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Title: "HAND-HELD COMPUTERS INCORPORATING REDUCED AREA IMAGING DEVICES"

Assistant Commissioner for Patents
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Washington, DC 20231

This is a Continuation-in-Part application of pending prior application No. 09/638,976 filed August 15, 2000. The entire disclosure of the prior application is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference.

Enclosed for filing with the above-identified utility patent application, please find the following:

1. ☒ Applicant claims small entity status. See 37 CFR 1.27.
2. ☒ Specification (Total Pages of Text, including Abstract and Claims: 63)
3. ☒ Drawing(s) (35 USC 113) (Total Sheets: 14) ☒ FORMAL ☐ INFORMAL
4. ☒ Oath or Declaration (Total Pages: 3) ☒ Signed ☐ Unsigned
5. ☒ Power of Attorney
6. ☒ Return Postcard (MPEP 503) (should be specifically itemized)
7. ☒ A check in the amount of \$1,598.00 is enclosed.
8. ☒ Other: Declaration Accompany Petition Under 37 CFR 1.102, Petition to Make Special Under Rule 1.102(c)

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	(COL. 1) NO. FILED			(COL. 2*) NO. EXTRA		SMALL ENTITY			LARGE ENTITY	
						RATE	FEE		RATE	FEE
BASIC FEE:							\$355.00	OR		\$710.00
TOTAL CLAIMS:	87	-	20		67	X \$9 =	\$603.00	OR	X \$18 =	
INDEP. CLAIMS:	19	-	3		16	X \$40 =	\$640.00	OR	X \$80 =	
MULTIPLE DEPENDENT CLAIMS						+ \$135 =	\$0.00	OR	+\$270 =	
*IF THE DIFFERENCE IN COL. 2 IS LESS THAN ZERO, ENTER "O" IN COL. 2.						TOTAL:	\$1,598.00			

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I HEREBY CERTIFY THAT THIS NEW APPLICATION AND THE DOCUMENTS REFERRED TO AS ENCLOSED THEREIN ARE BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 C.F.R. 1.10 ON THE DATE INDICATED ABOVE ADDRESSED TO BOX PAT APP, COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231.

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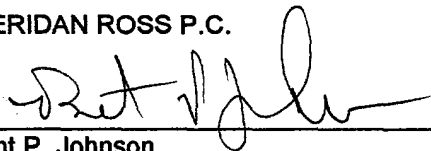
OTHER INFORMATION:

1. ☒ The Commissioner is hereby authorized to debit any underpayments or credit any overpayment to Deposit Account No. 19-1970.
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**HAND-HELD COMPUTERS INCORPORATING
REDUCED AREA IMAGING DEVICES**

This application is a continuation-in-part of U.S. Serial No. 09/638,976 filed on August 15, 2000, entitled "Hand Held Computers Incorporating Reduced Area Imaging Devices", which is a continuation-in-part of U.S. Serial No. 09/496,312, filed February 1, 2000, and entitled "Reduced Area Imaging Devices", which is a continuation application of U.S. Serial No. 09/175,685, filed October 20, 1998 and entitled "Reduced Area Imaging Devices", now U.S. Patent No. 6,043,839, which is a continuation-in-part of U.S. Serial No. 08/944,322, filed October 6, 1997 and entitled "Reduced Area Imaging Devices Incorporated Within Surgical Instruments", now U.S. Patent No. 5,929,901.

Technical Field

This invention relates to solid state image sensors and associated electronics, and more particularly, to solid state image sensors which are configured to be of a minimum size and used within miniature computer systems known as palm top computers, personal digital assistants (PDA), or hand-held computers/organizers.

Background Art

The three most common solid state image sensors include charged-coupled devices (CCD) charge injection devices (CID) and photo diode arrays. In the mid-1980s, complementary metal oxide semiconductors (CMOS) were developed for industrial use. CMOS imaging devices offer improved functionality and simplified system interfacing. Furthermore, many CMOS imagers can be manufactured at a fraction of the cost of other solid state imaging technologies.

The CCD device is still the preferred type of imager used in scientific applications. Only recently have CMOS-type devices been improved such that the quality of imaging compares to that of CCD devices. However, there are enormous drawbacks with CCD devices. Two major drawbacks are that CCD devices have immense power requirements, and the amount of processing circuitry required for a CCD imager always requires the use of a remote processing circuitry module which can

process the image signal produced by the CCD imager. Also, because of the type of chip architecture used with CCD devices, on-chip processing is impossible. Therefore, even timing and control circuitry must be remotod from the CCD imager plane. Therefore, CCD technology is the antithesis of "camera on a chip" technology discussed below.

5 One particular advance in CMOS technology has been in the active pixel-type CMOS imagers which consist of randomly accessible pixels with an amplifier at each pixel site. One advantage of active pixel-type imagers is that the amplifier placement results in lower noise levels. Another major advantage is that these CMOS imagers can be mass-produced on standard semiconductor production lines. One particularly notable
10 advance in the area of CMOS imagers including active pixel-type arrays is the CMOS imager described in U.S. Patent No. 5,471,515 to Fossum, et al. This CMOS imager can incorporate a number of other different electronic controls that are usually found on multiple circuit boards of much larger size. For example, timing circuits, and special
15 functions such as zoom and anti-jitter controls can be placed on the same circuit board containing the CMOS pixel array without significantly increasing the overall size of the host circuit board. Furthermore, this particular CMOS imager requires 100 times less power than a CCD-type imager does. In short, the CMOS imager disclosed in Fossum, et al. has enabled the development of a "camera on a chip."

 Passive pixel-type CMOS imagers have also been improved so that they too can
20 be used in an imaging device, which qualifies as a "camera on a chip." In short, the major difference between passive and active CMOS pixel arrays is that a passive pixel-type imager does not perform signal amplification at each pixel site. One example of a manufacturer which has developed a passive pixel array with performance nearly equal to known active pixel devices and compatible with the read out circuitry disclosed in the
25 U.S. Patent No. 5,471,515 is VLSI Vision, Ltd., 1190 Saratoga Avenue, Suite 180, San Jose, California 95129. A further description of this passive pixel device may be found

in the applicant's patent entitled "Reduced Area Imaging Devices Incorporated Within Surgical Instruments," now U.S. Patent No. 5,986,693, and is hereby incorporated by reference.

In addition to the active pixel-type CMOS imager which is disclosed in U.S. Patent No. 5,471,515, there have been developments in the industry for other solid state imagers which have resulted in the ability to have a "camera on a chip." For example, Suni Microsystems, Inc. of Mountain View, California, has developed a CCD/CMOS hybrid which combines the high quality image processing of CCDs with standard CMOS circuitry construction. In short, Suni Microsystems, Inc. has modified the standard CMOS and CCD manufacturing processes to create a hybrid process providing CCD components with their own substrate which is separate from the P well and N well substrates used by the CMOS components. Accordingly, the CCD and CMOS components of the hybrid may reside on different regions of the same chip or wafer. Additionally, this hybrid is able to run on a low power source (5 volts) which is normally not possible on standard CCD imagers which require 10 to 30 volt power supplies. A brief explanation of this CCD/CMOS hybrid can be found in the article entitled "Startup Suni Bets on Integrated Process" found in *Electronic News*, January 20, 1997 issue. This reference is hereby incorporated by reference for purposes of explaining this particular type of imaging processor.

Another example of a recent development in solid state imaging is the development of a CMOS imaging sensor which is able to achieve analog to digital conversion on each of the pixels within the pixel array. This type of improved CMOS imager includes transistors at every pixel to provide digital instead of analog output that enables the delivery of decoders and sense amplifiers much like standard memory chips. With this new technology, it may, therefore, be possible to manufacture a true digital

“camera on a chip.” This CMOS imager has been developed by a Stanford University joint project and is headed by Professor Abbas el-Gamal.

5 A second approach to creating a CMOS-based digital imaging device includes the use of an over-sample converter at each pixel with a one bit comparator placed at the edge of the pixel array instead of performing all of the analog to digital functions on the pixel. This new design technology has been called MOSAD (multiplexed over sample analog to digital) conversion. The result of this new process is low power usage, along with the capability to achieve enhanced dynamic range, possibly up to 20 bits. This process has been developed by Amain Electronics of Simi Valley, California. A brief description of both of the processes developed by Stanford University and Amain Electronics can be found in an article entitled “A/D Conversion Revolution for CMOS Sensor?,” September 1998 issue of *Advanced Imaging*. This article is also hereby incorporated by reference for purposes of explaining these particular types of imaging processors.

15 Yet another example of a recent development with respect to solid state imaging is an imaging device developed by ShellCase, of Jerusalem, Israel. In an article entitled “A CSP Optoelectronic Package for Imaging and Light Detection Applications” (A. Badihi), ShellCase introduces a die-sized, ultrathin optoelectronic package which is completely packaged at the wafer level using semiconductor processing. In short, 20 ShellCase provides a chip scale package (CSP) process for accepting digital image sensors which may be used, for example, in miniature cameras. The die-sized, ultrathin package is produced through a wafer level process which utilizes optically clear materials and completely encases the imager die. This packaging method, ideally suited for optoelectronic devices, results in superior optical performance and form factor not 25 available by traditional image sensors. This article is also incorporated by reference for purposes of explaining ShellCase’s chip scale package process.

Yet another example of a recent development with respect to solid state imaging is shown in U.S. Patent No. 6,020,581 entitled "Solid State CMOS Imager Using Silicon on Insulator or Bulk Silicon." This patent discloses an image sensor incorporating a plurality of detector cells arranged in an array wherein each detector cell as a MOSFET with a floating body and operable as a lateral bipolar transistor to amplify charge collected by the floating body. This invention overcomes problems of insufficient charge being collected in detector cells formed on silicon on insulator (SOI) substrates due to silicon thickness and will also work in bulk silicon embodiments.

The above-mentioned developments in solid state imaging technology have shown that "camera on a chip" devices will continue to be enhanced not only in terms of the quality of imaging which may be achieved, but also in the specific construction of the devices which may be manufactured by new breakthrough processes.

Although the "camera on a chip" concept is one which has great merit for application in many industrial areas, a need still exists for a reduced area imaging device which can be used in even the smallest type of industrial application. Recently, devices known as palm top computers, PDA(s), or hand-held computers have become very popular items. Essentially, these PDAs are miniature computers, small enough to be held in the hand, which have various software programs available to a user including word processing, e-mail, and organization software for addresses/phone books, etc.

One example of a U.S. patent disclosing a type of a PDA includes U.S. Patent No. 5,900,875. This patent is incorporated herein by reference for purposes of illustrating an example of a PDA including basic functionality for such a device. In a recent article entitled "Palm, Inc. Gets Ready for New Hands" appearing in the *Wallstreet Journal*, a number of soon to be commercially available PDAs are disclosed. One such device disclosed in this article is known as the "Hand Spring Visor Deluxe."

This device will soon be available which allows a user to accommodate pagers, MP3 players, still digital cameras and other devices.

It is one general object of this invention to provide a video system in combination with a standard PDA enabling a user to take video images by a very small camera module incorporated within the PDA, view the video images taken on a video view screen incorporated within the PDA, and to have the capability to store video images, download the video images, and send the video images electronically through a communications network.

Another object of this invention is to provide a PDA with the ability to not only transmit video images taken by the camera module, but also to receive video images sent from a remote location via the communications network, and to view such received video images on the video view screen of the PDA. Accordingly, the invention is ideally suited for video teleconferencing.

It is another object of this invention to provide a reduced area imaging device incorporated within a PDA which takes advantage of "camera on a chip" technology, but to rearrange the video processing circuitry in a selective stacked relationship so that the camera module has a minimum profile.

It is yet another object of this invention to provide imaging capability for a PDA wherein the video camera used is of such small size that it can be stored in the PDA when not in use. The camera module is attached to the PDA by a retractable cord which enables the imaging device to be used to image anything at which the camera module is pointed by the user without having to also move the PDA away from the view of the user.

It is yet another object of the invention to provide a video camera with a PDA wherein the camera communicates with a PDA by a wireless link such as a RF radio link so that the camera does not have to be physically connected to the PDA. This wireless

connection further enhances the capability to use the camera to shoot video without having to move the PDA or otherwise manipulate the PDA in a manner which detracts from shooting the video.

- 5 In all applications, to include use of the imaging device of this invention with a PDA, "camera on a chip" technology can be improved with respect to reducing its profile area, and incorporating such a reduced area imaging device within a PDA such that minimal size and weight is added to the PDA, and further that the imaging device can be used to image selected targets by the user.

Disclosure of the Invention

In accordance with the present invention, reduced area imaging devices are provided in combination with a hand-held computer or PDA. The term "imaging device" as used herein describes the imaging elements and processing circuitry which is used to produce a video signal which may be accepted by both a standard video device such as a television or video monitor accompanying a personal computer, and a small LCD screen which is incorporated within the PDA. The term "image sensor" as used herein describes the components of a solid state imaging device which captures images and stores them within the structure of each of the pixels in the array of pixels found in the imaging device. As further discussed below, the timing and control circuits can be placed either on the same planar structure as the pixel array, in which case the image sensor can also be defined as an integrated circuit, or the timing and control circuitry can be placed remote from the pixel array. The terms "video signal" or "image signal" as used herein, and unless otherwise more specifically defined, refer to an image which at some point during its processing by the imaging device, is found in the form of electrons which have been placed in a specific format or domain. The term "processing circuitry" as used herein refers to the electronic components within the imaging device which receive the image signal from the image sensor and ultimately place the image signal in a usable format. The terms "timing and control circuits" or "timing and control circuitry" as used herein refer to the electronic components which control the release of the image signal from the pixel array.

In a first embodiment of the PDA, the imaging device connects to the PDA by a cable or cord that may retract within the housing of the PDA. Thus in this embodiment, the camera is tethered to the PDA. In a second embodiment, the imaging device does not have to be physically connected to the PDA; rather, a wireless RF link or other acceptable wireless technology is used so that video signals produced by the imaging

device may be transmitted to and received by the PDA. One particularly advantageous wireless technology usable with the PDA of this invention is known as "Bluetooth".

Another recent wireless technology which is usable with the invention is a wireless protocol known as "IEEE 802.15.3". This wireless standard is developing under the

5 joint efforts of Kodak, Motorola, Cisco and the International Electronic and Electrical Engineers Standards Association (IEEE) Wireless Personal Area Network Working Group (WPAN). Bluetooth technology provides a universal radio interface in the 2.4GHz frequency band that enables portable electronic devices to connect and communicate wirelessly via short-range ad hoc networks. Bluetooth radios operate in an
10 unlicensed Instrumentation, Scientific, Medical (ISM) band at 2.4GHz. Bluetooth is a combination of circuit and packet switching. Slots can be reserved for synchronous packets. Each packet is transmitted in a different hop frequency. A packet nominally covers a single slot, but can be extended to cover up to five slots. Bluetooth can support an asynchronous data channel, up to three simultaneous synchronous voice channels, or
15 a channel that simultaneously supports asynchronous data and synchronous voice. Spectrum spreading is used to facilitate optional operation at power levels up to 100mW worldwide. Spectrum spreading is accomplished by frequency hopping in 79 hops displaced by 1 MHz, starting at 2.402 GHz and stopping at 2.480GHz. The maximum frequency-hopping rate is 1600 hops per second. The nominal link range is 10
20 centimeters to 10 meters, but can be extended to more than 100 meters by increasing the transmit power. A shaped, binary FM modulation is applied to minimize transceiver complexity. The gross data rate is 1Mb/second. A time division duplex scheme is used for full-duplex transmission. Additional technical information describing the Bluetooth global specification is found on the world wide web at www.bluetooth.com. Additional
25 information regarding the technical specification for the IEEE 802.15.3 standard may be found at <http://www.ieee802.org/15>, under the link for Task Force Three (TG3).

In a first arrangement of the imaging device, the image sensor, with or without the timing and control circuitry, may be placed at the distal tip of a very small video camera module which communicates with the PDA by a wireless RF link, or is attached by a cable or cord to the PDA, or the camera module communicates with the PDA by a wireless RF link while the remaining processing circuitry may be placed within the housing of the PDA.

In a second arrangement of the imaging device, the image sensor and the processing circuitry may all be placed in a stacked arrangement of miniature circuit boards and positioned at the distal tip of the video camera module. In this second arrangement, the pixel array of the image sensor may be placed by itself on its own circuit board while the timing and control circuitry and processing circuitry are placed on one or more other circuit boards, or the circuitry for timing and control may be placed with the pixel array on one circuit board, while the remaining processing circuitry can be placed on one or more of the other circuit boards.

In yet another alternative arrangement of the imaging device, the pixel array, timing and control circuits, and some of the processing circuitry can be placed near the distal end of the video camera module with the remaining part of the processing circuitry being placed in the housing of the PDA.

For the arrangement or configuration of the imaging device that calls for the array of pixels and the timing and control circuitry to be placed on the same circuit board, only one conductor is required in order to transmit the image signal to the video processing circuitry. When the timing and control circuits are incorporated onto other circuit boards, a plurality of connections are required in order to connect the timing and control circuitry to the pixel array, and then the one conductor is also required to transmit the image signal back to the video processing circuitry.

As mentioned above, the invention disclosed herein can be considered an improvement to a PDA wherein the improvement comprises a video system. The video system would include the video view screen or monitor attached to the PDA, the camera module, as well as supporting video processing circuitry for the imaging device. In yet another aspect, the invention disclosed herein can also be considered an improvement to a PDA wherein the improvement comprises a novel imaging device, preferably of CMOS construction. For this improvement comprising the imaging device, the imaging device includes the array of pixels, and the supporting video processing circuitry for providing a video ready signal.

In yet another aspect, the invention disclosed herein can also be considered an improvement to a PDA wherein the improvement comprises an imaging device which utilizes a wireless standard in order to transmit video images to the PDA.

This video ready signal may be formatted by the video processing circuitry for viewing on a NTSC/PAL compatible device such as television, or for viewing on a VGA compatible device such as a monitor of a personal computer. Of course, the video ready signal is formatted for viewing the video images on the video view screen incorporated within the PDA.

In yet another aspect, the invention disclosed herein can also be considered an improvement to a PDA wherein the improvement comprises a combination of a video system, and wireless telephone communication means for transmitting and receiving both audio and video signals. In this aspect, the invention has functionality for transmitting and receiving audio and video signals via the communications network. One example of a U.S. patent disclosing wireless remote communications between a personal computer and a PDA or miniature hand held computer is U.S. Patent No. 6,034,621. This patent is hereby incorporated by reference in its entirety for purposes of disclosing means by which data can be exchanged between the hand held computer and a personal computer,

to include video and audio signals. The specific example in this patent which readily lends itself to the communication network incorporated within this invention is found at Figure 4 of this '621 patent. The discussion further below outlines this particular communication network.

5 In yet another aspect, the invention disclosed herein can also be considered an improvement to a PDA wherein the improvement comprises a video system, and a standard wireless telephone communication means for transmitting and receiving audio signals. In this aspect, the PDA simply includes a standard wireless/cellular phone connected externally on the PDA which enables the user to conduct well-known
10 wireless/ telephone communications. This wireless/cellular communication means can be in addition to the wireless telephone communication means for transmitting and receiving both audio and video signals discussed immediately above with respect to the U.S. Patent No. 6,034,621.

Another example of a U.S. patent disclosing basic mobile phone technology
15 including a discussion of basic phone circuitry is U.S. Patent No. 6,018,670. This patent is hereby incorporated by reference in its entirety for purposes of disclosing standard or basic mobile phone technology and supporting circuitry.

Accordingly, the invention disclosed herein has utility with respect to an overall combination of elements, as well as various sub-combinations of elements.

20

Brief Description of the Drawings

Figure 1 is an enlarged fragmentary partially exploded perspective view of the distal end of the camera module which is used in conjunction with the PDA, specifically illustrating the arrangement of the image sensor with respect to the other elements of the
25 camera module;

Figure 1a is an enlarged exploded perspective view illustrating another configuration of the image sensor wherein video processing circuitry is placed behind and in longitudinal alignment with the image sensor;

Figure 2 is a perspective view of the PDA in a first embodiment incorporating the
5 reduced area imaging device of this invention;

Figure 3 illustrates the PDA of Figure 2 wherein the camera module is in the retracted position;

Figure 4 is an overall schematic diagram of the functional electronic components in the first embodiment which make up both the PDA and the reduced area imaging
10 device wherein communications are achieved by wireless/cellular technology for video teleconferencing via the world wide web which is well-known as a global communications network;

Figure 5 is a schematic diagram illustrating an example communications network which can be used for data transfer of text, audio, and visual signals between the PDA
15 and a personal computer which is in communication with the world wide web;

Figure 6a is a perspective view of the PDA in the first embodiment illustrated in combination with an externally attached wireless/cellular phone;

Figure 6b is another perspective view of the combination of Figure 6a illustrating the combination opened to expose the PDA;

Figure 7 is a perspective view of the PDA in a second embodiment wherein the
20 camera module utilizes a wireless technology, thus the camera module may be physically separated from the PDA during operation, but can still be housed within the PDA for storage and for recharge of the battery of the camera module;

Figure 8 is an overall schematic diagram, similar to Figure 4, of the functional
25 components which make up the PDA and a simplified cross sectional view of the camera

module in the second preferred embodiment wherein the camera module communicates with the PDA via a wireless link;

Figure 8a is an enlarged view of some of the components of the camera module, specifically, the components used in the wireless link with the PDA;

5 Figure 9 is a more detailed schematic diagram of the functional electronic components, which make up the imaging device;

Figure 9a is an enlarged schematic diagram of a circuit board/planar structure, which may include the array of pixels and the timing and control circuitry;

10 Figure 9b is an enlarged schematic diagram of a video processing board/planar structure having placed thereon the processing circuitry which processes the pre-video signal generated by the array of pixels and which converts the pre-video signal to a post-video signal which may be accepted by an NTSC/PAL compatible video device; and

15 Figures 10a-10e are schematic diagrams that illustrate an example of specific circuitry which may be used to make the video processing circuitry of the imaging device.

Best Mode for Carrying Out the Invention

In accordance with the invention, as shown in Figure 1, a camera module 10 is provided which incorporates a reduced area imaging device 11. As further discussed
20 below, the elements of the imaging device 11 may all be found near one location, or the elements may be separated from one another and interconnected by the appropriate wired connections. The array of pixels making up the image sensor captures images and stores them in the form of electrical energy by conversion of light photons to electrons. This conversion takes place by the photo diodes in each pixel which communicate with
25 one or more capacitors which store the electrons. Specifically, the camera module 10 includes an outer tube/sheath 14 which houses the components of the imaging device.

The camera module is shown as being cylindrical in shape having a window 16 sealed at the distal end of the camera module. A retractable cable 12 extends from the proximal end of the camera module 10. A shielded cable 21 is used to house the conductors which communicate with the imaging device 11. The shielded cable 21 is then housed within the retractable cable 12. A lens group 18 is positioned at the distal end of the camera module to enable an image to be appropriately conditioned prior to the image impinging upon the imaging device 11. Also shown is a focusing ring 20 which enables the lens group 18 to be displaced distally or proximally to best focus an image on the imaging device 11.

Now referring to Figures 2 and 3, a PDA 22 in a first embodiment is shown which incorporates the camera module 10. In basic terms, the PDA 22 is a miniature hand-held computer incorporating a video system enabling video to be taken by the camera module, and viewed on the video view screen 26, as well as enabling images to be stored and downloaded on a miniature computer disc (not shown) used with the PDA. Also discussed further below is the ability to transmit and receive audio and video signals.

Beginning first with a description of the basic components of the PDA 22, it includes a housing 24 which hold the components of the PDA and the video system. Cable 12 is housed within the housing 24 when in the retracted position. A spring biased spool (not shown) or some other known retracting device is mounted within the housing 24 enabling the cable 12 to be extended or retracted. A plurality of controls is provided enabling the user to manipulate the functions of the PDA. These are shown as buttons 34 on the housing 24. The video view screen 26 is used for displaying video images taken by the camera module 10, or for viewing incoming video signals received from a remote location. A command screen 28 is provided which allows a user to select programs with a stylus (not shown). A video capture button 30 is provided which allows

a user to capture a still video image taken by the camera module 10. A video store button 32 is also provided which enables a captured video image to be stored within the digital memory of the PDA, as further discussed below. An opening or cavity 35 is provided which allows the camera module 10 to be stored, along with cable 12 within the housing 24. As shown in Figure 3, the camera module 10 is in the stored or retracted position. The antenna 36 allows for enhanced transmission and reception of incoming or transmitted/outgoing audio and video signals. A video select switch 37 is provided enabling a user to view either video images taken by the camera module 10, or for viewing incoming video images. The video view screen 26 may be a liquid crystal display (LCD) type, or any other well-known display device of high resolution which has low power requirements, and has minimum size requirements as well.

An example of a manufacture of such a miniature LCD monitor includes DISPLAYTECH of Longmont, Colorado. DISPLAYTECH manufactures a miniature reflective display that consists of ferroelectric liquid crystal (FLC) applied to a CMOS integrated circuit. The reflective display is a VGA display panel having low voltage digital operation, low power requirements, and full color operation. One of their specific products includes the LightCaster™ VGA Display Panel, Model LDP-0307-MV1. This is but one example of a LCD monitor that is available and usable within the invention herein described.

A camera on/off switch 66 is provided enabling the user to turn the video system on or off. Also shown in Figures 2 and 3 is a speaker 76 and a microphone 78 which are used for sending and receiving audio signals in the conventional manner as with a wireless/cellular telephone. A further description of speaker 76 and microphone 78 is found below.

Referring back to Figures 1 and 1a, the imaging device 11 includes an image sensor 40. Figure 1 illustrates that the image sensor 40 can be a planar and square

shaped member, or alternatively, planar and circular shaped to better fit within outer tube 14. In the configuration of the imaging device in Figures 1 and 1a, there are only three conductors which are necessary for providing power to the image sensor 40, and for transmitting an image from the image sensor 40 back to the processing circuitry found within the phone housing 24. Specifically, there is a power conductor 44, a grounding conductor 46, and an image signal conductor 48, each of which are hardwired to the image sensor 40. Thus, shielded cable 21 may simply be a three conductor, 50 ohm type cable.

Image sensor 40 can be as small as 1 mm in its largest dimension. However, a more preferable size for most PDA applications would be between 4 mm to 8 mm in the image sensor's largest dimension (height or width). The image signal transmitted from the image sensor 40 through conductor 48 is also herein referred to as a pre-video signal. Once the pre-video signal has been transmitted from image sensor 40 by means of conductor 48, it is received by video processing board 50, as shown in Figure 6b. Video processing board 50 then carries out all the necessary conditioning of the pre-video signal and places it in a form, also referred to herein as a video ready signal, so that it may be viewed directly on a remote video device such as a television or standard computer video monitor. In order for the pre-video signal to be viewed on the video view screen/monitor 26, the pre-video signal is further conditioned by a digital signal processor 72, as further discussed below. The video signal produced by the video processing board 50 can be viewed by an NTSC/PAL compatible video device (such as a television) which connects to the PDA through a remote jack. This video signal produced by board 50 can be further defined as a post-video signal.

Figure 1 illustrates an arrangement wherein the image sensor 40 is placed by itself adjacent the distal end of the camera module 10. Alternatively, some or all of the video processing circuitry may be placed in adjacent circuit boards directly behind the image

sensor 40. Accordingly, 1a illustrates video processor board 50 aligned directly behind the image sensor 40. A plurality of pin connectors 52 can be used to interconnect image sensor 40 to video processor board 50. Depending upon the specific configuration of image sensor 40, pin connectors 52 may be provided for structural support only, and/or to provide a means by which image signals are transmitted between image sensor 40 and board 50. Additionally, digital signal processor 72 could also be placed behind image sensor 40 and behind video processing board 50. Accordingly, the image sensor, and all supporting video processing circuitry could be placed at the distal end of the camera module 10. However, because of the ample space within housing 24, it may be preferable to place at least some of the video processing circuitry within housing 24. In the case of Figure 1a, the conductor 49 represents the conductor which may carry the post-video signal for direct connection with a remote video device 60 such as a television or computer monitor. As also discussed further below with respect to the first embodiment, placement of the digital signal processor 72 at the distal tip of the camera module behind the video processing board 50 would also enable yet another conductor (not shown) to connect directly to the video monitor 26 for transmitting a video signal to the video monitor 26.

Again referring to Figures 1 and 1a, the area which is occupied by image sensor 40 may be defined as the profile area of the imaging device and which determines its critical dimensions. If it is desired to place video processing circuitry adjacent the image sensor 40 at the distal end of the camera module 10, such circuitry must be able to be placed on one or more circuit boards that are longitudinally aligned with image sensor 40 along longitudinal axis XX. If it is not important to limit the size of the profile area, then any circuitry placed behind image sensor 40 can be aligned in an offset manner, or may simply be larger than the profile area of image sensor 40. In the configuration shown in

Figure 1a, it is desirable that elements 40 and 50 be approximately the same size so that they may uniformly fit within the distal end of outer tube 14.

Now referring to the first embodiment of Figure 4, a further explanation is provided of the basic electronic components of the PDA 22. The PDA 22 of this invention includes functionality normally found in multiple devices. Specifically, the PDA 22 includes the computing capability of a PDA, a mobile/wireless phone, communication means for connection to a computer network such as the worldwide web, and a video system. The PDA 22 may be separated into two major groups, namely, a video and communication system 61, and a computer processing and memory unit 82. Both of these are discussed in further detail below.

As shown in Figure 4, a conventional lithium ion battery 62 is provided which communicates with power supply board 64. Power supply board 64 conditions various power outputs to the components of the device, to include power to the video components. In the preferred imaging device of this invention, the power to the imaging device may simply be direct current of between about 1.5 to 12 volts, depending upon the power requirements of the imaging device. A camera on/off switch 66 must be set to the "on" position in order to activate the camera module 10. The video processor board 50 then transfers power to supplies the camera module 10, and also receives the analog pre-video signal back from the camera module, as further discussed below. After processing of the pre-video signal at the video processor board 50, the video signal is video ready, meaning that it may then be directly viewed on a remote compatible video device 60, such as a television or computer monitor. A video port 54 can be provided on the housing 24 enabling a user to take a standard video jack (not shown) and interconnect the PDA with the video port of the remote video device. The video format for such remote video devices includes NTSC/PAL and VGA; thus, the video signal processed by video processor board 50 creates the video ready signals for use with these

remote video devices. For purposes of viewing images on the monitor 26, the pre-video signal is further processed into a digital format within video processor board 50, preferably an 8 bit component video signal format that is commonly referred to as "YUV 4:2:2." This video format easily lends itself to video compression. This 8-bit digital

5 video signal is then sent to the digital signal processor 72 which performs two functions relevant to the video signal. The digital signal processor 72 further converts the signal into a format that is compatible with the driver circuitry of the video monitor 26.

Secondly, the digital signal processor 72 compresses the YUV signal using a common video compression format, preferably JPEG. The JPEG encoded video signal is then

10 mixed with the audio signal created by microphone 78 and amplifier 74, and the resulting high frequency carrier signal may then be passed onto the transceiver/amplifier section 70 for transmission. It is to be understood that the transceiver/amplifier 70 is intended for communication with well-known wide area wireless communication networks. It is also contemplated within the spirit and scope of this invention that the PDA 22 be capable of
15 communication with computer networks to include the worldwide web. Accordingly, the invention is well adapted for conducting video teleconferencing that is normally conducted with desktop computers and supplemental video equipment. The transceiver/amplifier section also modulates the carrier signal prior to transmission.

Depending upon the position of video switch 37, the video signal from digital signal
20 processor 72 is either sent to the monitor 26, or is sent to the transceiver/amplifier section 70 for transmission. As also shown, the antenna 36 is used for enhancement of reception and transmission of transmitted and received carrier signals.

The transceiver/amplifier section 70 also serves as a receiver that receives an incoming carrier signal. This incoming signal is then demodulated within section 70, the
25 video and audio components of the incoming signal are separated, and then these separated signals are then sent to the digital signal processor 72 which performs video

decompression. Then, the decompressed video signal is sent to the monitor 26 for viewing (if the video switch 37 is placed in that selected mode). The decompressed audio signal is sent to the amplifier 74, and then to the speaker 76.

Figure 4 shows the transceiver/amplifier section 70 as being a cellular digital packet data system (CDPD) type transceiver. This particular transceiver/amplifier 70 could be the same as that disclosed in the U.S. Patent No. 6,034,621. A cellular digital packet system is a wireless standard providing two-way, 19.2 Kbps packet data transmission over existing cellular telephone channels.

The video switch 37 may simply be a momentary, spring loaded, push button-type switch. When the video switch 37 is not depressed, incoming video, which is received via the antenna 36, is processed as discussed above in the transceiver/amplifier section 70 and digital signal processor 72, and then sent to the monitor 26. When the video switch 37 is depressed and held, the video signal produced from the camera module 10 is processed as discussed above, and ultimately sent to the monitor 26 for viewing by the user. An operator can cycle the switch 37 between the two positions in order to selectively choose whether to view incoming or outgoing video.

Figure 5 illustrates a communications network that can be used by the invention. A communications network of this type is disclosed in the U.S. Patent No. 6,034,621, and is discussed specifically therein at Figures 3 and 4 of that patent. Figure 5 illustrates a CDPD base station 182 with a remote computer 188 utilizing a direct connection to the CDPD base station 182 via a modem 186 with a dial-up connection to the public switch telephone network (PSTN) 184. The CDPD base station 182 includes an antenna 181. The remote computer 188 can be a personal computer, a server, or any other well-known stand-alone computer.

Referring back to Figure 4, the computer processing and memory unit 82 which allows the PDA 22 to achieve basic word processing, etc., includes a microprocessor 83,

RAM 84, ROM 86, and digital storage 88. Digital storage 88 is provided for storing the formatted images taken by the camera module 10. The RAM 84, microprocessor 83, and ROM 86 are conventional or standard components as found in existing PDAs. An input/output bus 89 is provided which allows video signals to be stored or otherwise manipulated within the computer processing and memory unit 82. Accordingly, video taken by camera module 10 can be downloaded to digital storage 88. Also, existing image data stored in digital storage 88 could be viewed on video monitor 26.

Figures 6a and 6b illustrate another combination of the invention wherein the PDA 22 is simply combined with an externally mounted cellular telephone 190. The cellular phone 190 is a commercially available cellular/wireless telephone. As shown, the telephone includes the standard keypad 194, visual display 196, and antennae 198. The phone 190 is secured to the PDA 22 as by mounting means 192, which is shown in the preferred embodiment as a piano-type hinge. Thus, the PDA is altered very simply by providing means by which a cellular telephone can be attached to the PDA. This enables the user to hold both the PDA and cellular telephone in one hand while manipulating the PDA or phone 190 as desired with the other hand. All of the telephone circuitry for phone 190 is housed within the phone itself, and there is no circuitry within the PDA which is used within the phone 190.

The actual size of the phone 190 is smaller than the PDA 22. However, in order to create a uniform edged combination, the phone 190 is housed in a larger housing 200 which essentially matches the dimensions of housing 24. Additionally, a peripheral flange could be provided on the inner surface of housing 200 which comes into contact with housing 24 in the closed position of Figure 6a which would prevent inadvertent activation of the control buttons on the PDA 22.

Now referring to Figures 7 and 8, the second embodiment of the PDA is illustrated that utilizes a wireless camera module 10'. As with the first embodiment, the

camera module 10' is cylindrical shaped and can be stored within hole or orifice 35.

Thus, exteriorly, the PDA 22 appears the same, along with camera module 10' with the exception that there is no cable or cord interconnecting the camera module 10' to the PDA device 22. Now also referring to Figures 8 and 8a, in lieu of a wired connection,

5 the camera module 10' communicates with the PDA 22 by a transceiver radio element 91 which is mounted in the proximal end of the module 10'. Similarly, the PDA 22 also includes its own transceiver radio module 85 which allows video signals transmitted by transceiver 91 to be received and then passed on to the video processor board 50 for further video signal processing, as necessary. Antennae 93 communicates with
10 transceiver module 85 for enhancing reception of incoming video signals from the camera module 10'. The camera module 10' also has its own antennae 81 which enhances reception for authenticating signals which may be transmitted by transceiver 91. As understood by those skilled in the art, Bluetooth and other RF standards involve two-way communications whereby transmissions are authenticated and synchronized.

