUCTIONS:

- You have selected one of the most powerful remote control units available. Your HCU works with almost all modern TV, VCR and cable systems. Because it works with so many different models, it needs a little help to know just what equipment you are using.

- The HCU uses invisible light beams to talk with your TV, VCR or cable box. If anything blocks the light beams it will not work.

- Battery installation. Your HCU uses 4 size AAA batteries. It is very important to insert the batteries properly (see diagram A). IMPROPER INSERTION OF THE BATTERIES CAN PERMANENTLY DAMAGE YOUR HCU! Take your time. Unlike other remote control devices, your HCU will not "forget" what you taught it when the battery is removed.

- Except for the batteries, your HCU does not contain any user serviceable parts. Opening the case except for the battery compartment may cause permanent damage to your HCU and voids the warranty.

MATCH TO YOUR TELEVISION:

- Turn your television on.

- Aim your HCU at the television.

- Press the DO button, the ENTER button and the TV button. This tells the HCU that you want it to search for your brand of television. It will begin blinking red to tell you it is ready to start searching for your television set.

    - If you ever press DO, ENTER and TV accidentally and do not want to begin searching, simply press any key except the CHANNEL UP button to cancel the search.

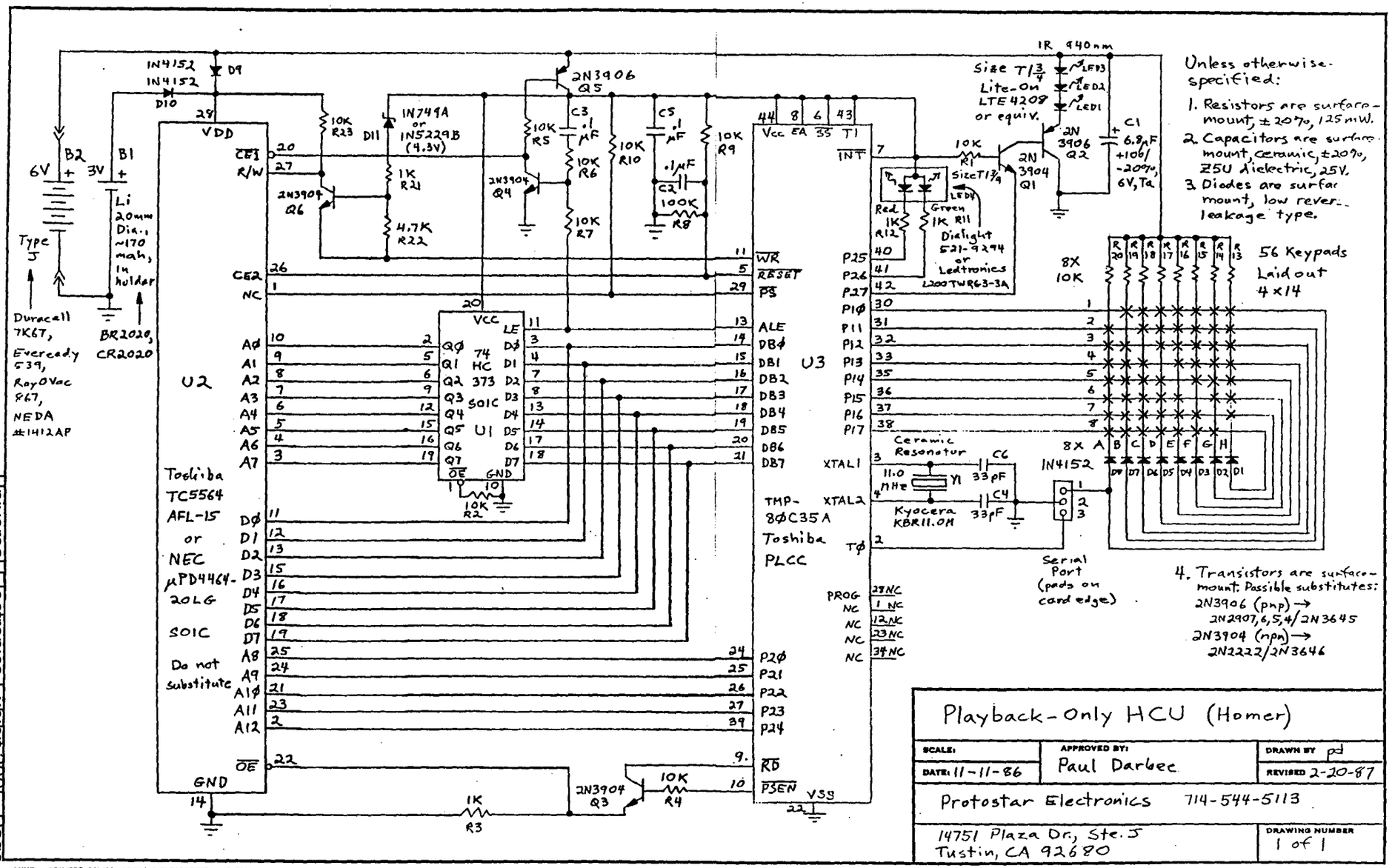
- Press the CHANNEL UP button on the HCU and release it. The red light will glow steadily after you let go. As soon as your television begins to change channels press the CHANNEL UP button again. (It may take up to X minutes before the HCU finds your TV's instruction codes.) If the red light goes out before your TV changes channels, you have a problem.

- Be sure to keep the HCU pointed at the TV while it searches.

- Note some sets do not have a CHANNEL UP function. In this case, your HCU will send another command, usually POWER OFF.

- In case of problems:
  - Try again.
  - Make sure to press the DO, ENTER, TV and CHANNEL UP key in that order. Press the CHANNEL UP key again as soon as you see the channels starting to change. You have about 3 seconds to do this. Otherwise the HCU starts sending codes for another television in its library. Pressing any other keys cancels the search. (This is to make

Exhibit E



Playback-Only HCU (Homer)

SCALE:	APPROVED BY: Paul Darbee	DRAWN BY pd
DATE: 11-11-86		REVISED 2-20-87

Protostar Electronics 714-544-5113

14751 Plaza Dr, Ste. 5
Tustin, CA 92680

DRAWING NUMBER 1 of 1

11X17 PRINTED ON NO. 1000H-8 CLEARPRINT FADE-OUT

Exhibit F

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

HOMER SPECIFICATIONS:

REVISION: 1.2
3-8-87

CONTENTS:

REVISION NOTES:

Rev 1.2 (3/8/87)
- o Name change throughout document from HCU to Homer.
- o General notes
  - o Renaming the HCU section removed.
- o Keypad layout
  - o Added as new section.
- o Synopsis
  - o Search function: for VCRs will now initiate "play" mode rather than cause a CHannel UP sequence.
  - o Search results: key sequence changed.
  - o Search results: light sequence now limited to just red and green (no yellow).
  - o Custom macros key sequence changed.
- o Manufacturing Test Station
  - o Added as a new section
- o Manufacturing Document
  - o Added as a new section.
- o User manual
  - o Not modified to reflect updated synopsis. Awaiting approval of synopsis.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

Rev 1.1 (2/16/87)

- o Table of contents.
  - o Added.
- o Revision notes.
  - o Added.
- o General notes.
  - o Added.
- o Synopsis.
  - o Added.
- o User Manual.
  - o Revised to reflect synopsis.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

GENERAL NOTES:

o Color scheme.

  o "Keys" refer to labels and/or surrounding background color.

  o Red keys refer to TV functions. These have been defined as TV, VOLume UP, VOLume DOWN and MUTE.

  o Green keys refer to VCR functions. These include the VCR key and the 8 key "mechanical transport" block.

  o The yellow key refers to CABLE functions. The CABLE key is the only dedicated key for cable functions.

  o The white keys refer to DO functions. The DO keys are DO, DO 1, DO 2, DO 3, and DO 4. (DO keys are mode independent.)

  o The remaining keys are blue. Their use depends on the mode.

  o The numeric keypad (digits 0-9) will be outlined or otherwise visually separated from the rest of the layout.

  x It may be best to swap the white and blue color schemes.

o Multi-lingual manual?

  o English and Spanish appear mandatory.

  o Japanese.

  o Translations should be independently retranslated back into English by two or three sources to check for accuracy.

o Easy to use manual.

  o Use of graphics

  o User manual must be easily understood by "average" customer. "Mode" is a word that probably should be avoided.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

- o Creating index of TV sets and brands supported, plus exception listing (odd ball commands) for the user. (Or at least distributor.)

- o Stick on labels for reminders?

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

KEYPAD LAYOUT:

Color legend: B=blue, G=green, R=red, W=white, Y=yellow

VCR	CABLE	TV	POWER	G	Y	R	B
DO 1	DO 2	DO 3	DO 4	W	W	W	W
REC	TV/VCR	STOP	PAUSE	G	G	G	G
<<	<	>	>>	G	G	G	G
			MUTE				R
1	2	3	VOL +	B	B	B	R
4	5	6	VOL -	B	B	B	R
7	8	9		B	B	B	
	0	ENTER	CH +		B	B	B
		RECALL	CH -			B	B
DO				W			
A	B	C	D	B	B	B	B
E	F	G	H	B	B	B	B

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

SYNOPSIS:

SEARCH FUNCTION:

- o DO, ENTER, <TV or VCR or CABLE>, and CHannel UP are to begin search sequence.
- o When searching for the VCR, the Homer will send a "PLAY" command rather than "CHannel UP". This is to accomodate VCRs that do not have the CHannel UP command.
- o CHannel UP to terminate search.

SEARCH RESULTS:

- o <TV or VCR or CABLE>, DO, ENTER, and CHannel UP will initiate flashing sequence indicating the library selection found by the search sequence. Flashing sequence will be only in red and green, as yellow is too close to green to prevent errors.

STANDARD FUNCTIONS:

- o Dedicated keys
    - o VOLume UP, VOLume DOWN and MUTE will be mapped from the TV library.
    - o The 8 "tape transport" keys will be mapped from the VCR library.
    - o Dedicated keys work irrespective of mode.
- o Mode dependent keys
    - o CHannel UP, CHannel DOWN, RECALL, the numeric keys 0-9, and ENTER are mode dependent. That is, the function executed depends on whether the user last pressed TV, VCR or CABLE.
    - o If a function is not available for a particular device in that mode, the Homer will not send any command. There is no "default" to another device type.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

- o Keys A-H are assigned additional functions for the target device (if any).
- o These functions will be documented for the user in the manual.
- o These functions may be changed through the use of custom macros. These functions are, in fact, predefined custom macros.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

SPECIAL FUNCTIONS:

- o Special functions provide a means for accessing more than the 8 (A-H) functions we have pre-programmed.
- o All functions in the library for a particular device are available to the user.
- o Functions may be accessed by pressing DO and two digits on the numeric keypad.
- o Special functions are mode dependent.
- o Special functions may be included in macros, standard or custom.

STANDARD MACROS:

- o DO and ENTER initiate a macro definition.
- o The next key pressed indicates which key is to be assigned the macro definition. Keys excluded from macro definition are TV, VCR, CABLE, ENTER, and the numeric keys 0-9.
- o DO and ENTER terminate the macro definition.
- o In the event insufficient space exists for the macro, a repeating flashing sequence of green, yellow and red will be sent to notify the user. The macro space used will be recovered.
- o User macro erasure is accomplished by defining an empty sequence for a key definition.
- o All macros will be erased by a master reset.
- o Macros calling is mode independent (although it may contain mode dependent sequences).
- x Macros calling macros could lock-up the device and may be an illegal entry.
- o Macro playback will be accomplished by pressing DO and the key defined by the user except in the case of the top DO keys 1-4. The top DO keys have an assumed DO. This will be particularly convenient for powering the system on or off, and for switching from cable A to cable B in some systems.
- o Key functions DO 1 through DO 4 are an added feature for this version only. Future models may use these keys for additional modes such as audio.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

CUSTOM MACROS:

- o DO, ENTER and ENTER initiate a custom macro definition.
- o The next key pressed indicates which key will be assigned the custom definition. The only keys allowed are those labeled A-H.
- o DO and ENTER terminate the custom macro definition.
- o Calling custom macros is mode dependent.

MASTER RESET:

- o DO, RECALL, ENTER, DO, RECALL, ENTER initiate a master reset.
- o Master reset will not change the searched library.
- o Master reset will erase both standard and custom macros. Mode dependent key definitions A-H will be reset to their defaults.

DIRECT LIBRARY ENTRY:

- o Direct library entry is intended for distributor use and will not be documented in the user manual.
- o DO, RECALL, <VCR, CABLE or TV>, a number of digits, and RECALL will specify which library to use.
- o Digits entered will probably reflect the "search result" play-back sequence, i.e. a trinary number sequence.
- o Direct library entry is an alternative to using the library search sequence. A user will still be able to use the search sequence. I.E. direct library entry does not "lock" the Homer on the entered device.

SERIAL COMMUNICATION MODE:

- o Serial communication mode is intended for manufacturing and distributor use and will not be documented in the user manual.
- o DO, 5 and PAUSE will activate serial communication mode.
- o If communication is not established within 10 seconds the Homer will time out.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

MANUFACTURING TEST STATION:

- o Hardware requirements:
- o Software requirements:
- o Security requirements:
    - o Manufacturing station ID number.
    - o Homer serial number.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

MANUFACTURING DOCUMENT:

- o PC board visual inspection
    - o Battery
    - o LEDs
    - o Other components
- o IBM/PC station
    - o Connection to MTS
    - o Software operation
- o MTS
    - o Connection to IBM
    - o Connection to Homer
- o Startup procedures
- o A programming cycle
    - o Loading code
    - o Testing code and hardware
- o Shutdown procedures
- o Reporting procedures

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

USER MANUAL:

Homer Model 1

BASIC INSTRUCTIONS:

- o You have selected one of the most powerful remote control units available. Your Homer works with almost all modern TV, VCR and cable systems. Because it works with so many different models, it needs a little help to know just what equipment you are using.

- o The Homer uses invisible light beams to talk with your TV, VCR or cable box. If anything blocks the light beams it will not work.

- o Battery installation. Your Homer uses 4 size AAA batteries. It is very important to insert the batteries properly (see diagram A). IMPROPER INSERTION OF THE BATTERIES CAN PERMANENTLY DAMAGE YOUR Homer! Take your time. Unlike other remote control devices, your Homer will not "forget" what you taught it when the battery is removed.

- o Except for the batteries, your Homer does not contain any user serviceable parts. Opening the case except for the battery compartment may cause permanent damage to your Homer and voids the warranty.

MATCH TO YOUR TELEVISION:

- o Turn your television on.

- o Aim your Homer at the television.

- o Press the DO button, the ENTER button and the TV button. This tells the Homer that you want it to search for your brand of television. It will begin blinking red to tell you it is ready to start searching for your television set.

    - o If you ever press DO, ENTER and TV accidentally and do not want to begin searching, simply press any key except the CHANNEL UP button to cancel the search.

- o Press the CHANNEL UP button on the Homer and release it. The red light will glow steadily after you let go. As soon as your television begins to change channels press the CHANNEL UP button again. (It may take up to X minutes before the Homer finds your TV's instruction codes.) If the red light goes out before your TV changes channels, you have a problem.

- Be sure to keep the Homer pointed at the TV while it searches.
- Note: some sets do not have a CHANNEL UP function. In this case, your Homer will send another command, usually POWER OFF.
- In case of problems:
    - Try again.
    - Make sure to press the DO, ENTER, TV and CHANNEL UP key in that order. Press the CHANNEL UP key again as soon as you see the channels starting to change. You have about 3 seconds to do this. Otherwise the Homer starts sending codes for another television in its library. Pressing any other keys cancels the search. (This is to make sure that you really want to start searching, and is not the family cat tap dancing on the keys!)
    - Check your battery.
    - Some television sets do not use infrared light beams for their control. Check with your dealer.

MATCH TO YOUR VCR:

- Similar to procedure for TV above. (This section will be expanded in future revisions.)

MATCH TO YOUR CABLE SYSTEM:

- Similar to procedure for TV above. (This section will be expanded in future revisions.)

BASIC COMMANDS:

- Take a look at the top of your Homer. The red labeled keys work with your television set. The green labeled keys work with your VCR. The blue keys are shared between your TV, VCR or CABLE. The white DO keys are special. We'll talk about them a bit later.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

- At the top of your Homer are three buttons: TV, VCR and CABLE. These buttons tell the Homer which device you want to control with the blue keys. For example, by pressing the TV key and the POWER key you are telling the Homer to turn your television's power on or off. Now if you want to change channels on your television up or down, you can just press the CHannel UP or CHannel DOWN buttons. Your Homer remembers that you selected TV. If you would like to change the channels on your cable unit, press the CABLE button. Now the CH UP and CH DOWN buttons will operate your CABLE box.

- Some kinds of equipment use slightly different commands. For example, your TV might not have a CHannel UP and CHannel DOWN command. Instead, it could have preset channel buttons labeled A through L. These "exceptions" still work with your Homer, but you have to do things a little differently. If your unit does not seem to be operating properly, it may be because it is an exception. The next section (STANDARD FUNCTIONS) tells you how to tells you how to find out about the exceptions.

STANDARD FUNCTIONS:

A	C	E	G
B	D	F	H

- Many remote controls have extra features. For example, televisions sometimes include remote color and tint controls. Your Homer has these extra features too!

- Some remote controls are exceptions. For example, some VCRs do not have a CHannel UP and CHannel down feature.

- To find out which standard functions you have:

    - Press DO and then press TV. The light on the Homer will blink at you. For example: red, yellow, green, green, yellow. If you do not remember everything the first time, just try again until you have it.

    - Open this manual to Chapter X and look for your matching color sequence. This will tell you what special functions are available for your model of television.

    - To find out which standard functions are available for your VCR and cable box are similar. Instead of pressing DO and TV, press DO and VCR for your VCR information. Press DO and CABLE for your cable information.

o To use your special functions make sure your are in the right mode. For example, if your chart reads:

RED, GREEN, YELLOW, YELLOW, GREEN

A = COLOR UP
B = COLOR DOWN
C = TINT UP
D = TINT DOWN
E = BASS UP
F = BASS DOWN
G = TREBLE UP
H = TREBLE DOWN

01 = POWER
02 = CHANNEL UP
03 = CHANNEL DOWN

o To turn the color up just press the TV button and then the "A" button. Of course, if you are already in TV mode, you can just press the "A" button. (If you can't remember which mode you are in, press the mode button again. It never hurts!)

o We have enclosed handy stick on-labels so you can write down any of your functions and stick them on the back.

SPECIAL FUNCTIONS:

o Eight standard functions are usually enough for most devices, but if they aren't don't worry. They are still included. After the list of keys A through H, is a second list of two numbers and a function. These are all of the functions your Homer can perform. To get to a function that is listed just press DO and it's two digit number. Commands you want to use frequently, you can put into a DO command (see below).

DO COMMANDS:

o There are certain things you might do over and over again. For example, turning your whole system on: CABLE, POWER, VCR, POWER, TV, POWER. That's six pushes. And you still might have to tune in to your favorite channel. Well, there is an easy way to teach your Homer a whole group of pushes so it will play them back by just touching two buttons!

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

- To teach your Homer a group of keystrokes:
    - First press the DO and then the ENTER key. This tells your Homer you want to build a DO command.
    - Press the key you want to use to name this chain. You can use any of the keys to call your chain except DO, TV, CABLE, VCR and the numbers 0-9.
    - Now press the keys that you want to include in your chain just as you would normally use your Homer. The keys will operate your equipment just like normal.
    - When you are finished building your command, press DO and ENTER.
- To play back your DO command, just press DO and the key you named your DO command. (You can see why you cannot name a chain any of the digits 0-9. DO and two numbers are used for extended special functions on some equipment.)
- If you named your DO command one of the DO keys named DO 1, DO 2, DO 3, or DO 4, you do not even have to press the main DO key! All they do are DO commands, so your Homer knows you want a DO command.
- Your DO key works in ANY mode: TV, VCR or CABLE.
- If your Homer begins blinking green, yellow, red while you are creating a DO command, it means it's memory is full. The command you are entering is automatically erased. You can enter in a shorter command, or erase another command to get more room.
- To erase a DO command and free up the memory for another chain:
    - Press DO and ENTER.
    - Press the key of the DO command you want to erase.
    - Press DO and ENTER, again.
- To erase ALL of your DO commands, see: MASTER RESET.

Protostar Homer Specifications [Rev 1.2] (Protostar HCU Manual)

CUSTOMIZING OPTIONS FOR KEYS A-H

- o You may prefer the functions keys A-H to perform differently than we have set them up. Well, you can change what these keys do. It is as easy as building a regular DO command.
- o Remember: customized options replace the normal functions A-H.
- o Remember: unlike normal DO commands, these are mode specific.
- o To customize:
    - o Start in the mode you wish to change. I.E., if you are going to customize the TV commands, start in TV mode.
    - o Press DO, DO, ENTER, ENTER and the key (A-H) you wish to change.
    - o Enter the function(s) you want the key to do (just like a normal DO command).
    - o Press DO and ENTER to end.
- o To erase one custom key:
    - o Press DO, DO, ENTER, ENTER and the key (A-H) you wish to erase.
    - o Press DO and ENTER.
- o To erase all custom key see MASTER RESET.

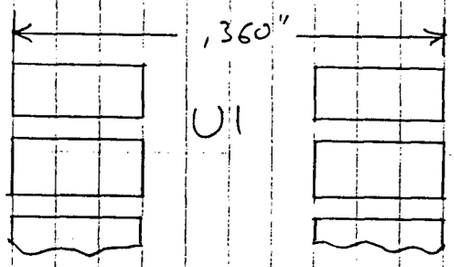
MASTER RESET:

- o Master reset erases all of the DO commands.
- o Master reset resets all of the custom commands (keys A-H) back to their original values.
- o Master reset does not change the TV, VCR or CABLE settings. That means you will not have to do a "search" for everything again.
- o To do a master reset:
    - o Press: DO, RECALL, ENTER, DO, RECALL, and ENTER.

Exhibit G

Homer PCB Artwork 3-23-87
Revision Page 1 of 2

1. Remove R2 and replace with short circuit.
2. Re-number R23 as R2.
3. Add C7 from ground to junction of Q4 collector, R5, and U2-20.
4. Label C7.
5. Reduce O.D. of pads on U1 to .360" from .400" (take off .020" from the outside of each pad).



6. Silkscreen UNIVERSAL ELECTRONICS, INC.
HP-PCB-01-03
in space between Y1 and D8, R20.
7. Move Y1 label between Y1 pads.
8. Give Photo Instructions such that there is no solder mask between fingers of keyboard switch contacts.
9. Make a photo for depositing carbon on the big round contact for B1.
10. Make 2 sets of negatives.

11. Scramble some of the data and/or address lines in some or all of the areas shown circled on the schematic. Check with Paul Darbee if this is confusing. Mark the changes on the schematic. These changes must be checked very carefully.

12. A feed through is missing on the ground trace connected to pin 2 of the serial port.

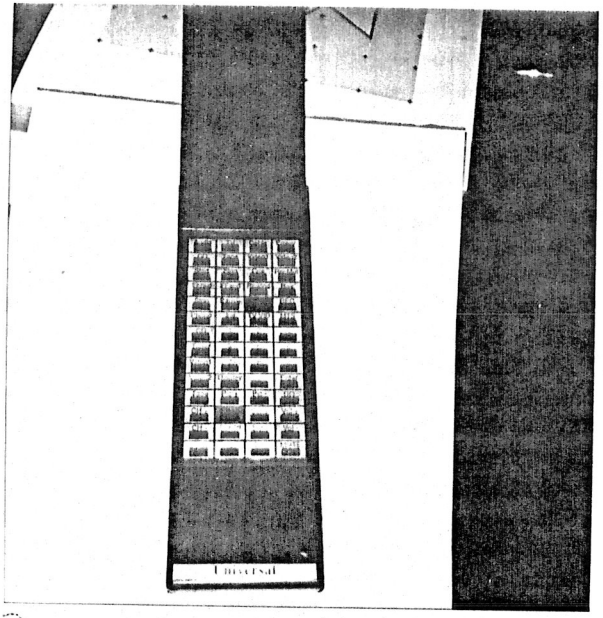
13. Add a duplicate serial port (with labels) in the corner of the board near R19. The pads and holes should be the same size, but the order of the pins may be changed.

14. Add another rectangular pad to solder a lithium battery clip to, near where your initials are. Move your initials and the − sign for the battery B1.

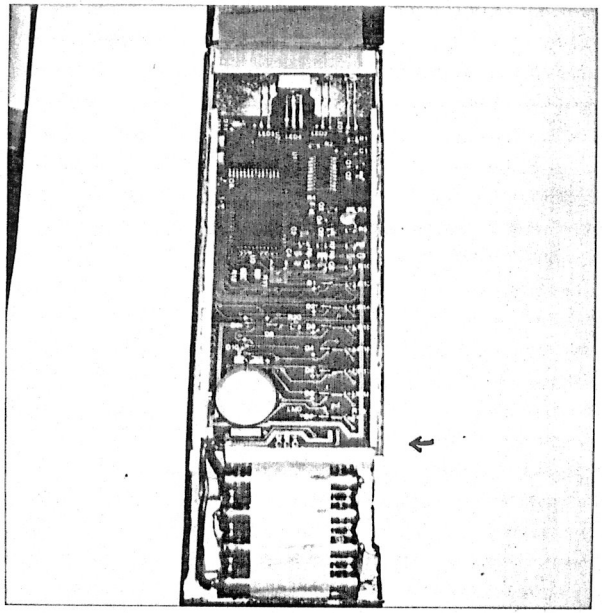
15. Move the trace from B2+ to D9 away from the lithium battery, and make it skinnier.

16. Remove the trace from U2 pin 1 to R10/U3-

Exhibit H

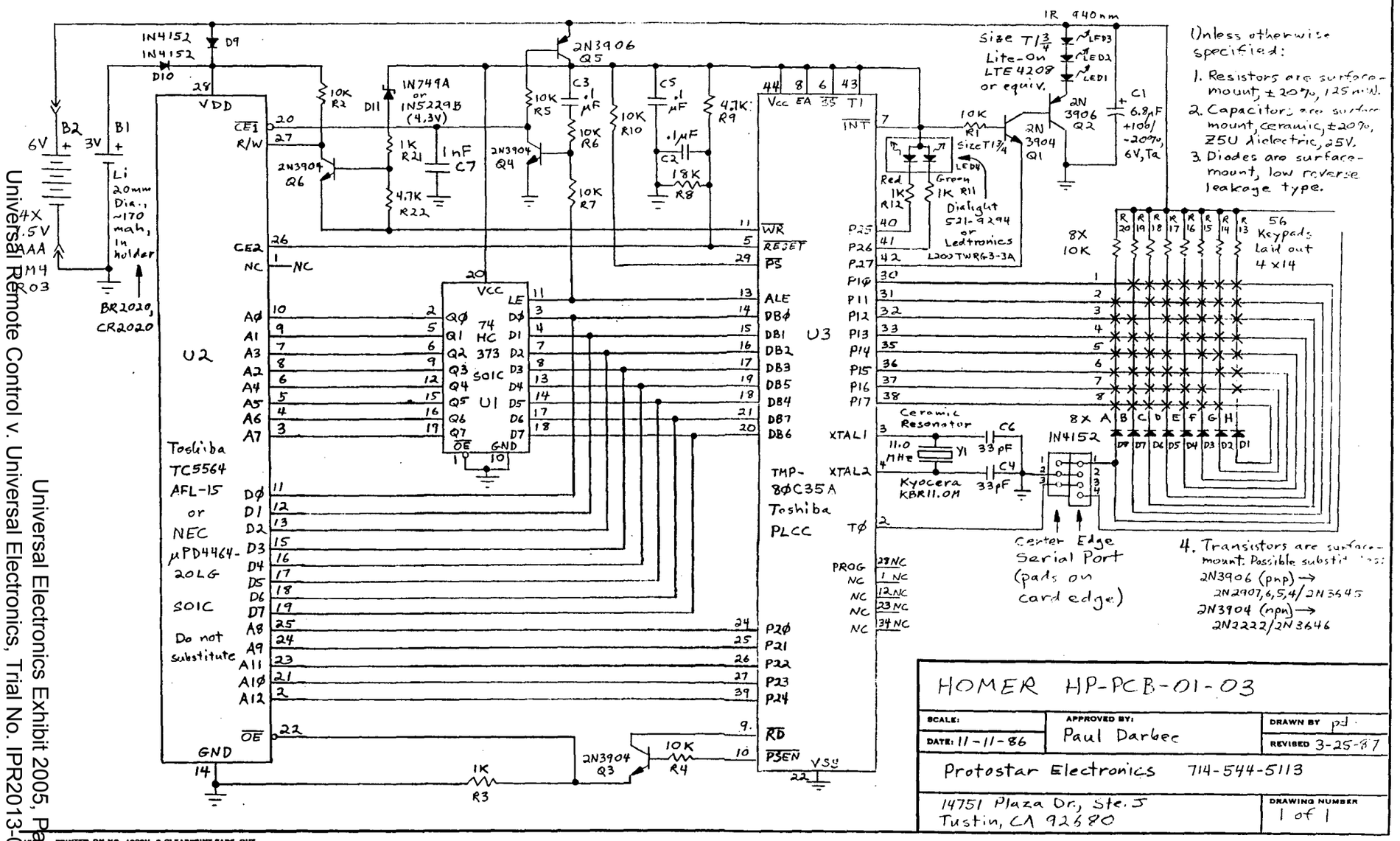


Pre-production Model
Mar/Apr 1987
EX 3



Pre-production Model serial Port
Mar/Apr 1987
EX 3

Exhibit I



HOMER HP-PCB-01-03

SCALE:	APPROVED BY: Paul Darbee	DRAWN BY pd
DATE: 11-11-86		REVISED 3-25-87

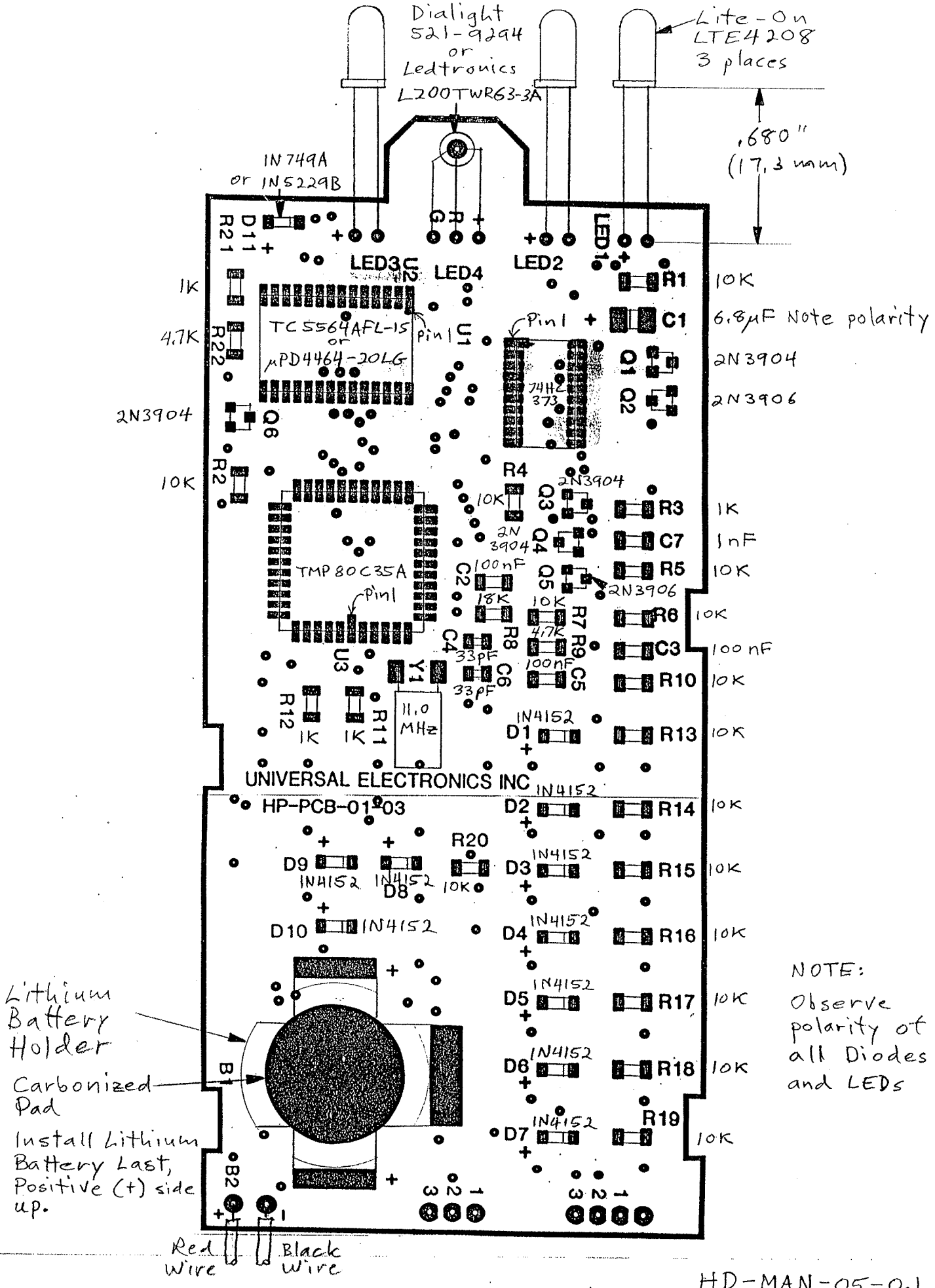
Protostar Electronics 714-544-5113

14751 Plaza Dr, Ste. J
Tustin, CA 92680

DRAWING NUMBER 1 of 1

PRINTED ON NO. 1000H-8 CLEARPRINT FADE-OUT

Exhibit J



Homer PCB Assembly Drawing

HD-MAN-05-0.1
3-27-87 pd

Exhibit K

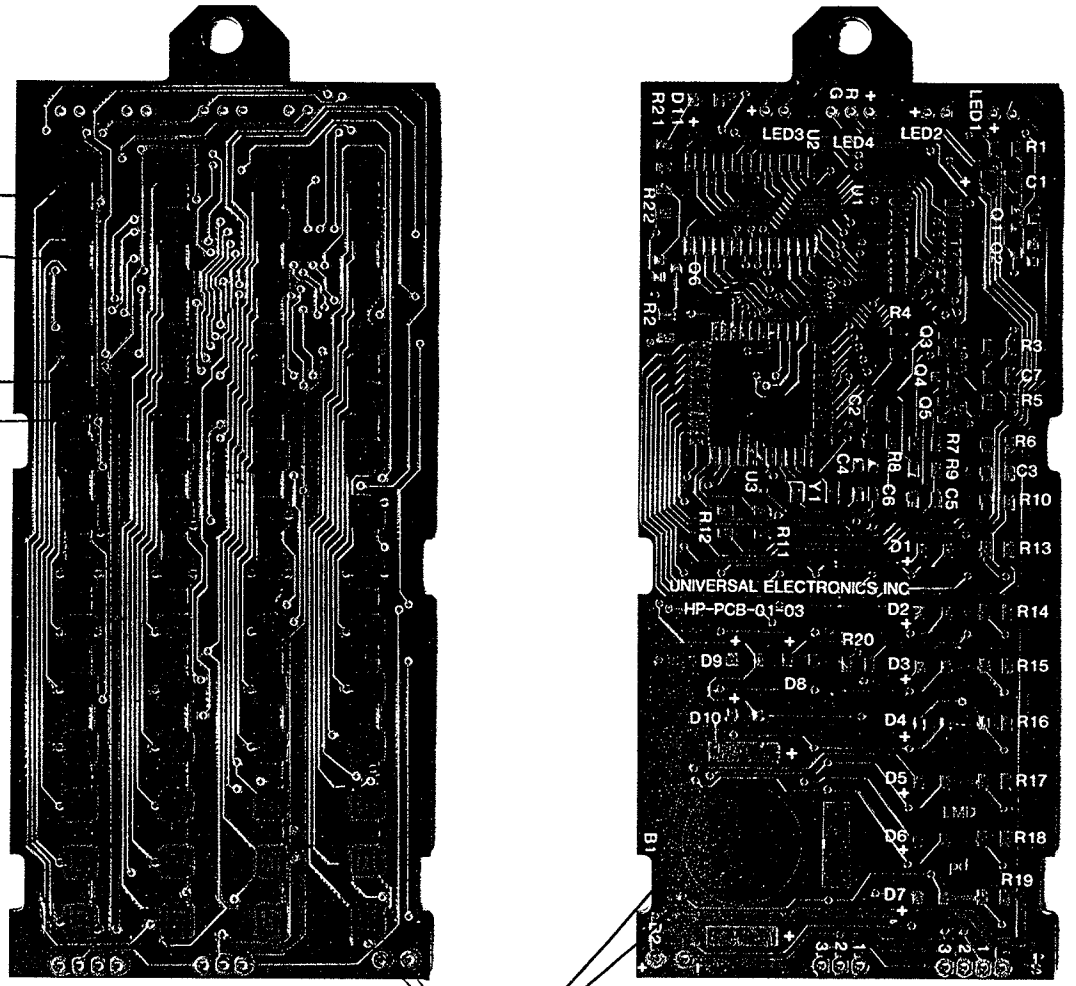
UNIVERSAL ELECTRONICS

29-APRIL-1987

2. USE SWITCH PAD NEGATIVE TO DEPOSIT CARBON ON SWITCH PADS

NO CARBON HERE (on bridge between keys)

SOLDER MASK

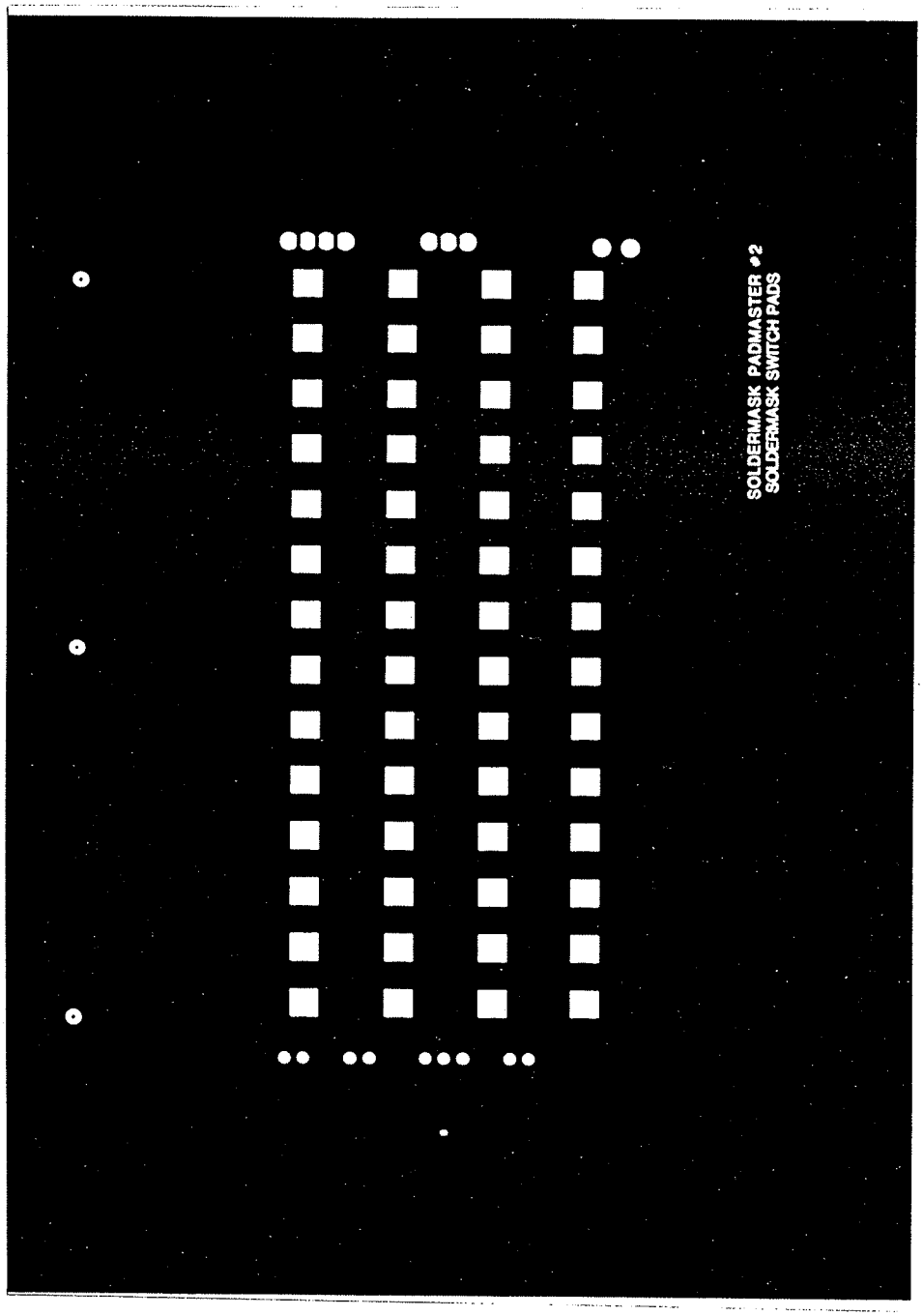


1. Solder MASK MUST USE "SOLDER MASK PADMASTER FR SWITCH PADS" ARTWORK

3. These holes were not plated through. <u>All</u> holes must be plated through.

4-29-87
Page 2 of 3

Homer

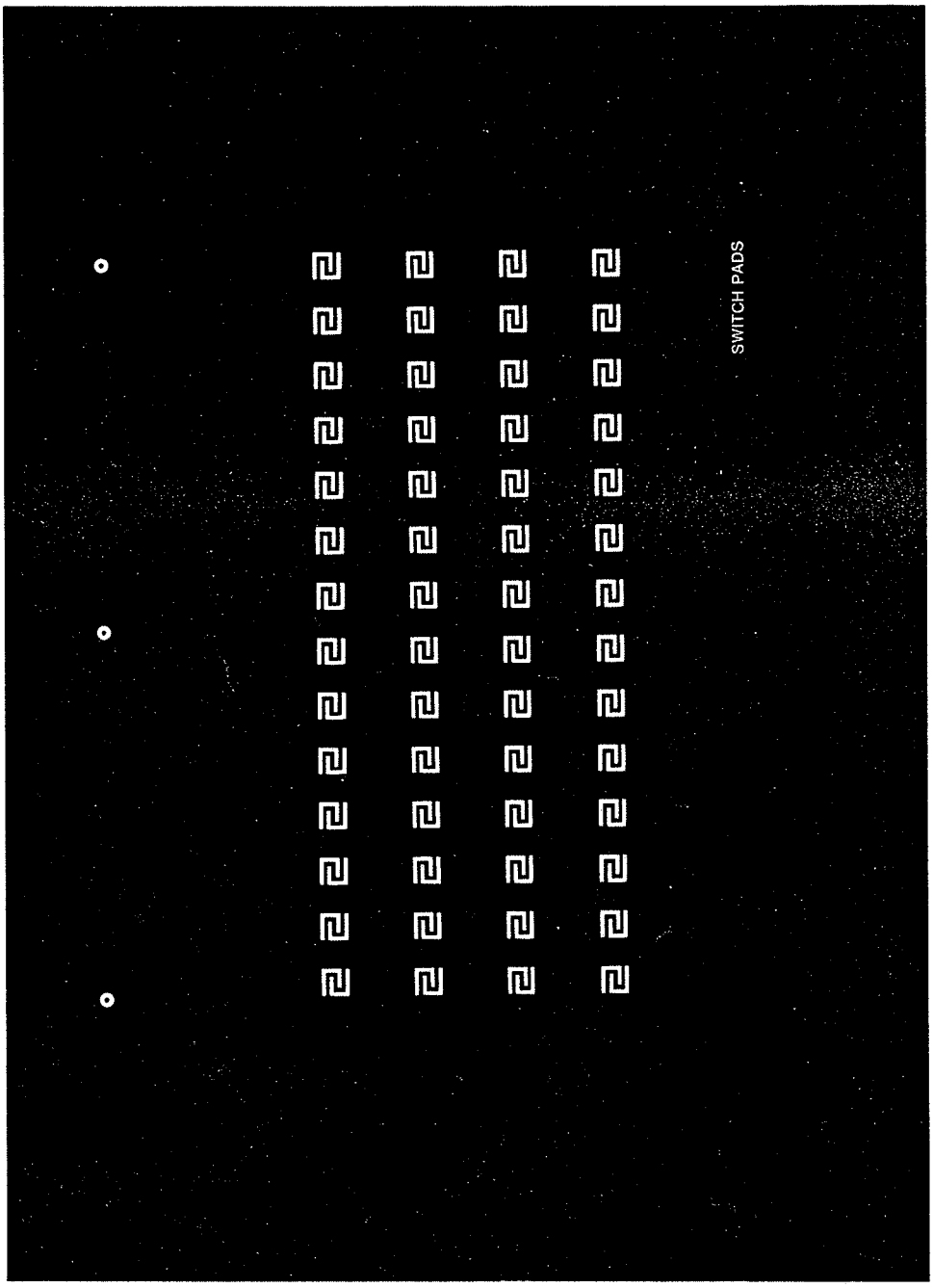


Use this for the solder mask on the switch pad side.

