APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM

Inventor: David A. Monroe

APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The invention is generally related to image capture and transmission systems and is specifically directed to an image capture, compression and transmission system for use in connection with land line and wireless telephone systems.

DISCUSSION OF THE PRIOR ART

Industry has developed and continues to develop and enhance techniques for scanning, compressing, transmitting, receiving, decompressing, viewing and printing documents. This technology, encompassing the full body of facsimile transmission and reception, is currently in widespread use. The current standards, CCITT Group III and Group IV, define methods to scan and transmit high quality, bi-level images with a high degree of success and has become commercially acceptable throughout the world. However, gray scale documents are not easily transmitted because the scanners and algorithms are not tailored to the function. Three dimensional objects will not fit into the flat document scanners and cannot be transmitted.

Examples of systems that have addressed some of these issues are shown in U.S. Patent No. 5,193,012 which shows a video to facsimile signal converter, and U.S. Patent No. 3,251,937 which discloses a system for transmitting still television pictures over a telephone line.

Wire photography, and its extension , radio photography, have long been used by the news media. The most common form involves an input device that converts photographs into encoded signals for communication over telecommunications facilities or radio. At the receiving end, reproducing equipment reconverts the encoded image signals by exposing photographic film or other sensitized paper. The term facsimile is often use with these products.

Still video equipment has recently become available from vendors such as Kodak, Canon and Sony, and is again primarily used by the television and print media, although applications are expanding rapidly in such areas as insurance investigations and real estate transactions. A still video camera captures a full color still video image that can be reproduced using a special video printer that converts the still video image data into hard copy form. For applications requiring communication of the still video image, transmit/receive units are available wherein the image begins and ends as a video image.

The Photophone from Image Data Corporation is an example of a specialty product that combines a video camera, display and storage facility in a terminal package. One terminal can send a real time or stored still video image to another for display or storage, or printing on special video printers. Again, the signal begins and ends as a video image.

Another example of a specialty product is peripheral equipment available for personal computers that enables the input/output, storage and processing of still video images in digitized formats. For instance, the Canon PV-540 is a floppy disk drive that uses conventional still video disks, digitizing and a still video image using a conventional format, and communicates with the computer through a standard communications I/O port.

U.S. Patent No. 5,193,012 discloses a still-video to facsimile conversion system for converting the still-video image frame into a half-tone facsimile reproduction without having to store an entire intermediated gray scale image frame by repeatedly transmitting the still-video image frame from a still-video source to an input circuit with a virtual facsimile page synchronization module . This system permits image to facsimile conversion by utilizing a half tone conversion technique.

While the various prior art systems and techniques provide limited solutions to the problem of transmitting visual images via a facsimile transmission system, all fall short of providing a reliable and convenient method and apparatus for readily capturing, storing, transmitting and printing visual images in a practical manner.

SUMMARY OF THE INVENTION

The subject invention is an image capture, compression and transmission system that is specifically designed to permit reliable visual image transmission over land line or wireless communications using commercially available facsimile transmission techniques. The invention incorporates a camera and signal converter into an integrated unit wherein the converted signal may be transmitted on a real time basis or may be stored in memory for later recall and transmission. The design of the invention permits maximum flexibility, with the camera/converter/telephone or other transmission device being designed in a modular configuration wherein any or all of the devices may exist as integrated or independent units.

The preferred embodiment permits capture of a video image using a digital camera, an analog camera, or a video camera such as a camcorder. The captured video image is then converted into still frame digitized format for transmission over any of a variety of transmission systems ranging from Group-III facsimile to computer, or to a like device at a remote location, in any protocol desired. The invention recognizes that once the signal is digitized, the transmission protocols are virtually endless.

For example, the present invention, permits a still frame visual image to be captured at a remote location and sent immediately, over wireless communication systems, to a remote location such as, by way of example, a computer system wherein the image could be merged directly into newsprint. The image may also be sent to and printed as a hard copy using any Group-III facsimile machine, anywhere in the world. Where desired, the images may be stored in memory for later recall, and may be archived on a portable medium such as a memory card or the like.

The system of the subject invention is particularly useful for applications where immediate transmission of visual images of scenes, people and objects is desirable and sophisticated equipment is not always available for receiving the information. The system also provides a unique and reliable means for transmitting visual data to and from remote locations, such as, by way of example, law enforcement and emergency vehicles and the like.

In the preferred embodiment of the invention, the system includes a video

camera and an integral cellular telephone, wherein the telephone using the standard audio mode or future digital modes, can be used to transmit and receive visual image signals. A desk model is also disclosed and permits connection to a standard land line telephonic system. A mobile console model is disclosed for use in law enforcement vehicles, and the like. Other communication systems are also supported by the subject invention, including hardwired networks, radio and satellite transmission and the like.

A local facsimile machine may be incorporated with the unit and can serve as a printer for providing hard copy of the captured image at the point of capture, as well as being adapted for receiving facsimile transmissions in the standard fashion.

The circuitry is disclosed for supporting any of the preferred configurations from a basic real time transmission system via Group-III fax to a comprehensive system supporting both land line and wireless transmission of image, audio and documentary data at both a local and remote station.

The subject invention also permits digitized collection of audio signals through the use of an internal microphone, and external input device, a cellular telephone, land line telephone, wireless radio or other communication system, and digitized audio playback, as well. The playback can be via an internal speaker, out an external out jack to a remote device or via a cellular telephone, land line telephone, wireless radio or other communication system.

The digitized image and audio capture features permit association of audio with an image, as well as data with the image. Useful data associated with the image includes GPS from either internal or external GPS devices, range information from ranging devices, date and time, and text which may be input from an integrated keyboard or from a remote device.

It is an important feature of the invention that the system supports storage of images in an interim storage format including raw video, compressed video, interim gray scale format and/or half tone format. The image can also be stored in the selected output mode, such as by way of example, a Group III facsimile mode. The versatile capability of the system permits transmission of captured data to a standard bi-level facsimile machine such as Group III, to gray scale facsimile systems or full color

facsimile systems, as well as to other remote receiving devices such as, by way of example, personal computers and network servers. The data may be transferred in any of a variety of formats and protocols including JPEG, FAX, wavelets, emerging imagery formats, FAX and computer data protocols. The invention is adapted to operate in multiple modes, with a unitary capture and send mode or separate capture and store, and send modes.

In the preferred embodiment, the system is adapted for tagging a collected image, video, audio, and other data such as a GPS information, with geospatial information and real time clock and added text. This permits the complete historical data to be transmitted simultaneously with the image signal.

It is contemplated that the system of the invention would be self-contained with an integral power unit such as a disposable battery, rechargeable battery source or the like. Therefore, the system is adapted to power up when in use and power down or "sleep" when not activated, preserving power during idle time. The power systems for the video camera, the video input circuits and converters, the modem or other transmission devices and other high drain components may be isolated and only powered when needed. This also permits use of ancillary functions, such as use as a cellular telephone, to proceed without draining the power source by powering idle components. The processor clock rate may also be slowed down during idle mode to further conserve power.

Where desired, the system also includes camera operation control capability through the use of a digital/analog circuits for converting digital commands to analog signals for controlling the gain, pedestal, setup, white clip, lens focus, white balance, lens iris, lens zoom and other functions of the camera from a local input device, a remote device or as automatic or programmed functions. The central processor may also be used to control camera shutter rate. Other camera features and parameters which may be controlled in this manner are compressor resolution (such as high, medium, low user settings) corresponding to compression rate parameters, field/frame mode, color or monochrome, image spatial resolution (640x420 pixels, 320x240 pixels, for example), lens and camera adjustments, input selection where multiple cameras or

video sources are used and the like.

When an integrated communications device is used, such as by way of example, a cellular telephone, the telephone can be isolated from the rest of the system to permit independent use, and independent power up and power off and other cellular phone functions.

In operation, the system permits not only the manual capture, dial (select) and send of images, but may also be fully automated to capture, dial and send, for example, on a timed sequence or in response to a sensor such as a motion sensor, video motion detection, or from a remote trigger device. The remote trigger also may be activated by an incoming telephone signal, for example.

The remote device may also be use for remote loading and downloading of firmware, and for setting of the programmable parameters such as to provide remote configuration of sampling modes during capture, compression rates, triggering methods and the like.

The triggering function permits a multitude of sampling schemes for a simple triggered activation for capturing an image upon initiation to a trigger signal to more complicated schemes for capturing and transmitting images prior to and after receipt of the trigger signal. The trigger function can be set to operate, for example, on a time per sample and number of sample basis, or time per sample and total sample time basis, or number of samples and total time basis. Depending on application, the trigger can sample in a prior to and after signal mode, using in combination the time per sample and number of samples prior and after signal basis, a total time basis, a percent prior versus percent after trigger basis, time per sample basis, time prior to and time after trigger basis, and other combination. For example, if the image capture device is positioned to monitor traffic accidents at a specific location, and an audio signal sensor identifying a crash were used as the trigger, it would be desirable to collect image sample both prior to and after the trigger signal. The number of samples, total sample time, and percentage of samples prior to and after trigger would be controlled by the specific application.

Circular sampling techniques are supported by the data capture system of the

present invention. This is particularly useful when triggering events are used to initiate transmission of collected image data over the communications system. For example, if a triggering event is motion detected at a motion sensor, it may be useful to look at the images captured for a period of time both prior to and after the actual event. The circuitry of the subject invention permits any circular sampling technique to be utilized depending upon application, such as prior to an after trigger, only after trigger or only before trigger or prior to and after the trigger point. Again, as an example, it may desirable to look primarily at images captured before a triggering event if the event is a catastrophic event such as an explosion or the like. Other circular sampling techniques may be employed, as well, incorporating multiple cameras, for example, wherein different fields are sampled depending upon the time frame in a sequence of events.

It is, therefore, an object and feature of the invention to provide an apparatus for capturing, converting and transmitting a visual image via standard facsimile transmissions systems.

It is another object and feature of the invention to provide an apparatus for compressing the visual image data in order to minimize the capacity requirements of the data capture and storage system.

It is an additional object and feature of the invention to provide an apparatus for capturing and storing a visual image for later recall and review and/or transmission.

It is yet another object and feature of the invention to provide an apparatus for storing a captured video image in digital format on a portable storage medium.

It is an additional object and feature of the invention to provide an apparatus capable of sending and receiving telephonic audio messages, facsimile documents and captured visual images to and from standard, readily available remote stations.

It is a further object and feature of the invention to provide the means and method for capturing images prior to, prior to and after, or after a triggering event.

It is also an object and feature of the invention to provide for multiple triggering events and/or optional viewing or review of the captured images prior to printing or transmission.

It is another object and feature of the invention to provide an apparatus which may be activated from a remote location for initiating the capture of images by the device.

Other objects and features will be readily apparent from the drawings and detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a basic facsimile camera configuration for capturing an image via a camera and transmitting it via Group-III facsimile transmission to a standard hard copy medium.

Fig. 2 is similar to Fig. 1, but incorporates a memory storage capability, permitting storage and optional review or viewing of the image prior to transmission.

Fig. 3 is similar to Figs. 1 and 2, but incorporates a data compression scheme for increasing the capacity of the memory and for increasing efficiency of transmission.

Fig. 4 includes the capture and transmission configuration of Fig. 2, with multiple transmission format capability including Group-III facsimile, personal computer, modem, parallel and serial transmission schemes.

Fig. 5 is an exemplary schematic diagram supporting the configurations shown in each of Figs. 1-4.

Figs. 6A, 6B, and 6C, are block diagrams of the physical components of desktop, portable and comprehensive console embodiments of the invention, respectively.

Fig. 7A and 7B are perspective drawings of a hand held device for capturing, storing and transmitting an image in accordance with the invention (new drawings to replace Frassinito design.

Figs. 8A-8L (Formerly Fig. 12) comprises a schematic diagram for an exemplary embodiment of the circuit for supporting the subject invention.

Fig. 9 is a diagram of the various triggering sequence options.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The image capture and transmission system of the subject invention is suited for capturing one or more single frame analog image or a digital image data signal and transmitting the captured signal via any of a plurality of transmission schemes to a remote receiving station where the image is downloaded in a suitable format for viewing and printing on hard paper copy, a CRT screen image, or other medium. The system is particularly well suited for sending and/or receiving images via a standard Group III facsimile transmission system and permits capture of the image at a remote location using an analog or digital camera. Two generic configurations are shown and described, the first, where each image is transmitted as it is captured, and the second, which permits capture, storage, and selective recall of captured images for transmission. The invention also contemplates a portable storage medium, wherein the captured stored medium may be removed from the capture device and archived for later use. While a system for black and white (gray tones) for Group-III facsimile transmission is described in detail herein, the invention could be readily adapted to transmission of color images utilizing the teachings of the present invention using industry standard color video standards and circuits. Both portable, or hand held, and stationary, or desktop, units are described. The circuitry utilized for both is configurations is identical , but stationary configurations do not need a battery.

Figs. 1-5 are circuit configuration diagrams for the various capture, storage and transmission schemes. The physical embodiments utilized to employ the teachings of the schemes taught in Figs. 1-5 are not limited. Figs. 6-10 are exemplary physical embodiments of the subject invention.

Turning now to Fig. 1, the simplest embodiment of the invention incorporates a standard analog or digital camera device 10 for capturing a visual image in the typical fashion. The camera 10 may be operator activated as indicated at 12, or may be programmed to be activated at selected intervals or in response to certain conditions. For example, a motion detector may be utilized to activate the camera 10 in a surveillance installation. Once activated, the camera 10 captures a visual image in typical fashion through a lens (see lens 192, for example, in Fig. 7A). In the illustrated

embodiment, the captured image is then transmitted to a gray scale bit map memory device 16, from which it is output to a half-tone conversion scheme 18 to be input into a binary bit map 20 for formatting the captured image in a configuration suitable for transmission via a Group-III facsimile system. The signal generated at 22 by the binary bit map 20 is input into a Group-III encoding and compression network 24 for generating an output signal at 26 which is introduced into a Group-III protocol transmission device 28. The output at 30 of the transmission device 28 is then transmitted into any standard transmission interface such as, by way of example, hard line telephonic transmission, cellular transmission, radio signal, satellite transmission or other transmission system 32 via a modem or similar device, as needed(as diagrammatically illustrated at 29), to be received via a compatible interface by a remote Group-III receiving system 34. The Group-III receiving system 34 is a typical Group-III facsimile system comprising a Group-III receiver 36, decoder and decompressor 38 and binary bit map 40, from which a facsimile hard copy such as plain paper copy 42 may be generated.

This configuration is particularly well suited where real near time transmission is desired, for example when the system is operator controlled and a "real time" image is desired at a remote location. An example of such a system may be a photo-identification confirmation of an apprehended suspect in law enforcement use, or transmission of images of damaged assets for insurance purposes, or transmission of images of construction job site conditions. This configuration is also well suited for use in those applications where a sensor activates the system and real time transmission of the sensed condition is desired. An example of such a system would be a motion activated camera in a surveillance location, where the image is immediately transmitted to a remote monitoring station. Of course, it will be readily understood by those who are skilled in the art that tagging a transmitted image with information such as, by way of example, date, time and location, can be incorporated in the transmitted signal so that a receiving station could monitor a plurality of remote image data capture systems. This is also useful for reviewing a body of previously stored or printed images to determine the time and location of such image.

The embodiment of Fig. 2 is similar to Fig. 1, but incorporates a memory and optional operator viewer system. The image is captured by the camera 10 and conditioned by the gray scale bit map 16, as in Fig. 1. In this embodiment, the output 44 of the bit map 16 is input into a standard digital memory device 46 for later recall. This configuration is particularly well suited for applications where near real time transmission of the image either is not required or is not desirable. It will be noted that with the exception of the insertion of the memory device 46 and the optional viewer device 48, the capture and transmission system of Fig. 2 is identical to that shown and described in Fig. 1. Once the image is captured by the camera 10 and is presented at 44 to the memory device 46, it is stored for later recall and transmission. The specific type of memory device is optional and may include, for example, an SRAM device, a DRAM, Flash RAM, hard drive, floppy disk, PCMCIA format removable memory (see, for example, the PCMCIA card 72 in Fig. 7A), writeable optical media or other storage device. The memory may selectively capture images, as indicated by the operator interface/capture interface 52, or may be programmed to selectively capture periodic images or all images. In the embodiment shown in Fig. 2, an optional viewer device 48 is provided. This permits the operator to recall and view all or selective images before transmission, as indicated by the operator interface/recall interface 54. This permits the operator to review all images retained in the memory 46 and transmit selective images, as desired, to the Group-III transmission system. The remainder of the system of Fig. 2 operates in the same manner as the configuration shown and described in Fig. 1.