15 Thus the transceiver module 85 whose main function is to receive a signal from the camera module 10', also transmits some signals to the camera module 10'. Accordingly, the camera module also acts as a receiver to authenticate and receive such signals. The proximal end of the camera module 10' also includes a rechargeable battery 79 which is recharged when the module 10' is seated within the opening 35 of the PDA 22. The
20 battery 79 can be a common rechargeable nickel-cadmium or lithium-ion type battery. The battery 79 has a contact 77 protruding from the proximal tip of the camera module 10'. The deepest portion of chamber/opening 35 also has a contact 87 (shown schematically in Figure 8) which makes contact with contact 77 when the camera module 10' is placed in the chamber. Contact 87 electrically couples with camera battery
25 charging circuit 95 which provides an electrical charge for recharging the battery 79. When the camera module 10' is placed in the chamber 35, the external housing or casing

of the camera module 10' is electrically conductive and contacts a ground (not shown) such as spring loaded clip within the chamber 35. Thus, recharge of the battery 79 can be accomplished.

As shown in Figure 8, the charge circuit 95 receives power from power supply board 64. Thus, the battery 62 of the PDA also provides recharging capability to the battery 79.

The operation of the PDA is essentially the same in the second embodiment. If the user desires to transmit video images to another party, the user would grasp the camera module 10', remove it from chamber 35, and then point it at the target. The camera module 10' collects the video images through the objective lens group 18 which conditions images received by the image sensor 40. The plurality of conductors housed in the shielded miniature cable 21 transfers the video signals to the transceiver radio element 91. The transceiver radio element 91, among other functions, adds a high frequency carrier signal and base band protocol to the video signal which is then transmitted to the transceiver radio module 85. The video signal transmitted by the transceiver radio element 91 is authenticated by the transceiver radio module 85, the video signal is stripped of its carrier, and then routed by a link controller (not shown as a separate element apart from transceiver 85) to the video processor circuitry 50. The video signal is then handled in the same manner as the first embodiment. The user would depress the video switch 37 to initiate transmission of the video to the other party of the telephone call. Once the camera module 10' is removed from its seated position in the chamber 35, the contact between contacts 77 and 87 is broken. This break in electrical contact would allow the battery 79 to energize the camera module 10', and thus allow the camera module 10' to begin wirelessly communicating with the transceiver radio module 85. The user would be able to easily hold and point the camera module 10' with one hand, while operating the PDA 22 in the other hand. As with the first

embodiment, the video monitor 26 would display the video images simultaneously while video images were being transmitted to the other party so long as video switch 37 was depressed. If the user wished to receive video images transmitted from the other party, the user would simply reset the video switch 37 to its off or inactive state. The camera module 10' would continue to shoot video and communicate with the module 85; however, the video images would not be seen on screen 26. Again as with the first embodiment, a remote video device 60 could receive video images and remotely display and record the same.

Although Figure 8 illustrates the video processor board 50 located within the PDA 22, the video processor board 50 may alternatively be co-located with the imaging device 40 within the distal tip of the camera module 10'. Accordingly, all necessary video processing may take place within the camera module and the video signal which would be transmitted by the radio transceiver element 91 is a post video signal which is ready for viewing by either the video monitor 26, or the remote video device 60 once the transceiver radio module 85 receives, authenticates, and strips the video signal of its carrier frequency as transmitted by the radio transceiver element 91.

Figure 9 is a schematic diagram illustrating one way in which the imaging device 11 may be constructed. As illustrated, the image sensor 40 may include the timing and control circuits on the same planar structure. Power is supplied to image sensor 40 by power supply board 64. The connection between image sensor 40 and board 64 may simply be a cable having two conductors therein, one for ground and another for transmitting the desired voltage. These are illustrated as conductors 44 and 46. The output from image sensor 40 in the form of the pre-video signal is input to video processor board 50 by means of the conductor 48. In the configuration of Figure 7, conductor 48 may simply be a 50-ohm conductor. Power and ground also are supplied to video processing board 50 by conductors 44 and 46 from power supply board 52.

The output signal from the video processor board 50 is in the form of the post-video signal and which may be carried by conductor 49 which can also be a 50 ohm conductor.

As discussed above with respect to the second embodiment, in lieu of a hard wired connection by conductors 48 and 49, the pre-video or post-video signal is transmitted wirelessly to the transceiver radio module 85.

Although Figure 9 illustrates the image sensor and the timing and control circuits being placed on the same circuit board or planar structure, it is possible to separate the timing and control circuits from the pixel array and place the timing and control circuits onto video processing board 50. The advantage in placing the timing and control circuits on the same planar structure as the image sensor is that only three connections are required between image sensor 40 and the rest of the imaging device, namely, conductors 44, 46 and 48. Additionally, placing the timing and control circuits on the same planar structure with the pixel array results in the pre-video signal having less noise. Furthermore, the addition of the timing and control circuits to the same planar structure carrying the image sensor only adds a negligible amount of size to one dimension of the planar structure. If the pixel array is to be the only element on the planar structure, then additional connections must be made between the planar structure and the video processing board 50 in order to transmit the clock signals and other control signals to the pixel array. For example, a ribbon-type cable (not shown) or a plurality of 50-ohm coaxial cables (not shown) must be used in order to control the downloading of information from the pixel array. Each of these additional connections would be hard wired between the boards.

Figure 9a is a more detailed schematic diagram of image sensor 40 which contains an array of pixels 90 and the timing and control circuits 92. One example of a pixel array 90 which can be used within the invention is similar to that which is disclosed in U.S. Patent No. 5,471,515 to Fossum, et al., said patent being incorporated by

reference herein. More specifically, Figure 3 of Fossum, et al. illustrates the circuitry that makes up each pixel in the array of pixels 90. The array of pixels 90 as described in Fossum, et al. is an active pixel group with intra-pixel charged transfer. The image sensor made by the array of pixels is formed as a monolithic complementary metal oxide semiconductor (CMOS) integrated circuit which may be manufactured in an industry standard complementary metal oxide semiconductor process. The integrated circuit includes a focal plane array of pixel cells, each one of the cells including a photo gate overlying the substrate for accumulating the photo generated charges. In broader terms, as well understood by those skilled in the art, an image impinges upon the array of pixels, the image being in the form of photons which strike the photo diodes in the array of pixels. The photo diodes or photo detectors convert the photons into electrical energy or electrons which are stored in capacitors found in each pixel circuit. Each pixel circuit has its own amplifier which is controlled by the timing and control circuitry discussed below. The information or electrons stored in the capacitors is unloaded in the desired sequence and at a desired frequency, and then sent to the video processing board 50 for further processing.

Although the active pixel array disclosed in U.S. Patent No. 5,471,515 is mentioned herein, it will be understood that the hybrid CCD/CMOS described above, or any other solid state imaging device may be used wherein timing and control circuits can be placed either on the same circuit board or planar structure with the pixel array, or may be separated and placed remotely. Furthermore, it will be clearly understood that the invention claimed herein is not specifically limited to an image sensor as disclosed in the U.S. Patent No. 5,471,515, but encompasses any image sensor which may be configured for use in conjunction with the other processing circuitry which makes up the imaging device of this invention.

To summarize the different options available in terms of arrangement of the components of the imaging device 11, the array of pixels 90 of the image sensor 40 may be placed alone on a first plane, or the timing and control circuitry 92 may be placed with the array of pixels 90 on the first plane. If the timing and control circuitry 92 is not placed with the array of pixels 90 on the first plane, the timing and control circuitry 92 may be placed by itself on a second plane, or the timing and control circuitry 92 may be placed on a second plane with some or all of the processing circuitry from video processing board 50. The video processing board 50 itself may be placed on one or more planes on corresponding circuit boards containing video processing circuitry. Figure 1a illustrates a single video processor board 50 located directly behind image sensor 40; however, it shall be understood that additional circuit boards containing additional circuitry may be placed behind the image sensor 40 and behind the video processing board 50. Some or all of the video processing circuitry may be placed within the camera module 10 near the distal end thereof adjacent the image sensor 40. Video processing circuitry which is not placed within the distal end of the camera module 10 may be placed within the housing 24 of the PDA. If video processing circuitry is placed near the distal end of the camera module 10, it is preferable to arrange the video processing circuitry in a stacked relationship behind the image sensor 40. Additionally, it is preferable to place the processing circuitry in a parallel arrangement with respect to image sensor 40 and to center such video processing circuitry along axis X-X in order to minimize the size of camera module 10.

The timing and control circuits 92 are used to control the release of the image information or image signal stored in the pixel array. In the image sensor of Fossum, et al., the pixels are arranged in a plurality of rows and columns. The image information from each of the pixels is first consolidated in a row by row fashion, and is then downloaded from one or more columns that contain the consolidated information from

the rows. As shown in Figure 9a, the control of information consolidated from the rows is achieved by latches 94, counter 96, and decoder 98. The operation of the latches, counter and decoder is similar to the operation of similar control circuitry found in other imaging devices. That is, a latch is a means of controlling the flow of electrons from each individual addressed pixel in the array of pixels. When a latch 94 is enabled, it will allow the transfer of electrons to the decoder 98. The counter 96 is programmed to count a discrete amount of information based upon a clock input from the timing and control circuits 92. When the counter 96 has reached its set point or overflows, the image information is allowed to pass through the latches 94 and be sent to the decoder 98 which places the consolidated information in a serial format. Once the decoder 98 has decoded the information and placed it in the serial format, then the row driver 100 accounts for the serial information from each row and enables each row to be downloaded by the column or columns. In short, the latches 94 will initially allow the information stored in each pixel to be accessed. The counter 96 then controls the amount of information flow based upon a desired time sequence. Once the counter has reached its set point, the decoder 98 then knows to take the information and place it in the serial format. The whole process is repeated, based upon the timing sequence that is programmed. When the row driver 100 has accounted for each of the rows, the row driver reads out each of the rows at the desired video rate.

The information released from the column or columns is also controlled by a series of latches 102, a counter 104 and a decoder 106. As with the information from the rows, the column information is also placed in a serial format which may then be sent to the video processing board 50. This serial format of column information is the pre-video signal carried by conductor 48. The column signal conditioner 108 places the column serial information in a manageable format in the form of desired voltage levels.

In other words, the column signal conditioner 108 only accepts desired voltages from the downloaded column(s).

5 The clock input to the timing and control circuits 92 may simply be a quartz crystal timer. This clock input is divided into many other frequencies for use by the various counters. The run input to the timing and control circuit 92 may simply be an on/off control. The default input can allow one to input the pre-video signal to a video processor board which may run at a frequency of other than 30 hertz. The data input controls functions such as zoom. At least for a CMOS type active pixel array which can be accessed in a random manner, features such as zoom are easily manipulated by
10 addressing only those pixels which locate a desired area of interest by the user.

A further discussion of the timing and control circuitry which may be used in conjunction with an active pixel array is disclosed in U.S. Patent No. 5,471,515 and is also described in an article entitled "Active Pixel Image Sensor Integrated With Readout Circuits" appearing in *NASA Tech Briefs*, October 1996, pp. 38 and 39. This particular
15 article is also incorporated by reference.

Once image sensor 40 has created the pre-video signal, it is sent to the video processing board 50 for further processing. At board 50, as shown in Figure 9b, the pre-video signal is passed through a series of filters. One common filter arrangement may include two low pass filters 114 and 116, and a band pass filter 112. The band pass filter
20 only passes low frequency components of the signal. Once these low frequency components pass, they are then sent to detector 120 and white balance circuit 124, the white balance circuit distinguishing between the colors of red and blue. The white balance circuit helps the imaging device set its normal, which is white. The portion of the signal passing through low pass filter 114 then travels through gain control 118
25 which reduces the magnitude or amplitude of this portion to a manageable level. The output from gain control 118 is then fed back to the white balance circuit 124. The

portion of the signal traveling through filter 116 is placed through the processor 122. In the processor 122, the portion of the signal carrying the luminance or non-chroma is separated and sent to the Y chroma mixer 132. Any chroma portion of the signal is held in processor 122.

5 Referring to the output of the white balance circuit 124, this chroma portion of the signal is sent to a delay line 126 where the signal is then further reduced by switch 128. The output of switch 128 is sent through a balanced modulator 130 and also to the Y chroma mixer 132 where the processed chroma portion of the signal is mixed with the processed non-chroma portion. Finally, the output from the Y chroma mixer 132 is sent
10 to the NTSC/PAL encoder 134, commonly known in the art as a "composite" encoder. The composite frequencies are added to the signal leaving the Y chroma mixer 132 in encoder 134 to produce the post-video signal which may be accepted by a television. Additionally, the signal from Y chroma mixer 132 is sent to the digital signal processor 72 so those images can be viewed on monitor 26.

15 In addition to the functions described above that are achieved by the digital signal processor 72, the processor 72 can also provide additional digital enhancements. Specifically, digital enhancement can sharpen or otherwise clarify the edges of an image viewed on a video screen which might normally be somewhat distorted. Additionally, selected background or foreground images may be removed thus only leaving the desired
20 group of images.

In addition to digital enhancement, the digital signal processor 72 can include other circuitry that may further condition the signal received from board 50 so that it may be viewed in a desired format other than NTSC/PAL. One common encoder which can be used would be an RGB encoder. An RGB encoder separates the signal into the
25 three primary colors (red, green and blue). A SVHS encoder (super video home system) encoder could also be added to processor 72. This type of encoder splits or separates

the luminance portion of the signal and the chroma portion of the signal. Some observers believe that a more clear signal is input to the video device by such a separation, which in turn results in a more clear video image viewed on the video device. Another example of an encoder which could be added to processor 72 includes a VGA compatible encoder, which enables the video signal to be viewed on a standard VGA monitor which is common to many computer monitors.

One difference between the arrangement of image sensor 40 and the outputs found in Figure 3 of the Fossum, et al. patent is that in lieu of providing two analog outputs [namely, VS out (signal) and VR out (reset)], the reset function takes place in the timing and control circuitry 92. Accordingly, the pre-video signal only requires one conductor 48.

Figures 10a-10e illustrate in more detail one example of circuitry which may be used in the video processing board 50 in order to produce a post-video signal which may be directly accepted by a NTSC/PAL compatible video device such as a television. The circuitry disclosed in Figures 10a-10e is very similar to circuitry that is found in a miniature quarter-inch Panasonic camera, Model KS-162. It will be understood by those skilled in the art that the particular arrangement of elements found in Figures 10a-10e are only exemplary of the type of video processing circuitry which may be incorporated in order to take the pre-video signal and condition it to be received by a desired video device.

As shown in Figure 10a, 5-volt power is provided along with a ground by conductors 44 and 46 to board 50. The pre-video signal carried by conductor 48 is buffered at buffer 137 and then is transferred to amplifying group 138. Amplifying group 138 amplifies the signal to a usable level as well as achieving impedance matching for the remaining circuitry.

The next major element is the automatic gain control 140 shown in Figure 10b. Automatic gain control 140 automatically controls the signal from amplifying group 138 to an acceptable level and also adds other characteristics to the signal as discussed below. More specifically, automatic gain control 140 conditions the signal based upon inputs from a 12-channel digital to analog converter 141. Converter 141 retrieves stored information from EEPROM (electrically erasable programmable read only memory) 143. EEPROM 143 is a non-volatile memory element, which may store user information, for example, settings for color, tint, balance and the like. Thus, automatic gains controls 140 changes the texture or visual characteristics based upon user inputs. Housing 24 could also include buttons for controlling the image viewed on monitor 26 such as a gain control 140. The signal leaving the automatic gain control 140 is an analog signal until being converted by analog to digital converter 142.

Digital signal processor 144 of Figure 10c further processes the converted signal into a serial type digital signal. One function of the microprocessor 146 is to control the manner in which digital signal processor 144 sorts the digital signals emanating from converter 142. Microprocessor 146 also controls analog to digital converter 142 in terms of when it is activated, when it accepts data, when to release data, and the rate at which data should be released. Microprocessor 146 may also control other functions of the imaging device such as white balance. The microprocessor 146 may selectively receive the information stored in the EEPROM 143 and carry out its various commands to further control the other elements within the circuitry.

After the signal is processed by digital signal processor 144, the signal is sent to digital encoder 148 illustrated in Figure 10d. Some of the more important functions of digital encoder 148 are to encode the digital signal with synchronization, modulated chroma, blanking, horizontal drive, and the other components necessary so that the signal may be placed in a condition for reception by a video device such as a television

monitor. As also illustrated in Figure 10d, once the signal has passed through digital encoder 148, the signal is reconverted into an analog signal through digital to analog converter 150.

5 This reconverted analog signal is then buffered at buffers 151 and then sent to amplifier group 152 of Figure 10e which amplifies the signal so that it is readily accepted by a desired video device. Specifically, as shown in Figure 10e, one SVHS outlet is provided at 160, and two composite or NTSC outlets are provided at 162 and 164, respectively.

10 From the foregoing, it is apparent that an entire imaging device may be incorporated within the distal tip of the camera module, or may have some elements of the imaging device being placed in the housing of the PDA. Based upon the type of image sensor used, the profile area of the imaging device may be made small enough to be placed into a camera module which has a very small diameter.

15 This invention has been described in detail with reference to particular embodiments thereof, but it will be understood that various other modifications can be effected within the spirit and scope of this invention.

What is claimed is:

1. In a PDA having capability to transmit and receive data in a communications network, the improvement comprising:

a video system integral with said PDA for receiving and transmitting video images, and for viewing said video images, said video system comprising;

5 a camera module housing an image sensor therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, a first circuit board mounted in said camera module and electrically coupled to said image sensor, said first circuit board including circuitry means for converting said pre-video signal to a desired video format, said camera module further including a transceiver radio element mounted therein and electrically communicating with said first circuit board to transmit the converted pre-video signal;

10 a transceiver radio module mounted in said PDA for wirelessly communicating with said transceiver element in said camera module to receive said converted pre-video signal;

15 a video view screen attached to said PDA for viewing said video images, said video view screen communicating with said transceiver radio module for displaying video images processed by said first circuit board.

2. A device, as claimed in claim 1, wherein:

said image sensor defines a profile area in said first plane, and said first circuit board is positioned in longitudinal alignment with said image sensor such that said first circuit board does not extend substantially beyond said profile.

3. A device, as claimed in claim 1, further including:

a second circuit board electrically coupled with said first circuit board and said image sensor for further processing said pre-video signal, said second board being placed adjacent said first circuit board within said camera module.

4. A device, as claimed in claim 1, wherein:

said first and second planes are offset from and substantially parallel to one another.

5. A device, as claimed in claim 3, wherein:

said second circuit board lies in a third plane which is offset from and extends substantially parallel to said first and second planes.

6. A device, as claimed in claim 3, wherein:

said second circuit board includes means for digital signal processing enabling the pre-video signal conditioned by said first circuit board to be viewed by said video view screen.

7. A device, as claimed in claim 1, wherein:

said first circuit board converts said pre-video signal to a post-video signal for direct reception by a remote video device, said post-video signal being of a format selected from the group consisting of a NTSC/PAL video signal and a VGA video signal.

8. A device, as claimed in claim 1, wherein:

said pixels are CMOS pixels.

9. A device, as claimed in claim 1, wherein:
said transceiver radio element and said transceiver radio module communicate by
a bluetooth communications standard.

10. A device, as claimed in claim 1, wherein:
said transceiver radio module and said transceiver radio element communicate
by an IEEE 802.15.13 communications standard.

11. A device, as claimed in claim 1, wherein:
said array of pixels includes an array of passive CMOS pixels, wherein individual
passive CMOS pixels of said array of passive CMOS pixels each include a photo diode
for producing photoelectrically generated signals, and an access transistor
communicating with said photo diode to control the release of photoelectrically
generated signals.

12. A device, as claimed in claim 1, wherein:
individual pixels within said array of pixels each include an amplifier.

13. A device, as claimed in claim 1, wherein:
said PDA includes a text screen mounted therein for viewing text which is
manipulated by a user.

14. A device as claimed in claim 1, further including:
a wireless telephone attached to said PDA.

15. A device, as claimed in claim 1, further including:

a remote video device electrically coupled to said video system for further viewing said video images.

16. A device, as claimed in claim 15, wherein:

said remote video device is selected from the group consisting of a television and a computer monitor.

17. A device, as claimed in claim 1 wherein:

said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, said camera module having an integral source of power which electrically communicates with said charge circuit when said camera module is mounted in said PDA.

18. In a PDA having capability to transmit and receive data in a communications network, the improvement comprising:

a video system integral with said PDA for receiving and transmitting video images, and for viewing said video images, said video system comprising;

a camera module housing an image sensor therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, said camera module further including a transceiver radio element mounted therein and electrically communicating with said circuitry means to transmit the pre-video signal to the PDA;

a transceiver radio module mounted in said PDA for wirelessly communicating with said transceiver element in said camera module to receive said pre-video signal;

15 a first circuit board mounted in said PDA and electrically communicating with said transceiver radio module for converting said pre-video signal into a desired video format;

20 a video view screen attached to said PDA for viewing said video images, said video view screen communicating with said first circuit board for displaying video images processed by said first circuit board.

19. A device, as claimed in claim 18, wherein:
said pixels are CMOS pixels.

20. A device, as claimed in claim 18, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

21. A device, as claimed in claim 18, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

22. In a PDA having capability to transmit and receive data in a communications network, the PDA having a housing, and a video view screen for viewing the data which includes video signals, the improvement comprising:

5 a camera module for taking video images, said camera module communicating with circuitry within said PDA enabling viewing on said video view screen and enabling

video signals to be transmitted from said camera module to said computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of said pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, a first circuit board electrically connected to said image sensor, said first circuit board including circuitry means for converting said pre-video signal to a desired video format;

a transceiver radio element housed within said camera module and electrically coupled to said first circuit board for transmitting said converted pre-video signal; and

a transceiver radio module housed in the PDA and wirelessly communicating with said transceiver radio element for receiving said converted pre-video signal, and said transceiver radio element being electrically coupled to the video view screen of the PDA enabling viewing of the converted pre-video signals.

23. A device, as claimed in claim 22, wherein:
said pixels are CMOS pixels.

24. A device, as claimed in claim 22, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

25. A device, as claimed in claim 22, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

26. A device, as claimed in claim 22 wherein:

said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, said camera module having an integral source of power which electrically communicates with said charge circuit when said camera module is mounted in said PDA.

27. In a PDA having capability to transmit data between a computer connected to a global communications network, the PDA having a housing, and a video view screen for viewing the data which includes video signals, the improvement comprising:

a camera module for taking video images, said camera module communicating with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to said computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of said pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal;

a transceiver radio element housed within said camera module and electrically coupled to said image sensor for transmitting said pre-video signal;

a transceiver radio module housed in the PDA and wirelessly communicating with said transceiver radio element for receiving said pre-video signal; and

a first circuit board housed within the PDA and electrically coupled to said transceiver radio module for taking said pre video signal and conditioning it to be a post video signal in a desired format, and said transceiver radio element being electrically

20 coupled to the video view screen of the PDA enabling viewing of the converted pre-video signals.

28. A device, as claimed in claim 27, wherein:
said pixels are CMOS pixels.

29. A device, as claimed in claim 27, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

30. A device, as claimed in claim 27, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

31. A device, as claimed in claim 27 wherein:
said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, said camera module having an integral source of power which electrically communicates with said charge circuit when said camera module is
5 mounted in said PDA.

32. A PDA having capability to transmit and receive data in a communications network, said PDA comprising:
an image sensor lying in a first plane, and an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and
5 coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal;

a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for converting said pre-video signal to a desired video format;

10 a camera module housing said image sensor and said first circuit board;
 a transceiver radio element mounted in said camera module communicating with said first circuit board for wirelessly transmitting the converted pre-video signal;

 a transceiver radio module communicating wirelessly with said transceiver radio element for receiving the converted pre-video signal;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;

 a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said
20 converted pre-video signal, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

 a microphone electrically communicating with said digital signal processor for recording sound and converting the sound to audio signals;

 a speaker electrically communicating with said digital signal processor for
25 broadcasting the audio signals;

 a video view screen attached to said PDA, said video view screen for selectively displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section from the other party;

 a video switch communicating with said first circuit board and said digital signal
30 processor for switching video images to be viewed on said video view screen; and

 a PDA power supply mounted in said PDA for providing power thereto.

33. A device, as claimed in claim 32, wherein:
said pixels are CMOS pixels.

34. A device, as claimed in claim 32, wherein:
said transceiver radio element and said transceiver radio module communicate by
a bluetooth communications standard.

35. A device, as claimed in claim 32, wherein:
said transceiver radio module and said transceiver radio element communicate by
an IEEE 802.15.13 communications standard.

36. A device, as claimed in claim 32 wherein:
said PDA further includes a camera battery charge circuit mounted therein for
recharging said camera module, and said camera module further includes a camera
module source of power mounted in said camera module which electrically
5 communicates with said charge circuit when said camera module is mounted in said
PDA.

37. A PDA having capability to transmit and receive data in a
communications network, said PDA comprising:

an image sensor lying in a first plane, and an array of pixels for receiving images
thereon, said image sensor further including circuitry means on said first plane and
5 coupled to said array of pixels for timing and control of said array of pixels, said image
sensor producing a pre-video signal;

a camera module housing said image sensor;

a transceiver radio element mounted in said camera module communicating with said image sensor for wirelessly transmitting the pre-video signal;

10 a transceiver radio module communicating wirelessly with said transceiver radio element for receiving the pre-video signal;

 a first circuit board electrically communicating with said transceiver radio module, said first circuit board including circuitry means for converting said pre-video signal to a desired video format;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;

 a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said
20 converted pre-video signal, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

 a microphone electrically communicating with said digital signal processor for recording sound and converting the sound to audio signals;

 a speaker electrically communicating with said digital signal processor for
25 broadcasting the audio signals;

 a video view screen attached to said PDA, said video view screen for selectively displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section from the other party;

 a video switch communicating with said first circuit board and said digital signal
30 processor for switching video images to be viewed on said video view screen; and

 a PDA power supply mounted in said PDA for providing power thereto.

38. A device, as claimed in claim 37, wherein:
said pixels are CMOS pixels.

39. A device, as claimed in claim 37, wherein:
said transceiver radio element and said transceiver radio module communicate by
a bluetooth communications standard.

40. A device, as claimed in claim 37, wherein:
said transceiver radio module and said transceiver radio element communicate by
an IEEE 802.15.13 communications standard.

41. A device, as claimed in claim 37 wherein:
said PDA further includes a camera battery charge circuit mounted therein for
recharging said camera module, and said camera module further includes a camera
module source of power mounted in said camera module which electrically
5 communicates with said charge circuit when said camera module is mounted in said
PDA.

42. In a PDA having capability to transmit and receive data in a
communications network, the improvement comprising:
a video system integral with said PDA for receiving and transmitting video
images, and for viewing said images, said video system comprising:
5 a camera module housing an image sensor therein, said image sensor lying
in a first plane and including an array of pixels for receiving images thereon, said image
sensor producing a pre-video signal, a first circuit board lying in a second plane and
electrically coupled to said image sensor, said first circuit board including circuitry means

for timing and control of said array of pixels and circuitry means for processing and
 10 converting said pre-video signal to a desired video format, a transceiver radio element
 communicating with said first circuit board for transmitting said converted pre-video
 signal;

a transceiver radio module mounted in said PDA for wirelessly receiving
 said converted pre-video signal; and

15 a video view screen attached to said PDA for viewing said video images,
 said video view screen communicating with said transceiver radio module, and displaying
 video images processed by said first circuit board.

43. A device, as claimed in claim 42, wherein:

said pixels are CMOS pixels.

44. A device, as claimed in claim 42, wherein:

said transceiver radio element and said transceiver radio module communicate by
 a bluetooth communications standard.

45. A device, as claimed in claim 42, wherein:

said transceiver radio module and said transceiver radio element communicate by
 an IEEE 802.15.13 communications standard.

46. In a PDA having capability to transmit and receive data in a
 communications network, the improvement comprising:

a video system integral with said PDA for receiving and transmitting video
 images, and for viewing said images, said video system comprising:

5 a camera module housing an image sensor therein, said image sensor including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, a transceiver radio element communicating with said image sensor for transmitting said pre-video signal;

10 a transceiver radio module mounted in said PDA for wirelessly receiving said pre-video signal;

a first circuit board electrically coupled to said transceiver radio module, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format, and

15 a video view screen attached to said PDA for viewing said video images, said video view screen communicating with said transceiver radio module, and displaying video images processed by said first circuit board.

47. A device, as claimed in claim 46, wherein:
said pixels are CMOS pixels.

48. A device, as claimed in claim 46, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

49. A device, as claimed in claim 46, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

50. In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing video images, the improvement comprising:

5 a camera module for taking video images, said camera module wirelessly communicating with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to the personal computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, a first circuit board lying in a 10 second plane and electrically connected to said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format, and a transceiver radio element housed in the camera module for wirelessly transmitting the converted pre-video signal to the PDA.

51. A device, as claimed in claim 50, wherein:
said pixels are CMOS pixels.

52. A device, as claimed in claim 50, wherein:
said transceiver radio element communicates with the PDA by a bluetooth communications standard.

53. A device, as claimed in claim 50, wherein:
said transceiver radio element communicates with the PDA by an IEEE 802.15.13 communications standard.

54. In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing video images, the improvement comprising:

5 a camera module for taking video images, said camera module wirelessly communicating with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to the personal computer, said camera module including an image sensor housed therein, said image sensor including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, and a transceiver radio element housed in the camera
10 module for wirelessly transmitting the pre-video signal to the PDA.

55. A device, as claimed in claim 54, wherein:
said pixels are CMOS pixels.

56. A device, as claimed in claim 54, wherein:
said transceiver radio element communicates with the PDA by a bluetooth communications standard.

57. A device, as claimed in claim 54, wherein:
said transceiver radio element communicates with the PDA by an IEEE 802.15.13 communications standard.

58. In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing the video images, the improvement comprising:

5 a camera module for taking video images, said camera module communicating
with circuitry within said PDA enabling viewing of said video images on said PDA and
enabling video signals to be transmitted from said camera module to the personal
computer, said camera module including an image sensor housed therein, said image
sensor lying in a first plane and including an array of pixels for receiving images thereon,
said image sensor further including circuitry means electrically coupled to said array of
10 said pixels for timing and control of said array of pixels, said circuitry means for timing
and control placed remote from said array of pixels on a second plane, said image sensor
producing a pre-video signal, a first circuit board electrically connected to said image
sensor and lying in a third plane, said first circuit board including circuitry means for
processing and converting said pre-video signal to a desired video format, and a radio
15 transceiver element communicating with said first circuit board for wirelessly
transmitting said converted pre-video signal.

59. A device, as claimed in claim 58, wherein:
said pixels are CMOS pixels.

60. A device, as claimed in claim 58, wherein:
said transceiver radio element communicates with the PDA by a bluetooth
communications standard.

61. A device, as claimed in claim 58, wherein:
said transceiver radio element communicates with the PDA by an IEEE
802.15.13 communications standard.

62. In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing the video images, the improvement comprising:

a camera module for taking video images, said camera module communicating with circuitry within said PDA enabling viewing of said video images on said PDA and enabling video signals to be transmitted from said camera module to the personal computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means electrically coupled to said array of said pixels for timing and control of said array of pixels, said circuitry means for timing and control placed remote from said array of pixels on a second plane, said image sensor producing a pre-video signal, and a radio transceiver element communicating with said image sensor for wirelessly transmitting said pre-video signal.

63. A device, as claimed in claim 62, wherein:
said pixels are CMOS pixels.

64. A device, as claimed in claim 62, wherein:
said transceiver radio element communicates with the PDA by a bluetooth communications standard.

65. A device, as claimed in claim 62, wherein:
said transceiver radio element communicates with the PDA by an IEEE 802.15.13 communications standard.

66. A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal;

5 a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format;

10 a radio transceiver element communicating with said first circuit board for wirelessly transmitting said converted pre-video signal;

a camera module housing said image sensor, said first circuit board, and said transceiver radio element therein;

a radio transceiver module housed within the PDA for wirelessly communicating with said radio transceiver element and receiving said converted pre-video signal;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;

20 a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said pre-video signal which is first conditioned by said first circuit board, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

a microphone electrically communicating with said digital signal processor for receiving sound and converting the sound to audio signals;

25 a speaker electrically communicating with said digital signal processor for broadcasting audio signals;

a video view screen attached to said PDA, said video view screen for selectively displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section; and

30 a video switch communicating with said first circuit board and said digital signal processor for switching video images to be viewed on said video view screen; and a power supply mounted to said PDA for providing power thereto.

67. A device, as claimed in claim 66, wherein:
said pixels are CMOS pixels.

68. A device, as claimed in claim 66, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

69. A device, as claimed in claim 66, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

70. A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal;

5 a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels; a radio transceiver element communicating with said first circuit board for wirelessly transmitting said pre-video signal;

a camera module housing said image sensor, said first circuit board, and said
10 transceiver radio element therein;

a radio transceiver module housed within the PDA for wirelessly communicating
with said radio transceiver element and receiving said pre-video signal;

a second circuit board electronically communicating with said radio transceiver
module, said second circuit board including circuitry means for converting said pre-video
15 signal to a desired video format;

a transceiver/amplifier section electrically coupled to said transceiver radio
module for amplifying and further transmitting the converted pre-video signal, and for
receiving, and amplifying video and audio signals transmitted by another party;

a digital signal processor electrically coupled to said transceiver radio module and
20 said transceiver/amplifier section, said digital signal processor further conditioning said
pre-video signal which is first conditioned by said first circuit board, and also for
conditioning video and audio signals received by said transceiver/amplifier section from
the other party;

a microphone electrically communicating with said digital signal processor for
25 receiving sound and converting the sound to audio signals;

a speaker electrically communicating with said digital signal processor for
broadcasting audio signals;

a video view screen attached to said PDA, said video view screen for selectively
displaying images from said imaging device, and for selectively displaying video images
30 received by said transceiver/amplifier section;

a video switch communicating with said first circuit board and said digital signal
processor for switching video images to be viewed on said video view screen; and

a power supply mounted to said PDA for providing power thereto.

71. A device, as claimed in claim 70, wherein:
said pixels are CMOS pixels.

72. A device, as claimed in claim 70, wherein:
said transceiver radio element and said transceiver radio module communicate by
a bluetooth communications standard.

73. A device, as claimed in claim 70, wherein:
said transceiver radio module and said transceiver radio element communicate by
an IEEE 802.15.13 communications standard.

74. A PDA having capability to transmit and receive data in a
communications network, said PDA comprising:

an image sensor lying in a first plane, and an array of pixels for receiving images
thereon, said image sensor further including circuitry means electrically coupled to said
array of pixels for timing and control of said array of pixels, said circuitry means for
timing and control being placed remote from said array of pixels on a second plane, said
image sensor producing a pre-video signal;

a first circuit board electrically coupled with said image sensor and lying in a third
plane, said first circuit board including circuitry means for processing and converting said
pre-video signal to a desired video format;

a transceiver radio element communicating with said first circuit board to
wirelessly transmit the converted pre-video signal;

a camera module housing said image sensor, said first circuit board and said
transceiver radio element;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting said converted pre-video signal and for receiving and amplifying video and audio signals transmitted by another party;

a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said
20 converted pre-video signal which is first conditioned by said first circuit board, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

a microphone electrically communicating with said digital signal processor for receiving sound and converting the sound to audio signals;

25 a speaker electrically communicating with said digital signal processor for broadcasting audio signals;

a video view screen attached to said PDA, said video view screen for selectively displaying selectively displaying video images from said image device, and for selectively displaying video images received by said transceiver/amplifier section from the other
30 party; and

a video switch communicating with said first circuit board and said digital signal processor for switching video images to be viewed on said video view screen; and a power supply mounted to said PDA for providing power thereto.

75. A device, as claimed in claim 74, wherein:
said pixels are CMOS pixels.

76. A device, as claimed in claim 74, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

77. A device, as claimed in claim 74, wherein:

said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

78. In a method for conducting video conferencing communications through a global communications network, the improvement comprising the steps of:

providing a camera module having an image sensor housed therein;

removing the camera module from connection with the PDA;

pointing the camera module at a targeted object and taking video images of the targeted object;

wirelessly transmitting the video images taken by image sensor to the PDA;

processing the video images transmitted by the camera module ; and

selectively viewing the video images on the PDA and selectively transmitting the video images to another party.

79. A method, as claimed in claim 78, wherein:

said image sensor includes a CMOS pixel array.