Note that most of the feed-throughs are covered by solder mask, but the switches are clear of solder mask.

4-29-87
Page 3 of 3

Homer



Use this to deposit carbon on the switch pads. On the boards you sent us April 27, 198; there was carbon on some of the etch traces near the switches. Put carbon only on the switch pads.

Exhibit L

```
2500 A.D. 8748 Macro Assembler  -  Version 4.00b
-------------------------------------------------

        Input  Filename : scan.asm
        Output Filename : scan.obj


1
2                                PL     59
3   0000                         TITLE  HOMER...and the plan of Zeus was being accomplished
4   0000                         STTL   (Of course who knows what Zeus has in mind?)
5                           ;--------------------------------------------------------------------------;
6                           ;        30 Apr 1987, 11:29                                              ;
7                           ;                                                                        ;
8                           ;        HCU playback only--Sony scan version                            ;
9                           ;                                                                        ;
10                          ;        The keymap is for the real thing.                               ;
11                          ;                                                                        ;
12                          ;           Copyright 1987 Protostar Electronics                         ;
13                          ;                 **All Rights Reserved**                                ;
14                          ;--------------------------------------------------------------------------;
15                               RECSIZE 16
16  0000                         INCLUDE MACROS.LIB
17                              MACLIST OFF
18
19                          HALT    MACRO
20                               DB      01
21                               ENDM

24                               SPACES ON
25                               FILLCHAR 01
                                 PAGE
```

HOMER...and the plan of Zeus was being accomplished
(Of course who knows what Zeus has in mind?)

```
;-------------------------------------------------------------------------;
;         Real Key Map  4x14                                              ;
;                                                                         ;
;                                                                         ;
;    1    1f 17 0f 07                The numbers in the matrix are the   ;
;                                    scan codes returned by the keyboard ;
;    2    1e 16 0e 06                scanner.                            ;
;                                                                         ;
;    3    1d 15 0d 05                                                    ;
;                                                                         ;
;    4    1c 14 0c 04                                                    ;
;                                                                         ;
;    5    1a 13 0b 03                                                    ;
;                                                                         ;
;    6    19 11 0a 02                                                    ;
;                                                                         ;
;    7    18 10 08 01                                                    ;
;                                                                         ;
;    8    38 30 28 20                                                    ;
;                                                                         ;
;    9    39 31 29 21                                                    ;
;                                                                         ;
;   10    3a 32 2a 22                                                    ;
;                                                                         ;
;   11    3b 33 2b 23                                                    ;
;                                                                         ;
;   12    3c 34 2c 25                                                    ;
;                                                                         ;
;   13    3d 35 2e 26                                                    ;
;                                                                         ;
;   14    3e 37 2f 27                              19 Feb 1987, 10:53    ;
;-------------------------------------------------------------------------;
         PAGE
```

HOMER...and the plan of Zeus was being accomplished
(Of course who knows what Zeus has in mind?)

```
                        ;--------------------------------------;
                        ;  Masks for LED & memory manipulation  ;
                        ;  plus other equates.                  ;
                        ;--------------------------------------;
0080                    OUT       EQU    80h                  ;mask for IR LED output (P27)
                                                                ;pin 38 in DIP package
0040                    GREEN     EQU    40h                  ;mask for green LED output (P26)
0020                    RED       EQU    20h                  ;mask for red LED output (P25)
0060                    YELLOW    EQU    RED.OR.GREEN         ;mask for yellow LED output (P26¦P25)

0010                    FOURK     EQU    10h                  ;mask for upper 4k memory (bit 4)

003C                    DOKEY     EQU    3Ch                  ;DO key scan code (really 3c)
002A                    ENTERKEY  EQU    2Ah                  ;ENTER key scan code (really 2A)
002B                    RCLKEY    EQU    2Bh                  ;RCL key (really 2b)
0022                    CHUPKEY   EQU    22h                  ;Channel up key
0004                    PAUSEKEY  EQU    04h                  ;Pause key

                        ;--------------------------------------;
                        ;         INTERAL RAM                  ;
                        ;--------------------------------------;
0021                    SCANCODE  EQU    33                   ;Addr to save current scan code
0022                    EXECUTOR  EQU    34                   ;Addr to save executor type #
0023                    TBLADR    EQU    35                   ;Two bytes to save table pointer
0025                    SCANFLAG  EQU    37                   ;Indicator for scanning
0026                    MACROFLG  EQU    38                   ;Indicator for macro execution (2 bytes)
0029                    VCRFLAG   EQU    41
0028                    TKEYCNT   EQU    40                   ;Count of phoney key downs
                                  PAGE
```

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     HOMER...and the plan of Zeus was being accomplished
     (Of course who knows what Zeus has in mind?)

 88                          ;--------------------------------------;
                             ; This is where it all starts after we ;
 90                          ; come down from the high 4k at power  ;
 91                          ; on.  The first instruction is just a ;
 92                          ; duplicate of whats in high mem.      ;
 93                          ;                                      ;
 94                          ;        28 Jan 1987, 10:59            ;
 95                          ;--------------------------------------;
 96  0000                            ORG    0
 97  0000   9A E0            START0:  ANL    P2,#.NOT. 1FH         ;Set to lower 4k (actualy...
 98                                                                ;...we come from high memory)
 99  0002   04 0F                    JMP    START1                ;Skip flags
100
101                          ;--------------------------------------;
102                          ;  MODEFLG -- This location is used to ;
103                          ;             store the device mode #  ;
104                          ;             during power down.       ;
105                          ;                                      ;
106                          ;        Mode Codes                    ;
107                          ;        ----------                    ;
108                          ;                                      ;
109                          ;  0 = Cable     1 = TV                ;
110                          ;  2 = VCR                             ;
111                          ;                                      ;
112                          ;        13 Feb 1987, 14:48            ;
113                          ;--------------------------------------;
1'  0004   01                MODEFLG  DB     1                     ;device mode # byte
11
116                          ;--------------------------------------;
117                          ;  DOFLAG -- This location is used to  ;
118                          ;            indicate a multi-key      ;
119                          ;            sequence is in progress.  ;
120                          ;                                      ;
121                          ;  Bit 0 = DO key pressed              ;
122                          ;      1 = Scan mode                   ;
123                          ;      3 = Macro def storing           ;
124                          ;      4 = Macro DO found              ;
125                          ;      6 = Direct library search       ;
126                          ;      7 = Macro def get key           ;
127                          ;                                      ;
128                          ;        23 Feb 1987, 17:53            ;
129                          ;--------------------------------------;
130  0005   00                DOFLAG   DB     0
131
132                          ;--------------------------------------;
133                          ;  DONUM -- used to store partial      ;
134                          ;           numbers for the DO-n-n     ;
135                          ;           sequence.                  ;
136                          ;                                      ;
137                          ;        21 Feb 1987, 15:19            ;
```

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     HOMER...and the plan of Zeus was being accomplished
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138                          ;---------------------------------------;
1    0006   00               DONUM     DB      0
140
141                          ;---------------------------------------;
142                          ;  MACPTR -- used to store address      ;
143                          ;            during macro definition.  ;
144                          ;                                      ;
145                          ;         23 Feb 1987, 17:58           ;
146                          ;---------------------------------------;
147  0007   00 00             MACPTR    DB      0,0
148
149                          ;---------------------------------------;
150                          ;  These locations are used to store    ;
151                          ;  the scan results.  In other words    ;
152                          ;  they point to the selected device    ;
153                          ;  type for each mode.                  ;
154                          ;                                       ;
155                          ;         13 Feb 1987, 14:49           ;
156                          ;---------------------------------------;
157  0009   C412             S$CABLE   DW      CABLE0              ;Addr of current cable data
158  000B   3015             S$TV      DW      TV10                ;Addr of current TV data
159  000D   7D15             S$VCR     DW      VCR6                ;Addr of current VCR data
160                                    PAGE
```

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     HOMER...and the plan of Zeus was being accomplished
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161
1    000F   B8 21          START1:  MOV    R0,#SCANCODE          ;Start address
163  0011   BF 09                   MOV    R7,#9                 ;Number of bytes
164  0013   27                     CLR    A                     ;Get a zero
165
166  0014   A0             STRT5:   MOV    @R0,A                 ;And clear the flag
167  0015   18                     INC    R0                    ;Bump to second byte
168  0016   EF 14                   DJNZ   R7,STRT5
169
170                         ;-------------------------------------------------------------------------;
171                         ;         MAIN KEYBOARD SCAN                          17 Feb 1987, 14:57    ;
172                         ;-------------------------------------------------------------------------;
173  0018   BA 37                   MOV    R2,#55                ;Number of retries
174  001A   F5             MNSCN:   SEL    MB1
175  001B   D4 8C                   CALL   KSCAN                 ;Scan the keyboard
176  001D   E5                     SEL    MB0
177  001E   96 25                   JNZ    CHKDO                 ;Jmp/got a key
178  0020   EA 1A                   DJNZ   R2,MNSCN              ;Jmp/try another scan
179  0022                           HALT                         ;No key found--shut down
182
183  0023   E4 08          JDEF:    JMP    DEFMAC                ;Long jump to macro definition
184
185                         ;-------------------------------------------------------------------------;
186                         ;    Check if we are in DO mode.                 17 Feb 1987, 13:46    ;
187                         ;-------------------------------------------------------------------------;
188  0025   B8 21          CHKDO:   MOV    R0,#SCANCODE
1    0027   A0                     MOV    @R0,A                 ;Save the scan code
19
191  0028   9A F0                   ANL    P2,#0F0h              ;mask off addr bits
192
193  002A   B8 05                   MOV    R0,#<DOFLAG           ;get addr of table
194  002C   80                     MOVX   A,@R0                 ;Get DO mode flag
195  002D   C6 33                   JZ     NODO                  ;Jmp/the DO key was pressed last
196  002F   F2 23                   JB7    JDEF                  ;Jmp/we are in macro definition
197  0031   04 61                   JMP    DOMODE                ;Go do DO mode stuff
198
199                         ;-------------------------------------------------------------------------;
200                         ;    See if we got the DO key                    17 Feb 1987, 12:19    ;
201                         ;-------------------------------------------------------------------------;
202  0033   F9             NODO:    MOV    A,R1                  ;Get the scan code
203  0034   03 C4                   ADD    A,#-DOKEY             ;Test if DO key
204  0036   96 3E                   JNZ    FAKEIT                ;Jmp/not the DO key
205  0038   9A D0                   ANL    P2,#0F0h.AND.(.NOT.RED) ;Set addr to first page
206  003A   23 01                   MOV    A,#1                  ;Indicate we have the DO key
207  003C   04 B7                   JMP    SET$DO2
208
209                         ;-------------------------------------------------------------------------;
210                         ;   First we check for a mode change key.          12 Mar 1987, 11:17    ;
211                         ;-------------------------------------------------------------------------;
212  003E   9A F0           FAKEIT:  ANL    P2,#0F0h              ;mask off addr bits
```

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     HOMER...and the plan of Zeus was being accomplished
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213  0040  8A 0E                ORL   P2,#(>MODEKEYS)&0Fh   ;or in new addr bits
     0042  B8 83                MOV   R0,#<MODEKEYS         ;get addr of table
215  0044  54 3B                CALL  KTSCNR                ;search the table
216  0046  E6 52                JNC   CHKDOS                ;jmp/not a mode change key
217
218                     ; we found a mode change key, save the mode and go to sleep
219
220  0048  8A 60                ORL   P2,#YELLOW            ;Turn off LEDs
221  004A  9A D0                ANL   P2,#(0F0h.AND.(.NOT.RED)) ;set the addr bits
222  004C  B9 04                MOV   R1,#<MODEFLG          ;get the low addr bits
223  004E  FF                   MOV   A,R7                  ;get the new mode
224  004F  91                   MOVX  @R1,A                 ;save the new mode
225  0050  44 91                JMP   SLEEPW                ;and power down
226
227                     ;-------------------------------------------------------------------------;
228                     ;   Check if D01-D04                                  20 Mar 1987, 15:24    ;
229                     ;-------------------------------------------------------------------------;
230  0052  B8 87        CHKDOS:  MOV   R0,#<DOKEYS           ;get addr of table
231  0054  54 3B                CALL  KTSCNR                ;search the table
232  0056  E6 5A                JNC   GETCMD                ;jmp/not a D01-D04
233  0058  C4 13                JMP   TM5                   ;Go try to execute a macro
234
235                     ;-------------------------------------------------------------------------;
236                     ;  Jump to command processor for the mode we're in.                       ;
237                     ;-------------------------------------------------------------------------;
238  005A  9A F0        GETCMD:  ANL   P2,#0F0h             ;Clear out addr bits
     005C  B8 04                MOV   R0,#<MODEFLG          ;Get mode flag addr
     005E  80                   MOVX  A,@R0                 ;Get mode #
241  005F  24 3D                JMP   CMD1
242
243                     ;-------------------------------------------------------------------------;
244                     ;   DOMODE -- The DO key was pressed before this keystroke.               ;
245                     ;                                                  23 Feb 1987, 14:17   ;
246                     ;-------------------------------------------------------------------------;
247  0061  AB           DOMODE:  MOV   R3,A                  ;Save flag
248  0062  F9                   MOV   A,R1                  ;Get the scan code
249  0063  D3 3C                XRL   A,#DOKEY              ;Is it the DO key again?
250  0065  C6 C4                JZ    RESET$DO              ;Jmp/yep
251
252  0067  FB                   MOV   A,R3                  ;Get flag
253  0068  32 A2                JB1   START$SCAN            ;Jmp/start or cancel a scan
254
255  006A  F9                   MOV   A,R1                  ;Get the scan code
256  006B  D3 2B                XRL   A,#RCLKEY             ;Is it a macro definition request?
257  006D  96 73                JNZ   D01                   ;Jmp/nope
258  006F  23 80                MOV   A,#80H                ;Indicate macro def mode
259  0071  04 B5                JMP   SET$DO
260
261  0073              D01:
262  0073  F9                   MOV   A,R1                  ;Get the scan code
```

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     HOMER...and the plan of Zeus was being accomplished
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0074   D3 2A                    XRL    A,#ENTERKEY          ;See if enter key
0076   C6 AF                    JZ     SET$SCAN             ;Set the scan flag

0078   B8 06                    MOV    R0,#<DONUM           ;Address of DO-n-n byte
007A   80                       MOVX   A,@R0                ;Get the byte
007B   C6 7F                    JZ     DO3                  ;Jmp/not a DO-n-n
007D   24 00                    JMP    DODIGITS

                         ; see if we have a digit key

007F                     DO3:
007F   9A F0                    ANL    P2,#0F0h             ;Clear addr bits
0081   8A 0E                    ORL    P2,#(>DIGITKEYS)&0Fh ;High addr of table
0083   B8 78                    MOV    R0,#<DIGITKEYS       ;Get addr of digit key table
0085   54 3B                    CALL   KTSCNR               ;Check if a digit key
0087   E6 94                    JNC    DO4                  ;Jmp/nope
0089   9A F0                    ANL    P2,#0F0h             ;Clear addr bits
008B   B8 06                    MOV    R0,#<DONUM           ;Get addr of Do-n-n byte
008D   FF                       MOV    A,R7                 ;Get the digit
008E   17                       INC    A                    ;Add 1 to make non-zero
008F   90                       MOVX   @R0,A                ;Save the digit
0090   23 01                    MOV    A,#1                 ;Value for DO flag
0092   04 B5                    JMP    SET$DO               ;Go set the flag and get out

                         ; didn't get a digit key, see if we have a mode key

0094   9A F0             DO4:   ANL    P2,#0F0h             ;mask off addr bits
0096   8A 0E                    ORL    P2,#(>MODEKEYS)&0Fh  ;or in new addr bits
0098   B8 83                    MOV    R0,#<MODEKEYS        ;get addr of table
009A   54 3B                    CALL   KTSCNR               ;search the table
009C   F6 A0                    JC     DO5                  ;Jmp/we got a mode key
009E   C4 00                    JMP    TRYMACRO             ;Go try for macro key

                         ; we got a mode key--show the device id

00A0   64 00             DO5:   JMP    DOSHOW

                         ;-------------------------------------------------------------------------;
                         ; see if we have channel up and start scanning for a new device          ;
                         ; if we do. Otherwise, just reset and go to sleep.        04 Mar 1987, 16:38 ;
                         ;-------------------------------------------------------------------------;
00A2                     START$SCAN:
00A2   F9                       MOV    A,R1                 ;Get scan code
00A3   D3 22                    XRL    A,#CHUPKEY           ;Check if channel up
00A5   96 C4                    JNZ    RESET$DO             ;Jmp/reset the DO flag
00A7   9A DF                    ANL    P2,#.NOT.RED         ;Set to red
00A9   54 55                    CALL   WAITUP               ;Wait until key is released
00AB   8A 60                    ORL    P2,#YELLOW           ;Turn off LEDs
00AD   64 3F                    JMP    SCAN                 ;Start scanning
```

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     HOMER...and the plan of Zeus was being accomplished
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313  00AF                    SET$SCAN:
3    00AF  23 02                      MOV     A,#2                ;Indicate we are about to enter scan mode
315  00B1  9A DF                      ANL     P2,#.NOT.RED        ;Use red
316  00B3  04 B7                      JMP     SET$DO2
317
318                          ; set the DO flag to the value in ACC
319
320  00B5                    SET$DO:
321  00B5  9A 9F                      ANL     P2,#.NOT.YELLOW     ;Turn on LEDs
322  00B7                    SET$DO2:
323  00B7  9A F0                      ANL     P2,#0F0h            ;Clear out addr bits
324  00B9  B8 05                      MOV     R0,#<DOFLAG         ;Get the flag addr
325  00BB  90                         MOVX    @R0,A               ;Set the flag
326  00BC  BE 00                      MOV     R6,#0
327  00BE  EF BE              SD5:    DJNZ    R7,$
328  00C0  EE BE                      DJNZ    R6,SD5
329  00C2  44 97                      JMP     SLEEP
330
331                          ; clear the DO flag
332
333  00C4                    RESET$DO:
334  00C4  27                         CLR     A                   ;Get a zero
335  00C5  9A F0                      ANL     P2,#0F0h            ;Clear addr bits
336  00C7  B8 06                      MOV     R0,#<DONUM
337  00C9  90                         MOVX    @R0,A               ;Clear numeric flag
338  00CA  04 B5                      JMP     SET$DO              ;And reset the DO flag
3
34   00CC                    EX8$SET:
341  00CC  9A F0                      ANL     P2,#0F0h            ;Clear addr bits
342  00CE  8A 0B                      ORL     P2,#>BIGGO          ;Set new bits
343  00D0  83                         RET
344
345  0100                             ORG     100H
346                          ;-------------------------------------------------------------------------;
347                          ;  DODIGITS -- Handles the second digit of a DO-n-n sequence.              ;
348                          ;                                                                         ;
349                          ;         23 Feb 1987, 10:26                                              ;
350                          ;-------------------------------------------------------------------------;
351  0100                    DODIGITS:
352  0100  AA                         MOV     R2,A                ;Save first digit
353  0101  CA                         DEC     R2                  ;Back to zero org
354  0102  9A F0                      ANL     P2,#0F0h            ;Clear out addr bits
355  0104  8A 0E                      ORL     P2,#(>DIGITKEYS)&0Fh ;Put in new addr bits
356  0106  B8 78                      MOV     R0,#<DIGITKEYS      ;Get addr of digit key table
357  0108  54 3B                      CALL    KTSCNR              ;Check if we have a digit key
358  010A  F6 1F                      JC      DD5                 ;Jmp/yep we have one
359  010C  9A F0                      ANL     P2,#0F0h            ;Clear out addr bits
360  010E  B8 06                      MOV     R0,#<DONUM          ;Get addr of flag
361  0110  80                         MOVX    A,@R0               ;Get first digit
362  0111  03 FA                      ADD     A,#-6               ;Was it a 5?
```

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     HOMER...and the plan of Zeus was being accomplished
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0113  C6 17                    JZ     DD3                ;Jmp/yep
0115  04 C4          DD$RST:   JMP    RESET$DO           ;Jmp/no--quit
0117  F9             DD3:      MOV    A,R1               ;Get key scan code
0118  03 FC                    ADD    A,#-PAUSEKEY       ;Is it pause?
011A  96 15                    JNZ    DD$RST             ;Jmp/no--quit
011C  F5                       SEL    MB1                ;We're goin' on high
011D  E4 00                    JMP    SERIAL             ;Jmp to serial input routine
011F                  DD5:
011F  27                       CLR    A                  ;Start a zero
0120                  DD10:
0120  2A                       XCH    A,R2               ;Get the first digit
0121  C6 29                    JZ     DD15               ;Jmp/done
0123  2A                       XCH    A,R2               ;Get back the partial results
0124  03 0A                    ADD    A,#10              ;Bump up by 10
0126  CA                       DEC    R2                 ;Decr counter
0127  24 20                    JMP    DD10               ;Try again
0129                  DD15:
0129  2A                       XCH    A,R2               ;Get the result
012A  6F                       ADD    A,R7               ;Add in ones place
012B  AD                       MOV    R5,A               ;Save for enter direct
012C  17                       INC    A                  ;Make one more for non-zero org
012D  9A F0                    ANL    P2,#0F0h           ;Clear out addr bits
012F  B8 06                    MOV    R0,#<DONUM         ;Get addr of flag
0131  90                       MOVX   @R0,A              ;Save function #
0132  B8 05                    MOV    R0,#<DOFLAG        ;Get DO flag addr
0134  80                       MOVX   A,@R0              ;Get the DO flag
0135  D2 3B                    JB6    JDIRECT            ;Jmp/we're doing enter direct
0137  27                       CLR    A                  ;Get a zero
0138  90                       MOVX   @R0,A              ;Clear the do flag
0139  04 5A                    JMP    GETCMD             ;Go jump to command proc
013B  C4 33           JDIRECT:  JMP    DIRECT

                      ;-------------------------------------------------------------------------;
                      ;  CMD1 -- command executor                                               ;
                      ;                                                                         ;
                      ;  ON ENTRY:  ACC=Mode #                                                  ;
                      ;                                                                         ;
                      ;         19 Mar 1987, 15:23                                              ;
                      ;-------------------------------------------------------------------------;
013D                  CMD1:

                      ;         first check the standard key table
                      ;         the scan code test results are kept in RB1,R7

013D  AF                       MOV    R7,A               ;Save mode #
013E  D5                       SEL    RB1                ;Select second register bank
```

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     HOMER...and the plan of Zeus was being accomplished
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413  013F  03 18                ADD    A,#<KEYTBLS          ;Add in base addr
4    0141  A8                   MOV    R0,A                 ;Save it in index
415  0142  9A F0                ANL    P2,#0F0h             ;Clear out addr bits
416  0144  8A 0E                ORL    P2,#>KEYTBLS         ;Set new addr bits
417  0146  80                   MOVX   A,@R0                ;Get low order addr of key table
418  0147  A8                   MOV    R0,A                 ;And put it where it is needed
419  0148  B9 21                MOV    R1,#SCANCODE         ;Get addr of scan code
420  014A  F1                   MOV    A,@R1                ;Get the scan code
421  014B  A9                   MOV    R1,A                 ;Put it where we need it
422  014C  54 3B                CALL   KTSCNR               ;Check the table
423  014E  C5                   SEL    RB0                  ;Return to first bank
424
425                     ;       get the address of the selected table entry
426
427  014F  FF                   MOV    A,R7                 ;Get mode #
428  0150  E7                   RL     A                    ;Times 2 bytes per entry
429  0151  03 09                ADD    A,#<S$CABLE          ;Add in base addr
430  0153  A8                   MOV    R0,A                 ;Put it in index reg
431
432  0154  9A F0                ANL    P2,#0F0h             ;Clear out addr bits
433  0156  80                   MOVX   A,@R0                ;Get first byte (low order) of addr
434  0157  A9                   MOV    R1,A                 ;Save the byte
435  0158  18                   INC    R0                   ;Point to next byte
436  0159  80                   MOVX   A,@R0                ;Get the high order byte
437  015A  AF                   MOV    R7,A                 ;Save it
438
4            ;-------------------------------------------------------------------------;
44           ;  CMDEXEC -- Takes KEYSCAN code in R6 and tries to match it to a table   ;
441          ;             entry.  If a match is found, the code generator is jumped to. ;
442          ;                                                                         ;
443          ;        19 Mar 1987, 10:43                                               ;
444          ;-------------------------------------------------------------------------;
445  015B  B8 23          CMDEXEC:  MOV    R0,#TBLADR
446  015D  F9                       MOV    A,R1
447  015E  A0                       MOV    @R0,A
448  015F  18                       INC    R0                   ;Save the table pointer
449  0160  FF                       MOV    A,R7
450  0161  A0                       MOV    @R0,A
451
452  0162  23 03                    MOV    A,#3                 ;Amount to add
453  0164  54 31                    CALL   ADD$ADDR             ;Bump to executor #
454  0166  54 1B                    CALL   GETBYTE              ;Get command executor #
455
456  0168  B8 22                    MOV    R0,#EXECUTOR         ;Get addr to save in
457  016A  A0                       MOV    @R0,A                ;And save the executor #
458  016B  54 2F                    CALL   BUMPADDR             ;Bump past the executor #
459
460  016D  9A F0                    ANL    P2,#0F0h             ;Clear out addr bits
461  016F  B8 06                    MOV    R0,#<DONUM           ;Addr of DO-n-n flag
462  0171  80                       MOVX   A,@R0                ;Get the DO-n-n flag
```

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     HOMER...and the plan of Zeus was being accomplished
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0172  AD                    MOV   R5,A              ;Save the flag
0173  96 DB                 JNZ   CE$NN             ;Jmp/we're doing a DO-n-n

0175  D5                    SEL   RB1
0176  FF                    MOV   A,R7              ;Get standard key #
0177  C5                    SEL   RB0
0178  AA                    MOV   R2,A              ;Save the standard key #

0179  BD 00                 MOV   R5,#0             ;Entry number
017B  BC 03                 MOV   R4,#3             ;Number of bytes in bit map
017D  54 1B           CE4:  CALL  GETBYTE           ;Get a byte of the bit map
017F  AB                    MOV   R3,A              ;Save the byte
0180  54 2F                 CALL  BUMPADDR          ;Bump addr to next byte
0182  FB                    MOV   A,R3              ;Get the byte back
0183  BB 08                 MOV   R3,#8             ;Number of bits per byte
0185  F2 93           CE5:  JB7   CE7               ;Jmp/bit is on
0187                  CE6:
0187  2A                    XCH   A,R2              ;Get the standard key #
0188  C6 CA                 JZ    CE$VCR            ;Jmp/bad key for this device
018A  07                    DEC   A                 ;Subtract one
018B  2A                    XCH   A,R2              ;Put things back
018C                  CE6A:
018C  E7                    RL    A                 ;Position to next bit
018D  EB 85                 DJNZ  R3,CE5            ;Jmp/more bits to test
018F  EC 7D                 DJNZ  R4,CE4            ;Jmp/try another byte
0191  24 BC                 JMP   CE$NONSTD         ;Jmp/non-standard key

0193  2A              CE7:  XCH   A,R2              ;Get standard key #
0194  C6 9B                 JZ    CE10              ;Jmp/we found it
0196  2A                    XCH   A,R2              ;Restore standard key #
0197  CA                    DEC   R2                ;Decr key #
0198  1D                    INC   R5                ;Bump entry counter
0199  24 8C                 JMP   CE6A              ;Go try next bit

                      ;       we found a standard key!

                      ; we go to the executor with R5=function number

019B                  CE10:
019B  F4 00                 CALL  GET$TABLE         ;Get table addr
019D  23 07                 MOV   A,#7              ;The 7th byte is the # of funcs
019F  54 31                 CALL  ADD$ADDR          ;
01A1  54 1B                 CALL  GETBYTE           ;Get the number of functions
01A3  37                    CPL   A                 ;Negate it
01A4  17                    INC   A                 ;In twos complement
01A5  6D                    ADD   A,R5              ;See if over the limit
01A6  F6 CA                 JC    CE$VCR            ;Jmp/over--try VCR

01A8  8A 60                 ORL   P2,#YELLOW        ;Turn of LEDs
01AA  9A B0                 ANL   P2,#(.NOT.GREEN)&0F0h ;Turn on green LED
```

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      HOMER...and the plan of Zeus was being accomplished
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513   01AC   B8 22              MOV   R0,#EXECUTOR          ;Addr of executor #
5'.   01AE   F0                 MOV   A,@R0                ;Get the executor #
5..   01AF   E7                 RL    A                    ;Times 2 bytes per
516   01B0   03 00              ADD   A,#<EXECS            ;Add in base of table
517   01B2   A8                 MOV   R0,A                 ;Get in index
518   01B3   8A 0E              ORL   P2,#(>EXECS)&0Fh     ;OR in new addr bits
519   01B5   80                 MOVX  A,@R0                ;Get the first byte of the addr
520   01B6   AF                 MOV   R7,A                 ;Save it
521   01B7   18                 INC   R0                   ;Bump pointer
522   01B8   80                 MOVX  A,@R0                ;Get next byte
523   01B9   AE                 MOV   R6,A                 ;And save it
524   01BA   54 00              CALL  COMPJMP              ;Jump to the executor
525
526   01BC   9A F0    CE$NONSTD:ANL   P2,#0F0h           ;Clear out addr bits
527   01BE   8A 0E              ORL   P2,#(>FUNCKEYS)&0Fh  ;Get new addr bits
528   01C0   B8 55              MOV   R0,#<FUNCKEYS        ;Get table address
529
530   01C2   B9 21              MOV   R1,#SCANCODE         ;Get scan code save addr
531   01C4   F1                 MOV   A,@R1                ;Get the scan code
532   01C5   A9                 MOV   R1,A                 ;Put it where we need it
533   01C6   54 3B              CALL  KTSCNR               ;Check the table
534   01C8   F6 D6              JC    CEN2                 ;Jmp/got one
535
536   01CA   B8 29    CE$VCR:   MOV   R0,#VCRFLAG
537   01CC   F0                 MOV   A,@R0                ;Get VCR flag
538   01CD   96 D4              JNZ   CEHLT                ;Jmp/we've already tried vcr
539   01CF   23 02              MOV   A,#2                 ;Set the VCR flag (& VCR mode #)
5     01D1   A0                 MOV   @R0,A                ;So we don't loop
541   01D2   24 3D              JMP   CMD1                 ;Go try VCR codes
542
543   01D4   44 97    CEHLT:    JMP   SLEEP
544
545   01D6   FF       CEN2:     MOV   A,R7                 ;Get the result
546   01D7   6D                 ADD   A,R5                 ;Add it to old count
547   01D8   AD                 MOV   R5,A                 ;And save it
548   01D9   24 9B              JMP   CE10                 ;Go execute
549
550   01DB   CD       CE$NN:    DEC   R5                   ;Put back to zero origin
551   01DC   27                 CLR   A                    ;Get a zero
552   01DD   90                 MOVX  @R0,A                ;Clear D0-n-n
553   01DE   24 9B              JMP   CE10                 ;Go execute what we got
554                             PAGE
```

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     HOMER...and the plan of Zeus was being accomplished
     (Of course who knows what Zeus has in mind?)

                              ORG    200H
                         ;---------------------------------------;
                         ;    COMPJMP -- Computed jump           ;
                         ;                                       ;
                         ;    R6-R7 contain address to jump to   ;
                         ;          (R6 high order bits)         ;
                         ;                                       ;
                         ;    WARNING: This routine must reside  ;
                         ;             at the same location as its ;
                         ;             counterpart in high memory! ;
                         ;                                       ;
                         ;         04 Mar 1987, 16:48            ;
                         ;---------------------------------------;
0200                     COMPJMP:
0200  C7                          MOV    A,PSW              ;Get the stack pointer
0201  53 07                       ANL    A,#07H             ;and isolate it
0203  07                          DEC    A                  ;Back up to get the right frame
0204  E7                          RL     A                  ;Times 2 bytes per frame
0205  53 0E                       ANL    A,#0EH             ;Blow out the junk
0207  03 08                       ADD    A,#8               ;Add stack memory offset
0209  A8                          MOV    R0,A               ;Setup the pointer
020A  FF                          MOV    A,R7               ;We must move from ACC
020B  A0                          MOV    @R0,A              ;Set lower address bits
020C  18                          INC    R0                 ;Point to next byte of stack frame
020D  FE                          MOV    A,R6               ;Move addr to ACC
020E  A0                          MOV    @R0,A              ;Set upper addr bits

020F  F5                          SEL    MB1                ;Start as upper bank
0210  72 13                       JB3    CJMB1              ;JMP/we want to go to upper bank
0212  E5                          SEL    MB0                ;Go to lower bank
0213                     CJMB1:
0213  92 18                       JB4    CJMB2              ;Jmp/addr is upper 4k
0215  9A EF                       ANL    P2,#.NOT. FOURK    ;turn off 4k bit
0217  83                          RET                       ;Return to computed address

0218  8A 10              CJMB2:   ORL    P2,#FOURK          ;Turn on 4k bit
021A  83                          RET                       ;Return to computed address

                         ;-------------------------------------------------------;
                         ;  GETBYTE -- returns a byte from an arbitrary memory addr.  ;
                         ;                                                       ;
                         ;         ARGUMENTS: R1 = low order byte of address     ;
                         ;                    R7 = high order byte of address    ;
                         ;                                                       ;
                         ;         RETURNS:   byte in ACC                        ;
                         ;                                                       ;
                         ;         DESTROYS:  ACC,P2                             ;
                         ;                                                       ;
                         ;         13 Feb 1987, 13:19                            ;
                         ;-------------------------------------------------------;
```

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     HOMER...and the plan of Zeus was being accomplished
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605  021B  0A          GETBYTE:  IN     A,P2              ;Get port value
6    021C  53 E0               ANL    A,#0E0h           ;Clear lower bits
607  021E  4F                 ORL    A,R7              ;OR in new addr bits
608
609                    ; here we might end up in the upper 4k of memory
610
611  021F  3A                  OUTL   P2,A              ;Change the port values
612  0220               GB$MOVE:
613  0220  81                 MOVX   A,@R1             ;Get the byte
614  0221  9A EF               ANL    P2,#.NOT.FOURK    ;(for upper copy)
615  0223  83                 RET
616
617
618                    ;-------------------------------------------------------;
619                    ;  PUTBYTE -- puts a byte into an arbitrary memory addr.  ;
620                    ;                                                         ;
621                    ;         ARGUMENTS: R1 = low order byte of address       ;
622                    ;                    R7 = high order byte of address      ;
623                    ;                    ACC = byte to put                    ;
624                    ;                                                         ;
625                    ;         DESTROYS:  R3,P2                                ;
626                    ;                                                         ;
627                    ;         23 Feb 1987, 12:50                              ;
628                    ;-------------------------------------------------------;
629  0224  AB          PUTBYTE:  MOV    R3,A             ;Save the byte to put
630  0225  0A                 IN     A,P2              ;Get the port value
6    0226  53 E0               ANL    A,#0E0h           ;Clear addr bits
6    0228  4F                 ORL    A,R7              ;OR in new addr bits
633  0229  3A                 OUTL   P2,A              ;Change the port
634
635                    ; at this point we might end up in the upper 4k, there is code up there
636                    ; to handle the situation
637
638  022A  FB          PB$MOVE:  MOV    A,R3             ;Get the byte back
639  022B  91                 MOVX   @R1,A             ;Put where it goes
640  022C  9A EF               ANL    P2,#.NOT.FOURK    ;Get us back to low mem
641  022E  83                 RET
642
643                    ;-------------------------------------------------------------------------;
644                    ;  BUMPADDR -- Add one to the address contained in R1,R7. This routine    ;
645                    ;              handles carries from the lower order address in R1 by adding ;
646                    ;              one to R7. R7 is kept from becoming dangerously invalid by  ;
647                    ;              anding out the non-address bits.                            ;
648                    ;                                                                          ;
649                    ;  ADD$ADDR -- Alternate entry; adds value in ACC to address in R1,R7.     ;
650                    ;                                                                          ;
651                    ;         RESISTERS: R1 = low order bits of address                        ;
652                    ;                    R7 = high order bits of address                     ;
653                    ;                                                                          ;
654                    ;         DESTROYS:  ACC                                                   ;
```

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```
655                     ;                                                    17 Feb 1987, 13:51   ;
656                     ;-------------------------------------------------------------------------;
657   022F              BUMPADDR:
658   022F   23 01               MOV     A,#1                ;Setup to add 1
659   0231              ADD$ADDR:
660   0231   69                  ADD     A,R1                ;Add the increment
661   0232   A9                  MOV     R1,A                ;And save the result
662   0233   E6 3A               JNC     BUMPRET             ;Jmp/no carry--just return
663   0235   1F                  INC     R7                  ;Bump the high order byte
664   0236   2F                  XCH     A,R7                ;Get the high order byte
665   0237   53 1F               ANL     A,#1Fh              ;Mask off dangerous bits
666   0239   2F                  XCH     A,R7                ;Put it back where we found it
667   023A   83         BUMPRET: RET                         ;Return to caller
668
669                     ;-----------------------------------------------------------;
670                     ;  Key table scanner                                        ;
671                     ;                                                           ;
672                     ;         R0 = addr of scan code table                      ;
673                     ;         R1 = key scan code                                ;
674                     ;         P2 addr bits must be set to address of table      ;
675                     ;                                                           ;
676                     ;      Returns:                                             ;
677                     ;         R7 = entry # in table                             ;
678                     ;         Carry set if entry was found,                     ;
679                     ;         clear if none found.                              ;
680                     ;                                                           ;
681                     ;         27 Jan 1987, 10:32                                ;
682                     ;-----------------------------------------------------------;
683   023B              KTSCNR:
684   023B   BF 00               MOV     R7,#0               ;Counter
685   023D              KTLP:
686   023D   80                  MOVX    A,@R0               ;Get a keycode
687   023E   C6 47               JZ      KTEND               ;Jmp/end of table
688   0240   69                  ADD     A,R1                ;Test if match
689   0241   C6 4B               JZ      KTFND               ;Jmp/found a match
690   0243   18                  INC     R0                  ;Bump to next entry
691   0244   1F                  INC     R7                  ;Bump counter
692   0245   44 3D               JMP     KTLP                ;Go try next entry
693
694   0247   BF FF      KTEND:   MOV     R7,#-1              ;Second indicator for not found
695   0249   97                  CLR     C                   ;Indicate nothing found
696   024A   83                  RET                         ;Return caller
697
698   024B   97          KTFND:   CLR     C                   ;
699   024C   A7                  CPL     C                   ;Flag that we found something
700   024D   83                  RET                         ;And return to caller
701
702                     ;-----------------------------------;
703                     ;   Delay a while for key debounce  ;
704                     ;-----------------------------------;
```

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```
                        DEBNC:                                  ;Delay for key bounce
;       024E    BE 28           MOV     R6,#40
0250    EF 50           DBNC5:  DJNZ    R7,$
0252    EE 50                   DJNZ    R6,DBNC5
0254    83                      RET

                        ;---------------------------------------;
                        ;  WAITUP -- Wait until no keys are down  ;
                        ;                                       ;
                        ;       29 Jan 1987, 15:46              ;
                        ;---------------------------------------;
0255    54 7B           WAITUP: CALL    DOWNKEY                 ;Test if key is down
0257    76 55                   JF1     WAITUP                  ;Jmp/key still down--try again
0259    83                      RET                             ;Return to caller

                        ;---------------------------------------;
                        ;  TESTKEY -- returns F1 reset if routine ;
                        ;       should exit, F1 set if          ;
                        ;       routine should continue         ;
                        ;       sending.                        ;
                        ;                                       ;
                        ;       Destroys: A,R4,R5,R7            ;
                        ;                                       ;
                        ;       29 Apr 1987, 16:40              ;
                        ;---------------------------------------;
025A    B6 6D           TESTKEY: JF0    TK$SCAN                 ;Jmp/we're in scan mode

025C    F9                      MOV     A,R1
025D    AF                      MOV     R7,A                    ;Save R1
025E    B9 28                   MOV     R1,#TKEYCNT             ;Get addr
0260    F1                      MOV     A,@R1                   ;Get the count
0261    C6 64                   JZ      TK3
0263    07                      DEC     A                       ;Subtract 1

0264    A1              TK3:    MOV     @R1,A                   ;Save it
0265    2F                      XCH     A,R7                    ;Get back old R1
0266    A9                      MOV     R1,A                    ;
0267    FF                      MOV     A,R7                    ;Get the count
0268    96 77                   JNZ     TK$GO                   ;Jmp/still more count to go
026A    54 7B                   CALL    DOWNKEY                 ;See if key is still down
026C    83                      RET                             ;F1 will be set by DOWNKEY

026D    54 7B           TK$SCAN: CALL   DOWNKEY                 ;See if key is still down
026F    76 75                   JF1     TK$STOP                 ;Jmp/key is down--stop
0271    D5                      SEL     RB1
0272    EC 77                   DJNZ    R4,TK$GO                ;Jmp/more to send
0274    C5                      SEL     RB0
0275    A5              TK$STOP: CLR    F1                      ;Indicate we should stop
0276    83                      RET
```