The configuration of Fig. 3 incorporates all of the features of Figs. 1 and 2, and additionally, includes an interim data compression and decompression scheme to permit increased utilization of the memory or storage medium 46. As shown in Fig. 3, an interim format compressor 56 is inserted between the gray scale bit map 16 and the memory device 46. This permits compression and reduction of the data required to store the image, effectively increasing the capacity of the storage device. It is an objective of the storage device to preserve the gray scale quality of the image for viewing at the location of capture. An interim format decompression device 58 is

inserted between the output of the memory device 46 and the rest of the system, whether the optional viewer 48 is utilized, or the output is entered directly into the half-tone convertor 18. The interim compression/decompression scheme is particularly useful when all of the image data is to be permanently archived, or when limited capacity portable media are used, such as, by way of example, floppy disks or a portable PCMCIA card. It will be noted that the remainder of the system shown in Fig. 3 is identical to the system shown and described in Fig. 2.

Fig. 4 illustrates the use of the image capture and/or retention configured in any of the optional embodiments of Figs. 1-3 and adapted for use in combination with any of a variety of transmitting and receiving schemes such as, by way of example, the Group-III system shown in Figs. 1-3, a modem, direct connection to a personal computer, serial or parallel transmission, or any selected transmitting/receiving protocol. This illustration demonstrates the versatility of the system once the image has been captured, converted and conditioned by the image capture device of the subject invention. Specifically, once the image is captured by the camera 10 and conditioned by the gray scale bit map 16, it may be stored and transmitted, or transmitted "real time" via any transmitting and receiving scheme. As shown in Fig. 4 the image capture device includes the memory device 46 and the optional viewer 48 for incorporating maximum capability. However, any of the schemes of Figs. 1-3 would be suitable for producing a transmittable signal. In the embodiment shown, a format select interface switch 60 is positioned to receive the fully conditioned signal on line 59. This would permit either automated or manual selection of the transmitting protocol, including the Group-III facsimile system previously described in connection with Figs. 1-3, as indicated by selecting format select switch 60 position A; or PC modem protocol as illustrated by the JPEG compressor 62 and protocol generator 64, as indicated by selecting format select switch position B; or the wavelet compressor and PC modem protocol, as illustrated by the wavelet compressor 66 and PC modem protocol generator 68 by selecting switch position C; or any selected conversion network 65, (if needed) with a compatible compressor 67 (if needed) and compatible protocol generator 75 (if needed), as indicated by switch position D; or a serial protocol scheme 77, with serial

drivers 79 directly to a hardwired personal computer 81 by selecting switch position E. Of course, it will be readily understood by those skilled in the art that one or a plurality of transmitting protocols may be simultaneously selected. Depending on the protocol selected, the signal output is generated at the selected output module and introduced to a communications interface module 83 via a modem or other device, as needed, for transmission via a transmission system to a compatible receiving station such as the Group-III facsimile device 34, the personal computer 85, the video telephone 89, and/or other server or receiving device 91 for distribution.

An exemplary circuit supporting the configurations of Figs. 1-4 is shown in Fig. 5. With specific reference to Fig. 5, an analog camera is indicated by the "video in" signal at 70. Typically, the video signal is a composite video/sync signal. The diagram shows all of the signal processing necessary to sync up to an NTSC signal 70 coming out of the analog camera and processed for introduction into an integral RAM memory 71 and/or a portable RAM memory via interface 73. An analog to digital (A/D) converter 74 converts the video portion of the analog signal from the camera and produces the digital signal for output at line 76. The digital output data on path 76 is introduced into a data multiplexer circuit 81 and into the RAM memory unit(s) 71, 72. In the exemplary embodiment, the portable RAM memory 72 is an image card such as, by way of example, a PCMCIA SRAM card or a PCMCIA Flash RAM card. However, it will be readily understood that any suitable RAM memory configuration can be used within the teachings of the invention. It is desirable to store compressed rather than raw data in card 72 because of space and transmission speed factors.

As the signal at 70 is introduced into the circuit, the sync detector 78 strips the sync signal portion off of the video signal. The sync signal drives the video address generator 80 for providing a signal used to generate an address signal at the address multiplexer circuit 82 for synchronizing the scanned in video signal with the locations in RAM to define each frame to be captured. The read/write control 84 controls the coordination of the sync signal 83 with the video signal to define a full frame. Basically, when the camera is activated either by the operator or by automation, the system processor 86 detects the initiation of the camera and capture sequence and sends

a signal via line 88 to the read/write control 84. The read/write control then monitors the incoming video signal 83 to find the horizontal and vertical sync pulse to identify the beginning of a frame. The read/write control then initiates writing to memory at the RAM devices to initiate capture of the frame. The read/write control continues to "write" to memory until the appropriate sync signal is received, indicating the end of the frame. At this point a single frame is captured in RAM 71 and/or on the portable medium RAM 72.

This frame may now be output from the system via any of the available transmitting schemes. In the exemplary embodiment, the processor 86 may be any processor or such as a microprocessoror DSP, with sufficient capability to perform the described functions. The processor bus is indicated at 87. The circuitry supporting the processor comprises the processor chip 86 and the control store memory (ROM, Flash RAM, PROM, EPROM or the like) 92 for storing the software program executed by the processor. It will be understood that other memory devices could be utilized without departing from the spirit of the invention. For example, a Flash RAM would permit flexibility and replacement of the program for upgrades and enhancements. The user interface commands are generated and interpreted by the software that is being executed by the processor 86.

The display unit 94 is connected through a typical interface 96, and provides visual user interface at the camera body to give the operator a visual read-out of the status of the collection and transmission of a selected frame. In the exemplary embodiment, the display unit is a two line, multi-character LCD display, but other sizes or technology displays could be readily incorporated, depending, for example, on the amount of graphics desired in the display module. The bank of operator buttons and/or switches 98 are connected to the system through the button interface 100.

The general purpose control register 102 serves as a latch and permits control bits to be introduced from the processor 86 to the transmitting systems or to transfer status bits from the transmitting systems back to the processor in the well known manner. The modem 104 may be any of a variety of widely available modems or modem chip sets currently in commercial use. The modem should support CCITT

Group III fax format for transmission to Group III fax machines. Once the signal is introduced into the modem 104, it is handled in typical fashion to provide input/output transmissions: (1) from the subject device to a hardwired telephonic line as indicated at 114, (2) from the subject device to the external facsimile machine as indicated at 116, or (3) from the subject device to an external wireless device telephone as indicated at 130. The specific selection is controlled by the user at button module 98 in conjunction with the processor 86.

An isolation transformer 110 is provided to isolate the circuitry connected to external communications circuit from the circuitry of the subject device. The relays at 108 and 112 permit patching directly into the hardwired telephonic line and to the telephone company system as indicated at 114, to an external handset or fax machine at 116, or to the modem 104, whereby facsimile data can be sent and received via the modem. These relays could be mechanical or solid state. The relay 118 is connected to a tone source 120 for providing an audible tone signaling to the user that the system is being used for transmitting or receiving a captured image.

With specific reference to the circuitry associated with relay 112, it will be noted that when the handset is switched away from the phone line to the tone source, the modem transformer 110 is switched to the telephone line 114. This blocks normal audio telephone service and permits the transmission of an image signal from the RAM devices 71 or 72, through the modem 104, and to the telephone line 114.

In the exemplary embodiment, a stand alone facsimile machine can be connected through the external handset jack at 116. With relay 112 set to activate telephone service and the tone generator 120 disconnected, the relay 108 can be set in either of two positions. The first position, as drawn, connects the facsimile machine at jack 116 to the telephone line, permitting standard facsimile transmission. The second or alternative position permits the modem 104 to transmit the image data signal directly to the facsimile machine at jack 116, for providing an archive copy or the like. In this configuration, the facsimile machine will operate as a local printer for printing the captured images. Signal source 120 may be used as a ringing voltage generator for signaling such facsimile machine prior to connection.

The system of the present invention also contemplates wireless transmission over a cellular telephone, radio frequency, satellite transmission or the like. In the exemplary embodiment, the specific configuration for a cellular telephone interface is shown in detail. The amplifiers 122, 124 amplify the input of the modem 104 and are controlled by the FETs 126, 128, respectively. The FETs are controlled by the control register 102 and allow selection of the audio either coming in from the cellular interface 130 or from the telephone line 104 to the modem. This permits the cellular phone to be used for three distinct functions: (1) as an audio telephone, (2) as a transmitting system for transmitting the captured image and related signals via a cellular system, and (3) for receiving incoming transmissions to the processor such as remote control, remote configuration, or images.

In the exemplary embodiment, the image card 72 is a DRAM card or non-volatile storage card such as a Flash RAM or the like and provides a removable medium for storing the image data as either raw or compressed data. The card can also be used to store compressed data sent into the system via external facsimile transmission. As illustrated, the system is capable of both sending and receiving image data via Group-III fax or other protocol. By incorporating the digital to analog (D/A) converter into the system and pulling the signal from the RAM 71 (or portable RAM 72), the signal can be displayed right at the camera viewfinder 134 or other display device connected at port 138. A sync generator 136 is incorporated to provide synchronization of incoming data in the same manner. The sync detector 78 is utilized to define a frame-by-frame correlation of the data generated by the camera at the video input 70 for storage to memory 71 or 72.

Any standard power source may be utilized, including replaceable or rechargeable batteries 141, or an AC adapter 142. The AC adapter is particularly suitable for desktop applications.

The exemplary embodiment includes a speaker or other audio transducer 144 for emitting a detectable signal whenever the user interface merits its use, such as user induced errors, system errors, user attention getting and the like.

In order to send a facsimile transmission over a typical Group-III Facsimile

system, the multiplexer 82 is switched to the processor 86 such that the RAM address is generated by the processor 82 instead of the video address generator signal. In the facsimile transmitting mode, the processor accesses the RAM and manipulates the data representing each frame image. For example, the processor will perform the gray scale to half tone conversions described in connection with Figs. 1-4 to prepare the signal for facsimile transmission. The processor can also perform image compression and output the image as a gray scale. In the facsimile transmission mode, once the half tone conversion is completed, the processor executes a code for performing a bi-level compression of the data and the signal representing the frame data is output over line 90, through the multiplexer 81 and over the processor bus 87 to the processor 86, then to modem 104 for transmission. Other memory and processor configurations could be used without departing from the scope and spirit of the invention, as will be recognized by those skilled in the art.

Various physical configurations of the invention are shown in Figs.7A & 7B. Figs. 6A, 6B and 6C are block diagrams for desktop and portable units. Figs. 7A and 7B iillustrate the subject invention as incorporated in a standard 35 millimeter type camera housing.

A basic desktop system is shown in Fig. 6A, and includes a console unit having a telephone jack 152, an external telephone connection 154 and a video input/camera power jack 156 for connecting the analog camera 10. A facsimile machine may be also connected at jack 154 to provide local printer capability. The configuration shown in Fig. 6B is a basic portable system, with a battery powered portable module 160 having a self-contained power source 162. The system may include an integral RAM and/or the removable memory module as indicated by the image card 72. The camera 10 may be an integral feature of the portable module 160, or may be a detached unit, as desired. In this embodiment, a cellular telephone 164 is provided with a data jack 166 for connecting to the output jack 168 of the module, whereby the image data signal may be transmitted via the cellular telephone to a remote facsimile machine over standard cellular and telephone company facilities. When incorporating the circuitry of Fig. 5, the cellular phone may be used as both an input and an output device, and incoming

data or stored images may be viewed through the viewfinder 170.

Fig. 6C shows a comprehensive desk or stationary configuration incorporating all of the features supported by the circuitry of Fig. 5. As there shown, the control module 172 is adapted for receiving the image card 72 and is powered by an AC power adapter as indicated at 142. The camera 10 is connected to the module via a hardwired connection at jack 174. A monitor 176 is provided for viewing data images. A video cassette recorder 178 is provided and may be used as an auxiliary input device for the images transmitted from the system. The facsimile machine 180 can be used as a local printer, or can be used to send facsimiles transmissions in the well-known manner. Direct connections to the telephone line system are provided at jack 182. The FAX/phone jack 186 can be connected to a facsimile machine 180 and/or a standard telephone 184, where the public telephone system can be accessed. A data jack 188 is used to connect to a cellular telephone or the cellular modem, or other wireless device for transmission or reception of image data.

Turning now to Figs. 7A and 7B, the camera body 190 is similar to a standard 35 millimeter camera housing and is adapted to receive a standard lens 192 with a viewfinder 194. The electronics are housed in the casing in the area normally occupied by the film and film advancing implements. The operator interface button keys 98 are housed within the housing and may be positioned on the back plate 196 of the body. ~~Fig. 8~~. The LCD unit may be positioned to be visible through the viewfinder 194 or may be in a separate back window 198. The memory card 72 is positioned in a slot 200 provided in a sidewall of the camera body. This camera has the appearance of a standard SLR 35 millimeter camera. In addition, where desired, an integral cellular phone can be incorporated in the camera housing and transmission can be sent directly from the camera housing to a remote receiving station. The keypad for the telephone is indicated at 202.

Fig. 8 is an illustration of an exemplary schematic diagram for the circuit of a system according to the teaching of the invention as specifically taught in the diagram of Fig. 5. Pin numbers, wiring harnesses and components are as shown on the drawing. Fig. 8, part A, is the system interconnect and shows the central processor board 300, the

video board 302, the power board 304 and the CRT electronic interconnect board 306. The telephone interface is provided at 307. Board 308 is the audio connector board. Board 310 is the serial connector board and board 312 is the video connector board. Fig. 8, part B contains the audio logic, with audio I/O at 314. The audio amplifiers are designated 316 and 318. A microphone connector is provided at 320, with preamplifier circuit 322. Audio switches are provided at 324 and 326. Summing circuit 328 provides audio summing. The serial RAM for audio is designated 330. Fig. 8, part C includes the camera module 332 and the camera control digital to analog convertor 334. Amplifier 336 is the video buffer. Module 338 is the camera shutter control resistor.

Fig. 8, part D contains the central processor unit 340. Voltage in is at 342, with the power switch at FET 344. Power shutdown is provided at the video shutdown bit 346. The video connector is designated at 348. Pin 1 is switched five volts out to video logic. Pins 2-9 are connected to the video data bus and pins 10-22 are video control signals. Buffers 350 and 352 are the video board I/O isolation buffers. As shown, pin 19 of buffer 352 is the output enable and is connected to the video shutdown bit 346. Line 354 is bus enable. Pin A0 of buffer 350 is the direction control signal and pins A1-A7 are connected to the processor data bus. Pins I0-I7 of buffer 352 are also connected to the processor bus.

The system DRAM memory is designated 356. The processor I/O module is designated 358 and the I/O decoder is provided at 360. A non-volatile RAM 362 provides system parameters. The processor oscillator is shown at 364 and a real time clock at 366. Controller 368 is the RAM card controller. The PCMCIA socket for the RAM card is shown at 370a and 370b. The modem is designated 372. The serial controller is shown at 374 with serial controller oscillator 376. Module 378 is a memory module. A signal buffer is provided at 380, and an address decoder at 382. Connectors are designated at 384, 386 and 388.

Fig. 8, part E shows the modem board connector at 390, the glue logic PLD at 392 and the glue logic module at 394. Module 396 is the synchronous/asynchronous serial controller. Circuit 398 is the signal multiplex relay and circuit 400 is the transmit/PTT relay. Bypass relays are shown at 402. Relay 404 is the digital mode

relay. Transformer 406 is the audio isolation transformer. Circuit 408 provides a low speed data filter. The line drivers are designated 410 and the line rectifiers are designated 412, respectively. Connector 414 provides radio/serial data connection.

