Description

AN AIRCRAFT SURVEILLANCE SYSTEM

This invention relates to an aircraft surveillance system.

It is an aim of the present invention to provide an aircraft surveillance system which can be used to survey the inside of an aircraft during an emergency such for example as a hijack or which can be used to survey land or objects outside the aircraft such for example as a border sheltering terrorists.

Accordingly, this invention provides an aircraft surveillance system comprising an aircraft, at least one closed circuit slow scan television camera which is positioned in the aircraft and which is for surveying a predetermined area, first transducer means which is positioned in the aircraft and which is for converting video signals from the camera into audio signals, first transceiver means which is positioned in the aircraft and which is for transmitting the audio signals from the first transducer means and for receiving command signals, second transceiver means which is positioned in a command base remote from the aircraft and which is for receiving the audio signals from the first transceiver means and for sending the command signals, second transducer means which is positioned in the command base and which is for converting the audio signals received by the second transceiver means into video signals, and at least one television monitor for providing a visual display consequent upon receiving the video signals from the second transducer means.

The aircraft surveillance system of the invention is especially useful for surveying the inside of an aircraft during a hijack. When a hijack occurs, the hijackers invariably inform ground control that they have hijacked the aircraft and, with the surveillance system of the present invention, it is only necessary for the ground control to issue an appropriate command signal to cause the camera to operate and to cause pictures of the hijack to be transmitted back to a television monitor in ground control. The transmitted pictures can be enlarged as may be desired, for example to ascertain the identity of a hijacker and/or whether or not the hijacker has a real gun, grenade or the like or whether the gun, grenade or the like is an imitation device. It will thus be apparent, that by the time the aircraft is forced to land at its destination determined by the hijacker, ground control will be in a good position to know exactly what action to take.

The aircraft surveillance system of the invention is also of a special use for surveying land. In this case, the aircraft will usually be a slow flying aircraft such for example as a helicopter, as opposed to a passenger flying aircraft. Pictures of the land can be relayed to a command base and the pictures may help to establish the position of terrorists, escaped prisoners or the like on the land.

The pictures can be displayed as black and white or colour pictures.

The command base will usually be a ground command base but, if desired, the command base could be in another aircraft, a ship or a vehicle.

The command signals will usually be start-up signals for initiating operation of the aircraft surveillance system. However, if desired, the start-up signals may be other signals for actuating the commencement of other desired functions.

The first and the second transceiver means may be substantially identical pieces of equipment.

The first transducer means will usually convert the video signals from the camera to audio signals on cassette tape. The audio signals will usually be transmitted from the aircraft to the command base as radio signals. For example, the audio signals may be transmitted on normal aircraft radio frequencies such for example as the aircraft Mayday frequency.

Advantageously, the first transducer means and the first transceiver means are housed together in a single piece of equipment. Similarly, the second transducer means and the second transceiver means are also advantageously housed together in a single piece of equipment. Such single pieces of equipment can be arranged to be mobile or static.

The transducer means and the transceiver means are advantageously in the form of a single piece of equipment known as IBSONSCAN II. The IBSONSCAN II is manufactured and sold by Ibsonmain Limited, of Uxbridge, Middlesex, England. Other equipment can of course by used if desired.

Preferably, the first and the second transceiver means record on to tape so that they have a playback facility for helping repeated surveillance of an area or an object in that area.

Usually, the first and the second transceiver means will have a rewind facility.

Any appropriate camera may be employed. Examples of cameras that may be employed are those manufactured by Ademco,Philips and Norbane. The cameras may be positioned where desired and appropriate in the aircraft. For example, for a passenger aircraft there will usually be one camera positioned in the cockpit together with a number of other cameras positioned in the passenger, accommodation of the aircraft, the actual number of cameras employed being dependent upon the size of the passenger accommodation. For a jumbo jet, it is envisaged that at least four cameras will be required for the passenger accommodation, whilst it is envisaged that a minimum of two cameras will be required for the passenger accommodation of a Boeing 737 or a Boeing 757.