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     HOMER...and the plan of Zeus was being accomplished
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0277  C5              TK$GO:   SEL   RB0
0278  A5                       CLR   F1                ;Just to be sure
0279  B5                       CPL   F1                ;Indicate we should continue
027A  83                       RET

                       ;---------------------------------------;
                       ;        DOWNKEY                        ;
                       ;                                       ;
                       ;  This routine tests if ANY key is down. ;
                       ;  Returns F1 set if a key is down.     ;
                       ;                                       ;
                       ;   Destroys A,R5,R7                    ;
                       ;                                       ;
                       ;        19 Mar 1987, 10:59             ;
                       ;---------------------------------------;
027B  A5              DOWNKEY: CLR   F1                ;clear flag
027C  BF 08                    MOV   R7,#8             ;8 columns to search
027E  BD FE                    MOV   R5,#.NOT. 1       ;setup scan mask

0280  FD              DK5:     MOV   A,R5              ;must output from ACC
0281  39                      OUTL  P1,A              ;output scan mask

0282  09                      IN    A,P1              ;get the results
0283  89 FF                   ORL   P1,#0FFH          ;save power
0285  37                      CPL   A                 ;invert them
0286  5D                      ANL   A,R5              ;mask off diagonal
0287  96 8F                   JNZ   DK10              ;Jmp/got a key down
0289  FD                      MOV   A,R5
028A  E7                      RL    A                 ;move the scan mask
028B  AD                      MOV   R5,A              ;set to scan the next column
028C  EF 80                   DJNZ  R7,DK5            ;go scan another column
028E  83                      RET                     ;no keys down

028F                  DK10:
028F  B5                      CPL   F1                ;Indicate a key is down
0290  83                      RET                     ;Return to caller

                       ;---------------------------------------;
                       ;        SLEEP                          ;
                       ;                                       ;
                       ;  Saves the device selection and turns ;
                       ;  off the power.  All registers and    ;
                       ;  interal RAM are lost.                ;
                       ;                                       ;
                       ;        17 Mar 1987, 10:36             ;
                       ;---------------------------------------;
0291  BE 00           SLEEPW:  MOV   R6,#0

0293  EF 93           SLP0:    DJNZ  R7,$               ;A short delay
0295  EE 93                    DJNZ  R6,SLP0
```

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      HOMER...and the plan of Zeus was being accomplished
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805
806   0297  C5          SLEEP:  SEL   RB0
807   0298  B8 25               MOV   R0,#SCANFLAG      ;Addr of scan flag
808   029A  F0                  MOV   A,@R0             ;Get scan flag
809   029B  96 CA               JNZ   SLEEP3            ;Jmp/we're scanning
810
811   029D  B8 26               MOV   R0,#MACROFLG      ;Get addr of macro flag
812   029F  F0                  MOV   A,@R0             ;Get the macro flag
813   02A0  A9                  MOV   R1,A              ;Save first byte
814   02A1  18                  INC   R0                ;Bump to second byte
815   02A2  F0                  MOV   A,@R0             ;Get second byte
816   02A3  C6 C9               JZ    SLEEP2            ;Jmp/not doing macro
817   02A5  AF                  MOV   R7,A              ;Save second byte
818
819   02A6  54 2F       SLPBUMP: CALL   BUMPADDR        ;Bump the macro address
820   02A8  FF          SLPNBMP: MOV    A,R7            ;Get the second byte
821   02A9  A0                   MOV    @R0,A           ;Save it
822   02AA  AF                   MOV    R7,A            ;And save the addr
823   02AB  C8                   DEC    R0              ;Decr to first byte
824   02AC  F9                   MOV    A,R1            ;Get the first byte
825   02AD  A0                   MOV    @R0,A           ;Save it
826   02AE  54 1B                CALL   GETBYTE         ;Get the next key scan code
827   02B0  C6 C3                JZ     DEMACRO         ;Jmp/end of table
828   02B2  A9                   MOV    R1,A            ;Put it where we need it
829   02B3  BE 00                MOV    R6,#0           ;Delay between codes
830   02B5  BF 00                MOV    R7,#0
831   02B7  EF B7       SLPDLY:  DJNZ   R7,$
832   02B9  EE B7                DJNZ   R6,SLPDLY
833   02BB  B8 28                MOV    R0,#TKEYCNT     ;Set the rep count
834   02BD  23 0C                MOV    A,#12           ;For macro execution
835   02BF  A0                   MOV    @R0,A
836   02C0  F9                   MOV    A,R1            ;Get scan code
837   02C1  04 25                JMP    CHKDO           ;Go execute the code
838
839   02C3  9A F0       DEMACRO: ANL    P2,#0F0h        ;Clear addr bits
840   02C5  27                   CLR    A               ;Get a zero
841   02C6  B8 05                MOV    R0,#<DOFLAG     ;Get addr of DO flag
842   02C8  90                   MOVX   @R0,A           ;Clear the flag
843   02C9              SLEEP2:  HALT                   ;turn power off
846   02CA  64 6E       SLEEP3:  JMP    SCAN$CONT       ;Go continue the scan
847
848   02CC  0000        CURMAC   DW     0               ;Start of current mac being def'd
849
850                              PAGE
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     HOMER...and the plan of Zeus was being accomplished
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0300                            ORG     300H
                        ;-------------------------------------------------------------------------;
                        ;  DOSHOW -- Blink the LED to show the selected device.                   ;
                        ;                                                                         ;
                        ;       23 Feb 1987, 10:32                                                ;
                        ;-------------------------------------------------------------------------;
0300   FF               DOSHOW: MOV     A,R7                    ;Get the mode key #
0301   E7                      RL      A                       ;2 bytes per table entry
0302   03 09                   ADD     A,#<S$CABLE             ;Base address
0304   A8                      MOV     R0,A                    ;Get the pointer
0305   9A F0                   ANL     P2,#0F0h                ;mask off addr bits
0307   80                      MOVX    A,@R0                   ;Get low order byte
0308   A9                      MOV     R1,A                    ;Save it
0309   18                      INC     R0                      ;Bump to next byte
030A   80                      MOVX    A,@R0                   ;Get the high order byte
030B   AF                      MOV     R7,A                    ;And save it
030C   23 02                   MOV     A,#2                    ;Two bytes for link addr
030E   54 31                   CALL    ADD$ADDR                ;Bump the address
0310   54 1B                   CALL    GETBYTE                 ;Get the ID byte

                        ; now we flash the LED to indicate the contents of the ID byte

0312   B8 08                   MOV     R0,#8                   ;Eight bits per byte

0314   8A 60           DO5B:   ORL     P2,#YELLOW              ;Turn off all LEDs
0316   BE 00                   MOV     R6,#0
0318   BF 00                   MOV     R7,#0

031A   EF 1A           DO5C:   DJNZ    R7,$
031C   EF 1C                   DJNZ    R7,$
031E   EF 1E                   DJNZ    R7,$
0320   EE 1A                   DJNZ    R6,DO5C

0322   F2 28                   JB7     DO5ON
0324   9A DF                   ANL     P2,#.NOT.RED            ;Red for bit off
0326   64 2A                   JMP     DO5D
0328                   DO5ON:
0328   9A BF                   ANL     P2,#.NOT.GREEN          ;Green for bit on
032A                   DO5D:
032A   BE 00                   MOV     R6,#0
032C   BF 00                   MOV     R7,#0
032E   EF 2E           DO5E:   DJNZ    R7,$
0330   EF 30                   DJNZ    R7,$
0332   EE 2E                   DJNZ    R6,DO5E

0334   E7                      RL      A                       ;Shift in next bit
0335   E8 14                   DJNZ    R0,DO5B                 ;Jmp/more bits to go

0337   9A F0                   ANL     P2,#0F0h                ;Clear out addr bits
0339   B8 05                   MOV     R0,#<DOFLAG             ;Get addr of flag
```

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      HOMER...and the plan of Zeus was being accomplished
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901   033B   27                   CLR    A              ;Get a zero
5     033C   90                   MOVX   @R0,A          ;And clear the flag
903   033D   44 97                JMP    SLEEP          ;Power down
904
905                               PAGE
```

```
     HOMER...and the plan of Zeus was being accomplished
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906                          ;-------------------------------------------------------------------------;
9                            ;  SCAN -- Scan through the device tables looking sending the first function  ;
908                          ;          code until another key is pressed.                             ;
909                          ;                                                                         ;
910                          ;         20 Feb 1987, 14:27                                              ;
911                          ;-------------------------------------------------------------------------;
912  033F  23 01             SCAN:     MOV    A,#1
913  0341  B8 25                       MOV    R0,#SCANFLAG          ;Get addr of flag
914  0343  A0                          MOV    @R0,A                 ;Set the scan flag
915  0344  9A F0                       ANL    P2,#0F0h              ;Clear addr bits
916  0346  B8 04                       MOV    R0,#<MODEFLG          ;Get addr of mode
917  0348  80                          MOVX   A,@R0                 ;Get the mode #
918  0349  E7                          RL     A                     ;Times 2 bytes per entry
919  034A  03 09                       ADD    A,#<S$CABLE           ;Plus base addr
920  034C  A8                          MOV    R0,A                  ;Get the computed address
921  034D  80                          MOVX   A,@R0                 ;Get first byte of table addr
922  034E  A9                          MOV    R1,A                  ;Save it
923  034F  18                          INC    R0
924  0350  80                          MOVX   A,@R0                 ;Get next byte of table addr
925  0351  AF                          MOV    R7,A                  ;And save it
926
927  0352  B8 23             SCANLOOP: MOV    R0,#TBLADR            ;Address to save table in
928  0354  F9                          MOV    A,R1                  ;Get the first byte
929  0355  A0                          MOV    @R0,A                 ;Save it
930  0356  18                          INC    R0                    ;Bump the addr
931  0357  FF                          MOV    A,R7                  ;Get second byte of addr
9    0358  A0                          MOV    @R0,A                 ;And save it
93   0359  23 03                       MOV    A,#3                  ;Two bytes for link word + 1 for ID
934  035B  54 31                       CALL   ADD$ADDR              ;Bump address
935  035D  54 1B                       CALL   GETBYTE               ;Get the executor #
936  035F  B8 22                       MOV    R0,#EXECUTOR          ;Get the save addr
937  0361  A0                          MOV    @R0,A                 ;And save it
938  0362  D5                          SEL    RB1
939  0363  BD 05                       MOV    R5,#5                 ;Send function five times
940
941  0365  BC 05             SCAN$SEND:MOV    R4,#5                 ;Send it n times fast
942  0367  C5                          SEL    RB0
943  0368  BD 00                       MOV    R5,#0                 ;Indicate first function
944  036A  85                          CLR    F0
945  036B  95                          CPL    F0                    ;Indicate we're in scan mode
946  036C  24 9B                       JMP    CE10
947
948  036E                    SCAN$CONT:
949  036E  9A 9F                       ANL    P2,#.NOT.YELLOW       ;Turn on both LEDs
950  0370  BA 64                       MOV    R2,#100               ;Scan nn times for delay between
951
952  0372                    SC$SCAN:
953  0372  F5                          SEL    MB1
954  0373  D4 8C                       CALL   KSCAN                 ;Check for key down
955  0375  E5                          SEL    MB0
```

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      HOMER...and the plan of Zeus was being accomplished
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956   0376   96 8E                    JNZ     SCAN$END            ;Jmp/key pressed--stop scanning
9     0378   EA 72                    DJNZ    R2,SC$SCAN          ;Jmp/scan again
958   037A   8A 60                    ORL     P2,#YELLOW          ;Turn off all LEDs
959   037C   D5                       SEL     RB1
960   037D   ED 65                    DJNZ    R5,SCAN$SEND        ;Jmp/send the function again
961
962   037F   C5              SC$NXT:  SEL     RB0
963   0380   F4 00                    CALL    GET$TABLE           ;Get the table address
964   0382   54 1B                    CALL    GETBYTE             ;Get the first byte of link addr
965   0384   AD                       MOV     R5,A                ;Save it
966   0385   54 2F                    CALL    BUMPADDR            ;Bump to next byte
967   0387   54 1B                    CALL    GETBYTE             ;Get the next byte
968   0389   AF                       MOV     R7,A                ;Save high order byte
969   038A   FD                       MOV     A,R5                ;Get low order byte
970   038B   A9                       MOV     R1,A                ;And save it too
971   038C   64 52                    JMP     SCANLOOP            ;Go scan next device
972
973   038E                   SCAN$END:
974   038E   D3 22                    XRL     A,#CHUPKEY          ;Test if good key
975   0390   96 A2                    JNZ     SE$NO               ;Jmp/not the right key
976   0392   F4 00                    CALL    GET$TABLE           ;Get the current table addr
977   0394   9A F0                    ANL     P2,#0F0h            ;Clear out the addr bits
978   0396   B8 04                    MOV     R0,#<MODEFLG        ;Get the mode # addr
979   0398   80                       MOVX    A,@R0               ;Get the mode #
980   0399   E7                       RL      A                   ;Times 2 bytes per entry
981   039A   03 09                    ADD     A,#<S$CABLE         ;Plus the base addr
9     039C   A8                       MOV     R0,A                ;Into index register
9     039D   F9                       MOV     A,R1                ;Get low order byte
984   039E   90                       MOVX    @R0,A               ;Save it
985   039F   18                       INC     R0
986   03A0   FF                       MOV     A,R7                ;Get high order byte
987   03A1   90                       MOVX    @R0,A               ;Save it
988   03A2   9A F0           SE$NO:   ANL     P2,#0F0h            ;Clear addr bits
989   03A4   B8 05                    MOV     R0,#<DOFLAG         ;Get the flag addr
990   03A6   27                       CLR     A                   ;Get a zero
991   03A7   90                       MOVX    @R0,A               ;Clear the DO flag
992   03A8                            HALT                        ;And power down
995
996                          ;-------------------------------------------------------------------------;
997                          ;       TRYDIRECT -- Look for a mode key for direct library code entry.   ;
998                          ;                                                                         ;
999                          ;       24 Mar 1987, 14:14                                                ;
1000                         ;-------------------------------------------------------------------------;
1001  03A9   9A F0           TRYDIRECT:ANL    P2,#0F0h            ;Clear addr bits
1002  03AB   8A 0E                    ORL     P2,#>MODEKEYS       ;Set new addr bits
1003  03AD   B8 83                    MOV     R0,#<MODEKEYS       ;Get low order addr byte of table
1004  03AF   54 3B                    CALL    KTSCNR              ;See if we have a mode key
1005  03B1   F6 B5                    JC      TD5                 ;Jmp/we do!
1006  03B3   04 C4                    JMP     RESET$DO            ;Bad key sequence
1007
```

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      HOMER...and the plan of Zeus was being accomplished
      (Of course who knows what Zeus has in mind?)

1008  03B5  9A F0        TD5:    ANL   P2,#0F0h          ;Clear addr bits
10    03B7  B8 04               MOV   R0,#<MODEFLG      ;Get mode byte addr
1010  03B9  FF                  MOV   A,R7              ;Get new mode #
1011  03BA  90                  MOVX  @R0,A             ;Save the new mode
1012  03BB  B8 05               MOV   R0,#<DOFLAG       ;Get the DO flag addr
1013  03BD  23 40               MOV   A,#40h            ;Get the direct entry bit
1014  03BF  90                  MOVX  @R0,A             ;Save the flag
1015  03C0  44 97               JMP   SLEEP             ;And get out
1016
1017
1018                      ;-------------------------------------------------------------------------;
1019                      ;  NEXTMAC -- Bump pointer to the next macro scan code                   ;
1020                      ;                                                                         ;
1021                      ;         RETURNS: Scan code in ACC; R1,R7 point to scan code           ;
1022                      ;                                                                         ;
1023                      ;         23 Feb 1987, 15:32                                            ;
1024                      ;-------------------------------------------------------------------------;
1025  03C2  54 2F        NEXTMAC: CALL   BUMPADDR         ;Bump to next entry
1026  03C4  54 1B                 CALL   GETBYTE          ;Get the byte
1027  03C6  96 C2                 JNZ    NEXTMAC          ;Jmp/more to go
1028  03C8  54 2F                 CALL   BUMPADDR         ;Bump to scan code entry
1029  03CA  54 1B                 CALL   GETBYTE          ;Get the scan code
1030  03CC  83                    RET                     ;Return to caller
1031                        PAGE
```

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      HOMER...and the plan of Zeus was being accomplished
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1032                        ;-------------------------------------;
1033                        ;  SONYCAR -- Generate Sony carrier   ;
1034                        ;        for # of pulses in R6.       ;
1035                        ;                                     ;
1036                        ;   40 khz                            ;
1037                        ;                                     ;
1038                        ;   Destroys: R6,R7                  ;
1039                        ;                                     ;
1040                        ;         09 Feb 1987, 16:39          ;
1041                        ;-------------------------------------;
1042  03CD   9A 7F          SONYCAR:  ANL    P2,#.NOT. OUT        ;TURN ON LED
1043  03CF   BF 02                    MOV    R7,#2                ;
1044  03D1   EF D1                    DJNZ   R7,$                 ; 9 cyl ON
1045  03D3   00                       NOP
1046  03D4   8A 80                    ORL    P2,#OUT              ;TURN OFF LED
1047
1048  03D6   BF 01                    MOV    R7,#1
1049  03D8   EF D8                    DJNZ   R7,$                 ;9 cyl OFF
1050  03DA   00                       NOP
1051  03DB   EE CD                    DJNZ   R6,SONYCAR           ;GO DO SOME MORE PULSES
1052  03DD   83                       RET
1053
1054                        ;-------------------------------------;
1055                        ;  ZENCAR -- Generate Zenith carrier  ;
1056                        ;        for # of pulses in R6.       ;
1057                        ;                                     ;
1058                        ;   Carrier period = 25us             ;
1059                        ;                                     ;
1060                        ;   Destroys: R6,R7                  ;
1061                        ;                                     ;
1062                        ;         19 Feb 1987, 14:57          ;
1063                        ;-------------------------------------;
1064  03DE   9A 7F          ZENCAR:   ANL    P2,#.NOT. OUT        ;TURN ON LED
1065  03E0   BF 03                    MOV    R7,#3                ;
1066  03E2   EF E2                    DJNZ   R7,$                 ;9 cyl ON
1067  03E4   8A 80                    ORL    P2,#OUT              ;TURN OFF LED
1068
1069  03E6   BF 01                    MOV    R7,#1                ;
1070  03E8   EF E8                    DJNZ   R7,$                 ;9 cyl OFF
1071  03EA   EE DE                    DJNZ   R6,ZENCAR            ;GO DO SOME MORE PULSES
1072  03EC   83                       RET
1073
1074  0400                            ORG    400H
1075                        ;-------------------------------------;
1076                        ;  EXEC2 -- Executor type #2  (SONY)  ;
1077                        ;                                     ;
1078                        ;         19 Feb 1987, 12:45          ;
1079                        ;-------------------------------------;
1080  0400   F4 00          EXEC2:    CALL   GET$TABLE            ;Get the table address
1081  0402   23 08                    MOV    A,#8                 ;Get # of bytes in header
```

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      HOMER...and the plan of Zeus was being accomplished
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1082  0404  54 31                    CALL   ADD$ADDR            ;Bump the address pointer
10    0406  54 1B                    CALL   GETBYTE            ;Get the trailing part of code
1084  0408  AC                       MOV    R4,A               ;And save it
1085  0409  FD                       MOV    A,R5               ;Get function number
1086  040A  17                       INC    A                  ;Add one for post-fix byte
1087  040B  54 31                    CALL   ADD$ADDR           ;Add it to address
1088
1089  040D  54 1B                    CALL   GETBYTE            ;Get the byte
1090  040F  A8                       MOV    R0,A               ;And save it
1091
1092                        ;-------------------------------------;
1093                        ;  SONYGO -- Sony command executor   ;
1094                        ;                                     ;
1095                        ;     R0,R4 = function code           ;
1096                        ;                                     ;
1097                        ;         19 Feb 1987, 12:47          ;
1098                        ;-------------------------------------;
1099  0410  BE 60           SONYGO:  MOV    R6,#96             ;send sync
1100  0412  74 CD                    CALL   SONYCAR
1101
1102  0414  BB 02                    MOV    R3,#2              ;Number of bytes to send
1103  0416  BD 08                    MOV    R5,#8              ;get # of bits in 1st byte
1104  0418  F8                       MOV    A,R0               ;get data byte
1105
1106  0419  BF D8           SONY10:  MOV    R7,#224-8          ;size of gap
1107  041B  EF 1B                    DJNZ   R7,$               ;450 cyl
11
11    041D  BE 30                    MOV    R6,#48             ;# of bits in long pulse
1110  041F  F2 23                    JB7    SONY15             ;jmp/send long pulse
1111  0421  BE 18                    MOV    R6,#24             ;send short pulse
1112  0423                 SONY15:
1113  0423  74 CD                    CALL   SONYCAR            ;send the pulse
1114
1115  0425  E7                       RL     A                  ;get next bit in table
1116  0426  ED 19                    DJNZ   R5,SONY10          ;Jmp/still more bits in this byte
1117
1118  0428  BD 04                    MOV    R5,#4              ;get # of bits in 2nd byte
1119  042A  FC                       MOV    A,R4               ;get data byte
1120  042B  EB 19                    DJNZ   R3,SONY10          ;Jmp/another byte to go
1121
1122  042D  BE 25                    MOV    R6,#37
1123  042F  EF 2F           SONY70:  DJNZ   R7,$               ;Delay after sending
1124  0431  EE 2F                    DJNZ   R6,SONY70
1125
1126  0433  54 5A                    CALL   TESTKEY            ;See if key is still down
1127  0435  76 10                    JF1    SONYGO             ;JMP/key still down--resend
1128  0437  44 97                    JMP    SLEEP              ;now go to sleep
1129                                 PAGE
```

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      HOMER...and the plan of Zeus was being accomplished
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1130  0600                        ORG    600H
11                          ;-------------------------------------------------------------------------;
1132                        ;  TRYMACRO -- See if we have a valid macro key after DO key.  If we do   ;
1133                        ;             have one, execute it.                                       ;
1134                        ;                                                                         ;
1135                        ;        R1 = scan code                                                   ;
1136                        ;                                                                         ;
1137                        ;        23 Feb 1987, 15:53                                               ;
1138                        ;-------------------------------------------------------------------------;
1139  0600  B8 27           TRYMACRO: MOV   R0,#MACROFLG+1       ;Get addr of macro flag
1140  0602  F0                       MOV   A,@R0                ;Get second byte
1141  0603  C6 07                    JZ    TM2                  ;Jmp/not doing macro
1142  0605  04 C4                    JMP   RESET$DO             ;Reset the DO flag
1143
1144  0607  9A F0           TM2:     ANL   P2,#0F0h             ;Clear addr bits
1145  0609  8A 0E                    ORL   P2,#(>DEFKEYS)&0Fh   ;Get new addr bits
1146  060B  B8 5E                    MOV   R0,#<DEFKEYS         ;Get the table addr
1147  060D  54 3B                    CALL  KTSCNR               ;Check the table
1148  060F  F6 13                    JC    TM5                  ;Jmp/it's in there
1149  0611  04 C4           TM99:    JMP   RESET$DO             ;Not a valid key
1150
1151  0613  F9              TM5:     MOV   A,R1                 ;Get the scan code
1152  0614  AA                      MOV   R2,A                 ;Save it
1153  0615  BF 15                    MOV   R7,#>MACRO$START     ;Get starting addr of macro table
1154  0617  B9 EE                    MOV   R1,#<MACRO$START     ;
1155
11    0619  54 1B           TM10:    CALL  GETBYTE              ;Get the scan code from table
11.   061B  C6 11                    JZ    TM99                 ;Jmp/end of table
1158  061D  DA                      XRL   A,R2                 ;Check if it's what we want
1159  061E  C6 24                    JZ    TMFND                ;Jmp/we found what we're looking for
1160
1161  0620  74 C2                    CALL  NEXTMAC              ;Skip to next macro def
1162  0622  C4 19                    JMP   TM10
1163
1164  0624  B8 26           TMFND:   MOV   R0,#MACROFLG         ;Get addr of flag
1165  0626  F9                       MOV   A,R1                 ;Get 1st byte of macro addr
1166  0627  A0                       MOV   @R0,A                ;Save it
1167  0628  18                       INC   R0                   ;Bump to second byte
1168  0629  FF                       MOV   A,R7                 ;Get second byte of macro addr
1169  062A  A0                       MOV   @R0,A                ;Save it
1170  062B  9A F0                    ANL   P2,#0F0h             ;Clear addr bits
1171  062D  B8 05                    MOV   R0,#<DOFLAG          ;Get DO flag addr
1172  062F  27                       CLR   A                    ;Get a zero
1173  0630  90                       MOVX  @R0,A                ;Clear the DO flag
1174  0631  44 97                    JMP   SLEEP                ;Go do our thing
1175
1176
1177                        ;-------------------------------------------------------------------------;
1178                        ;        DIRECT -- Try to find the directly entered library entry.        ;
1179                        ;                                                                         ;
```

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(Of course who knows what Zeus has in mind?)

```
1180                    ;               R5 = ID code of library entry                   ;
11                      ;               Currect MODEFLG is used.                        ;
1182                    ;                                                               ;
1183                    ;       24 Mar 1987, 14:35                                      ;
1184                    ;-------------------------------------------------------------------------;
1185  0633  9A F0       DIRECT: ANL     P2,#0F0h        ;Clear addr bits
1186  0635  B8 04               MOV     R0,#<MODEFLG    ;Get mode byte addr
1187  0637  80                 MOVX    A,@R0           ;Get the new mode
1188  0638  E7                 RL      A               ;Times 2 bytes per
1189  0639  03 09              ADD     A,#<S$CABLE     ;Add in the base addr
1190  063B  A8                 MOV     R0,A            ;Put in index reg
1191  063C  80                 MOVX    A,@R0           ;Get first byte
1192  063D  A9                 MOV     R1,A            ;Save it
1193  063E  18                 INC     R0
1194  063F  80                 MOVX    A,@R0           ;Get second byte
1195  0640  AF                 MOV     R7,A            ;Save it
1196
1197  0641  54 1B              CALL    GETBYTE         ;Get first byte of link
1198  0643  AC                 MOV     R4,A            ;Save it
1199  0644  54 2F              CALL    BUMPADDR        ;Move up
1200  0646  54 1B              CALL    GETBYTE         ;Get second byte of link
1201  0648  AE                 MOV     R6,A            ;Save it
1202
1203  0649  54 2F              CALL    BUMPADDR        ;Move up
1204  064B  54 1B              CALL    GETBYTE         ;Get ID byte
1205  064D  AA                 MOV     R2,A            ;Save lst ID for stopping search
12^^  064E  C4 5C              JMP     DE10            ;Jump past first get
12v
1208  0650  54 1B       DE5:    CALL    GETBYTE         ;Get first byte of link
1209  0652  AC                 MOV     R4,A            ;Save it
1210  0653  54 2F              CALL    BUMPADDR        ;Move up
1211  0655  54 1B              CALL    GETBYTE         ;Get second byte of link
1212  0657  AE                 MOV     R6,A            ;Save it
1213
1214  0658  54 2F              CALL    BUMPADDR        ;Move up
1215  065A  54 1B              CALL    GETBYTE         ;Get ID byte
1216
1217  065C  DA         DE10:   XRL     A,R2            ;Check against end of search
1218  065D  C6 7B              JZ      DE99E           ;Jmp/not found
1219  065F  DA                 XRL     A,R2            ;Restore
1220  0660  DD                 XRL     A,R5            ;Check against target
1221  0661  C6 69              JZ      DE99
1222
1223  0663  FC                 MOV     A,R4            ;Get first byte of link
1224  0664  A9                 MOV     R1,A            ;Save it
1225  0665  FE                 MOV     A,R6            ;Get second byte of link
1226  0666  AF                 MOV     R7,A            ;Save it
1227  0667  C4 50              JMP     DE5             ;Go try next entry
1228
1229  0669  F9         DE99:   MOV     A,R1            ;Get low byte of addr
```

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1230  066A  03 FE                ADD   A,#-2              ;Get back to start
1     066C  F6 6F                JC    DE99NC             ;Jmp/no barrow
1232  066E  CF                   DEC   R7                 ;Down one for barrorw
1233
1234  066F  9A F0          DE99NC: ANL   P2,#0F0h           ;Clear addr bits
1235  0671  2F                   XCH   A,R7               ;Get high byte
1236  0672  90                   MOVX  @R0,A              ;Save it
1237  0673  C8                   DEC   R0
1238  0674  2F                   XCH   A,R7               ;Get low byte
1239  0675  90                   MOVX  @R0,A              ;Save it
1240  0676  27                   CLR   A
1241  0677  9A DF                ANL   P2,#.NOT.RED       ;Indicate good search
1242  0679  04 B7                JMP   SET$DO2            ;And get out
1243
1244  067B  04 C4          DE99E:  JMP   RESET$DO           ;Indicate error and leave
1245
1246                       ;-------------------------------------------------------;
1247                       ;  EXEC3 -- Executor for type #3                       ;
1248                       ;                                                       ;
1249                       ;  REGISTERS:    R5 = function number                  ;
1250                       ;                                                       ;
1251                       ;        17 Mar 1987, 15:21                             ;
1252                       ;-------------------------------------------------------;
1253  067D  9A F0          EXEC3:  ANL   P2,#0F0h           ;Clear addr bits
1254  067F  B8 04                  MOV   R0,#<MODEFLG       ;Address of mode
1255  0681  80                     MOVX  A,@R0              ;Get the mode
12    0682  AB                     MOV   R3,A               ;Save the result
12    0683  BF 12                  MOV   R7,#>ZENDATA       ;We use the TV data
1258  0685  B9 36                  MOV   R1,#<ZENDATA       ;table
1259  0687                 EXC3A:
1260  0687  FD                     MOV   A,R5               ;Get function number
1261  0688  E7                     RL    A                  ;Times 2 bytes per entry
1262  0689  54 31                  CALL  ADD$ADDR           ;Add it to address
1263
1264  068B                 EXC3B:
1265  068B  54 1B                  CALL  GETBYTE            ;Get the first byte
1266  068D  A8                     MOV   R0,A               ;Save it
1267  068E  54 2F                  CALL  BUMPADDR           ;Point to next entry
1268  0690  54 1B                  CALL  GETBYTE            ;Get the second byte
1269  0692  AC                     MOV   R4,A               ;And save it
1270
1271  0693  FB                     MOV   A,R3               ;Get the mode flag
1272  0694  96 9A                  JNZ   EXC3C              ;Jmp/no change needed
1273  0696  FC                     MOV   A,R4               ;Get the first byte
1274  0697  53 7F                  ANL   A,#7Fh             ;Clear out high bit
1275  0699  AC                     MOV   R4,A               ;Put the byte back where we got it
1276  069A                 EXC3C:
1277
1278                       ;-------------------------------------;
1279                       ;  ZENGO -- Executor for Zenith codes ;
```

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```
1280                        ;                                       ;
1281                        ;  ARGUMENTS: R0,R4 = Bits in code      ;
1282                        ;                                       ;
1283                        ;         19 Feb 1987, 15:36            ;
1284                        ;---------------------------------------;
1285  069A  BB 02           ZENGO:    MOV     R3,#2                 ;Number of bytes
1286  069C  BD 08                     MOV     R5,#8                 ;get # of bits in 1st byte
1287  069E  FC                        MOV     A,R4                  ;get data byte
1288
1289  069F                  ZEN10:
1290  069F  BE 14                     MOV     R6,#20                ;# of carrier cycles
1291  06A1  74 DE                     CALL    ZENCAR                ;Send the carrier
1292  06A3  F2 B7                     JB7     ZEN25                 ;jmp/send second pulse
1293  06A5  BF 3C                     MOV     R7,#60                ;Setup for gap
1294  06A7  BE 07                     MOV     R6,#7
1295  06A9  EF A9           ZEN15:    DJNZ    R7,$                  ;Delay for long gap time
1296  06AB  EE A9                     DJNZ    R6,ZEN15
1297  06AD                  ZEN20:
1298  06AD  E7                        RL      A                     ;get next bit in table
1299  06AE  ED 9F                     DJNZ    R5,ZEN10              ;and go until byte is gone
1300  06B0  BD 03                     MOV     R5,#3                 ;get # of bits in 2nd byte
1301  06B2  F8                        MOV     A,R0                  ;get data byte
1302  06B3  EB 9F                     DJNZ    R3,ZEN10              ;Jmp/more to go
1303
1304  06B5  C4 C9                     JMP     ZEN99
1305
1306  06B7                  ZEN25:
1307  06B7  BF B2                     MOV     R7,#178               ;size of gap
1308  06B9  EF B9                     DJNZ    R7,$
1309
1310  06BB  BE 14                     MOV     R6,#20                ;# of cylcles in pulse
1311  06BD  74 DE                     CALL    ZENCAR                ;send the pulse
1312
1313  06BF  BF D1                     MOV     R7,#209
1314  06C1  BE 06                     MOV     R6,#6                 ;Delay medium gap time
1315  06C3  EF C3           ZEN35:    DJNZ    R7,$
1316  06C5  EE C3                     DJNZ    R6,ZEN35
1317  06C7  C4 AD                     JMP     ZEN20
1318
1319                        ; here we delay for the repetition gap time
1320
1321  06C9                  ZEN99:
1322  06C9  BE AE                     MOV     R6,#174
1323  06CB  BF 32                     MOV     R7,#50                ;Block gap delay
1324  06CD  EF CD           ZEN30:    DJNZ    R7,$
1325  06CF  EE CD                     DJNZ    R6,ZEN30
1326
1327  06D1  54 5A                     CALL    TESTKEY               ;See if key is still down
1328  06D3  76 9A                     JF1     ZENGO                 ;JMP/key still down--resend
1329  06D5  44 97           ZENSLP:   JMP     SLEEP                 ;now go to sleep
```

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      HOMER...and the plan of Zeus was being accomplished
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1330
1331  0700                        ORG    700H                ;page 7
1332                        ;-------------------------------------;
1333                        ;  GET$TABLE -- Returns the address  ;
1334                        ;    of the data table for this     ;
1335                        ;    execution.                     ;
1336                        ;                                   ;
1337                        ;  RETURNS: R1,R7 = address         ;
1338                        ;                                   ;
1339                        ;         19 Feb 1987, 15:53        ;
1340                        ;-------------------------------------;
1341  0700                  GET$TABLE:
1342  0700  B8 23                    MOV    R0,#TBLADR          ;Get pointer to table address
1343  0702  F0                      MOV    A,@R0               ;Get first byte of address
1344  0703  A9                      MOV    R1,A                ;Save low order byte
1345  0704  18                      INC    R0
1346  0705  F0                      MOV    A,@R0               ;Get second byte
1347  0706  AF                      MOV    R7,A                ;And save it
1348  0707  83                      RET
1349
1350                        ;-----------------------------------------------------------------------;
1351                        ;  DEFMAC -- Macro key definition.  First entry gets the keycode, subsequent  ;
1352                        ;         entries store key strokes until a DO-RCL sequence is entered.       ;
1353                        ;                                                                             ;
1354                        ;         17 Mar 1987, 13:10                                                  ;
1355                        ;-----------------------------------------------------------------------;
13?   0708  72 70           DEFMAC:  JB3    DM50                ;Jmp/we are storing key strokes
13..
1358  070A  B8 5E                    MOV    R0,#<DEFKEYS        ;Get addr of valid key table
1359  070C  9A F0                    ANL    P2,#0F0h            ;Clear out addr bits
1360  070E  8A 0E                    ORL    P2,#(>DEFKEYS)&0Fh  ;Put in new addr bits
1361  0710  54 3B                    CALL   KTSCNR              ;Check the table
1362  0712  F6 24                    JC     DM5                 ;Jmp/we found one
1363  0714  64 A9                    JMP    TRYDIRECT
1364  0716  8A 60                    ORL    P2,#YELLOW
1365  0718  9A DF                    ANL    P2,#.NOT.RED
1366  071A  BE 00                    MOV    R6,#0
1367  071C                  DM1:
1368  071C  EF 1C                    DJNZ   R7,$
1369  071E  EF 1E                    DJNZ   R7,$
1370  0720  EE 1C                    DJNZ   R6,DM1
1371  0722  04 C4                    JMP    RESET$DO            ;Bad go reset flags
1372
1373  0724                  DM5:
1374  0724  F9                      MOV    A,R1
1375  0725  AA                      MOV    R2,A                ;Save scan code
1376  0726  BF 15                    MOV    R7,#>MACRO$START    ;Get addr of start of defs
1377  0728  B9 EE                    MOV    R1,#<MACRO$START    ;
1378
1379  072A  54 1B           DM7:     CALL   GETBYTE             ;Get the scan code
```

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      HOMER...and the plan of Zeus was being accomplished
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1380  072C  C6 35          DM7A:   JZ      DM15            ;Jmp/end of table
13    072E  DA                    XRL     A,R2            ;Check against what we want
1382  072F  C6 B2                JZ      DM20            ;Jmp/we matched
1383
1384                      ; scan until next entry
1385
1386  0731  74 C2                 CALL    NEXTMAC         ;Jump to next macro
1387  0733  E4 2C                 JMP     DM7A
1388
1389                      ; set up to start storing
1390
1391  0735                DM15:
1392
1393                      ; first store the macro start addr
1394
1395  0735  9A F0                 ANL     P2,#0F0h        ;Clear out addr bits
1396  0737  8A 02                 ORL     P2,#>CURMAC     ;Put in new addr bits
1397  0739  B8 CC                 MOV     R0,#<CURMAC     ;Get addr of storage location
1398  073B  F9                    MOV     A,R1            ;Get first byte
1399  073C  90                    MOVX    @R0,A           ;Save it
1400  073D  18                    INC     R0              ;Point to next location
1401  073E  FF                    MOV     A,R7            ;Get second byte
1402  073F  90                    MOVX    @R0,A           ;And save it
1403
1404                      ; store the scan code in the first byte of the macro
1405
14'   0740  FA                    MOV     A,R2            ;Get the scan code
140,  0741  54 24                CALL    PUTBYTE         ;And save it
1408  0743  54 2F                CALL    BUMPADDR        ;Point to next byte
1409  0745  9A F0                ANL     P2,#0F0h        ;Clear addr bits
1410  0747  B8 07                MOV     R0,#<MACPTR     ;Get pointer address
1411  0749  F9                    MOV     A,R1            ;Get first byte
1412  074A  90                    MOVX    @R0,A           ;Save it
1413  074B  18                    INC     R0              ;Bump addr
1414  074C  FF                    MOV     A,R7            ;Get second byte
1415  074D  90                    MOVX    @R0,A           ;Save it
1416  074E  23 88                 MOV     A,#88H          ;Get storing flag
1417  0750  04 B5                 JMP     SET$D0          ;And go set the flag
1418
1419  0752                DMD0:
1420  0752  BB 10                 MOV     R3,#10h         ;Value for D0 flag
1421  0754  E4 7C                 JMP     DM60            ;And continue processing
1422
1423                      ; check for D0-RCL end sequence
1424                      ; we come here for the next key after a D0
1425
1426  0756                DMCHK:
1427  0756  F9                    MOV     A,R1            ;Get the key
1428  0757  03 D5                 ADD     A,#-RCLKEY      ;Check if RCL key
1429  0759  96 5F                 JNZ     DMC5            ;Jmp/keep storing
```

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      HOMER...and the plan of Zeus was being accomplished
      (Of course who knows what Zeus has in mind?)