Fig. 8, part F shows the status LED's 416 and the PCMCIA door open switch 418. Fig. 8, part G shows the power switches 420. Fig. 8, part H is the battery pack 422.

Fig. 8, part I is the power supply. The rechargeable battery connection is shown at 424, with DC power input at 426. An internal battery/external DC input transfer relay is provided at 430. The signal for the power switch on the removable disk drive access door is on pins 3,4 of connector 428. The voltage IN regulator is designated at 432, with the processor voltage regulator designated 434. The processor power control bit is at 436. The system power control bit is at 438, with the system voltage regulator at 440. The video power control bits are at 442 and 444, with the video voltage regulators at 446 and 448, respectively. Battery 450 is the real time clock battery. Connector 452 is the battery charger connector. Connector 454 connects processor power, system power, regulated battery power and real time clock power, as shown. Connector 456 connects video power. The power sequencer circuit is at 458.

Fig. 8, part J shows the direct access arrangement to a land line telephone at 460 and the video viewfinder circuitry (CRT electronics) at 462.

Fig. 8, part K is the video control circuitry. The video input amplifier is designated at 464. The composite video sync stripper is designated at 466. The video H/V timing pulse generator is at 468 and the video phase lock loop at 470. The register 472 is the video control register. Circuit 474 provide programmable video filters--edge enhancers, with the FET switch designated at 476. The video filter circuit is at 478 and the video filter is at 480. The video reference digital to analog circuit is shown at 482, with the video analog to digital circuit at 484 and the video analog to digital data out buffer at 486. The voltage reference circuit is designated at 488.

Fig. 8, part L shows the push button control switches as 490 and 492. The keyboard display is designated 494, and the microcontroller 496 is the keyboard and keyboard display microcontroller. The backlight circuitry is designated at 498, with the

back light control at 500. Module 502 is the LCD module.

The circuitry supports any of the preferred configurations from a basic real time transmission system via Group-III fax to a comprehensive system supporting both land line and wireless transmission of image, audio and documentary data at both a local and remote station.

The subject invention also permits digitized collection of audio signals through the use of an internal microphone, and external input device, a cellular telephone, land line telephone, wireless radio or other communication system, and digitized audio playback, as well. The playback can be via an internal speaker, out an external out jack to a remote device or via a cellular telephone, land line telephone, wireless radio or other communication system.

The digitized image and audio capture features permit association of audio with an image, as well as data with the image. Useful data associated with the image includes GPS from either internal or external GPS devices, date and time, and text which may be input from an integrated keyboard or from a remote location.

It is an important feature of the invention that the system supports storage of images in an interim storage format including raw video, interim gray scale format and/or half tone format. The image can also be stored in the selected output mode, such as by way of example, a Group III facsimile mode. The versatile capability of the system permits transmission of captured data to a standard bi-level facsimile machine such as Group III, to gray scale facsimile systems or full color facsimile systems, as well as to other remote receiving devices such as, by way of example, personal computers and network servers. The data may be transferred in any of a variety of formats and protocols including JPEG, FAX, emerging new imagery formats, wavelets and data protocols. The invention is adapted to operate in multiple modes, with a unitary capture and send mode or separate capture and store, and send modes.

In the preferred embodiment, the system is adapted for tagging a collected image, video, audio, and other data such as a GPS signal, with a real time clock and added text. This permits the complete historical data to be transmitted simultaneously with the image signal.

It is contemplated that the system of the invention would be self-contained with an integral power unit such as a rechargeable battery source or the like. Therefore, the system is adapted to power up when in use and power down when not activated, preserving power during idle time. The power systems for the video camera, the video input circuits and converters, the modem or other transmission devices and other high drain components may be isolated and only powered when needed. This also permits use of ancillary functions, such as use as a cellular telephone, to proceed without draining the power source by powering idle components. The processor clock rate may also be slowed down during idle mode to further conserve power.

Where desired, the system also includes camera operation control capability through the use of a digital/analog network for converting digital commands to analog signals for controlling the gain, pedestal, setup, white clip, lens focus, and other functions of the camera from a local input device, a remote device or as programmed functions. The central processor may also be used to control camera shutter rate. Other camera features and parameters which may be controlled in this manner are compressor resolution (high, medium, low), field/frame mode, color or monochrome, image spatial resolution (640x430, 320x240, for example), lens and camera adjustments, input selection where multiple cameras are used and the like.

When an integrated communications device is used, such as by way of example, a cellular telephone, the telephone can be isolated from the rest of the system to permit independent use, and independent power up and power off and other cellular phone functions.

In operation, the system permits not only the manual capture, dial (select) and send of images, but may also be fully automated to capture, dial and send, for example, on a timed sequence or in response to a sensor such as a motion sensor or from a remote trigger device. The remote trigger may be activated by an incoming telephone signal, for example. The remote device may also be use for remote loading and downloading of firmware, and of the programmable devices, as well as to provide remote configuration of sampling modes during both the capture and the send functions.

Circular sampling techniques are supported by the data capture system of the

present invention. Fig. 9 is a diagram illustrating exemplary sampling techniques in accordance with the teachings of the invention. As shown in Fig. 9, the time sequence is indicated by the Time Line: t1, t2...tn, with a sample at each time interval, as indicated by S1...Sn. For purposes of illustration, the triggering event occurs at time interval t10. Based on the predetermined programming of the system, images will start to be collected upon triggering event, as shown at 210, for a predetermined period prior to and after trigger, as shown at 212, or immediately preceding the trigger, as shown at 214. This permits "circular image storage" without requiring that all images be collected and stored in order to look at events surrounding a triggering event. The technique is also very useful when multiple overlapping zones are monitored by multiple devices and it is desirable to sequence from device to device without losing any critical images.

This is particularly useful when triggering events are used to initiate transmission of collected image data over the communications system. For example, if a triggering event is motion detected at a motion sensor, it may be useful to look at the images captured for a period of time both prior to and after the actual event. The circuitry of the subject invention permits any circular sampling technique to be utilized depending upon application, such as prior to an after trigger, only after trigger or only before trigger. Again, as an example, it may desirable to look primarily at images captured before a triggering event if the event is a catastrophic event such as an explosion or the like. Other circular sampling techniques may be employed, as well, incorporating multiple cameras, for example, wherein different fields are sampled depending upon the time frame in a sequence of events.

Other configurations are contemplated and are within the teachings of the invention. While specific embodiments have been shown and described herein, it will be understood that the invention includes all modifications and enhancements within the scope and spirit of the claims.

CLAIMS

What is claimed is:

1. An self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

   a. An image capture device;

   b. A processor for generating a data signal representing the image;

   c. A communications device adapted for transmitting the data signal to the remote receiving station

   d. a subprocessor for generating a Group-III facsimile compatible signal representing the digital signal.

2. The image processing system of claim 1, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

3. The image processing system of claim 1, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

4. The image processing system of claim 1, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

5. The image processing system of claim 3, wherein the subprocessor comprises:

   a. A gray scale bit map;

   b. A half tone converter; and

   c. A binary bit map.

6. The image processing system of claim 1, wherein there is further included an integrated wireless telephone associated with the communications device.

7. The image processing system of claim 1, further comprising a housing for housing all of the elements of the system in an integrated body.

8. The image processing system of claim 1, wherein said image capture device is a digital camera.

wherein the cellular device includes

9. The image processing system of claim 2, ~~further including~~ a view screen for viewing the captured and stored image.

10. The image processing system of claim 1, further including a facsimile receiving device associated locally with the system for providing a local printer for reproducing the captured image in hard copy.

11. The image processing system of claim 1, wherein the processor is adapted for generating a signal in any of a plurality of selected protocols and wherein the communications device is adapted for transmitting the signal in the proper protocol to a remote, compatible receiving station.

12. The image processing system of claim 1, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

13. The image processing system of claim 1, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

14. The image processing system of claim 1, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

15. The image processing system of claim 1, further comprising a data processor for creating a text data signal associated with said image data signal.

16. The image processing system of claim 2, wherein said image data signal is stored in a raw video format.

17. The image processing system of claim 2, wherein said image data signal is stored in a compressed format.

18. The image processing system of claim 2, wherein said image data signal is stored in a half-tone format.

19. The image processing system of claim 1, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is generated in a standard bi-level facsimile machine format and protocol.

20. The image processing system of claim 1, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

21. The image processing system of claim 1, wherein the remote receiving station is a color facsimile machine and the image data signal is generated in a full color format and protocol.

22. The image processing system of claim 1, wherein the remote receiving station is a digital device and the image data is digital.

23. The image processing system of claim 1, further comprising an self-contained power source for powering the system.

24. The image processing system of claim 1, further including control apparatus for remotely controlling operating functions of the image capture device.

25. The image processing system of claim 24, wherein said image capture device is a camera with a shuttered lens and where said control apparatus controls any combination of lens direction, iris, focus and shutter speed.

26. The image processing system of claim 1, further comprising an input device for controlling the processor configuration from a remote location.

27. The image processing system of claim 1, wherein said image capture device may be controlled to capture a plurality of images in controlled order.

28. The image processing system of claim 26, wherein said image capture device may be controlled to capture a plurality of images in a controlled order.

29. A self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. An image capture device;

b. A processor for generating a data signal representing the image;

c. A communications device adapted for transmitting the data signal to the remote receiving station, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

30. The image processing system of claim 29, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

31. The image processing system of claim 29, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

32. The image processing system of claim 29, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

33. The image processing system of claim 29, further including a subprocessor for generating a Group-III facsimile compatible signal representing the digital signal.

34. The image processing system of claim 29, wherein the subprocessor comprises:

a. A gray scale bit map;

b. A half tone converter; and

c. A binary bit map.

35. The image processing system of claim 29, wherein there is further included an integrated wireless telephone associated with the communications device.

36. The image processing system of claim 29, further comprising a housing for housing all of the elements of the system in an integrated body.

37. The image processing system of claim 29, wherein said image capture device is a digital camera.

38. The image processing system of claim 30, further including a view screen for viewing the captured and stored image.

39. The image processing system of claim 29, wherein the processor is adapted for generating a signal in any of a plurality of selected protocols and wherein the communications device is adapted for transmitting the signal in the proper protocol to a remote, compatible receiving station.

40. The image processing system of claim 29, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

41. The image processing system of claim 29, wherein the processor routine converts the signals to a Group-III facsimile protocol, the system further including a facsimile modem for accepting the signal and transmitting to the compatible receiving station.

42. The image processing system of claim 29, further including a hardwired transmission system and a wireless transmission system associated with the modem and a switching device for selecting in the alternative either the hardwired or the wireless transmission system.

43. The image processing system of claim 40, further including a local facsimile receiving system associated with the modem for providing local hard copy of the stored image signals in the memory.

44. The image processing system of claim 43, further including a switching device for selectively activating and deactivating the local facsimile receiving system.

45. The image processing system of claim 40, wherein the wireless transmission system is a cellular telephone system and wherein the wired transmission system is a land line telephone system, and wherein the processing system further includes and integral cellular telephone and/or and integral land line telephone, and wherein each of said telephones is capable of operating in a standard telephonic format for receiving incoming and transmitting outgoing audio calls.

46. The image processing system of claim 45, further including an interrupt device to prohibit use of the telephones in a standard telephonic mode whenever image data signals are being transmitted.

47. The image processing system of claim 45, wherein the interrupt device further includes a tone generator for generating an audible signal when in the interrupt mode.

48. The image processing system of claim 40, further including an integral viewer for viewing the images stored in the memory.

49. The image processing system of claim 40, wherein the memory is a removable memory medium which may be selectively removed from the system.

50. The image processing system of claim 49, wherein the removable memory medium comprises a PCMCIA card memory.

51. The image processing system of claim 29, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

52. The image processing system of claim 29, further comprising a data processor for creating a text data signal associated with said image data signal.

53. The image processing system of claim 30, wherein said image data signal is stored in a raw video format.

54. The image processing system of claim 30, wherein said image data signal is stored in a compressed format.

55. The image processing system of claim 30, wherein said image data signal is stored in a half-tone format.

56. The image processing system of claim 30, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is generated in a standard bi-level facsimile machine format and protocol.

57. The image processing system of claim 29, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

58. The image processing system of claim 29, further comprising an self-contained power source for powering the system.

59. The image processing system of claim 58, wherein said communications device is adapted to be used independently of the image capture device and the processor, and wherein the power supply is adapted for isolating the power to the communications device from the power to the image capture device and processor.

60. The image processing system of claim 59, further including a power initiation device associated with the image capture device and the processor, wherein the power to the image capture device and the processor is off when the initiation device is not activated.

61. The image processing system of claim 59, wherein the power initiation device is user controlled.

62. The image processing system of claim 59, further including a trigger device for activating the power initiation device.

63. The image processing system of claim 62, wherein the trigger device is a timer.

64. The image processing system of claim 62, wherein said trigger device is triggered by the presence of an image to be captured.

65. The image processing system of claim 64, wherein said trigger device is a motion sensor.

66. The image processing system of claim 29, further including control apparatus for remotely controlling operating functions of the image capture device.

67. The image processing system of claim 66, wherein said image capture device is a camera with a shuttered lens and where said control apparatus any combination of lens direction, iris, focus and shutter speed.

68. The image processing system of claim 29, further comprising an input device for controlling the processor configuration from a remote location.

69. The image processing system of claim 29, wherein said image capture device may be controlled to capture a plurality images in controlled order.

70. A self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. An image capture device;

b. A processor for generating a data signal representing the image;

c. A communications device adapted for transmitting the data signal to the remote receiving station;

d. A wireless transmission system between the communications device and the compatible receiving station.

71. The image processing system of claim 70, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

72. The image processing system of claim 70, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

73. The image processing system of claim 70, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

74. The image processing system of claim 70, further including a subprocessor for generating a Group-III facsimile compatible signal representing the digital signal.

75. The image processing system of claim 70, wherein the subprocessor comprises:

a. A gray scale bit map;

b. A half tone converter; and

c. A binary bit map.

76. The image processing system of claim 70, wherein there is further included an integrated wireless telephone associated with the communications device.

77. The image processing system of claim 70, further comprising a housing for housing all of the elements of the system in an integrated body.

78. The image processing system of claim 70, wherein said image capture device is a digital camera.

79. The image processing system of claim 71, further including a view screen for viewing the captured and stored image.

80. The image processing system of claim 74, further including a facsimile receiving device associated locally with the system for providing a local printer for reproducing the captured image in hard copy.

81. The image processing system of claim 70, wherein the processor is adapted for generating a signal in any of a plurality of selected protocols and wherein the communications device is adapted for transmitting the signal in the proper protocol to a remote, compatible receiving station.

82. The image processing system of claim 70, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

83. The image processing system of claim 82, wherein the processor routine converts the signals to a Group-III facsimile protocol, the system further including a facsimile modem for accepting the signal and transmitting to the compatible receiving station.

84. The image processing system of claim 82, further including a hardwired transmission system and a wireless transmission system associated with the modem and a switching device for selecting in the alternative either the hardwired or the wireless transmission system.

85. The image processing system of claim 82, further including a local facsimile receiving system associated with the modem for providing local hard copy of the stored image signals in the memory.

86. The image processing system of claim 85, further including a switching device for selectively activating and deactivating the local facsimile receiving system.

87. The image processing system of claim 82, further including an integral viewer for viewing the images stored in the memory.

88. The image processing system of claim 82, wherein the memory is a removable memory medium which may be selectively removed from the system.

89. The image processing system of claim 88, wherein the removable memory medium comprises a PCMCIA card memory.

90. The image processing system of claim 70, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

91. The image processing system of claim 70, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

92. The image processing system of claim 70, further comprising a data processor for creating a text data signal associated with said image data signal.

93. The image processing system of claim 92, further including an input device for providing text data to the data processor.