The cameras will usually be connected to the aircraft TPU power circuit to ensure that the power to the cameras cannot easily be switched off. Indeed, it is desirable that the entire aircraft surveillance system is such that it cannot by switched on or off or otherwise generally interferred with by aircraft personnel so that, in the event that the hijackers should know that they are being filmed, they cannot instruct the aircraft personnel to switch off the aircraft surveillance system.

The cameras can be positioned at random

positions in the same type of aircraft if desired in order that hijackers cannot easilly know the location of the cameras. The cameras can also be concealed where possible, for example in overhead compartments, again so that their presence cannot easily be established.

Preferably, the aircraft surveillance system is such that the TV monitor has a picture hold facility.

The aircraft surveillance system may be one which has a visual display facility only, the signals passing from the aircraft to the command base then being signals which are only for permitting the visual display. Alternatively, the aircraft surveillance system may be one which has a visual display facility and also a speech facility, the signals passing from the aircraft to the command base then being first signals which permit the visual display and second signals which permit the speech.

An embodiment of the invention will now be described solely by way of example and with reference to the accompanying drawing which shows in diagrammatic form an aircraft surveillance system.

Referring to the drawing, there is shown an aircraft surveillance system 2 comprising an aircraft 4 and four closed circuit slow scan television cameras 6 which are positioned in the aircraft 4 and which are for surveying predetermined areas in the aircraft 4 such for example as the cockpit area and the passenger areas. One camera 6 will be employed for surveying each predetermined area.

The aircraft surveillance system 2 also comprises first transducer means 8 which is positioned in the aircraft 4 and which is for converting video signals from the cameras 6 into audio signals. First transceiver means 10 is positioned in the aircraft 4 and is for transmitting the audio signals from the first transducer means 8 and for receiving command signals.

The aircraft surveillance system 2 also comprises second transceiver means 12 which is positioned in a command base 14 remote from the aircraft 4 and which is for receiving audio signals from the first transceiver means 10 and for sending the command signals. The command base 14 is also provided with second transducer means 16 which is for converting the audio signals received by the second transceiver means 12 into video signals. A television monitor 18 is linked to the second transducer means 16 for providing a visual display consequent upon receiving the video signals from the second transducer means 16.

The cameras 6 are controlled by a control device 20 which is activated by receiving appropriate control signals from the first transducer means 8. The control device 20 can be used to make the cameras 6 pan, tilt, zoom or perform other functions. The control device 20 can also be used to activate lights or perform other control functions.

The first transducer means 8 and the first transceiver means 10 are advantageously formed together in a single housing as a single piece of equipment 22. Similarly, the second transceiver means 12 and the second transducer means 16 are advantageously formed together in a single housing as a single piece of equipment 24. The equipment 22,24 is advantageously the equipment referred to above and known as IBSONSCAN II. The equipment 22,24 is such that it enables the pictures to be set as a continuous series of still pictures, updated every twenty two seconds, through standard voice frequency radio channels. The equipment 22 is able to take a television frame from the television cameras 6, convert the video signals to audio signals, record then, dial the command base 14, make a security check, and send the pictures, if desired accompanied by the time, date, source and any other required information. The equipment 24 is able to receive the signals from the equipment 22, make a security check, accept the signals, and record the signals, The equipment 24 contemporaneously restores the signal to a video mode and allows the picture to be displayed on the television monitor 18, together with any other transmitted information such for example as the above mentioned time, date and source.

The equipment 22,24 can control the entire aircraft surveillance system 2 and the transmitting equipment by sending up to sixty four separate instructions. If a poor connection is made, the equipment 22 can be instructed to rewind and replay its recording of an entire sequence. The equipment 24 can receive an entire transmission and it also has the facility to enable a single frame to be held on the television monitor 18. An entire transmission can be played back later for analysis and hard copying if desired.

It is envisaged that the aircraft surveillance system 2 will be especially useful for dealing with hijack situations and also for enabling aircraft border patrols to spot terroriste.