80. In a PDA having capability to transmit and receive data communications network, the improvement comprising:

a camera module housing an image sensor therein, said camera module for producing video images of a targeted object;

means for wirelessly interconnecting said camera module to said PDA, said means for wirelessly interconnecting enabling said camera module to be selectively displaced at a location remote from said PDA; and

a video view screen attached to said PDA for selectively viewing video images taken by said camera module, and for selectively viewing incoming video images received from the personal computer connected to the global communications network.

81. A device, as claimed in claim 80, wherein:

said PDA includes a housing, and an opening for receiving said camera module so as to place said camera module in a stored position.

82. In a PDA having a housing and a video view screen for viewing video images, the improvement comprising:

a camera module housing an image sensor therein, said camera module for producing video images of a targeted object; and

means for wirelessly interconnecting said camera module to said PDA, said means for wirelessly interconnecting enabling said camera module to be selectively displaced at a location remote from said PDA.

83. A device, as claimed in claim 82, wherein:

said PDA includes an opening in said housing for receiving said camera module so as to place said camera module in a stored position.

84. In a PDA, the improvement comprising:

a camera module housing an image sensor therein;

first circuitry means coupled to said image sensor for timing and control of said image sensor;

second circuitry means for processing images taken by said image sensor to create video signals of a desired video format; and

means for wirelessly interconnecting said camera module to a housing of said PDA, said means for wirelessly interconnecting enabling said camera module to be selectively displaced from said housing by the user for pointing the camera module at a targeted object without having to manipulating the PDA.

85. A device, as claimed in claim 84, wherein:

said PDA includes an opening in said housing for receiving said camera module so as to place said camera module in a stored position.

86. In a PDA having the capability to transmit data between a personal computer connected to a global communications network, the improvement comprising:

a camera module housing an image sensor therein;

a camera module battery housed within said camera module for providing power to said camera module;

a camera battery charge circuit housed within the PDA;

a PDA battery housed within the PDA for providing power to said camera battery charge circuit; and

wherein the camera module is received in the PDA so said camera module battery electrically communicates with said camera battery charge circuit to selectively charge said camera module battery.

87. A method of powering and recharging a camera module for use with a PDA, said method comprising the steps of:

providing a PDA housing a camera battery charge circuit therein;

5 providing a camera module housing an image sensor therein for taking video images, and a camera module battery housed within said camera module for selectively powering said camera module;

removing said camera module from seated engagement with the PDA resulting in activation of said camera module battery for powering said camera module; and

10 returning said camera module to its seated position with said PDA and in electrical communication with the battery charge circuit to charge said camera module battery.

ABSTRACT

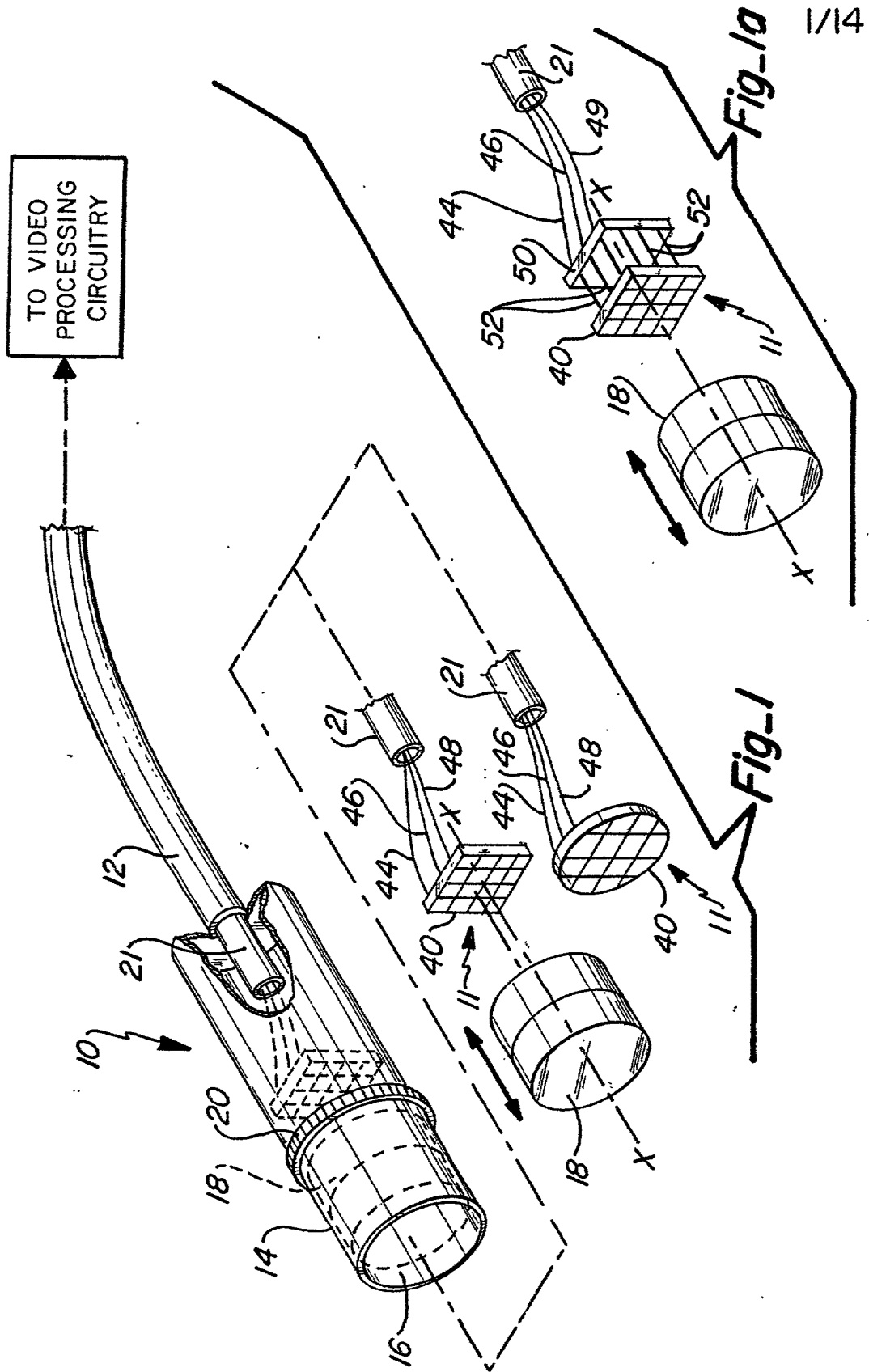
A reduced area-imaging device is provided for use with a miniature hand-held computer referred to in the industry as a PDA. In one configuration of the imaging device, the image sensor is placed remote from the remaining image processing circuitry.

5 In a second configuration, all of the image processing circuitry to include the image sensor is placed in a stacked fashion near the same location. In the first configuration, the entire imaging device can be placed at the distal end of a camera module. In a second configuration, the image sensor is remote from the remaining image processing circuitry wherein available space within the PDA is used to house the remaining circuitry.

10 In any of the configurations, the image sensor may be placed alone on a first circuit board, or timing and control circuits may be included on the first circuit board containing the image sensor. One or more video processing boards can be stacked in a longitudinal fashion with respect to the first board, or the video processing boards may be placed within the housing of the communication device. The PDA includes a miniature LCD-

15 type video view screen which is capable of viewing not only the images taken by the camera module, but also can show incoming video images received from a personal computer connected to a global communications network. The camera module is of such small size that it can be easily stored within the housing of the PDA. In a first embodiment, the camera module communicates with the housing of the PDA by a wired

20 connection utilizing a small retractable cable. In a second embodiment, the camera module communicates wirelessly with the PDA. In either embodiment, the camera module may be pointed at any desired object within sight of the user, and without having to actually point or move the phone housing in order to take an image. In the wireless embodiment, a user has total freedom to manipulate the positioning of the camera
25 module without adjusting the position of the video telephone since there is not even a cable to contend with. Any acceptable wireless standard may be used for communication



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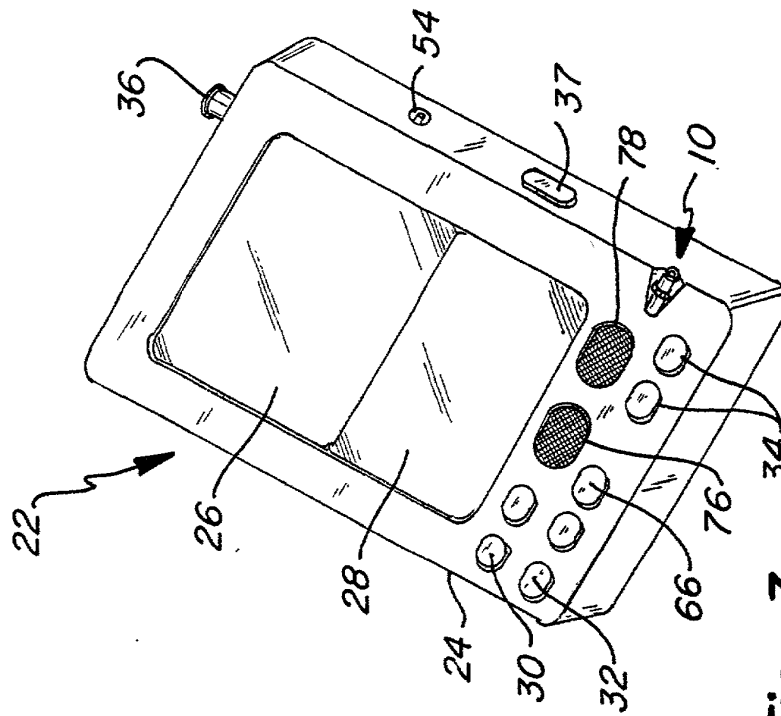


Fig-3

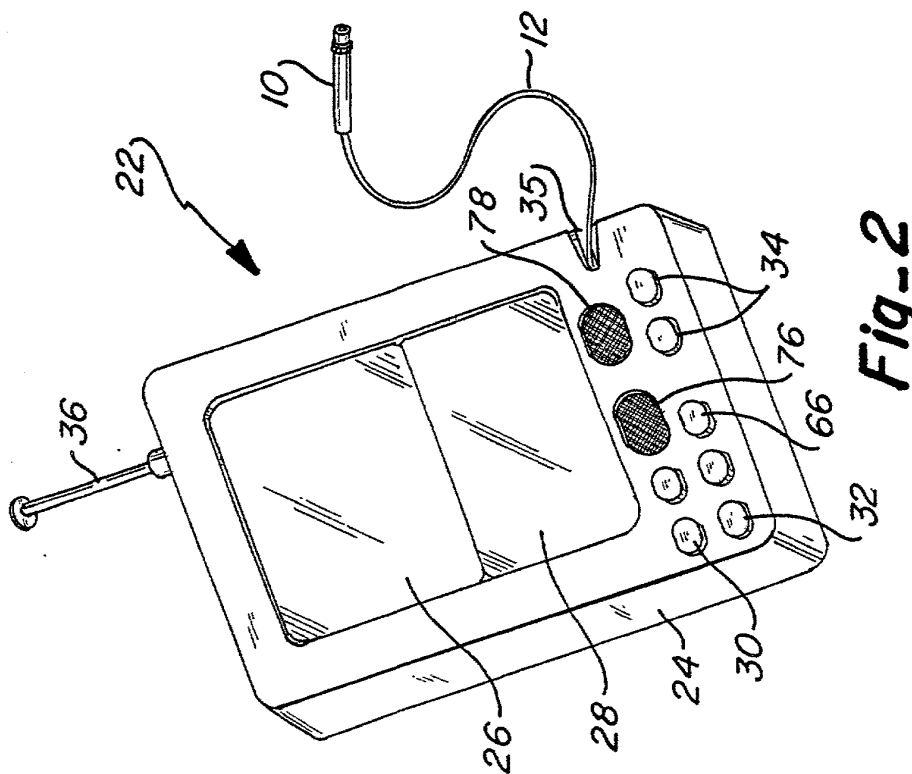


Fig-2

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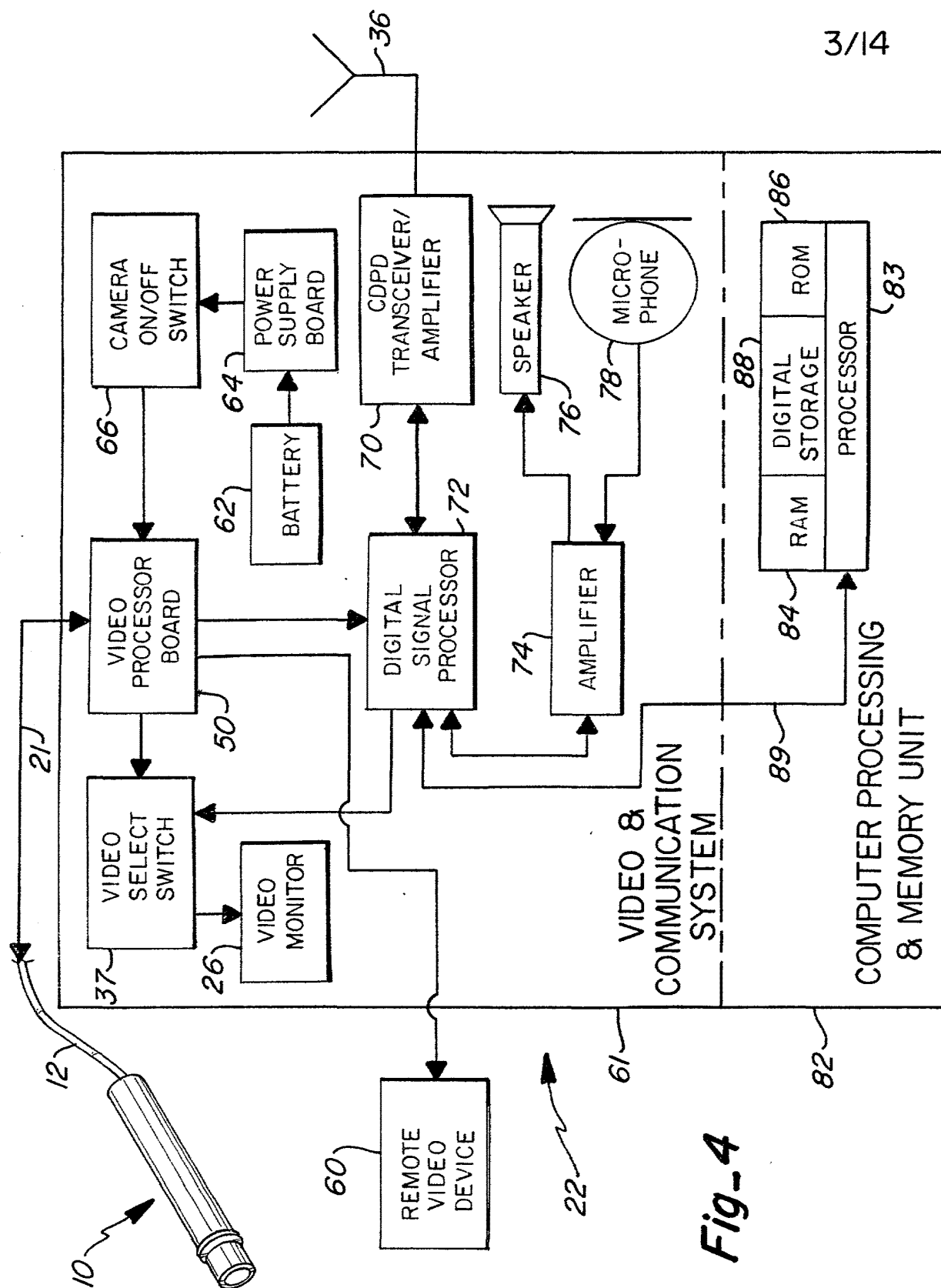


Fig. 4

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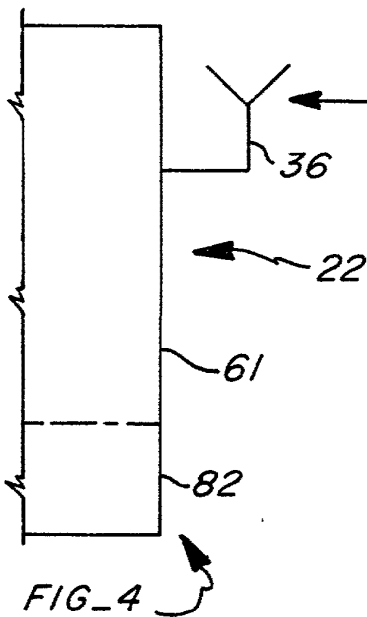
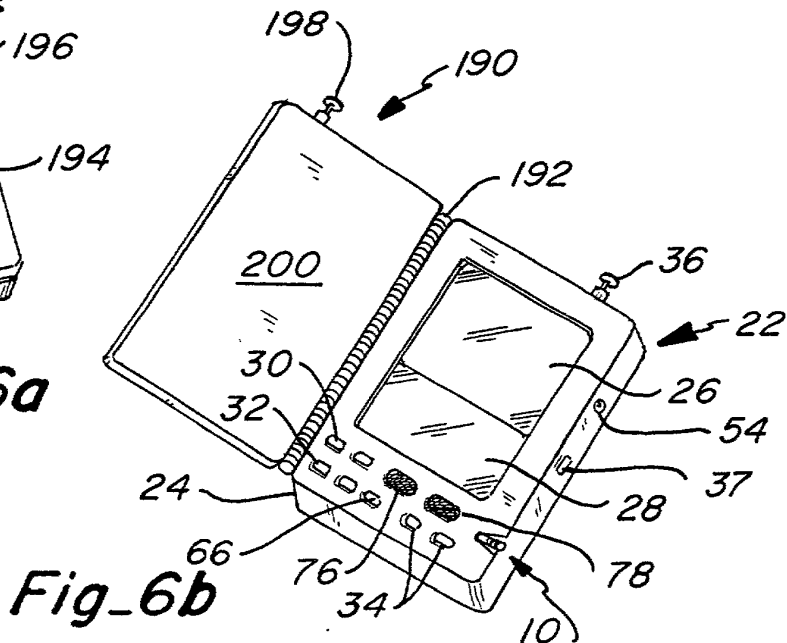
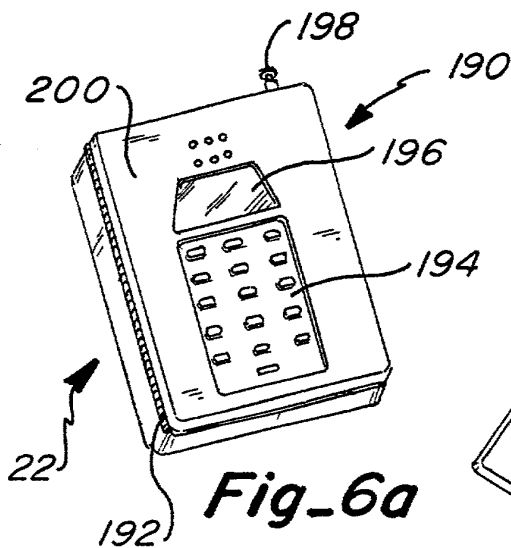
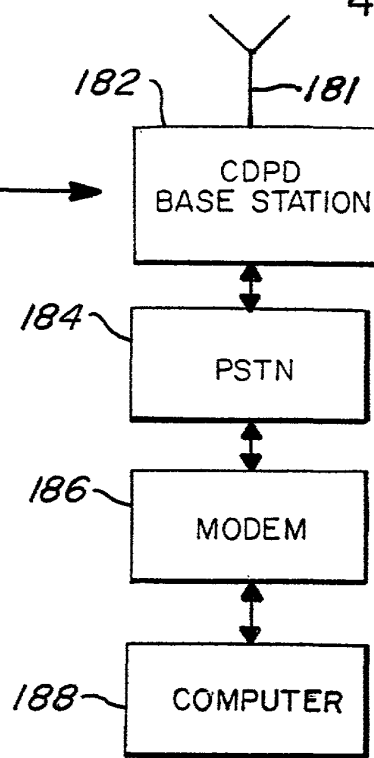
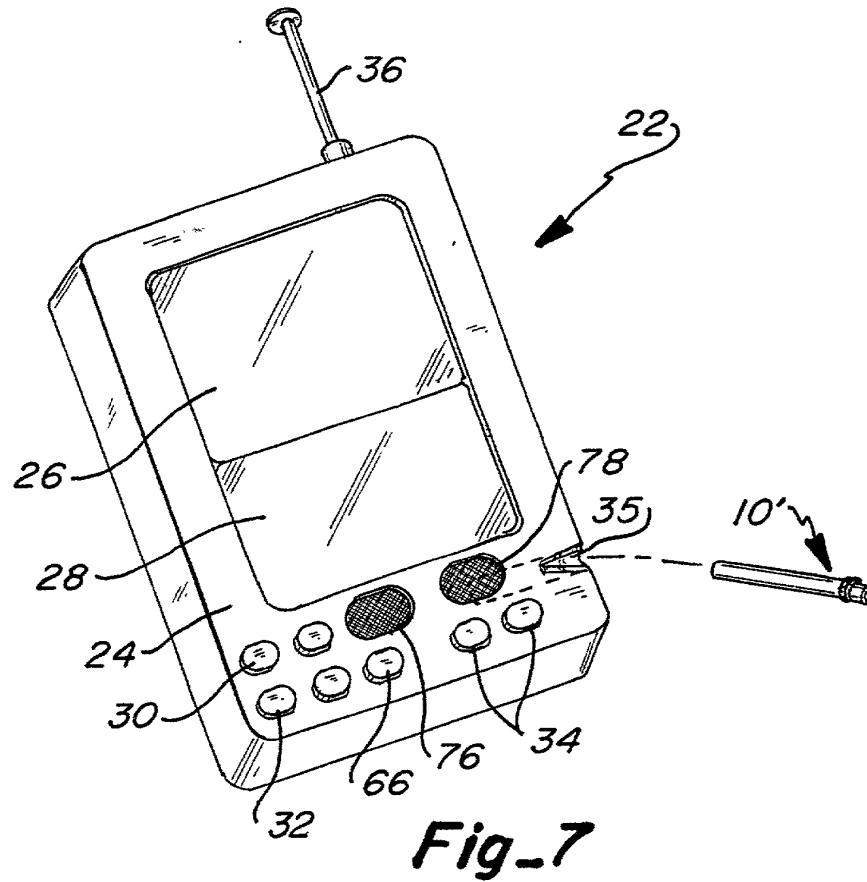


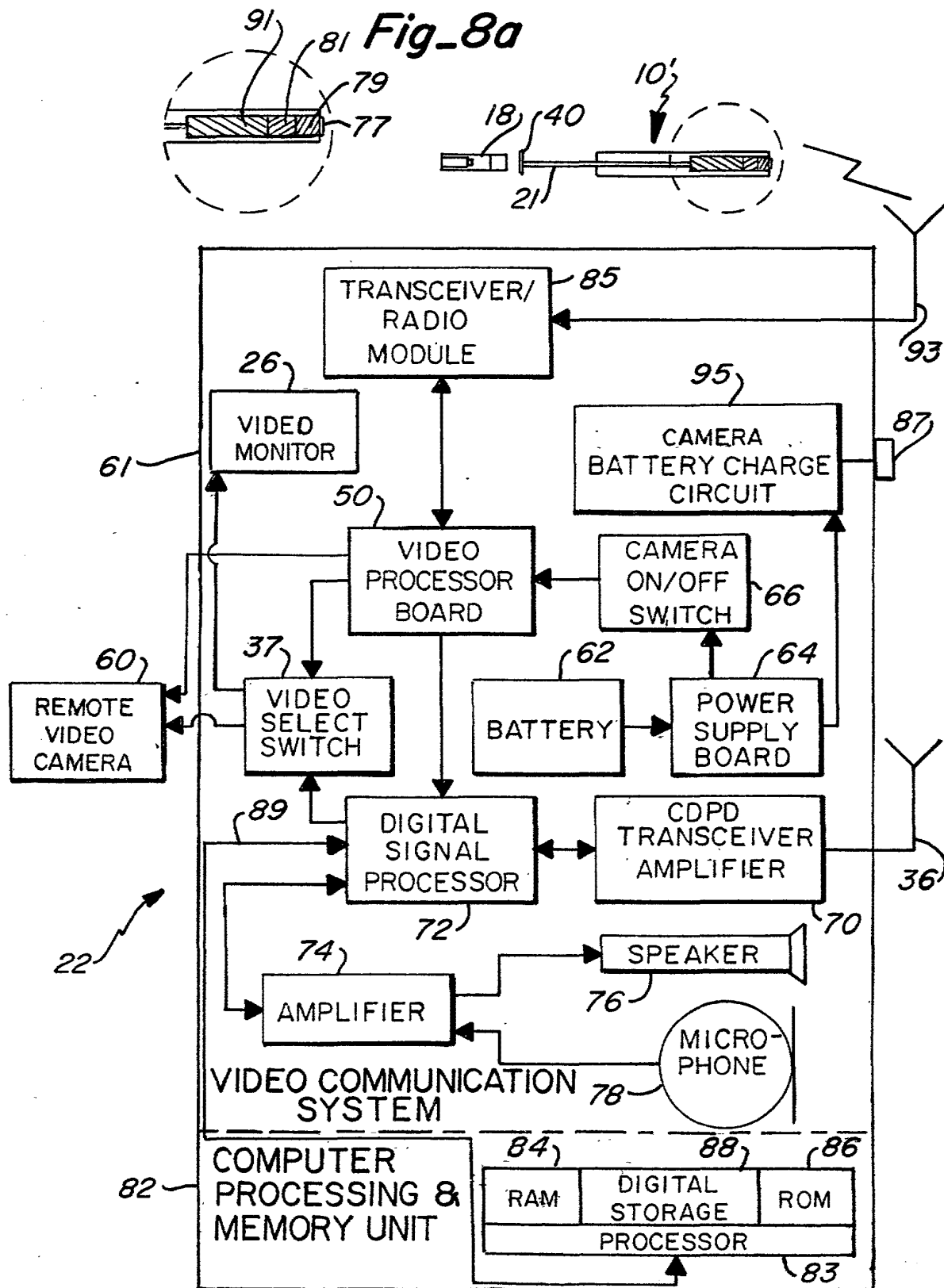
Fig-5

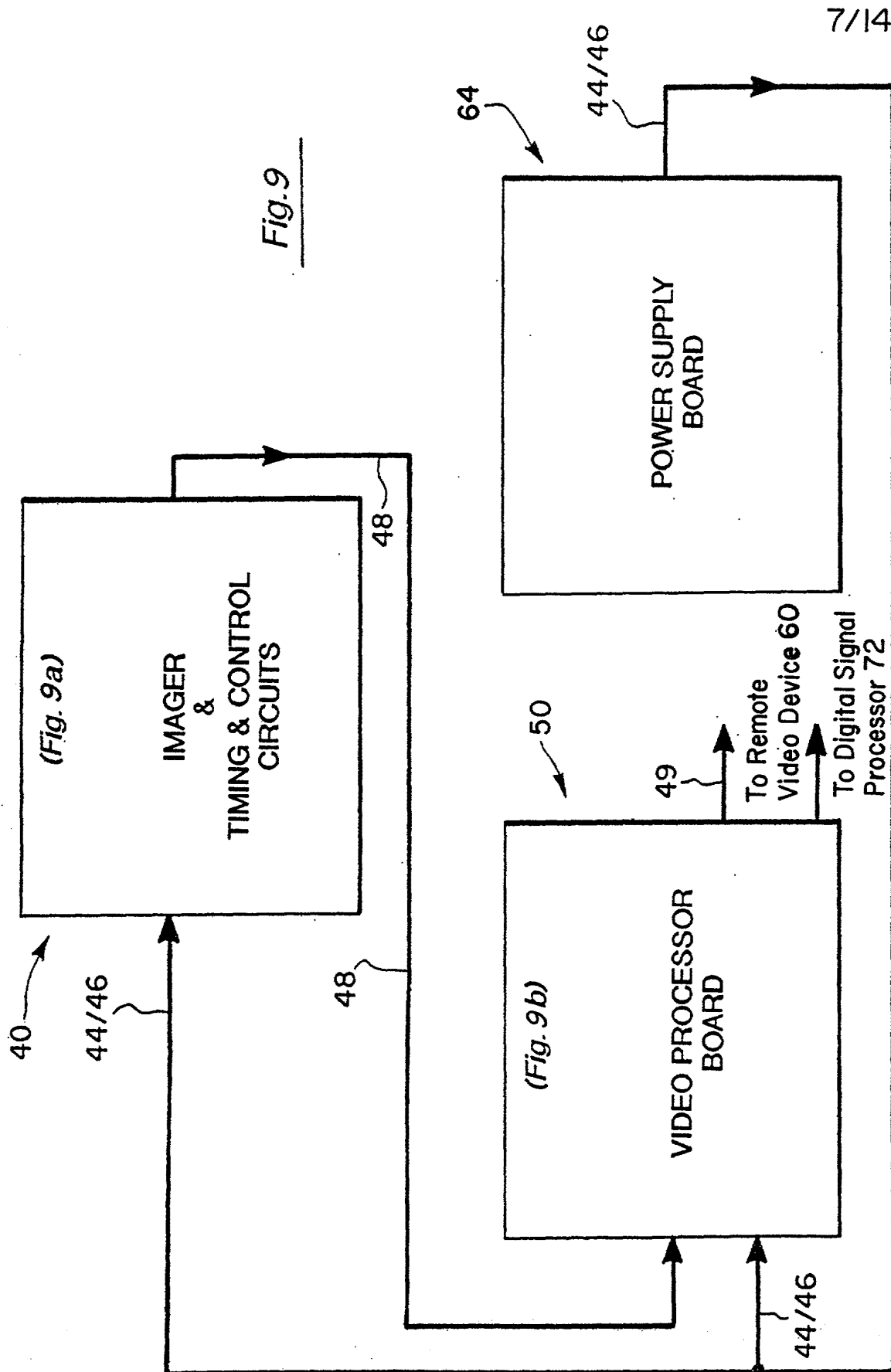


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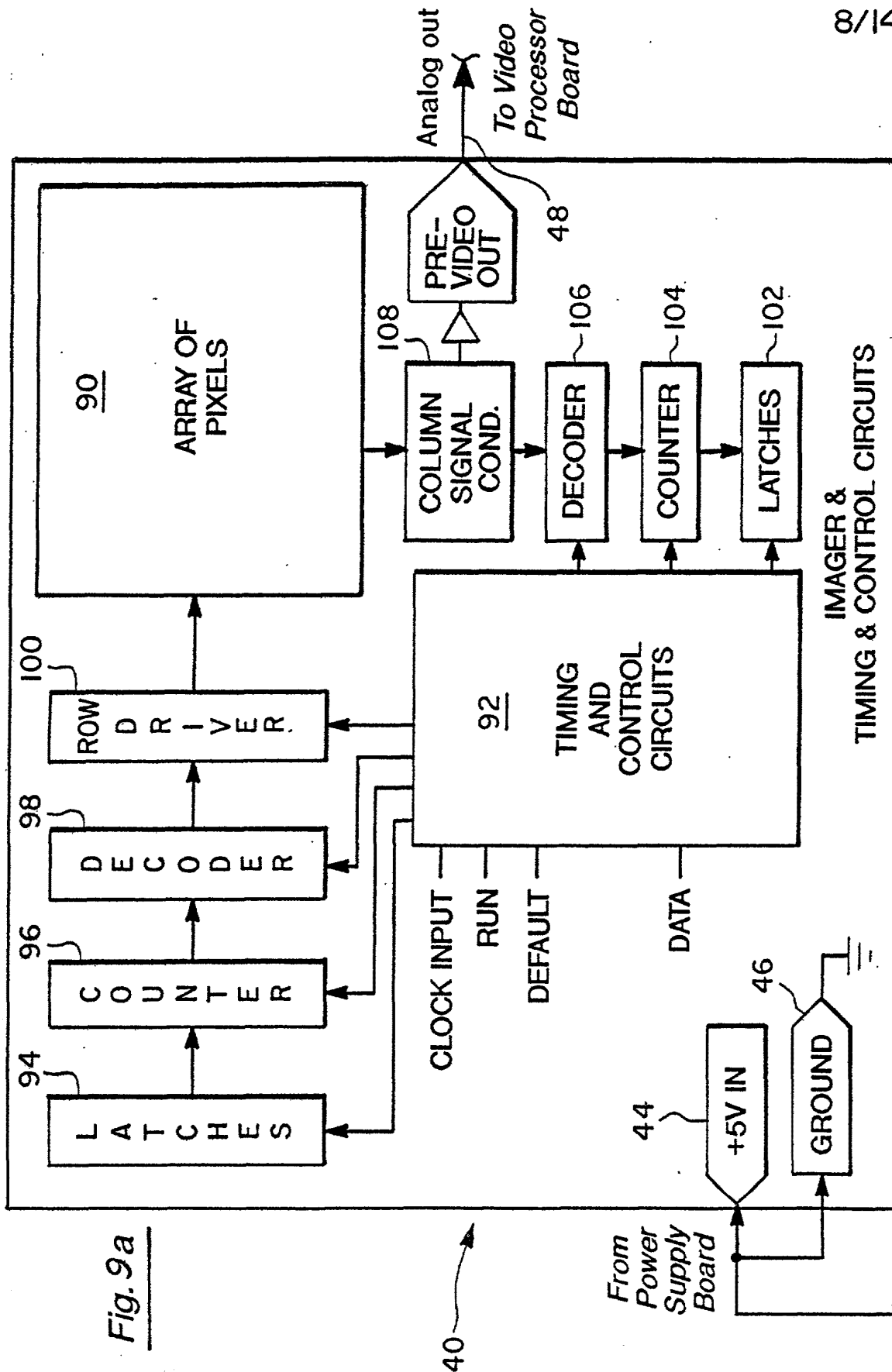