94. The image processing system of claim 93, wherein said input device is user controlled.

95. The image processing system of claim 94, wherein said user controlled input device is an integral keyboard.

96. The image processing system of claim 93, said input device comprising a real time clock.

97. The image processing system of claim 93, said input device comprising a global positioning system.

98. The image processing system of claim 71, wherein said image data signal is stored in a raw video format.

99. The image processing system of claim 71, wherein said image data signal is stored in a compressed format.

100. The image processing system of claim 71, wherein said image data signal is stored in a half-tone format.

101. The image processing system of claim 70, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is generated in a standard bi-level facsimile machine format and protocol.

102. The image processing system of claim 70, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

103. The image processing system of claim 70, wherein the remote receiving station is a color facsimile machine and the image data signal is generated in a full color format and protocol.

104. The image processing system of claim 70, wherein the remote receiving station is a digital device and the image data is digital.

105. The image processing system of claim 70, further comprising an self-contained power source for powering the system.

106. The image processing system of claim 105, wherein said communications device is adapted to be used independently of the image capture device and the processor, and wherein the power supply is adapted for isolating the power to the communications device from the power to the image capture device and processor.

107. The image processing system of claim 106, further including a power initiation device associated with the image capture device and the processor, wherein the power to the image capture device and the processor is off when the initiation device is not activated.

108. The image processing system of claim 107, wherein the power initiation device is user controlled.

109. The image processing system of claim 107, further including a trigger device for activating the power initiation device.

110. The image processing system of claim 109, wherein the trigger device is a timer.

111. The image processing system of claim 109, wherein the trigger device is triggered by the presence of an image to be captured.

112. A self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. An image capture device;

b. A processor for generating a data signal representing the image;

c. A communications device adapted for transmitting the data signal to the remote receiving station;

d. A remote trigger device for activating the processing system to initiate image capture.

113. The image processing system of claim 112, wherein the remote receiving station is a digital device and the image data is digital.

114. The image processing system of claim 112, further comprising an self-contained power source for powering the system.

115. The image processing system of claim 114, wherein said communications device is adapted to be used independently of the image capture device and the processor, and wherein the power supply is adapted for isolating the power to the communications device from the power to the image capture device and processor.

116. The image processing system of claim 115, further including a power initiation device associated with the image capture device and the processor, wherein the power to the image capture device and the processor is off when the initiation device is not activated.

117. The image processing system of claim 116, wherein the power initiation device is user controlled.

118. The image processing system of claim 116, further including a trigger device for activating the power initiation device.

119. The image processing system of claim 118, wherein the trigger device is a timer.

120. The image processing system of claim 118, wherein said trigger device is triggered by the presence of an image to be captured.

121. The image processing system of claim 119, wherein said trigger device is a motion sensor.

122. The image processing system of claim 112, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

123. The image processing system of claim 112, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

124. The image processing system of claim 112, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

125. The image processing system of claim 112, further including a subprocessor for generating a Group-III facsimile compatible signal representing the digital signal.

126. The image processing system of claim 125, wherein the subprocessor comprises:

a. A gray scale bit map;

b. A half tone converter; and

c. A binary bit map.

127. The image processing system of claim 112, wherein there is further included an integrated wireless telephone associated with the communications device.

128. The image processing system of claim 112, further comprising a housing for housing all of the elements of the system in an integrated body.

129. The image processing system of claim 112, wherein said image capture device is a digital camera.

130. The image processing system of claim 112, further including a view screen for viewing the captured and stored image.

131. The image processing system of claim 112, wherein the processor is adapted for generating a signal in any of a plurality of selected protocols and wherein the communications device is adapted for transmitting the signal in the proper protocol to a remote, compatible receiving station.

132. The image processing system of claim 112, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

133. The image processing system of claim 112, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

134. The image processing system of claim 112, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

135. The image processing system of claim 134, wherein said audio signal capture device is an input device for receiving an externally generated audio signal.

136. The image processing system of claim 112, further comprising a data processor for creating a text data signal associated with said image data signal.

137. The image processing system of claim 121, wherein said image data signal is stored in a raw video format.

138. The image processing system of claim 121, wherein said image data signal is stored in a compressed format.

139. The image processing system of claim 121, wherein said image data signal is stored in a half-tone format.

140. The image processing system of claim 112, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is generated in a standard bi-level facsimile machine format and protocol.

141. The image processing system of claim 112, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

142. The image processing system of claim 112, wherein the remote receiving station is a color facsimile machine and the image data signal is generated in a full color format and protocol.

143. The image processing system of claim 112, further including control apparatus for remotely controlling operating functions of the image capture device.

144. A modular image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. A camera component for capturing an image;

b. A processor component for generating a digital signal representing the image;

c. A communications component adapted for transmitting the digital image to the remote receiving station; and

d. A unit for housing each of the separate components for forming an assembled system.

145. The system of claim 144, wherein the camera is a hand held system.

146. The system of claim 148, wherein the communications component comprises a wireless communications device.

147. The system of claim 144, wherein the base unit is a housing incorporating a standard hand held video camera and is adapted receiving the processor component and the communications component.

148. The image processing system of claim 144, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

149. The image processing system of claim 144, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

150. The image processing system of claim 144, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

151. The image processing system of claim 144, further including a subprocess or for generating a Group-III facsimile compatible signal representing the digital signal.

152. The image processing system of claim 144, wherein there is further included an integrated wireless telephone associated with the communications device.

153. The image processing system of claim 144, further including a view screen for viewing the captured and stored image.

154. The image processing system of claim 144, including a hardwired interface between the communications device and the compatible receiving station.

155. The image processing system of claim 144, including a wireless transmission system between the communications device and the compatible receiving station.

156. The image processing system of claim 144, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

157. The image processing system of claim 144, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

158. The image processing system of claim 144, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

159. The image processing system of claim 144, further comprising a data processor for creating a text data signal associated with said image data signal.

160. The image processing system of claim 144, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is

generated in a standard bi-level facsimile machine format and protocol.

161. The image processing system of claim 144, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

162. The image processing system of claim 144, wherein the remote receiving station is a color facsimile machine and the image data signal is generated in a full color format and protocol.

163. The image processing system of claim 144, wherein the remote receiving station is a digital device and the image data is digital.

164. The image processing system of claim 144, further comprising an self-contained power source for powering the system.

165. The image processing system of claim 144, further including control apparatus for remotely controlling operating functions of the image capture device.

166. The image processing system of claim 165, wherein said image capture device is a camera with a shuttered lens and where said control apparatus any combination of lens direction, iris, focus and shutter speed.

167. The image processing system of claim 144, further comprising an input device for controlling the processor configuration from a remote location.

168. A self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. An image capture device;

b. A processor for generating a data signal representing the image;

c. A communications device adapted for transmitting the data signal to the remote receiving station;

d. An audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

169. The image processing system of claim 168, wherein said audio signal capture device is an integral microphone.

170. The image processing system of claim 168, wherein said audio signal capture device is an input device for receiving an externally generated audio signal.

171. The image processing system of claim 168, further comprising a device for outputting processed captured audio signal.

172. The image processing system of claim 168, wherein said audio processor system is adapted for associating an audio signal with an image signal.

173. The image processing system of claim 168, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

174. The image processing system of claim 168, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

175. The image processing system of claim 168, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

176. The image processing system of claim 168, further including a subprocess or for generating a Group-III facsimile compatible signal representing the digital signal.

177. The image processing system of claim 168, wherein there is further included an integrated wireless telephone associated with the communications device.

178. The image processing system of claim 168, further comprising a housing for housing all of the elements of the system in an integrated body.

179. The image processing system of claim 168, wherein said image capture device is a digital camera.

180. The image processing system of claim 168, wherein the processor is adapted for generating a signal in any of a plurality of selected protocols and wherein the communications device is adapted for transmitting the signal in the proper protocol to a remote, compatible receiving station.

181. The image processing system of claim 1, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol

receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

182. The image processing system of claim 168, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

183. The image processing system of claim 168, further comprising a data processor for creating a text data signal associated with said image data signal.

184. The image processing system of claim 168, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is generated in a standard bi-level facsimile machine format and protocol.

185. The image processing system of claim 168, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

186. The image processing system of claim 168, wherein the remote receiving station is a color facsimile machine and the image data signal is generated in a full color format and protocol.

187. The image processing system of claim 168, wherein the remote receiving station is a digital device and the image data is digital.

188. The image processing system of claim 168, further comprising an self-contained power source for powering the system.

189. The image processing system of claim 168, further including control apparatus for remotely controlling operating functions of the image capture device.

190. The image processing system of claim 1, further comprising an input device for controlling the processor configuration from a remote location.

191. A self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. An image capture device;

b. A processor for generating a data signal representing the image;

c. A communications device adapted for transmitting the data signal to the remote receiving station, the processor is adapted for generating a signal in any of a plurality of selected protocols and wherein the communications device is adapted for transmitting the signal in the proper protocol to a remote, compatible receiving station.

192. The image processing system of claim 191, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

193. The image processing system of claim 191, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

194. The image processing system of claim 191, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

195. The image processing system of claim 191, further including a subprocess or for generating a Group-III facsimile compatible signal representing the digital signal.

196. The image processing system of claim 191, wherein there is further included an integrated wireless telephone associated with the communications device.

197. The image processing system of claim 191, further comprising a housing for housing all of the elements of the system in an integrated body.

198. The image processing system of claim 191, wherein said image capture device is a digital camera.

199. The image processing system of claim 191, further including a view screen for viewing the captured and stored image.

200. The image processing system of claim 195, further including a facsimile receiving device associated locally with the system for providing a local printer for reproducing the captured image in hard copy.

201. The image processing system of claim 191, including a hardwired interface between the communications device and the compatible receiving station.

202. The image processing system of claim 191, including a wireless transmission system between the communications device and the compatible receiving station.

203. The image processing system of claim 191, wherein:

a. The image capture device is an analog video camera for generating a video signal;

b. The processor further comprises:

i. An analog to digital converter;

ii. A sync detector and a video address generator for synchronizing the digital signal with the analog signal for defining the beginning and end of the signal to define a still frame;

iii. A random access memory for receiving and storing the converted, synchronized signal frame-by-frame;

iv. A processor routine for converting the signals stored in the memory to a protocol adapted for transmission to a remote, compatible protocol receiving station;

c. A communications device for transmitting the signal in the proper protocol to the compatible receiving station.

204. The image processing system of claim 203, wherein the processor routine converts the signals to a Group-III facsimile protocol, the system further including a facsimile modem for accepting the signal and transmitting to the compatible receiving station.

205. The image processing system of claim 203, further including a hardwired transmission system and a wireless transmission system associated with the modem and a switching device for selecting in the alternative either the hardwired or the wireless transmission system.

206. The image processing system of claim 203, further including a local facsimile receiving system associated with the modem for providing local hard copy of the stored image signals in the memory.

207. The image processing system of claim 203, further including a switching device for selectively activating and deactivating the local facsimile receiving system.

208. The image processing system of claim 204, wherein the wireless transmission system is a cellular telephone system and wherein the wired transmission system is a land line telephone system, and wherein the processing system further includes and integral cellular telephone and/or and integral land line telephone, and wherein each of said telephones is capable of operating in a standard telephonic format for receiving incoming and transmitting outgoing audio calls.

209. The image processing system of claim 208, further including an interrupt device to prohibit use of the telephones in a standard telephonic mode whenever image data signals are being transmitted.

210. The image processing system of claim 208, wherein the interrupt device further includes a tone generator for generating an audible signal when in the interrupt mode.

211. The image processing system of claim 203, further including an integral viewer for viewing the images stored in the memory.

212. The image processing system of claim 203, wherein the memory is a removable memory medium which may be selectively removed from the system.

213. The image processing system of claim 212, wherein the removable memory medium comprises a PCMCIA card memory.

214. The image processing system of claim 191, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

215. The image processing system of claim 191, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

216. The image processing system of claim 191, further comprising a data processor for creating a text data signal associated with said image data signal.

217. The image processing system of claim 216, further including an input device for providing text data to the data processor.

218. The image processing system of claim 217, wherein said input device is user controlled.

219. The image processing system of claim 218, wherein said user controlled input device is an integral keyboard.

220. The image processing system of claim 216, said input device comprising a real time clock.

221. The image processing system of claim 217, said input device comprising a global positioning system.

222. The image processing system of claim 191, wherein the remote receiving station is a standard bi-level facsimile machine and the image data signal is generated in a standard bi-level facsimile machine format and protocol.

223. The image processing system of claim 191, wherein the remote receiving station is a gray-scale facsimile machine and the image data signal is generated in a gray-scale format and protocol.

224. The image processing system of claim 191, wherein the remote receiving station is a color facsimile machine and the image data signal is generated in a full color format and protocol.

225. The image processing system of claim 191, wherein the remote receiving station is a digital device and the image data is digital.

226. The image processing system of claim 191, further comprising an self-contained power source for powering the system.

227. The image processing system of claim 191, further including control apparatus for remotely controlling operating functions of the image capture device.

228. The image processing system of claim 227, wherein said image capture device is a camera with a shuttered lens and where said control apparatus any combination of lens direction, iris, focus and shutter speed.

229. The image processing system of claim 227, further comprising an input device for controlling the processor configuration from a remote location.

230. A self-contained image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. An image capture device;

b. A processor for generating a data signal representing the image;

c. A communications device adapted for transmitting the data signal to the remote receiving station;

d. A self-contained power source for powering the system.

231. The image processing system of claim 230, wherein said communications device is adapted to be used independently of the image capture device and the processor, and wherein the power supply is adapted for isolating the power to the communications device from the power to the image capture device and processor.

232. The image processing system of claim 231, further including a power initiation device associated with the image capture device and the processor, wherein the power to the image capture device and the processor is off when the initiation device is not activated.

233. The image processing system of claim 232, wherein the power initiation device is user controlled.

234. The image processing system of claim 232, further including a trigger device for activating the power initiation device.

235. The image processing system of claim 234, wherein the trigger device is a timer.

236. The image processing system of claim 234, wherein said trigger device is triggered by the presence of an image to be captured.

237. The image processing system of claim 236, wherein said trigger device is a motion sensor.

238. The image processing system of claim 230, further including a memory for receiving and storing the data signal, and wherein the communications device is adapted for recalling the stored data signal from memory.

239. The image processing system of claim 230, wherein said memory is a removable random access medium and wherein the system is adapted for selectively charging and discharging the memory.

240. The image processing system of claim 230, wherein the image capture device is an analog camera for generating an analog image signal and there is further included an analog to digital converter for converting the analog image signal to a digital signal.

241. The image processing system of claim 230 further including a subprocess or for generating a Group-III facsimile compatible signal representing the digital signal.

242 The image processing system of claim 230, wherein there is further included an integrated wireless telephone associated with the communications device.

243. The image processing system of claim 230, further comprising a housing for housing all of the elements of the system in an integrated body.

244. The image processing system of claim 230, wherein said image capture device is a digital camera.

245. The image processing system of claim 230, further including a facsimile receiving device associated locally with the system for providing a local printer for reproducing the captured image in hard copy.

246. The image processing system of claim 230, wherein the system is of modular construction, and the camera, the processor and the communications device are each independent, functional units which may be coupled to one another for defining the assembled system.

247. The image processing system of claim 230, further comprising an audio signal capture device adapted for capturing an audio signal in correlation with the captured video signal.

248. A method for capturing an analog image signal and converting it to a digital signal for transmission over a telephone system, the method comprising the steps of:

a. capturing the image as an analog image signal with a standard analog image capture device;

b. converting the analog image signal to a digital data signal;

c. defining a beginning of frame and an end of frame portion of the signal;

d. storing a complete frame; and

e. transmitting the stored frame over a telephone system to a remote receiving device.

249. The method of claim 248, wherein the transmitting step further included transmitting the stored frame of a cellular telephone.

250. The method of claim 249, further including the step of selectively transmitting the stored frame over a land line telephone.

251. The method of claim 250, further including the step of isolating the cellular telephone whenever the land line telephone transmitting step is selected.

252. The method of claim 248, further including the step of automatically activating steps 248b, 248c, 248d and 248e whenever an image is present to be captured.