It is to be appreciated that the embodiment of the invention described above with reference to the accompanying drawing has been given by way of example only and that modifications may be effected. Thus, for example, more or less than the illustrated four cameras 6 may be employed, and more than one television monitor 18 may also be employed. Also, the cameras 6 could be directed outside an aircraft to survey a predetermined area such as a border or a coastline.

Claims

1. An aircraft surveillance system comprising an aircraft, at least one closed circuit slow scan television camera which is positioned in the aircraft and which is for surveying a predetermined area, first transducer means which is positioned in the aircraft and which is for converting video signals from the camera into audio signals, first transceiver means which is positioned in the aircraft and which is for transmitting the audio signals from the first transducer means and for receiving command signals, second transceiver means which is positioned in a command base remote from the aircraft and which is for receiving the audio signals from the first transceiver means and for

sending the command signals, second transducer means which is positioned in the command base and which is for converting the audio signals received by the second transceiver means into video signals, and at least one television monitor for providing a visual display consequent upon receiving the video signals from the second transducer means.

2. An aircraft surveillance system according to claim 1 in which the first transducer means is for converting the video signals from the camera to audio signals on cassette tape.

3. An aircraft surveillance system according to claim 1 or claim 2 in which the first transducer means and the first transceiver means are housed together in a single piece of equipment, and in which the second transducer means and the second transceiver means are also housed together in a single piece of equipment.

4. An aircraft surveillance system according to any one of the preceding claims in which the first and the second transceiver means record on to tape so that they have a play back facility for helping repeated surveillance of an area of an object in that area.

5. An aircraft surveillance system according to any one of the preceding claims in which the first and the second transceiver means have a rewind facility.

6. An aircraft surveillance system according to any one of the preceding claims in which the television monitor has a picture hold facility.

7. An aircraft surveillance system according to any one of the preceding claims and which has a visual display facility only, the signals passing from the aircraft to the command base then being signals which are only for permitting the visual display.

8. An aircraft surveillance system according to any one of claims 1 - 6 and which has a visual display facility and also a speech facility, the signals passing from the aircraft to the command base then being first signals which permit the visual display and second signals which permit the speech.

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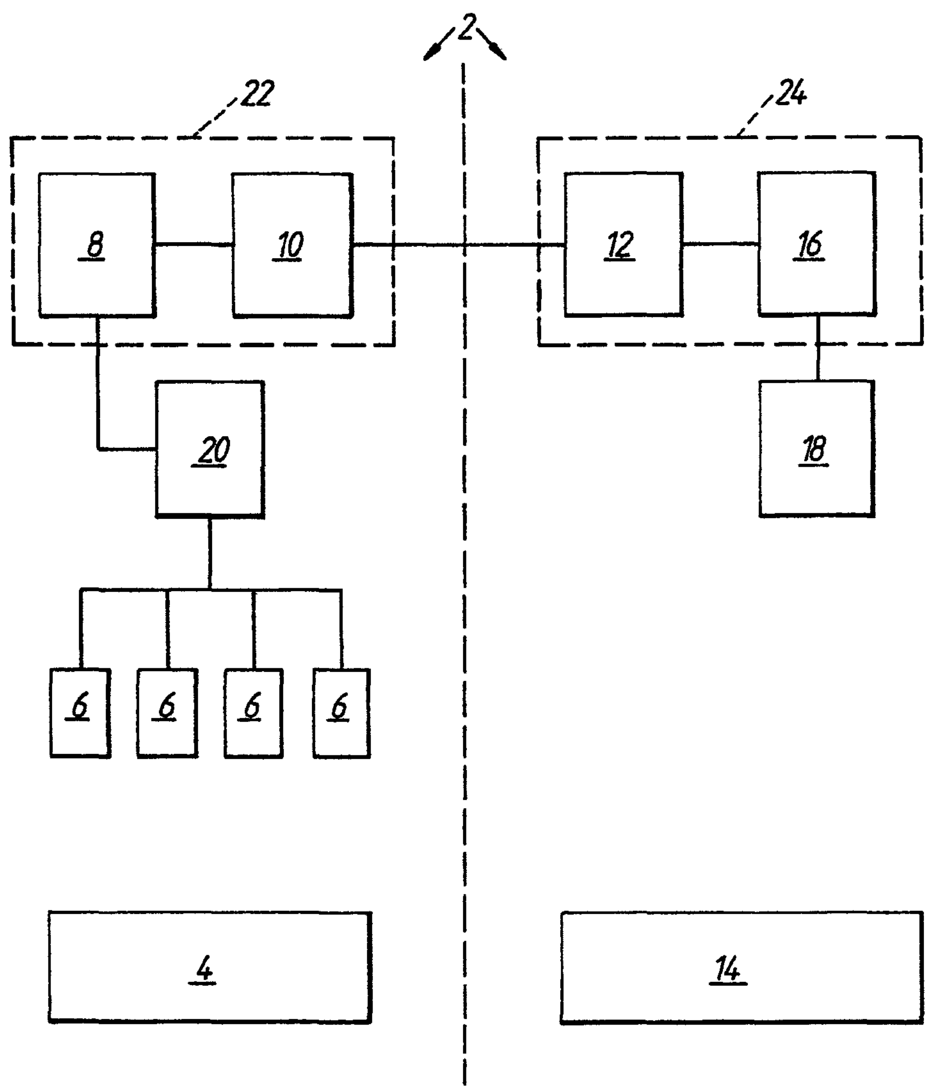