Fig. 9a

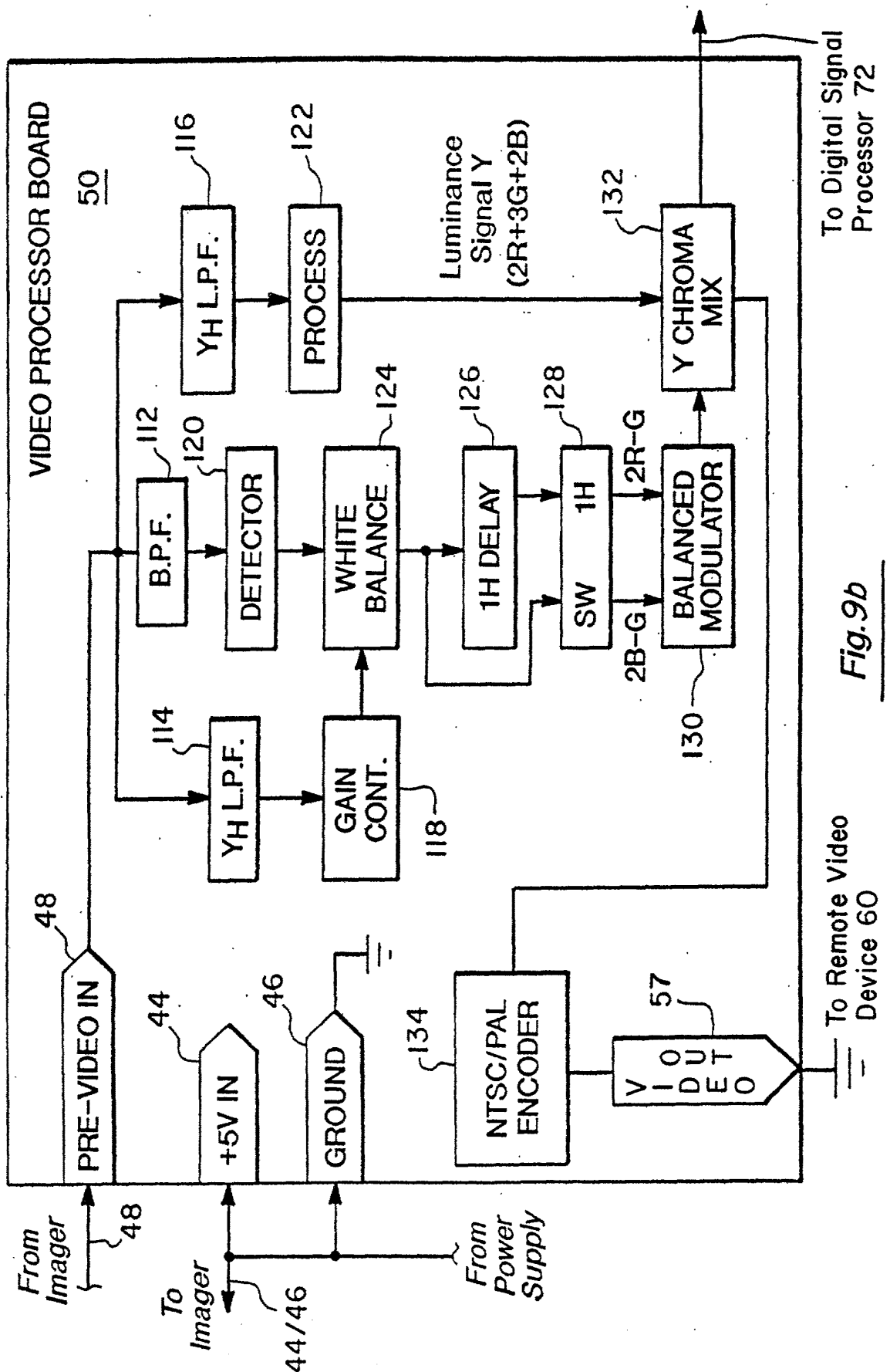


Fig. 9b

138



11/14

Fig. 10b

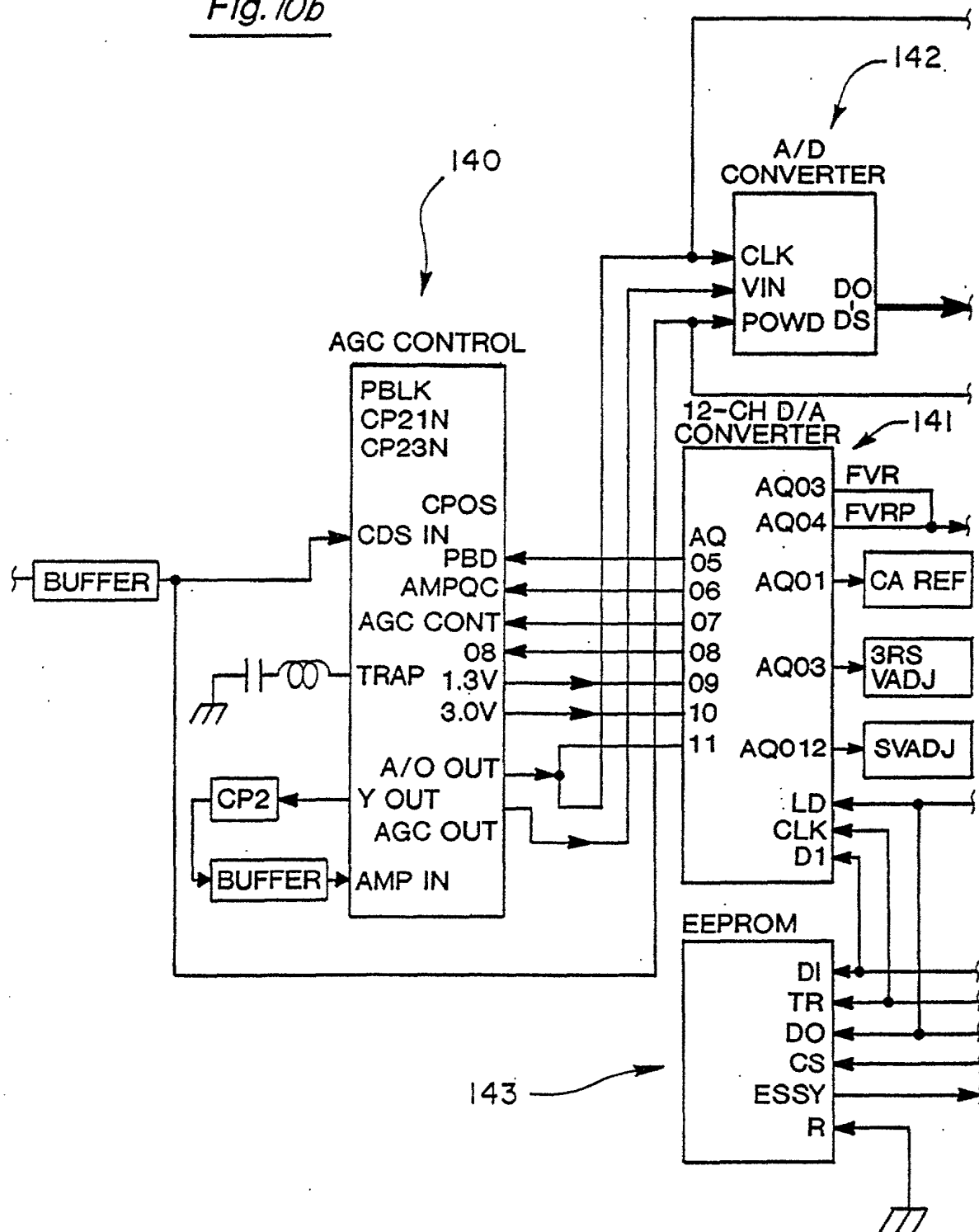
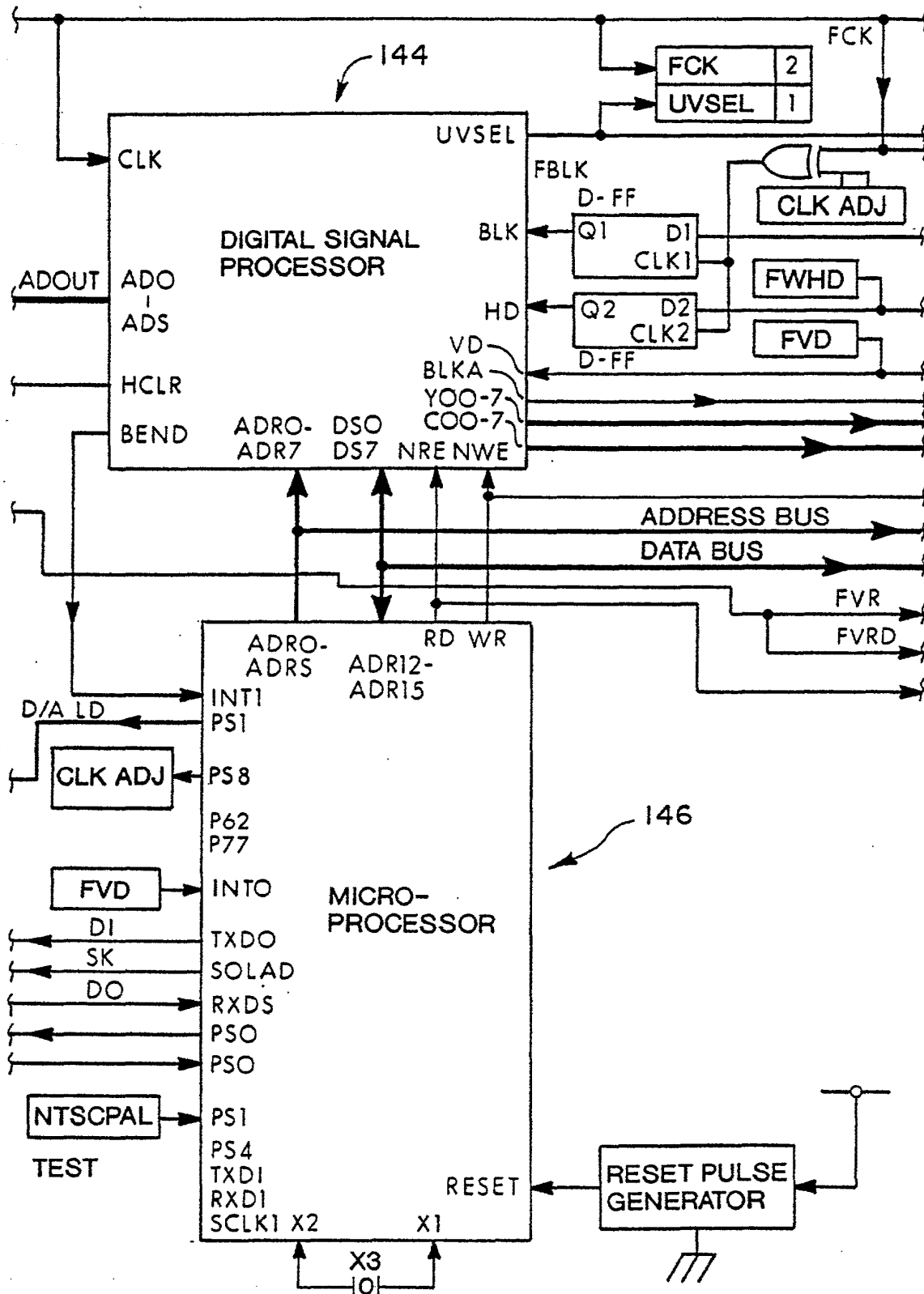
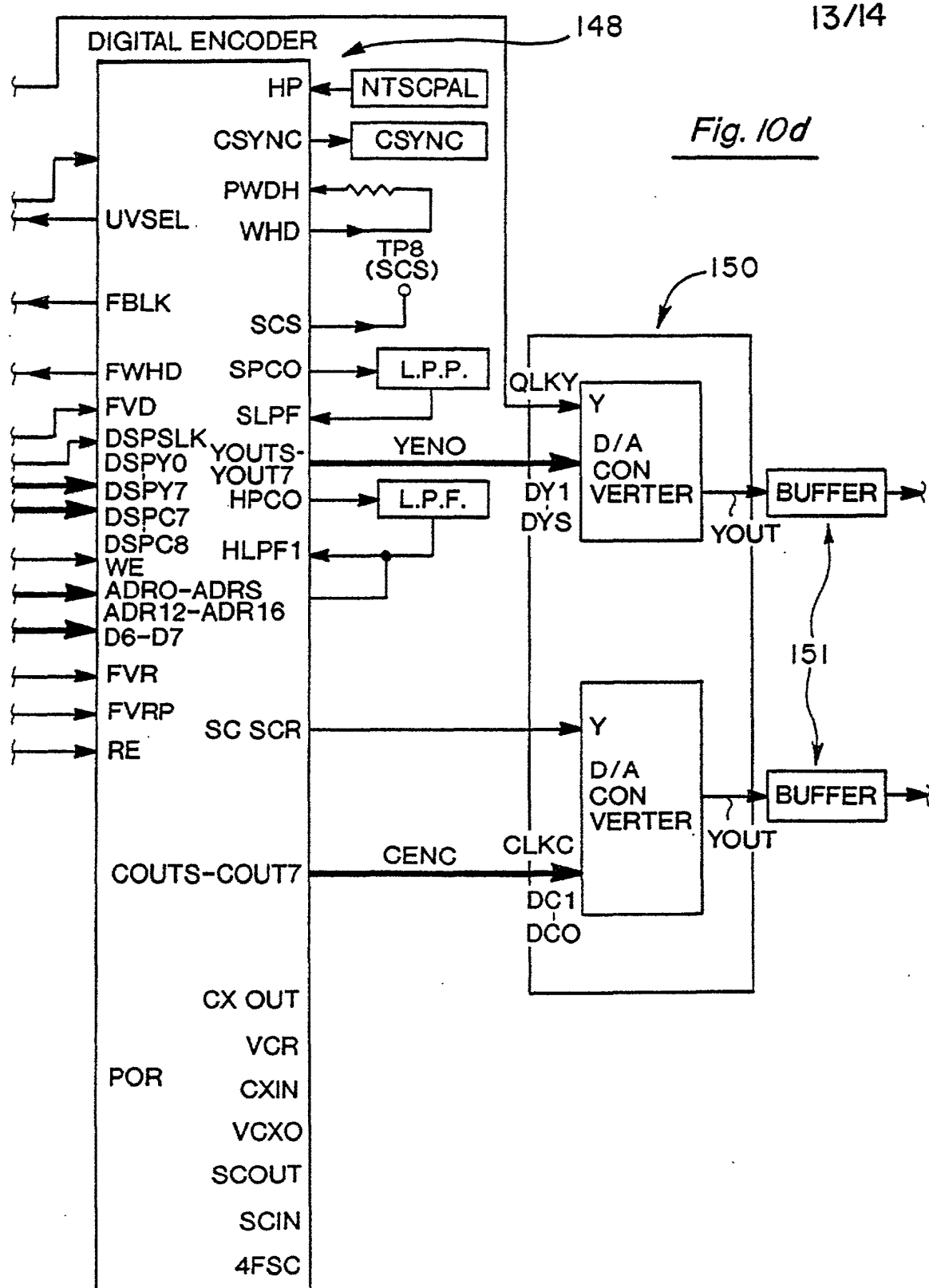


Fig. 10c

12/14





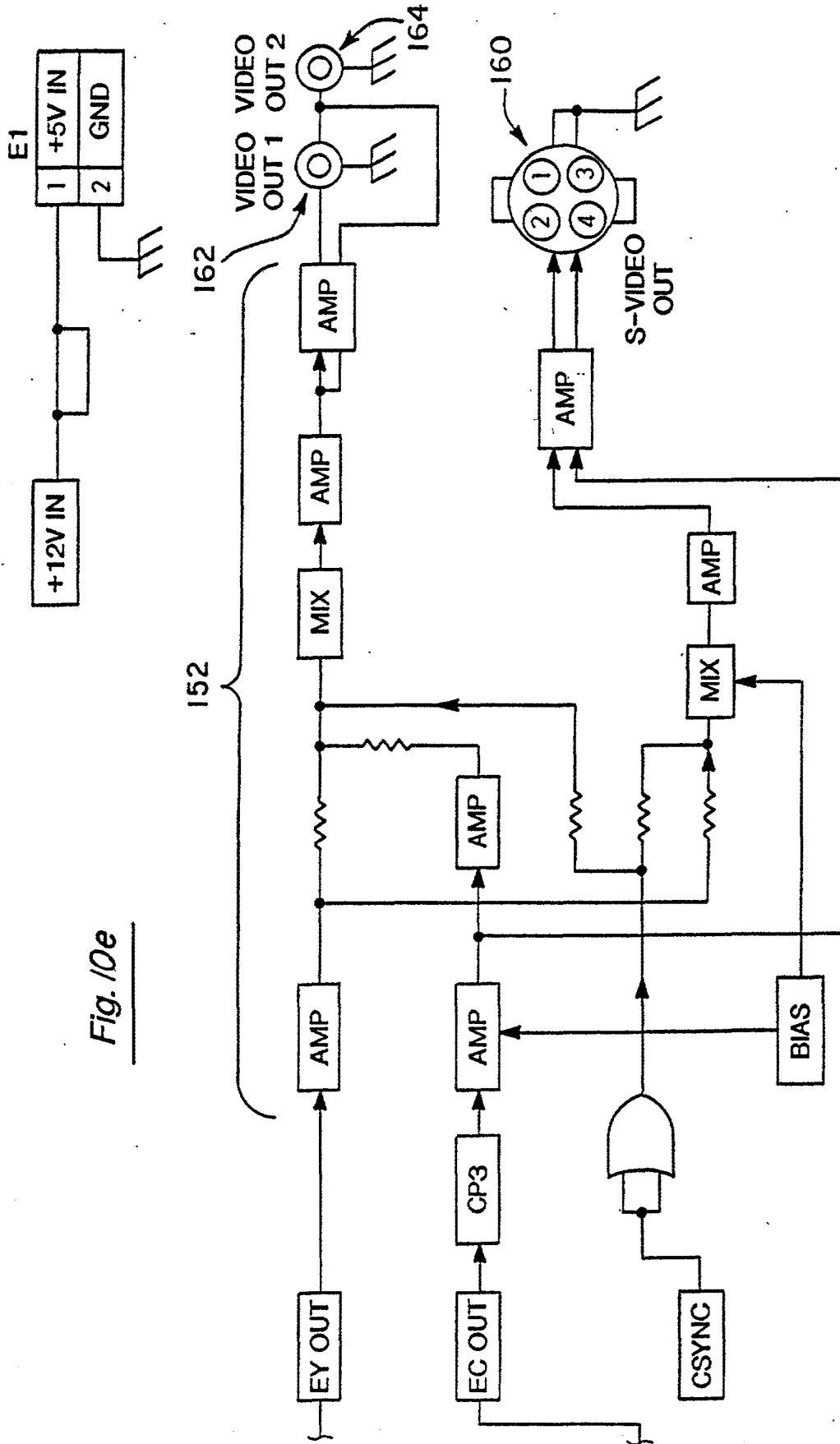


Fig. 10e

14/14

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**DECLARATION FOR UTILITY OR
DESIGN PATENT APPLICATION**
(37 CFR 1.63)

☒ Declaration Submitted with Initial Filing
☐ Declaration Submitted after Initial Filing (surcharge [37 CFR 1.16(e)] required)

Attorney Docket Number: 7018-23-CIP10

First Named Inventor: Adair, Edwin L.

COMPLETE IF KNOWN

Application Number: _____

Filing Date: _____

Group Art Unit: _____

Examiner Name: _____

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Hand Held Computers Incorporating Reduced Area Imaging Devices

The specification of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YY) _____ as United States Application Number or PCT International Application Number _____ as was amended on (MM/DD/YY) _____ (if applicable).

I hereby stated that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or Inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or Inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

Certified Copy Attached ?

Yes No

☐☐☐

(Number)

(Country)

(Foreign Filing Date)

☐☐☐

(Number)

(Country)

(Day/Month/Year Filed)

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached.

I hereby claim the benefit under 35 U.S.C. 119(e) of the United States provisional application(s) listed below.

(Application Number)

(Filing Date)

☐

Additional provisional application numbers are listed on supplemental priority data sheet PTO/SB/02B attached hereto.

(Application Number)

(Filing Date)

09/638,976 U.S. Parent Application or PCT Parent Number	August 15, 2000 Parent Filing Date	Parent Patent Number (if applicable)
09/496,312 U.S. Parent Application or PCT Parent Number	February 1, 2000 Parent Filing Date	Parent Patent Number (if applicable)
09/175,685 U.S. Parent Application or PCT Parent Number	October 20, 1998 Parent Filing Date	6,043,839 Parent Patent Number (if applicable)
08/944,322 U.S. Parent Application or PCT Parent Number	October 6, 1997 Parent Filing Date	5,929,901 Parent Patent Number (if applicable)

Brent P. Johnson	38,031
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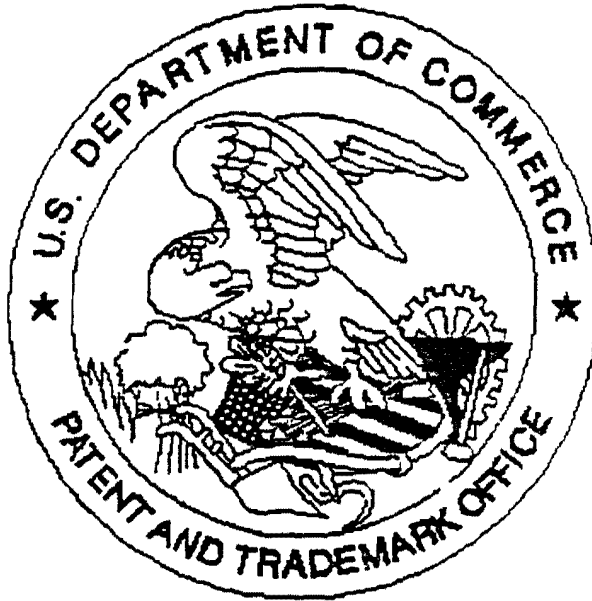
Direct all correspondence to: Brent P. Johnson
SHERIDAN ROSS, P.C.
1560 Broadway, Suite 1200
Denver, CO 80202-5141

Inventor's signature Edwin L. Adair Date 12 August
Residence 317 Paragon Way Citizenship USA
Post Office Address Same
City, State, Zip, Country Castle Pines Village, CO, 80104

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Second Inventor's signature Jeffrey L. Adair Date 8-12-01
Residence 1861 East Redfox Place Citizenship USA
Post Office Address Same
City, State, Zip, Country Highlands Ranch, CO, 80126

Full name of third joint inventor, if any (given name, family name) Randall S. Adair
Third Inventor's signature Randall S. Adair Date 8/12/01
Residence 3082 South Flamingo Way Citizenship USA
Post Office Address Same
City, State, Zip, Country Denver, CO 80222

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PATENT APPLICATION SERIAL NO. _____

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

08/28/2001 MBELETE1 00000023 191970 09935993

01 FC:201		355.00	OP
02 FC:202		720.00	OP
03 FC:203	80.00 CH	523.00	OP

PTO-1556
(5/87)

*U.S. GPO: 2000-468-987/39595

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2000

Application or Docket Number

7018-23-CIP10

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	87	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	87 minus 20 =	* 67
INDEPENDENT CLAIMS	21 minus 3 =	* 18
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY
TYPE ☐

OR OTHER THAN
SMALL ENTITY

RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X\$ 9=	603.00	OR	X\$18=	
X40=	720.00	OR	X80=	
+135=		OR	+270=	
TOTAL	1678.00	OR	TOTAL	

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	*	Minus **	=
Independent	*	Minus ***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

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RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
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+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

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TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

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AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
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FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

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+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

CLAIMS ONLY

SERIAL NO.

64935993

FILING DATE

5/23/01

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
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TOTAL IND.	21	↓		↓		↓
TOTAL DEP.	66	←		←		←
TOTAL CLAIMS	87					

* MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

03CO

#5

Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED AREA)
IMAGING DEVICES"

) Group Art Unit:

) Examiner:

) INFORMATION DISCLOSURE
) STATEMENT

CERTIFICATE OF MAILING

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ADDRESSED TO ASSISTANT COMMISSIONER FOR
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SHERIDAN ROSS P.C.

BY: *Christine Jaquet*

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Pursuant to Applicant's duty of disclosure under 37 CFR § 1.56 and 37 CFR §§ 1.97-1.98, Applicant hereby provides a copy of each of the documents identified on the enclosed PTO Form 1449, although Applicant does not admit that any of such documents, alone or in any combination, are considered to be material to patentability as defined in 37 CFR § 1.56(b). Moreover, the inclusion of these documents is not to be construed as an admission by Applicant that each such document is prior art as to the above-identified patent application.

Respectfully submitted,

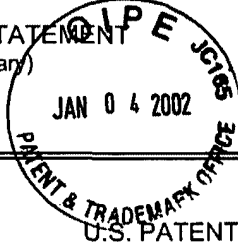
SHERIDAN ROSS P.C.

By: *Brent P. Johnson*

Brent P. Johnson
Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

Date: 12/18/01

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 7018-23-CIP10	SERIAL NO. 09/935,993
	APPLICANT ADAIR, et al.	
	FILING DATE August 23, 2001	GROUP ART

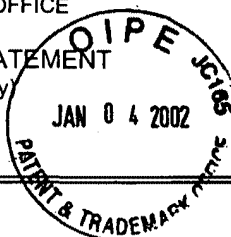


U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROP.
	AA	4,491,865	1/1/85	Danna et al.	358	98	9/29/82
	AB	4,745,471	5/17/88	Takamura et al.	358	98	5/12/87
	AC	4,786,965	11/22/88	Yabe	358	98	8/10/87
	AD	4,814,648	3/21/89	Hynecek	307	497	9/24/87
	AE	4,854,302	8/8/89	Allred, III	128	6	11/12/87
	AF	4,869,246	9/26/89	Adair	128	303.1	12/11/87
	AG	4,942,473	7/17/90	Zeevi et al.	358	213.26	6/30/88
	AH	Re. 33,854	3/24/92	Adair	128	6	10/15/90
	AI	5,116,317	5/26/92	Carson, Jr. et al.	604	96	6/18/91
	AJ	5,162,913	11/10/92	Chatenever et al.	358	213.19	2/26/90
	AK	5,220,198	6/15/93	Tsuji	257	731	4/29/91
	AL	5,251,613	10/12/93	Adair	128	6	6/9/92
	AM	5,381,784	1/17/95	Adair	128	6	9/30/92
	AN	5,402,768	4/4/95	Adair	128	4	6/22/93
	AO	5,453,785	9/26/95	Lenhardt et al.	348	357	7/28/93
	AP	5,471,515	11/28/95	Fossum et al.	377	60	1/28/94
	AQ	5,489,256	2/6/96	Adair	600	133	11/2/94
	AR	5,605,531	2/25/97	Lane et al.	600	118	4/8/94
	AS	5,630,782	5/20/97	Adair	600	133	3/7/95
	AT	5,630,783	5/20/97	Steinberg	600	158	8/11/95
	AU	5,682,199	10/28/97	Lankford	348	72	3/28/96
	AV	5,701,155	12/23/97	Wood et al.	348	72	12/28/95
	AW	5,734,418	3/31/98	Danna	348	76	7/17/96

EXAMINER	DATE CONSIDERED
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

FORM PTO-1449	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 7018-23-CIP10	SERIAL NO. 09/935,993
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)		APPLICANT ADAIR, et al.	
		FILING DATE August 23, 2001	GROUP ART



	AX	5,754,313	5/19/98	Pelchy et al.	358	473	7/17/96
	AY	6,028,764	2/22/00	Richardson et al.	361	681	3/10/99

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION	
							YES	NO
	AZ	EP 0 492 349 A1	01.07.92	EPO			X	

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

	BA	Nixon et al.; "Active-Pixel Image Sensor Integrated with Readout Circuits"; <u>NASA Tech Briefs</u> , October 1996, pps. 38, 40.
	BB	Zarnowski et al.; "Imaging options expand with CMOS technology"; <u>Laser Focus World</u> , June 1997, 5 pages.
	BC	Meyerson; "Kids, I'm dialing Grandma now, so stand straight...and smile!"; <u>Denver Rocky Mountain News</u> , September 5, 2000, pp. 12B.
	BD	Drexler; "See and say: Wireless video phone on the way"; Publication date unknown; 4 pages; http://www.cnn.com/TECH/computing/9909/27/nec.vid.phone.idg ;
	BE	"Wireless Pictures - Part of a New Technology"; Publication date unknown; 4 pages; http://www.kodak.com/US/en/corp/researchDevelopment/technologyFeatures/wireless.shtml ;
	BF	"Sanyo Semiconductor Adds Bluetooth Connectivity To Digital Camera Chips With Tality Intellectual Property"; Sanyo Press Release San Jose, CA - December 5, 2000; 2 pages; http://www.tality.com/news_events/release/pr-bluetooth_sanyo.html ;
	BG	"Ericsson Unveils the T68, A GPRS Phone With MMS, A Color Display And Bluetooth"; Press Release Stockholm, Sweden--(Business Wire)-March 21, 2001; 2 pages. http://biz.yahoo.com/bw/010321/2239.html ;
	BH	"Nokia and Fujifilm to cooperate in developing Bluetooth technology to send digital still images and applications technology"; Press Release Nokia and Fuji Photo Film Co., Ltd. of Japan-(February 14, 2000); 1 page; http://press.nokia.com/PR/200002/775373_5.html ;

EXAMINER	DATE CONSIDERED
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(19)



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(11) Publication number:

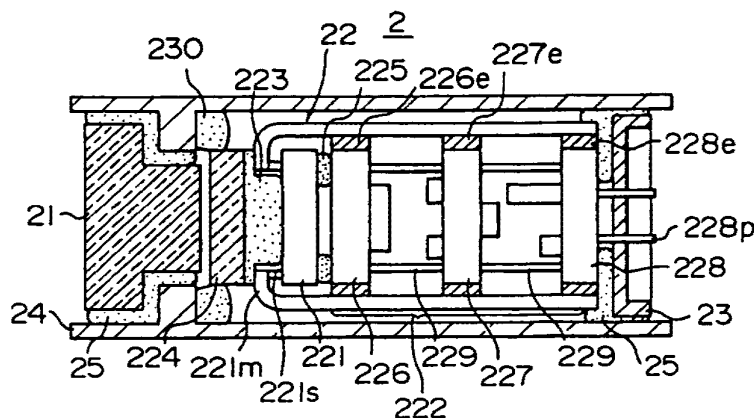
0 492 349 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91121544.0**(51) Int. Cl. 5: **H04N 5/225, A61B 1/04**(22) Date of filing: **16.12.91**(30) Priority: **28.12.90 JP 408992/90**(43) Date of publication of application:
01.07.92 Bulletin 92/27(84) Designated Contracting States:
DE FR GB(71) Applicant: **MATSUSHITA ELECTRIC
INDUSTRIAL CO., LTD**
1006, Oaza Kadoma, Kadoma-shi
Osaka 571(JP)(72) Inventor: **Suzuki, Takahisa****1931-5, Tokaichibacho, Midori-ku
Yokohama-shi(JP)**Inventor: **Tsukada, Tatsuki**
**229-39, Araicho, Hodogaya-ku
Yokohama-shi(JP)**Inventor: **Hatada, Kenzo**
**8-3, Nanseldal-4-chome
Katano-shi(JP)**(74) Representative: **Patentanwälte Leinweber &
Zimmermann**
Rosental 7/II Aufg.
W-8000 München 2(DE)(54) **Camera head for solid-state image pickup device and method of producing same.**

(57) The present invention provides a compact camera head for a solid-state image pickup device, a dimension of which is not so limited by a package for a solid-state image pickup element. Outer-leads are connected via inner-leads respectively to electrodes of a solid-state image pickup chip (221) to constitute the solid-state image pickup element. An optical glass plate (224) is attached to a light-receiving surface of the solid-state image pickup chip

(221). The outer-leads (221m) are connected to side electrodes of a circuit module (222) constituted by a chip-connecting board (226), a circuit board (227) and a connector board (228), to thereby provide an image pickup unit. The image pickup unit is inserted into a chassis (24), and the opposite open ends of the chassis are sealed by an optical filter (21) and a seal plate (23).

FIG. 2

FIELD OF THE INVENTION AND RELATED ART STATEMENT

This invention relates to a camera head for a solid-state image pickup device which camera head uses a solid-state image pickup chip, and also relates to a method of producing such a camera head.

Generally, a solid-state image pickup device comprises a lens, a camera head portion, and a camera control unit.

The camera head portion comprises an optical filter, a solid-state image pickup element, a circuit board, and a receptacle. These parts are contained or housed in a chassis. The solid-state image pickup element is formed by sealing a solid-state image pickup chip (solid-state image pickup semiconductor device) between an optical glass plate and a ceramics package. The solid-state image pickup element is larger in size as compared with the solid-state image pickup chip because of the provision of parts associated with the solid-state image pickup chip. Therefore, there has been encountered a problem that despite the solid-state image pickup chip per se is small, the camera head portion can not be reduced in size. In fact, in the case of using the solid-state image pickup element having the solid-state image pickup chip of 1/3 inch sealed in a ceramics package, the camera head must have a size at least equal to the diagonal length of the solid-state image pickup chip plus about 3 mm. Further, taking into consideration the circuit board (on which the solid-state image pickup element is to be mounted) and the receptacle to which the circuit board is to be mounted, the camera head must have a size equal to the diagonal length of the solid-state image pickup chip plus about 7 mm. Therefore, when the solid-state image pickup chip of 1/3 inch (8.5 mm) is used, the outer diameter of the camera head is about 3/5 inch (15 mm). It is difficult to insert the camera head into a narrow portion, such as the interior of a pipe and the interior of a precision machine.

Further, since the solid-state image pickup chip can be easily affected by dust and moisture, it must be sealed by the ceramics package and the optical glass plate. Therefore, the feeding of signals to and from the solid-state image pickup chip is carried out through external terminal pins. This requires another board for holding these external terminal pins.

OBJECT AND SUMMARY OF THE INVENTION

It is an object of this invention to provide a camera head for a solid-state image pickup device which camera head has an outer diameter closer to a diagonal length of a solid-state image pickup

chip.

According to the present invention, to this end, there is provided a camera head for a solid-state image pickup device comprising a chassis which has opposite open ends, and an image pickup unit housed in the chassis. The image pickup unit includes a solid-state image pickup chip constituted by a solid-state image pickup semiconductor device, chip-connecting board disposed adjacent to said solid-state image pickup chip and having an electric circuit mounted thereon, a connector board having external lead pins, leads connecting electrodes provided at an outer peripheral edge of at least one of said chip-connecting board and said connector board to electrodes of said solid-state image pickup chip, and a protective member sealing a light-receiving surface of said solid-state image pickup chip, said protective member being one of an optical glass plate and an optical filter.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of a solid-state image pickup device using a camera head provided in accordance with one embodiment of the present invention;

Fig. 2 is a cross-sectional view of the camera head shown in Fig. 1;

Figs. 3A to 3D are views showing a method of producing an image pickup unit; and

Fig. 4 is a cross-sectional view of a conventional camera head.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Fig. 1, a solid-state image pickup device comprises a lens 1, a camera head portion 2, and a camera control unit 3. The camera head portion 2 comprises an optical filter 21 for intercepting all rays except for visible rays or light, an image pickup unit 22, and a seal plate 23. As shown in Fig. 2, the image pickup unit 22 is housed in a chassis 24 of a hollow cylindrical shape. The opposite ends of the chassis 24 are closed by the optical filter 21 and the seal plate 23, respectively. The image pickup unit 22 is sealed in the chassis 24 through layers 25 of an adhesive.

When an image passing through the lens 1 is received by the image pickup unit 22, the video signal is amplified, and is fed to the camera control unit 3 via a plug 4 and a cable 5. The image is displayed on a monitor connected to the camera control unit 3.

As shown in Fig. 2 and Figs. 3A to 3D, the image pickup unit 22 comprises a solid-state image pickup chip (solid-state image pickup semiconductor device) 221, and a circuit module 222. Outer-

leads 221m are connected respectively to electrodes of the solid-state image pickup chip 221 via inner-leads 221s. An optical glass plate 224 is secured to the light-receiving surface of the solid-state image pickup chip 221 through an adhesive layer 223 of a light-transmitting nature. The circuit module 222 is secured through an adhesive layer 225 to a surface of the solid-state image pickup chip 221 opposite to a light-receiving surface thereof.

The circuit module 222 comprises a chip-connecting board 226, a circuit board 227 including a circuit for driving the solid-state image pickup chip 221 and a circuit for amplifying the video signal from the solid-state image pickup chip 221, and a connector board 228. Signals are fed between these boards via connection pins 229, and signals are fed between the solid-state image pickup chip 221 and each of these boards via the outer-leads 221m and side electrodes 226e, 227e and 228e of the boards. External lead pins 228p are mounted on the connector board 228, and are adapted to be connected to the plug 4 so as to send the signals to the camera control unit 3.

The method of producing the image pickup unit 22 of the camera head of the present invention will now be described with reference to Figs. 3A to 3D. This production method comprises the following five steps (i) to (v).

(i) First step (Fig. 3A)

The inner-leads 221s are connected respectively to the electrodes of the solid-state image pickup chip 221, and the outer-leads 221m are connected respectively to the inner-leads 221s.

(ii) Second step (Fig. 3B)

The optical glass plate 224 is bonded to the light-receiving surface of the solid-state image pickup chip 221 by the adhesive 223 to protect the light-receiving surface.

(iii) Third step (Fig. 3C)

The chip-connecting board 226, the circuit board 227 and the connector board 228 are arranged in such a manner that their side electrodes 226e, 227e and 228e are disposed in registry with one another, and these three boards are aligned with each other. They are connected together by the connection pins 229 to provide the circuit module 222. A surface of the solid-state image pickup chip 221 opposite to the light-receiving surface thereof is bonded to the chip-connecting board 226 through the adhesive 225.

(iv) Fourth step (Fig. 3D)

Each outer-lead 221m is bent through about 90° at a point near the chip 221, and is soldered to the side electrodes 226e, 227e and 228e of the boards 226, 227 and 228 to make electrical connections among the boards, thereby constituting the image pickup unit 22.

(v) Fifth step (Fig. 2)

The image pickup unit 22 is inserted into the chassis 24, and the optical glass plate 224 is fixed at its outer periphery to the chassis 24 by an adhesive 230. Subsequently, the optical filter 21 is inserted into the chassis 24 through one open end thereof, and the adhesive 25 is filled in the gap between the optical filter 21 and the chassis 24. Further, the seal plate 23 is inserted into the other open end of the chassis 24, and the adhesive 25 is filled in the gap between the seal plate 23 and the chassis 24. With the above procedure, the assembling of the camera head is completed.

As described above, in this embodiment, the electrodes of the solid-state image pickup chip are directly connected through the outer-leads with the inner-leads to the electrodes of the chip-connecting board, the circuit board, the connector board.