1430  075B  B9 00                    MOV   R1,#0              ;Set to indicate end of macro
14    075D  E4 74                    JMP   DM55              ;And continue processing
1432
1433  075F                  DMC5:
1434  075F  F9                      MOV   A,R1              ;Get the key
1435  0760  AA                      MOV   R2,A              ;Save it
1436  0761  B8 07                    MOV   R0,#<MACPTR       ;Get pointer addr
1437  0763  80                      MOVX  A,@R0             ;Get first byte of pointer
1438  0764  A9                      MOV   R1,A              ;Save it
1439  0765  18                      INC   R0                ;Point to next byte
1440  0766  80                      MOVX  A,@R0             ;Get the second byte of pointer
1441  0767  AF                      MOV   R7,A              ;Save it
1442  0768  23 3C                   MOV   A,#DOKEY          ;Get D0 key code
1443  076A  54 24                   CALL  PUTBYTE           ;Save it
1444  076C  54 2F                   CALL  BUMPADDR          ;Incr address
1445  076E  E4 90                    JMP   DM65              ;Continue processing
1446
1447                        ; store a key stroke
1448
1449  0770                  DM50:
1450  0770  9A F0                    ANL   P2,#0F0h          ;Clear addr bits
1451  0772  92 56                    JB4   DMCHK
1452  0774                  DM55:
1453  0774  F9                      MOV   A,R1              ;Get the key code
1454  0775  AA                      MOV   R2,A              ;Save it
1455  0776  03 C4                   ADD   A,#-DOKEY         ;Check if D0 key
14    0778  C6 52                    JZ    DMD0              ;Jmp/found the D0 key
14    077A  BB 00                    MOV   R3,#0             ;Value for D0 flag
1458
1459  077C                  DM60:
1460  077C  9A F0                    ANL   P2,#0F0h          ;Clear addr bits
1461  077E  B8 05                    MOV   R0,#<D0FLAG       ;Get addr of the flag
1462  0780  80                      MOVX  A,@R0             ;Get the flag
1463  0781  53 EF                   ANL   A,#.NOT.10h       ;Clear out D0 bit
1464  0783  4B                      ORL   A,R3              ;Put in what we want
1465  0784  90                      MOVX  @R0,A             ;And save the flag
1466  0785  B8 07                    MOV   R0,#<MACPTR       ;Get pointer addr
1467  0787  80                      MOVX  A,@R0             ;Get first byte of pointer
1468  0788  A9                      MOV   R1,A              ;Save it
1469  0789  18                      INC   R0                ;Point to next byte
1470  078A  80                      MOVX  A,@R0             ;Get the second byte of pointer
1471  078B  AF                      MOV   R7,A              ;Save it
1472  078C  D3 1F                   XRL   A,#01Fh           ;Compare to end addr
1473  078E  C6 E6                    JZ    DMDIE             ;Jmp/no more room
1474  0790                  DM65:
1475  0790  FA                      MOV   A,R2              ;Get the key scan code
1476  0791  54 24                   CALL  PUTBYTE           ;Save it
1477  0793  96 9C                    JNZ   DM90              ;Jmp/power down
1478  0795  54 2F                   CALL  BUMPADDR
1479  0797  27                      CLR   A
```

ANL

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      HOMER...and the plan of Zeus was being accomplished
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1480  0798  54 24                    CALL   PUTBYTE
14    079A  04 C4                    JMP    RESET$DO          ;Reset store mode
1482
1483  079C  54 2F           DM90:    CALL   BUMPADDR
1484  079E  9A F0                    ANL    P2,#0F0h          ;Clear out addr bits
1485  07A0  B8 07                    MOV    R0,#<MACPTR       ;Address of pointer save
1486  07A2  F9                       MOV    A,R1              ;Get first byte of pointer
1487  07A3  90                       MOVX   @R0,A             ;Save it
1488  07A4  18                       INC    R0                ;Point to next byte
1489  07A5  FF                       MOV    A,R7              ;Get second byte of pointer
1490  07A6  90                       MOVX   @R0,A             ;Save it
1491
1492                        ; wink the red LED and stop
1493
1494  07A7                  DM999:
1495  07A7  9A DF                    ANL    P2,#.NOT.RED      ;Turn on red LED
1496  07A9  BE 00                    MOV    R6,#0
1497  07AB  EF AB           DM999W:  DJNZ   R7,$
1498  07AD  EF AD                    DJNZ   R7,$
1499  07AF  EE AB                    DJNZ   R6,DM999W
1500  07B1                           HALT
1503
1504                        ; delete a macro entry
1505
1506  07B2                  DM20:
1507  07B2  FF                       MOV    A,R7              ;Save the pointer
15    07B3  AD                       MOV    R5,A              ;
150   07B4  F9                       MOV    A,R1              ;
1510  07B5  AC                       MOV    R4,A              ;
1511  07B6  85                       CLR    F0
1512  07B7  95                       CPL    F0                ;Indicate at start of entry
1513
1514  07B8  74 C2                    CALL   NEXTMAC           ;Move pointer to next entry
1515  07BA  E4 C0                    JMP    DM25A             ;Skip the restore this time
1516
1517  07BC  AE              DM25:    MOV    R6,A              ;Restore second pointer
1518  07BD  FF                       MOV    A,R7              ;
1519  07BE  FA                       MOV    A,R2              ;
1520  07BF  A9                       MOV    R1,A              ;
1521  07C0                  DM25A:
1522  07C0  54 1B                    CALL   GETBYTE           ;Get a byte
1523  07C2  A8                       MOV    R0,A              ;Save it
1524  07C3  54 2F                    CALL   BUMPADDR          ;Point to next byte
1525  07C5  FF                       MOV    A,R7              ;Save the pointer
1526  07C6  AE                       MOV    R6,A              ;
1527  07C7  F9                       MOV    A,R1              ;
1528  07C8  AA                       MOV    R2,A              ;
1529
1530  07C9  FD                       MOV    A,R5              ;Restore first pointer
1531  07CA  AF                       MOV    R7,A              ;
```

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1532  07CB  FC                    MOV   A,R4              ;
1     07CC  A9                    MOV   R1,A              ;
1534
1535  07CD  F8                    MOV   A,R0              ;Restore the byte to ACC
1536  07CE  54 24                 CALL  PUTBYTE           ;Save the byte
1537  07D0  C6 DB                 JZ    DM30              ;Jmp/found a zero
1538  07D2  85                    CLR   F0                ;Indicate middle of entry
1539  07D3  54 2F           DM27: CALL  BUMPADDR          ;Bump to next address
1540  07D5  FF                    MOV   A,R7              ;Save the pointer
1541  07D6  AD                    MOV   R5,A              ;
1542  07D7  F9                    MOV   A,R1              ;
1543  07D8  AC                    MOV   R4,A              ;
1544  07D9  E4 BC                 JMP   DM25              ;Do some more
1545
1546                        ; found a zero, see if we're done
1547
1548  07DB                  DM30:
1549  07DB  B6 E0                 JF0   DM39              ;Jmp/we're done
1550  07DD  95                    CPL   F0                ;Set we found a zero
1551  07DE  E4 D3                 JMP   DM27              ;Continue
1552
1553  07E0                  DM39:
1554  07E0  B8 21                 MOV   R0,#SCANCODE      ;Get addr of scan code
1555  07E2  F0                    MOV   A,@R0             ;Retrieve the scan code
1556  07E3  A9                    MOV   R1,A              ;Put it where we want it
1557  07E4  E4 24                 JMP   DM5               ;And get going
15
15                          ; we ran out of room, delete the current macro & stop storing
1560
1561  07E6                  DMDIE:
1562  07E6  9A F0                 ANL   P2,#0F0h          ;Clear out addr bits
1563  07E8  8A 02                 ORL   P2,#>CURMAC       ;Get new addr bits
1564  07EA  B8 CC                 MOV   R0,#<CURMAC       ;Get low order addr
1565  07EC  80                    MOVX  A,@R0             ;Get first byte
1566  07ED  A9                    MOV   R1,A              ;Save it
1567  07EE  18                    INC   R0                ;Point to next byte
1568  07EF  80                    MOVX  A,@R0             ;Get it
1569  07F0  AF                    MOV   R7,A              ;Save it
1570  07F1  27                    CLR   A                 ;Get a zero
1571  07F2  54 24                 CALL  PUTBYTE           ;Make end of table indicator
1572  07F4  9A 9F                 ANL   P2,#.NOT.YELLOW
1573  07F6  BE 00                 MOV   R6,#0
1574  07F8  EF F8           DMD1: DJNZ  R7,$
1575  07FA  EF FA                 DJNZ  R7,$
1576  07FC  EE F8                 DJNZ  R6,DMD1
1577  07FE  44 C3                 JMP   DEMACRO           ;Clear flags & stop
1578
1579                          ;--------------------;
1580                          ;  End of MB0 Bank0  ;
1581                          ;--------------------;
```

HOMER...and the plan of Zeus was being accomplished
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1583  0800                        ORG    800H
1584
1585
1586                      ;---------------------------------------;
1587                      ;        SLEEP1                         ;
1588                      ;                                       ;
1589                      ;  This is just the upper bank equivalant ;
1590                      ;  of SLEEP.  And actually we just jump  ;
1591                      ;  to the low bank SLEEP.                ;
1592                      ;                                       ;
1593                      ;        06 Feb 1987, 13:32             ;
1594                      ;---------------------------------------;
1595  0800  E5            SLEEP1:  SEL    MB0                  ;Select lower bank
1596  0801  44 97                  JMP    SLEEP
1597
1598                      ;-------------------------------------------------------;
1599                      ;  Function selection for device #1                    ;
1600                      ;-------------------------------------------------------;
1601  0803  E5            COMPJMP1: SEL   MB0
1602  0804  44 00                  JMP    COMPJMP
1603
1604                      ;-------------------------------------;
1605                      ;  EXEC4 -- Executor type #4  (Syl)   ;
1606                      ;                                     ;
1607                      ;        20 Feb 1987, 15:45           ;
1608                      ;-------------------------------------;
1609  0806  E5            EXEC4:   SEL    MB0
1610  0807  F4 00                  CALL   GET$TABLE            ;Get the table address
1611  0809  23 08                  MOV    A,#8                 ;Get # of bytes in header
1612  080B  6D                    ADD    A,R5                 ;Plus function #
1613  080C  54 31                  CALL   ADD$ADDR             ;Bump the address pointer
1614  080E  54 1B                  CALL   GETBYTE              ;Get the first byte
1615  0810  F5                    SEL    MB1
1616  0811  AC                    MOV    R4,A                 ;Save it
1617
1618                      ; Sylvania cable controller executor
1619
1620  0812  BB 07          SYLGO:   MOV    R3,#7                ;7 bits per code
1621  0814  FC                    MOV    A,R4                 ;Get the code
1622
1623  0815  9A 7F          SYLPULSE: ANL   P2,#.NOT.OUT         ;Turn on IR LED
1624  0817  BF 03                  MOV    R7,#3
1625  0819  EF 19                  DJNZ   R7,$                 ;18us on
1626  081B  00                    NOP
1627  081C  8A 80                  ORL    P2,#OUT              ;Turn off IR LED
1628
1629  081E  BF 3C                  MOV    R7,#60               ;Small gap delay
1630  0820  EF 20                  DJNZ   R7,$
1631
1632  0822  F2 28                  JB7    SYLNXT               ;Jmp/next bit
```

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      HOMER...and the plan of Zeus was being accomplished
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1634  0824  BF 56                 MOV   R7,#148-62          ;Big gap time
1635  0826  EF 26                 DJNZ  R7,$                ;Do the delay
1636
1637  0828  E7           SYLNXT:  RL    A                  ;Shift in next bit
1638  0829  EB 15                 DJNZ  R3,SYLPULSE         ;Jmp/go send next bit
1639
1640  082B  BF 00                 MOV   R7,#0
1641  082D  BE 27                 MOV   R6,#39              ;Delay between codes
1642  082F  EF 2F           SYLGAP:  DJNZ  R7,$
1643  0831  EE 2F                 DJNZ  R6,SYLGAP
1644
1645  0833  E5                    SEL   MB0
1646  0834  54 5A                 CALL  TESTKEY             ;See if any keys are down
1647  0836  F5                    SEL   MB1
1648  0837  76 12                 JF1   SYLGO               ;Jmp/key down--do again
1649  0839  04 00           SYLSLP:  JMP   SLEEP1
1650
1651
1652                        ;-------------------------------------;
1653                        ;  EXEC5 -- Executor type #5, Regency ;
1654                        ;                                     ;
1655                        ;         20 Feb 1987, 16:51          ;
1656                        ;-------------------------------------;
1657  083B  E5              EXEC5:   SEL   MB0
1658  083C  F4 00                    CALL  GET$TABLE           ;Get the table address
1659  083E  23 08                    MOV   A,#8                ;Plus # of bytes in header
1660  0840  54 31                    CALL  ADD$ADDR            ;Bump the address
1661  0842  54 1B                    CALL  GETBYTE             ;Get the first byte
1662  0844  AB                       MOV   R3,A                ;Save the prefix byte
1663  0845  FD                       MOV   A,R5                ;Get function #
1664  0846  17                       INC   A                   ;Plus 1 for prefix byte
1665  0847  54 31                    CALL  ADD$ADDR            ;Bump the address to the function byte
1666  0849  54 1B                    CALL  GETBYTE             ;Get the specific function byte
1667  084B  AC                       MOV   R4,A                ;Save the function byte
1668  084C  F5                       SEL   MB1
1669
1670                        ;-------------------------------------;
1671                        ; Regency cable controller executor   ;
1672                        ;  r3,r4 contain the 13 bits to send  ;
1673                        ;                                     ;
1674                        ;         20 Feb 1987, 16:54          ;
1675                        ;-------------------------------------;
1676  084D  BD 05           REGGO:   MOV   R5,#5              ;5 bits in first byte
1677  084F  B8 02                    MOV   R0,#2               ;2 bytes to send
1678  0851  FB                       MOV   A,R3                ;Get the first byte
1679
1680  0852  9A 7F                    ANL   P2,#.NOT.OUT        ;Send the pre-pulse
1681  0854  BF 03                    MOV   R7,#3               ;Delay time
1682  0856  EF 56                    DJNZ  R7,$
1683  0858  8A 80                    ORL   P2,#OUT             ;Turn of IR LED
```

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      HOMER...and the plan of Zeus was being accomplished
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1683
16    085A   BF 66                MOV    R7,#102          ;Delay for time for first pulse
1685  085C   EF 5C                DJNZ   R7,$
1686
1687  085E   9A 7F          REGPULSE: ANL  P2,#.NOT.OUT     ;Turn on IR LED
1688  0860   BF 03                MOV    R7,#3
1689  0862   EF 62                DJNZ   R7,$              ;18us on
1690  0864   8A 80                ORL    P2,#OUT           ;Turn off IR LED
1691
1692  0866   BF 1C                MOV    R7,#28           ;Small gap delay
1693  0868   EF 68                DJNZ   R7,$
1694
1695  086A   F2 70                JB7    REGNXT           ;Jmp/next bit
1696  086C   BF 22                MOV    R7,#34           ;Big gap time
1697  086E   EF 6E                DJNZ   R7,$             ;Do the delay
1698
1699  0870   E7            REGNXT: RL     A                ;Shift in next bit
1700  0871   ED 5E                DJNZ   R5,REGPULSE      ;Jmp/go send next bit
1701  0873   BD 07                MOV    R5,#7            ;7 bits in second byte
1702  0875   FC                   MOV    A,R4             ;Get second data byte
1703  0876   E8 5E                DJNZ   R0,REGPULSE      ;Jmp/send second byte
1704
1705  0878   BF 4C                MOV    R7,#76           ;Big gap time
1706  087A   EF 7A                DJNZ   R7,$             ;Do the delay
1707
1708  087C   9A 7F                ANL    P2,#.NOT.OUT     ;Do post pulse
17    087E   BF 03                MOV    R7,#3
171v  0880   EF 80                DJNZ   R7,$
1711  0882   8A 80                ORL    P2,#OUT          ;Turn off LED
1712
1713  0884   BF 00                MOV    R7,#0
1714  0886   BE 7D                MOV    R6,#125          ;Delay between codes
1715  0888   EF 88          REGGAP: DJNZ   R7,$
1716  088A   EE 88                DJNZ   R6,REGGAP
1717
1718  088C   E5                   SEL    MB0
1719  088D   54 5A                CALL   TESTKEY          ;See if any keys are down
1720  088F   F5                   SEL    MB1
1721  0890   76 4D                JF1    REGGO            ;Jmp/key down--do again
1722  0892   04 00                JMP    SLEEP1
1723
1724                              PAGE
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      HOMER...and the plan of Zeus was being accomplished
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1725                        ;--------------------------------------------------------;
1                           ;  EXEC1 -- Executor for type #1                       ;
1727                        ;                                                        ;
1728                        ;  REGISTERS:    R5 = function number                   ;
1729                        ;                                                        ;
1730                        ;         18 Feb 1987, 16:30                             ;
1731                        ;--------------------------------------------------------;
1732  0894  E5              EXEC1:    SEL     MB0
1733  0895  F4 00                    CALL    GET$TABLE           ;Get the table address pointer
1734  0897  23 08                    MOV     A,#8                ;Get # of bytes in header
1735  0899  54 31                    CALL    ADD$ADDR            ;Bump the address pointer
1736  089B  54 1B                    CALL    GETBYTE             ;Get the prefix byte
1737  089D  B8 00                    MOV     R0,#<BIGBUF         ;Get addr of buffer
1738  089F  9A F0                    ANL     P2,#0F0h            ;Clear addr bits
1739  08A1  8A 0B                    ORL     P2,#>BIGBUF         ;Put in new high order addr bits
1740  08A3  90                      MOVX    @R0,A               ;Save prefix byte
1741  08A4  18                      INC     R0                  ;Bump buffer addr
1742
1743  08A5  FD                      MOV     A,R5                ;Get function number
1744  08A6  E7                      RL      A                   ;Times 4 bytes per entry
1745  08A7  E7                      RL      A
1746  08A8  17                      INC     A                   ;Plus 1 for prefix byte
1747  08A9  54 31                   CALL    ADD$ADDR            ;Add it to address
1748
1749  08AB  BD 04                   MOV     R5,#4               ;Number of bytes to move
1750  08AD  54 1B             EXC1C:    CALL    GETBYTE             ;Get a table entry
17    08AF  9A F0                    ANL     P2,#0F0h            ;Clear addr bits
17    08B1  8A 0B                    ORL     P2,#>BIGBUF         ;OR in new bits
1753  08B3  90                      MOVX    @R0,A               ;Save the byte
1754  08B4  18                      INC     R0                  ;Bump the save addr
1755  08B5  54 2F                   CALL    BUMPADDR            ;Bump the source addr
1756  08B7  ED AD                   DJNZ    R5,EXC1C            ;Jmp/move some more
1757
1758  08B9  F5                      SEL     MB1
1759  08BA  24 00                   JMP     MVCRGO
1760
1761                        ;--------------------------------------------;
1762                        ;  RCACAR -- Generate carrier pulses for the ;
1763                        ;            RCA TV.                         ;
1764                        ;                                            ;
1765                        ;         R6 = # of pulses                   ;
1766                        ;                                            ;
1767                        ;         Destroys: R6                       ;
1768                        ;                                            ;
1769                        ;         02 Apr 1987, 15:16                 ;
1770                        ;--------------------------------------------;
1771  08BC  9A 7F             RCACAR:   ANL     P2,#.NOT. OUT       ;TURN OFF LED
1772  08BE  00                      NOP
1773  08BF  00                      NOP                           ;4 on -- 4 off
1774  08C0  8A 80                   ORL     P2,#OUT             ;TURN ON LED
```

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1775  08C2  EE BC                   DJNZ   R6,RCACAR          ;GO DO SOME MORE PULSES
17    08C4  83                      RET
1777
1778  0900                          ORG    900h
1779                        ;-----------------------------------------;
1780                        ;      Multitech VCR function executor    ;
1781                        ;                                         ;
1782                        ;          R1 = <ADDRESS OF DATA          ;
1783                        ;                                         ;
1784                        ;        17 Feb 1987, 14:20               ;
1785                        ;-----------------------------------------;
1786  0900  9A F0           MVCRGO:  ANL    P2,#0F0h           ;Clear high order addr bits
1787  0902  8A 0B                   ORL    P2,#>BIGBUF        ;Put in new bits
1788  0904  B9 00                   MOV    R1,#<BIGBUF        ;Get buffer addr
1789
1790  0906  BE 80                   MOV    R6,#128            ;128 pulses
1791  0908  34 43                   CALL   MVCRCAR
1792
1793  090A  BE 05                   MOV    R6,#5
1794  090C  EF 0C           MVCR5:   DJNZ   R7,$               ;2572 cyl OFF
1795  090E  EE 0C                   DJNZ   R6,MVCR5
1796
1797  0910  BD 06                   MOV    R5,#6              ;5 bytes in table entry
1798  0912  BC 01                   MOV    R4,#1
1799  0914  24 20                   JMP    MVCR15
1800
18^   0916  F2 37           MVCR10:  JB7    MVCR20             ;Jmp/no pulse
18.   0918  BF B8                   MOV    R7,#184            ;0 bit gap pause
1803  091A  BE 04                   MOV    R6,#4
1804  091C  EF 1C           MVCR22:  DJNZ   R7,$
1805  091E  EE 1C                   DJNZ   R6,MVCR22
1806
1807  0920  E7              MVCR15:  RL     A                  ;Get next bit
1808  0921  EC 16                   DJNZ   R4,MVCR10          ;Jmp/more bits to go
1809  0923  81                      MOVX   A,@R1              ;Get next byte
1810  0924  19                      INC    R1                 ;Bump to next byte
1811  0925  BC 08                   MOV    R4,#8              ;Bits/byte=8
1812  0927  ED 16                   DJNZ   R5,MVCR10          ;Jmp/more to go
1813
1814  0929  BE 30                   MOV    R6,#48
1815  092B  EF 2B           MVCR25:  DJNZ   R7,$               ;Inter code gap pause
1816  092D  EE 2B                   DJNZ   R6,MVCR25
1817
1818  092F  E5                      SEL    MB0
1819  0930  54 5A                   CALL   TESTKEY
1820  0932  F5                      SEL    MB1
1821  0933  76 00                   JF1    MVCRGO             ;JMP/KEY STILL DOWN
1822  0935  04 00                   JMP    SLEEP1
1823
1824
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      HOMER...and the plan of Zeus was being accomplished
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1825  0937  BE 20        MVCR20:  MOV   R6,#32          ;32 pulses of carrier
1826  0939  34 43                 CALL  MVCRCAR        ;Send the carrier
1827
1828  093B  BF 41                 MOV   R7,#65         ;Pause after pulse
1829  093D  EF 3D                 DJNZ  R7,$
1830  093F  EF 3F                 DJNZ  R7,$
1831
1832  0941  24 20                 JMP   MVCR15
1833
1834
1835
1836                      ;-----------------------------------------;
1837                      ; MVCRCAR -- Generate carrier pulses for the ;
1838                      ;            Multitech VCR.               ;
1839                      ;                                         ;
1840                      ;         R6 = # of pulses                ;
1841                      ;                                         ;
1842                      ;         Destroys: R7,R6                 ;
1843                      ;                                         ;
1844                      ;         29 Jan 1987, 15:11              ;
1845                      ;-----------------------------------------;
1846  0943  9A 7F        MVCRCAR: ANL   P2,#.NOT. OUT     ;TURN OFF LED
1847  0945  BF 02                 MOV   R7,#2            ;
1848  0947  EF 47                 DJNZ  R7,$             ; 8 cyl ON
1849  0949  8A 80                 ORL   P2,#OUT          ;TURN ON LED
1850
1851  094B  BF 02                 MOV   R7,#2
1852  094D  EF 4D                 DJNZ  R7,$             ;10 cyl OFF
1853  094F  EE 43                 DJNZ  R6,MVCRCAR       ;GO DO SOME MORE PULSES
1854  0951  83                    RET
1855
1856                      ;-----------------------------------------;
1857                      ;  PANCAR -- Generate carrier pulses for the ;
1858                      ;            Panasonic VCR.               ;
1859                      ;                                         ;
1860                      ;         R6 = # of pulses                ;
1861                      ;                                         ;
1862                      ;         Destroys: R7,R6                 ;
1863                      ;                                         ;
1864                      ;         07 Apr 1987, 10:26              ;
1865                      ;-----------------------------------------;
1866  0952  9A 7F        PANCAR:  ANL   P2,#.NOT. OUT     ;TURN OFF LED
1867  0954  BF 01                 MOV   R7,#1            ;
1868  0956  EF 56                 DJNZ  R7,$             ;7 cyl ON
1869  0958  00                    NOP
1870  0959  8A 80                 ORL   P2,#OUT          ;TURN ON LED
1871
1872  095B  BF 01                 MOV   R7,#1            ;6 off
1873  095D  EE 52                 DJNZ  R6,PANCAR        ;GO DO SOME MORE PULSES
1874  095F  83                    RET
```

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      HOMER...and the plan of Zeus was being accomplished
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1875
1876                        ;-----------------------------------------;
1877                        ;  MAGCAR -- Generate carrier pulses for the ;
1878                        ;            Panasonic VCR.               ;
1879                        ;                                         ;
1880                        ;         R6 = # of pulses                ;
1881                        ;                                         ;
1882                        ;         Destroys: R7,R6                 ;
1883                        ;                                         ;
1884                        ;         21 Apr 1987, 16:15              ;
1885                        ;-----------------------------------------;
1886  0960  9A 7F           MAGCAR:   ANL    P2,#.NOT. OUT          ;TURN OFF LED
1887  0962  BF 02                     MOV    R7,#2                  ;
1888  0964  EF 64                     DJNZ   R7,$                   ;8 cyl ON
1889  0966  8A 80                     ORL    P2,#OUT                ;TURN ON LED
1890
1891  0968  BF 01                     MOV    R7,#1                  ;8 off
1892  096A  EF 6A                     DJNZ   R7,$
1893  096C  EE 60                     DJNZ   R6,MAGCAR              ;GO DO SOME MORE PULSES
1894  096E  83                        RET
1895
1896                        ;---------------------------------------------------;
1897                        ;  EXEC6 -- Executor for type #6                     ;
1898                        ;                                                   ;
1899                        ;  REGISTERS:    R5 = function number               ;
1900                        ;                                                   ;
1901                        ;         17 Mar 1987, 15:36                        ;
1902                        ;---------------------------------------------------;
1903  096F  E5              EXEC6:    SEL    MB0
1904  0970  F4 00                     CALL   GET$TABLE              ;Get the table address pointer
1905  0972  23 08                     MOV    A,#8                   ;Get # of bytes in header
1906  0974  6D                        ADD    A,R5                   ;Add in function #
1907  0975  54 31                     CALL   ADD$ADDR               ;Bump the address pointer
1908  0977  54 1B                     CALL   GETBYTE                ;Get the function byte
1909  0979  F5                        SEL    MB1
1910  097A  AC                        MOV    R4,A                   ;Save function byte
1911
1912  097B                 JERGO:
1913  097B  9A 7F                     ANL    P2,#.NOT.OUT           ;Turn on IR
1914  097D  BF 01                     MOV    R7,#1                  ;6 cyl on
1915  097F  EF 7F                     DJNZ   R7,$
1916  0981  8A 80                     ORL    P2,#OUT                ;Turn off IR
1917
1918  0983  BF 01                     MOV    R7,#1
1919  0985  EF 85                     DJNZ   R7,$                   ;6 cyl off
1920  0987  BD 05                     MOV    R5,#5                  ;Number of bits
1921  0989  FC                        MOV    A,R4                   ;Get function
1922
1923  098A                 JERPULSE:
1924  098A  9A 7F                     ANL    P2,#.NOT.OUT           ;Turn on IR
```

```
      HOMER...and the plan of Zeus was being accomplished
      (Of course who knows what Zeus has in mind?)

1925  098C  BF 0B                  MOV   R7,#11
19    098E  EF 8E                  DJNZ  R7,$
1927  0990  8A 80                  ORL   P2,#OUT
1928  0992  F2 B5                  JB7   JERLONG           ;Jmp/long gap
1929
1930  0994  BE 0A                  MOV   R6,#10
1931  0996  BF 00                  MOV   R7,#0
1932  0998  EF 98          JER10:  DJNZ  R7,$              ;Off for 5400 cyl
1933  099A  EE 98                  DJNZ  R6,JER10
1934
1935  099C                JERLP:
1936  099C  E7                     RL    A                 ;Move to next bit
1937  099D  ED 8A                  DJNZ  R5,JERPULSE
1938  099F  9A 7F                  ANL   P2,#.NOT.OUT      ;Turn on IR
1939  09A1  BF 0C                  MOV   R7,#12
1940  09A3  EF A3                  DJNZ  R7,$
1941  09A5  8A 80                  ORL   P2,#OUT
1942
1943  09A7  BE 1F                  MOV   R6,#31            ;Inter-function gap
1944  09A9  EF A9          JERGAP: DJNZ  R7,$
1945  09AB  EE A9                  DJNZ  R6,JERGAP
1946
1947  09AD  E5                     SEL   MB0
1948  09AE  54 5A                  CALL  TESTKEY           ;See if key is still down
1949  09B0  F5                     SEL   MB1
1950  09B1  76 7B                  JF1   JERGO             ;Jmp/key still down
19    09B3  04 00          JERSLP: JMP   SLEEP1
19
1953                       ; long gap
1954
1955  09B5                JERLONG:
1956  09B5  BE 10                  MOV   R6,#16
1957  09B7  EF B7          JER20:  DJNZ  R7,$
1958  09B9  EE B7                  DJNZ  R6,JER20
1959  09BB  24 9C                  JMP   JERLP
1960
1961                       ;-------------------------------------------------------;
1962                       ;  EXEC0 -- Executor for type #0                       ;
1963                       ;                                                       ;
1964                       ;  REGISTERS:    R5 = function number                   ;
1965                       ;                                                       ;
1966                       ;         07 Apr 1987, 12:07                            ;
1967                       ;-------------------------------------------------------;
1968  09BD  E5             EXEC0:  SEL   MB0
1969  09BE  F4 00                  CALL  GET$TABLE         ;Get the table address
1970  09C0  23 08                  MOV   A,#8              ;Get # of bytes in header
1971  09C2  54 31                  CALL  ADD$ADDR          ;Bump the address pointer
1972
1973  09C4  B8 00                  MOV   R0,#<BIGBUF       ;Buffer addr
1974  09C6  54 1B          EX0$LP1: CALL  GETBYTE          ;Get a byte
```

```
      HOMER...and the plan of Zeus was being accomplished
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1975  09C8  9A F0                  ANL   P2,#0F0h          ;Clear addr bits
19    09CA  8A 0B                  ORL   P2,#>BIGBUF       ;Put in new addr bits
1977  09CC  90                     MOVX  @R0,A             ;Save the byte
1978  09CD  18                     INC   R0                ;Bump output pointer
1979  09CE  54 2F                  CALL  BUMPADDR          ;Bump input pointer
1980
1981  09D0  FD                     MOV   A,R5              ;Get function #
1982  09D1  E7                     RL    A                 ;Times 4 bytes per entry
1983  09D2  E7                     RL    A
1984  09D3  54 31                  CALL  ADD$ADDR          ;Move to function entry
1985
1986  09D5  BE 04                  MOV   R6,#4             ;# of bytes to move
1987  09D7  54 1B           EX0$LP2: CALL  GETBYTE         ;Get a byte
1988  09D9  9A F0                  ANL   P2,#0F0h          ;Clear addr bits
1989  09DB  8A 0B                  ORL   P2,#>BIGBUF       ;Put in new addr bits
1990  09DD  90                     MOVX  @R0,A             ;Save the byte
1991  09DE  18                     INC   R0                ;Bump output pointer
1992  09DF  54 2F                  CALL  BUMPADDR          ;Bump input pointer
1993  09E1  EE D7                  DJNZ  R6,EX0$LP2        ;Jmp/move some more
1994
1995  09E3  F5                     SEL   MB1
1996  09E4  44 00                  JMP   PANGO             ;Go execute what we've got
1997
1998  0A00                         org   0a00h
1999                       ;-------------------------------------------------------;
2000                       ;       PANGO -- Send Panasonic codes located in        ;
20                         ;                BIGBUF.                                ;
20                         ;                                                       ;
2003                       ;       07 Apr 1987, 14:10                              ;
2004                       ;-------------------------------------------------------;
2005  0A00                 PANGO:
2006
2007                       ; send sync burst
2008
2009  0A00  BE C0                  MOV   R6,#192           ;192 pulses
2010  0A02  34 52                  CALL  PANCAR            ;Send them
2011
2012                       ; set up to send the code
2013
2014  0A04  9A F0                  ANL   P2,#0F0h          ;Clear addr bits
2015  0A06  8A 0B                  ORL   P2,#>BIGBUF       ;Set to addr of buffer
2016
2017  0A08  B8 00                  MOV   R0,#<BIGBUF       ;Addr of code to send
2018  0A0A  B9 07                  MOV   R1,#7             ;Seven bits in first byte
2019  0A0C  BA 05                  MOV   R2,#5             ;# of bytes to send
2020  0A0E  80                     MOVX  A,@R0             ;Get first byte
2021
2022                       ; delay after sync burst
2023
2024  0A0F  BE 05                  MOV   R6,#5
```

```
      HOMER...and the plan of Zeus was being accomplished
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2025  0A11  BF D2                    MOV   R7,#210
20    0A13  EF 13           PAN5:    DJNZ  R7,$
2027  0A15  EE 13                    DJNZ  R6,PAN5
2028
2029                        ; check if 1 or 0
2030
2031  0A17  F2 23           PAN10:   JB7   PAN50              ;Jmp/send a one
2032
2033                        ; we just delay for zero bit
2034
2035  0A19  BE 04                    MOV   R6,#4
2036  0A1B  BF A0                    MOV   R7,#160
2037  0A1D  EF 1D           PAN20:   DJNZ  R7,$
2038  0A1F  EE 1D                    DJNZ  R6,PAN20
2039  0A21  44 2F                    JMP   PAN80               ;Go get next bit
2040
2041                        ; send a 1 bit
2042
2043  0A23                  PAN50:
2044  0A23  BE 30                    MOV   R6,#48              ;Send 48 pulses
2045  0A25  34 52                    CALL  PANCAR
2046
2047  0A27  BE 02                    MOV   R6,#2               ;Delay after 1 bit
2048  0A29  BF 32                    MOV   R7,#50
2049  0A2B  EF 2B           PAN60:   DJNZ  R7,$
2050  0A2D  EE 2B                    DJNZ  R6,PAN60
20
20
2053                        ; now get the next bit if any
2054  0A2F  E7              PAN80:   RL    A                  ;Move next bit into position
2055  0A30  E9 17                    DJNZ  R1,PAN10           ;Jmp/more bits in this byte
2056  0A32  18                       INC   R0                 ;Point to next byte
2057  0A33  80                       MOVX  A,@R0              ;Get the next byte
2058  0A34  B9 08                    MOV   R1,#8              ;8 bits/byte
2059  0A36  EA 17                    DJNZ  R2,PAN10
2060
2061                        ; delay for repeat time
2062
2063  0A38  BE 25                    MOV   R6,#37
2064  0A3A  EF 3A           PAN90:   DJNZ  R7,$
2065  0A3C  EE 3A                    DJNZ  R6,PAN90
2066
2067                        ; see if we need to send some more
2068
2069  0A3E  E5                       SEL   MB0
2070  0A3F  54 5A                    CALL  TESTKEY            ;Check if key down
2071  0A41  F5                       SEL   MB1
2072  0A42  76 00                    JF1   PANGO              ;Jmp/send some more
2073  0A44  04 00                    JMP   SLEEP1             ;Get out
2074
```

```
      HOMER...and the plan of Zeus was being accomplished
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2075
2076
2077  0B00                              ORG     0B00H
2078  0B00  00 00 00 00 00  BIGBUF:     DB      0,0,0,0,0,0,0,0
      0B05  00 00 00
2079
2080                        ;-------------------------------------------------------;
2081                        ;  EXEC8 -- Executor for type #8                       ;
2082                        ;                                                       ;
2083                        ;  REGISTERS:    R5 = function number                   ;
2084                        ;                                                       ;
2085                        ;         03 Apr 1987, 10:47                            ;
2086                        ;-------------------------------------------------------;
2087  0B08  E5              EXEC8:    SEL     MB0
2088  0B09  F4 00                     CALL    GET$TABLE           ;Get the table address
2089  0B0B  23 08                     MOV     A,#8                ;Get # of bytes in header
2090  0B0D  54 31                     CALL    ADD$ADDR            ;Bump the address pointer
2091
2092  0B0F  54 1B                     CALL    GETBYTE             ;Get timing byte
2093  0B11  B8 6D                     MOV     R0,#<BGT1+1         ;Get addr
2094  0B13  14 CC                     CALL    EX8$SET             ;Set the upper addr bits
2095  0B15  90                        MOVX    @R0,A               ;Put timing byte
2096  0B16  54 2F                     CALL    BUMPADDR            ;Bump the pointer
2097
2098  0B18  54 1B                     CALL    GETBYTE             ;Get timing byte
2099  0B1A  B8 6F                     MOV     R0,#<BGT2+1         ;Get addr
2100  0B1C  14 CC                     CALL    EX8$SET             ;Set the upper addr bits
2101  0B1E  90                        MOVX    @R0,A               ;Put timing byte
2102  0B1F  54 2F                     CALL    BUMPADDR            ;Bump the pointer
2103
2104  0B21  54 1B                     CALL    GETBYTE             ;Get timing byte
2105  0B23  B8 86                     MOV     R0,#<BGT3+1         ;Get addr
2106  0B25  14 CC                     CALL    EX8$SET             ;Set the upper addr bits
2107  0B27  90                        MOVX    @R0,A               ;Put timing byte
2108  0B28  54 2F                     CALL    BUMPADDR            ;Bump the pointer
2109
2110  0B2A  54 1B                     CALL    GETBYTE             ;Get timing byte
2111  0B2C  B8 94                     MOV     R0,#<BGT4+1         ;Get addr
2112  0B2E  14 CC                     CALL    EX8$SET             ;Set the upper addr bits
2113  0B30  90                        MOVX    @R0,A               ;Put timing byte
2114  0B31  54 2F                     CALL    BUMPADDR            ;Bump the pointer
2115
2116  0B33  54 1B                     CALL    GETBYTE             ;Get timing byte
2117  0B35  B8 88                     MOV     R0,#<BGT5+1         ;Get addr
2118  0B37  14 CC                     CALL    EX8$SET             ;Set the upper addr bits
2119  0B39  90                        MOVX    @R0,A               ;Put timing byte
2120  0B3A  54 2F                     CALL    BUMPADDR            ;Bump the pointer
2121
2122  0B3C  54 1B                     CALL    GETBYTE             ;Get assumed bit flag
2123  0B3E  AC                        MOV     R4,A                ;Save the flag
```

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      HOMER...and the plan of Zeus was being accomplished
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2124
21    0B3F   BE 03                MOV    R6,#3              ;Three bytes to move
2126  0B41   B8 00                MOV    R0,#<BIGBUF        ;Buffer addr
2127  0B43   54 2F          EX8$LP1: CALL   BUMPADDR         ;Bump the pointer
2128  0B45   54 1B                CALL   GETBYTE            ;Get a byte
2129  0B47   9A F0                ANL    P2,#0F0h           ;Clear addr bits
2130  0B49   8A 0B                ORL    P2,#>BIGBUF        ;Put in new addr bits
2131  0B4B   90                   MOVX   @R0,A              ;Save the byte
2132  0B4C   18                   INC    R0                 ;Bump output pointer
2133  0B4D   EE 43                DJNZ   R6,EX8$LP1         ;Jmp/move some more
2134
2135  0B4F   FD                   MOV    A,R5               ;Get function #
2136  0B50   6D                   ADD    A,R5               ;Plus original for times 2
2137  0B51   6D                   ADD    A,R5               ;Plus original for times 3
2138  0B52   17                   INC    A                  ;Plus one for previous fetch
2139  0B53   54 31                CALL   ADD$ADDR           ;Move to function entry
2140
2141  0B55   BE 03                MOV    R6,#3              ;Three bytes to move
2142  0B57   54 1B          EX8$LP2: CALL   GETBYTE          ;Get a byte
2143  0B59   9A F0                ANL    P2,#0F0h           ;Clear addr bits
2144  0B5B   8A 0B                ORL    P2,#>BIGBUF        ;Put in new addr bits
2145  0B5D   90                   MOVX   @R0,A              ;Save the byte
2146  0B5E   18                   INC    R0                 ;Bump output pointer
2147  0B5F   54 2F                CALL   BUMPADDR           ;Bump input pointer
2148  0B61   EE 57                DJNZ   R6,EX8$LP2         ;Jmp/move some more
2149
2'    0B63   F5                   SEL    MB1
21..                       ;      JMP    BIGGO              ;Go execute what we've got
2152
2153  0B64                 BIGGO:
2154
2155                       ; send sync burst
2156
2157  0B64   BE 00                MOV    R6,#0              ;256 pulses
2158  0B66   F4 F0                CALL   BIGCAR             ;Send them
2159  0B68   BE 56                MOV    R6,#(342-256)      ;We need more pulses
2160  0B6A   F4 F0                CALL   BIGCAR             ;Send the rest
2161
2162                       ; delay for gap after sync burst
2163
2164  0B6C   BF D5         BGT1:  MOV    R7,#213
2165  0B6E   BE 07         BGT2:  MOV    R6,#7
2166  0B70   EF 70         BIG5:  DJNZ   R7,$
2167  0B72   EE 70                DJNZ   R6,BIG5
2168
2169                       ; set up to send the code
2170
2171  0B74   9A F0                ANL    P2,#0F0h           ;Clear addr bits
2172  0B76   8A 0B                ORL    P2,#>BIGBUF        ;Set to addr of buffer
2173
```

```
      HOMER...and the plan of Zeus was being accomplished
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2174  0B78  B8 00                    MOV   R0,#<BIGBUF          ;Addr of code to send
2175  0B7A  B9 01                    MOV   R1,#1               ;One bit in first byte
2176  0B7C  BA 07                    MOV   R2,#7               ;# of bytes to send
2177  0B7E  FC                       MOV   A,R4                ;Get assumed bit flag
2178  0B7F  C6 97                    JZ    BIG80               ;Jmp/don't assume first bit
2179  0B81  23 80                    MOV   A,#80H              ;First byte is a fake
2180
2181  0B83  F2 8F           BIG10:   JB7   BIG$S1              ;Jmp/send a one bit
2182
2183                        ; send a zero bit (which is just IR off for a while!)
2184
2185  0B85  BE 03           BGT3:    MOV   R6,#3
2186  0B87  BF 6D           BGT5:    MOV   R7,#109
2187  0B89  EF 89           BIG20:   DJNZ  R7,$
2188  0B8B  EE 89                    DJNZ  R6,BIG20
2189  0B8D  64 97                    JMP   BIG80
2190
2191  0B8F  BE 15           BIG$S1:  MOV   R6,#21              ;Number of pulses
2192  0B91  F4 F0                    CALL  BIGCAR
2193
2194  0B93  BF D2           BGT4:    MOV   R7,#210             ;Delay for gap between 1 bits
2195  0B95  EF 95                    DJNZ  R7,$
2196
2197                        ; get next bit, byte, or we're done
2198
2199  0B97  E7              BIG80:   RL    A                   ;Move in next bit
2200  0B98  E9 83                    DJNZ  R1,BIG10            ;Jmp/more in current byte
2201
2202  0B9A  80                       MOVX  A,@R0               ;Get next byte
2203  0B9B  18                       INC   R0                  ;Point to next one to get
2204  0B9C  B9 08                    MOV   R1,#8               ;Reset bit counter
2205  0B9E  EA 83                    DJNZ  R2,BIG10            ;Jmp/more bytes to go
2206
2207                        ; delay for time 'til repeat code
2208
2209  0BA0                  BIG90:
2210  0BA0  BE 34                    MOV   R6,#52
2211  0BA2  BF 00                    MOV   R7,#0
2212  0BA4  EF A4           BIG90L:  DJNZ  R7,$
2213  0BA6  EE A4                    DJNZ  R6,BIG90L
2214
2215
2216                        ; send the repeat code until TESTKEY says we're done
2217
2218  0BA8                  BIG99:
2219  0BA8  BE 00                    MOV   R6,#0               ;256 pulses
2220  0BAA  F4 F0                    CALL  BIGCAR              ;Send them
2221  0BAC  BE 56                    MOV   R6,#342-256         ;We need more pulses
2222  0BAE  F4 F0                    CALL  BIGCAR              ;Send the rest
2223
```

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      HOMER...and the plan of Zeus was being accomplished
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0BB0  BE 02                   MOV   R6,#2
0BB2  BF 00                   MOV   R7,#0             ;Middle of repeat code gap delay
0BB4  EF B4           BIG99L: DJNZ  R7,$
0BB6  EE B4                   DJNZ  R6,BIG99L
0BB8  BE 16                   MOV   R6,#22
0BBA  F4 F0                   CALL  BIGCAR            ;Send second part of repeat code
                      ; delay between repeats
0BBC  BE 7D                   MOV   R6,#125
0BBE  EF BE           BIG99L2: DJNZ R7,$
0BC0  EE BE                   DJNZ  R6,BIG99L2
0BC2  E5                      SEL   MB0
0BC3  54 5A                   CALL  TESTKEY           ;Check if key still down
0BC5  F5                      SEL   MB1
0BC6  76 A8                   JF1   BIG99             ;Jmp/keep sending repeat code
0BC8  04 00                   JMP   SLEEP1            ;Get out

0C00                          ORG   0C00H
                      ;-------------------------------------------------------;
                      ;  EXEC7 -- Executor for type #7                       ;
                      ;                                                       ;
                      ;  REGISTERS:    R5 = function number                   ;
                      ;                                                       ;
                      ;        02 Apr 1987, 14:55                             ;
                      ;-------------------------------------------------------;
0C00                  EXEC7:
0C00  E5                      SEL   MB0
0C01  F4 00                   CALL  GET$TABLE         ;Get the table address
0C03  23 08                   MOV   A,#8              ;Get # of bytes in header
0C05  54 31                   CALL  ADD$ADDR          ;Bump the address pointer
0C07  54 1B                   CALL  GETBYTE           ;Get the trailing part of code
0C09  AC                      MOV   R4,A              ;And save it
0C0A  FD                      MOV   A,R5              ;Get function number
0C0B  17                      INC   A                 ;Add one for post-fix byte
0C0C  54 31                   CALL  ADD$ADDR          ;Add it to address

0C0E  54 1B                   CALL  GETBYTE           ;Get the byte
0C10  A8                      MOV   R0,A              ;And save it
0C11  F5                      SEL   MB1

                      ; R0 = function, R4 = 2 bit prefix

0C12                  RCAGO:

0C12  BE C8                   MOV   R6,#200           ;# of cyls of carrier
```

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      HOMER...and the plan of Zeus was being accomplished
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0C14  14 BC                     CALL   RCACAR              ;Send carrier
0C16  BF 00                     MOV    R7,#0
0C18  EF 18                     DJNZ   R7,$               ;This makes 514 cyl off
0C1A  BF 09                     MOV    R7,#9
0C1C  EF 1C                     DJNZ   R7,$               ;Plus another 20 = 534

0C1E  BB 02                     MOV    R3,#2              ;Number of bytes of code
0C20  BD 02                     MOV    R5,#2              ;Get number of bits in prefix
0C22  FD                        MOV    A,R5               ;Get the prefix
0C23                    RCA5:
0C23  F2 31                     JB7    RCA$S1             ;Send a 1 bit

                        ; here we send a short or zero bit

0C25  BE 10                     MOV    R6,#16             ;Get number of carrier pulses
0C27  14 BC                     CALL   RCACAR             ;Send them

0C29  BF 00                     MOV    R7,#0
0C2B  EF 2B                     DJNZ   R7,$
0C2D  BF D3                     MOV    R7,#211            ;Get rest of wait time
0C2F  84 39                     JMP    RCA80              ;Go finish the bit

                        ; here we send a long or "1" bit

0C31  BE 42             RCA$S1: MOV    R6,#66             ;Get # of cycles of carrier
0C33  14 BC                     CALL   RCACAR             ;And send them

0C35  BF 00                     MOV    R7,#0
0C37  EF 37                     DJNZ   R7,$               ;Delay

                        ; get the next bit if there are any

0C39                    RCA80:
0C39  E7                        RL     A                  ;Get next bit
0C3A  ED 23                     DJNZ   R5,RCA5            ;Jmp/more bits in this byte
0C3C  F8                        MOV    A,R0               ;Get next byte
0C3D  BD 08                     MOV    R5,#8              ;8 bits per byte
0C3F  EB 23                     DJNZ   R3,RCA5

                        ; fall through at end of code

0C41  E5                        SEL    MB0
0C42  54 5A                     CALL   TESTKEY            ;See if key is still down
0C44  F5                        SEL    MB1
0C45  76 12                     JF1    RCAGO              ;Jmp/key still down
0C47  04 00                     JMP    SLEEP1

                        ;-------------------------------------------------------;
                        ;  EXEC9 -- Executor for type #9                        ;
                        ;                                                       ;
```

HOMER...and the plan of Zeus was being accomplished
(Of course who knows what Zeus has in mind?)