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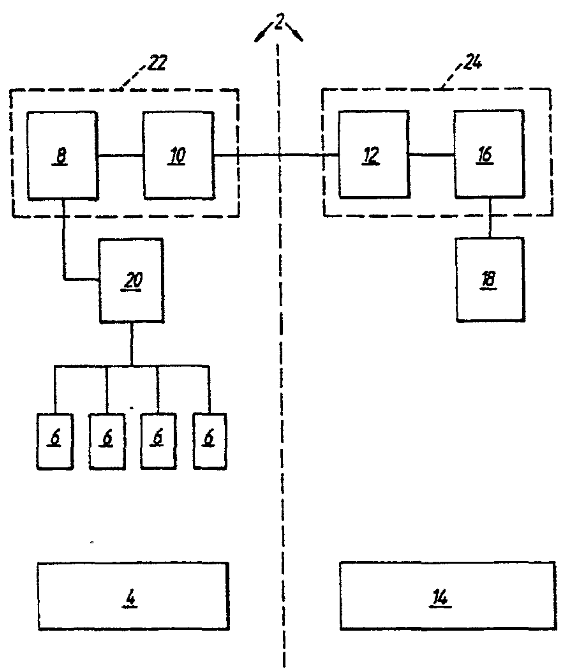
(54) **An aircraft surveillance system.**

(57) An aircraft surveillance system (2) comprising an aircraft (4), at least one closed circuit slow scan television camera (6) which is positioned in the aircraft (4) and which is for surveying a predetermined area, first transducer means (8) which is positioned in the aircraft (4) and which is for converting video signals from the camera (6) into audio signals, first transceiver means (10) which is positioned in the aircraft (4) and which is for transmitting the audio signals from the first transducer means (8) and for receiving command signals, second transceiver means (12) which is positioned in a command base (14) remote from the aircraft (4) and which is for receiving the audio signals from the first transceiver means (10) and for sending the command signals, second transducer means (16) which is positioned in the command base (14) and which is for converting the audio signals received from the second transceiver means (12) into video signals, and at least one television monitor (18) for providing a visual display consequent upon receiving the video signals from the second transducer means (16).



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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	EP-A-0 137 320 (ATIS) * Page 3, line 33 - page 4, line 33; figure 1 *	1-7	G 08 B 13/18
Y	EP-A-0 028 933 (ASCOTTS LTD) * Page 4, line 23 - page 5, line 29; figure 1 *	1-7	
A	CH-A- 651 984 (DUCROT) * Whole document *	1,8	
A	FR-A-2 551 240 (ARPHI) * Abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			G 08 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22-11-1988	SGURA S.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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(54) Infrared vehicle identification system.