On the other hand, in a conventional camera head as shown in Fig. 4, a chassis 124 houses therein an optical filter 121, a solid-state image pickup element 122, a circuit board 1222 and a receptacle 123. The solid-state image pickup element 122 has a solid-state image pickup chip 1221 sealed between a ceramics package 1223 and an optical glass plate 1224. Terminal pins 122p of the solid-state image pickup element 122 are soldered to one arm of the circuit board 1222, and connection pins 123p of the receptacle 123 are soldered to the other arm of the circuit board 1222.

As apparent from this, in this embodiment of the invention, it can be possible to reduce the number of the associated parts which have heretofore been required for feeding the signals from the solid-state image pickup chip to the circuit board and the external lead pins. In addition, in this embodiment of the invention, the opposite open ends of the outer chassis are closed by the optical filter and the moisture prevention plate (seal plate), respectively, and the gap between the chassis and each of these two parts is filled with the adhesive to thereby seal the inner parts. With this arrangement, the parts (including the electric circuit board) contained in the chassis can be sealed, and therefore the stability and reliability of the circuit can be enhanced. Further, in this embodiment of the invention, in the case where the solid-state image pickup chip of 1/3 inch (8.5 mm) is used, the outer

diameter of the camera head is about 10 mm, and therefore is smaller about 5 mm than that of the conventional camera head.

In the above embodiment, although the light-receiving surface of the solid-state image pickup chip is protected by the optical glass plate, an optical filter may be used instead of this optical glass plate, in which case the optical filter may be replaced by an optical glass plate.

Instead of the seal plate, an adhesive having a sealing effect may be used to seal the open end of the chassis, in which case the adhesive is applied to the entire open end of the outer chassis except for the external lead pins 228p.

In the above embodiment, although the side electrodes are provided on the chip-connecting board 226, the circuit board 227 and the connector board 228, respectively, these side electrodes may be omitted by transmitting the signal through the connection pins 229.

In each of the above modifications, similar effects as achieved in the above embodiment can be obtained.

As is clear from the above embodiment, the electrodes of the solid-state image pickup chip are connected directly to the side electrodes of the circuit board through the outer-leads with the inner-leads. Therefore a ceramics package 1223 and any component part 1222 for fixing the ceramics package are not needed. Further, the opposite open ends of the chassis are closed by the optical filter and the seal plate, respectively, and the gap between the chassis and each of these two parts is filled with the adhesive to seal the interior of the chassis. With this arrangement, not only the solid-state image pickup chip but also the boards including the electric circuits parts can be sealed, and therefore the stability and reliability of the circuit are advantageously enhanced.

Further, in the production method of the present invention, after the very weak electrodes of the solid-state image pickup chip are reinforced by the optical glass plate, the outer-leads are bent, and therefore production defects such as the separation of the electrode can advantageously be reduced. Further, the electrodes of the boards are first aligned with one another, and then in this condition, the wiring of the very thin outer-leads are carried out. Therefore, the outer-leads can advantageously be connected to the side electrodes of these boards without applying any undue force to the outer-leads.

With the above construction, there is provided an advantage that the outer diameter of the camera head can be reduced to a small size close to the diagonal length of the solid-state image pickup chip. This provides an advantage that an image of a narrow portion, such as the interior of a pipe and

the interior of a precision machine, can be picked up, which has not heretofore been achieved.

Claims

1. A camera head for a solid-state image pickup device comprising:
 - a chassis which has opposite open ends; and an image pickup unit housed in said chassis, said image pickup unit including:
 - a solid-state image pickup chip constituted by a solid-state image pickup semiconductor device,
 - chip-connecting board disposed adjacent to said solid-state image pickup chip and having an electric circuit mounted thereon,
 - a connector board having external lead pins,
 - leads connecting electrodes provided at an outer peripheral edge of at least one of said chip-connecting board and said connector board to electrodes of said solid-state image pickup chip, and
 - a protective member sealing a light-receiving surface of said solid-state image pickup chip, said protective member being one of an optical glass plate and an optical filter.
2. A camera head for a solid-state image pickup device comprising:
 - an image pickup unit including:
 - a solid-state image pickup chip constituted by a solid-state image pickup semiconductor device,
 - chip-connecting board disposed adjacent to said solid-state image pickup chip and having an electric circuit mounted thereon,
 - a connector board having external lead pins,
 - leads connecting electrodes provided at an outer peripheral edge of at least one of said chip-connecting board and said connector board to electrodes of said solid-state image pickup chip, and
 - a protective member sealing a light-receiving surface of said solid-state image pickup chip, said protective member being one of an optical glass plate and an optical filter,
 - a chassis which has opposite open ends and houses therein said image pickup unit;
 - a first seal member for sealing one end of said chassis, which is one of an optical glass plate and an optical filter; and
 - a second seal member for sealing the other end of said chassis.
3. A camera head according to Claim 2, wherein said second seal member is in the form of a

plate.

4. A camera head according to Claim 2, wherein said second seal member is an adhesive.

5

5. A method of producing a camera head for a solid-state image pickup device, comprising the steps of:

connecting outer-leads respectively to electrodes of a solid-state image pickup chip via inner-leads, which chip is constituted by a solid-state image pickup semiconductor device;

10

bonding a protective member to a light-receiving surface of said solid-state image pickup chip, said protective member being one of an optical glass plate and an optical filter;

15

arranging a chip-connecting board and a connector board in an aligned manner at a side of said solid-state image pickup chip opposite to said light-receiving surface thereof, and connecting said chip-connecting board and said connector board together, said chip-connecting board having electric circuit parts mounted thereon, and said connector board having external lead pins;

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bending said outer-leads to be brought into contact with electrodes provided respectively at outer peripheral edges of said chip-connecting board and said connector board, and connecting said outer-leads to said electrodes of said two boards to form an image pickup unit;

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inserting said image pickup unit into a chassis having opposite open ends; and

35

sealing one open end of said chassis adjacent to said light-receiving surface of said solid-state image pickup chip by a first seal member, said first seal member being one of an optical glass plate and an optical filter, and sealing the other open end of said chassis by a second seal member.

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FIG. 1

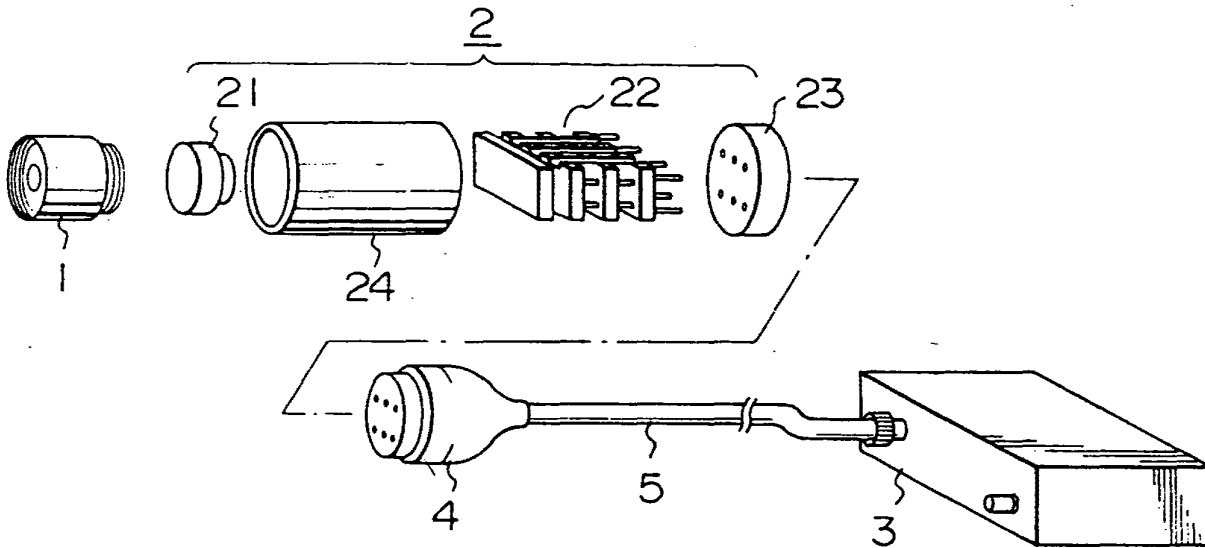


FIG. 2

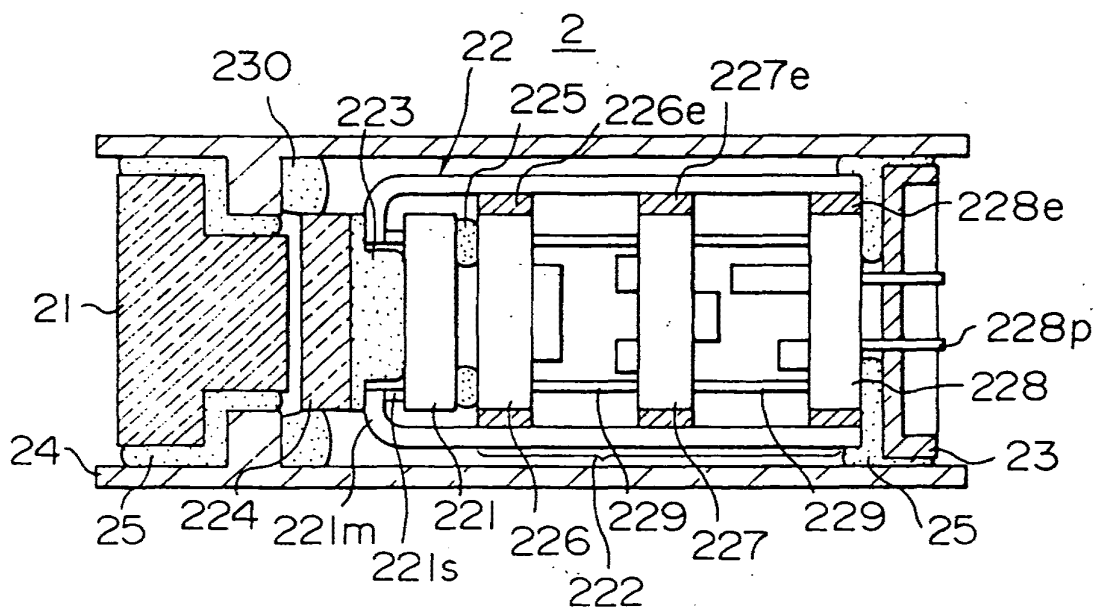


FIG. 3A

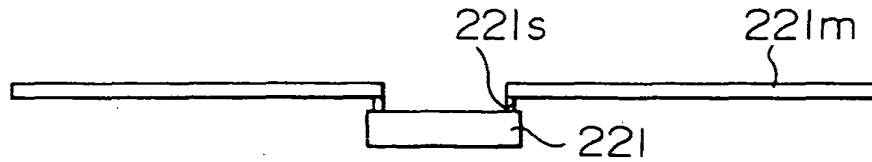


FIG. 3B

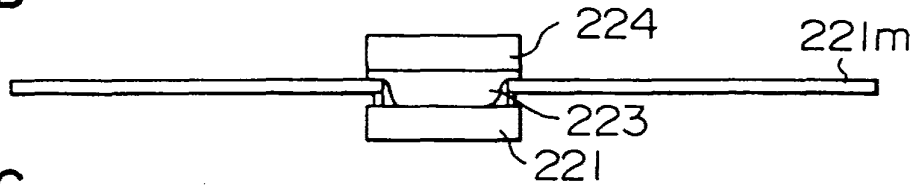


FIG. 3C

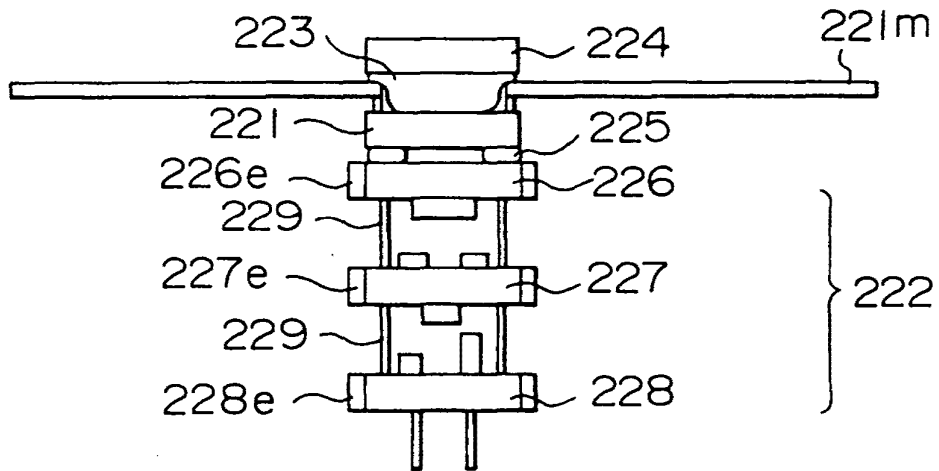


FIG. 3D

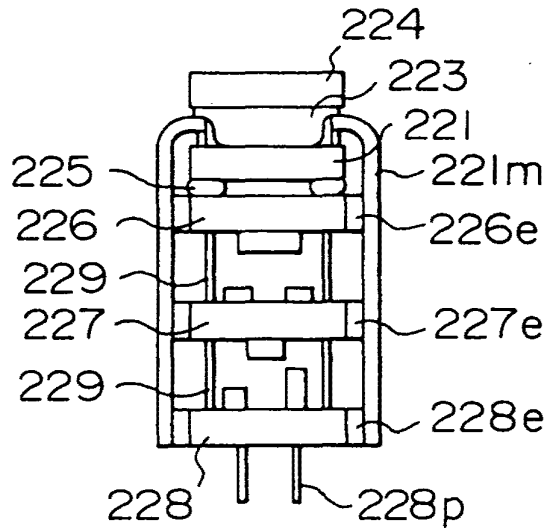
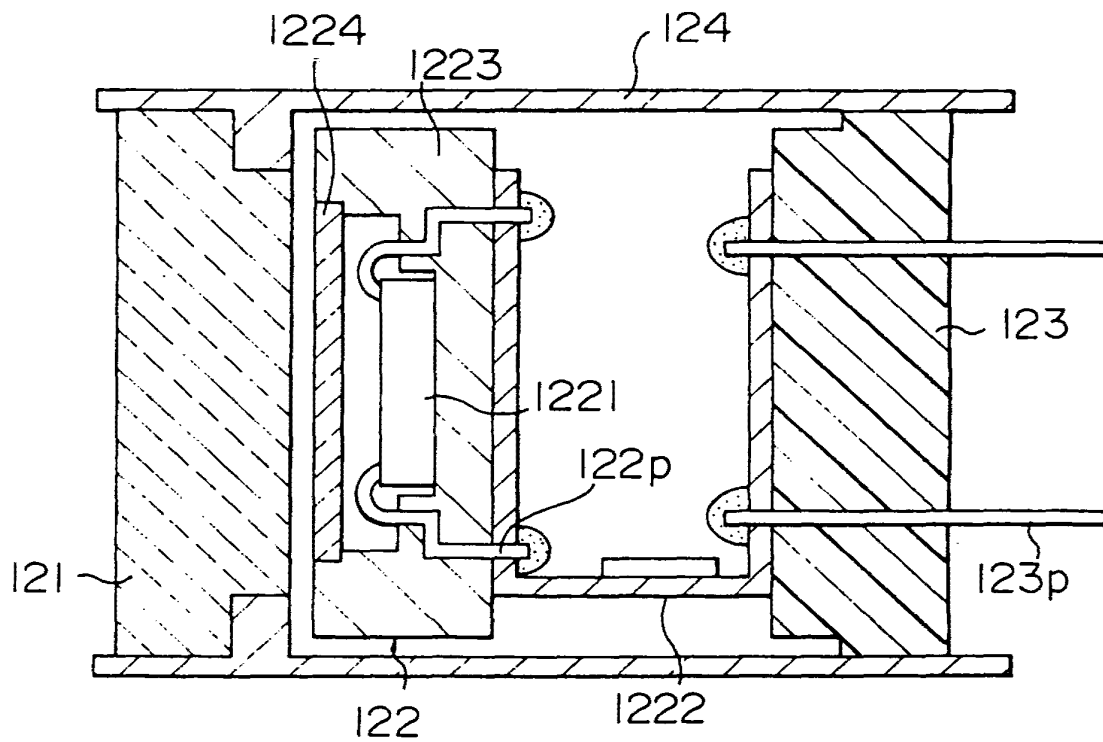


FIG. 4
PRIOR ART





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 91121544.0
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	<u>US - A - 4 918 521</u> (YABE) * Fig. 1; column 2, line 67 - column 3, line 38; fig. 10; column 9, line 64 - column 10, line 45 *	1,2	H 04 N 5/225 A 61 B 1/04
A	<u>US - A - 4 890 159</u> (OGIU) * Fig. 1; column 5, line 49 - column 6, line 6 *	1,2	
A	<u>GB - A - 2 156 179</u> (WELCH ALLYN) * Fig. 2; page 2, line 119 - page 3, line 78 *	1,2	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H 04 N 5/00 A 61 B 1/00
Place of search		Date of completion of the search	Examiner
VIENNA		02-04-1992	BENISCHKA
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document			

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#4



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COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10

CONFIRMATION NO. 1949

FORMALITIES LETTER



OC000000006541074

Brent P. Johnson
SHERIDAN ROSS P.C.
Suite 1200
1560 Broadway
Denver, CO 80202-5141



Date Mailed: 09/11/2001

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

This application has been accorded an Application Number and Filing Date. The application, however, is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given **TWO MONTHS** from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a)

The required item(s) identified below must be timely submitted to avoid abandonment:

- An Abstract not to exceed 150 words in length, commencing on a separate sheet (37 CFR 1.72(b)).

*A copy of this notice **MUST** be returned with the reply.*


Customer Service Center

Initial Patent Examination Division (703) 308-1202

PART 2 - COPY TO BE RETURNED WITH RESPONSE

0350
#4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED AREA
IMAGING DEVICES"

Assistant Commissioner for Patents
Washington, D.C. 20231



Group Art Unit:

Examiner:

RESPONSE TO NOTICE TO FILE
CORRECTED APPLICATION PAPERS

CERTIFICATE OF MAILING

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SHERIDAN ROSS P.C.

BY:

Christine Jacques

Dear Sir:

Applicant submits this Response to Notice to File Corrected Application Papers to address the Notice to File Corrected Application Papers having a mailing date of September 11, 2001. Although the Applicant believes that no fees are due for filing this Response to Notice to File Corrected Application Papers, please charge any fees deemed necessary to Deposit Account No. 19-1970.

Please amend the above-identified patent application as follows:

IN THE ABSTRACT:

Please replace the paragraph beginning at page 62, line 2, with the following rewritten paragraph:

A reduced area-imaging device is provided for use with a miniature hand-held computer referred to in the industry as a PDA. Various configurations of the imaging device are provided

Application No. 09/934,201

which position elements of the imaging device in desired locations. The PDA includes a miniature LCD-type video screen which can display not only images taken by the camera module, but also incoming video images. The camera module may communicate with the housing of the PDA either by a wired connection, or wirelessly. The camera module is small enough that it can be stored within the housing of the PDA. The camera module may be pointed at an object within sight of the user without having to move the PDA housing in order to take an image. Any acceptable wireless standard may be used for wireless communication between the camera module and the PDA. One particularly advantageous standard includes Bluetooth.

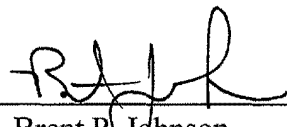
REMARKS/ARGUMENTS

Attached hereto is a marked up version of the changes made to the abstract by the current amendment. The attached page is captioned **"Version With Markings to Show Changes Made."**

It is respectfully requested that the amended abstract be entered and that the Notice to File Corrected Application Papers be withdrawn.

Respectfully submitted,

SHERIDAN ROSS P.C.

By: 
Brent P. Johnson
Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

Date: 11/6/01

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Abstract:

Paragraph beginning at page 62, line 2 has been amended as follows:

ABSTRACT

A reduced area-imaging device is provided for use with a miniature hand-held computer referred to in the industry as a PDA. Various configurations of the imaging device are provided which position elements of the imaging device in desired locations. The PDA includes a miniature LCD-type video screen which can display not only images taken by the camera module, but also incoming video images. The camera module may communicate with the housing of the PDA either by a wired connection, or wirelessly. The camera module is small enough that it can be stored within the housing of the PDA. The camera module may be pointed at an object within sight of the user without having to move the PDA housing in order to take an image. Any acceptable wireless standard may be used for wireless communication between the camera module and the PDA. One particularly advantageous standard includes Bluetooth. [In one configuration of the imaging device, the image sensor is placed remote from the remaining image processing circuitry. In a second configuration, all of the image processing circuitry to include the image sensor is placed in a stacked fashion near the same location. In the first configuration, the entire imaging device can be placed at the distal end of a camera module. In a second configuration, the image sensor is remote from the remaining image processing circuitry wherein available space within the PDA is used to house the remaining circuitry. In any of the configurations, the image sensor may be placed alone on a first circuit board, or timing and control circuits may be included on the first circuit board containing the image sensor. One or more video processing boards can be stacked in a longitudinal fashion with respect to the first board, or the video processing boards may be placed within the housing of the communication device. The PDA includes a miniature LCD-type video view screen which is capable of viewing not only the images taken by the camera module, but also can show incoming video images received from a personal computer connected to a global communications network. The camera

#4

Application No. 09/934,201

module is of such small size that it can be easily stored within the housing of the PDA. In a first embodiment, the camera module communicates with the housing of the PDA by a wired connection utilizing a small retractable cable. In a second embodiment, the camera module communicates wirelessly with the PDA. In either embodiment, the camera module may be pointed at any desired object within sight of the user, and without having to actually point or move the phone housing in order to take an image. In the wireless embodiment, a user has total freedom to manipulate the positioning of the camera module without adjusting the position of the video telephone since there is not even a cable to contend with. Any acceptable wireless standard may be used for communication between the camera module and the video telephone. One particularly advantageous standard includes bluetooth.]



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED AREA)
IMAGING DEVICES"

Assistant Commissioner for Patents
Washington, D.C. 20231

Group Art Unit:

Examiner:

FIRST PRELIMINARY AMENDMENT

Technology Center 2600

<p>CERTIFICATE OF MAILING</p> <p>I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE ASSISTANT COMMISSIONER OF PATENTS, WASHINGTON, DC 20231 ON <u>11/6/01</u>.</p> <p>SHERIDAN ROSS P.C.</p> <p>BY: <u>Christine Jacquot</u></p>
--

Dear Sir:

Prior to the initial review of the above-identified patent application by the Examiner, please enter the following Preliminary Amendment. Although Applicants do not believe that any fees are due based upon the filing of this Preliminary Amendment, please charge any such fees to Deposit Account 19-1970.

Please amend the above-identified patent application as follows:

IN THE CLAIMS:

Please amend claims 27, 78 and 86 as follows:

B1 27. (Amended) In a PDA having capability to transmit data between a computer connected to a communications network, the PDA having a housing, and a video view screen for viewing the data which includes video signals, the improvement comprising:

Application No.: to be assigned

B1
Encl.

a camera module for taking video images, said camera module communicating with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to said computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of said pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal;

a transceiver radio element housed within said camera module and electrically coupled to said image sensor for transmitting said pre-video signal;

a transceiver radio module housed in the PDA and wirelessly communicating with said transceiver radio element for receiving said pre-video signal; and

a first circuit board housed within the PDA and electrically coupled to said transceiver radio module for taking said pre video signal and conditioning it to be a post video signal in a desired format, and said transceiver radio element being electrically coupled to the video view screen of the PDA enabling viewing of the converted pre-video signals.

B2

78. (Amended) In a method for conducting video conferencing communications through a communications network, the improvement comprising the steps of:

providing a camera module having an image sensor housed therein;

removing the camera module from connection with the PDA;

Application No.: to be assigned

5 *BZ*
Concl. pointing the camera module at a targeted object and taking video images of the targeted
object;

wirelessly transmitting the video images taken by image sensor to the PDA;

processing the video images transmitted by the camera module; and

selectively viewing the video images on the PDA and selectively transmitting the video

10 images to another party.

BZ 86. (Amended) In a PDA having the capability to transmit data between a personal
computer connected to a communications network, the improvement comprising:

a camera module housing an image sensor therein;

a camera module battery housed within said camera module for providing power to said

5 camera module;

a camera battery charge circuit housed within the PDA;

a PDA battery housed within the PDA for providing power to said camera battery charge
circuit; and

wherein the camera module is received in the PDA so said camera module battery

10 electrically communicates with said camera battery charge circuit to selectively charge said camera
module battery.

Application No.: to be assigned

REMARKS/ARGUMENTS

Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version With Markings to Show Changes Made."**

Respectfully submitted,

SHERIDAN ROSS P.C.

By: _____


Brent P. Johnson

Registration No. 38,031

1560 Broadway, Suite 1200

Denver, Colorado 80202-5141

(303) 863-9700

Date: 11/6/01

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 27, 78 and 86 have been amended as follows:

27. (Amended) In a PDA having capability to transmit data between a computer connected to a [global] communications network, the PDA having a housing, and a video view screen for viewing the data which includes video signals, the improvement comprising:

5 a camera module for taking video images, said camera module communicating with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to said computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of said pixels for timing and control of said array of pixels, said image sensor
10 producing a pre-video signal;

a transceiver radio element housed within said camera module and electrically coupled to said image sensor for transmitting said pre-video signal;

a transceiver radio module housed in the PDA and wirelessly communicating with said transceiver radio element for receiving said pre-video signal; and

15 a first circuit board housed within the PDA and electrically coupled to said transceiver radio module for taking said pre video signal and conditioning it to be a post video signal in a desired format, and said transceiver radio element being electrically coupled to the video view screen of the PDA enabling viewing of the converted pre-video signals.

78. (Amended) In a method for conducting video conferencing communications through a [global] communications network, the improvement comprising the steps of:

providing a camera module having an image sensor housed therein;
removing the camera module from connection with the PDA;

5 pointing the camera module at a targeted object and taking video images of the targeted object;

wirelessly transmitting the video images taken by image sensor to the PDA;

processing the video images transmitted by the camera module; and

selectively viewing the video images on the PDA and selectively transmitting the video

10 images to another party.

86. (Amended) In a PDA having the capability to transmit data between a personal computer connected to a [global] communications network, the improvement comprising:

a camera module housing an image sensor therein;

5 a camera module battery housed within said camera module for providing power to said camera module;

a camera battery charge circuit housed within the PDA;

a PDA battery housed within the PDA for providing power to said camera battery charge circuit; and

10 wherein the camera module is received in the PDA so said camera module battery electrically communicates with said camera battery charge circuit to selectively charge said camera module battery.

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45246	46299	47999	48040						

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

 ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
 INCORPORATING REDUCED AREA
 IMAGING DEVICES"

) Group Art Unit: 2613
)
)
) Examiner:
)
)
) SUPPLEMENTAL INFORMATION
) DISCLOSURE STATEMENT

Assistant Commissioner for Patents
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SHERIDAN ROSS P.C.
BY: Christine Jaquet

Dear Sir:

Pursuant to Applicants duty of disclosure under 37 CFR § 1.56, Applicants hereby submit this Supplemental Information Disclosure Statement with a copy of the documents identified on the enclosed PTO Form 1449, although Applicants do not admit that any of such documents, alone or in any combination, are considered to be material to patentability as defined in 37 CFR § 1.56(b). Moreover, the inclusion of these documents is not to be construed as an admission by Applicants that each such document is prior art as to the above-identified patent application.

Respectfully submitted,

SHERIDAN ROSS P.C.

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OCT 08 2002
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By: Brent P. Johnson
Brent P. Johnson
Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

Date: 9/27/02

SHEET 1 OF 1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 7018-23-CIP10	SERIAL NO. 09/935,993
	APPLICANT ADAIR et al.	
	FILING DATE August 23, 2001	GROUP ART 2613

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROP.
	AA	5,980,450	11/9/99	Thompson	600	112	4/22/98
	AB	6,413,209	7/2/0	Thompson	600	169	3/29/99
	AC						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION	
							YES	NO
	AD							
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	AH		Technology Center 2600

EXAMINER	DATE CONSIDERED
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10	1949
22442	7590	12/17/2004	EXAMINER	
SHERIDAN ROSS PC 1560 BROADWAY SUITE 1200 DENVER, CO 80202			RAO, ANAND SHASHIKANT	
			ART UNIT	PAPER NUMBER
			2613	

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/935,993

Applicant(s)

ADAIR ET AL.

Examiner

Andy S. Rao

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-86 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-77 is/are allowed.
- 6) ☒ Claim(s) 78-86 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/2/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

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DETAILED ACTION

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 78-86 are rejected under 35 U.S.C. 102(e) as being anticipated by Jacobsen et al., (hereinafter referred to as "Jacobsen").

Jacobsen discloses a method for conducting video conferencing through a global communications network, the improvement comprising the steps of: providing a camera module having an image sensor housed therein (Jacobsen: column 12, lines 38-39), removing the camera module from connection with the PDA (Jacobsen: column 12, lines 40-41); pointing the camera module at a targeted object (Jacobsen: column 12, lines 42-43), and selectively taking video images of the targeted object (Jacobsen: column 12, lines 44-46); wirelessly transmitting the video images taken by the image sensor to the PDA (Jacobsen: column 12, lines 30-35); processing the video images transmitted by the camera module (Jacobsen: column 8, lines 1-37); and selectively viewing the video images on the PDA and selectively transmitting the video images to another party (Jacobsen: column 9, lines 10-27), as in claim 78.

Regarding claim 79, Jacobsen discloses that the sensor is a CMOS pixel array (Jacobsen: column 14, lines 1-10), as in the claim.

Jacobsen discloses in a PDA having the capability to transmit and receive data communications network, the improvement comprising the steps of: a camera module having an image sensor housed therein, said camera module for producing video images of a targeted object (Jacobsen: column 12, lines 38-39); means for wireless interconnecting said camera module to said PDA (Jacobsen: column 12, lines 40-41), said means for wirelessly interconnecting enabling said camera module to selectively displaced at a location remote from said PDA (Jacobsen: column 12, lines 42-43), and selectively taking video images of the targeted object (Jacobsen: column 12, lines 44-46); and a video monitor attached to said wireless phone

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for selectively viewing said video images taken by said camera module (Jacobsen: column 13, lines 20-30), and for selectively viewing incoming video images transmitted to another party (Jacobsen: column 9, lines 10-27), as in claim 80.

Regarding claim 81, Jacobsen discloses a PDA including a housing, and an opening in said housing for receiving and placing said camera module so as to place said camera module in a stored position (Jacobsen: column 12, lines 35-50), as in the claim.

Jacobsen discloses in a PDA having a housing and a video view screen for viewing video images, the improvement comprising the steps of: the improvement comprising the steps of: a camera module having an image sensor housed therein, said camera module for producing video images of a targeted object (Jacobsen: column 12, lines 38-39); means for wireless interconnecting said camera module to said PDA (Jacobsen: column 12, lines 40-41), said means for wirelessly interconnecting enabling said camera module to selectively displaced at a location remote from said PDA (Jacobsen: column 12, lines 42-43), as in claim 82.

Regarding claim 83, Jacobsen discloses a PDA including a housing, and an opening in said housing for receiving and placing said camera module so as to place said camera module in a stored position (Jacobsen: column 12, lines 35-50), as in the claim.

Jacobsen a PDA, the improvement comprising the steps of: a camera module having an image sensor housed therein (Jacobsen: column 12, lines 38-39); a first circuitry means coupled to said image sensor for timing and control of said image sensor (Jacobsen: column 14, lines 1-5); and a second circuitry means communication with said first circuitry means for processing images taken by said image sensor to create video images of a desired video format (Jacobsen: column 5, lines 50-60); means for wireless interconnecting said camera module to said PDA

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(Jacobsen: column 12, lines 40-41), said means for wirelessly interconnecting enabling said camera module to selectively displaced at a location remote from said PDA (Jacobsen: column 12, lines 42-43), as in claim 84.

Regarding claim 85, Jacobsen discloses a PDA including a housing, and an opening in said housing for receiving and placing said camera module so as to place said camera module in a stored position (Jacobsen: column 12, lines 35-50), as in the claim.

Jacobsen discloses in a PDA having the capability to transmit data between a personal computer connected to a global communications network, the improvement comprising the steps of: a camera module having an image sensor housed therein (Jacobsen: column 12, lines 38-39); a camera module battery housed within said camera module for providing power to said camera module (Jacobsen: column 12, lines 30-35); a camera battery charge circuit housed within the PDA (Jacobsen: column 13, lines 30-45); a PDA battery housed within the telephone for providing power to said camera battery charge battery circuit (Jacobsen: column 14, lines 60-65); and wherein the camera module is received in the PDA so said camera module battery electrically communicates with said camera battery charge circuit to selectively charge said camera module battery (Jacobsen: column 16, lines 30-40), as in claim 87.

Jacobsen discloses a method for powering and recharging a camera module for use with a PDA (Jacobsen: column 13, lines 20-30), the method comprising the steps of: providing a PDA housing a camera battery charge circuit housed therein (Jacobsen: column 13, lines 30-45); providing a camera module housing an image sensor for therein for taking video images (Jacobsen: column 12, lines 38-39); providing a camera module battery housed within said camera module for providing power to said camera module (Jacobsen: column 12, lines 30-35);

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removing said camera module from seated engagement with the PDA resulting in activation of said camera module battery for powering said camera module (Jacobsen: column 12, lines 30-45); and returning said camera module to its seated position with said PDA and in electrical communication with the battery charge circuit to charge said camera module battery (Jacobsen: column 13, lines 20-45), as in claim 87.

Allowable Subject Matter

3. Claims 1-77 are allowed.

Independent claims 1, 18, 22, 27, 32, 37, 42, 46, 50, 54, 58 62, 66, 70, and 74 disclose "...a PDA for conducting wireless telephonic communications, the improvement comprising: a video system integral with said telephone for receiving and transmitting video images, and for viewing said video images, said video system comprising; a camera module housing an image sensor therein, said image sensor including an array of pixels for receiving images thereon said image sensor further including circuitry means on said first plane and coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, a first circuit board mounted in said camera module adjacent said image sensor and electrically coupled to said image sensor, said first circuit board including circuitry means for converting said pre-video signal to a desired video format, said camera module further including a transceiver radio element mounted therein and electrically communicating with said first circuit board to transmit said converted pre-video signal..." which is a feature that is not obvious nor anticipated over the art of record. Accordingly, if rejected claims 78-86 are cancelled, the application would be placed in a condition for allowance.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy S. Rao whose telephone number is (703)-305-4813. The examiner can normally be reached on Monday-Friday 8 hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris S. Kelley can be reached on (703)-305-4856. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

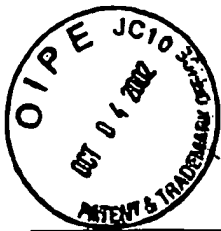
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Andy S. Rao
Primary Examiner
Art Unit 2613

5.