```
2324                        ;  REGISTERS:    R5 = function number                ;
23                          ;                                                    ;
23                          ;         16 Apr 1987, 11:12                         ;
2327                        ;---------------------------------------------------;
2328  0C49                  EXEC9:
2329  0C49  E5                       SEL    MB0
2330  0C4A  F4 00                    CALL   GET$TABLE          ;Get the table address
2331  0C4C  23 08                    MOV    A,#8               ;Get # of bytes in header
2332  0C4E  6D                       ADD    A,R5               ;Add in function #
2333  0C4F  54 31                    CALL   ADD$ADDR           ;Bump the address pointer
2334  0C51  54 1B                    CALL   GETBYTE            ;Get function code
2335  0C53  AC                       MOV    R4,A               ;And save it
2336  0C54  F5                       SEL    MB1
2337
2338
2339  0C55                  RT226GO:
2340  0C55  BA 03                    MOV    R2,#3              ;Number of times to send
2341  0C57                  RT226AGN:
2342  0C57  BD 08                    MOV    R5,#8              ;Number of bits to send
2343  0C59  FC                       MOV    A,R4               ;Get the function code
2344
2345  0C5A                  RT226A:
2346  0C5A  F2 73                    JB7    RT226ON            ;Jmp/bit is on
2347
2348  0C5C                  RT226DLY:
2349  0C5C  BF 96                    MOV    R7,#150
2350  0C5E  EF 5E                    DJNZ   R7,$               ;~814 HCCs
23    0C60  EF 60                    DJNZ   R7,$
2352  0C62  8A 80                    ORL    P2,#OUT            ;Turn off IR
2353
2354  0C64  E7                       RL     A                  ;
2355  0C65  ED 5A                    DJNZ   R5,RT226A          ;Jmp/more bits to go
2356
2357                        ; inter-code pause
2358
2359  0C67  BE 27                    MOV    R6,#39
2360  0C69  BF 53                    MOV    R7,#83
2361  0C6B  EF 6B           RT226B:  DJNZ   R7,$
2362  0C6D  EE 6B                    DJNZ   R6,RT226B
2363
2364  0C6F  EA 57                    DJNZ   R2,RT226AGN        ;Jmp/send again
2365  0C71  04 00                    JMP    SLEEP1
2366
2367  0C73                  RT226ON:
2368  0C73  9A 7F                    ANL    P2,#.NOT.OUT       ;Turn on IR
2369  0C75  84 5C                    JMP    RT226DLY
2370
2371                        ;---------------------------------------------------;
2372                        ;  EXEC10 -- Executor for type #10                   ;
2373                        ;                                                    ;
```

```
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                          ;  REGISTERS:    R5 = function number                  ;
                          ;                                                       ;
                          ;         16 Apr 1987, 11:12                            ;
                          ;-------------------------------------------------------;
0C77                      EXEC10:
0C77  E5                            SEL   MB0
0C78  F4 00                         CALL  GET$TABLE           ;Get the table address
0C7A  23 08                         MOV   A,#8                ;Get # of bytes in header
0C7C  6D                            ADD   A,R5                ;Add in function #
0C7D  54 31                         CALL  ADD$ADDR            ;Bump the address pointer
0C7F  54 1B                         CALL  GETBYTE             ;Get function code
0C81  AC                            MOV   R4,A                ;And save it
0C82  F5                            SEL   MB1

0C83                      RT214G0:
0C83  BB 03                         MOV   R3,#3               ;Header count
0C85                      RT214PX:
0C85  BE 11                         MOV   R6,#17              ;# of carrier pulses
0C87  34 60                         CALL  MAGCAR              ;Send the carrier

0C89  BE 04                         MOV   R6,#4
0C8B  BF 91                         MOV   R7,#145
0C8D  EF 8D               RT214A:   DJNZ  R7,$                ;Small gap
0C8F  EE 8D                         DJNZ  R6,RT214A

0C91  BE 11                         MOV   R6,#17              ;# of carrier pulses
0C93  34 60                         CALL  MAGCAR              ;Send the carrier

0C95  BE 0C                         MOV   R6,#12
0C97  BF CD                         MOV   R7,#205
0C99  EF 99               RT214B:   DJNZ  R7,$                ;Huge gap
0C9B  EE 99                         DJNZ  R6,RT214B

0C9D  EB 85                         DJNZ  R3,RT214PX          ;Jmp/more header to go

0C9F  BE 11                         MOV   R6,#17              ;# of carrier pulses
0CA1  34 60                         CALL  MAGCAR              ;Send the carrier

0CA3  BE 04                         MOV   R6,#4
0CA5  BF 91                         MOV   R7,#145
0CA7  EF A7               RT214E:   DJNZ  R7,$                ;Small gap
0CA9  EE A7                         DJNZ  R6,RT214E

0CAB  FC                            MOV   A,R4                ;Get code byte
0CAC  BB 0B                         MOV   R3,#11              ;Length of code (1=2 0=1)
0CAE  2B                            XCH   A,R3

0CAF                      RT214LP:
0CAF  2B                            XCH   A,R3                ;Get code back
0CB0  BE 11                         MOV   R6,#17              ;# of carrier pulses
```

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2424  0CB2  34 60                   CALL   MAGCAR            ;Send the carrier
2     0CB4  F2 D5                   JB7    RT214LNG          ;Jmp/long gap
2426
2427  0CB6  BE 04                   MOV    R6,#4
2428  0CB8  BF 91                   MOV    R7,#145
2429  0CBA  EF BA           RT214C: DJNZ   R7,$              ;Small gap
2430  0CBC  EE BA                   DJNZ   R6,RT214C
2431  0CBE  CB                      DEC    R3                ;Decr for zero bit
2432
2433  0CBF  E7              RT214D: RL     A                 ;Get next bit
2434  0CC0  2B                      XCH    A,R3              ;Get the count
2435  0CC1  F2 C5                   JB7    RT214X
2436  0CC3  96 AF                   JNZ    RT214LP           ;Jmp/more to send
2437
2438  0CC5                  RT214X:
2439  0CC5  BE 25                   MOV    R6,#37
2440  0CC7  BF 6F                   MOV    R7,#111
2441  0CC9  EF C9           RT214Z: DJNZ   R7,$              ;Repeat gap
2442  0CCB  EE C9                   DJNZ   R6,RT214Z
2443
2444  0CCD  E5                      SEL    MB0
2445  0CCE  54 5A                   CALL   TESTKEY           ;See if key is still down
2446  0CD0  F5                      SEL    MB1
2447  0CD1  76 AF                   JF1    RT214LP           ;Jmp/key still down
2448  0CD3  04 00                   JMP    SLEEP1
2449
2/
24..  0CD5  BE 08           RT214LNG: MOV    R6,#8
2452  0CD7  BF B1                   MOV    R7,#177
2453  0CD9  EF D9           RT21RF: DJNZ   R7,$              ;Big gap
2454  0CDB  EE D9                   DJNZ   R6,RT21RF
2455  0CDD  CB                      DEC    R3
2456  0CDE  CB                      DEC    R3
2457  0CDF  84 BF                   JMP    RT214D
2458
2459  0D00                          ORG    0D00H
2460  0E00                          ORG    0E00H
2461
2462
2463                        ;-------------------------------------------------------------------------;
2464                        ;       EXECS -- Table of command executor addresses                      ;
2465                        ;                                                                         ;
2466                        ;       19 Mar 1987, 14:42                                                ;
2467                        ;-------------------------------------------------------------------------;
2468  0E00  BD09            EXECS:  DW     EXEC0             ;Panasonic
2469  0E02  9408                    DW     EXEC1
2470  0E04  0004                    DW     EXEC2             ;Sony
2471  0E06  7D06                    DW     EXEC3
2472  0E08  0608                    DW     EXEC4
2473  0E0A  3B08                    DW     EXEC5
```

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2474  0E0C  6F09                    DW      EXEC6
24    0E0E  000C                    DW      EXEC7
2476  0E10  080B                    DW      EXEC8
2477  0E12  490C                    DW      EXEC9
2478  0E14  770C                    DW      EXEC10
2479  0E16  9702                    DW      SLEEP
2480
2481                        ;---------------------------------------------------------------------------;
2482                        ;       KEYTBLS -- Table of key table address for the device modes          ;
2483                        ;                                                                           ;
2484                        ;       19 Mar 1987, 14:43                                                  ;
2485                        ;---------------------------------------------------------------------------;
2486  0E18  32              KEYTBLS:  DB      <CABLEKEYS
2487  0E19  42                        DB      <TVKEYS
2488  0E1A  1B                        DB      <VCRKEYS
2489
2490                        ;---------------------------------------------------------------------------;
2491                        ;  VCRKEYS -- Scan codes for the standard VCR function keys.  This is the    ;
2492                        ;             standard order for VCR keys.                                  ;
2493                        ;                                                                           ;
2494                        ;       18 Feb 1987, 14:21                                                  ;
2495                        ;---------------------------------------------------------------------------;
2496  0E1B  F5              VCRKEYS:  DB      -0Bh                ;Play
2497  0E1C  DE                        DB      -22h                ;Chan up
2498  0E1D  DD                        DB      -23h                ;Chan down
2499  0E1E  F9                        DB      -07h                ;Power
25    0E1F  E6                        DB      -1Ah                ;Rewind
25.   0E20  FD                        DB      -03h                ;Fast forward
2502  0E21  E4                        DB      -1Ch                ;Record
2503  0E22  FC                        DB      -04h                ;Pause
2504  0E23  F4                        DB      -0Ch                ;Stop
2505  0E24  EC                        DB      -14h                ;Tv/vcr
2506  0E25  CE                        DB      -32h                ;0
2507  0E26  E8                        DB      -18h                ;1
2508  0E27  F0                        DB      -10h                ;2
2509  0E28  F8                        DB      -08h                ;3
2510  0E29  C8                        DB      -38h                ;4
2511  0E2A  D0                        DB      -30h                ;5
2512  0E2B  D8                        DB      -28h                ;6
2513  0E2C  C7                        DB      -39h                ;7
2514  0E2D  CF                        DB      -31h                ;8
2515  0E2E  D7                        DB      -29h                ;9
2516  0E2F  D6                        DB      -2Ah                ;Enter
2517  0E30  D5                        DB      -2Bh                ;Recall (RCL)
2518  0E31  00                        DB      0                   ;**end of table**
2519
2520                        ;---------------------------------------------------------------------------;
2521                        ;  CABLEKEYS -- Scan codes for the standard cable function keys. This is the ;
2522                        ;             standard order for cable keys.                                ;
2523                        ;                                                                           ;
```

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```
2524                    ;       19 Feb 1987, 13:26                                      ;
25                      ;-------------------------------------------------------------------------;
2526  0E32  DE          CABLEKEYS:DB    -22h            ;Chan up
2527  0E33  DD                  DB     -23h            ;Chan down
2528  0E34  F9                  DB     -07h            ;Power
2529  0E35  CE                  DB     -32h            ;0
2530  0E36  E8                  DB     -18h            ;1
2531  0E37  F0                  DB     -10h            ;2
2532  0E38  F8                  DB     -08h            ;3
2533  0E39  C8                  DB     -38h            ;4
2534  0E3A  D0                  DB     -30h            ;5
2535  0E3B  D8                  DB     -28h            ;6
2536  0E3C  C7                  DB     -39h            ;7
2537  0E3D  CF                  DB     -31h            ;8
2538  0E3E  D7                  DB     -29h            ;9
2539  0E3F  D6                  DB     -2Ah            ;Enter
2540  0E40  D5                  DB     -2Bh            ;Recall (RCL)
2541  0E41  00                  DB     0               ;**end of table**
2542
2543                    ;-------------------------------------------------------------------------;
2544                    ;  TVKEYS -- Scan codes for the standard TV function keys. This is the   ;
2545                    ;          standard order for TV keys.                                    ;
2546                    ;                                                                         ;
2547                    ;       19 Feb 1987, 14:24                                              ;
2548                    ;-------------------------------------------------------------------------;
2549  0E42  DE          TVKEYS:   DB    -22h            ;Chan up
25    0E43  DD                  DB     -23h            ;Chan down
25    0E44  F9                  DB     -07h            ;Power
2552  0E45  CE                  DB     -32h            ;0
2553  0E46  E8                  DB     -18h            ;1
2554  0E47  F0                  DB     -10h            ;2
2555  0E48  F8                  DB     -08h            ;3
2556  0E49  C8                  DB     -38h            ;4
2557  0E4A  D0                  DB     -30h            ;5
2558  0E4B  D8                  DB     -28h            ;6
2559  0E4C  C7                  DB     -39h            ;7
2560  0E4D  CF                  DB     -31h            ;8
2561  0E4E  D7                  DB     -29h            ;9
2562  0E4F  D6                  DB     -2Ah            ;Enter
2563  0E50  D5                  DB     -2Bh            ;Recall (RCL)
2564  0E51  FE                  DB     -02h            ;Volume up
2565  0E52  FF                  DB     -01h            ;Volume down
2566  0E53  E0                  DB     -20h            ;Mute
2567  0E54  00                  DB     0               ;**end of table**
2568
2569                    ;-------------------------------------------------------------------------;
2570                    ;  FUNCKEYS -- Keycodes for the non-standard function keys A-H            ;
2571                    ;                                                                         ;
2572                    ;       21 Feb 1987, 14:54                                              ;
2573                    ;-------------------------------------------------------------------------;
```

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0E55                    FUNCKEYS:
0E55  C3                        DB      -3Dh                ;A
0E56  C2                        DB      -3Eh                ;B
0E57  CB                        DB      -35h                ;C
0E58  C9                        DB      -37h                ;D
0E59  D2                        DB      -2Eh                ;E
0E5A  D1                        DB      -2Fh                ;F
0E5B  DA                        DB      -26h                ;G
0E5C  D9                        DB      -27h                ;H
0E5D  00                        DB      0                   ;**end of table**

                        ;-------------------------------------------------------------------------;
                        ;  DEFKEYS -- Keycodes valid for macro definitions.                       ;
                        ;                                                                         ;
                        ;       23 Feb 1987, 15:37                                                ;
                        ;-------------------------------------------------------------------------;
0E5E                    DEFKEYS:
0E5E  E2                        DB      -1Eh                ;Do 1
0E5F  EA                        DB      -16h                ;Do 2
0E60  F2                        DB      -0Eh                ;Do 3
0E61  FA                        DB      -06h                ;Do 4
0E62  E4                        DB      -1Ch                ;Rec
0E63  EC                        DB      -14h                ;Tv/vcr
0E64  F4                        DB      -0Ch                ;Stop
0E65  FC                        DB      -04h                ;Pause
0E66  E3                        DB      -1Dh                ;Rewind  <<
0E67  ED                        DB      -13h                ;Reverse  <
0E68  F5                        DB      -0Bh                ;Play     >
0E69  FD                        DB      -03h                ;FF      >>
0E6A  FE                        DB      -02h                ;Mute
0E6B  FF                        DB      -01h                ;Vol +
0E6C  E0                        DB      -20h                ;Vol -
0E6D  DE                        DB      -22h                ;Ch +
0E6E  DD                        DB      -23h                ;Ch -
0E6F  C3                        DB      -3Dh                ;A
0E70  CB                        DB      -35h                ;B
0E71  D2                        DB      -2Eh                ;C
0E72  DA                        DB      -26h                ;D
0E73  C2                        DB      -3Eh                ;E
0E74  C9                        DB      -37h                ;F
0E75  D1                        DB      -2Fh                ;G
0E76  D9                        DB      -27h                ;H
0E77  00                        DB      0                   ;**end of table**

                        ;-------------------------------------------------------------------------;
                        ;  DIGITKEYS -- Keycodes for the digit pad                                ;
                        ;                                                                         ;
                        ;                                       21 Feb 1987, 15:14                ;
                        ;-------------------------------------------------------------------------;
```

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2624  0E78                    DIGITKEYS:
26    0E78  CE                        DB      -32h                ;0
2626  0E79  E8                        DB      -18h                ;1
2627  0E7A  F0                        DB      -10h                ;2
2628  0E7B  F8                        DB      -08h                ;3
2629  0E7C  C8                        DB      -38h                ;4
2630  0E7D  D0                        DB      -30h                ;5
2631  0E7E  D8                        DB      -28h                ;6
2632  0E7F  C7                        DB      -39h                ;7
2633  0E80  CF                        DB      -31h                ;8
2634  0E81  D7                        DB      -29h                ;9
2635  0E82  00                        DB      0                   ;**end of table**
2636
2637                          ;-------------------------------------------------------------------------;
2638                          ;  MODEKEYS -- key scan codes for the keys that are used to change device  ;
2639                          ;              modes.  The keys must be listed in the order of mode numbers. ;
2640                          ;                                                                         ;
2641                          ;         20 Mar 1987, 15:21                                              ;
2642                          ;-------------------------------------------------------------------------;
2643  0E83                    MODEKEYS:
2644  0E83  E9                        DB      -17h                ;Cable
2645  0E84  F1                        DB      -0Fh                ;TV
2646  0E85  E1                        DB      -1Fh                ;VCR
2647  0E86  00                        DB      0                   ;--END OF TABLE--
2648
2649                          ;-------------------------------------------------------------------------;
26                            ;  DOKEYS -- key scan codes for the DO1 - DO4 keys.                       ;
265.                          ;                                                                         ;
2652                          ;         In the future we will eliminate these keys by using them for    ;
2653                          ;         additional mode keys.                                           ;
2654                          ;                                                                         ;
2655                          ;                                                                         ;
2656                          ;         20 Mar 1987, 15:21                                              ;
2657                          ;-------------------------------------------------------------------------;
2658  0E87                    DOKEYS:
2659  0E87  E2                        DB      -1Eh                ;DO1
2660  0E88  EA                        DB      -16h                ;DO2
2661  0E89  F2                        DB      -0Eh                ;DO3
2662  0E8A  FA                        DB      -06h                ;DO4
2663  0E8B  00                        DB      0                   ;--END OF TABLE--
2664
2665                              ;-------------------------------;
2666                              ;        SCAN THE KEYBOARD      ;
2667                              ;                               ;
2668                              ;     Returns scan code in ACC, ;
2669                              ;     and R1.                   ;
2670                              ;                               ;
2671                              ;     Destroys: R1,R4,R5,R6,R7  ;
2672                              ;                               ;
2673                              ;                               ;
```

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```
                            ;                                ;
                            ;     13 Feb 1987, 11:11         ;
                            ;--------------------------------;
0E8C   BC 08          KSCAN:    MOV    R4,#8                  ;8 rows to scan
0E8E   BD FE                    MOV    R5,#.NOT. 1            ;initial scan mask

0E90                    NEXTROW:
0E90   FD                       MOV    A,R5                   ;get the scan mask
0E91   39                       OUTL   P1,A                   ;scan a row

0E92   BF 00                    MOV    R7,#0
0E94   EF 94                    DJNZ   R7,$
0E96   09                       IN     A,P1                   ;Input the column
0E97   89 FF                    ORL    P1,#0FFh               ;Save power
0E99   37                       CPL    A                      ;It comes in upside down
0E9A   5D                       ANL    A,R5                   ;Strip the unused diagonal bit
0E9B   96 A5                    JNZ    GOTKEY                 ;JMP/found a key down
0E9D   FD                       MOV    A,R5                   ;get scan mask
0E9E   E7                       RL     A                      ;set mask to next row
0E9F   AD                       MOV    R5,A                   ;and save it
0EA0   EC 90                    DJNZ   R4,NEXTROW             ;jmp/try next row

                          ;-----------------------------------------------------;
                          ; We scanned the entire keyboard and didn't find a key! ;
                          ; If this was caused by the key bouncing, we won't end  ;
                          ; up doing a function even though a legit one was       ;
                          ; requested.  Of course user tolerence should be pretty ;
                          ; high for this kind of event.  He'll just push the     ;
                          ; button again when he gets no response.  But then again ;
                          ; he see the LED flash on and go off real quick which   ;
                          ; might just give him a hint of what's going on.  We'll ;
                          ; have to see about this later.                         ;
                          ;                                                       ;
                          ; Now that it's later--we'll just rescan a few times to ;
                          ; see if we can get it.  If we still don't get anything, ;
                          ; we'll just have to go back to sleep.                  ;
                          ;                                                       ;
                          ; Later still: we only scan once and return a zero if no ;
                          ; key is found.  The caller is responsible for rescanning;
                          ; if desired.                                           ;
                          ;                                                       ;
                          ;        19 Feb 1987, 14:40                             ;
                          ;-----------------------------------------------------;
0EA2   27                       CLR    A                      ;Return a zero for no key
0EA3   A9                       MOV    R1,A                   ;Ditto
0EA4   83                       RET                           ;Return to caller

                          ;-----------------------------------------------------;
                          ;  Calculate the key scan code -- which is row*8 + col.  ;
                          ;-----------------------------------------------------;
```

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2724  0EA5  BD 00        GOTKEY:  MOV   R5,#0            ;init column counter
27    0EA7  F2 AD        NEXTCOL: JB7   GOTCOL           ;jmp/we found the column
2726  0EA9  1D                   INC   R5               ;bump column counter
2727  0EAA  E7                   RL    A                ;set to next column
2728  0EAB  C4 A7                JMP   NEXTCOL          ;go try again
2729
2730  0EAD  FC           GOTCOL:  MOV   A,R4             ;MULTIPLY ROW x 8
2731  0EAE  E7                   RL    A                ;    .
2732  0EAF  E7                   RL    A                ;    .
2733  0EB0  E7                   RL    A                ;    .
2734  0EB1  03 F8                ADD   A,#-8            ;range from 0-56
2735  0EB3  6D                   ADD   A,R5             ;add in the col #
2736
2737                     ;-------------------------------------------------------------------------;
2738                     ;    At this point ACC contains the key # found.  If more than one key was   ;
2739                     ;    pressed, the first one found is used.  Sometime a test for special      ;
2740                     ;    combinations of keys must be put in.              11 Feb 1987, 11:47    ;
2741                     ;-------------------------------------------------------------------------;
2742  0EB4  53 3F                ANL   A,#3FH           ;be ultra cautious
2743  0EB6  A9                   MOV   R1,A             ;save unadulterated keycode
2744  0EB7  83                   RET                    ;and return
2745
2746                             PAGE
```

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```
2747  0F00                      ORG    0F00H
27                      ;-------------------------------------------------------;
2749                    ;               HCUCOM                                  ;
2750                    ;                                                       ;
2751                    ;       This is the bootstrap loader for the HCU        ;
2752                    ;       playback only unit.  After bootstrapping        ;
2753                    ;       your stuck as the serial code is partialy       ;
2754                    ;       over written. (re)                              ;
2755                    ;                                   13 Jan 1987, 10:35  ;
2756                    ;-------------------------------------------------------;
2757
2758        0001        XMIT    EQU    01H              ;P1 mask for xmit data
2759        0010        HIGHMEM EQU    10H              ;high memory bit mask
2760
2761        00FC        TM4800  EQU    -4 .AND. 0FFH    ;4800 baud timer value
2762        0026        HB4800  EQU    77/2             ;half bit time for 4800 bps (77)
2763        000B        CY4800  EQU    11               ;DJNZ after timer for 4800 bps
2764                                                    ;for use with DJNZ
2765
2766        00F7        TM2400  EQU    -9 .AND. 0FFH    ;2400 baud timer value
2767        004D        HB2400  EQU    77               ;half bit time for 2400 bps
2768        0008        CY2400  EQU    8                ;DJNZ after timer for 2400 bps
2769                                                    ;for use with DJNZ
2770
2771        00FC        BITTIME EQU    TM4800           ;Bit time for out selected rate
2772        000B        CYTIME  EQU    CY4800
27          0026        HBTIME  EQU    HB4800           ;Half bit time (cyls/2-1)
27
2775                    ;NAK    EQU    21               ;FIX THESE <-------------!!!!
2776        006E        NAK     EQU    'n'              ;For testing
2777                    ;SOH    EQU    1                ;   (I did!!!)
2778        0073        SOH     EQU    's'              ;Testing
2779                    ;ACK    EQU    6
2780        0061        ACK     EQU    'a'
2781                    ;EOT    EQU    4
2782        0065        EOT     EQU    'e'
2783
2784                    ;-------------------------------------------------;
2785                    ;   This is the bootstrap serial routine.        ;
2786                    ;                                                 ;
2787                    ;   Data format is very simple, transmission is   ;
2788                    ;   initiated by sending a NAK character.  The PC ;
2789                    ;   respondes with a data block.  If the checksum ;
2790                    ;   matches, the HCU respondes with an ACK; else it ;
2791                    ;   respondes with another NAK to request retrans- ;
2792                    ;   mission.                                      ;
2793                    ;                                                 ;
2794                    ;   Data block format:                            ;
2795                    ;                                                 ;
2796                    ;     ------------------------------------        ;
```

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```
2797                    ;     ¦SOH¦CNT¦Addr16¦  ...data...   ¦CHK¦          ;
27                      ;     ------------------------------------          ;
2799                    ;       ¦   ¦   ¦       ¦             ->checksum    ;
2800                    ;       ¦   ¦   ¦       ->data bytes                ;
2801                    ;       ¦   ¦   ->16 bit load address               ;
2802                    ;       ¦   ->count of data bytes + 2 addr bytes    ;
2803                    ;       ->SOH character                             ;
2804                    ;                                                   ;
2805                    ;   checksum is the two's complement of the CNT      ;
2806                    ;   thru data bytes.                                 ;
2807                    ;                                                   ;
2808                    ;         23 Apr 1987, 17:15                        ;
2809                    ;---------------------------------------------------;
2810  0F00  9A F0       SERIAL:  ANL   P2,#0F0h           ;Turn off addr bits
2811  0F02  B8 05                MOV   R0,#<DOFLAG       ;Get DO flag addr
2812  0F04  27                   CLR   A
2813  0F05  90                   MOVX  @R0,A             ;Clear DO flag
2814
2815  0F06  9A 9F                ANL   P2,#.NOT.YELLOW   ;Turn on LEDs
2816  0F08  B9 21                MOV   R1,#SCANCODE      ;We can re-use this location
2817  0F0A  23 00                MOV   A,#00             ;Send a NAK only nn times
2818  0F0C  A1                   MOV   @R1,A             ;Save the retry count
2819
2820  0F0D  B9 21       SERRTY:  MOV   R1,#SCANCODE      ;Get the counter location
2821  0F0F  F1                   MOV   A,@R1             ;Get the counter
2822  0F10  07                   DEC   A                 ;Down one
28'   0F11  A1                   MOV   @R1,A             ;Save it
282.  0F12  96 15                JNZ   SER4              ;Jmp/more tries
2825  0F14                       HALT
2828
2829  0F15              SER4:
2830  0F15  23 6E                MOV   A,#NAK            ;Send a NAK to start com
2831  0F17  F4 C0                CALL  SENDBYTE          ;
2832  0F19              SER5:
2833  0F19  F4 6A                CALL  GETCOM            ;Get a byte from the input stream
2834  0F1B  F6 0D                JC    SERRTY            ;Error--try again
2835  0F1D  03 8D                ADD   A,#-SOH           ;Check if start of block
2836  0F1F  96 0D                JNZ   SERRTY            ;Jmp/no SOH, get next byte
2837
2838  0F21  F4 6A                CALL  GETCOM            ;Get count
2839  0F23  F6 0D                JC    SERRTY            ;Jmp/error
2840
2841  0F25  AB                   MOV   R3,A              ;Save count for later
2842  0F26  AD                   MOV   R5,A              ;Use count for read
2843  0F27  AE                   MOV   R6,A              ;Init chksum
2844  0F28  B8 28                MOV   R0,#40            ;Set starting buffer addr
2845
2846  0F2A  F4 6A       SERLP:   CALL  GETCOM            ;Get the next byte
2847  0F2C  F6 0D                JC    SERRTY            ;Bitch if we got an error
2848  0F2E  A0                   MOV   @R0,A             ;Store it away
```

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      HOMER...and the plan of Zeus was being accomplished
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2849  0F2F  18                    INC   R0              ;Next buffer location
28    0F30  6E                    ADD   A,R6            ;Add to check sum
2851  0F31  AE                    MOV   R6,A            ;And save it
2852  0F32  ED 2A                 DJNZ  R5,SERLP        ;Go get another
2853
2854  0F34  F4 6A                 CALL  GETCOM          ;Get the checksum byte
2855  0F36  F6 0D                 JC    SERRTY          ;Jmp/rats--we lost it
2856
2857  0F38  6E                    ADD   A,R6            ;Check if checksum worked
2858  0F39  96 0D                 JNZ   SERRTY          ;Jmp/it didn't--send a nak
2859
2860                      ;  now we have a good block--move the data to where it goes
2861
2862  0F3B  B8 28                 MOV   R0,#40          ;Addr of addr bytes
2863  0F3D  F0                    MOV   A,@R0           ;Get high addr byte
2864  0F3E  AC                    MOV   R4,A            ;Save it
2865  0F3F  8A 60                 ORL   P2,#YELLOW
2866  0F41  12 45                 JB0   SERLED
2867  0F43  9A BF                 ANL   P2,#.NOT.GREEN  ;Turn off green LED
2868  0F45  18            SERLED: INC   R0              ;Point to low addr byte
2869  0F46  F0                    MOV   A,@R0           ;Get it
2870  0F47  AD                    MOV   R5,A            ;Save it
2871  0F48  18                    INC   R0              ;Point to data
2872
2873  0F49  CB                    DEC   R3
2874  0F4A  EB 4D                 DJNZ  R3,SERYES       ;Jmp/we do!
28    0F4C                        HALT
287
2879  0F4D                SERYES:
2880  0F4D  FC                    MOV   A,R4            ;get high addr byte
2881  0F4E  AF                    MOV   R7,A            ;and save it
2882  0F4F  FD                    MOV   A,R5            ;get low addr byte
2883  0F50  A9                    MOV   R1,A            ;and save it
2884  0F51  FB                    MOV   A,R3            ;Get the count
2885  0F52  AD                    MOV   R5,A            ;Save the count
2886
2887  0F53                SERMV:
2888  0F53  FF                    MOV   A,R7            ;Get high order addr
2889  0F54  D3 0F                 XRL   A,0Fh           ;Check if protected memory
2890  0F56  C6 61                 JZ    SERNB           ;Jmp/don't write
2891
2892  0F58  F0                    MOV   A,@R0           ;get the byte
2893  0F59  E5                    SEL   MB0             ;Select low bank
2894  0F5A  D3 96                 XRL   A,#96h          ;
2895  0F5C  54 24                 CALL  PUTBYTE         ;go place the byte in low mem
2896  0F5E  54 2F                 CALL  BUMPADDR        ;Go to next addr
2897  0F60  F5                    SEL   MB1             ;Return to high bank
2898
2899  0F61  18            SERNB:  INC   R0              ;point to next byte
2900  0F62  ED 53                 DJNZ  R5,SERMV        ;jmp/move some more
```

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      HOMER...and the plan of Zeus was being accomplished
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2901  0F64  23 61                 MOV   A,#'a'              ;Get ACK
29    0F66  F4 C0                 CALL  SENDBYTE           ;Send it
2903  0F68  E4 19                 JMP   SER5               ;jmp/get next block
2904
2905                      ;-----------------------------------------------;
2906                      ;  GETCOM -- get a byte from the serial input  ;
2907                      ;                                             ;
2908                      ;        RETURNS:  data byte in ACC           ;
2909                      ;                  Carry set if error detected;
2910                      ;                                             ;
2911                      ;        USES:     RB1                        ;
2912                      ;                                             ;
2913                      ;     ...__ _ _ _ _ _ _ _ _ _...              ;
2914                      ;          |_|_|_|_|_|_|_|_|_|                ;
2915                      ;           ¦ .....data..... ¦                ;
2916                      ;           ¦                ¦                ;
2917                      ;           start bit (low)   stop bit (high) ;
2918                      ;                                             ;
2919                      ;  Note: Acutally the input is inverted, therefore ;
2920                      ;        the start bit is high and the stop bit ;
2921                      ;        is low.                              ;
2922                      ;                                             ;
2923                      ;        23 Apr 1987, 17:13                   ;
2924                      ;-----------------------------------------------;
2925  0F6A  D5            GETCOM:  SEL   RB1                ;register bank #1
2926  0F6B  89 FF                  ORL   P1,#0FFH           ;make sure port 1 is all high
29    0F6D  BB 00                  MOV   R3,#0
29
2929  0F6F  BE 12                 MOV   R6,#18             ;
2930  0F71  BD 00                 MOV   R5,#0              ;
2931  0F73  BC 00                 MOV   R4,#0              ;3 REGISTERS FOR SERIAL TIMEOUT
2932
2933  0F75                 GETSTRT:
2934  0F75  EC 7D                 DJNZ  R4,GS5
2935  0F77  ED 7D                 DJNZ  R5,GS5
2936  0F79  EE 7D                 DJNZ  R6,GS5
2937  0F7B  E4 AF                 JMP   TIMEOUT            ;Jmp/input timed out
2938
2939  0F7D  26 75          GS5:    JNT0  GETSTRT            ;Get serial input bit
2940
2941                       ; We just got a start bit indication
2942
2943  0F7F  BF 26          GS10:   MOV   R7,#HBTIME         ;Get half bit time
2944  0F81  EF 81                  DJNZ  R7,$               ;and delay for it
2945
2946  0F83  23 FC                 MOV   A,#BITTIME         ;Get timer value for baud rate
2947  0F85  62                    MOV   T,A                ;and load it into timer
2948  0F86  55                    STRT  T                  ;Start the timer
2949
2950  0F87  F4 B3                 CALL  GETBIT             ;Get a bit from the com line
```