253. A sampling method for capturing for retrieval a visual image record of an incident, comprising the steps of:

a. monitoring a zone wherein images will appear;

b. activating a capture device in response to a trigger signal;

c. capturing the images in the zone in response to a predetermined set of conditions ranging from a period of time preceding the trigger signal to a period of time following the trigger signal;

d. utilizing the captured images to reconstruct the events occurring in the zone.

254. The sampling method of claim 253, wherein utilization includes the step of storing the captured images for archival purposes.

255. The sampling method of claim 253, wherein utilization includes the step of transmitting the captured images to a remote location for monitoring purposes.

256. The sampling method of claim 255, wherein said transmission occurs on a near real time basis.

257. The method of claim 253, wherein said trigger signal is a timer.

258. The method of claim 253, further including the step of monitoring the audio conditions in the zone and wherein said triggering signal is an audio sensor.

259, The method of claim 253, further including the step of monitoring the motion conditions in the zone and wherein said triggering signal is a motion sensor.

260. The method of claim 253, wherein said capturing step includes capturing a predetermined set of images preceding the trigger signal.

261. The method of claim 253, wherein said capturing step includes capturing a predetermined set of images following the trigger signal.

262. The method of claim 253, wherein said capturing step includes capturing a predetermined set of images both preceding and following the trigger signal.

263. An portable, self-contained handheld image processing system for capturing a visual image and transmitting it to a remote receiving station, the image processing system comprising:

a. a camera for capturing an image;

b. a processor for generating a digital signal representing the image;

c. a communications device adapted for transmitting the digital image to the remote receiving station.

264. The system of claim 263, further including an integral cellular telephone for defining the communications device.

265. The system of claim 263, wherein all of the components of the system are housed in a single housing.

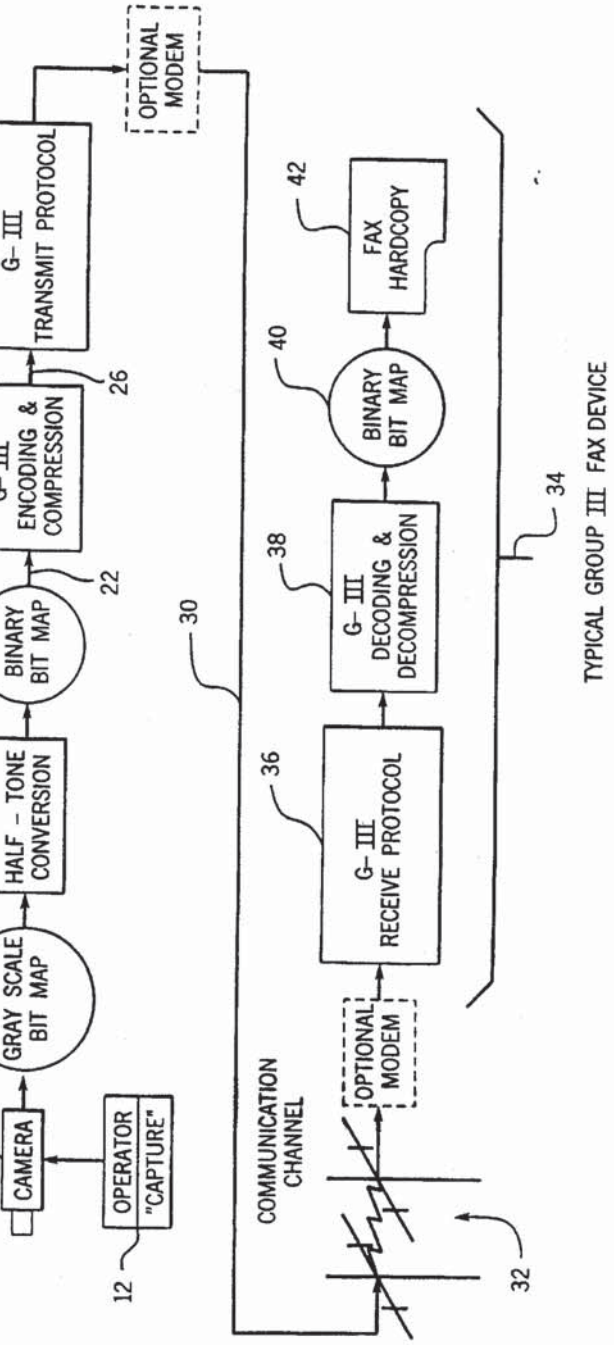
266. The system of claim 265, wherein said housing resembles a standard 35 millimeter camera body.

ABSTRACT

An image capture, conversion, compression, storage and transmission system provides a data signal representing the image in a format and protocol capable of being transmitted over any of a plurality of readily available transmission systems and received by readily available, standard equipment receiving stations. In its most comprehensive form, the system is capable of sending and receiving audio, documentary and visual image data to and from standard remote stations readily available throughout the world.

PRINT OF DRAWINGS
AS ORIGINALLY FT

FIG. 1



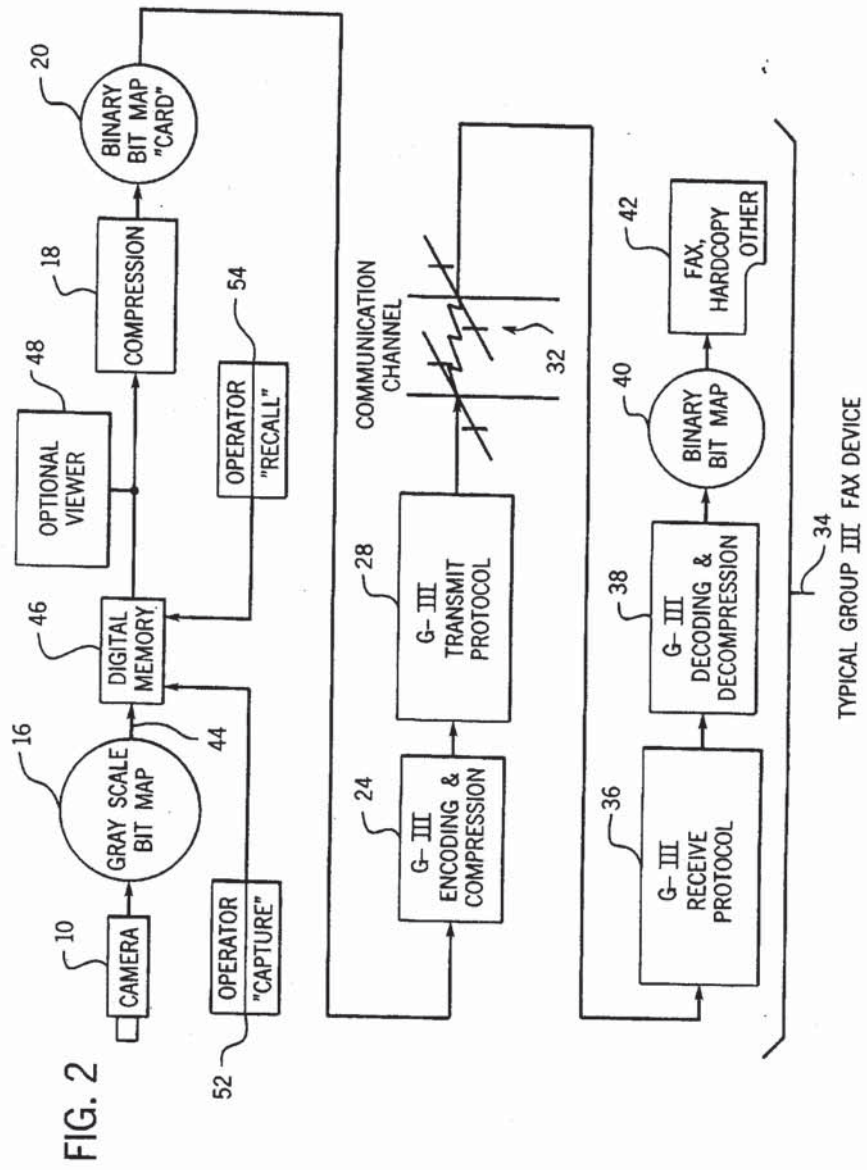

10
CAMERA
16
GRAY SCALE BIT MAP
OPERATOR "CAPTURE"
52
44
46
DIGITAL MEMORY
48
OPTIONAL VIEWER
18
COMPRESSION
20
BINARY BIT MAP "CARD"
54
OPERATOR "RECALL"
24
G- III ENCODING & COMPRESSION
28
G- III TRANSMIT PROTOCOL
COMMUNICATION CHANNEL
32
36
G- III RECEIVE PROTOCOL
38
G- III DECODING & DECOMPRESSION
40
BINARY BIT MAP
42
FAX, HARDCOPY OTHER
34
TYPICAL GROUP III FAX DEVICE

FIG. 2

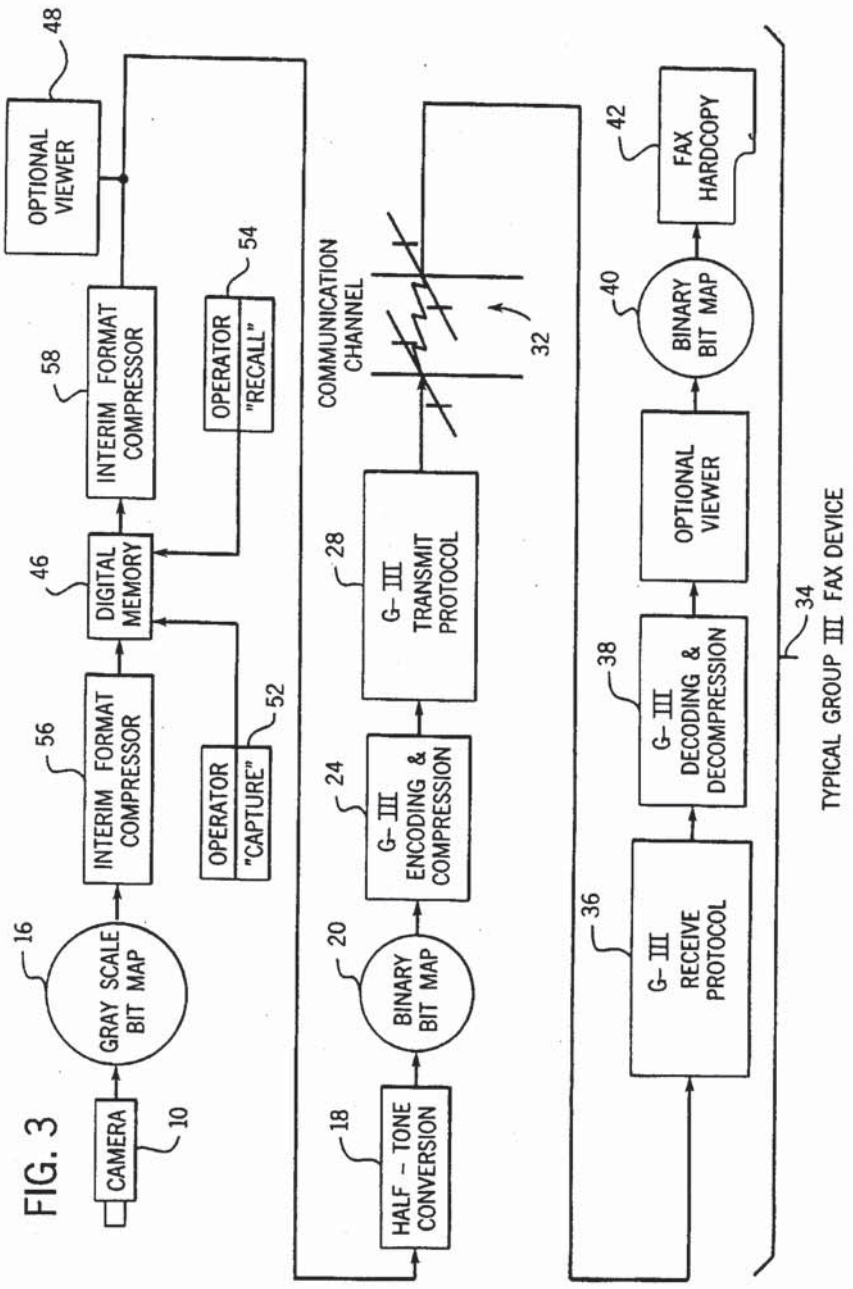

CAMERA
10
GRAY SCALE BIT MAP
16
INTERIM FORMAT COMPRESSOR
56
DIGITAL MEMORY
46
INTERIM FORMAT COMPRESSOR
58
OPTIONAL VIEWER
48
OPERATOR "CAPTURE"
52
OPERATOR "RECALL"
54
HALF - TONE CONVERSION
18
BINARY BIT MAP
20
G- III ENCODING & COMPRESSION
24
G- III TRANSMIT PROTOCOL
28
COMMUNICATION CHANNEL
32
G- III RECEIVE PROTOCOL
36
G- III DECODING & DECOMPRESSION
38
OPTIONAL VIEWER
BINARY BIT MAP
40
FAX HARDCOPY
42
TYPICAL GROUP III FAX DEVICE
34

FIG. 3

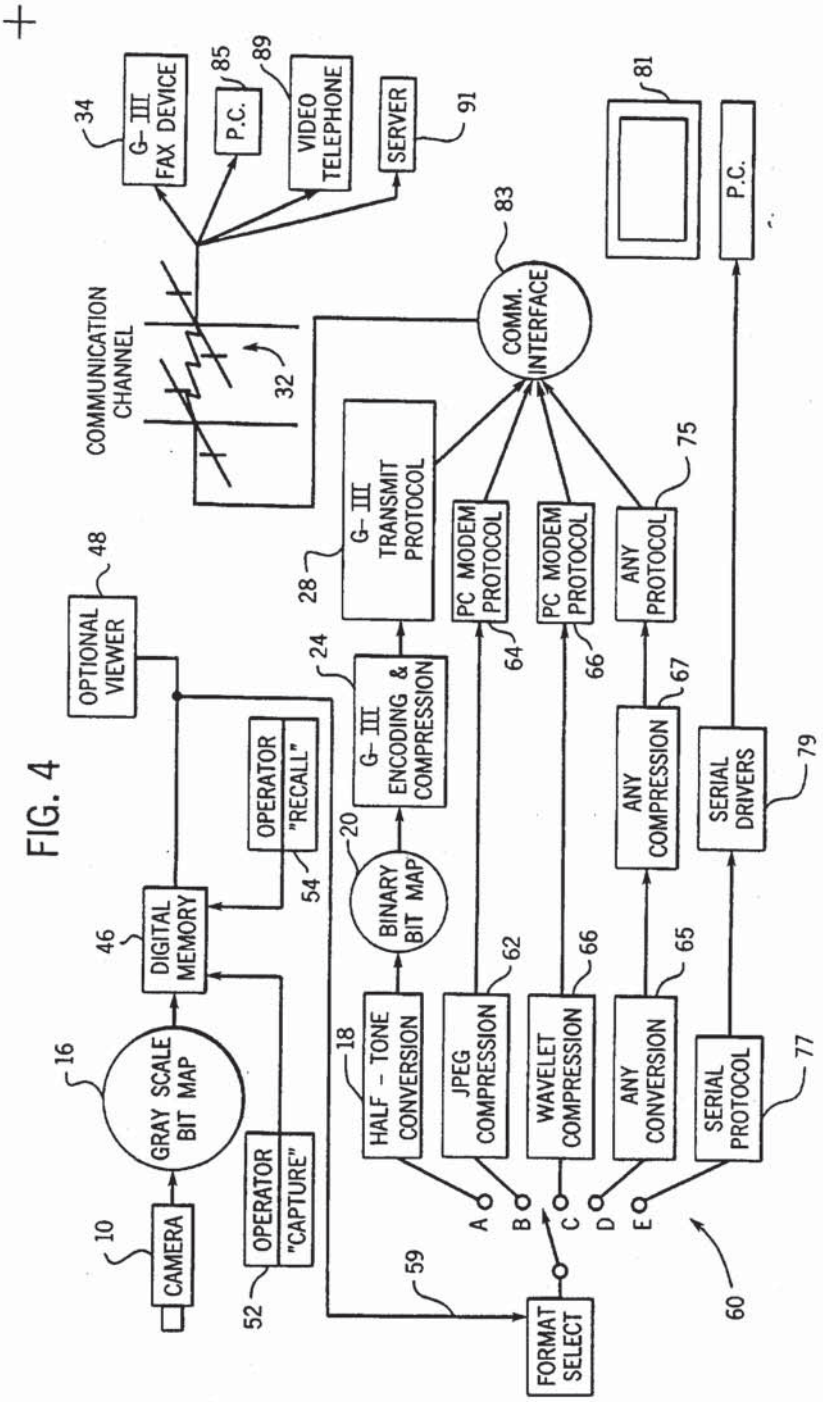

G- III FAX DEVICE
34
P.C.
85
VIDEO TELEPHONE
89
SERVER
91
81
P.C.
COMMUNICATION CHANNEL
32
COMM. INTERFACE
83
OPTIONAL VIEWER
48
G- III TRANSMIT PROTOCOL
28
PC MODEM PROTOCOL
64
PC MODEM PROTOCOL
66
ANY PROTOCOL
75
G- III ENCODING & COMPRESSION
24
OPERATOR "RECALL"
54
DIGITAL MEMORY
46
BINARY BIT MAP
20
ANY COMPRESSION
67
SERIAL DRIVERS
79
GRAY SCALE BIT MAP
16
HALF - TONE CONVERSION
18
JPEG COMPRESSION
62
WAVELET COMPRESSION
66
ANY CONVERSION
65
SERIAL PROTOCOL
77
CAMERA
10
OPERATOR "CAPTURE"
52
FORMAT SELECT
59
A
B
C
D
E
60