ANDY RAO
PRIMARY EXAMINER



SHEET 1 OF 1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 7018-23-CIP10	SERIAL NO. 09/935,993
	APPLICANT ADAIR et al.	
	FILING DATE August 23, 2001	GROUP ART 2613

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROP.
BR	AA	5,980,450	11/9/99	Thompson	600	112	4/22/98
AK	AB	6,413,209	7/2/0	Thompson	600	169	3/29/99
AK	AC						

FOREIGN PATENT DOCUMENTS

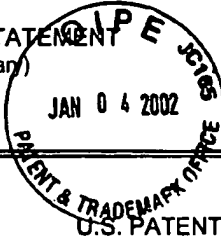
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION	
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OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

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EXAMINER A. RAO	DATE CONSIDERED 12/12/04
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 7018-23-CIP10	SERIAL NO. 09/935,993
	APPLICANT ADAIR, et al.	
	FILING DATE August 23, 2001	GROUP ART



*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROP.
AK	AA	4,491,865	1/1/85	Danna et al.	358	98	9/29/82
	AB	4,745,471	5/17/88	Takamura et al.	358	98	5/12/87
	AC	4,786,965	11/22/88	Yabe	358	98	8/10/87
	AD	4,814,648	3/21/89	Hynecek	307	497	9/24/87
	AE	4,854,302	8/8/89	Allred, III	128	6	11/12/87
	AF	4,869,246	9/26/89	Adair	128	303.1	12/11/87
	AG	4,942,473	7/17/90	Zeevi et al.	358	213.26	6/30/88
	AH	Re. 33,854	3/24/92	Adair	128	6	10/15/90
	AI	5,116,317	5/26/92	Carson, Jr. et al.	604	96	6/18/91
	AJ	5,162,913	11/10/92	Chatenever et al.	358	213.19	2/26/90
	AK	5,220,198	6/15/93	Tsuji	257	731	4/29/91
	AL	5,251,613	10/12/93	Adair	128	6	6/9/92
	AM	5,381,784	1/17/95	Adair	128	6	9/30/92
	AN	5,402,768	4/4/95	Adair	128	4	6/22/93
	AO	5,453,785	9/26/95	Lenhardt et al.	348	357	7/28/93
	AP	5,471,515	11/28/95	Fossum et al.	377	60	1/28/94
	AQ	5,489,256	2/6/96	Adair	600	133	11/2/94
	AR	5,605,531	2/25/97	Lane et al.	600	118	4/8/94
	AS	5,630,782	5/20/97	Adair	600	133	3/7/95
	AT	5,630,783	5/20/97	Steinberg	600	158	8/11/95
	AU	5,682,199	10/28/97	Lankford	348	72	3/28/96
	AV	5,701,155	12/23/97	Wood et al.	348	72	12/28/95
	AW	5,734,418	3/31/98	Danna	348	76	7/17/96

EXAMINER	A. Rao	DATE CONSIDERED	12/12/04
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 7018-23-CIP10	SERIAL NO. 09/935,993
	APPLICANT ADAIR, et al.	
	FILING DATE August 23, 2001	GROUP ART

AK	AX	5,754,313	5/19/98	Pelchy et al.	358	473	7/17/86
AK	AY	6,028,764	2/22/00	Richardson et al.	361	681	3/10/99

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB CLASS	TRANSLATION	
							YES	NO
AK	AZ	EP 0 492 349 A1	01.07.92	EPO			X	

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

AK	BA	Nixon et al.; "Active-Pixel Image Sensor Integrated with Readout Circuits"; <u>NASA Tech Briefs</u> , October 1996, pps. 38, 40.
	BB	Zamowski et al.; "Imaging options expand with CMOS technology"; <u>Laser Focus World</u> , June 1997, 5 pages.
	BC	Meyerson; "Kids, I'm dialing Grandma now, so stand straight...and smile!"; <u>Denver Rocky Mountain News</u> , September 5, 2000, pp. 12B.
	BD	Drexler; "See and say: Wireless video phone on the way"; Publication date unknown; 4 pages; http://www.cnn.com/TECH/computing/9909/27/nec.vid.phone.idg ;
	BE	"Wireless Pictures - Part of a New Technology"; Publication date unknown; 4 pages; http://www.kodak.com/US/en/corp/researchDevelopment/technologyFeatures/wireless.shtml ;
	BF	"Sanyo Semiconductor Adds Bluetooth Connectivity To Digital Camera Chips With Tality Intellectual Property"; Sanyo Press Release San Jose, CA - December 5, 2000; 2 pages; http://www.tality.com/news_events/release/pr-bluetooth_sanyo.html ;
	BG	"Ericsson Unveils the T68, A GPRS Phone With MMS, A Color Display And Bluetooth"; Press Release Stockholm, Sweden--(Business Wire)-March 21, 2001; 2 pages. http://biz.yahoo.com/bw/010321/2239.html ;
	BH	"Nokia and Fujifilm to cooperate in developing Bluetooth technology to send digital still images and applications technology"; Press Release Nokia and Fuji Photo Film Co., Ltd. of Japan-(February 14, 2000); 1 page; http://press.nokia.com/PR/200002/775373_5.html ;

EXAMINER	A. RAO	DATE CONSIDERED	12/12/04
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

Notice of References Cited	Application/Control No. 09/935,993	Applicant(s)/Patent Under Reexamination ADAIR ET AL.	
	Examiner Andy S. Rao	Art Unit 2613	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,104,334	08-2000	Allport, David E.	341/175
	B	US-6,184,804	02-2001	Harrison, Shelton E.	341/22
	C	US-6,083,353	07-2000	Alexander, Jr., John F.	202/158
	D	US-6,147,366	11-2000	Drottar et al.	257/82
	E	US-6,009,336	12-1999	Harris et al.	455/566
	F	US-6,141,037	10-2000	Upton et al.	348/65
	G	US-6,073,034	06-2000	Jacobsen et al.	455/566
	H	US-6,370,282	04-2002	Pavley et al.	382/311
	I	US-6,730,900	05-2004	Hsish et al.	250/208.1
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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CONFIRMATION NO. 1949

Bib Data Sheet

SERIAL NUMBER 09/935,993	FILING DATE 08/23/2001 RULE	CLASS 348	GROUP ART UNIT 2613	ATTORNEY DOCKET NO. 7018-23-CIP10
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APPLICANTS

Edwin L. Adair, Castle Pines Village, CO;

Jeffrey L. Adair, Highlands Ranch, CO;
Randall S. Adair, Denver, CO;



** CONTINUING DATA *****

This application is a CIP of 09/638,976 08/15/2000 PAT 6,424,369
which is a CIP of 09/496,312 02/01/2000 PAT 6,275,255
which is a CON of 09/175,685 10/20/1998 PAT 6,043,839
which is a CIP of 08/944,322 10/06/1997 PAT 5,929,901

** FOREIGN APPLICATIONS *****

IF REQUIRED, FOREIGN FILING LICENSE GRANTED
** 09/10/2001

** SMALL ENTITY **

Foreign Priority claimed 35 USC 119 (a-d) conditions met	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance	STATE OR COUNTRY CO	SHEETS DRAWING 14	TOTAL CLAIMS 87	INDEPENDENT CLAIMS 21
Verified and Acknowledged	Examiner's Signature  Initials 				

ADDRESS

22442
SHERIDAN ROSS PC
1560 BROADWAY
SUITE 1200
DENVER, CO
80202

TITLE

Hand-held computers incorporating reduced area imaging devices

FILING FEE RECEIVED 1678	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit
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Index of Claims



Application No.

09/935,993

Examiner

Andy S. Rao

Applicant(s)

ADAIR ET AL.

Art Unit

2613

√	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

N	Non-Elected
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A	Appeal
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Claim		Date											
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Search Notes

Application No.

09/935,993

Examiner

Andy S. Rao

Applicant(s)

ADAIR ET AL.

Art Unit

2613

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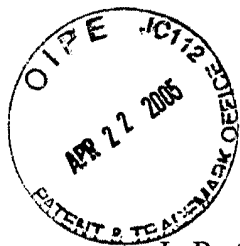
Class	Subclass	Date	Examiner
348	65-76,143-160	12/12/2004	AR
348	373-376	12/12/2004	AR
455	556-570	12/12/2004	AR
382	310-320	12/12/2004	AR
345	327,351	12/12/2004	AR

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED AREA
IMAGING DEVICES"

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

Dear Sir:

Applicant submits this Amendment and Response to address the Office Action having a mailing date of December 17, 2004. Although the Applicant believes that no fees are due for filing this Amendment and Response, please charge any fees deemed necessary to Deposit Account No. 19-1970.

Please amend the above-identified patent application as follows:

) Group Art Unit: 2613
)
) Examiner: Rao, A.
)
) AMENDMENT AND RESPONSE
)

<p style="text-align: center;">CERTIFICATE OF MAILING</p> <p>I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450</p> <p>ON <u>4/18/2005</u></p> <p style="text-align: center;">SHERIDAN ROSS P.C.</p> <p>BY: <u>Christine Jaguel</u></p>
--

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) In a PDA having capability to transmit and receive data in a communications network, the improvement comprising:
a video system integral with said PDA for receiving and transmitting video images, and for viewing said video images, said video system comprising;

5 a camera module housing an image sensor therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, a first circuit board mounted in said camera module and electrically coupled to said image sensor, said first
10 circuit board including circuitry means for converting said pre-video signal to a desired video format, said camera module further including a transceiver radio element mounted therein and electrically communicating with said first circuit board to transmit the converted pre-video signal;

a transceiver radio module mounted in said PDA for wirelessly communicating with said
15 transceiver element in said camera module to receive said converted pre-video signal;

a video view screen attached to said PDA for viewing said video images, said video view screen communicating with said transceiver radio module for displaying video images processed by said first circuit board.

2. (Original) A device, as claimed in claim 1, wherein:

said image sensor defines a profile area in said first plane, and said first circuit board is positioned in longitudinal alignment with said image sensor such that said first circuit board does not extend substantially beyond said profile.

3. (Original) A device, as claimed in claim 1, further including:

a second circuit board electrically coupled with said first circuit board and said image sensor for further processing said pre-video signal, said second board being placed adjacent said first circuit board within said camera module.

4. (Original) A device, as claimed in claim 1, wherein:

said first and second planes are offset from and substantially parallel to one another.

5. (Original) A device, as claimed in claim 3, wherein:

said second circuit board lies in a third plane which is offset from and extends substantially parallel to said first and second planes.

6. (Original) A device, as claimed in claim 3, wherein:
said second circuit board includes means for digital signal processing enabling the pre-video signal conditioned by said first circuit board to be viewed by said video view screen.

7. (Original) A device, as claimed in claim 1, wherein:
said first circuit board converts said pre-video signal to a post-video signal for direct reception by a remote video device, said post-video signal being of a format selected from the group consisting of a NTSC/PAL video signal and a VGA video signal.

8. (Original) A device, as claimed in claim 1, wherein:
said pixels are CMOS pixels.

9. (Original) A device, as claimed in claim 1, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

10. (Original) A device, as claimed in claim 1, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

11. (Original) A device, as claimed in claim 1, wherein:

said array of pixels includes an array of passive CMOS pixels, wherein individual passive CMOS pixels of said array of passive CMOS pixels each include a photo diode for producing photoelectrically generated signals, and an access transistor communicating with said photo
5 diode to control the release of photoelectrically generated signals.

12. (Original) A device, as claimed in claim 1, wherein:

individual pixels within said array of pixels each include an amplifier.

13. (Original) A device, as claimed in claim 1, wherein:

said PDA includes a text screen mounted therein for viewing text which is manipulated by a user.

14. (Original) A device as claimed in claim 1, further including:

a wireless telephone attached to said PDA.

15. (Original) A device, as claimed in claim 1, further including:

a remote video device electrically coupled to said video system for further viewing said video images.

16. (Original) A device, as claimed in claim 15, wherein:

said remote video device is selected from the group consisting of a television and a computer monitor.

17. (Original) A device, as claimed in claim 1 wherein:

said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, said camera module having an integral source of power which electrically communicates with said charge circuit when said camera module is mounted in said PDA.

18. (Original) In a PDA having capability to transmit and receive data in a

communications network, the improvement comprising:

a video system integral with said PDA for receiving and transmitting video images, and for viewing said video images, said video system comprising;

5 a camera module housing an image sensor therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, said camera module further including a transceiver radio element mounted therein and electrically
10 communicating with said circuitry means to transmit the pre-video signal to the PDA;

a transceiver radio module mounted in said PDA for wirelessly communicating with said transceiver element in said camera module to receive said pre-video signal;

a first circuit board mounted in said PDA and electrically communicating with said transceiver radio module for converting said pre-video signal into a desired video format;

15 a video view screen attached to said PDA for viewing said video images, said video view screen communicating with said first circuit board for displaying video images processed by said first circuit board.

19. (Original) A device, as claimed in claim 18, wherein:
said pixels are CMOS pixels.

20. (Original) A device, as claimed in claim 18, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

21. (Original) A device, as claimed in claim 18, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

22. (Original) In a PDA having capability to transmit and receive data in a communications network, the PDA having a housing, and a video view screen for viewing the data which includes video signals, the improvement comprising:

a camera module for taking video images, said camera module communicating with circuitry
5 within said PDA enabling viewing on said video view screen and enabling video signals to be
transmitted from said camera module to said computer, said camera module including an image
sensor housed therein, said image sensor lying in a first plane and including an array of pixels
for receiving images thereon, said image sensor further including circuitry means on said first
plane and coupled to said array of said pixels for timing and control of said array of pixels, said
10 image sensor producing a pre-video signal, a first circuit board electrically connected to said
image sensor, said first circuit board including circuitry means for converting said pre-video
signal to a desired video format;

a transceiver radio element housed within said camera module and electrically coupled to
said first circuit board for transmitting said converted pre-video signal; and

15 a transceiver radio module housed in the PDA and wirelessly communicating with said
transceiver radio element for receiving said converted pre-video signal, and said transceiver radio
element being electrically coupled to the video view screen of the PDA enabling viewing of the
converted pre-video signals.

23. (Original) A device, as claimed in claim 22, wherein:
said pixels are CMOS pixels.

24. (Original) A device, as claimed in claim 22, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

25. (Original) A device, as claimed in claim 22, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

26. (Original) A device, as claimed in claim 22 wherein:
said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, said camera module having an integral source of power which electrically communicates with said charge circuit when said camera module is mounted in said PDA.

27. (Previously Presented) In a PDA having capability to transmit data between a computer connected to a communications network, the PDA having a housing, and a video view screen for viewing the data which includes video signals, the improvement comprising:

a camera module for taking video images, said camera module communicating with
5 circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to said computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said

first plane and coupled to said array of said pixels for timing and control of said array of pixels,

10 said image sensor producing a pre-video signal;

a transceiver radio element housed within said camera module and electrically coupled to said image sensor for transmitting said pre-video signal;

a transceiver radio module housed in the PDA and wirelessly communicating with said transceiver radio element for receiving said pre-video signal; and

15 a first circuit board housed within the PDA and electrically coupled to said transceiver radio module for taking said pre video signal and conditioning it to be a post video signal in a desired format, and said transceiver radio element being electrically coupled to the video view screen of the PDA enabling viewing of the converted pre-video signals.

28. (Original) A device, as claimed in claim 27, wherein:
said pixels are CMOS pixels.

29. (Original) A device, as claimed in claim 27, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

30. (Original) A device, as claimed in claim 27, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

31. (Original) A device, as claimed in claim 27 wherein:

said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, said camera module having an integral source of power which electrically communicates with said charge circuit when said camera module is mounted in said PDA.

32. (Original) A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane, and an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array
5 of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal;

a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for converting said pre-video signal to a desired video format;
a camera module housing said image sensor and said first circuit board;

10 a transceiver radio element mounted in said camera module communicating with said first circuit board for wirelessly transmitting the converted pre-video signal;

a transceiver radio module communicating wirelessly with said transceiver radio element for receiving the converted pre-video signal;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;

a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said converted pre-video signal, and also for conditioning video and audio signals received by said

20 transceiver/amplifier section from the other party;

a microphone electrically communicating with said digital signal processor for recording sound and converting the sound to audio signals;

a speaker electrically communicating with said digital signal processor for broadcasting the audio signals;

25 a video view screen attached to said PDA, said video view screen for selectively displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section from the other party;

a video switch communicating with said first circuit board and said digital signal processor for switching video images to be viewed on said video view screen; and

30 a PDA power supply mounted in said PDA for providing power thereto.

33. (Original) A device, as claimed in claim 32, wherein:
said pixels are CMOS pixels.

34. (Original) A device, as claimed in claim 32, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

35. (Original) A device, as claimed in claim 32, wherein:

said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

36. (Original) A device, as claimed in claim 32 wherein:

said PDA further includes a camera battery charge circuit mounted therein for recharging said camera module, and said camera module further includes a camera module source of power mounted in said camera module which electrically communicates with said charge circuit when
5 said camera module is mounted in said PDA.

37. (Original) A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane, and an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array
5 of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal;

a camera module housing said image sensor;

a transceiver radio element mounted in said camera module communicating with said image sensor for wirelessly transmitting the pre-video signal;

10 a transceiver radio module communicating wirelessly with said transceiver radio element
for receiving the pre-video signal;

 a first circuit board electrically communicating with said transceiver radio module, said
first circuit board including circuitry means for converting said pre-video signal to a desired
video format;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for
amplifying and further transmitting the converted pre-video signal, and for receiving, and
amplifying video and audio signals transmitted by another party;

 a digital signal processor electrically coupled to said transceiver radio module and said
transceiver/amplifier section, said digital signal processor further conditioning said converted
20 pre-video signal, and also for conditioning video and audio signals received by said
transceiver/amplifier section from the other party;

 a microphone electrically communicating with said digital signal processor for recording
sound and converting the sound to audio signals;

 a speaker electrically communicating with said digital signal processor for broadcasting
25 the audio signals;

 a video view screen attached to said PDA, said video view screen for selectively
displaying images from said imaging device, and for selectively displaying video images received
by said transceiver/amplifier section from the other party;

30 a video switch communicating with said first circuit board and said digital signal
processor for switching video images to be viewed on said video view screen; and
a PDA power supply mounted in said PDA for providing power thereto.

38. (Original) A device, as claimed in claim 37, wherein:
said pixels are CMOS pixels.

39. (Original) A device, as claimed in claim 37, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth
communications standard.

40. (Original) A device, as claimed in claim 37, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE
802.15.13 communications standard.

41. (Original) A device, as claimed in claim 37 wherein:
said PDA further includes a camera battery charge circuit mounted therein for recharging
said camera module, and said camera module further includes a camera module source of power
mounted in said camera module which electrically communicates with said charge circuit when
said camera module is mounted in said PDA.

42. (Original) In a PDA having capability to transmit and receive data in a communications network, the improvement comprising:

a video system integral with said PDA for receiving and transmitting video images, and for viewing said images, said video system comprising:

5 a camera module housing an image sensor therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, a first circuit board lying in a second plane and electrically coupled to said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video
10 format, a transceiver radio element communicating with said first circuit board for transmitting said converted pre-video signal;

a transceiver radio module mounted in said PDA for wirelessly receiving said converted pre-video signal; and

a video view screen attached to said PDA for viewing said video images, said video view
15 screen communicating with said transceiver radio module, and displaying video images processed by said first circuit board.

43. (Original) A device, as claimed in claim 42, wherein:
said pixels are CMOS pixels.

44. (Original) A device, as claimed in claim 42, wherein:

said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

45. (Original) A device, as claimed in claim 42, wherein:

said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

46. (Original) In a PDA having capability to transmit and receive data in a communications network, the improvement comprising:

a video system integral with said PDA for receiving and transmitting video images, and for viewing said images, said video system comprising:

5 a camera module housing an image sensor therein, said image sensor including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, a transceiver radio element communicating with said image sensor for transmitting said pre-video signal;

10 a transceiver radio module mounted in said PDA for wirelessly receiving said pre-video signal;

a first circuit board electrically coupled to said transceiver radio module, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format, and

15 a video view screen attached to said PDA for viewing said video images, said video view screen communicating with said transceiver radio module, and displaying video images processed by said first circuit board.

47. (Original) A device, as claimed in claim 46, wherein:
said pixels are CMOS pixels.

48. (Original) A device, as claimed in claim 46, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

49. (Original) A device, as claimed in claim 46, wherein:
said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

50. (Original) In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing video images, the improvement comprising:

a camera module for taking video images, said camera module wirelessly communicating
5 with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to the personal computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, a first circuit board lying in a second plane and electrically connected to said image sensor, said
10 first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format, and a transceiver radio element housed in the camera module for wirelessly transmitting the converted pre-video signal to the PDA.

51. (Original) A device, as claimed in claim 50, wherein:

said pixels are CMOS pixels.

52. (Original) A device, as claimed in claim 50, wherein:

said transceiver radio element communicates with the PDA by a bluetooth communications standard.

53. (Original) A device, as claimed in claim 50, wherein:

said transceiver radio element communicates with the PDA by an IEEE 802.15.13 communications standard.

54. (Original) In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing video images, the improvement comprising:

a camera module for taking video images, said camera module wirelessly communicating
5 with circuitry within said PDA enabling viewing on said video view screen and enabling video signals to be transmitted from said camera module to the personal computer, said camera module including an image sensor housed therein, said image sensor including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal, and a transceiver radio element housed in the camera module for wirelessly transmitting the pre-video signal to the
10 PDA.

55. (Original) A device, as claimed in claim 54, wherein:

said pixels are CMOS pixels.

56. (Original) A device, as claimed in claim 54, wherein:

said transceiver radio element communicates with the PDA by a bluetooth communications standard.

57. (Original) A device, as claimed in claim 54, wherein:

said transceiver radio element communicates with the PDA by an IEEE 802.15.13 communications standard.

58. (Original) In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing the video images, the improvement comprising:

a camera module for taking video images, said camera module communicating with
5 circuitry within said PDA enabling viewing of said video images on said PDA and enabling
video signals to be transmitted from said camera module to the personal computer, said camera
module including an image sensor housed therein, said image sensor lying in a first plane and
including an array of pixels for receiving images thereon, said image sensor further including
circuitry means electrically coupled to said array of said pixels for timing and control of said
10 array of pixels, said circuitry means for timing and control placed remote from said array of
pixels on a second plane, said image sensor producing a pre-video signal, a first circuit board
electrically connected to said image sensor and lying in a third plane, said first circuit board

including circuitry means for processing and converting said pre-video signal to a desired video format, and a radio transceiver element communicating with said first circuit board for wirelessly
15 transmitting said converted pre-video signal.

59. (Original) A device, as claimed in claim 58, wherein:
said pixels are CMOS pixels.

60. (Original) A device, as claimed in claim 58, wherein:
said transceiver radio element communicates with the PDA by a bluetooth
communications standard.

61. (Original) A device, as claimed in claim 58, wherein:
said transceiver radio element communicates with the PDA by an IEEE 802.15.13
communications standard.

62. (Original) In a PDA having capability to transmit and receive data in a
communications network, the PDA including a video view screen for viewing the video images,
the improvement comprising:

a camera module for taking video images, said camera module communicating with
5 circuitry within said PDA enabling viewing of said video images on said PDA and enabling

video signals to be transmitted from said camera module to the personal computer, said camera module including an image sensor housed therein, said image sensor lying in a first plane and including an array of pixels for receiving images thereon, said image sensor further including circuitry means electrically coupled to said array of said pixels for timing and control of said
10 array of pixels, said circuitry means for timing and control placed remote from said array of pixels on a second plane, said image sensor producing a pre-video signal, and a radio transceiver element communicating with said image sensor for wirelessly transmitting said pre-video signal.

63. (Original) A device, as claimed in claim 62, wherein:

said pixels are CMOS pixels.

64. (Original) A device, as claimed in claim 62, wherein:

said transceiver radio element communicates with the PDA by a bluetooth
communications standard.

65. (Original) A device, as claimed in claim 62, wherein:

said transceiver radio element communicates with the PDA by an IEEE 802.15.13
communications standard.

66. (Original) A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal;

5 a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format;

a radio transceiver element communicating with said first circuit board for wirelessly transmitting said converted pre-video signal;

10 a camera module housing said image sensor, said first circuit board, and said transceiver radio element therein;

a radio transceiver module housed within the PDA for wirelessly communicating with said radio transceiver element and receiving said converted pre-video signal;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;

20 a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said pre-video signal which is first conditioned by said first circuit board, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

a microphone electrically communicating with said digital signal processor for receiving sound and converting the sound to audio signals;

a speaker electrically communicating with said digital signal processor for broadcasting audio signals;

25 a video view screen attached to said PDA, said video view screen for selectively displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section; and

a video switch communicating with said first circuit board and said digital signal processor for switching video images to be viewed on said video view screen; and

30 a power supply mounted to said PDA for providing power thereto.

67. (Original) A device, as claimed in claim 66, wherein:
said pixels are CMOS pixels.

68. (Original) A device, as claimed in claim 66, wherein:
said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

69. (Original) A device, as claimed in claim 66, wherein:

said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

70. (Original) A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal;

5 a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels;
a radio transceiver element communicating with said first circuit board for wirelessly transmitting said pre-video signal;

10 a camera module housing said image sensor, said first circuit board, and said transceiver radio element therein;

a radio transceiver module housed within the PDA for wirelessly communicating with said radio transceiver element and receiving said pre-video signal;

15 a second circuit board electronically communicating with said radio transceiver module, said second circuit board including circuitry means for converting said pre-video signal to a desired video format;

a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;

20 a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said pre-video signal which is first conditioned by said first circuit board, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

a microphone electrically communicating with said digital signal processor for receiving sound and converting the sound to audio signals;

25 a speaker electrically communicating with said digital signal processor for broadcasting audio signals;

a video view screen attached to said PDA, said video view screen for selectively displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section;

30 a video switch communicating with said first circuit board and said digital signal processor for switching video images to be viewed on said video view screen; and

a power supply mounted to said PDA for providing power thereto.

71. (Original) A device, as claimed in claim 70, wherein:
said pixels are CMOS pixels.

72. (Original) A device, as claimed in claim 70, wherein:

said transceiver radio element and said transceiver radio module communicate by a bluetooth communications standard.

73. (Original) A device, as claimed in claim 70, wherein:

said transceiver radio module and said transceiver radio element communicate by an IEEE 802.15.13 communications standard.

74. (Original) A PDA having capability to transmit and receive data in a communications network, said PDA comprising:

an image sensor lying in a first plane, and an array of pixels for receiving images thereon, said image sensor further including circuitry means electrically coupled to said array of pixels for timing and control of said array of pixels, said circuitry means for timing and control being placed remote from said array of pixels on a second plane, said image sensor producing a pre-video signal;

a first circuit board electrically coupled with said image sensor and lying in a third plane, said first circuit board including circuitry means for processing and converting said pre-video signal to a desired video format;

a transceiver radio element communicating with said first circuit board to wirelessly transmit the converted pre-video signal;

a camera module housing said image sensor, said first circuit board and said transceiver radio element;

15 a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting said converted pre-video signal and for receiving and amplifying video and audio signals transmitted by another party;

a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said converted
20 pre-video signal which is first conditioned by said first circuit board, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;

a microphone electrically communicating with said digital signal processor for receiving sound and converting the sound to audio signals;

a speaker electrically communicating with said digital signal processor for broadcasting
25 audio signals;

a video view screen attached to said PDA, said video view screen for selectively displaying selectively displaying video images from said image device, and for selectively displaying video images received by said transceiver/amplifier section from the other party; and
a video switch communicating with said first circuit board and said digital signal processor for
30 switching video images to be viewed on said video view screen; and

a power supply mounted to said PDA for providing power thereto.

75. (Original) A device, as claimed in claim 74, wherein:
said pixels are CMOS pixels.

76. (Original) A device, as claimed in claim 74, wherein:
said transceiver radio element and said transceiver radio module communicate by a
bluetooth communications standard.

77. (Original) A device, as claimed in claim 74, wherein:
said transceiver radio module and said transceiver radio element communicate by an
IEEE 802.15.13 communications standard.

78. (Previously Presented) In a method for conducting video conferencing
communications through a communications network, the improvement comprising the steps of:
providing a camera module having an image sensor housed therein;
removing the camera module from connection with the PDA;
5 pointing the camera module at a targeted object and taking video images of the targeted
object;
wirelessly transmitting the video images taken by image sensor to the PDA;
processing the video images transmitted by the camera module; and

selectively viewing the video images on the PDA and selectively transmitting the video
10 images to another party.

79. (Original) A method, as claimed in claim 78, wherein:

said image sensor includes a CMOS pixel array.

80. (Currently Amended) In a PDA having capability to transmit and receive data
communications network, the improvement comprising:

a camera module housing an image sensor therein, said camera module for producing
video images of a targeted object;

5 means for wirelessly interconnecting said camera module to said PDA, said means for
wirelessly interconnecting enabling said camera module to be selectively displaced [at a location
remote] away from and not in contact with said PDA; and

a video view screen attached to said PDA for selectively viewing video images taken by
said camera module, and for selectively viewing incoming video images received from the
10 personal computer connected to the global communications network.

81. (Original) A device, as claimed in claim 80, wherein:

said PDA includes a housing, and an opening for receiving said camera module so as to
place said camera module in a stored position.

82-85. (Cancel)

86. (Previously Presented) In a PDA having the capability to transmit data between a personal computer connected to a communications network, the improvement comprising:

a camera module housing an image sensor therein;

5 a camera module battery housed within said camera module for providing power to said camera module;

a camera battery charge circuit housed within the PDA;

a PDA battery housed within the PDA for providing power to said camera battery charge circuit; and

10 wherein the camera module is received in the PDA so said camera module battery electrically communicates with said camera battery charge circuit to selectively charge said camera module battery.

87. (Currently Amended) A method of powering and recharging a camera module for use with a PDA, said method comprising the steps of:

providing a PDA [housing] including a camera battery charge circuit and a PDA battery housed therein;

5 providing a camera module housing an image sensor therein for taking video images, and a camera module battery housed within said camera module for selectively powering said camera

Application No. 09/935,993

module;

removing said camera module from seated engagement with the PDA resulting in
activation of said camera module battery for powering said camera module; and

10 returning said camera module to its seated position with said PDA and in electrical
communication with the battery charge circuit to charge said camera module battery.

REMARKS/ARGUMENTS

Claims 78-87 were rejected under 35 U.S.C. § 102(e) as being anticipated by Jacobsen et al. Claims 82-85 are canceled. Claims 80 and 87 are amended.

Independent Claim 78 recites a method of conducting video conferencing communications to include the steps of removing the camera module from connection with the PDA, taking video images of a targeted object, and wirelessly transmitting the video images taken by the image sensor to the PDA.

The Examiner stated that generally, the method claimed in claim 78 was disclosed in Jacobsen in col. 8, 9, and 12. Applicant respectfully traverses the Examiner's rejection, and believes that Jacobsen does not disclose any form of a PDA that can be physically separated or disconnected from a PDA yet still provide capability for the user to take video images. On the contrary, the only type of camera disclosed in Jacobsen is one that is physically connected to the communication device housing and further, there is no disclosure whatsoever of wireless transmission of the video images for processing/viewing. For example, the embodiment referred to in Jacobsen at col. 12 is shown in Figure 8, and this embodiment discloses a camera 215 which remains connected to the housing by telescoping elements. The camera may be pivoted to enable the user to point and hold the camera in a selected direction; however, the camera 215 always remains physically connected to the housing. As stated above, Claim 78 requires a step of removing the camera module from connection with the PDA and wirelessly transmitting video images taken by the image sensor to the PDA. Jacobsen fails to disclose any method requiring

these two steps.

Independent Claim 80 claims a PDA including means for wirelessly interconnecting the camera module to the PDA, the means for wirelessly interconnecting enabling the camera module to be selectively displaced away from and not in contact with the PDA. The means for wirelessly interconnecting corresponds to the capability of the present invention to transmit video images wirelessly from the disconnected camera module to the PDA for viewing/processing of the video images taken by the camera module. Therefore, for the same reasons as set forth above with respect to Claim 78, Claim 80 also clearly distinguishes over Jacobsen.

Independent Claim 86 claims a different aspect of the present invention, namely, the particular arrangement of the power sources in the camera module and the PDA that allows the camera module to be physically disconnected from the PDA in order that video images can be taken by the camera module and then wirelessly transmitted by the camera module to the PDA. In connection therewith, Claim 86 requires a camera module battery to be housed within the camera module, a camera battery charge circuit housed within the PDA, a PDA battery housed within the PDA for providing power to the camera battery charge circuit, and wherein when the camera module is received/stored in the PDA. The camera module battery electrically communicates with the camera battery charge circuit to selectively charge the camera module battery. Therefore, when a user decides to take video images by the camera module, the camera module battery remains charged while being stored. For this claim, the Examiner referenced a number of locations within the Jacobsen reference which the Examiner asserted corresponded to

the elements of the claimed invention. However, Applicant also disagrees with the Examiner's interpretation of the Jacobsen reference with respect to this claim. More specifically, the Examiner references various locations within the Jacobsen reference to include disclosure at columns 12, 13, 14 and 16. It is noted for each of these separate locations within Jacobsen that the disclosure therein refers to different embodiments, and there is no continuity between these embodiments in terms of how the various elements in these embodiments correspond to the claimed invention. The disclosure at column 12 refers to the embodiment of Figure 8, the disclosure at column 13 refers to the embodiment of Figure 9A, the disclosure at column 14 refers to the embodiment at Figures 13G-I, and the disclosure at column 16 refers to the embodiment shown in Figures 17A-17C. None of these embodiments or even separate discrete elements of these embodiments disclose the invention described above with respect to Claim 86. In the embodiment shown at Figure 8, there is simply shown a battery 212 which powers the communication device. For the embodiment in Figures 9A and 9B, the communication device may be used in conjunction with a docking station which has its own battery. However, these embodiments at least fail to disclose a camera battery charge circuit housed within the device and a separate camera module battery which is housed within the camera module. As for the embodiment shown in Figures 13G-13I, another type of docking station is illustrated with its own battery; however, this embodiment is also deficient for the same reason as set forth above with the embodiment shown in Figures 8, 9A and 9B. As for the embodiment shown in Figures 17A-17C, this embodiment is in the form of a card reader system, and the only power source disclosed

Application No. 09/935,993

therein is the internal battery 720 that provides power for all of the reader functions. Therefore, Claim 86 clearly distinguishes over the Jacobsen reference.

Independent Claim 87 relates to a method of powering and recharging a camera module for use with a PDA, and requires a PDA including a camera battery charge circuit, and a PDA battery housed therein. This method also requires the camera module to have a separate camera module battery housed therein wherein removal of the camera module from engagement with the PDA results in activation of the camera module battery for powering the camera module. The Jacobsen reference generally fails to disclose any type of camera module having its own dedicated power source. For the same reasons as also set forth above with respect to the other Jacobsen embodiments, Claim 87 clearly distinguishes over the Jacobsen reference.

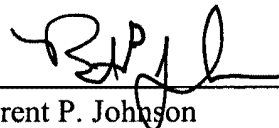
Applicant gratefully acknowledges the allowability of Claims 1-77. Applicant has also reviewed the Examiner's comments regarding allowability, and respectfully requests that the Examiner further clarify the reasons for allowance based upon the number of independent claims allowed and the different claim language used within the various independent claims.

Application No. 09/935,993

Applicant has made a sincere effort to place the application in a condition for allowance; therefore, such favorable action is earnestly solicited. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

SHERIDAN ROSS P.C.

By: _____

Brent P. Johnson
Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

Date: 4/18/05



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED AREA
IMAGING DEVICES"

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

) Group Art Unit: 2613
)
) Examiner: RAO, A.
)
) REQUEST FOR EXTENSION OF TIME
)

<p style="text-align: center;">CERTIFICATE OF MAILING</p> <p>I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450</p> <p>ON <u>4/18/05</u></p> <p style="text-align: center;">SHERIDAN ROSS P.C.</p> <p>BY: <u>Christine Jaquet</u></p>
--

Dear Sir:

Applicants, through their attorneys, respectfully petition for an extension of time under 37 CFR § 1.136(a) of one (1) month to respond to the Office Action mailed on December 17, 2005, with respect to the above-identified application, thereby extending the period for response from March 17, 2005, to April 17, 2005.

Enclosed is a check in the amount of \$60.00 as payment for the extension fee. Please credit any overpayment or debit any underpayment to Deposit Account No. 19-1970.

Respectfully submitted,

SHERIDAN ROSS P.C.

By: _____

B. P. Johnson
Brent P. Johnson
Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

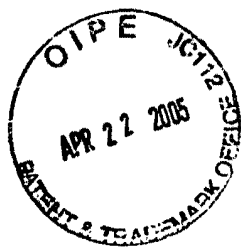
Date: _____

4/18/05

04/25/2005 MAHME1 00000001 09935993

01 FC:2251

60.00 OP



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED
AREA IMAGING DEVICES"

) Group Art Unit: 2613

) Examiner: RAO, A.

) SUPPLEMENTAL INFORMATION
) DISCLOSURE STATEMENT

<p style="text-align: center;">CERTIFICATE OF MAILING</p> <p>I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450 ON <u>4/18/05</u></p> <p style="text-align: center;">SHERIDAN ROSS P.C.</p> <p>BY: <u>Christine Jacques</u></p>
--

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The references cited on attached Form PTO-1449 are being called to the attention of the Examiner.

☒ Copies of the cited U.S. patents/patent application publications are not enclosed in accordance with the waivers dated July 11, 2003 and October 19, 2004, whereby patent applications filed, regardless of the filing date, need not submit copies of U.S. patents and U.S. patent application publications.