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      HOMER...and the plan of Zeus was being accomplished
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2951  0F89  F6 75                 JC     GETSTRT             ;Jmp/false start
29
2953                      ; Got a good start bit, load data bit count
2954
2955  0F8B  BA 08                 MOV    R2,#8               ;8 bits/byte
2956
2957  0F8D                NXTBIT:
2958  0F8D  42                    MOV    A,T                 ;Get timer
2959  0F8E  F2 8D                 JB7    NXTBIT              ;Jmp/still waiting
2960
2961  0F90  BF 08                 MOV    R7,#CYTIME-3        ;Get count for timer adjust
2962  0F92  EF 92                 DJNZ   R7,$                ;Addjust timer
2963
2964                      ; Bit time is up, get the next bit
2965
2966  0F94  23 FC                 MOV    A,#BITTIME          ;Get timer value for baud rate
2967  0F96  62                    MOV    T,A                 ;And load it into timer
2968  0F97  55                    STRT   T                   ;Start the timer
2969
2970  0F98  F4 B3                 CALL   GETBIT
2971  0F9A  FB                    MOV    A,R3                ;Bit accumulator from R3
2972  0F9B  67                    RRC    A                   ;Shift the carry bit in
2973  0F9C  AB                    MOV    R3,A                ;Save it
2974  0F9D  EA 8D                 DJNZ   R2,NXTBIT           ;Go get next bit
2975
2976                      ; Finished the byte--now check the stop bit
29
29    0F9F  42            STOPBIT: MOV   A,T                 ;Get timer
2979  0FA0  F2 9F                 JB7    STOPBIT             ;Jmp/not done yet
2980
2981  0FA2  BF 08                 MOV    R7,#CYTIME-3        ;Get count for timer adjust
2982  0FA4  EF A4                 DJNZ   R7,$                ;Addjust timer
2983
2984  0FA6  F4 B3                 CALL   GETBIT              ;Get the stop bit
2985  0FA8  A7                    CPL    C                   ;Stop bit is high if good
2986  0FA9  F6 AF                 JC     GC$ERROR            ;Missing stop bit (framing error)
2987  0FAB  FB                    MOV    A,R3                ;Return result in ACC
2988  0FAC  C5                    SEL    RB0                 ;Restore to Register bank 0
2989  0FAD  97                    CLR    C                   ;Clear error indicator (carry bit)
2990  0FAE  83                    RET                        ;Return with carry clear
2991
2992                      ; error return
2993
2994  0FAF                GC$ERROR:
2995  0FAF  97            TIMEOUT: CLR   C                   ;Set carry
2996  0FB0  A7                    CPL    C
2997  0FB1  C5                    SEL    RB0                 ;Restore to Register bank 0
2998  0FB2  83                    RET                        ;and return
2999
3000                      ;-------------------------------------------------------------;
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      HOMER...and the plan of Zeus was being accomplished
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3001                        ;         GETBIT                                          ;
30                          ;                                                         ;
3003                        ;         Samples the line 3 times and returns the majority vote    ;
3004                        ;         in the Carry bit.                               ;
3005                        ;                                                         ;
3006                        ;         Destroys: A,R1,R7                               ;
3007                        ;                                                         ;
3008                        ;         23 Apr 1987, 17:13                              ;
3009                        ;---------------------------------------------------------;
3010  0FB3  B9 00           GETBIT:   MOV    R1,#0              ;Init sample accumulator
3011  0FB5  BF 03                     MOV    R7,#3              ;We try 3 times
3012  0FB7  36 BA           GBLP1:    JT0    GBZBIT             ;Get the serial line
3013  0FB9  19                        INC    R1                 ;Add 1 for each high bit test
3014  0FBA  EF B7           GBZBIT:   DJNZ   R7,GBLP1           ;Go do next test
3015  0FBC  F9                        MOV    A,R1               ;Get test result in ACC
3016  0FBD  67                        RRC    A
3017  0FBE  67                        RRC    A                  ;Put result of voting in Carry
3018  0FBF  83                        RET
3019
3020
3021                        ;-------------------------------------------------;
3022                        ;  SENDBYTE -- send a byte to the serial line     ;
3023                        ;                                                 ;
3024                        ;         ARGUMENT: byte to send in ACC           ;
3025                        ;                                                 ;
3026                        ;         RETURNS:  nothing                       ;
30                          ;                                                 ;
302                         ;         USES:     RB1                           ;
3029                        ;                                                 ;
3030                        ;      ...__ _ _ _ _ _ _ _ _...                   ;
3031                        ;           |_|_|_|_|_|_|_|_|                     ;
3032                        ;            | .....data..... |                    ;
3033                        ;            |                |                    ;
3034                        ;            start bit (low)   stop bit (high)    ;
3035                        ;                                                 ;
3036                        ;         12 Jan 1987, 11:41                      ;
3037                        ;-------------------------------------------------;
3038  0FC0  D5              SENDBYTE: SEL    RB1                ;Switch to other reg bank
3039  0FC1  AB                        MOV    R3,A               ;Save byte to send
3040
3041                        ; send start bit
3042
3043  0FC2  23 FC                     MOV    A,#BITTIME         ;Get timer value for baud rate
3044  0FC4  62                        MOV    T,A                ;and load it into timer
3045  0FC5  55                        STRT   T                  ;Start the timer
3046
3047  0FC6  99 FE                     ANL    P1,#.NOT. XMIT     ;Drop serial line to low
3048  0FC8  BE 08                     MOV    R6,#8              ;8 bits to xmit
3049
3050  0FCA  42              SND5:     MOV    A,T                ;Get timer
```

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      HOMER...and the plan of Zeus was being accomplished
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3051  0FCB  F2 CA                 JB7   SND5              ;Jmp/not done yet
30
3053  0FCD  BF 08                 MOV   R7,#CYTIME-3      ;Get count for timer adjust
3054  0FCF  EF CF                 DJNZ  R7,$              ;Adjust timer
3055
3056  0FD1  FB                    MOV   A,R3              ;Get byte to xmit
3057  0FD2  77                    RR    A                 ;Rotate next bit to P10 position
3058  0FD3  AB                    MOV   R3,A              ;Save the byte for next time
3059  0FD4  F2 DA                 JB7   SND1              ;Jmp/send a 1 bit
3060  0FD6  99 FE                 ANL   P1,#.NOT.XMIT     ;Set output low
3061  0FD8  E4 DC                 JMP   SND10             ;Go setup clock
3062
3063  0FDA  89 01           SND1: ORL   P1,#XMIT          ;Set output high
3064
3065  0FDC  23 FC           SND10:MOV   A,#BITTIME        ;Get timer value for baud rate
3066  0FDE  62                    MOV   T,A               ;and load it into timer
3067  0FDF  55                    STRT  T                 ;Start the timer
3068  0FE0  EE CA                 DJNZ  R6,SND5           ;Jmp/more bits to send
3069
3070  0FE2  42              SND15:MOV   A,T               ;Get timer
3071  0FE3  F2 E2                 JB7   SND15             ;Jmp/not done yet
3072
3073  0FE5  BF 08                 MOV   R7,#CYTIME-3      ;Get count for timer adjust
3074  0FE7  EF E7                 DJNZ  R7,$              ;Adjust timer
3075
3076                        ; send the stop bit
30
3078  0FE9  89 01                 ORL   P1,#XMIT          ;Set output high for stop bit
3079  0FEB  42              SND25:MOV   A,T               ;Get timer
3080  0FEC  F2 EB                 JB7   SND25             ;Jmp/not done yet
3081
3082  0FEE  C5                    SEL   RB0               ;Return to register bank zero
3083  0FEF  83                    RET
3084
3085                        ;-----------------------------------------;
3086                        ;  BIGCAR -- Generate carrier pulses for the ;
3087                        ;            common big coding scheme.      ;
3088                        ;                                           ;
3089                        ;         R6 = # of pulses                  ;
3090                        ;                                           ;
3091                        ;         Destroys: R7,R6                   ;
3092                        ;                                           ;
3093                        ;         02 Apr 1987, 16:39                ;
3094                        ;-----------------------------------------;
3095  0FF0  9A 7F           BIGCAR: ANL   P2,#.NOT. OUT    ;TURN OFF LED
3096  0FF2  BF 02                 MOV   R7,#2             ;
3097  0FF4  EF F4                 DJNZ  R7,$              ; 9 cyl ON
3098  0FF6  00                    NOP
3099  0FF7  8A 80                 ORL   P2,#OUT           ;TURN ON LED
3100
```

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      HOMER...and the plan of Zeus was being accomplished
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3101  0FF9  BF 02                 MOV   R7,#2
31    0FFB  EF FB                 DJNZ  R7,$
3103  0FFD  EE F0                 DJNZ  R6,BIGCAR          ;GO DO SOME MORE PULSES
3104  0FFF  83                    RET
3105
3106
3107
3108                              PAGE
```

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      HOMER...and the plan of Zeus was being accomplished
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3109  1000                        ORG    1000H
3110                        ;---------------------------------------;
3111                        ; We actually start execution here when ;
3112                        ; the processor is reset.  This is because ;
3113                        ; all the port lines are set high.      ;
3114                        ;                                       ;
3115                        ;       27 Jan 1987, 15:10              ;
3116                        ;---------------------------------------;
3117  1000  9A E0           pwron:  ANL    P2,#.NOT.1Fh         ;Jump to bank 0 location 2
3118  1002                        HALT                        ;a HALT just in case
3121                        PAGE
```

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3127                        ;--------------------------------;
31                          ;  Multitech VCR function table  ;
3124                        ;                                ;
3125                        ;         14 Apr 1987, 14:06     ;
3126                        ;--------------------------------;
3127  1003  3810            VCR0:     DW     VCR1                ;Flink to next entry
3128  1005  20              VCR0:     DB     20H                 ;ID byte
3129  1006  01              VCR0:     DB     1                   ;Executor type code
3130  1007  FF C0            VCR0:     DB     11111111b,11000000b ;Standard key bit map
3131  1009  00              VCR0:     DB     00000000b           ;...cont...
3132  100A  0B              VCR0:     DB     11                  ;Number of functions
3133
3134  100B  F6              VCR0:     DB     11110110B           ;Prefix
3135
3136  100C  DB AB 6D A8     VCR0:     DB     11011011B,10101011B,01101101b,10101000B    ;play
3137  1010  FB 56 D5 68     VCR0:     DB     11111011B,01010110B,11010101B,01101000B    ;ch +
3138  1014  F7 56 D5 A8     VCR0:     DB     11110111B,01010110B,11010101B,10101000B    ;ch -
3139  1018  FD 56 D5 58     VCR0:     DB     11111101B,01010110B,11010101B,01011000B    ;power
3140  101C  EB AB 6B A8     VCR0:     DB     11101011B,10101011B,01101011B,10101000B    ;rew
3141  1020  EF 56 D6 A8     VCR0:     DB     11101111B,01010110B,11010110B,10101000B    ;ff
3142  1024  DA D5 B6 E8     VCR0:     DB     11011010B,11010101B,10110110B,11101000B    ;record
3143  1028  AD D5 BD A8     VCR0:     DB     10101101B,11010101B,10111101B,10101000B    ;pause
3144  102C  EA D5 B5 E8     VCR0:     DB     11101010B,11010101B,10110101B,11101000B    ;stop
3145  1030  FE AD AA A8     VCR0:     DB     11111110B,10101101B,10101010B,10101000B    ;tv/vcr
3146  1034  AF AB 7A A8     VCR0:     DB     10101111B,10101011B,01111010B,10101000B    ;noise cancel
3147
31    1038  5610            VCR1:     DW     VCR2                ;End of list
314   103A  21              VCR1:     DB     21H                 ;ID byte
3150  103B  02              VCR1:     DB     2                   ;Executor type code (#2 Sony)
3151  103C  FF BF            VCR1:     DB     11111111b,10111111b ;Standard key bit map
3152  103E  F8              VCR1:     DB     11111000b           ;...cont...
3153  103F  15              VCR1:     DB     21                  ;Number of functions
3154
3155  1040  80              VCR1:     DB     10000000B           ;Post-fix for Video 1
3156  1041  58              VCR1:     DB     01011000B           ;VIDEO 1 PLAY                1
3157  1042  08              VCR1:     DB     00001000B           ;VIDEO 1 CHAN UP             2
3158  1043  88              VCR1:     DB     10001000B           ;VIDEO 1 CHAN DOWN           3
3159  1044  A8              VCR1:     DB     10101000B           ;VCR1 POWER                  4
3160  1045  D8              VCR1:     DB     11011000B           ;VIDEO 1 REWIND              5
3161  1046  38              VCR1:     DB     00111000B           ;VIDEO 1 FAST FORWARD        6
3162  1047  78              VCR1:     DB     01111000B           ;VIDEO 1 RECORD              7
3163  1048  98              VCR1:     DB     10011000B           ;VIDEO 1 PAUSE               8
3164  1049  18              VCR1:     DB     00011000B           ;VIDEO 1 STOP                9
3165  104A  91              VCR1:     DB     10010001B           ;v2 0                       10
3166  104B  01              VCR1:     DB     00000001B           ;v2 1                       11
3167  104C  81              VCR1:     DB     10000001B           ;v2 2                       12
3168  104D  41              VCR1:     DB     01000001B           ;v2 3                       13
3169  104E  C1              VCR1:     DB     11000001B           ;v2 4                       14
3170  104F  21              VCR1:     DB     00100001B           ;v2 5 DIGITS FOR VIDEO 2    15
3171  1050  A1              VCR1:     DB     10100001B           ;v2 6                       16
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      HOMER...and the plan of Zeus was being accomplished
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3177  1051  61                      DB    01100001B           ;v2 7                          17
3178  1052  E1                      DB    11100001B           ;v2 8                          18
3179  1053  11                      DB    00010001B           ;v2 9                          19
3180  1054  D0                      DB    11010000B           ;VIDEO 1 enter                 20
3181  1055  54                      DB    01010100B           ;ANT FOR VIDEO 1               21
3182
3183
3184  1056  7410          VCR2:     DW    VCR3                ;Loop the list back to start
3185  1058  22                      DB    22H                 ;ID byte
3186  1059  02                      DB    2                   ;Executor type code (#2 Sony)
3187  105A  FF BF                   DB    11111111b,10111111b ;Standard key bit map
3188  105C  F8                      DB    11111000b           ;...cont...
3189  105D  15                      DB    21                  ;Number of functions
3190
3191  105E  C0                      DB    11000000B           ;Post-fix for Video 2
3192  105F  58                      DB    01011000B           ;VIDEO 1 PLAY                   1
3193  1060  08                      DB    00001000B           ;VIDEO 1 CHAN UP                2
3194  1061  88                      DB    10001000B           ;VIDEO 1 CHAN DOWN              3
3195  1062  A8                      DB    10101000B           ;VCR1 POWER                     4
3196  1063  D8                      DB    11011000B           ;VIDEO 1 REWIND                 5
3197  1064  38                      DB    00111000B           ;VIDEO 1 FAST FORWARD           6
3198  1065  78                      DB    01111000B           ;VIDEO 1 RECORD                 7
3199  1066  98                      DB    10011000B           ;VIDEO 1 PAUSE                  8
3200  1067  18                      DB    00011000B           ;VIDEO 1 STOP                   9
3201  1068  91                      DB    10010001B           ;v2 0                          10
3202  1069  01                      DB    00000001B           ;v2 1                          11
3203  106A  81                      DB    10000001B           ;v2 2                          12
3204  106B  41                      DB    01000001B           ;v2 3                          13
3205  106C  C1                      DB    11000001B           ;v2 4                          14
3206  106D  21                      DB    00100001B           ;v2 5 DIGITS FOR VIDEO 2       15
3207  106E  A1                      DB    10100001B           ;v2 6                          16
3208  106F  61                      DB    01100001B           ;v2 7                          17
3209  1070  E1                      DB    11100001B           ;v2 8                          18
3210  1071  11                      DB    00010001B           ;v2 9                          19
3211  1072  D0                      DB    11010000B           ;VIDEO 1 enter                 20
3212  1073  54                      DB    01010100B           ;ANT FOR VIDEO 1               21
3213
3214
3215                        ; Panasonic VCR
3216
3217  1074  8914          VCR3:     DW    VCR4                ;Loop the list back to start
3218  1076  23                      DB    23H                 ;ID byte
3219  1077  00                      DB    0                   ;Executor type code
3220  1078  FF 80                   DB    11111111b,10000000b ;Standard key bit map
3221  107A  00                      DB    00000000b           ;...cont...
3222  107B  0B                      DB    11                  ;Number of functions
3223
3224  107C  DE                      DB    11011110B           ;7 bit Pre-fix
3225
3226  107D  B7 6A B6 A0             DB    10110111B,01101010B,10110110b,10100000b   ;play
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      HOMER...and the plan of Zeus was being accomplished
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3227  1081  BD 6A B5 60          DB    10111101B,01101010B,10110101b,01100000b   ;ch up
3228  1085  5E B5 75 60          DB    01011110B,10110101B,01110101b,01100000b   ;ch dn
3224  1089  FA D5 55 60          DB    11111010B,11010101B,01010101b,01100000b   ;power
3225  108D  BE D5 6A A0          DB    10111110B,11010101B,01101010b,10100000b   ;rewind
3226  1091  5F 6A EA A0          DB    01011111B,01101010B,11101010b,10100000b   ;ff
3227  1095  EE D5 56 A0          DB    11101110B,11010101B,01010110b,10100000b   ;record
3228  1099  AF 6A BA A0          DB    10101111B,01101010B,10111010b,10100000b   ;pause
3229  109D  FD AA AA A0          DB    11111101B,10101010B,10101010b,10100000b   ;stop
3230  10A1  D7 6A AE A0          DB    11010111B,01101010B,10101110b,10100000b   ;fast advance
3231  10A5  55 DA BE A0          DB    01010101B,11011010B,10111110b,10100000b   ;slow
3232
3233
3234
3235                        ; Sony television
3236
3237  10A9  2E12          TV0:  DW    TV1                 ;Link to next entry
3238  10AB  00                  DB    00h                 ;ID byte
3239  10AC  02                  DB    2                   ;Executor type code (#2 Sony)
3240  10AD  FF FD               DB    11111111b,11111101b ;Standard key bit map
3241  10AF  C0                  DB    11000000b           ;...cont...
3242  10B0  18                  DB    24                  ;Number of functions
3243
3244  10B1  00                  DB    0                   ;Post-fix for Sony TV
3245  10B2  09                  DB    00001001B           ;tv TV CHAN UP                      0
3246  10B3  89                  DB    10001001B           ;tv TV CHAN DOWN                    1
3247  10B4  A9                  DB    10101001B           ;tv TV POWER                        2
32'
324>  10B5  91                  DB    10010001B           ;tv&vl 0                            3
3250  10B6  01                  DB    00000001B           ;tv&vl 1                            4
3251  10B7  81                  DB    10000001B           ;tv&vl 2                            5
3252  10B8  41                  DB    01000001B           ;tv&vl 3                            6
3253  10B9  C1                  DB    11000001B           ;tv&vl 4                            7
3254  10BA  21                  DB    00100001B           ;tv&vl 5 DIGITS FOR TV & VIDEO 1    8
3255  10BB  A1                  DB    10100001B           ;tv&vl 6                            9
3256  10BC  61                  DB    01100001B           ;tv&vl 7                           10
3257  10BD  E1                  DB    11100001B           ;tv&vl 8                           11
3258  10BE  11                  DB    00010001B           ;tv&vl 9                           12
3259  10BF  D1                  DB    11010001B           ;Enter                             13
3260  10C0  49                  DB    01001001B           ;tv TV volume up                   14
3261  10C1  C9                  DB    11001001B           ;tv TV volume down                 15
3262  10C2  29                  DB    00101001B           ;tv TV MUTE                        16
3263
3264  10C3  5D                  DB    01011101B           ;tv Disp                        17 a
3265  10C4  E9                  DB    11101001B           ;tv MTS                         19 b
3266  10C5  19                  DB    00011001B           ;tv PICTURE +                   18 c
3267  10C6  99                  DB    10011001B           ;tv PICTURE -                   20 d
3268  10C7  6D                  DB    01101101B           ;tv SLEEP MODE                  21 e
3269  10C8  A5                  DB    10100101B           ;tv TV/VIDEO                    22 f
3270  10C9  55                  DB    01010101B           ;tv ANT FOR TV                  23 g
3271
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327 PAGE

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      HOMER...and the plan of Zeus was being accomplished
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3273  1200                        ORG    1200H
32.                         ;---------------------------------------;
3275                        ;    COMPJMP -- Computed jump           ;
3276                        ;       duplicate code in upper 4k      ;
3277                        ;                                       ;
3278                        ;    R6-R7 contain address to jump to   ;
3279                        ;         (R6 high order bits)          ;
3280                        ;                                       ;
3281                        ;    WARNING: This routine must reside  ;
3282                        ;             at the same location as its ;
3283                        ;             counterpart in low memory! ;
3284                        ;                                       ;
3285                        ;        04 Mar 1987, 16:47             ;
3286                        ;---------------------------------------;
3287  1200                        ORG    COMPJMP.OR.1000h
3288  1200                  COMPJMPA:
3289  1200  C7                    MOV    A,PSW               ;Get stack pointer
3290  1201  53 07                ANL    A,#07H              ;Isolate it
3291  1203  07                    DEC    A                   ;Back one to get the right frame
3292  1204  E7                    RL     A                   ;Make it into a 2 byte offset
3293  1205  53 0E                ANL    A,#0EH              ;and remove any gargage
3294  1207  03 08                ADD    A,#8                ;Adjust to beginning of stack memory
3295  1209  A8                    MOV    R0,A                ;Setup pointer
3296  120A  FF                    MOV    A,R7                ;Must come from acc
3297  120B  A0                    MOV    @R0,A               ;Set lower address bits
3298  120C  18                    INC    R0                  ;Point to next byte
32    120D  FE                    MOV    A,R6                ;Get the addr
330   120E  A0                    MOV    @R0,A               ;Set upper address bits
3301
3302  120F  F5                    SEL    MB1                 ;Select upper memory bank
3303  1210  72 13                 JB3    CJMB1A              ;Jmp/we want to go to upper bank
3304  1212  E5                    SEL    MB0                 ;No/we want to go to lower bank
3305  1213                  CJMB1A:
3306  1213  92 18                JB4    CJMB2A              ;Jmp/we want to go to the upper 4k
3307  1215  9A EF                ANL    P2,#.NOT. FOURK     ;Turn off 4k bit
3308  1217  83                    RET                        ;Return to computed address
3309
3310  1218                  CJMB2A:
3311  1218  8A 10                ORL    P2,#FOURK           ;Turn on 4k bit
3312  121A  83                    RET                        ;Return to computed address
3313
3314                        ;-------------------------------------------------------;
3315                        ;  GETBYTE -- this is the code for the upper 4k portion of  ;
3316                        ;             GETBYTE.                                  ;
3317                        ;                                                       ;
3318                        ;        13 Feb 1987, 13:29                             ;
3319                        ;-------------------------------------------------------;
3320  1220                        ORG    GB$MOVE.OR.1000h    ;This is were we have to be
3321  1220  81                    MOVX   A,@R1               ;Get the byte we need
3322  1221  9A EF                ANL    P2,#.NOT.FOURK      ;Return to lower memory
```

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3323
33.                     ;-------------------------------------------------------;
3325                    ;  PUTBYTE -- this is the code for the upper 4k portion of   ;
3326                    ;            PUTBYTE.                                   ;
3327                    ;                                                       ;
3328                    ;         23 Feb 1987, 12:48                            ;
3329                    ;-------------------------------------------------------;
3330  122A                          ORG    PB$MOVE.OR.1000h
3331  122A  FB                      MOV    A,R3                ;Get the byte back
3332  122B  91                      MOVX   @R1,A               ;Put where it goes
3333  122C  9A EF                   ANL    P2,#.NOT.FOURK      ;Get us back to low mem
3334
3335                    ;---------------------------------------;
3336                    ; Zenith Unified Remote (Space Command)   ;
3337                    ;                                       ;
3338                    ; Data is 1 bit plus 10 bits.  The first  ;
3339                    ; bit determines cable/tv.  1=Tv 0=cable. ;
3340                    ;                                       ;
3341                    ;         09 Feb 1987, 13:57            ;
3342                    ;---------------------------------------;
3343
3344  122E  6612        TV1:        DW     TV2                 ;Link to next entry
3345  1230  11                      DB     11h                 ;ID byte
3346  1231  03                      DB     3                   ;Executor type code (#3 Zenith)
3347  1232  FF FD                   DB     11111111b,11111101b ;Standard key bit map
3348  1234  C0                      DB     11000000b           ;...cont...
33/   1235  18                      DB     24                  ;Number of functions
335v
3351                    ;               -- 1=TV 0=Cable
3352                    ;               |
3353                    ;               v
3354
3355  1236              ZENDATA:
3356  1236  C0B2                    DW     1011001011000000B   ;Channel up                1
3357  1238  C0AA                    DW     1010101011000000B   ;Channel down              2
3358  123A  20B5                    DW     1011010100100000B   ;Power                     3
3359  123C  A0CA                    DW     1100101010100000B   ;0                         4
3360  123E  C0CA                    DW     1100101011000000B   ;1                         5
3361  1240  20CB                    DW     1100101100100000B   ;2                         6
3362  1242  40CB                    DW     1100101101000000B   ;3                         7
3363  1244  A0CC                    DW     1100110010100000B   ;4                         8
3364  1246  C0CC                    DW     1100110011000000B   ;5                         9
3365  1248  20CD                    DW     1100110100100000B   ;6                        10
3366  124A  40CD                    DW     1100110101000000B   ;7                        11
3367  124C  A0D2                    DW     1101001010100000B   ;8                        12
3368  124E  C0D2                    DW     1101001011000000B   ;9                        13
3369  1250  A0D4                    DW     1101010010100000B   ;Enter/recall             14
3370  1252  20B3                    DW     1011001100100000B   ;Volume up                15
3371  1254  20AB                    DW     1010101100100000B   ;Volume down              16
3372  1256  40B3                    DW     1011001101000000B   ;Mute/priv                17
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3377  1258  40B5                DW    1011010101000000B    ;Screen                          18
3378  125A  20D3                DW    1101001100100000B    ;Space phone/parental control    19
3379  125C  A0B4                DW    1011010010100000B    ;Auto on/data enter              20
3380  125E  40AB                DW    1010101101000000B    ;Auto off/clear entry            21
3381  1260  A0AA                DW    1010101010100000B    ;Auto dial/fav. chan.            22
3382  1262  C0B4                DW    1011010011000000B    ;Ant                             23
3383  1264  C0D4                DW    1101010011000000B    ;Stero                           24
3384
3385
3386                      ;----------------------------------------;
3387                      ;       RCA TV (ECG RT202)               ;
3388                      ;                                        ;
3389                      ;       02 Apr 1987, 14:42               ;
3390                      ;----------------------------------------;
3391  1266  8012          TV2:  DW    TV3                  ;Link to next entry
3392  1268  12                  DB    12h                  ;ID byte
3393  1269  07                  DB    7                    ;Executor type code
3394  126A  FF FB               DB    11111111b,11111011b  ;Standard key bit map
3395  126C  C0                  DB    11000000b            ;...cont...
3396  126D  11                  DB    17                   ;Number of functions
3397
3398  126E  00                  DB    00000000B            ;2 bit prefix
3399  126F  57                  DB    01010111B            ;Ch up
3400  1270  4F                  DB    01001111B            ;Ch dn
3401  1271  59                  DB    01011001B            ;Power
3402  1272  61                  DB    01100001B            ;0
3403  1273  63                  DB    01100011B            ;1
3404  1274  65                  DB    01100101B            ;2
3405  1275  67                  DB    01100111B            ;3
3406  1276  69                  DB    01101001B            ;4
3407  1277  6B                  DB    01101011B            ;5
3408  1278  6D                  DB    01101101B            ;6
3409  1279  6F                  DB    01101111B            ;7
3410  127A  71                  DB    01110001B            ;8
3411  127B  71                  DB    01110001B            ;9
3412  127C  7D                  DB    01111101B            ;Rcl
3413  127D  47                  DB    01000111B            ;Vol +
3414  127E  4F                  DB    01001111B            ;Vol -
3415  127F  43                  DB    01000011B            ;Mute
3416
3417                      ;----------------------------------------;
3418                      ;       RCA TV (ECG RT203)               ;
3419                      ;                                        ;
3420                      ;       02 Apr 1987, 17:25               ;
3421                      ;----------------------------------------;
3422  1280  D613          TV3:  DW    TV4                  ;Link to next entry
3423  1282  13                  DB    13h                  ;ID byte
3424  1283  08                  DB    8                    ;Executor type code
3425  1284  FF FB               DB    11111111b,11111011b  ;Standard key bit map
3426  1286  C0                  DB    11000000b            ;...cont...
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3423  1287  11                      DB    17                    ;Number of functions
3424
3425  1288  14 06 03 B9 2A          DB    20,6,3,185,42         ;Timing constants
3426  128D  01                      DB    1                     ;First bit assumed
3427
3428  128E  DF AD                   DB    11011111B,10101101B   ;Three byte prefix code
3429  1290  55                      DB    01010101B             ;
3430
3431  1291  FF 55 55                DB    11111111B,01010101B,01010101b    ;Ch +       1
3432  1294  7F D5 55                DB    01111111B,11010101B,01010101b    ;Ch -       2
3433  1297  EF AA 55                DB    11101111B,10101010B,01010101b    ;power      3
3434  129A  F7 AA D5                DB    11110111B,10101010B,11010101b    ;0          4
3435  129D  7B EA D5                DB    01111011B,11101010B,11010101b    ;1          5
3436  12A0  BB DA D5                DB    10111011B,11011010B,11010101b    ;2          6
3437  12A3  5D FA D5                DB    01011101B,11111010B,11010101b    ;3          7
3438  12A6  DB D6 D5                DB    11011011B,11010110B,11010101b    ;4          8
3439  12A9  6D F6 D5                DB    01101101B,11110110B,11010101b    ;5          9
3440  12AC  AD EE D5                DB    10101101B,11101110B,11010101b    ;6         10
3441  12AF  56 FE D5                DB    01010110B,11111110B,11010101b    ;7         11
3442  12B2  EB F5 D5                DB    11101011B,11110101B,11010101b    ;8         12
3443  12B5  75 F5 D5                DB    01110101B,11110101B,11010101b    ;9         13
3444  12B8  5B FB 55                DB    01011011B,11111011B,01010101b    ;rcl       14
3445  12BB  BF B5 55                DB    10111111B,10110101B,01010101b    ;vol +     15
3446  12BE  5F F5 55                DB    01011111B,11110101B,01010101b    ;vol -     16
3447  12C1  77 EB 55                DB    01110111B,11101011B,01010101b    ;vol -     17
3448
3449                        ;----------------------------------------;
345                         ;   Zenith cable converter data         ;
3451                        ;                                        ;
3452                        ;         20 Feb 1987, 16:39             ;
3453                        ;----------------------------------------;
3454  12C4  CC12            CABLE0:  DW    CABLE1                ;Link to next entry
3455  12C6  00                       DB    00h                   ;ID byte
3456  12C7  03                       DB    3                     ;Executor type code (#3 Zenith)
3457  12C8  FF FC                    DB    11111111b,11111100b   ;Standard key bit map
3458  12CA  00                       DB    00000000b             ;...cont...
3459  12CB  17                       DB    23                    ;Number of functions
3460
3461                        ;----------------------------------------;
3462                        ;  Sylvania cable converter data        ;
3463                        ;                                        ;
3464                        ;         17 Mar 1987, 15:01             ;
3465                        ;----------------------------------------;
3466  12CC  E312            CABLE1:  DW    CABLE2                ;Link to next entry
3467  12CE  01                       DB    01h                   ;ID byte
3468  12CF  04                       DB    4                     ;Executor type code (#3 Zenith)
3469  12D0  FF FA                    DB    11111111b,11111010b   ;Standard key bit map
3470  12D2  00                       DB    00000000b             ;...cont...
3471  12D3  0F                       DB    15                    ;Number of functions
3472
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3523
35                          ;----------------------------------------;
3525                        ;  Jerrold 450 cable converter data      ;
3526                        ;                                        ;
3527                        ;         20 Mar 1987, 13:44             ;
3528                        ;----------------------------------------;
3529  1300  1913            CABLE3:   DW    CABLE4              ;Link to next entry
3530  1302  03                        DB    03H                 ;ID byte
3531  1303  06                        DB    6                   ;Jerrold executor (#6)
3532  1304  FF FC                     DB    11111111b,11111100b ;Standard key bit map
3533  1306  00                        DB    00000000b           ;...cont...
3534  1307  11                        DB    17                  ;Number of functions
3535
3536  1308  A0                        DB    10100000B           ;Channel up                1
3537  1309  80                        DB    10000000B           ;Channel down              2
3538  130A  60                        DB    01100000B           ;Power                     3
3539  130B  90                        DB    10010000B           ;0                         4
3540  130C  B8                        DB    10111000B           ;1                         5
3541  130D  B0                        DB    10110000B           ;2                         6
3542  130E  A8                        DB    10101000B           ;3                         7
3543  130F  D8                        DB    11011000B           ;4                         8
3544  1310  D0                        DB    11010000B           ;5                         9
3545  1311  C8                        DB    11001000B           ;6                        10
3546  1312  F8                        DB    11111000B           ;7                        11
3547  1313  F0                        DB    11110000B           ;8                        12
3548  1314  E8                        DB    11101000B           ;9                        13
35'   1315  78                        DB    01111000B           ;Enter                    14
35    1316  E0                        DB    11100000B           ;A                        15
3551  1317  C0                        DB    11000000B           ;B                        16
3552  1318  98                        DB    10011000B           ;Event                    17
3553
3554                        ;----------------------------------------;
3555                        ;         Norsat Satelite receiver       ;
3556                        ;                                        ;
3557                        ;         09 Apr 1987, 18:33             ;
3558                        ;----------------------------------------;
3559  1319  6313            CABLE4:   DW    CABLE5              ;Link to next entry
3560  131B  04                        DB    04h                 ;ID byte
3561  131C  08                        DB    8                   ;Executor type code
3562  131D  FF F8                     DB    11111111b,11111000b ;Standard key bit map
3563  131F  00                        DB    00000000b           ;...cont...
3564  1320  13                        DB    19                  ;Number of functions
3565
3566  1321  D5 07 03 D2 6D           DB    213,7,3,210,109     ;Timing constants
3567  1326  01                        DB    1                   ;First bit assumed
3568
3569
3570  1327  5D 5E                     DB    01011101B,01011110B ;Three byte prefix code
3571  1329  BD                        DB    10111101B           ;
3572
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3623  1398  77 EB 55              DB    01110111B,11101011B,01010101b    ;9          13
3624  139B  F7 AA D5              DB    11110111B,10101010B,11010101b    ;skew left  14  a
3625  139E  55 FF 55              DB    01010101B,11111111B,01010101b    ;skew right 15  b
3626  13A1  DB D6 D5              DB    11011011B,11010110B,11010101b    ;audio ->   16  c
3627  13A4  75 F5 D5              DB    01110101B,11110101B,11010101b    ;sat        17  d
3628  13A7  7B EA D5              DB    01111011B,11101010B,11010101b    ;ant east   18  e
3629  13AA  BB DA D5              DB    10111011B,11011010B,11010101b    ;ant west   19  f
3630
3631                        ;----------------------------------------;
3632                        ;       Emerson CD player                ;
3633                        ;                                        ;
3634                        ;       09 Apr 1987, 18:33               ;
3635                        ;----------------------------------------;
3636  13AD  C412            CD0:    DW    CABLE0                ;Link to next entry
3637  13AF  9B                      DB    9Bh                   ;ID byte
3638  13B0  08                      DB    8                     ;Executor type code
3639  13B1  FF 00                   DB    11111111b,00000000b   ;Standard key bit map
3640  13B3  00                      DB    00000000b             ;...cont...
3641  13B4  08                      DB    8                     ;Number of functions
3642
3643  13B5  78 07 03 DA 69          DB    120,7,3,218,105       ;Timing constants
3644  13BA  01                      DB    1                     ;First bit assumed
3645
3646  13BB  EB 6A ED                DB    11101011B,01101010B,11101101B ; PREFIX
3647
3648
3649  13BE  5D FA D5                DB    01011101B,11111010B,11010101B ;Forward track
3650  13C1  EF AB 55                DB    11101111B,10101011B,01010101B ;Reverse track
3651  13C4  DB D6 D5                DB    11011011B,11010110B,11010101B ;Play
3652  13C7  5B FB 55                DB    01011011B,11111011B,01010101B ;Stop
3653  13CA  FF 55 55                DB    11111111B,01010101B,01010101B ;Repeat
3654  13CD  6D F6 D5                DB    01101101B,11110110B,11010101B ;Forward index
3655  13D0  AD EE D5                DB    10101101B,11101110B,11010101B ;Reverse index
3656  13D3  7F D5 55                DB    01111111B,11010101B,01010101B ;Memory
3657
3658                        ;----------------------------------------;
3659                        ;  TV RT-221,222                        ;
3660                        ;                                        ;
3661                        ;       14 Apr 1987, 13:19               ;
3662                        ;----------------------------------------;
3663  13D6  0914            TV4:    DW    TV5                   ;Link to next entry
3664  13D8  14                      DB    14h                   ;ID byte
3665  13D9  05                      DB    5                     ;Regency executor (#5)
3666  13DA  FF FB                   DB    11111111b,11111011b   ;Standard key bit map
3667  13DC  C0                      DB    11000000b             ;...cont...
3668  13DD  11                      DB    17                    ;Number of functions
3669
3670  13DE  C7                      DB    .NOT.00111000B        ;Prefix
3671
3672  13DF  BF                      DB    .NOT.01000000B        ;Channel up                    1
```

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3673  13E0  3F                DB    .NOT.11000000B      ;Channel down          2
3674  13E1  DF                DB    .NOT.00100000B      ;Power                 3
3675  13E2  3B                DB    .NOT.11000100B      ;0                     4
3676  13E3  F7                DB    .NOT.00001000B      ;1                     5
3677  13E4  FB                DB    .NOT.00000100B      ;2                     6
3678  13E5  F3                DB    .NOT.00001100B      ;3                     7
3679  13E6  77                DB    .NOT.10001000B      ;4                     8
3680  13E7  7B                DB    .NOT.10000100B      ;5                     9
3681  13E8  73                DB    .NOT.10001100B      ;6                    10
3682  13E9  B7                DB    .NOT.01001000B      ;7                    11
3683  13EA  BB                DB    .NOT.01000100B      ;8                    12
3684  13EB  B3                DB    .NOT.01001100B      ;9                    13
3685  13EC  37                DB    .NOT.11001000B      ;Recall (review)      14
3686  13ED  FF                DB    .NOT.00000000B      ;Vol up               15
3687  13EE  7F                DB    .NOT.10000000B      ;Vol dn               16
3688  13EF  33                DB    .NOT.11001100B      ;Mute                 17
3689
3690                    ;----------------------------------------;
3691                    ;  TV (Magnavox) RT-220, RT-223          ;
3692                    ;                                        ;
3693                    ;        22 Apr 1987, 15:35              ;
3694                    ;----------------------------------------;
3695  13F0  3015        TV9:    DW    TV10                ;Link to next entry
3696  13F2  19                  DB    19h                 ;ID byte
3697  13F3  05                  DB    5                   ;Regency executor (#5)
3698  13F4  FF F9               DB    11111111b,11111001b ;Standard key bit map
3699  13F6  80                  DB    10000000b           ;...cont...
3700  13F7  10                  DB    16                  ;Number of functions
3701
3702  13F8  C7                  DB    .NOT.00111000B      ;Prefix
3703
3704  13F9  C7                  DB    .NOT.00111000B      ;Channel up            1
3705  13FA  27                  DB    .NOT.11011000B      ;Channel down          2
3706  13FB  A7                  DB    .NOT.01011000B      ;Power                 3
3707  13FC  F7                  DB    .NOT.00001000B      ;0                     4
3708  13FD  77                  DB    .NOT.10001000B      ;1                     5
3709  13FE  B7                  DB    .NOT.01001000B      ;2                     6
3710  13FF  37                  DB    .NOT.11001000B      ;3                     7
3711  1400  D7                  DB    .NOT.00101000B      ;4                     8
3712  1401  57                  DB    .NOT.10101000B      ;5                     9
3713  1402  97                  DB    .NOT.01101000B      ;6                    10
3714  1403  17                  DB    .NOT.11101000B      ;7                    11
3715  1404  E7                  DB    .NOT.00011000B      ;8                    12
3716  1405  67                  DB    .NOT.10011000B      ;9                    13
3717  1406  87                  DB    .NOT.01111000B      ;Vol up               14
3718  1407  47                  DB    .NOT.10111000B      ;Vol dn               15
3719  1408  07                  DB    .NOT.11111000B      ;A ch                 16
3720
3721                    ;----------------------------------------;
3722                    ;        TV RT-232                       ;
```

HOMER...and the plan of Zeus was being accomplished
(Of course who knows what Zeus has in mind?)

```
3723                        ;                                       ;
37                          ;       15 Apr 1987, 15:32              ;
3725                        ;---------------------------------------;
3726  1409  5614            TV5:    DW      TV6                     ;Link to next entry
3727  140B  15                      DB      15h                     ;ID byte
3728  140C  08                      DB      8                       ;Executor type code
3729  140D  FF 00                   DB      11111111b,00000000b     ;Standard key bit map
3730  140F  00                      DB      00000000b               ;...cont...
3731  1410  11                      DB      17                      ;Number of functions
3732
3733  1411  69 07 03 C8 64         DB      105,7,3,200,100         ;Timing constants
3734  1416  01                      DB      1                       ;First bit assumed
3735
3736
3737  1417  F7 AA D5                DB      11110111B,10101010B,11010101B ;Prefix
3738
3739  141A  AD EE D5                DB      10101101B,11101110B,11010101B ;CHANNEL UP
3740  141D  B5 ED D5                DB      10110101B,11101101B,11010101B ;CHANNEL DOWN
3741  1420  7B EA D5                DB      01111011B,11101010B,11010101B ;POWER
3742  1423  BB DA D5                DB      10111011B,11011010B,11010101B ;VOLUME UP
3743  1426  B7 DB 55                DB      10110111B,11011011B,01010101B ;VOLUME DOWN
3744  1429  EF AB 55                DB      11101111B,10101011B,01010101B ; 0
3745  142C  FF 55 55                DB      11111111B,01010101B,01010101B ; 1
3746  142F  BF B5 55                DB      10111111B,10110101B,01010101B ; 2
3747  1432  5F F5 55                DB      01011111B,11110101B,01010101B ; 3
3748  1435  6D F6 D5                DB      01101101B,11110110B,11010101B ; 4
37'   1438  75 F5 D5                DB      01110101B,11110101B,11010101B ; 5
37    143B  5B FB 55                DB      01011011B,11111011B,01010101B ; 6
3751  143E  DB D6 D5                DB      11011011B,11010110B,11010101B ; 7
3752  1441  EB D5 D5                DB      11101011B,11010101B,11010101B ; 8
3753  1444  5D FA D5                DB      01011101B,11111010B,11010101B ; 9
3754  1447  56 FE D5                DB      01010110B,11111110B,11010101B ;ENTER
3755  144A  77 EB 55                DB      01110111B,11101011B,01010101B ;MUTE
3756  144D  F7 AA D5                DB      11110111B,10101010B,11010101B ;ADD
3757  1450  5A FD D5                DB      01011010B,11111101B,11010101B ;CLEAR
3758  1453  7F D5 55                DB      01111111B,11010101B,01010101B ;ANON???
3759
3760                        ;---------------------------------------;
3761                        ;       TV RT-226                       ;
3762                        ;                                       ;
3763                        ;       16 Apr 1987, 10:58              ;
3764                        ;---------------------------------------;
3765  1456  7014            TV6:    DW      TV7                     ;Link to next entry
3766  1458  16                      DB      16h                     ;ID byte
3767  1459  09                      DB      9                       ;Executor type code
3768  145A  2F F9                   DB      00101111b,11111001b     ;Standard key bit map
3769  145C  C0                      DB      11000000b               ;...cont...
3770  145D  12                      DB      18                      ;Number of functions
3771
3772  145E  BE                      DB      10111110B               ;Power                  1
```

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      HOMER...and the plan of Zeus was being accomplished
      (Of course who knows what Zeus has in mind?)

3773  145F  A0                  DB    10100000B          ;1                    2
3774  1460  B0                  DB    10110000B          ;2                    3
3775  1461  A8                  DB    10101000B          ;3                    4
3776  1462  78                  DB    01111000B          ;4                    5
3777  1463  A4                  DB    10100100B          ;5                    6
3778  1464  B4                  DB    10110100B          ;6                    7
3779  1465  AC                  DB    10101100B          ;7                    8
3780  1466  BC                  DB    10111100B          ;8                    9
3781  1467  A2                  DB    10100010B          ;9                   10
3782  1468  B3                  DB    10110011B          ;Vol up              11
3783  1469  A3                  DB    10100011B          ;Vol dn              12
3784  146A  B7                  DB    10110111B          ;Mute                13
3785  146B  B3                  DB    10110011B          ;10                  14
3786  146C  AA                  DB    10101010B          ;11                  15
3787  146D  BA                  DB    10111010B          ;12                  16
3788  146E  BB                  DB    10111011B          ;Anon1               17
3789  146F  AB                  DB    10101011B          ;Anon2               18
3790
3791                    ;---------------------------------------;
3792                    ;  TV  RT-220                          ;
3793                    ;                                     ;
3794                    ;         16 Apr 1987, 14:08          ;
3795                    ;---------------------------------------;
3796  1470  1415        TV7:  DW    TV8                ;Link to next entry
3797  1472  17                DB    17h                ;ID byte
3798  1473  05                DB    5                  ;Regency executor (#5)
3799  1474  FF FB             DB    11111111b,11111011b;Standard key bit map
380A  1476  80                DB    10000000b          ;...cont...
3801  1477  10                DB    16                 ;Number of functions
3802
3803  1478  C7                DB    .NOT.00111000B     ;Prefix
3804
3805  1479  DF                DB    .NOT.00100000B     ;Channel up           1
3806  147A  27                DB    .NOT.11011000B     ;Channel down         2
3807  147B  A7                DB    .NOT.01011000B     ;Power                3
3808  147C  F7                DB    .NOT.00001000B     ;0                    4
3809  147D  77                DB    .NOT.10001000B     ;1                    5
3810  147E  B7                DB    .NOT.01001000B     ;2                    6
3811  147F  37                DB    .NOT.11001000B     ;3                    7
3812  1480  D7                DB    .NOT.00101000B     ;4                    8
3813  1481  57                DB    .NOT.10101000B     ;5                    9
3814  1482  97                DB    .NOT.01101000B     ;6                   10
3815  1483  17                DB    .NOT.11101000B     ;7                   11
3816  1484  E7                DB    .NOT.00011000B     ;8                   12
3817  1485  67                DB    .NOT.10011000B     ;9                   13
3818  1486  07                DB    .NOT.11111000B     ;Recall (a/ch)       14
3819  1487  87                DB    .NOT.01111000B     ;Vol up              15
3820  1488  47                DB    .NOT.10111000B     ;Vol dn              16
3821
3822                    ;---------------------------------------;
```

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      HOMER...and the plan of Zeus was being accomplished
      (Of course who knows what Zeus has in mind?)

