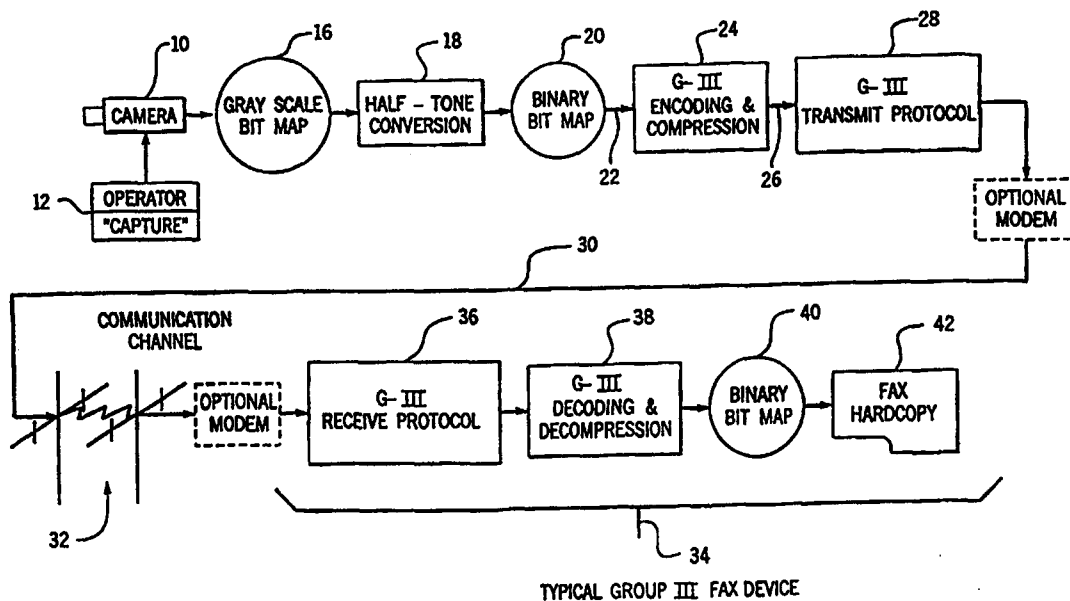




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(54) Title: APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM



(57) Abstract

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

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

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BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

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

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DISCUSSION OF THE PRIOR ART

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

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

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

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Still video equipment has recently become available from vendors such as Kodak, Canon and Sony, and is again primarily used by the television and print media, although applications are expanding rapidly in such areas as insurance investigations and real estate transactions. A still video camera captures a full color still video image that can be reproduced using a special video printer

that converts the still video image data into hard copy form. For applications requiring communication of the still video image, transmit/receive units are available wherein the image begins and ends as a video image.

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

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

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

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

SUMMARY OF THE INVENTION

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

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

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

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

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

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

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

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