FIG. 4

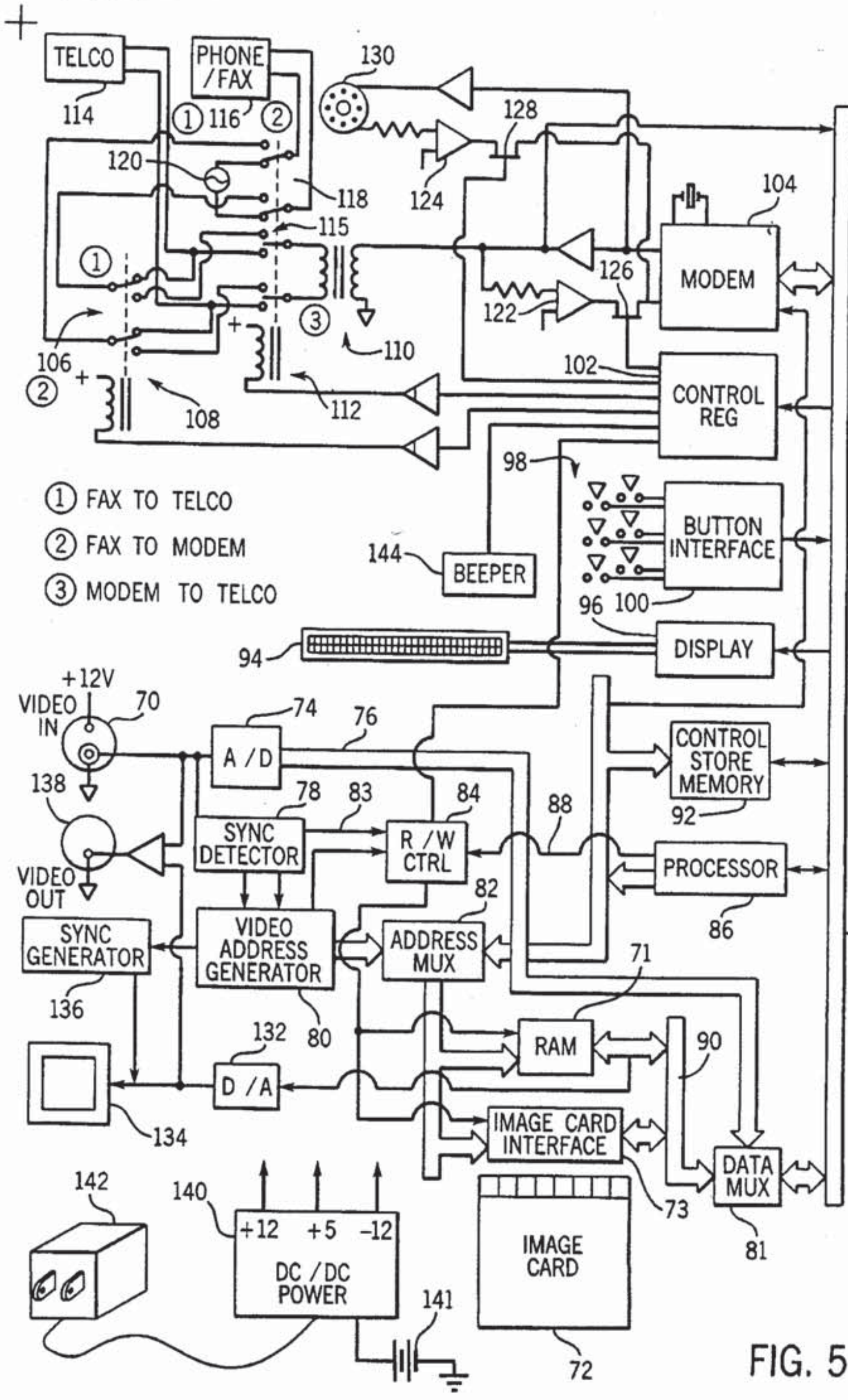


FIG. 5

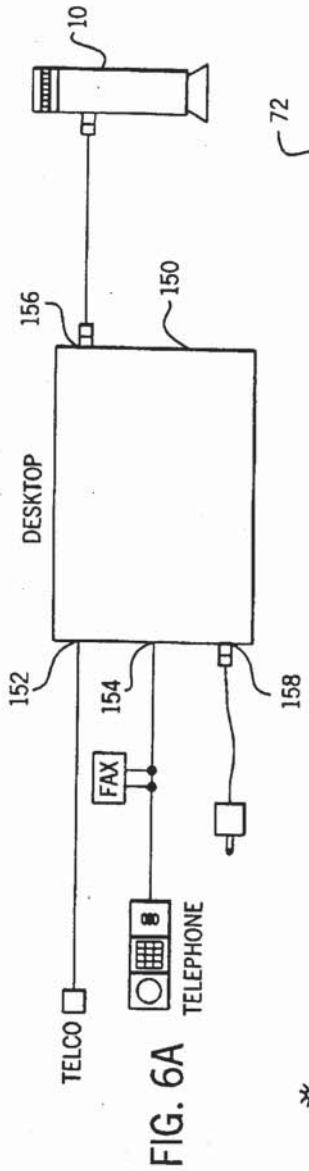

10
156
150
DESKTOP
152
154
158
FAX
TELEPHONE
TELCO

FIG. 6A

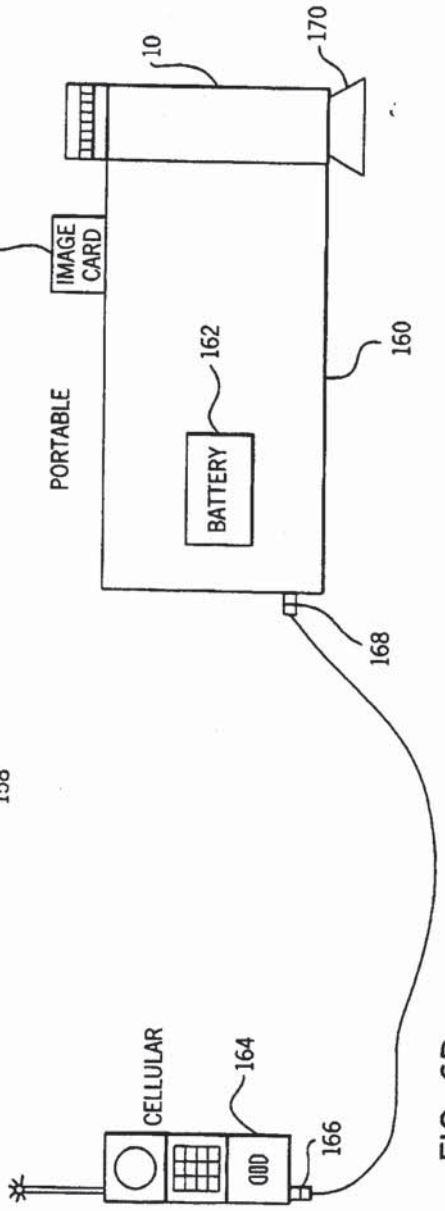

10
170
72
IMAGE CARD
PORTABLE
162
160
BATTERY
168
CELLULAR
164
166

FIG. 6B

PRINT OF DRAWINGS
AS ORIGINALLY FI

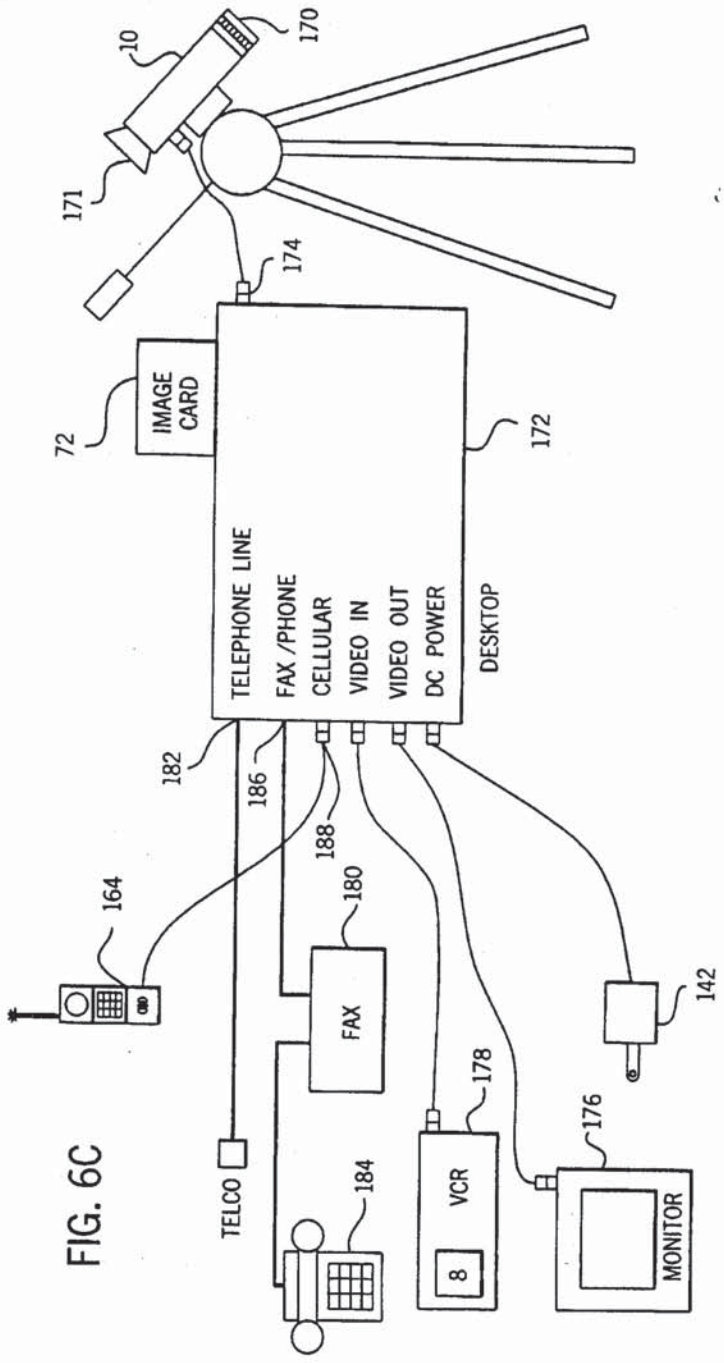


FIG. 6C

FIG. 7A

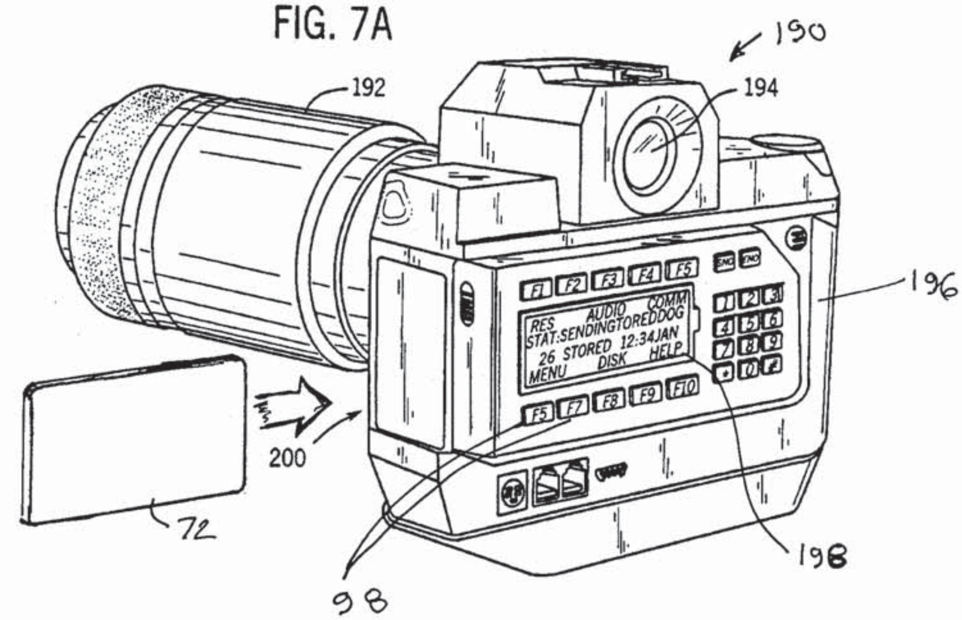
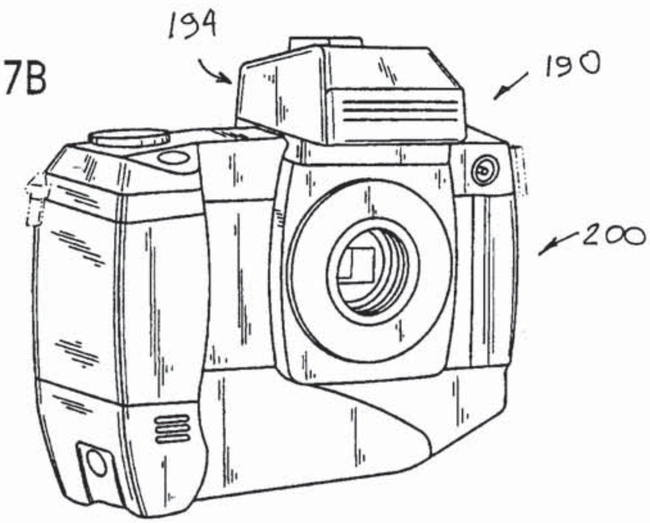