3823                          ;         EMERSON VCR (70-2036)           ;
38.                           ;                                         ;
3825                          ;         20 Apr 1987, 14:38              ;
3826                          ;-----------------------------------------;
3827  1489  E514              VCR4:     DW      VCR5                    ;Link to next entry
3828  148B  24                         DB      24h                     ;ID byte
3829  148C  08                         DB      8                       ;Executor type code
3830  148D  9F FF                      DB      10011111b,11111111b     ;Standard key bit map
3831  148F  F0                         DB      11110000b               ;...cont...
3832  1490  19                         DB      25                      ;Number of functions
3833
3834  1491  50 07 03 C9 64            DB      80,7,3,201,100          ;Timing constants
3835  1496  00                         DB      0                       ;No first bit assumed
3836
3837  1497  DA B5 BD                   DB      11011010B,10110101B,10111101B ;Prefix
3838
3839  149A  6D F6 D5                   DB      01101101B,11110110B,11010101B ;VCR Play
3840  149D  EF AB 55                   DB      11101111B,10101011B,01010101B ;VCR Power
3841  14A0  AD EE D5                   DB      10101101B,11101110B,11010101B ;VCR Rewind
3842  14A3  56 FE D5                   DB      01010110B,11111110B,11010101B ;VCR Fast forward
3843  14A6  DB D6 D5                   DB      11011011B,11010110B,11010101B ;VCR Record
3844  14A9  5D FA D5                   DB      01011101B,11111010B,11010101B ;VCR Pause
3845  14AC  EB D5 D5                   DB      11101011B,11010101B,11010101B ;VCR Stop
3846  14AF  FF 55 55                   DB      11111111B,01010101B,01010101B ;VCR TV/VCR
3847  14B2  6B F7 55                   DB      01101011B,11110111B,01010101B ;VCR Digit 0
3848  14B5  AB EF 55                   DB      10101011B,11101111B,01010101B ;VCR Digit 1
38    14B8  55 FF 55                   DB      01010101B,11111111B,01010101B ;VCR Digit 2
385.  14BB  D5 EB D5                   DB      11010101B,11101011B,11010101B ;VCR Digit 3
3851  14BE  6A FB D5                   DB      01101010B,11111011B,11010101B ;VCR Digit 4
3852  14C1  AA F7 D5                   DB      10101010B,11110111B,11010101B ;VCR Digit 5
3853  14C4  55 7F D5                   DB      01010101B,01111111B,11010101B ;VCR Digit 6
3854  14C7  DF AD 55                   DB      11011111B,10101101B,01010101B ;VCR Digit 7
3855  14CA  6F ED 55                   DB      01101111B,11101101B,01010101B ;VCR Digit 8
3856  14CD  D7 D7 55                   DB      11010111B,11010111B,01010101B ;VCR Digit 9
3857  14D0  B5 ED D5                   DB      10110101B,11101101B,11010101B ;SLOW
3858  14D3  AF DD 55                   DB      10101111B,11011101B,01010101B ;DIGIT A (11)
3859  14D6  57 FD 55                   DB      01010111B,11111101B,01010101B ;DIGIT B
3860  14D9  77 EB 55                   DB      01110111B,11101011B,01010101B ;DIGIT C
3861  14DC  B7 DB 55                   DB      10110111B,11011011B,01010101B ;DIGIT D
3862  14DF  5B FB 55                   DB      01011011B,11111011B,01010101B ;DIGIT E
3863  14E2  F7 AA D5                   DB      11110111B,10101010B,11010101B ;DIGIT F
3864
3865                          ;-----------------------------------------;
3866                          ;         Goldstar VCR                    ;
3867                          ;                                         ;
3868                          ;         22 Apr 1987, 16:27              ;
3869                          ;-----------------------------------------;
3870  14E5  7D15              VCR5:     DW      VCR6                    ;Link to next entry
3871  14E7  25                         DB      25h                     ;ID byte
3872  14E8  08                         DB      8                       ;Executor type code
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      HOMER...and the plan of Zeus was being accomplished
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3873  14E9  FF C0                DB    11111111b,11000000b   ;Standard key bit map
38.   14EB  00                   DB    00000000b             ;...cont...
3875  14EC  0A                   DB    10                    ;Number of functions
3876
3877  14ED  50 07 03 C9 64       DB    80,7,3,201,100        ;Timing constants
3878  14F2  00                   DB    0                     ;No first bit assumed
3879
3880  14F3  AB 5B DD             DB    10101011B,01011011B,11011101B ;Prefix
3881
3882  14F6  EF AB 55             DB    11101111B,10101011B,01010101B ;VCR Play                1
3883  14F9  EB D5 D5             DB    11101011B,11010101B,11010101B ;VCR Channel up          2
3884  14FC  75 F5 D5             DB    01110101B,11110101B,11010101B ;VCR Channel down        3
3885  14FF  DB D6 D5             DB    11011011B,11010110B,11010101B ;VCR Power               4
3886  1502  BF B5 55             DB    10111111B,10110101B,01010101B ;VCR Rewind              5
3887  1505  5F F5 55             DB    01011111B,11110101B,01010101B ;VCR Fast forward        6
3888  1508  77 EB 55             DB    01110111B,11101011B,01010101B ;VCR Record              7
3889  150B  5B FB 55             DB    01011011B,11111011B,01010101B ;VCR Pause               8
3890  150E  7F D5 55             DB    01111111B,11010101B,01010101B ;VCR Stop                9
3891  1511  6D F6 D5             DB    01101101B,11110110B,11010101B ;VCR TV/VCR              10
3892
3893                       ;---------------------------------------;
3894                       ;       TV  RT-214                      ;
3895                       ;       (Magnavox)                      ;
3896                       ;                                       ;
3897                       ;       21 Apr 1987, 15:31              ;
3898                       ;---------------------------------------;
38    1514  F013           TV8:    DW    TV9                     ;Link to next entry
3900  1516  18                     DB    18h                     ;ID byte
3901  1517  0A                     DB    10                      ;Executor #10
3902  1518  FF FB                  DB    11111111b,11111011b     ;Standard key bit map
3903  151A  C0                     DB    11000000b               ;...cont...
3904  151B  12                     DB    18                      ;Number of functions
3905
3906  151C  90                     DB    10010000B               ;Channel up             1
3907  151D  80                     DB    10000000B               ;Channel down           2
3908  151E  C2                     DB    11000010B               ;Power                  3
3909  151F  F0                     DB    11110000B               ;0                      4
3910  1520  E4                     DB    11100100B               ;1                      5
3911  1521  CC                     DB    11001100B               ;2                      6
3912  1522  F8                     DB    11111000B               ;3                      7
3913  1523  92                     DB    10010010B               ;4                      8
3914  1524  86                     DB    10000110B               ;5                      9
3915  1525  9E                     DB    10011110B               ;6                     10
3916  1526  C0                     DB    11000000B               ;7                     11
3917  1527  E0                     DB    11100000B               ;8                     12
3918  1528  C8                     DB    11001000B               ;9                     13
3919  1529  81                     DB    10000001B               ;Recall                14
3920  152A  98                     DB    10011000B               ;Vol up                15
3921  152B  84                     DB    10000100B               ;Vol dn                16
3922  152C  3200                   DW    001100010B              ;A ch                  17
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3923  152E  2600                    DW    00100110B           ;Hi Fi                          18
39:
3925                        ;Marantz RMC 55 (TV & VCR)
3926                        ;----------------------------------------;
3927                        ;       Marantz TV                       ;
3928                        ;                                        ;
3929                        ;       29 Apr 1987, 15:19               ;
3930                        ;----------------------------------------;
3931  1530  A910            TV10:   DW    TV0                 ;Link to next entry
3932  1532  1A                      DB    1Ah                 ;ID byte
3933  1533  08                      DB    8                   ;Executor type code
3934  1534  FF F9                   DB    11111111b,11111001b ;Standard key bit map
3935  1536  C0                      DB    11000000b           ;...cont...
3936  1537  14                      DB    20                  ;Number of functions
3937
3938  1538  69 07 03 CC 6A          DB    105,7,3,204,106     ;Timing constants
3939  153D  01                      DB    1                   ;First bit assumed
3940
3941  153E  DF AD 55                DB    11011111B,10101101B,01010101B ;TV Prefix
3942
3943  1541  FF 55 55                DB    11111111B,01010101B,01010101B ;TV Channel up          1
3944  1544  7F D5 55                DB    01111111B,11010101B,01010101B ;TV Channel down        2
3945  1547  EF AB 55                DB    11101111B,10101011B,01010101B ;TV Power               3
3946  154A  F7 AA D5                DB    11110111B,10101010B,11010101B ;TV Digit 0             4
3947  154D  7B EA D5                DB    01111011B,11101010B,11010101B ;TV Digit 1             5
3948  1550  BB DA D5                DB    10111011B,11011010B,11010101B ;TV Digit 2             6
39(   1553  5D FA D5                DB    01011101B,11111010B,11010101B ;TV Digit 3             7
395u  1556  DB D6 D5                DB    11011011B,11010110B,11010101B ;TV Digit 4             8
3951  1559  6D F6 D5                DB    01101101B,11110110B,11010101B ;TV Digit 5             9
3952  155C  AD EE D5                DB    10101101B,11101110B,11010101B ;TV Digit 6            10
3953  155F  56 FE D5                DB    01010110B,11111110B,11010101B ;TV Digit 7            11
3954  1562  EB D5 D5                DB    11101011B,11010101B,11010101B ;TV Digit 8            12
3955  1565  75 F5 D5                DB    01110101B,11110101B,11010101B ;TV Digit 9            13
3956  1568  BF B5 55                DB    10111111B,10110101B,01010101B ;TV Volume up          14
3957  156B  5F F5 55                DB    01011111B,11110101B,01010101B ;TV Volume down        15
3958  156E  B7 DB 55                DB    10110111B,11011011B,01010101B ;TV Mute               16
3959  1571  5B FB 55                DB    01011011B,11111011B,01010101B ;ANTENNA/AUX           17
3960  1574  5A FD D5                DB    01011010B,11111101B,11010101B ;TIME/CHANNEL          18
3961  1577  B5 ED D5                DB    10110101B,11101101B,11010101B ;(PROGRAM)             19
3962  157A  77 EB 55                DB    01110111B,11101011B,01010101B ;(TV/VCR)              20
3963
3964
3965                        ;----------------------------------------;
3966                        ;       Marantz VCR                      ;
3967                        ;                                        ;
3968                        ;       29 Apr 1987, 15:26               ;
3969                        ;----------------------------------------;
3970  157D  0310            VCR6:   DW    VCR0                ;Link to next entry
3971  157F  26                      DB    26h                 ;ID byte
3972  1580  08                      DB    8                   ;Executor type code
```

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3973  1581  FF FF                DB    11111111b,11111111b   ;Standard key bit map
39    1583  F0                   DB    11110000b             ;...cont...
3975  1584  20                   DB    32                    ;Number of functions
3976
3977  1585  69 07 03 D0 6A       DB    105,7,3,208,106       ;Timing constants
3978  158A  01                   DB    1                     ;First bit assumed
3979
3980  158B  75 F5 D5             DB    01110101B,11110101B,11010101B ;VCR Prefix
3981
3982  158E  6F ED 55             DB    01101111B,11101101B,01010101B ;VCR Play                1
3983  1591  FF 55 55             DB    11111111B,01010101B,01010101B ;VCR Channel up          2
3984  1594  7F D5 55             DB    01111111B,11010101B,01010101B ;VCR Channel down        3
3985  1597  EF AB 55             DB    11101111B,10101011B,01010101B ;VCR Power               4
3986  159A  6B F7 55             DB    01101011B,11110111B,01010101B ;VCR Rewind              5
3987  159D  D7 D7 55             DB    11010111B,11010111B,01010101B ;VCR Fast forward        6
3988  15A0  AF DD 55             DB    10101111B,11011101B,01010101B ;VCR Record              7
3989  15A3  AB EF 55             DB    10101011B,11101111B,01010101B ;VCR Pause               8
3990  15A6  DF AD 55             DB    11011111B,10101101B,01010101B ;VCR Stop                9
3991  15A9  B7 DB 55             DB    10110111B,11011011B,01010101B ;VCR TV/VCR               0
3992  15AC  B5 ED D5             DB    10110101B,11101101B,11010101B ;VCR Digit 0              1
3993  15AF  F7 AA D5             DB    11110111B,10101010B,11010101B ;VCR Digit 1              2
3994  15B2  7B EA D5             DB    01111011B,11101010B,11010101B ;VCR Digit 2              3
3995  15B5  BB DA D5             DB    10111011B,11011010B,11010101B ;VCR Digit 3              4
3996  15B8  5D FA D5             DB    01011101B,11111010B,11010101B ;VCR Digit 4              5
3997  15BB  DB D6 D5             DB    11011011B,11010110B,11010101B ;VCR Digit 5              6
3998  15BE  6D F6 D5             DB    01101101B,11110110B,11010101B ;VCR Digit 6              7
39    15C1  AD EE D5             DB    10101101B,11101110B,11010101B ;VCR Digit 7              8
4000  15C4  56 FE D5             DB    01010110B,11111110B,11010101B ;VCR Digit 8              9
4001  15C7  EB D5 D5             DB    11101011B,11010101B,11010101B ;VCR Digit 9              0
4002  15CA  BF B5 55             DB    10111111B,10110101B,01010101B ;SLOW +                   1
4003  15CD  5F F5 55             DB    01011111B,11110101B,01010101B ;SLOW -                   2
4004  15D0  55 FF 55             DB    01010101B,11111111B,01010101B ;EJECT                    3
4005  15D3  55 7F D5             DB    01010101B,01111111B,11010101B ;CM SKIP                  4
4006  15D6  D5 EB D5             DB    11010101B,11101011B,11010101B ;PROGRAM                  5
4007  15D9  75 F5 D5             DB    01110101B,11110101B,11010101B ;INPUT                    6
4008  15DC  5A FD D5             DB    01011010B,11111101B,11010101B ;MODE                     7
4009  15DF  6A FB D5             DB    01101010B,11111011B,11010101B ;AM/PM                    8
4010  15E2  AA F7 D5             DB    10101010B,11110111B,11010101B ;SHIFT                    9
4011  15E5  77 EB 55             DB    01110111B,11101011B,01010101B ;RESET                   30
4012  15E8  5B FB 55             DB    01011011B,11111011B,01010101B ;MEM/PS                   1
4013  15EB  57 FD 55             DB    01010111B,11111101B,01010101B ;SR                       2
4014
4015                             PAGE
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```
4016                    ;-------------------------------------------------------------------------;
40                      ;   MACRO SPACE -- This is where the user defined macros are stored.  The  ;
4018                    ;               data is arranged as macro scan code followed byte the codes ;
4019                    ;               to send, followed by zero.  A zero macro scan code indicates ;
4020                    ;               the end of the table.                                     ;
4021                    ;                                                                         ;
4022                    ;   MACRO$END -- The last usable byte for storing macro definitions.      ;
4023                    ;                                                                         ;
4024                    ;       23 Feb 1987, 17:17                                                ;
4025                    ;-------------------------------------------------------------------------;
4026  15EE              MACRO$START:
4027  15EE  06                  DB      06h             ;D04
4028  15EF  30                  DB      30h             ;
4029  15F0  18                  DB      18h             ;Test macro of digit keys
4030  15F1  39                  DB      39h             ;
4031  15F2  28                  DB      28h             ;
4032  15F3  00                  DB      0               ;End of macro
4033  15F4  00                  DB      0               ;End of table
4034  1F00                      ORG     1F00h
4035        1EFF          MACRO$END EQU   $-1
4036  1F00  00                  DB      0
4037  1F01  00                  DB      0
4038
4039                      OPTIONS  H
4040  1F02                END     pwron
4040  1F02                END     pwron
```

Defined	Symbol Name		Value	References										
2780	ACK	=	0061											
6	ADD$ADDR		0231	453	504	868	934	1082	1087	1262	1613	1659	1664	1735
				1747	1907	1971	1984	2090	2139	2257	2262	2333	2383	
2164	BGT1		0B6C	2093										
2165	BGT2		0B6E	2099										
2185	BGT3		0B85	2105										
2194	BGT4		0B93	2111										
2186	BGT5		0B87	2117										
2191	BIG$S1		0B8F	2181										
2181	BIG10		0B83	2200	2205									
2187	BIG20		0B89	2188										
2166	BIG5		0B70	2167										
2199	BIG80		0B97	2178	2189									
2209	BIG90		0BA0											
2212	BIG90L		0BA4	2213										
2218	BIG99		0BA8	2241										
2226	BIG99L		0BB4	2227										
2235	BIG99L2		0BBE	2236										
2078	BIGBUF		0B00	1737	1739	1752	1787	1788	1973	1976	1989	2015	2017	2126
				2130	2144	2172	2174							
3095	BIGCAR		0FF0	2158	2160	2192	2220	2222	2230	3103				
2153	BIGGO		0B64	342										
2771	BITTIME	=	00FC	2946	2966	3043	3065							
657	BUMPADDR		022F	458	475	819	966	1025	1028	1199	1203	1210	1214	1267
				1408	1444	1478	1483	1524	1539	1755	1979	1992	2096	2102
				2108	2114	2120	2127	2147	2896					
6	BUMPRET		023A	662										
34	CABLE0		12C4	157	3636									
3466	CABLE1		12CC	3454										
3494	CABLE2		12E3	3466										
3529	CABLE3		1300	3494										
3559	CABLE4		1319	3529										
3598	CABLE5		1363	3559										
2526	CABLEKEYS		0E32	2486										
3636	CD0		13AD	3598										
550	CE$NN		01DB	464										
526	CE$NONSTD		01BC	488										
536	CE$VCR		01CA	481	509									
501	CE10		019B	491	548	553	946							
473	CE4		017D	487										
478	CE5		0185	486										
479	CE6		0187											
484	CE6A		018C	495										
490	CE7		0193	478										
543	CEHLT		01D4	538										
545	CEN2		01D6	534										
188	CHKDO		0025	177	837									
230	CHKDOS		0052	216										
74	CHUPKEY	=	0022	306	974									

Defined	Symbol Name		Value	References			
585	CJMB1		0213	583			
33.	CJMB1A		1213	3303			
590	CJMB2		0218	586			
3310	CJMB2A		1218	3306			
406	CMD1		013D	241	541		
445	CMDEXEC		015B				
Pre	CODE		0000				
568	COMPJMP		0200	524	1602	3287	
1601	COMPJMP1		0803				
3288	COMPJMPA		1200				
848	CURMAC		02CC	1396	1397	1563	1564
2768	CY2400	=	0008				
2763	CY4800	=	000B	2772			
2772	CYTIME	=	000B	2961	2981	3053	3073
Pre	DATA		0000				
707	DBNC5		0250	708			
364	DD$RST		0115	368			
374	DD10		0120	380			
382	DD15		0129	376			
366	DD3		0117	363			
372	DD5		011F	358			
1217	DE10		065C	1206			
1208	DE5		0650	1227			
1229	DE99		0669	1221			
1244	DE99E		067B	1218			
1234	DE99NC		066F	1231			
7[illegible]	DEBNC		024E				
259[illegible]	DEFKEYS		0E5E	1145	1146	1358	1360
1356	DEFMAC		0708	183			
839	DEMACRO		02C3	827	1577		
2624	DIGITKEYS		0E78	275	276	355	356
1185	DIRECT		0633	397			
788	DK10		028F	781			
774	DK5		0280	785			
1367	DM1		071C	1370			
1391	DM15		0735	1380			
1506	DM20		07B2	1382			
1517	DM25		07BC	1544			
1521	DM25A		07C0	1515			
1539	DM27		07D3	1551			
1548	DM30		07DB	1537			
1553	DM39		07E0	1549			
1373	DM5		0724	1362	1557		
1449	DM50		0770	1356			
1452	DM55		0774	1431			
1459	DM60		077C	1421			
1474	DM65		0790	1445			
1379	DM7		072A				
1380	DM7A		072C	1387			
1483	DM90		079C	1477			

Defined	Symbol Name		Value	References								
1494	DM999		07A7									
14.	DM999W		07AB	1499								
1433	DMC5		075F	1429								
1426	DMCHK		0756	1451								
1574	DMD1		07F8	1576								
1561	DMDIE		07E6	1473								
1419	DMDO		0752	1456								
261	DO1		0073	257								
273	DO3		007F	268								
289	DO4		0094	278								
298	DO5		00A0	293								
875	DO5B		0314	897								
879	DO5C		031A	882								
889	DO5D		032A	886								
892	DO5E		032E	894								
887	DO5ON		0328	884								
351	DODIGITS		0100	269								
130	DOFLAG		0005	193	324	390	841	900	989	1012	1171	1461	2811
71	DOKEY	=	003C	203	249	1442	1455					
2658	DOKEYS		0E87	230								
247	DOMODE		0061	197								
139	DONUM		0006	266	280	336	360	388	461			
857	DOSHOW		0300	298								
770	DOWNKEY		027B	716	744	747						
72	ENTERKEY	=	002A	263								
2782	EOT	=	0065									
19"	EX0$LP1		09C6									
198.	EX0$LP2		09D7	1993								
2127	EX8$LP1		0B43	2133								
2142	EX8$LP2		0B57	2148								
340	EX8$SET		00CC	2094	2100	2106	2112	2118				
1750	EXC1C		08AD	1756								
1259	EXC3A		0687									
1264	EXC3B		068B									
1276	EXC3C		069A	1272								
1968	EXEC0		09BD	2468								
1732	EXEC1		0894	2469								
2378	EXEC10		0C77	2478								
1080	EXEC2		0400	2470								
1253	EXEC3		067D	2471								
1609	EXEC4		0806	2472								
1656	EXEC5		083B	2473								
1903	EXEC6		096F	2474								
2253	EXEC7		0C00	2475								
2087	EXEC8		0B08	2476								
2328	EXEC9		0C49	2477								
2468	EXECS		0E00	516	518							
81	EXECUTOR	=	0022	456	513	936						
212	FAKEIT		003E	204								
69	FOURK	=	0010	587	590	614	640	3307	3311	3322	3333	

efined	Symbol Name		Value	References										
2574	FUNCKEYS		0E55	527	528									
6	GB$MOVE		0220	3320										
3012	GBLP1		0FB7	3014										
3014	GBZBIT		0FBA	3012										
2994	GC$ERROR		0FAF	2986										
1341	GET$TABLE		0700	502	963	976	1080	1610	1657	1733	1904	1969	2088	2255
				2330	2380									
3010	GETBIT		0FB3	2950	2970	2984								
605	GETBYTE		021B	454	473	505	826	869	935	964	967	1026	1029	1083
				1089	1156	1197	1200	1204	1208	1211	1215	1265	1268	1379
				1522	1614	1660	1665	1736	1750	1908	1974	1987	2092	2098
				2104	2110	2116	2122	2128	2142	2258	2264	2334	2384	
238	GETCMD		005A	232	395									
2925	GETCOM		0F6A	2833	2838	2846	2854							
2933	GETSTRT		0F75	2939	2951									
2730	GOTCOL		0EAD	2725										
2724	GOTKEY		0EA5	2690										
65	GREEN	=	0040	67	512	888	2867							
2943	GS10		0F7F											
2939	GS5		0F7D	2934	2935	2936								
2767	HB2400	=	004D											
2762	HB4800	=	0026	2773										
2773	HBTIME	=	0026	2943										
2759	HIGHMEM	=	0010											
183	JDEF		0023	196										
397	JDIRECT		013B	392										
19	JER10		0998	1933										
195	JER20		09B7	1958										
1944	JERGAP		09A9	1945										
1912	JERGO		097B	1950										
1955	JERLONG		09B5	1928										
1935	JERLP		099C	1959										
1923	JERPULSE		098A	1937										
1951	JERSLP		09B3											
2486	KEYTBLS		0E18	413	416									
2677	KSCAN		0E8C	175	954									
694	KTEND		0247	687										
698	KTFND		024B	689										
685	KTLP		023D	692										
683	KTSCNR		023B	215	231	277	292	357	422	533	1004	1147	1361	
147	MACPTR		0007	1410	1436	1466	1485							
4035	MACRO$END	=	1EFF											
4026	MACRO$START		15EE	1153	1154	1376	1377							
84	MACROFLG	=	0026	811	1139	1164								
1886	MAGCAR		0960	1893	2392	2400	2410	2424						
174	MNSCN		001A	178										
114	MODEFLG		0004	222	239	916	978	1009	1186	1254				
2643	MODEKEYS		0E83	213	214	290	291	1002	1003					
1801	MVCR10		0916	1808	1812									
1807	MVCR15		0920	1799	1832									

Defined	Symbol Name		Value	References										
1825	MVCR20		0937	1801										
1810	MVCR22		091C	1805										
1815	MVCR25		092B	1816										
1794	MVCR5		090C	1795										
1846	MVCRCAR		0943	1791	1826	1853								
1786	MVCRGO		0900	1759	1821									
2776	NAK	=	006E	2830										
2725	NEXTCOL		0EA7	2728										
1025	NEXTMAC		03C2	1027	1161	1386	1514							
2680	NEXTROW		0E90	2694										
202	NODO		0033	195										
2957	NXTBIT		0F8D	2959	2974									
63	OUT	=	0080	1042	1046	1064	1067	1623	1627	1679	1682	1687	1690	1708
				1711	1771	1774	1846	1849	1866	1870	1886	1889	1913	1916
				1924	1927	1938	1941	2352	2368	3095	3099			
2031	PAN10		0A17	2055	2059									
2037	PAN20		0A1D	2038										
2026	PAN5		0A13	2027										
2043	PAN50		0A23	2031										
2049	PAN60		0A2B	2050										
2054	PAN80		0A2F	2039										
2064	PAN90		0A3A	2065										
1866	PANCAR		0952	1873	2010	2045								
2005	PANGO		0A00	1996	2072									
75	PAUSEKEY	=	0004	367										
638	PB$MOVE		022A	3330										
67	PUTBYTE		0224	1407	1443	1476	1480	1536	1571	2895				
2290	RCA$S1		0C31	2284										
2283	RCA5		0C23	2308	2311									
2306	RCA80		0C39	2294										
1771	RCACAR		08BC	1775	2274	2289	2299							
2271	RCAGO		0C12	2318										
73	RCLKEY	=	002B	256	1428									
66	RED	=	0020	67	205	221	308	315	885	1241	1365	1495		
1715	REGGAP		0888	1716										
1675	REGGO		084D	1721										
1699	REGNXT		0870	1695										
1687	REGPULSE		085E	1700	1703									
333	RESET$DO		00C4	250	307	364	1006	1142	1149	1244	1371	1481		
Pre	RSECT		0000											
2396	RT214A		0C8D	2397										
2404	RT214B		0C99	2405										
2429	RT214C		0CBA	2430										
2433	RT214D		0CBF	2457										
2414	RT214E		0CA7	2415										
2388	RT214GO		0C83											
2451	RT214LNG		0CD5	2425										
2421	RT214LP		0CAF	2436	2447									
2390	RT214PX		0C85	2407										
2438	RT214X		0CC5	2435										

efined	Symbol Name		Value	References							
2441	RT214Z		0CC9	2442							
24:	RT21RF		0CD9	2454							
2345	RT226A		0C5A	2355							
2341	RT226AGN		0C57	2364							
2361	RT226B		0C6B	2362							
2348	RT226DLY		0C5C	2369							
2339	RT226GO		0C55								
2367	RT226ON		0C73	2346							
157	S$CABLE		0009	429	859	919	981	1189			
158	S$TV		000B								
159	S$VCR		000D								
962	SC$NXT		037F								
952	SC$SCAN		0372	957							
912	SCAN		033F	311							
948	SCAN$CONT		036E	846							
973	SCAN$END		038E	956							
941	SCAN$SEND		0365	960							
80	SCANCODE	=	0021	162	188	419	530	1554	2816	2820	
83	SCANFLAG	=	0025	807	913						
927	SCANLOOP		0352	971							
327	SD5		00BE	328							
988	SE$NO		03A2	975							
3038	SENDBYTE		0FC0	2831	2902						
2829	SER4		0F15	2824							
2832	SER5		0F19	2903							
2810	SERIAL		0F00	370							
28'	SERLED		0F45	2866							
284u	SERLP		0F2A	2852							
2887	SERMV		0F53	2900							
2899	SERNB		0F61	2890							
2820	SERRTY		0F0D	2834	2836	2839	2847	2855	2858		
2879	SERYES		0F4D	2874							
320	SET$DO		00B5	259	285	338	1417				
322	SET$DO2		00B7	207	316	1242					
313	SET$SCAN		00AF	264							
806	SLEEP		0297	329	543	903	1015	1128	1174	1329	1596	2479
1595	SLEEP1		0800	1648	1722	1822	1951	2073	2242	2319	2365	2448
843	SLEEP2		02C9	816							
846	SLEEP3		02CA	809							
801	SLEEPW		0291	225							
803	SLP0		0293	804							
819	SLPBUMP		02A6								
831	SLPDLY		02B7	832							
820	SLPNBMP		02A8								
3063	SND1		0FDA	3059							
3065	SND10		0FDC	3061							
3070	SND15		0FE2	3071							
3079	SND25		0FEB	3080							
3050	SND5		0FCA	3051	3068						
2778	SOH	=	0073	2835							

Defined	Symbol Name		Value	References									
1106	SONY10		0419	1116	1120								
11	SONY15		0423	1110									
1123	SONY70		042F	1124									
1042	SONYCAR		03CD	1051	1100	1113							
1099	SONYGO		0410	1127									
304	START$SCAN		00A2	253									
97	START0		0000										
162	START1		000F	99									
2978	STOPBIT		0F9F	2979									
166	STRT5		0014	168									
1641	SYLGAP		082F	1642									
1620	SYLGO		0812	1647									
1636	SYLNXT		0828	1632									
1623	SYLPULSE		0815	1637									
1648	SYLSLP		0839										
82	TBLADR	=	0023	445	927	1342							
1008	TD5		03B5	1005									
730	TESTKEY		025A	1126	1327	1645	1719	1819	1948	2070	2239	2316	2445
2995	TIMEOUT		0FAF	2937									
755	TK$GO		0277	743	750								
747	TK$SCAN		026D	730									
752	TK$STOP		0275	748									
739	TK3		0264	736									
86	TKEYCNT	=	0028	734	833								
1156	TM10		0619	1162									
1144	TM2		0607	1141									
27[illegible]	TM2400	=	00F7										
276[illegible]	TM4800	=	00FC	2771									
1151	TM5		0613	233	1148								
1149	TM99		0611	1157									
1164	TMFND		0624	1159									
1001	TRYDIRECT		03A9	1363									
1139	TRYMACRO		0600	294									
3237	TV0		10A9	3931									
3344	TV1		122E	3237									
3931	TV10		1530	158	3695								
3387	TV2		1266	3344									
3418	TV3		1280	3387									
3663	TV4		13D6	3418									
3726	TV5		1409	3663									
3765	TV6		1456	3726									
3796	TV7		1470	3765									
3899	TV8		1514	3796									
3695	TV9		13F0	3899									
2549	TVKEYS		0E42	2487									
3127	VCR0		1003	3970									
3148	VCR1		1038	3127									
3179	VCR2		1056	3148									
3212	VCR3		1074	3179									
3827	VCR4		1489	3212									

Defined	Symbol Name		Value	References									
3870	VCR5		14E5	3827									
39	VCR6		157D	159	3870								
85	VCRFLAG	=	0029	536									
2496	VCRKEYS		0E1B	2488									
716	WAITUP		0255	309	717								
2758	XMIT	=	0001	3047	3060	3063	3078						
67	YELLOW	=	0060	220	310	321	511	875	949	958	1364	1572	2815	2865
1289	ZEN10		069F	1299	1302								
1295	ZEN15		06A9	1296									
1297	ZEN20		06AD	1317									
1306	ZEN25		06B7	1292									
1324	ZEN30		06CD	1325									
1315	ZEN35		06C3	1316									
1321	ZEN99		06C9	1304									
1064	ZENCAR		03DE	1071	1291	1311							
3355	ZENDATA		1236	1257	1258								
1285	ZENGO		069A	1328									
1329	ZENSLP		06D5										
3117	pwron		1000	4040									

Lines Assembled : 4040 Assembly Errors : 0

Exhibit M

Homer Revisions for Inkel

by Paul Darbee, Universal Electronics
May 18,1987

PC Board

1. Holes connecting the lithium cell negative terminal to the other side of the board are not plated through. All holes must be plated through.

2. Artwork is not square on the board. The result is that the three holes for the serial port are not centered in the opening of the battery compartment, the visible LED does not align with the hole in the case, and the switch pads are not aligned accurately. The top of the board (LED end) is off by .020" (.36 mm) and the bottom is off by .020" (.5 mm) in the opposite direction.

3. The infrared LEDs should be inserted from the switch pad side of the board so they will align better with the LED holders.

4. The visible LED is a problem - it doesen't stick up through the case far enough. What we can do is to drill the PCB hole for it larger (.226" = 5.74 mm) so it can go farther through the PCB, then put a drop of super glue or epoxy to hold it in place.

5. Change the value of R11 from 1K to 330 ohms so the visible LED is brighter when green or yellow.

Lithium Battery Holder

1. Good, permanent contact between the lithium battery and the circuit is essential. Even a momentary open circuit will kill the memory and the product will be useless unless re-programmed at the factory.

2. The lithium cells we have here are 3.2 mm thick, so the holder is not tall enough for them. We are assuming that the cells you are using will fit the holder tightly, so the cell can't move around, even if you drop or hit the PC board.

3. The metal for the holder seems too thick - we think it should be springier, like the spring clips for the AAA cells.

4. There needs to be a tab bent down on the side of the holder where the battery slides in, to keep it from ever sliding out. You could also mold a retainer into the bottom half of the case which will prevent the battery from sliding out.

5. It is not important that the battery is easily replaceable. It is important that the electrical contact is permanent for the life of the battery (10 years).

Battery Compartment

1. The double spring clips do not contact the AAA cells in the center. This is okay for the two batteries whose negative ends make contact, but the bend in the spring misses the raised button on the positive end. Therefore, two of the batteries are not held in with enough force - they can easily slide away from the fixed contact at the other end and break the battery circuit.

2. You may want a tab or hole or something to solder the wire onto the single clips.

3. The battery labels, as shown on the blueprint, are missing.

4. Without the foam pad, the batteries can move around, which is not good.

5. The battery cover latch does not close by itself - you have to push it.

Rubber Keypad

1. Conductive pucks should be oval, 3 x 4 mm.

2. The pad will have to be cut in to clear the 4 clips which hold the PCB.

3. The keys stick, which is unacceptable. One solution is to put a draft angle of about 2 degrees on the key buttons. Another solution is either to make the keys less than 8 x 3 mm, or to widen the holes in the plastic case more than 8 x 3 mm.

4. Can you remove the unused keys by cutting off the button and leaving rubber covering the unused switchpad? We are worried about spills and dirt getting between the PCB and the keyboard.

Lens for Infrared LEDs

1. The plastic used is almost opaque to infrared light. Do not use that plastic in production or the product will not work. There is a type of plastic that looks black (or deep red when you shine a light through it) that is used in other remote controllers. We should use the same plastic.

2. We would like the lens opening to be larger so that the controller can be used over a larger angular range. The specification we must meet is plus or minus 45 degrees from the horizontal or vertical.

3. The lens rattles - please make it fit tightly.

Top Case

1. The keys stick (see Rubber Keyboard comments). The holes for the keys have to be made wider than 8 x 3 mm, or the rubber keys have to be made narrower, or there has to be a draft angle on the key buttons.

2. The hole for the visible LED does not align properly with the "racing stripe" groove.

3. The bumps at the bottom of the case which hold it to the other half were broken off on two of the units you sent us. Are they strong enough? The unit must survive a five foot drop test to a cement floor.

4. The raised "waffle iron" pattern on the inside under the rubber key mat is not raised far enough, so the PC board is "floating" against the springiness of the keys, rather than resting solidly against the "waffle iron." The "waffle iron" ribs should be made 1 mm taller.

5. The holders for the the 3 IR LEDs do not close around the LEDs and do not align with the holders on the other half of the case. We need to achieve as wide an angular spread of IR light as possible. Therefore, the LEDs should be as close to the lens as possible (touching it is okay), and the holding clips should be as far back as possible. Since the clips have to be moved anyhow, can you move them toward the PC board 1.88 mm (.075")? The clips on the other half of the case would have to move farther, since they are .76 mm (.030") misaligned with the top clips.

6. We would like the lens to be larger, especially across the width of the case, so that the infrared light is not blocked.

7. Don't forget the labels for the batteries as shown on the blueprint.

8. The outer finish is to be a matte texture, but we understand you will not do this to the mold until everything else is approved.

9. Please advise us if it is possible to color the "racing stripes" at the top of the case.

Bottom Case

1. See the Top Case notes regarding the 3 infrared LED holders (note 5), the lens (note 6), the texture (note 8), and the fit (note 3).

2. The 1 mm diameter PC Board supports are not doing the job they were intended for, which is to provide something to push against when keys are pressed.

a. The 7 standoffs nearest the batteries are not necessary, since the PC board clips and the stiffness of the board provide enough support. You can remove these 7.

b. The 3 near the IC chips do provide support, but they are easily broken off. Please increase their diameter to at least 2 mm.

c. The end of the PC board near the LEDs is not supported at all. Please add 3 standoffs (2 mm diameter or larger) 23 mm (.906") from the other three.

d. The one underneath the visible LED would be too long if we were not going to drill the LED hole in the PCB so the LED bottom will be flush with the surface of the PCB (see PC Board note 4). Since we are going to do that the length is okay, but the diameter should be increased like the others.

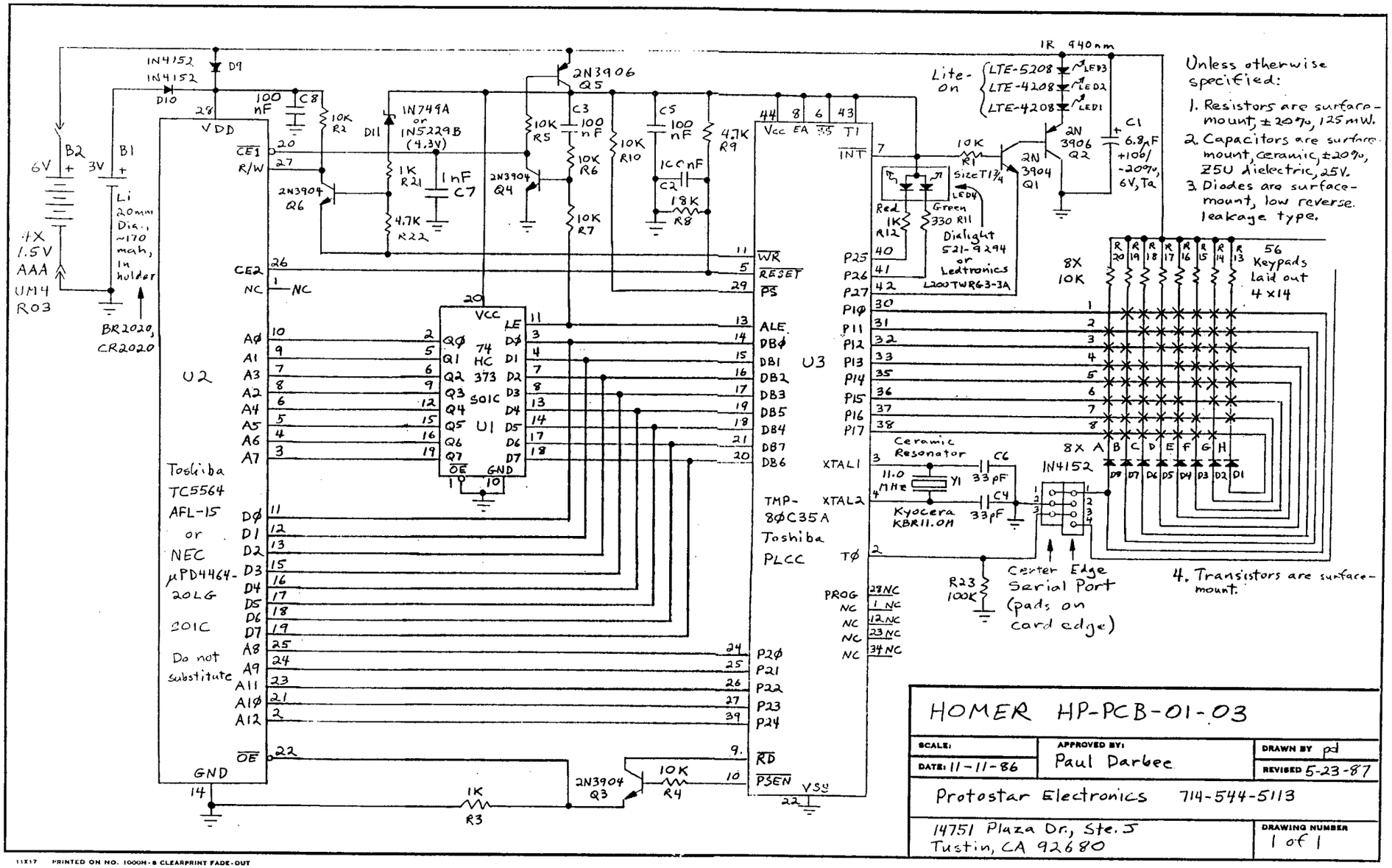
3. The initials of the designers should be engraved on the inside of the bottom case.