☒ Examiner's attention is drawn to the following co-pending applications, copies of which have been or are being submitted:

Serial No. 09/934,201 filed 8/21/2001

Submission of the above information is not intended as an admission that any item is citable under the statutes or rules to support a rejection, that any item disclosed represents analogous art, or that those skilled in the art would refer to or recognize the pertinence of any reference without the benefit of hindsight, nor should an inference be drawn as to the pertinence of the references based on the order in which they are presented. Submission of this statement should not be taken as an indication that a search has been conducted, or that no better art exists.

04/25/2005 MAHME1 00000001 09935993

02 FC:1806

180.00 0P

It is respectfully requested that the cited information be expressly considered during the prosecution of this application and the references made of record therein.

FEES

<input type="checkbox"/>	<p>37 CFR 1.97(b): No fee is believed due in connection with this submission, because the information disclosure statement submitted herewith is satisfies one of the following conditions ("X" indicates satisfaction):</p> <ul style="list-style-type: none"> <input type="checkbox"/> Within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d), or <input type="checkbox"/> Within three months of the date of entry into the national stage of an international application as set forth in 37 CFR 1.491 or <input type="checkbox"/> Before the mailing date of a first Office Action on the merits, or <input type="checkbox"/> Before the mailing of a first Office action after the filing of a request for continued examination under 37 CFR 1.114. <p>Although no fee is believed due, if any fee is deemed due in connection with this submission, please charge such fee to Deposit Account 19-1970.</p>
<input checked="" type="checkbox"/>	<p>37 CFR 1.97(c): The information disclosure statement transmitted herewith is being filed after all the above conditions (37 CFR 1.97(b)), but before the mailing date of one of the following conditions:</p> <ul style="list-style-type: none"> (1) a final action under 37 C.F.R. 1.113 or (2) a notice of allowance under 37 C.F.R. 1.311, or (3) an action that otherwise closes prosecution in the application. <p>This Information Disclosure Statement is accompanied by:</p> <ul style="list-style-type: none"> <input type="checkbox"/> A Certification (below) as specified by 37 C.F.R. 1.97(e). Although no fee is believed due, if any fee is deemed due in connection with this submission, please charge such fee to Deposit Account 19-1970. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> A check is enclosed in the amount of \$180.00 for the fee set forth in 37 C.F.R. 1.17(p) for submission of an information disclosure statement. Please credit any overpayment or charge any underpayment to Deposit Account 19-1970.
<input type="checkbox"/>	<p>37 CFR 1.97(d): This Information Disclosure Statement is being submitted after the period specified in 37 CFR 1.97(c).</p> <ul style="list-style-type: none"> <input type="checkbox"/> This information Disclosure Statement includes a Certification (below) as specified by 37 C.F.R. 1.97(e) <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> <input type="checkbox"/> Applicants hereby requests consideration of the reference(s) disclosed herein. Please charge Deposit Account 19-1970 in the amount of \$180.00 under 37 C.F.R. 1.17(p). Please credit any overpayment or charge any underpayment to Deposit Account 19-1970. Election to pay the fee should not be taken as an indication that applicant(s) cannot execute a certification.

Certification (37 C.F.R. 1.97(e))
(Applicable only if checked)

- ☐ The undersigned certifies that:
- ☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. 37 C.F.R. 1.97(e)(1).
 - ☐ A copy of the communication from the foreign patent office is enclosed.

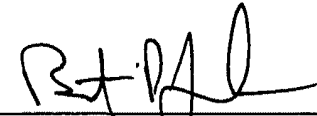
OR

- ☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this Information Disclosure Statement was known to any individual designated in 37 C.F.R. 1.56(c) more than three months prior to the filing of this statement. 37 C.F.R. 1.97(e)(2).

Respectfully submitted,

SHERIDAN ROSS P.C.

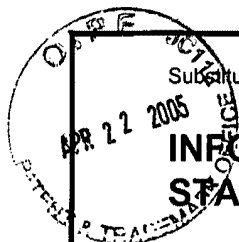
By: _____



Brent P. Johnson
Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

Date: _____

4/18/05



Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

Sheet

1

of

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Complete if Known

Application Number	09/935,993
Filing Date	August 23, 2001
First Named Inventor	ADAIR
Art Unit	2613
Examiner Name	RAO, A.
Attorney Docket Number	7018-23-CIP9

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number Number-kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	AA	US-6,452,626	9/17/2002	Adair et al.	
	AB	US-6,862,036	3/1/2005	Adair et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ³	Number ⁴	Kind Code ⁵ (if known)				
		PCT	-					
			-					
			-					
			-					
			-					
			-					
			-					
			-					

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

Examiner Initials*	Cite No. ¹	

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 09935993			
CLAIMS AS FILED - PART I									
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA		RATE	FEE	RATE	FEE		
BASIC FEE (37 CFR 1.16(a))				\$ _____		\$ _____			
TOTAL CLAIMS (37 CFR 1.16(c))				X \$ _____ =		X \$ _____ =			
INDEPENDENT CLAIMS (37 CFR 1.16(b))				X \$ _____ =		X \$ _____ =			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(d))				+ \$ _____ =		+ \$ _____ =			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL			
CLAIMS AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADDI- TIONAL FEE	RATE	ADDI- TIONAL FEE		
	Total (37 CFR 1.16(c))	Minus	"	X \$ _____ =	OR	X \$ _____ =	OR		
	Independent (37 CFR 1.16(b))	Minus	"	X \$ _____ =	OR	X \$ _____ =	OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))			+ \$ _____ =	OR	+ \$ _____ =	OR		
				TOTAL ADD'L FEE		TOTAL ADD'L FEE			
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADDI- TIONAL FEE	RATE	ADDI- TIONAL FEE		
	Total (37 CFR 1.16(c))	Minus	"	X \$ _____ =	OR	X \$ _____ =	OR		
	Independent (37 CFR 1.16(b))	Minus	"	X \$ _____ =	OR	X \$ _____ =	OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))			+ \$ _____ =	OR	+ \$ _____ =	OR		
				TOTAL ADD'L FEE		TOTAL ADD'L FEE			
AMENDMENT C	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADDI- TIONAL FEE	RATE	ADDI- TIONAL FEE		
	Total (37 CFR 1.16(c))	Minus	"	X \$ _____ =	OR	X \$ _____ =	OR		
	Independent (37 CFR 1.16(b))	Minus	"	X \$ _____ =	OR	X \$ _____ =	OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(d))			+ \$ _____ =	OR	+ \$ _____ =	OR		
				TOTAL ADD'L FEE		TOTAL ADD'L FEE			

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

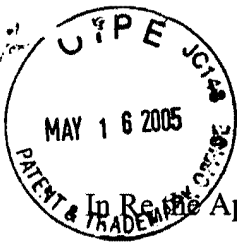
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED
AREA IMAGING DEVICES"

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

) Group Art Unit: 2613

)

) Examiner: RAO, A.

)

) SUPPLEMENTAL INFORMATION

) DISCLOSURE STATEMENT

)

)

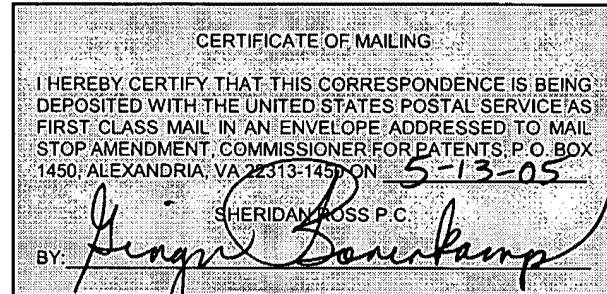
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Dear Sir:

The references cited on attached Form PTO-SB08 are being called to the attention of the Examiner.

☒ Copies of the 2 cited non-patent and/or 3 foreign references that are not labeled with an (*) are enclosed herewith.

☐ Copies of the cited U.S. patents and/or patent applications are enclosed herewith.

☐ Copies of the cited U.S. patents/patent application publications are not enclosed in accordance with the waiver dated July 11, 2003, whereby patent applications filed after June 30, 2003 and international applications that have entered the national stage under 35 U.S.C. § 371 after June 30, 2003 need not submit copies of U.S. patents and U.S. patent application publications.

☒ Copies of the references are not enclosed, in accordance with 37 C.F.R. 1.98(d), because the references were cited by or submitted to the U.S. Patent and Trademark Office in prior application Serial No. 09/638,976, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

☐ To the best of applicants' belief, the pertinence of the foreign-language references are believed to be summarized in the attached English abstracts and in the figures, although applicants do not necessarily vouch for the accuracy of the translation.

05/17/2005 RMEBRANT 00000019 09935993

01 FC:1806

180.00 OP

☐ Examiner's attention is drawn to the following co-pending applications, copies of which have been or are being submitted:

Serial No. _____ filed _____

Serial No. _____ filed _____

☐ Other: _____

Submission of the above information is not intended as an admission that any item is citable under the statutes or rules to support a rejection, that any item disclosed represents analogous art, or that those skilled in the art would refer to or recognize the pertinence of any reference without the benefit of hindsight, nor should an inference be drawn as to the pertinence of the references based on the order in which they are presented. Submission of this statement should not be taken as an indication that a search has been conducted, or that no better art exists.

It is respectfully requested that the cited information be expressly considered during the prosecution of this application and the references made of record therein.

FEES

<input type="checkbox"/>	<p>37 CFR 1.97(b): No fee is believed due in connection with this submission, because the information disclosure statement submitted herewith satisfies one of the following conditions ("X" indicates satisfaction):</p> <ul style="list-style-type: none"><input type="checkbox"/> Within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d), or<input type="checkbox"/> Within three months of the date of entry into the national stage of an international application as set forth in 37 CFR 1.491 or<input type="checkbox"/> Before the mailing date of a first Office Action on the merits, or<input type="checkbox"/> Before the mailing of a first Office action after the filing of a request for continued examination under 37 CFR 1.114. <p>Although no fee is believed due, if any fee is deemed due in connection with this submission, please charge such fee to Deposit Account 19-1970.</p>
<input checked="" type="checkbox"/>	<p>37 CFR 1.97(c): The information disclosure statement transmitted herewith is being filed after all the above conditions (37 CFR 1.97(b)), but before the mailing date of one of the following conditions:</p> <ul style="list-style-type: none">(1) a final action under 37 C.F.R. 1.113 or(2) a notice of allowance under 37 C.F.R. 1.311, or(3) an action that otherwise closes prosecution in the application. <p>This Information Disclosure Statement is accompanied by:</p> <ul style="list-style-type: none"><input type="checkbox"/> A Certification (below) as specified by 37 C.F.R. 1.97(e). Although no fee is believed due, if any fee is deemed due in connection with this submission, please charge such fee to Deposit Account 19-1970. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"><input checked="" type="checkbox"/> Enclosed please find a check in the amount of \$180.00 for the fee set forth in 37 C.F.R. 1.17(p) for submission of an information disclosure statement. Please credit any overpayment or charge any underpayment to Deposit Account 19-1970.

<input type="checkbox"/>	<p>37 CFR 1.97(d): This Information Disclosure Statement is being submitted after the period specified in 37 CFR 1.97(c).</p> <p><input type="checkbox"/> This information Disclosure Statement includes a Certification (below) as specified by 37 C.F.R. 1.97(e) AND</p> <p><input type="checkbox"/> Applicants hereby requests consideration of the reference(s) disclosed herein. Please charge Deposit Account 19-1970 in the amount of \$180.00 under 37 C.F.R. 1.17(p). Please credit any overpayment or charge any underpayment to Deposit Account 19-1970. Election to pay the fee should not be taken as an indication that applicant(s) cannot execute a certification.</p>
--------------------------	---

Certification (37 C.F.R. 1.97(e))
(Applicable only if checked)

☐ The undersigned certifies that:

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. 37 C.F.R. 1.97(e)(1).

☐ A copy of the communication from the foreign patent office is enclosed.

OR

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this Information Disclosure Statement was known to any individual designated in 37 C.F.R. 1.56(c) more than three months prior to the filing of this statement. 37 C.F.R. 1.97(e)(2).

Respectfully submitted,

SHERIDAN ROSS P.C.

By: 

Craig W. Mueller
Registration No. 52,055
1560 Broadway, Suite 1200
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	09/935,993
Filing Date	August 23, 2001
First Named Inventor	ADAIR
Art Unit	2613
Examiner Name	RAO, A.
Attorney Docket Number	7018-23-CIP10

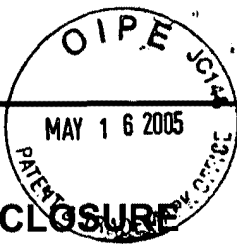
Sheet 1 of 2

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Examiner Initials*	Cite No. ¹	Document Number Number-kind Code ^{2 (if known)}	Publication Date MM-YYYY	Name of Patentee of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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		6,023,241	2-2000	Clapper et al.	
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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.



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**INFORMATION DISCLOSURE
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Sheet	2	of	2	Application Number	09/935,993
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Examiner Initials*	Cite No. ¹	Foreign Patent Document		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
		Country Code ²	Number ⁴ ; Kind Code ⁵ (if known)				
		DE	- 199 47 875	4/19/2001			
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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.



⑮ BUNDESREPUBLIK
DEUTSCHLAND



DEUTSCHES
PATENT- UND
MARKENAMT

⑫ **Offenlegungsschrift**
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⑤① Int. Cl. 7:
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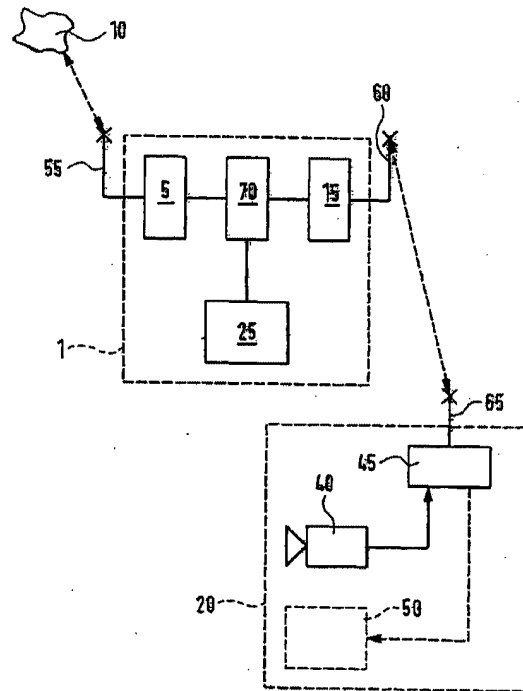
⑦② Erfinder:
Schange, Frank, 31135 Hildesheim, DE

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

Prüfungsantrag gem. § 44 PatG ist gestellt

⑤④ Telekommunikationsendgerät und Videomodul

⑤⑦ Es wird ein Telekommunikationsendgerät (1) und ein Videomodul (20) vorgeschlagen, die die Bildtelefonie für ein im wesentlichen herkömmliches Telekommunikationsendgerät ermöglichen. Das Telekommunikationsendgerät (1) ist insbesondere als Mobilfunkgerät ausgebildet und umfaßt eine Netzschnittstelle (5) zum Übertragen von ersten Videosignalen mit Videoinformationen zwischen dem Telekommunikationsendgerät (1) und einem Telekommunikationsnetz (10). Das Telekommunikationsendgerät (1) umfaßt weiterhin eine Videomodulschnittstelle (15) zum Übertragen von zweiten Videosignalen mit den Videoinformationen zwischen dem Telekommunikationsendgerät (1) und einem Videomodul (20). Das Videomodul (20) umfaßt eine Kamera (40). Es umfaßt weiterhin eine Telekommunikationsschnittstelle (45), über die von der Kamera (40) aufgezeichnete Videosignale mit Videoinformationen an ein Telekommunikationsendgerät (1) zur Absetzung an ein Telekommunikationsnetz (10) übertragbar sind.



DE 199 47 875 A 1

Beschreibung

Stand der Technik

Die Erfindung geht von einem Telekommunikationsendgerät und von einem Videomodul nach der Gattung der unabhängigen Ansprüche aus.

Aus der US 5 485 504 ist bereits ein Funktelefon bekannt, das eine Kamera zur Aufzeichnung von Videoinformationen und eine Anzeigevorrichtung zur Wiedergabe von Videoinformationen umfaßt, wobei die Videoinformationen zwischen dem Funktelefon und einem ISDN-Telekommunikationsnetz (Integrated Services Data Network) über B-Kanäle übertragen werden.

Ein Videomodul mit einer Kamera ist beispielsweise in Form eines Camcorders bekannt.

Vorteile der Erfindung

Das erfindungsgemäße Telekommunikationsendgerät mit den Merkmalen des unabhängigen Anspruchs 1 hat demgegenüber den Vorteil, daß eine Videomodulschnittstelle zum Übertragen von zweiten Videosignalen mit den Videoinformationen zwischen dem Telekommunikationsendgerät und einem externen Videomodul vorgesehen ist. Auf diese Weise ist es nicht erforderlich, das Telekommunikationsendgerät mit einer Kamera zur Aufzeichnung von Videoinformationen und mit einer Anzeigevorrichtung zur Wiedergabe von Videoinformationen zu versehen. Dies ist besonders bei als Mobilfunkgerät oder Mobiltelefon ausgebildeten Telekommunikationsendgeräten von Vorteil, bei denen eine besonders kleine Baugröße erreicht werden soll. Durch die Übertragung der zweiten Videosignale mit den Videoinformationen zwischen dem Telekommunikationsendgerät und einem externen Videomodul kann die Videofunktionalität mit Kamera und entsprechender Anzeigevorrichtung vom Telekommunikationsendgerät auf das externe Videomodul ausgelagert werden, so daß das Telekommunikationsendgerät als Modem für den Anschluß des Videomoduls an das Telekommunikationsnetz dient.

Ein weiterer Vorteil wird dadurch bewirkt, daß herkömmliche Telekommunikationsendgeräte mit wenig Aufwand und geringen Kosten durch Einbau der Videomodulschnittstelle videofähig gemacht werden können, um mit einem möglicherweise schon vorhandenen Videomodul Videosignale austauschen zu können.

Durch die in den Unteransprüchen aufgeführten Maßnahmen sind vorteilhafte Weiterbildungen und Verbesserungen des im unabhängigen Anspruch 1 angegebenen Telekommunikationsendgerätes möglich.

Besonders vorteilhaft ist es, wenn die ersten Videosignale den zweiten Videosignalen entsprechen und von der Videomodulschnittstelle transparent durchgereicht werden können. Auf diese Weise wird der Signalverarbeitungsaufwand im Telekommunikationsendgerät und damit Leistung eingespart, was besonders bei Mobilfunkgeräten oder Mobiltelefonen die Betriebsdauer bei Betrieb mit Akkumulatoren erhöht.

Ein weiterer Vorteil besteht darin, daß eine Anzeigevorrichtung vorgesehen ist, an der vom Videomodul empfangene Videoinformationen darstellbar sind. Auf diese Weise kann eine Anzeigevorrichtung für das Videomodul eingespart und eine sowieso am Telekommunikationsendgerät vorhandene Anzeigevorrichtung für die Darstellung von Videoinformationen genutzt werden, vorausgesetzt, die Anzeigevorrichtung des Telekommunikationsendgerätes ist videofähig.

Ein weiterer Vorteil besteht darin, daß die Videomodul-

schnittstelle drahtlos ist, so daß die Übertragung der zweiten Videosignale zwischen dem Telekommunikationsendgerät und dem Videomodul drahtlos, insbesondere über Funk, erfolgt. Auf diese Weise ist keine störende Kabelverbindung zwischen dem Telekommunikationsendgerät und der Videomodulschnittstelle erforderlich.

Ein weiterer Vorteil besteht darin, daß das Telekommunikationsendgerät einen Steckplatz aufweist, auf den das Videomodul aufsteckbar ist, um über Anschlußkontakte mit der Videomodulschnittstelle zu kontaktieren. Auf diese Weise wird die Funktionalität des Telekommunikationsendgerätes erhöht. Es läßt sich besonders einfach zu einem videofähigen Telekommunikationsendgerät aufrüsten, so daß kein neues, von vornherein videofähiges Telekommunikationsendgerät angeschafft werden muß. Der Benutzer kann sein bisheriges Telekommunikationsendgerät weiter benutzen und spart dadurch Kosten.

Das erfindungsgemäße Videomodul mit den Merkmalen des unabhängigen Anspruchs 8 hat den Vorteil, daß eine Telekommunikationsschnittstelle vorgesehen ist, über die von der Kamera aufgezeichnete Videosignale mit Videoinformationen an ein Telekommunikationsendgerät zur Absetzung an ein Telekommunikationsnetz übertragbar sind. Auf diese Weise läßt sich ein herkömmliches Videomodul lediglich durch Einbau einer Telekommunikationsschnittstelle besonders einfach netzfähig machen und über ein Telekommunikationsendgerät als Modem an das Telekommunikationsnetz anschließen. Die von der Kamera aufgezeichneten Videodaten können somit vom Videomodul an beliebige videofähige Teilnehmer des Telekommunikationsnetzes ohne wesentlichen Mehraufwand versendet werden.

Durch die in den Unteransprüchen aufgeführten Maßnahmen sind vorteilhafte Weiterbildungen und Verbesserungen des im unabhängigen Anspruch 8 angegebenen Videomoduls möglich.

Besonders vorteilhaft ist es, daß das Videomodul eine Anzeigevorrichtung aufweist, an der Videoinformationen darstellbar sind, die über die Telekommunikationsschnittstelle vom Telekommunikationsendgerät empfangen wurden. Auf diese Weise kann das Videomodul auch zu einem Empfänger von über das Telekommunikationsnetz versendeten Videoinformationen ausgebaut werden und sowohl als Videosignalquelle als auch als Videosignalsenke dienen. Die Funktionalität des Videomoduls wird somit erhöht.

Ein weiterer Vorteil besteht darin, daß das Videomodul über die Telekommunikationsschnittstelle empfangene Videoinformationen zumindest teilweise an das Telekommunikationsendgerät zur Darstellung an einer Anzeigevorrichtung des Telekommunikationsendgerätes überträgt, wenn die Videoinformationen nicht vollständig am Videomodul wiedergebbar sind. Auf diese Weise kann das Videomodul zur Darstellung von empfangenen Videoinformationen eine bereits vorhandene Anzeigevorrichtung des Telekommunikationsendgerätes nutzen und erfordert somit keine eigene Anzeigevorrichtung oder lediglich eine einfache Anzeigevorrichtung, an der die Videoinformationen nicht vollständig wiedergebbar sind. Auf diese Weise kann Aufwand beim Videomodul eingespart werden.

Ein weiterer Vorteil besteht darin, daß das Videomodul über Anschlußkontakte auf einen Steckplatz des Telekommunikationsendgerätes aufsteckbar ist. Auf diese Weise läßt sich ein herkömmliches Telekommunikationsendgerät besonders einfach zu einem videofähigen Telekommunikationsendgerät und somit zu einem Bildtelefon aufrüsten.

Zeichnung

Ausführungsbeispiele der Erfindung sind in der Zeich-

nung dargestellt und in der nachfolgenden Beschreibung näher erläutert. Es zeigen Fig. 1 eine erste Ausführungsform eines erfindungsgemäßen Telekommunikationsendgerätes und eines erfindungsgemäßen Videomoduls in Form eines Blockschaltbildes und Fig. 2 eine zweite Ausführungsform des erfindungsgemäßen Telekommunikationsendgerätes und des erfindungsgemäßen Videomoduls in einem Blockschaltbild.

Beschreibung der Ausführungsbeispiele

In Fig. 1 kennzeichnet 1 ein Telekommunikationsendgerät, das schnurgebunden oder drahtlos ausgebildet sein kann. Bei Ausbildung als drahtloses Telekommunikationsendgerät kann es sich beispielsweise um ein Mobiltelefon oder ein Schnurlostelefon handeln. Im folgenden soll der Fall beschrieben werden, daß das Telekommunikationsendgerät 1 als Mobiltelefon ausgebildet ist. Das Mobiltelefon 1 umfaßt eine Netzschnittstelle 5, an die eine erste Sende-/Empfangsantenne 55 angeschlossen ist und die Sende- und Empfangsschaltkreise zum Senden und Empfangen von Signalen über ein Telekommunikationsnetz 10 umfaßt, wobei das Telekommunikationsnetz 10 im beschriebenen Ausführungsbeispiel als Funktelekommunikationsnetz ausgebildet ist. Das Mobiltelefon 1 umfaßt ferner eine Videomodulschnittstelle 15, an die eine zweite Sende-/Empfangsantenne 60 angeschlossen ist und die Sende- und Empfangsschaltkreise zum Austausch von Videoinformationen mit einem Videomodul 20 umfaßt. Sowohl die Videomodulschnittstelle 15 als auch die Netzschnittstelle 5 sind an eine Auswerteeinheit 70 angeschlossen, die auch mit einer ersten Anzeigevorrichtung 25 verbunden ist.

Das Videomodul 20 umfaßt eine Telekommunikationsschnittstelle 45, an die eine Videoaufnahmeverrichtung 40 angeschlossen ist, die im folgenden beispielhaft als Kamera ausgebildet sein soll. Optional kann das Videomodul 20 eine zweite Anzeigevorrichtung 50 umfassen, die dann ebenfalls an die Telekommunikationsschnittstelle 45 angeschlossen und in Fig. 1 gestrichelt dargestellt ist. An die Telekommunikationsschnittstelle 45 ist außerdem eine dritte Sende-/Empfangsantenne 65 angeschlossen.

In Fig. 1 sind nur die für die Funktion der Erfindung erforderlichen Bauelemente des Mobiltelefons 1 und des Videomoduls 20 dargestellt. Weitere, für den Betrieb des Mobiltelefons 1 und des Videomoduls 20 erforderliche Bauelemente sind aus Gründen der Übersichtlichkeit in Fig. 1 nicht dargestellt.

Im folgenden wird die Funktionsweise des erfindungsgemäßen Mobiltelefons 1 beschrieben. Dabei prüft die Auswerteeinheit 70, ob vom Funktelekommunikationsnetz 10 in der Netzschnittstelle 5 Videosignale mit Videoinformationen empfangen wurden. Ist dies der Fall, so veranlaßt die Auswerteeinheit 70 die Videomodulschnittstelle 25 zum Absenden weiterer Videosignale mit den Videoinformationen über die zweite Sende-/Empfangsantenne 60 an das Videomodul 20. Dabei können die in der Netzschnittstelle 5 vom Funktelekommunikationsnetz 10 empfangenen Videosignale mit den Videoinformationen von der Videomodulschnittstelle 15, veranlaßt durch die Auswerteeinheit 70, transparent und damit ohne Formatumwandlung durchgereicht und von der zweiten Sende-/Empfangsantenne 60 an das Videomodul 20 abgestrahlt werden. Dies ist jedoch nur möglich, wenn für den Austausch von Videosignalen zwischen dem Funktelekommunikationsnetz 10 und dem Mobiltelefon 1 das gleiche Videosignalformat verwendbar ist, wie für den Austausch von Videosignalen zwischen dem Mobiltelefon 1 und dem Videomodul 20. Andernfalls, d. h. bei unterschiedlichem Videosignalformat veranlaßt die Aus-

werteeinheit 70 die Videomodulschnittstelle 15 zur Umwandlung des Videosignalformats der vom Funktelekommunikationsnetz 10 in der Netzschnittstelle 5 empfangenen Videosignale in das Videosignalformat für die Übertragung der Videoinformationen zum Videomodul 20.

Die Telekommunikationsschnittstelle 45 prüft nun, ob die vom Mobiltelefon 1 über die dritte Sende-/Empfangsantenne 65 empfangenen Videoinformationen am Videomodul 20 darstellbar sind, d. h. ob die zweite Anzeigevorrichtung 50 vorhanden ist. Ist dies der Fall, so prüft die Telekommunikationsschnittstelle 45, ob die vom Mobiltelefon 1 empfangenen Videoinformationen vollständig an der zweiten Anzeigevorrichtung 50 darstellbar sind. Ist dies der Fall, so werden die vom Mobiltelefon 1 empfangenen Videoinformationen vollständig an der zweiten Anzeigevorrichtung 50, die beispielsweise als Flüssigkristallanzeige ausgebildet sein kann, wiedergegeben. Andernfalls, d. h. wenn die zweite Anzeigevorrichtung 50 nicht vorhanden ist oder keine vollständige Wiedergabe der empfangenen Videoinformationen ermöglicht, sendet die Telekommunikationsschnittstelle 45 über die dritte Sende-/Empfangsantenne 65 die nicht am Videomodul 20 wiedergebbaren Videoinformationen zum Mobiltelefon 1 mit einer entsprechenden Kennung zurück. Die vom Videomodul 20 solchermaßen an das Mobiltelefon 1 gesandten Videoinformationen mit der Kennung werden über die zweite Sende-/Empfangsantenne 60 empfangen und an die Videomodulschnittstelle 15 weitergeleitet. Anhand der Kennung erkennt die Auswerteeinheit 70, daß die vom Videomodul 20 empfangenen Videoinformationen dort nicht wiedergebar sind und veranlaßt deren Wiedergabe an der ersten Anzeigevorrichtung 25 des Mobiltelefons 1, die ebenfalls als Flüssigkristallanzeige ausgebildet sein kann.

Wenn in der Auswerteeinheit 70 bekannt ist, daß das Videomodul 20 keine Anzeigevorrichtung oder nur eine Anzeigevorrichtung aufweist, die keine vollständige Wiedergabe der vom Funktelekommunikationsnetz 20 ausgesandten Videoinformationen ermöglicht, so können die vom Funktelekommunikationsnetz 10 in der Netzschnittstelle 5 empfangenen Videoinformationen auch gleich an der ersten Anzeigevorrichtung 25 zur Wiedergabe gebracht werden, ohne an das Videomodul 20 versendet zu werden.

Die wiederzugebenden und vom Funktelekommunikationsnetz 10 abgesetzten Videoinformationen werden somit vom Signalpfad zum Videomodul 20 auf die erste Anzeigevorrichtung 25 des Mobiltelefons 1 umgeleitet.

Auch von der Kamera 40 aufgezeichnete Videoinformationen können mit einer entsprechenden Kennung von der Telekommunikationsschnittstelle 45 versehen und über die dritte Sende-/Empfangsantenne 65 an das Mobiltelefon 1 versendet werden. Dort werden diese Videoinformationen mit der zugehörigen Kennung von der zweiten Sende-/Empfangsantenne 60 empfangen und an die Videomodulschnittstelle 15 weitergeleitet. Die Auswerteeinheit 70 erkennt anhand der Kennung, daß die empfangenen Videoinformationen von der Kamera 40 aufgezeichnet wurden und kann zu Kontrollzwecken eine Wiedergabe an der ersten Anzeigevorrichtung 25 veranlassen. Eine Wiedergabe zu Kontrollzwecken kann auch bereits die Telekommunikationsschnittstelle 45 an der zweiten Anzeigevorrichtung 50 veranlassen, wenn diese am Videomodul 20 vorhanden ist. Die Wiedergabe der von der Kamera 40 aufgezeichneten Videoinformationen ermöglicht eine bessere Ausrichtung der vorzugsweise beweglich am Videomodul 20 angeordneten Kamera 40, damit der gewünschte Bildausschnitt eingestellt werden kann. Die Auswerteeinheit 70 veranlaßt weiterhin die Netzschnittstelle 5 zur Übertragung der von der Kamera 40 aufgezeichneten und von der Videomodulschnittstelle 15 emp-

fangenen Videoinformationen an einen oder mehrere Teilnehmer des Funktelekommunikationsnetzes 10, dessen Rufnummer oder deren Rufnummern an einer in Fig. 1 nicht dargestellten Eingabeeinheit, beispielsweise einer Zehnertastatur, des Mobiltelefons 1 eingegeben wurden.

Bei gleichem VideosignalfORMAT für die Übertragung von Videosignalen zwischen dem Funktelekommunikationsnetz 10 und dem Mobiltelefon 1 sowie für die Übertragung von Videosignalen zwischen dem Mobiltelefon 1 und dem Videomodul 20 veranlaßt die Auswerteeinheit 70 die Videomodulschnittstelle 15 zur transparenten Durchreichung der vom Videomodul 20 empfangenen Videosignale mit den von der Kamera 40 aufgezeichneten Videoinformationen zur Netzschnittstelle 5, die diese dann über die erste Sende-/Empfangsantenne 55 an das Funktelekommunikationsnetz 10 absetzt. Für den Fall unterschiedlicher VideosignalfORMate für die Übertragung von Videosignalen zwischen dem Funktelekommunikationsnetz 10 und dem Mobiltelefon 1 und für die Übertragung zwischen dem Mobiltelefon 1 und dem Videomodul 20 veranlaßt die Auswerteeinheit 70 die Videomodulschnittstelle 15 zur Umwandlung des FORMats der vom Videomodul 20 empfangenen Videosignale mit den von der Kamera 40 aufgezeichneten Videoinformationen in das für die Übertragung vom Mobiltelefon 1 zum Funktelekommunikationsnetz 10 erforderliche VideosignalfORMAT. Die Auswerteeinheit 70 veranlaßt dann die Netzschnittstelle 5 zur Abstrahlung von Videosignalen mit den von der Kamera 40 aufgezeichneten Videoinformationen in dem von der Videomodulschnittstelle 15 umgewandelten VideosignalfORMAT an das Funktelekommunikationsnetz 10.

Die zwischen dem Funktelekommunikationsnetz 10 und dem Mobiltelefon 1 ausgetauschten Videosignale sollen im folgenden als erste Videosignale und die zwischen dem Mobiltelefon 1 und dem Videomodul 20 ausgetauschten Videosignale als zweite Videosignale bezeichnet werden. Bei Verwendung der Funkübertragung gemäß Fig. 1 zwischen dem Mobiltelefon 1 und dem Videomodul 20 ist es sinnvoll, wenn die ersten Videosignale und die zweiten Videosignale in jeweils einem unterschiedlichen Funkfrequenzbereich übertragen werden, damit keine gegenseitige Beeinflussung der ersten und der zweiten Videosignale stattfindet.

Statt der Funkübertragung zwischen dem Mobiltelefon 1 und dem Videomodul 20 kann auch eine optische Übertragung, beispielsweise in einem Infrarotwellenlängenbereich, vorgesehen sein, wobei in diesem Fall die Videomodulschnittstelle 15 und die Telekommunikationsschnittstelle 45 jeweils einen optischen Sendeempfänger aufweisen. Diese Sendeempfänger können bei Verwendung eines Infrarotwellenlängenbereichs beispielsweise jeweils gemäß dem IRDA-Standard (Infrared-Data-Association) ausgebildet sein.

Es kann weiterhin vorgesehen sein, statt einer wie bisher beschriebenen drahtlosen Verbindung zwischen dem Mobiltelefon 1 und dem Videomodul 20 eine drahtgebundene Verbindung vorzusehen. Die Videomodulschnittstelle 15 des Mobiltelefons 1 und die Telekommunikationsschnittstelle 45 des Videomoduls 20 sind dann über Kabel miteinander verbunden. Dazu können die Videomodulschnittstelle 15 und die Telekommunikationsschnittstelle 45 jeweils ein Anschlußmodul gemäß dem RS-232-Standard umfassen, das zum Anschluß des entsprechenden Verbindungskabels an das Mobiltelefon 1 bzw. an das Videomodul 20 dient.

Das Anschlußmodul gemäß dem RS-232-Standard ist eine serielle Schnittstelle, wie sie auch für den Anschluß von Komponenten an einen Personal Computer üblich ist.

In Fig. 2 ist ein weiteres Ausführungsbeispiel dargestellt, bei dem gleiche Bezugszeichen gleiche Elemente kennzeichnen wie in Fig. 1. Dabei ist das Videomodul 20 draht-

gebunden an das Mobiltelefon 1 angeschlossen, wobei das Videomodul 20 über Anschlußkontakte 35 auf einen Steckplatz 30 des Mobiltelefons 1 aufgesteckt ist. Über die Anschlußkontakte 35 kontaktiert dabei die Telekommunikationsschnittstelle 45 des Videomoduls 20 mit der Videomodulschnittstelle 15 des Mobiltelefons 1. Die Anschlußkontakte 35 können dabei sowohl am Videomodul 20 als auch am Mobiltelefon 1 in einer dem Fachmann bekannten Weise ausgebildet sein und eine Steckverbindung zwischen dem Videomodul 20 und dem Mobiltelefon 1 ermöglichen, die ein Herausfallen des Videomoduls 20 aus dem Mobiltelefon 1 verhindert.