FIG. 7B



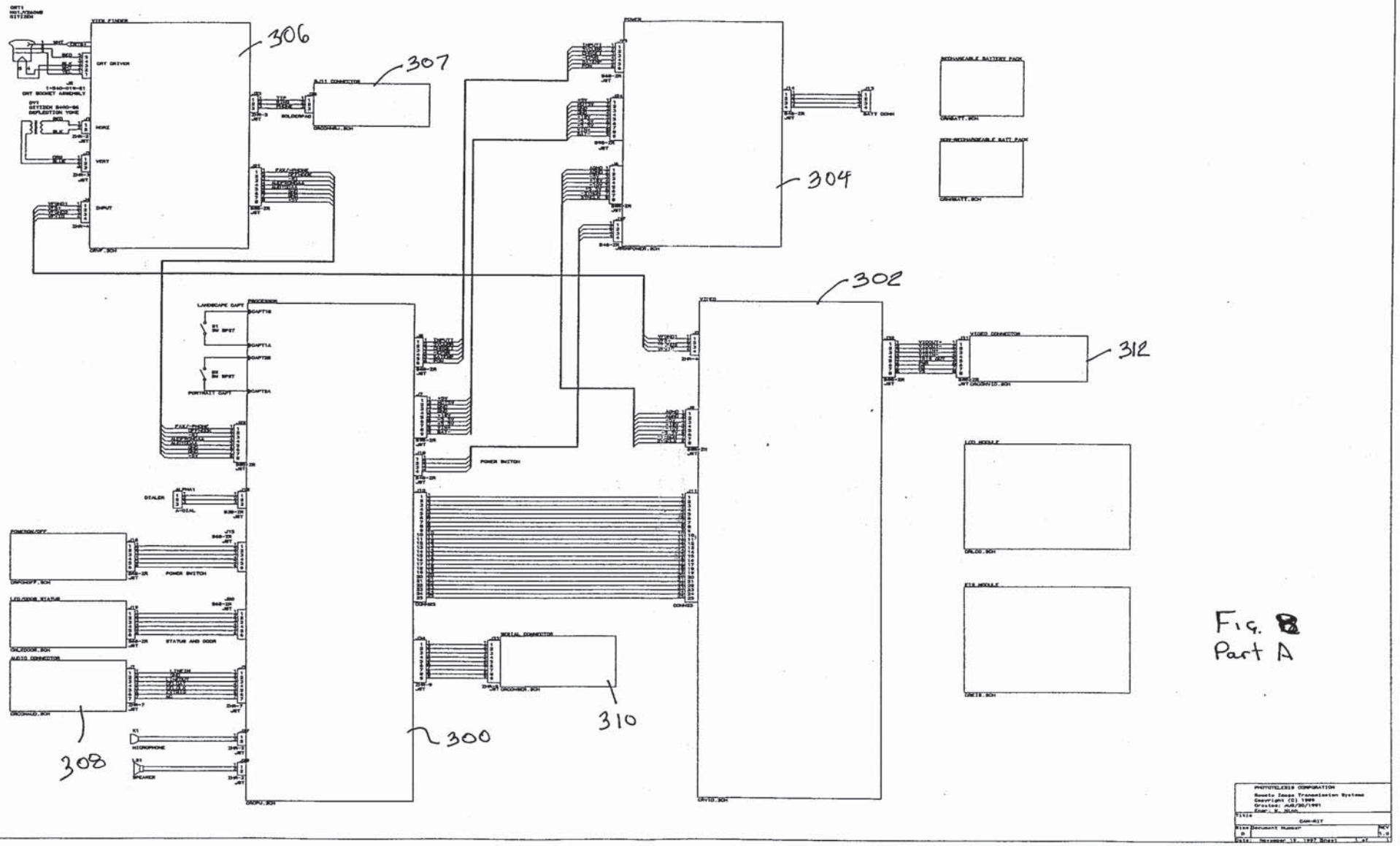


Fig. 8
Part A

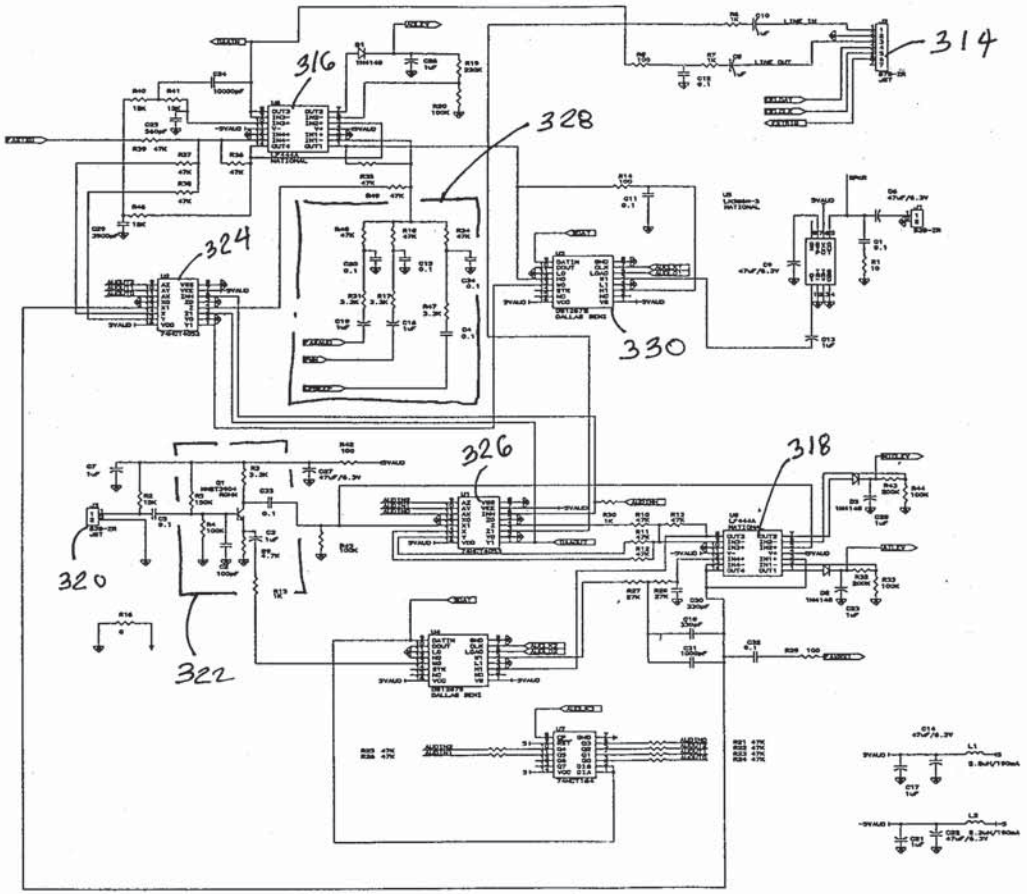


Fig 8
Part B

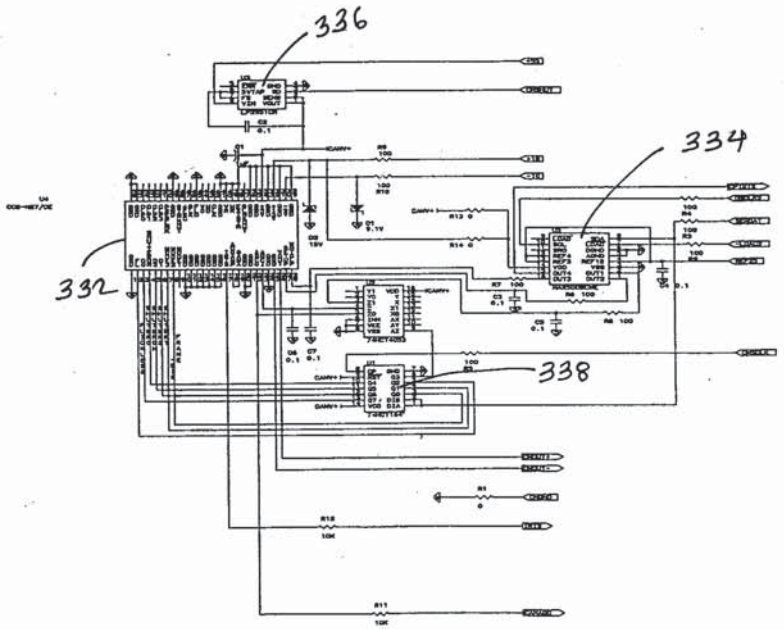


Fig. 8
Part C

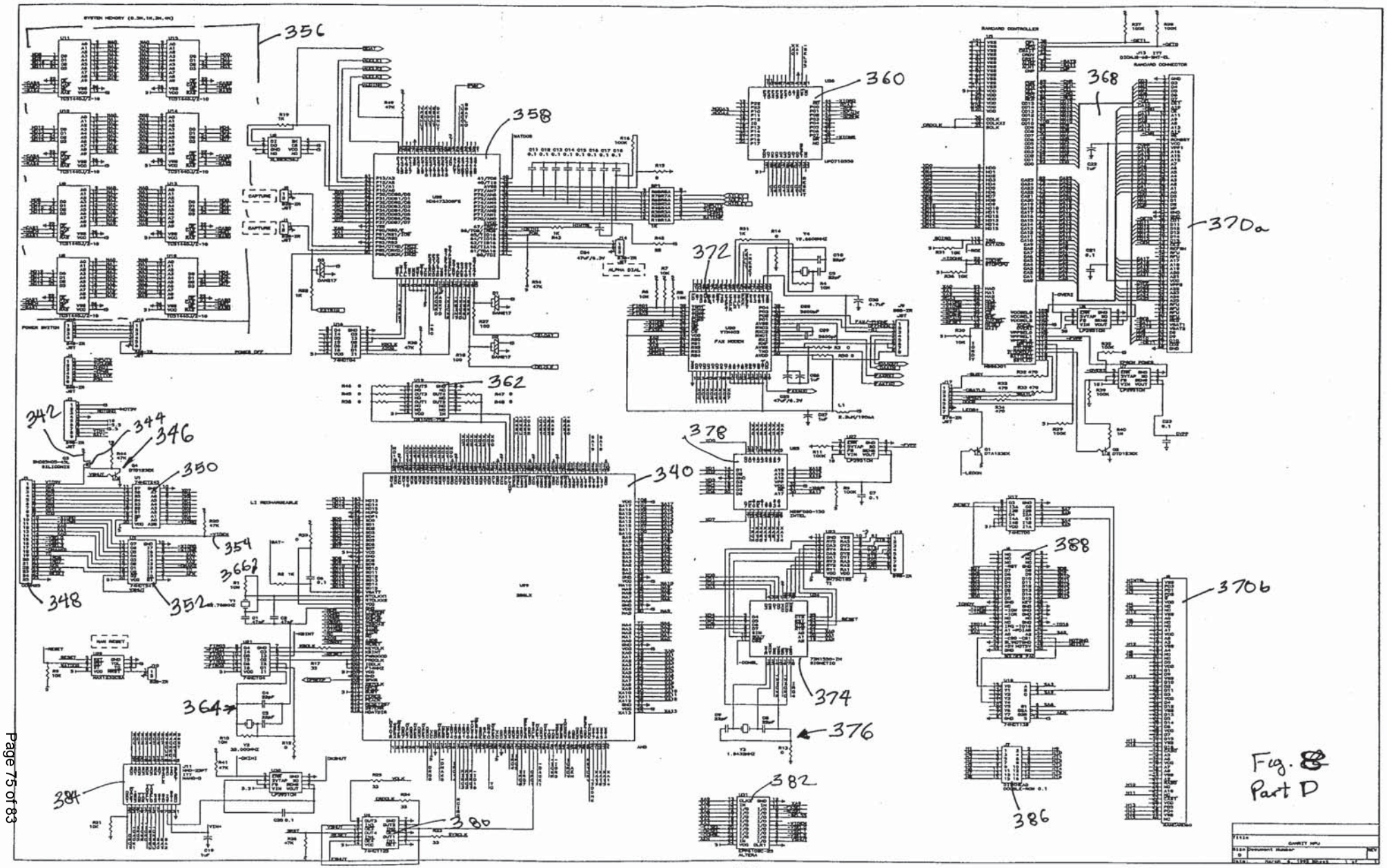

356
358
360
362
364
366
368
370a
370b
372
374
376
378
380
382
384
386
388
340
342
344
346
348
350
352
354

Fig. 8
Part D

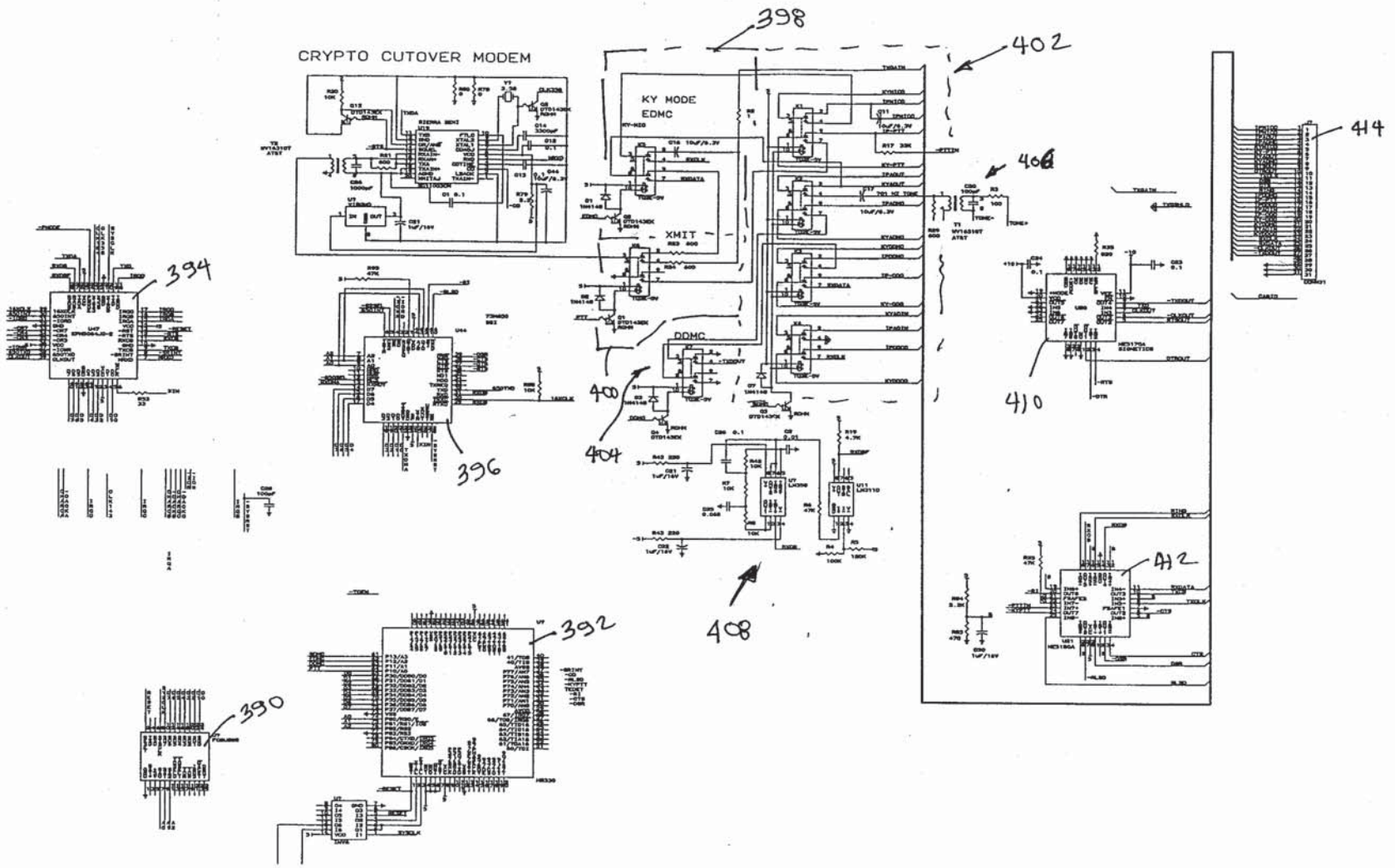

CRYPTO CUTOVER MODEM
KY MODE
EDMC
XMIT
DDMC
398
402
404
406
408
410
412
414
390
392
394
396

Fig. 8
Part E

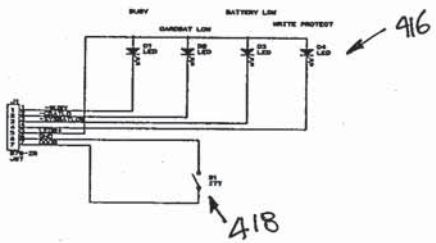


Fig. 8
Part F

PHOTOTELESIS CORPORATION
Remote Image Transmission Systems
Copyright (C) 1999
Created: MON/DD/1999
Scale: X...Size