4. See the Lithium Battery Holder note 5. If you decide to mold in a retainer for the lithium battery, it goes on this piece.

Keyboard Overlay

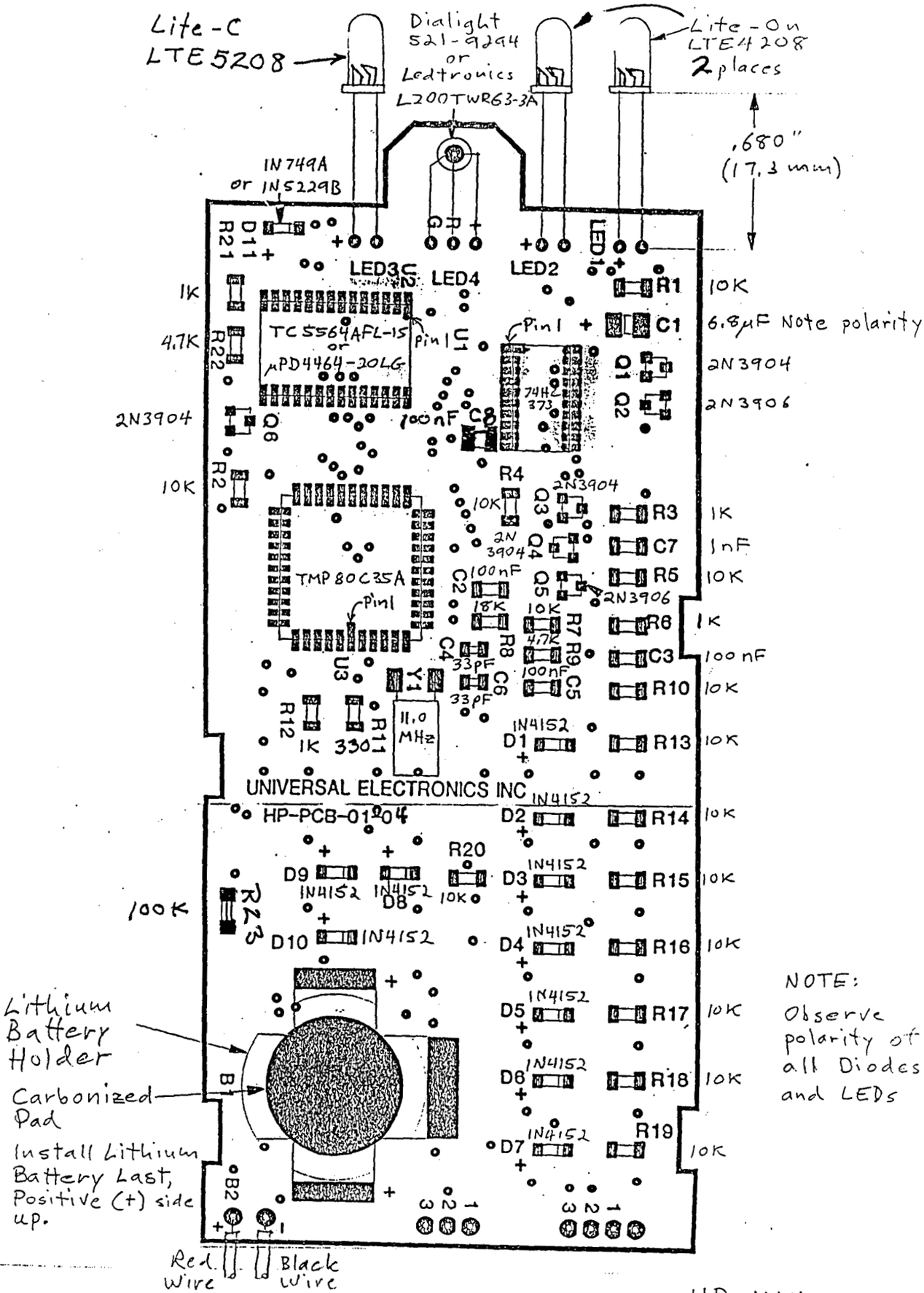
1. Even though we do not yet have the final artwork for the keyboard overlay, we would like you to prepare blank overlays as soon as possible. The preferred material is metal (aluminum) with a pressure-sensitive adhesive on the back, although Mylar (polyester) would be okay if it is thick enough. The inset on the top case allows 0.5 mm thickness. Please make sure the openings for the keys match whatever final dimensions you decide on to solve the key-sticking problem.

Exhibit N



11X17 PRINTED ON NO. 1000H-8 CLEARPRINT FADE-OUT

Exhibit O



Homer PCB Assembly Drawing

HD-MAN-05-0.2
5-29-87 RL

Exhibit P

Universal Electronics

UNI-COM

Universal Remote Control

User's Manual

Review Copy

June 8, 1987

Copy For: Paul

UNI-COM User Manual

Introducing UNI-COM

Congratulations! You have selected one of the most powerful remote controls available today. Your UNI-COM works with almost all modern television, VCR, cable and compact disk (CD) systems. Because it works with so many different models, UNI-COM needs a little help to know just what equipment you are using.

This booklet will have you using UNI-COM's basic functions in just minutes. If you care to learn some other, more advanced functions, (which are also easy to learn) you will have an awesome source of remote control power right at your fingertips!

Before Using UNI-COM

Before using UNI-COM, there are a few simple guidelines you should always follow:

- UNI-COM uses invisible light beams to talk with your TV, VCR, cable box or CD player. Make sure ~~nothing~~ no objects (furniture, plants, people, etc..) block the light beams or it will not work.
- When using UNI-COM, make sure you always point it at the device(s) you want to control.
- Except for the batteries (which are included), UNI-COM does not have any user-serviceable parts. Opening the case except for the battery cover may cause permanent damage to your UNI-COM and voids the warranty.

Matching UNI-COM to Your Equipment

As you know, there are many brands and models of remote controlled TVs, VCRs, cable converters and CD players that have been sold and are on the market today. UNI-COM knows this and can control most of them, including yours. Since UNI-COM works with so many different models, it needs you to tell it what equipment you have. Once UNI-COM is matched to your equipment, you can use it just like your old remote controls.

Matching Your TV:

First, let's match UNI-COM to your TV:

1. Turn your TV on.

2. Aim UNI-COM at your TV.

   Make sure that you are reasonably close to the TV set (about 15 feet) and that nothing is blocking the path to the TV set.

3. Press TV. O.K.

4. Press Do.

5. Press Enter. O.K.

6. Press Ch+.

   The ~~red~~ light at the top of UNI-COM will start blinking telling you that UNI-COM is searching for your TV (the search could take a few minutes). Be sure to keep pointing UNI-COM at your TV. When your TV's channel starts changing: O.K.

7. Press Ch+ again. O.K.

   If UNI-COM's light stops blinking and your TV's channel did not change, repeat the steps above. If it does not match the second time, refer to the Some Questions You May Have section at the back of this book. O.K.

If Your TV Does Not Have a Channel Up Button O.K.
Some TVs do not have a channel up feature. If yours is one of these, the channel will not change to let you know that UNI-COM has found your TV. Instead, UNI-COM will let you know by doing something else like turning your TV on and off or changing the volume. When you notice something like this, just press the CH+ button on UNI-COM to let it know it has found your TV. O.K.

Matching Your VCR:
UNI-COM can easily control two VCRs. Here we will match VCR1 (your main VCR if you have more than one) to UNI-COM. If you have a second VCR, just do the same thing except for VCR2.

1. Turn your VCR on and load a tape into it.

2. Aim UNI-COM at your VCR.

3. Press VCR1, Do, Enter, ~~and then~~ Ch+. O.K.

   This tells UNI-COM to search for your VCR. The light at top will start blinking. Be sure to keep UNI-COM pointed at your VCR. When your VCR begins playing:

4. Press Ch+ again. O.K.

   If UNI-COM's light stops blinking and your VCR did not go into play, repeat the steps above. If it does not match the second time, refer to the Some Questions You May Have section at the back of this book.

O.K.

Matching Your Cable Converter:

To match UNI-COM to your cable converter:

1. Turn your cable converter on.

2. Aim UNI-COM at your cable converter.

3. Press Cable, Do, Enter, ~~then~~ Ch+. O.K.

   UNI-COM's light will blink as it searches for your cable converter. Be sure to keep UNI-COM pointed at your converter. When it begins changing channels:

4. Press Ch+ again. O.K.

   If UNI-COM stops blinking and your cable converter's channel has not changed, repeat the steps above. If it does not match the second time, refer to the Some Questions You May Have section at the back of this book. O.K.

Matching Your CD Player

To match UNI-COM to your CD player:

1. Turn your CD player on and load a disk into it.

2. Aim UNI-COM at your CD player.

3. Press CD, Do, Enter, ~~and then~~ Ch+. O.K.

   This tells UNI-COM to search for your CD. The light at top will start blinking. Be sure to keep UNI-COM pointed at your CD player . When your CD begins playing:

4. Press Ch+ again. O.K.

   If UNI-COM's light stops blinking and your CD did not go into play, repeat the steps above. If it does not match the second time, refer to the Some Questions You May Have section at the back of this book. O.K.

UNI-COM's Keyboard

UNI-COM's keyboard is made up of four groups of buttons:

- Device Selection Buttons.
- Basic Function Buttons.
- Channel Selection Buttons.
- Do, Do1 and Do2 and the A-Through-H Buttons.

A. Device Selection Buttons
These buttons select which device you want UNI-COM to control (TV, VCR1, VCR2, Cable, or CD).

B. Basic Function Buttons
The 12 basic function buttons (Power, Rec, TV-VCR, Stop, Pause, <<, <, Play, >>, Vol+, Vol-, and Mute) are used to control your TV, VCR, and CD player. They work in much the same way as your old remotes.

C. Channel Selection Buttons O.K.
The number buttons (0-9), Ch+, Ch-, are used with your TV and cable converter to select the channel you want to watch. Recall brings back the last channel you were watching before changing channels.

D. Do, Do1 and Do2 and the A-Through-H Buttons.
Do, Do1 and Do2 are used to perform a DO command which we'll talk about later in this book. The A-through-H buttons perform any special functions your equipment may have (color control, picture control, tint control, etc..). We'll talk more about these later.

Some Basic Functions

Now that UNI-COM is matched to your equipment, the basic functions that your old remote controls used to perform can now be done by UNI-COM. At the very top of your UNI-COM are 5 buttons: TV, VCR1, VCR2, Cable, and CD. These select which device you want to control. For example, if you want to turn your TV on:

1. Press TV. This selects your television.

2. Press Power to turn your TV on.

Once a device is selected, UNI-COM will control that device until you tell it to control a different one. Since you have already selected and turned your TV on, let's perform some basic TV functions:

1. Press Ch+. Your TV's channel should change up.

2. Press Ch-. Your TV's channel should change down.

3. Press 0, 3, then Enter. Your TV should tune to channel 3.

4. Press Vol+. Your TV's volume should increase.

5. Press Vol-. Your TV's volume should decrease.

6. Press Power. Your TV should turn off.

7. Press Power again. You TV should turn back on.

If your television has mute and/or recall functions, UNI-COM can perform these as well. (Of course, if your original remote did not have these features, UNI-COM cannot perform them.) Now, let's move on to controlling your VCR.

Remember, you have to tell UNI-COM which device you want to control, in this case your VCR:

1. Press VCR. This tell UNI-COM that you want to control your VCR.

2. Press Power. Your VCR should turn on.

3. Press Play. Your VCR should start playing. (If your VCR is set for channel 3 on your TV set, you should see what is recorded on the tape.)

4. Press Stop.

5. Press >>. Your VCR should fast forward.

6. Press Stop.

7. Press <<. Your VCR sould rewind.

To record on your VCR, set the tape up and do the following:

1. Press Rec to begin recording.

2. Press Pause to pause during recording.

3. Press Stop to halt recording.

If your VCR has TV/VCR, and reverse play functions these too can be controlled by UNI-COM.

If you have a cable converter, let's see how UNI-COM controls that.

1. Press Cable.

   Remember, you have to tell UNI-COM which piece of equipment you want to control.

2. Press Power. Your cable converter should turn on.

3. Press Ch+. Your channel should change up.

4. Press Ch-. Your channel should change down.

5. Press 0, 7, then Enter. Your cable converter should tune to channel 7.

If you have a CD player, lets see how UNI-COM controls that:

1. Press CD, then Power. This tell UNI-COM that you want to control your CD and to turn it on.

2. Press Play. Your CD should start playing.

4. Press Stop.

5. Press >>. Your CD should skip to the next track.

6. Press Stop.

7. Press <<. Your CD sould skip to the previous track.

Special Features

Besides the basic functions such as channel up/down and volume up/down that most TV remote controls have, there could be special features as well, for example:

- Color up/down
- Picture up/down
- Tint up/down
- Sleep

Your VCR's remote control can also have special features such as:

- Forward advance
- Channel up/down

Cable converter remotes can also have additional features such as:

- Channel recall
- Delete

CD players can have special features such as:

- Repeat
- Track Programming

Once you have matched UNI-COM to your TV, VCR, cable converter and CD player, special features that were controlled by your old remotes can now be controlled by UNI-COM! Since UNI-COM can control such a wide range of equipment, there isn't enough room on it for buttons for every possible feature of every remote control. Instead, there are eight buttons at the bottom labelled A through H. To find out what these eight buttons control for your particular TV, VCR, cable converter and CD player models:

1. Look at the second book (Appendix) that came with your UNI-COM that lists model numbers for each type of equipment UNI-COM controls.

2. Find the model numbers of the devices that you have.

3. Read the feature charts next to your model numbers which tell you what functions the A through H buttons control for your particular device. For example, the feature chart for your TV might read:

   A = Color up
   B = Color down
   C = Picture up
   D = Picture down
   E = Tint up
   F = Tint down
   G = Last channel recall
   H = Sleep

4. To turn the color up in this example, you would press TV, (of course if UNI-COM is already set to control your TV, you do not have to press TV again but it doesn't hurt if you do so) then A.

5. To turn the color back down, you would just press B.

6. Write down what special functions are controlled by the A through H keys on the handy stick-on labels enclosed with your UNI-COM. (There are separate labels for your TV, VCR, cable converter and CD player.)

7. After writing down the special functions on the labels, stick them on to the back of your UNI-COM so that you have them for quick and easy reference.

If A Device Has More Than 8 Special Features:

Usually, the eight A through H buttons are enough for most devices. If they're not, don't worry, if your device has more than eight special features these too are also controlled by UNI-COM! After the A through H function buttons, any additional functions are performed by pressing two of the 0-9 number buttons. For example, your TV's feature chart (at the index of this book) may show additional functions like these:

2 4 = Space Phone
2 5 = Stereo Broadcast

If you did have these features and wanted to use them, you would press DO and then the two-digit number for that feature. In our example, if you want to turn stereo broadcast on you would:

1. Press Do.

2. Press 2, then 5.

   This would turn your TV's stereo broadcast feature on.

If you use a feature like this frequently you may want to assign it to a DO command, which is the next topic of discussion.

Some Advanced Features

Now that you are familiar with basic UNI-COM features, you can see how much power it gives you in controlling your equipment. However, this is only part of UNI-COM's full capabilities. In the sections that follow, we will discuss some advanced (but easy to learn) UNI-COM features that allow you to perform functions you never thought possible from any remote control. For example, we will discuss DO commands which give you the power to perform a multitude of different functions with the push of just one or two buttons!

DO Commands

Before sitting down to watch your favorite show there are certain things you might have to do. For example, you may have to turn your TV, VCR and cable converter on, get your VCR ready to record, and set the cable converter to your favorite station. Normally with your old remote controls,

it took a lot of button pushing, not to mention having to find the right remote control. With UNI-COM you can do all this and more with the push of just one or two buttons!

To tell UNI-COM to do what you want, you must first set it up. (UNI-COM is very smart; once you set it up, it will remember it for a long time.) As an example, you can set-up UNI-COM to turn your whole system on and set the TV to channel 3 by doing the following:

1. First, Do then Recall. This tells UNI-COM that you want to set it up.

   Next, you must tell UNI-COM which button you will press to turn everything on and set the TV to channel 3. You can use any of UNI-COM's buttons except the Do, TV, Cable, VCR, VCR2, CD and the number buttons 0-9. For our example, let's use DO1 at the top of the keyboard:

2. Press Do1.

   Now, you must tell UNI-COM what buttons you would normally press to turn your whole system on and set the TV to channel 3:

3. Press TV, then Power. This tells UNI-COM to turn your TV on.

4. Press 0, 3, then Enter. This tells UNI-COM to set your TV to channel 3.

5. Press VCR, then Power. This tells UNI-COM to turn your VCR on.

6. Press Cable, then Power. This tells UNI-COM to turn your cable converter on.

7. Press Do, then Recall. This tells UNI-COM that you are finished setting it up and to remember what you have set-up.

   Now UNI-COM knows how to turn your TV, VCR, and cable converter on and set the TV to channel 3, just by pressing one button:

8. Aim UNI-COM at your equipment and press Do1.

   Your TV, VCR, and cable converter should now be on and your TV set to channel 3... all because you set-up UNI-COM with how to DO it! To turn everything back off just press the Do1 button again.

O.K

Now that you know how DO commands work, you can set-up UNI-COM to "DO" practically anything! Just remember to keep the following in mind:

- First press Do, then Recall to let UNI-COM know you are going to set-up a DO command.
- Look at UNI-COM's light. If it flashes red, it means that it is ready to learn a DO command. If it flashes yellow, it means you are in the middle of setting it up already. To start set-up from the beginning, press Do again.
- Select a button you want to use to perform the DO command you are setting up. (Remember, you cannot use the Do, TV, VCR, VCR2, CD, Cable, or the 0-9 buttons.)
- Press the buttons you would normally press to do what you want.
- When you are finished setting up UNI-COM, press Do, then Recall.
- To do what you have taught UNI-COM, press Do then the button you have assigned to perform the DO command. If you assigned the Dol or Do2 button to that DO command, you <u>do not</u> have to press Do, just press the button.
- DO commands work in any mode: TV, VCR, or CABLE.

If you make a mistake while setting up UNI-COM, that's okay. Just start over again from the beginning. UNI-COM is very forgiving!

If UNI-COM starts blinking green, yellow, red while you are trying to set it up, it is telling you that its memory is full. The DO command you are setting up is automatically erased. You can set-up a shorter DO command, or erase another DO command you have already set-up to get more room.

<u>Erasing A DO Command.</u>
To erase a DO command to make more room for another DO command:

1. Press Do, then Recall.
2. Press the button you have assigned to the DO command

that you want to erase. (For example, to erase the DO command you taught UNI-COM above, press DO1.)

3. Press Do and Recall again.

Quik-Match

At the beginning of this booklet you learned how to match your equipment to UNI-COM by having it search for your particular model in its memory, however, searching usually takes a few minutes. There is a quicker way to match your equipment to UNI-COM by doing a Quik-Match. For example, to Quik-Match your VCR:

1. Find your VCR's model number in the index.

2. Look at the feature chart for your particular VCR model. Under the heading: Quik-Match you will see a sequence of eight R's and G's which may look like this:

   R R R R G G G G

   An "R" means a red blink, a "G" means a green blink.

3. Write down the sequence of R's and G's for your particular VCR model.

4. Press Do, Enter, then Recall. This tells UNI-COM you want to do a Quik-Match.

Now you must enter the sequence of R's and G's for your particular VCR model. This is done by pressing CH- for "R" and CH+ for "G". For example, if you were to enter the sequence shown above you would press:

Ch-. Ch-, Ch-, Ch-, Ch+, Ch+, Ch+, Ch+

5. Enter the correct sequence by pressing Ch- for "R" and Ch+ for "G". UNI-COM's light will flash red or green depending on what button you push.

6. If UNI-COM has successfully Quick-Matched your device, it will automatically flash green. If it did not match, it will flash yellow. Try to Quick-Match it again. If it fails a second time, refer to the Some Questions You May Have section at the back of this booklet.

If UNI-COM flashes green, your VCR was successfully matched. Follow the same procedure to Quik-Match your other devices to UNI-COM. If UNI-COM flashes yellow, your device was not matched. Try Quik-Matching it again. See the Questions About UNI-COM section of this booklet if your device cannot be Quik-Matched.

Quik-Matching Additional Devices

One of the great benefits of Quik-Matching is that you can switch UNI-COM's functions between the remote controlled TVs, VCRs, cable converters and CD players you may own. This is done by using Quik-Match with a DO command. Here's how:

Let's suppose you have two TVs in your house and only one UNI-COM. No problem, with Quik-Match and DO commands you can assign your second TV to a DO command:

1. Press Do, Recall, and the button you want to use (for example, Do2). This tells UNI-COM that you want to teach it a DO command.

   Remember, you cannot use the Do, TV, VCR, VCR2, CD, Cable, or the 0-9 buttons.

2. Press Do, Enter, then Recall. This tells UNI-COM that you want to do a quik-match.

3. Enter the R and G sequence of the second TV you want to control.

   Remember Ch- is an "R" and Ch+ is a "G".

4. Press Do, then Recall. This tells UNI-COM you are finished setting up a DO command.

   Now, to control your second TV, press Do2. This tells UNI-COM that you want to control your second TV. To go back to controlling your first TV, just press TV. Whenever you want to control your second TV, just press Do2.

   You can see how easily UNI-COM can be set-up to control a whole house-full of infrared remote controlled equipment. Just set-up each device as a DO command!

Erasing UNI-COM's Memory

UNI-COM does not forget what you have set-up (even if you remove the batteries) unless you erase its memory. To erase everything you have set-up:

1. Press Do, Recall, Enter.

2. Press Do, Recall, and Enter again.

Battery Installation

Your UNI-COM uses four "AAA" size batteries which last an average of one year. The batteries are located at the bottom of the unit, under the battery cover. It is very important that the batteries are inserted properly (see diagram A). Take your time when installing the batteries. Unlike other remote control devices, UNI-COM will not forget anything you have set-up even when the batteries are removed.

We recommend that you use "standard" carbon-zinc batteries. For longer life, alkaline batteries are an excellent choice. We do not recommend the use of rechargeable, nickle-cadmium batteries.

In Case Of Trouble...

- You press a function button (for example, << or Vol+) and nothing happens.

  Make sure you tell UNI-COM which device to control by pressing either TV, VCR1, VCR2, Cable, or CD.

  Make sure you point UNI-COM at the device you want to control and that nothing is blocking the path from UNI-COM to the device.

  Check UNI-COM's batteries. Replace them if they are weak or dead.

- You press a Do button (Do1, Do2 or one you have defined) and nothing happens.

  Make sure you have set-up UNI-COM to perform a specific operation when you press that button. (See DO Commands.)

  Keep UNI-COM pointed at your equipment while the light is flashing.

  Check UNI-COM's batteries. Replace them if they are weak or dead.

- You press a special function button (A through H, or a two number sequence) and nothing happens.

  Make sure you tell UNI-COM which device to control by pressing either TV, VCR1, VCR2, Cable, or CD.

Check to see if your old remote control also has these special functions. If not, UNI-COM does not control them either.

Make sure you are pressing the correct special function button. (See the special function button listing for your device at the back of this booklet.)

Check UNI-COM's batteries. Replace them if they are weak or dead.

- UNI-COM does not match to a device.

  Check to see if your device is infra-red remote controlled. You can tell by either looking in the user's manual of the device or by examining the front panel for an infrared sensor or detector.

  UNI-COM has not been programmed at the factory for your device. If your UNI-COM needs programming for your particular device, it must be done at Universal Electronics or at one of the many nationwide update stations. See the list of update stations enclosed with UNI-COM for the one nearest you.

Some Questions You May Have

This section will hopefully answer any questions you may have about UNI-COM and how to use it:

- What if UNI-COM does not work (does not match or Quik-Match) with my equipment?

  UNI-COM is programmed at the factory to work with most of the infra-red type remote controls in use today. If UNI-COM does not work with your equipment, it is either because your device is not infra-red remote controlled or because UNI-COM has not been programmed for your device. If your UNI-COM needs programming for your particular device, it must be done at Universal Electronics or at one of the many nationwide update stations. See the list of update stations enclosed with UNI-COM for the one nearest you.

- Can I make a DO command part of another DO command?

  No, you cannot ~~chain~~ put DO commands together. For example, let's suppose you've already set-up DO2 as a

DO command, then you cannot do: Do, Recall, Do1, TV, Power Do2, Do, then Recall. (The Do2 is invalid and will not work when you press Do1.)

- What if UNI-COM stops working all of a sudden?

  Make sure you point UNI-COM at your equipment. Since UNI-COM is more powerful than most other remotes it has greater range, but it does not work through walls (or other solid things.) or if you point it in the opposite direction. O.K

  Check the batteries. UNI-COM's batteries will last about one year. If the batteries are weak or dead, replace them with fresh cells. (See Battery Replacement.)

  Make sure you are not in the middle of setting up a Do command. You will know you are in the middle of a Do command if you press a button, UNI-COM's light flashes but nothing happens. Either finish setting up the Do command by pressing Do, then Recall or erase the Do command you are currently setting up. (See, Erasing A Do Command.)

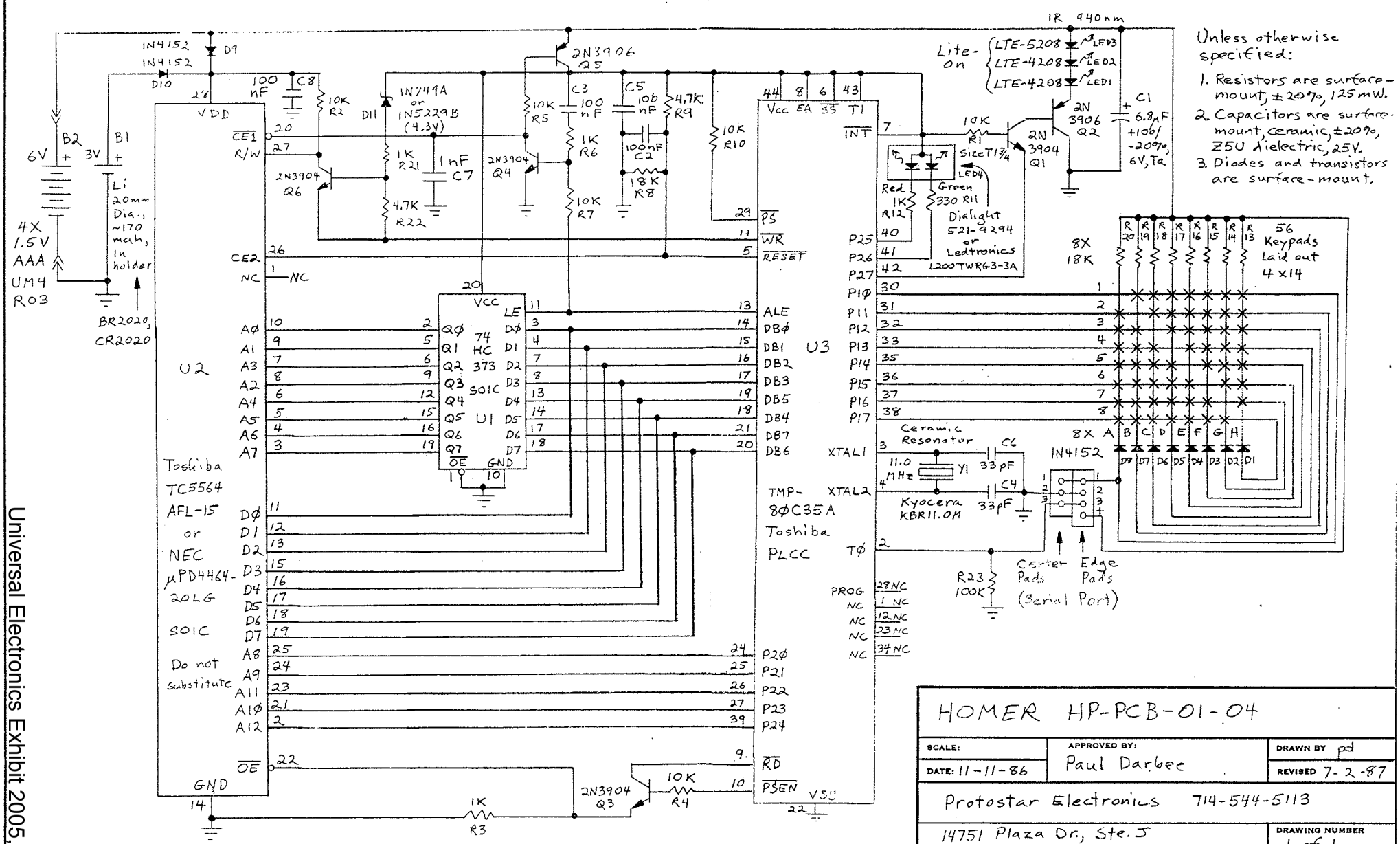
- What if I buy new equipment? Is my UNI-COM obsolete?

  No! Just match UNI-COM to your new equipment. If UNI-COM does not match to a new device, it must be updated at an update station. (See the list of update stations enclosed.)

- What do I do with my old remote controls?

  1. They make great paperweights.
  2. Keep them for posterity. (They may be worth something someday.)
  3. Give them as gifts to ignorant friends(?).

Exhibit Q



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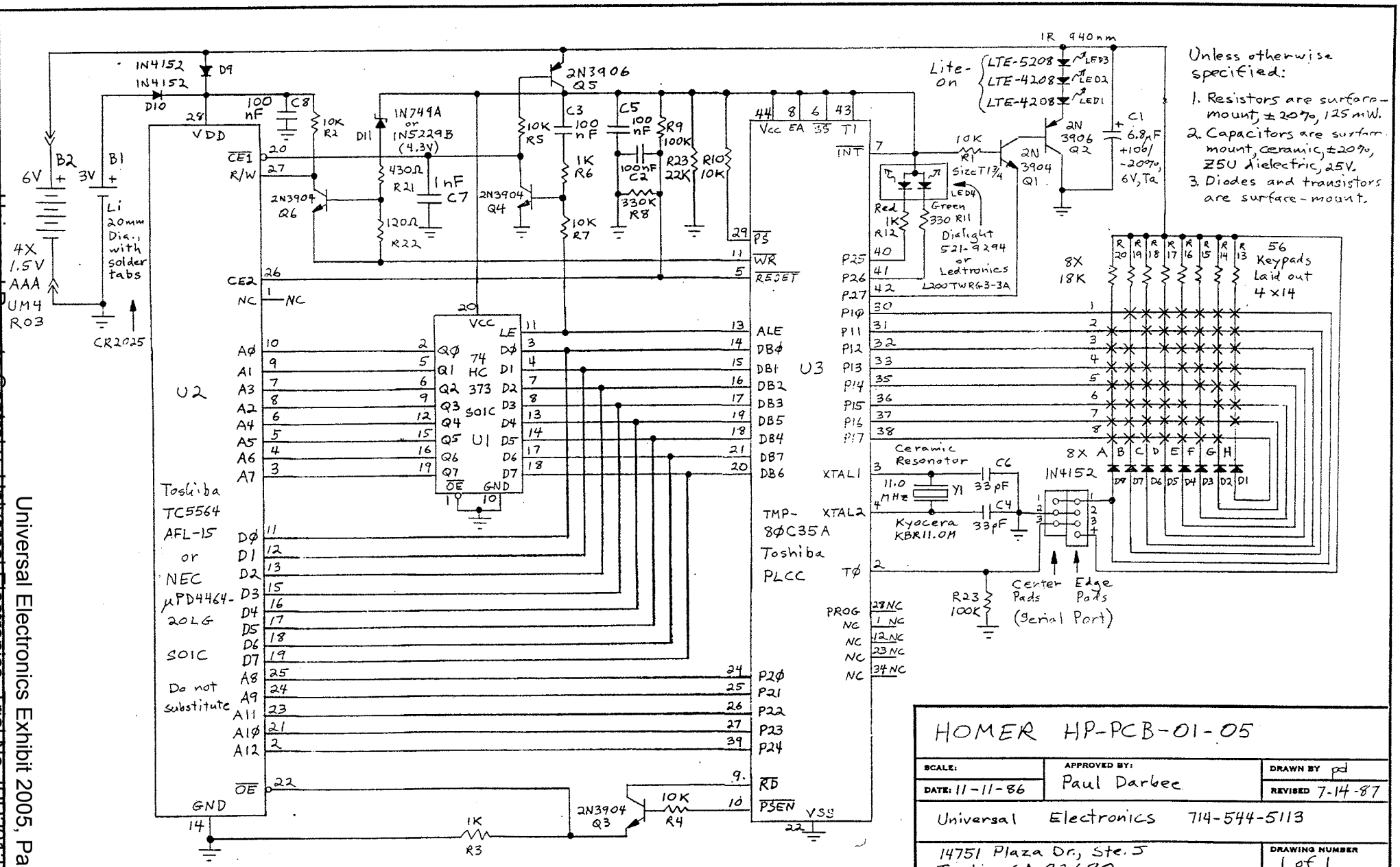
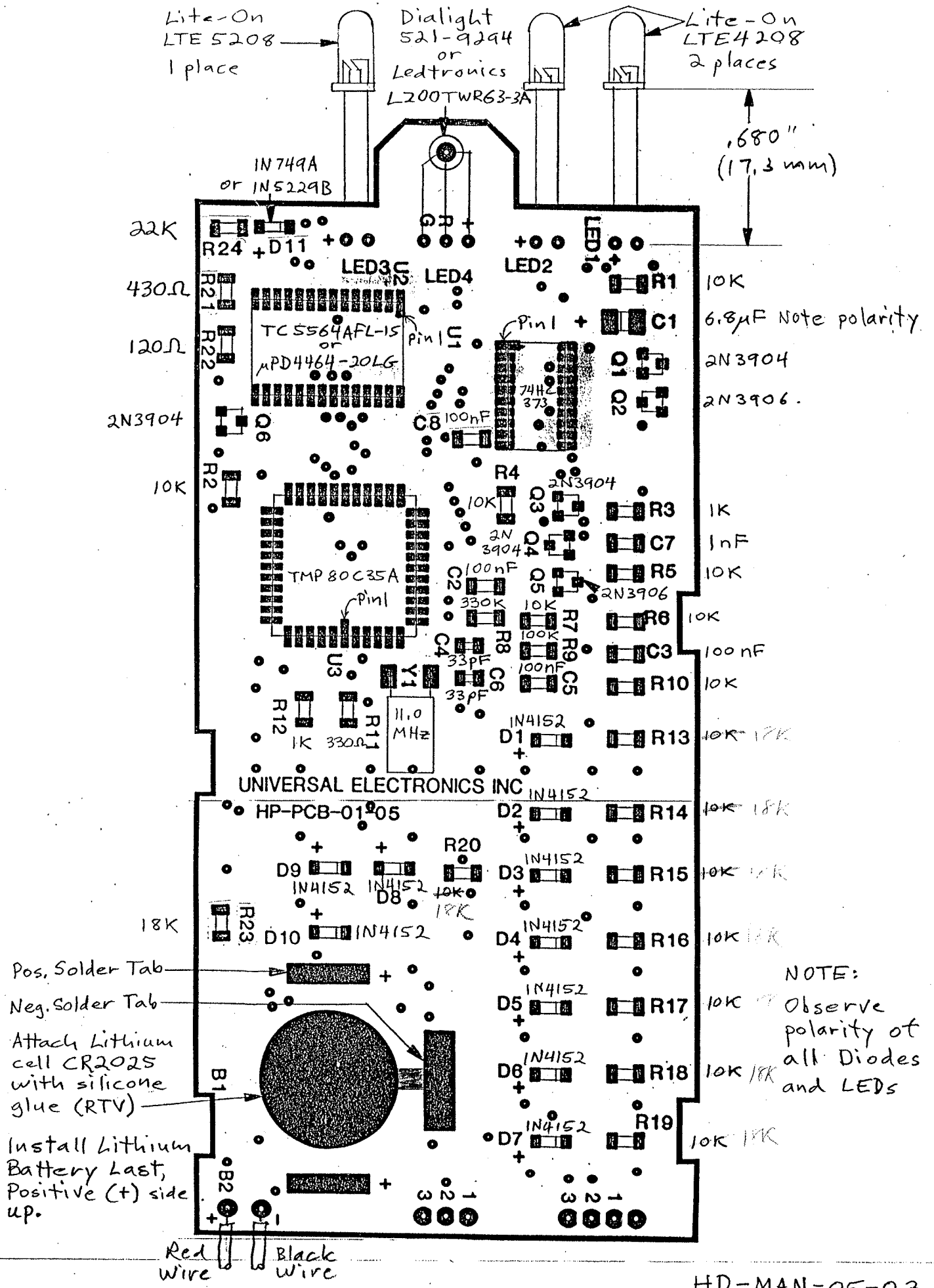


HOMER HP-PCB-01-05		
SCALE:	APPROVED BY: Paul Darbee	DRAWN BY pd
DATE: 11-11-86		REVISED 7-14-87
Universal Electronics 714-544-5113		
14751 Plaza Dr, Ste. 5 Tustin, CA 92680		DRAWING NUMBER 1 of 1

Exhibit S

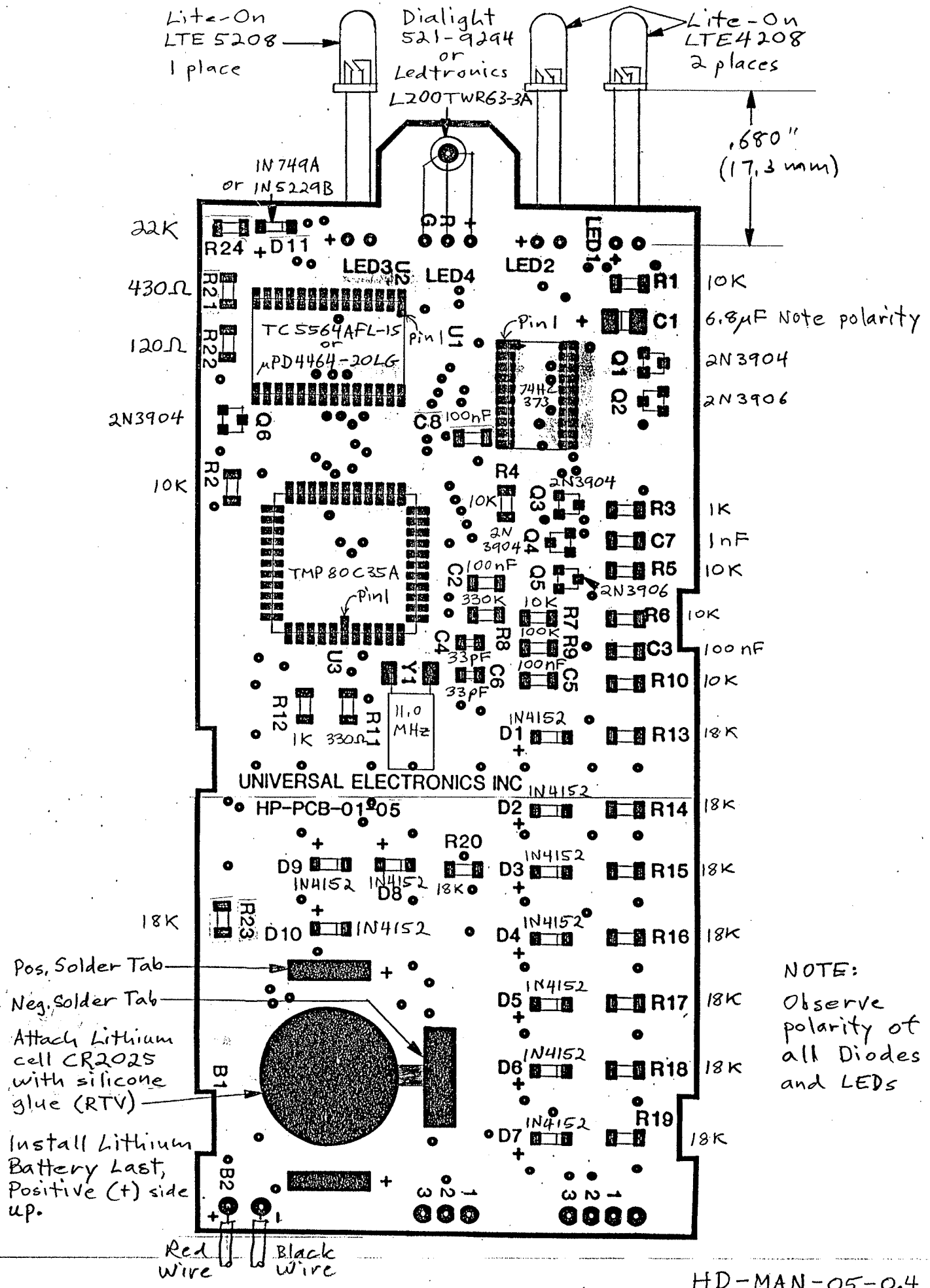


Homer PCB Assembly Drawing

HD-MAN-05-0.3

~~7-24~~ -87 pd

Exhibit T



Homer PCB Assembly Drawing

HD-MAN-05-0.4

8-6-87 pd