Durch das auf das Mobiltelefon 1 aufgesteckte Videomodul 20 wird das Mobiltelefon 1 zu einem vollwertigen Bildtelefon erweitert. Über die erste Sende-/Empfangsantenne 55 sind dabei nach wie vor die ersten Videosignale zwischen dem Funktelekommunikationsnetz 10 und dem Mobiltelefon 1 austauschbar.

Es kann zusätzlich vorgesehen sein, in entsprechender Weise den Videosignalen zugeordnete Audiosignale zusammen mit den Videosignalen zwischen dem Funktelekommunikationsnetz 10 und dem Mobiltelefon 1 bzw. zwischen dem Mobiltelefon 1 und dem Videomodul 20 zu übertragen. Eine Wiedergabe der den Videosignalen zugeordneten Audiosignale ist dann durch einen oder mehrere Lautsprecher am Videomodul 20 und/oder einen oder mehrere Lautsprecher am Mobiltelefon 1 möglich. Der bzw. die Lautsprecher sind in Fig. 1 und in Fig. 2 nicht dargestellt und bezüglich des Mobiltelefons 1 an der Auswerteeinheit 70 und bezüglich des Videomoduls 20 an der Telekommunikationsschnittstelle 45 anzuschließen.

Es kann weiterhin vorgesehen sein, am Videomodul 20 ein in Fig. 1 und Fig. 2 nicht dargestelltes Mikrofon zur Tonaufnahme vorzusehen und an die Telekommunikationsschnittstelle 45 anzuschließen. Das Mikrofon zeichnet dann Audiosignale in Zuordnung zu den von der Kamera 40 aufgezeichneten Videosignalen synchron mittels einer in den Fig. 1, 2 nicht dargestellten Steuerung auf. Diese werden dann zusammen mit den Videosignalen in der beschriebenen Weise zum Mobiltelefon 1 und von dort zum Funktelekommunikationsnetz 10 übertragen, wobei am Mobiltelefon 1 eine Kontrolle der aufgezeichneten Audiosignale mittels eines oder mehrerer Lautsprecher erfolgen kann, die an die Auswerteeinheit 70 anzuschließen sind.

Im Videomodul 20 kann weiterhin ein in Fig. 1 und Fig. 2 nicht dargestellter Speicher vorgesehen sein, der von der Kamera 40 aufgezeichnete Videosignale vor der Übertragung an das Mobiltelefon 1 zwischenspeichert, um beispielsweise eine Anpassung der Übertragungsrate an eine für die Übertragung der Videosignale zum Mobiltelefon 1 bzw. zum Funktelekommunikationsnetz 10 zur Verfügung stehende Bandbreite zu ermöglichen. Die ersten und die zweiten Videosignale werden vorzugsweise in digitaler Form übertragen und im Mobiltelefon 1 und im Videomodul 20 verarbeitet. Desweiteren ist es möglich, die zwischengespeicherte Videoinformation in ein digitales Photoformat (z. B. JPEG) zu wandeln und die somit erzeugten Digital-Photos im Videomodul 20 zwischenzuspeichern oder über das Mobiltelefon 1 zum Funktelekommunikationsnetz 10 zu übertragen.

Das erfindungsgemäße Telekommunikationsendgerät 1 kann zusammen mit dem Videomodul 20 für die Video- oder Bildtelefonie eingesetzt werden und während einer Telekommunikationsverbindung Videosequenzen des Benutzers des Telekommunikationsendgerätes 1 an einen gewünschten Zielteilnehmer des Telekommunikationsnetzes 10 übertragen, sofern dieser Zielteilnehmer auch videofähig ist. Das erfindungsgemäße Telekommunikationsendgerät kann zu-

sammen mit dem Videomodul 20 als digitaler Photoapparat verwendet werden. Die digitalen Photos können im Speicher des Videomoduls 20 abgelegt werden oder aber vorzugsweise zum Funktelekommunikationsnetz 10 übertragen werden und in entsprechend verbundenem Massenspeicher abgelegt werden. 5

Das erfindungsgemäße Telekommunikationsendgerät 1 kann bei Ausbildung als Mobiltelefon gemäß dem GSM-Standard (Global System for Mobile Communications) oder gemäß dem UMTS-Standard (Universal Mobile Telecommunication System) ausgebildet sein. Bei Ausbildung des Telekommunikationsendgerätes 1 als Schnurlostelefon kann der DECT-Standard (Digital European Cordless Telecommunication) zugrundegelegt sein. Bei Ausbildung als drahtgebundenes Telekommunikationsendgerät kann der ISDN-Standard (Integrated Services Data Network) zugrundegelegt sein. 15

Patentansprüche

1. Telekommunikationsendgerät (1), insbesondere Mobilfunkgerät, mit einer Netzschnittstelle (5) zum Übertragen von ersten Videosignalen mit Videoinformationen zwischen dem Telekommunikationsendgerät (1) und einem Telekommunikationsnetz (10), **dadurch gekennzeichnet**, daß eine Videomodulschnittstelle (15) zum Übertragen von zweiten Videosignalen mit den Videoinformationen zwischen dem Telekommunikationsendgerät (1) und einem externen Videomodul (20) vorgesehen ist. 20
2. Telekommunikationsendgerät (1) nach Anspruch 1, dadurch gekennzeichnet, daß die ersten Videosignale den zweiten Videosignalen entsprechen und von der Videomodulschnittstelle (15) transparent durchgereicht werden. 25
3. Telekommunikationsendgerät (1) nach Anspruch 1, dadurch gekennzeichnet, daß die Videomodulschnittstelle (15) eine Formatumwandlung zwischen den ersten Videosignalen und den zweiten Videosignalen durchführt. 30
4. Telekommunikationsendgerät (1) nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß eine Anzeigevorrichtung (25) vorgesehen ist, an der vom Videomodul (20) empfangene Videoinformationen darstellbar sind. 35
5. Telekommunikationsendgerät (1) nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß die Videomodulschnittstelle (15) drahtlos ist, so daß die Übertragung der zweiten Videosignale zwischen dem Telekommunikationsendgerät (1) und dem Videomodul (20) drahtlos, insbesondere über Funk, erfolgt. 40
6. Telekommunikationsendgerät (1) nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß die Videomodulschnittstelle (15) drahtgebunden ist, so daß die Übertragung der zweiten Videosignale zwischen dem Telekommunikationsendgerät (1) und dem Videomodul (20) drahtgebunden erfolgt. 45
7. Telekommunikationsendgerät (1) nach Anspruch 6, dadurch gekennzeichnet, daß das Telekommunikationsendgerät (1) einen Steckplatz (30) aufweist, auf den das Videomodul (20) aufsteckbar ist, um über Anschlußkontakte (35) mit der Videomodulschnittstelle (15) zu kontaktieren. 50
8. Videomodul (20) mit einer Kamera (40), dadurch gekennzeichnet, daß eine Telekommunikationsschnittstelle (45) vorgesehen ist, über die von der Kamera (40) aufgezeichnete Videosignale mit Videoinformationen an ein Telekommunikationsendgerät (1) zur Absetzung 55

- an ein Telekommunikationsnetz (10) übertragbar sind.
9. Videomodul (20) nach Anspruch 8, dadurch gekennzeichnet, daß eine Anzeigevorrichtung (50) vorgesehen ist, an der Videoinformationen darstellbar sind, die über die Telekommunikationsschnittstelle (45) vom Telekommunikationsendgerät (1) empfangen wurden.
 10. Videomodul (20) nach Anspruch 8 oder 9, dadurch gekennzeichnet, daß das Videomodul (20) über die Telekommunikationsschnittstelle (45) empfangene Videoinformationen zumindest teilweise an das Telekommunikationsendgerät (1) zur Darstellung an einer Anzeigevorrichtung (25) des Telekommunikationsendgerätes (1) überträgt, wenn die Videoinformationen nicht vollständig am Videomodul (20) wiedergebar sind.
 11. Videomodul (20) nach Anspruch 8, 9 oder 10, dadurch gekennzeichnet, daß die Telekommunikationsschnittstelle (45) drahtlos ist.
 12. Videomodul (20) nach Anspruch 8, 9 oder 10, dadurch gekennzeichnet, daß die Telekommunikationsschnittstelle (45) drahtgebunden ist.
 13. Videomodul (20) nach Anspruch 12, dadurch gekennzeichnet, daß das Videomodul (20) über Anschlußkontakte (35) auf einen Steckplatz (30) des Telekommunikationsendgerätes (1) aufsteckbar ist.

Hierzu 1 Seite(n) Zeichnungen

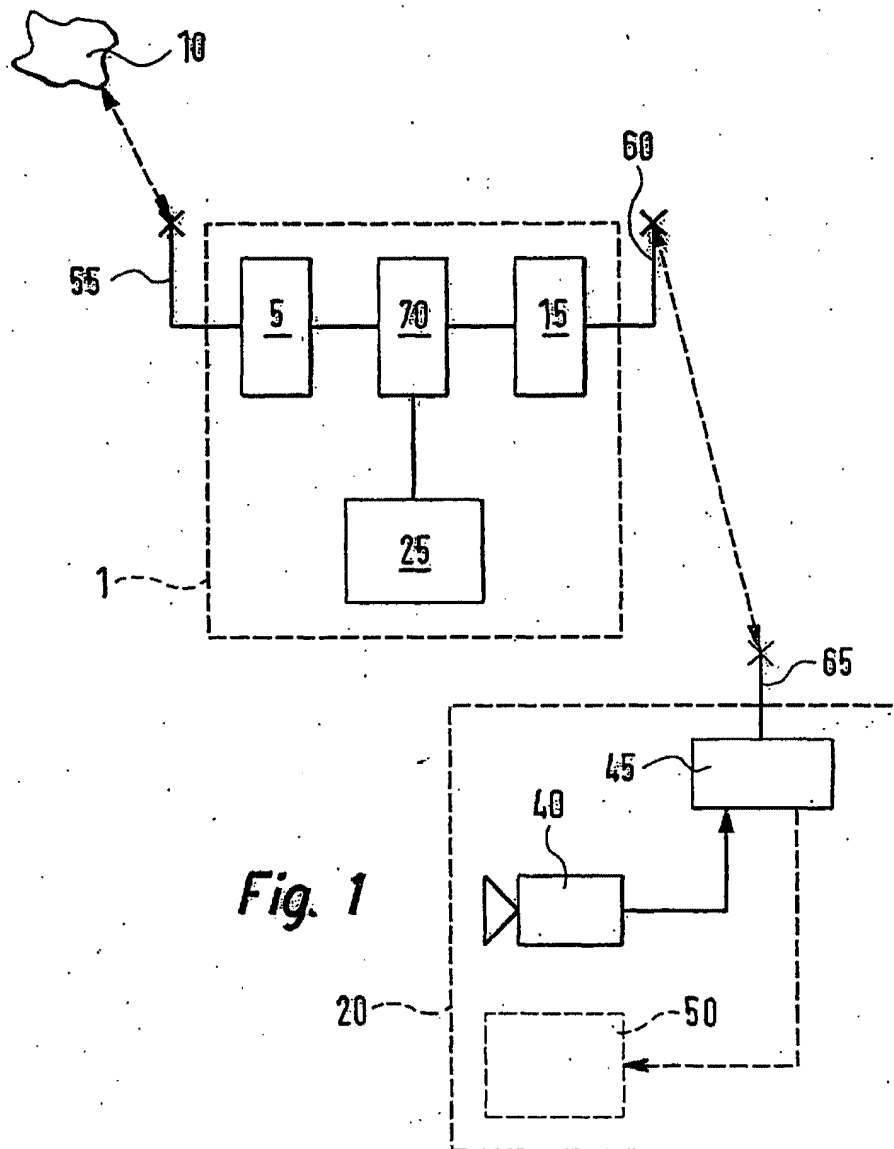


Fig. 1

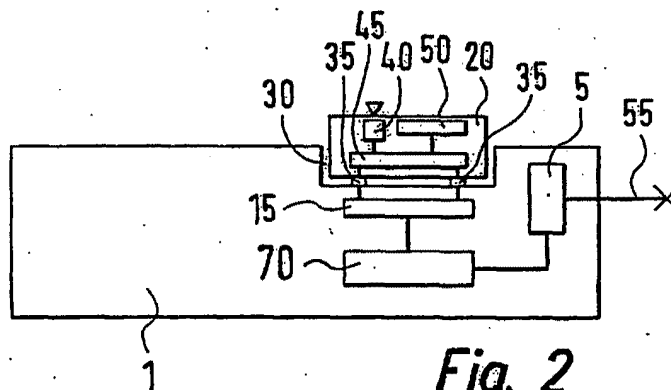


Fig. 2

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- Bernstein, Lawrence J.,
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(54) **A CMOS active pixel digital camera**

(57) An image sensor device comprising a silicon substrate having a plurality of CMOS circuit formed thereon, including a pixel array having a plurality of rows and a plurality of columns, a row addressing circuit operatively connected to each the pixel array and the timing control circuit, the row addressing circuit having a row bus that provides address lines to each row in the pixel array, a column addressing circuit, a pixel timing circuit, a timing control logic block, a signal processing circuit, and an interface circuit coupled to external computational means for provision of address and control signals to the sensor device, the interface circuit being operatively coupled the timing control logic, the pixel timing circuit, the row addressing circuit and the column addressing circuit.

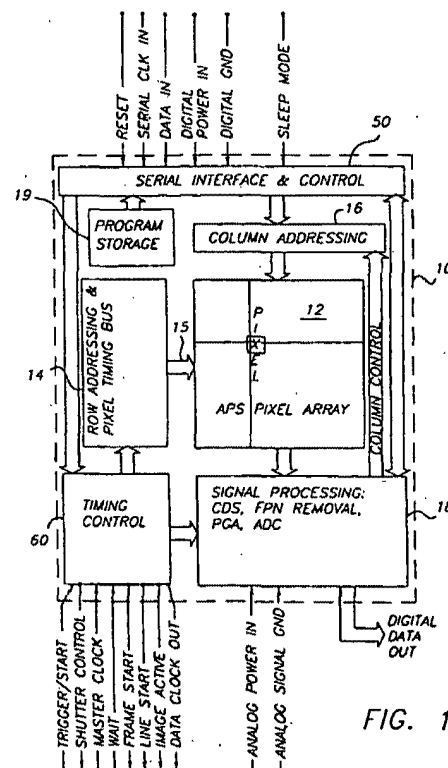


FIG. 1

EP 0 932 302 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 20 0052

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A	NAKAMURA J ET AL: "ON-FOCAL-PLANE SIGNAL PROCESSING FOR CURRENT-MODE ACTIVE PIXEL SENSORS" IEEE TRANSACTIONS ON ELECTRON DEVICES,US,IEEE INC. NEW YORK, vol. 44, no. 10, 1 October 1997 (1997-10-01), pages 1747-1758, XP000703889 ISSN: 0018-9383 * figure 13 *	1-10	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 December 2000	Examiner De Paepe, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)



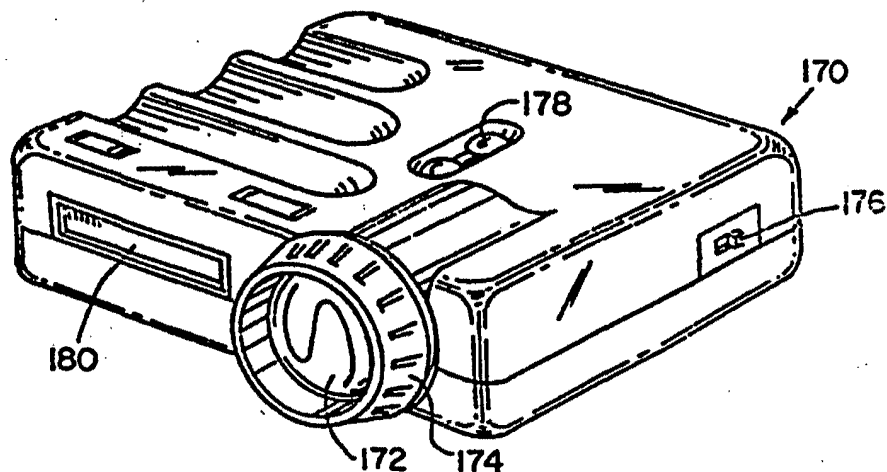
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US97/20171		haven Lane, San Jose, CA 95121 (US). RICHARD, Alan [US/US]; 20 Melanie Lane, Wrentham, MA 02093 (US). CHERN, Wen-Foo [US/US]; 28 Country Corners, Wayland, MA 01778 (US). (74) Agents: HOOVER, Thomas, O. et al.; Hamilton, Brook, Smith & Reynolds, P.C., Two Militia Drive, Lexington, MA 02173 (US). (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
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08/741,671 31 October 1996 (31.10.96) US 08/766,607 13 December 1996 (13.12.96) US 08/810,646 3 March 1997 (03.03.97) US 08/838,420 7 April 1997 (07.04.97) US 08/853,630 9 May 1997 (09.05.97) US 08/855,909 14 May 1997 (14.05.97) US 08/884,485 27 June 1997 (27.06.97) US 08/942,272 30 September 1997 (30.09.97) US			
(63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application			
US 08/942,272 (CIP) Filed on 30 September 1997 (30.09.97)			
(71) Applicant (for all designated States except US): KOPIN CORPORATION [US/US]; 695 Myles Standish Boulevard, Taunton, MA 02780 (US).			
(72) Inventors; and			
(75) Inventors/Applicants (for US only): JACOBSEN, Jeffrey [US/US]; 501 Tevis Trail, Hollister, CA 95023 (US). FAN, John, C., C. [US/US]; 881 West Roxbury Parkway, Chesnut Hill, MA 02167 (US). POMBO, Stephen, A. [US/US]; 976 Harrison Avenue, Campbell, CA 95008 (US). ZAVRACKY, Matthew [US/US]; 20 Grove Street, Plympton, MA 02367 (US). BUMGARDNER, Rodney [US/US]; 3366 Methil-			
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(54) Title: MICRODISPLAY FOR PORTABLE COMMUNICATION SYSTEM

(57) Abstract

The invention relates to a microdisplay system that utilizes a small high resolution active matrix liquid crystal display with an illumination system and a magnifying optical system to provide a display for a portable communication device. A handset for the communication system incorporates the display for use as, for example, a wireless telephone or paging device. The small display can provide a high resolution color image at low power thus providing for portable battery powered operation.



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INTERNATIONAL SEARCH REPORT

Intr lonal Application No

PCT/US 97/20171

A. CLASSIFICATION OF SUBJECT MATTER

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M G09G H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 486 946 A (JACHIMOWICZ ET AL) 23 January 1996	1,4,7, 12-14, 30,33, 36,41, 43,84 73,76-83
Y	see column 3, line 34 - column 11, line 9; figures 1-10	
A		15-29, 44-58, 85-104

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

12 November 1998

Date of mailing of the international search report

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Delangue, P

INTERNATIONAL SEARCH REPORT

Inter. Appl. No.

PCT/US 97/20171

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	see page 2 - page 14; figures 1-9	2,3,6,9, 12,14, 31,32, 34-36, 38,41, 43,100
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A	see column 4, line 14 - line 41; figures 1-5	1,2,7, 12-14, 30,31, 36,41, 43,84
Y	EP 0 631 289 A (SONY CORP) 28 December 1994 see column 1, line 5 - line 11 see column 5, line 47 - column 6, line 18 see column 7, line 55 - column 11, line 12; figures 1-5	59
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A	see column 4, line 61 - column 8, line 18; figures 1-9	68
X	EP 0 704 788 A (AT & T CORP) 3 April 1996	62
A	see column 2, line 55 - column 5, line 30; figures 1-6	68
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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/20171

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 96 24197 A (MOTOROLA INC) 8 August 1996 see page 4, line 15 - page 10, line 15; figures 1-8 ---	62 68
P,X	GB 2 308 486 A (NOKIA MOBILE PHONES LTD) 25 June 1997 see the whole document ---	1,2,4,7, 10,13, 30,31, 33,36, 39-44,84
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 97/20171

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-58,73-104

Electro-optic packaging of an LCD microdisplay for the purpose of miniaturization in a portable electronic equipment

2. Claims: 59-61

Display control circuit for the purpose of selecting a video or an inverted video signal to be sent to the display

3. Claims: 62-72

Docking system for a telephone with interconnecting means for the purpose of transmitting image data from the telephone to a display integrated in the docking station

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/20171

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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UNITED STATES DEPARTMENT OF COMMERCE
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NOTICE OF ALLOWANCE AND FEE(S) DUE

22442 7590 07/13/2005
SHERIDAN ROSS PC
1560 BROADWAY
SUITE 1200
DENVER, CO 80202

EXAMINER

RAO, ANAND SHASHIKANT

ART UNIT PAPER NUMBER

2613

DATE MAILED: 07/13/2005

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10	1949

TITLE OF INVENTION: HAND-HELD COMPUTERS INCORPORATING REDUCED AREA IMAGING DEVICES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$1000	10/13/2005

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
- B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
- B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

22442 7590 07/13/2005

SHERIDAN ROSS PC
1560 BROADWAY
SUITE 1200
DENVER, CO 80202

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10	1949

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APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$1000	10/13/2005

EXAMINER	ART UNIT	CLASS-SUBCLASS
RAO, ANAND SHASHIKANT	2613	348-158000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

- ☐ A check in the amount of the fee(s) is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
 NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

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09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10	1949
22442	7590	07/13/2005	EXAMINER	
SHERIDAN ROSS PC 1560 BROADWAY SUITE 1200 DENVER, CO 80202			RAO, ANAND SHASHIKANT	
			ART UNIT	PAPER NUMBER
			2613	

DATE MAILED: 07/13/2005

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 726 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 726 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571) 272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

Notice of Allowability

Application No.

09/935,993

Examiner

Andy S. Rao

Applicant(s)

ADAIR ET AL.

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on.
2. ☒ The allowed claim(s) is/are 1-81 and 86-87 (respectively renumbered as claims 1-83).
3. ☒ The drawings filed on 23 August 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 5/16/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

ANDY RAO
PRIMARY EXAMINER

Allowable Subject Matter

1. Claims 1-81, and 86-87 are allowed.

Independent claims 1, 18, 22, 27, 32, 37, 42, 46, 50, 54, 58, 62, 66, 70, and 74 are directed towards a PDA including a specifically recited camera module characterized by being “a camera module housing an image sensor therein, said image sensor including an array of pixels for receiving images thereon, said image sensor further including circuitry means on said first plane and coupled to said array of pixels for timing and control of said array of pixels, said image sensor producing a pre-video signal, a first circuit board mounted in said camera module adjacent said image sensor and electrically coupled to said image sensor, said first circuit board including circuitry means for converting said pre-video signal to a desired video format, said camera module further including a transceiver radio element mounted therein and electrically communicating with said first circuit board to transmit said converted pre-video signal...” which is a feature that is not anticipated nor obvious over the art of record. Independent claims 78 and 80 recite a method including a PDA usage method including “removing the camera from connection with the PDA; pointing the camera module at a targeted object and selectively taking video images of the targeted object; and wirelessly transmitting...” as in the claim. Independent claims 86 and 87 recite a PDA with a dual camera battery/charging circuit and PDA battery/charging circuit configuration which is not anticipated nor obvious over the art of record. Dependent claims 2-17, 19-21, 23-26, 28-31, 33-36, 38-41, 43-45, 47-49, 51-53, 55-57, 59-61, 63-65, 67-69, 71-73, 75-77, 79, and 81 are allowed for the reasons concerning the independent claims.

Art Unit: 2613

Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy S. Rao whose telephone number is (571)-272-7337. The examiner can normally be reached on Monday-Friday 8 hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad S. Dastouri can be reached on (571)-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Andy S. Rao
Primary Examiner
Art Unit 2613

asr
July 11, 2005

ANDY RAO
PRIMARY EXAMINER

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

MAY 16 2005

Complete If Known

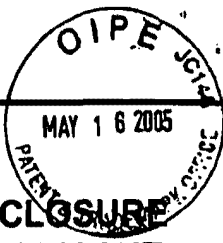
Sheet	1	of	2	Application Number	09/935,993
				Filing Date	August 23, 2001
				First Named Inventor	ADAIR
				Art Unit	2613
				Examiner Name	RAO, A.
				Attorney Docket Number	7018-23-CIP10

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number Number-kind Code ² (if known)	Publication Date MM-YYYY	Name of Patentee of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
AK		6,147,366	11-2000	Drott et al.	
		6,023,241	2-2000	Clapper et al.	
		6,154,254	11-2000	Hankins et al.	
		6,141,037	10-2000	Upton et al.	
		6,037,034	06-2000	Jacobsen et al.	
		4,928,300	05-2000	Ogawa et al.	
		5,900,875	05-1999	Haitani et al.	
		5,983,073	11-1999	Ditzik	
		6,009,336	12-1999	Harris et al.	
		6,018,670	01-2000	Degenhardt	
		6,067,313	05-2000	Cafarella et al.	
		6,658,272	12-2003	Lenchick et al.	
		6,172,950	01-2001	Robb	
		6,561,669	05-2003	Naghi et al.	
		5,711,013	01-1998	Collett et al.	
		6,417,882	07-2002	Manhat-Shetti	
		5,748,411	05-1998	Loritz et al.	
		5,801,919	09-1998	Griencewic	
		5,929,901	07-1999	Adair et al.	
		5,612,732	03-1997	Yuyama et al.	
		6,370,282	04-2002	Pavely et al.	
↓		6,730,900	05-2004	Hsish et al.	

Examiner Signature		Date Considered	7/10/05
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.



Substitute for form 1449A/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT***Complete if Known*

Application Number	09/935,993
Filing Date	August 23, 2001
First Named Inventor	ADAIR
Art Unit	2613
Examiner Name	RAO, A.
Attorney Docket Number	7018-23-CIP10

Sheet	2	of	2
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FOREIGN PATENT DOCUMENTS


Examiner Initials*	Cite No. ¹	Foreign Patent Document Country Code ² ; Number ³ ; Kind Code ⁴ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
AK		DE - 199 47 875	4/19/2001			
		EP - 0 492 349 A 1*	1/7/1992			
		EP - 0 932 302	7/28/1999			
		EP - 0 957 448 A2*	11/17/1999			
		PCT - 97/26744*	7/24/1997			
		PCT - 98/19435	5/7/1998			
		-				

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

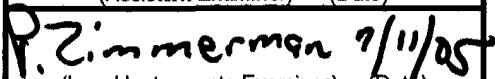
Examiner Initials*	Cite No. ¹	
AR		"Active-Pixel Image Sensor Integrated with Readout Circuits"; NASA Tech Briefs, October 1996.
		"Applications Hold the Key to Imager Choice"; Photonics Spectra, March 1997.
		"CMOS Image Sensors Challenge CCDs", MICRODESIGN RESOURCES, June 22, 1998, MICROPROCESSOR REPORT, pp. 1-5.
		"Imaging Options Expand with CMOS Technology"; Laser Focus World, June 1997.
		"NASA's Tiny Camera Has a Wide-Angle Future"; Business Week, March 6, 1995.
		"Silicon Eyes", Business Week, pp. 94-100, October 12, 1998.
		Hsieh et al.; "Low-Power parallel Video Compression Architecture for a Single-Chip Digital CMOS Camera"; Journal of VLSI Signal Processing; Vol. 21, 1999; pps. 195-207.
		Tariq et al.; "Robust and Scalable Matching Pursuits Video Transmission Using the Bluetooth Air Interface Standard"; IEEE Transactions on Consumer Electronics; Vol. 46(3); 2000; pps. 673-81.

Examiner Signature		Date Considered	7/10/05
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Issue Classification 	Application/Control No.	Applicant(s)/Patent under Reexamination	
	09/935,993	ADAIR ET AL.	
	Examiner	Art Unit	
	Andy S. Rao	2613	

ISSUE CLASSIFICATION										
ORIGINAL					CROSS REFERENCE(S)					
CLASS	SUBCLASS				CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
348	158				455	556				
INTERNATIONAL CLASSIFICATION										
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 (Assistant Examiner) (Date)		ANDY RAO PRIMARY EXAMINER Andy Rao (Primary Examiner)		Total Claims Allowed: 83 O.G. Print Claim(s) 1 O.G. Print Fig. 1	
P. Zimmerman 7/11/05 (Legal Instruments Examiner) (Date)		7/10/05 (Date)			

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant										<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	31	31	61	61		91		121		151		181		
2	2	32	32	62	62		92		122		152		182		
3	3	33	33	63	63		93		123		153		183		
4	4	34	34	64	64		94		124		154		184		
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6	6	36	36	66	66		96		126		156		186		
7	7	37	37	67	67		97		127		157		187		
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27	27	57	57		87		117		147		177		207		
28	28	58	58		88		118		148		178		208		
29	29	59	59		89		119		149		179		209		
30	30	60	60		90		120		150		180		210		

Index of Claims



Application/Control No.

09/935,993

Examiner

Andy S. Rao

Applicant(s)/Patent under Reexamination

ADAIR ET AL.

Art Unit

2613

✓	Rejected
=	Allowed

-	(Through numeral) Cancelled
+	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date									
Final	Original	7/11/05									
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Claim		Date									
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Search Notes

Application/Control No.

09/935,993

Examiner

Andy S. Rao

Applicant(s)/Patent under
Reexamination

ADAIR ET AL.

Art Unit

2613

SEARCHED

Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner
348	50-400	7/9/2005	AR
455	500-600	7/10/2005	AR
382	300-320	7/10/2005	AR

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
Inventor Name search: #08/638,976, #09/175,685, #09/934,201	7/9/2005	AR

[illegible]

Andy S. Rao

2613

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner
345	320-360	7/9/2005	AR

[illegible]



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BIBDATASHEET

CONFIRMATION NO. 1949

Bib Data Sheet

SERIAL NUMBER 09/935,993	FILING DATE 08/23/2001 RULE	CLASS 348	GROUP ART UNIT 2613	ATTORNEY DOCKET NO. 7018-23-CIP10
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APPLICANTS

Edwin L. Adair, Castle Pines Village, CO;
 Jeffrey L. Adair, Highlands Ranch, CO;
 Randall S. Adair, Denver, CO;

** CONTINUING DATA *****

This application is a CIP of 09/638,976 08/15/2000 PAT 6,424,369
 which is a CIP of 09/496,312 02/01/2000 PAT 6,275,255
 which is a CON of 09/175,685 10/20/1998 PAT 6,043,839
 which is a CIP of 08/944,322 10/06/1997 PAT 5,929,901

** FOREIGN APPLICATIONS *****

IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** SMALL ENTITY **
 ** 09/10/2001

Foreign Priority claimed 35 USC 119 (a-d) conditions met Verified and Acknowledged	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> yes <input checked="" type="checkbox"/> no Met after Allowance Examiner's Signature Initials	STATE OR COUNTRY CO	SHEETS DRAWING 14	TOTAL CLAIMS 87	INDEPENDENT CLAIMS 21
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ADDRESS
 22442
 SHERIDAN ROSS PC
 1560 BROADWAY
 SUITE 1200
 DENVER, CO
 80202

TITLE
 Hand-held computers incorporating reduced area imaging devices

FILING FEE RECEIVED 1678	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit
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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail**

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
(571) 273-2885

or **Fax**

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

22442

7590

07/13/2005

SHERIDAN ROSS PC

1560 BROADWAY

SUITE 1200

DENVER, CO 80202 07/13/2005 HGUTEMAZ 00000017 09935993

02 FE:2504

300.00 OP

03 FC:8001

30.00 OP

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Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Christine Jacquet (Depositor's name)
 Christine Jacquet (Signature)
 10/7/05 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10	1949

TITLE OF INVENTION: HAND-HELD COMPUTERS INCORPORATING REDUCED AREA IMAGING DEVICES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$1000	10/13/2005

EXAMINER	ART UNIT	CLASS-SUBCLASS
RAO, ANAND SHASHIKANT	2613	348-158000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. SHERIDAN ROSS PC
 2. _____
 3. _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☒ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
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4b. Payment of Fee(s):

- ☒ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 19-1978 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

Date

Typed or printed name

Registration No.

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

the Application of:

ADAIR, et al.

Serial No.: 09/935,993

Filed: August 23, 2001

Atty. File No.: 7018-23-CIP10

For: "HAND-HELD COMPUTERS
INCORPORATING REDUCED
AREA IMAGING DEVICES"

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

) Group Art Unit: 2613

) Examiner: RAO, A.

) COMMENTS ON STATEMENT OF
) REASONS FOR ALLOWANCE

CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS
BEING DEPOSITED WITH THE UNITED STATES
POSTAL SERVICE AS FIRST CLASS MAIL IN AN
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PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450
ON 10/7/05

SHERIDAN ROSS P.C.

BY: Christine Jacques

Dear Sir:

In the Examiner's Reasons for Allowance, the Examiner has generally characterized certain features of the present invention. However, based upon the number of independent claims allowed, the Examiner's Reasons for Allowance should not be interpreted as an exhaustive explanation of each of the elements claimed in the independent claims. Furthermore, it should be understood that the Examiner's general characterization of the claims and the elements therein should not be construed to mean that each independent claim contains each of the elements listed by the Examiner. Thus, to the extent the Examiner is generally opining upon allowability of the claims based on some features of the invention, then Applicant agrees that some of the specific elements listed contribute to the patentability of the claimed invention.

Respectfully submitted,

SHERIDAN ROSS P.C.

By: Brent P. Johnson

Registration No. 38,031
1560 Broadway, Suite 1200
Denver, Colorado 80202-5141
(303) 863-9700

Date: 10/7/05



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,993	08/23/2001	Edwin L. Adair	7018-23-CIP10	1949
22442	7590	01/19/2006	EXAMINER	
SHERIDAN ROSS PC 1560 BROADWAY SUITE 1200 DENVER, CO 80202			RAO, ANAND SHASHIKANT	
			ART UNIT	PAPER NUMBER
			2613	

DATE MAILED: 01/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.



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09/935993

APPLICATION NO/ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
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EXAMINER

ART UNIT	PAPER
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20060118

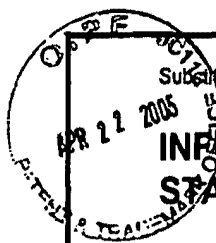
DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

ANDY RAO
PRIMARY EXAMINER

Andy S. Rao
Primary Examiner
Art Unit: 2613



Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Complete if Known	
				Application Number	09/935,993
				Filing Date	August 23, 2001
				First Named Inventor	ADAIR
				Art Unit	2613
				Examiner Name	RAO, A.
Sheet	1	of	1	Attorney Docket Number	7018-23-CIP9

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number Number-kind Code ^{2/3/4/5/6/7}	Publication Date MM-DD-YYYY	Name of Patentee of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
AK	AA	US-6,452,626	9/17/2002	Adair et al.	
AK	AB	US-6,862,036	3/1/2005	Adair et al.	

FOREIGN PATENT DOCUMENTS								
Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T*
		Country Code ³ ; Number ⁴ ; Kind Code ⁵ (if known)						
		PCT	-					
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OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)		
Examiner Initials*	Cite No. ¹	

Examiner Signature		A. RAO	Date Considered	7/13/05
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.



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BIBDATASHEET

CONFIRMATION NO. 1949

Bib Data Sheet

SERIAL NUMBER 09/935,993	FILING DATE 08/23/2001 RULE	CLASS 348	GROUP ART UNIT 2613	ATTORNEY DOCKET NO. 7018-23-CIP10
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APPLICANTS

Edwin L. Adair, Castle Pines Village, CO;
 Jeffrey L. Adair, Highlands Ranch, CO;
 Randall S. Adair, Denver, CO;

** CONTINUING DATA *****

This application is a CIP of 09/538,976 08/15/2000 PAT 6,424,369
 which is a CIP of 09/496,312 02/01/2000 PAT 6,275,255
 which is a CON of 09/175,685 10/20/1998 PAT 6,043,839
 which is a CIP of 08/944,322 10/06/1997 PAT 5,929,901

** FOREIGN APPLICATIONS *****

IF REQUIRED, FOREIGN FILING LICENSE GRANTED
 ** 09/10/2001

** SMALL ENTITY **

Foreign Priority claimed 35 USC 119 (a-d) conditions met Verified and Acknowledged	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> yes <input checked="" type="checkbox"/> no Met after Allowance Examiner's Signature Initials	STATE OR COUNTRY CO	SHEETS DRAWING 14	TOTAL CLAIMS 87	INDEPENDENT CLAIMS 21
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TITLE
 Hand-held computers incorporating reduced area imaging devices

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