Title
CARRIT STATUS AND DOOR STATUS

Size Document Number REV
B X.X

Date: Tuesday, xx, 1999 Sheet x of x

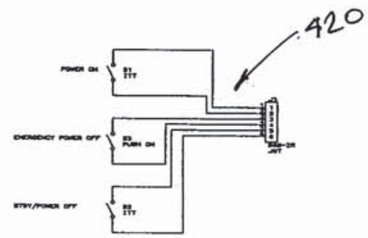
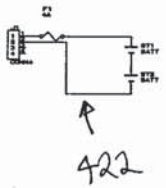


Fig. 8
Part G

PHOTOTELESIS CORPORATION
Remote Image Transmission Systems

Title
GAMBIT POWER ON/OFF PCB

Size	Document Number	REV
A		1.0



Battery Pack

Fig. 8
Part H

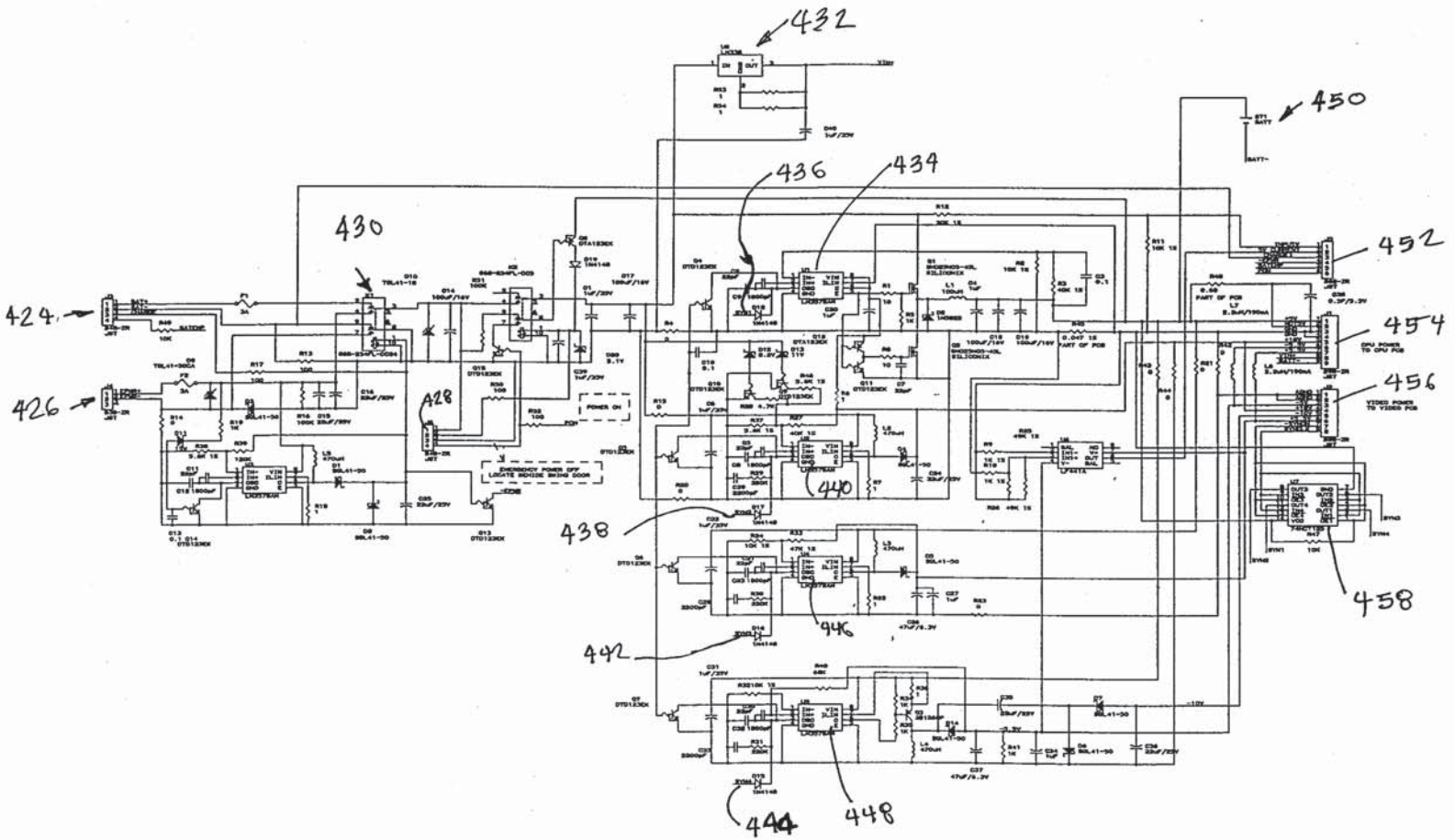

432
450
436
434
430
452
424
454
426
456
428
440
438
458
446
442
448
444

Fig. 8
Part I

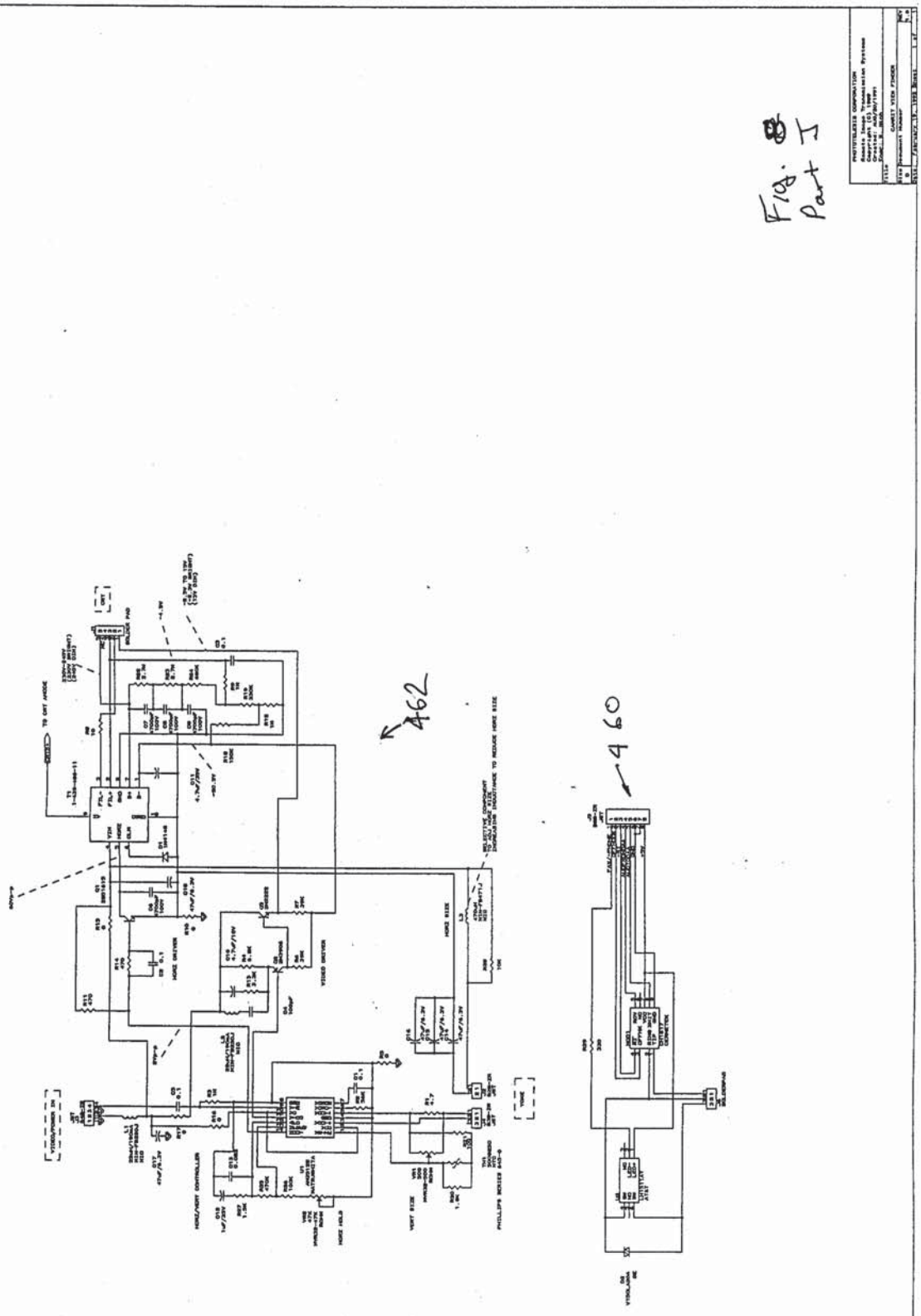


Fig. 8
Part I

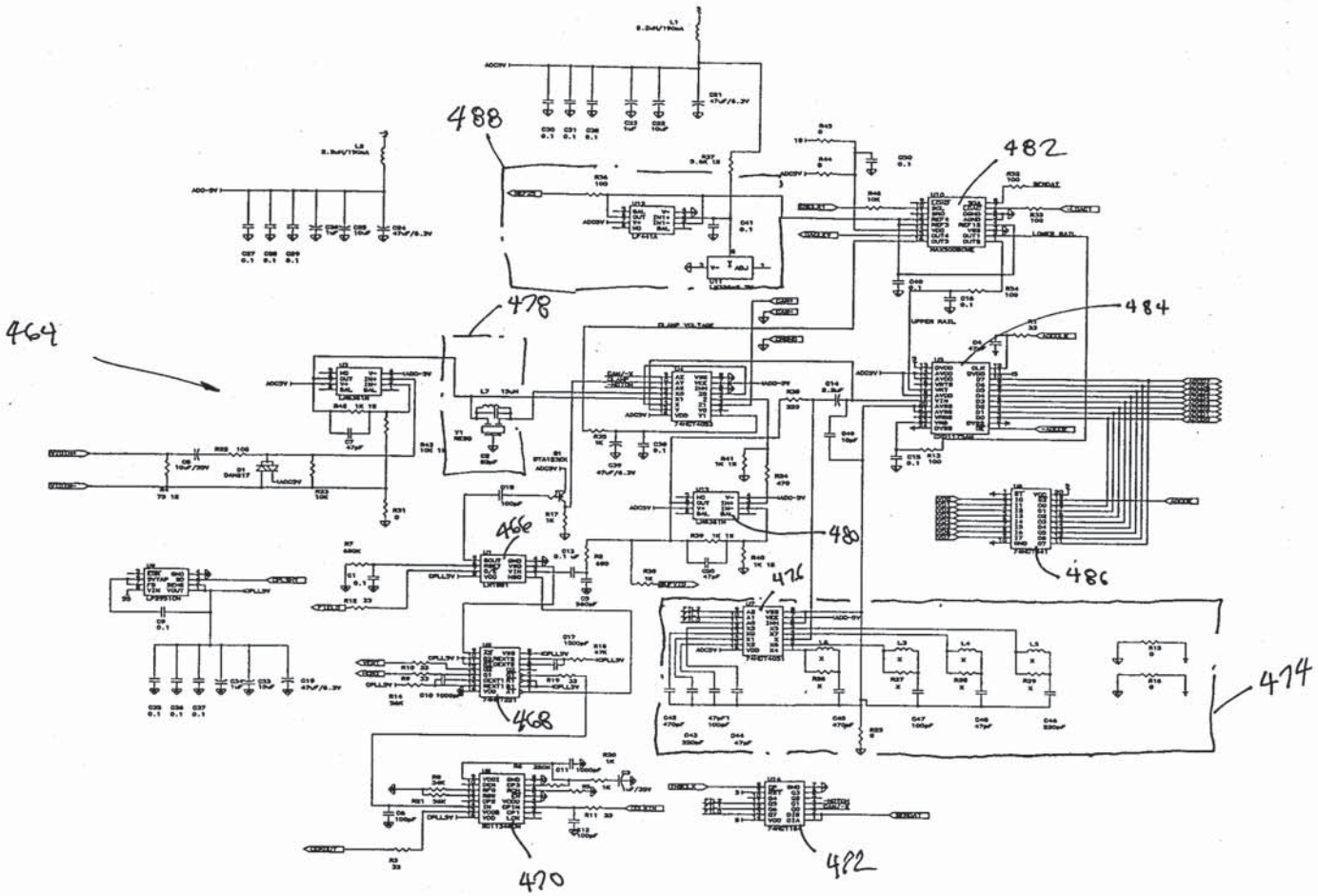


Fig. 8
Prior Art

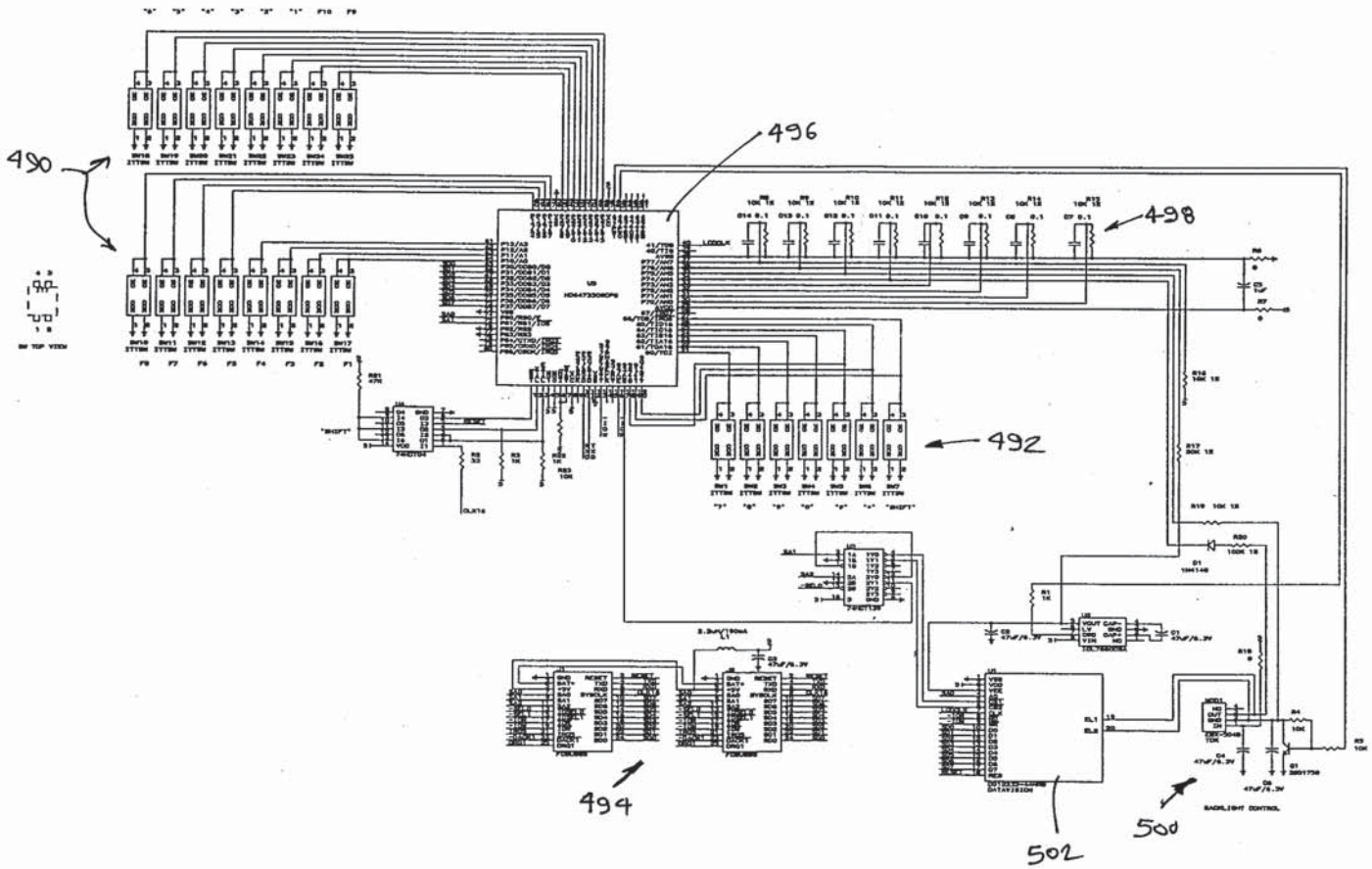


Fig. 8
Part L