(57) An infrared vehicle identification system [109] comprising a microprocessor controlled infrared (IR) transmnitter [112] located on an aircraft nose wheel landing strut [111] and an infrared receiver [128] including a microprocessor [44] enclosed in a plurality of edge light assemblies [20] located along surface pathways of an airport including runways and taxiways. The infrared transmitter [112] comprises an array of light emitting diodes [120] (LEDs) arranged in a semicircle within the horizontal plane. The transmitter [112] emits a plurality of fields [121, Fig.13] of encoded data to provide vehicle identification and position information. One field [122] comprises a steady stream of pulses that allows the IR receiver [128] to calculate the baud rate of the transmitter [112] and automatically adjust its internal timing. The other fields include a unique word [123] for marking the beginning of a message, the number [124] of characters in the message, the' vehicle identification number [125], the vehicle position [126] and a checksum [127]. The latter [127] ensures that a complete and correct message has been received. If the transmitted message is interrupted for any reason, the checksum [127] will detect it and the messages will be voided. The IR receiver [128] relays a valid message of vehicle identification [125] and position [126] to a central computer system [12, Fig.1] at the airport control tower via the edge light assembly power wiring [21, Fig.1].

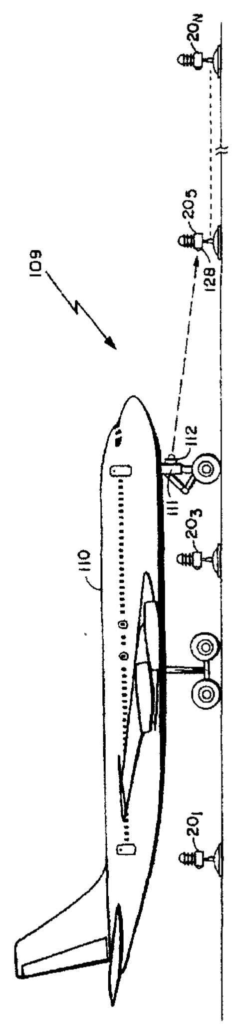

FIG. 10

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Background of the Invention

This invention relates to identification of airport surface traffic and in particular to an apparatus and method for detecting and identifying aircraft or other vehicle movement on airport taxiways, runways and other surface areas.

Currently, ground control of aircraft at an airport is done visually by the air traffic controller in the tower. Low visibility conditions sometimes make it impossible for the controller to see all parts of the field. Ground surface radar can help in providing coverage during low visibility conditions; it plays an important part in the solution of the runway incursion problem but cannot solve the entire problem. A runway incursion is defined as "any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in loss of separation with an aircraft taking off, intending to take off, landing, or intending to land." The U.S. Federal Administration Agency (FAA) has estimated that it can only justify the cost of ground surface radar at 29 of the top 100 airports in the United States. However, such radar only provides location information; it cannot alert the controller to possible conflicts between aircraft.

In the prior art, an airport control and monitoring system has been used to sense when an airplane reaches a certain point on a taxiway and controls switching lights on and off to indicate to the pilot when he may proceed on to a runway. Such a system sends microwave sensor information to a computer in the control tower. The computer comprises software for controlling the airport lighting and for providing fault information on the airport lighting via displays or a control panel to an operator. Such a system is described in sales information provided on a Bi-directional Series 7 Transceiver (BRITEE) produced by ADB-ALNACO, Inc., A Siemens Company, of Columbus, Ohio. However, such a system does not show the location of all vehicles on an airfield and is not able to detect and avoid a possible vehicle incursion.

A well known approach to airport surface traffic control has been the use of scanning radars operating at high frequencies such as K-band in order to obtain adequate definition and resolution. An existing airport ground traffic control equipment of that type is known in the art as Airport Surface Detection Equipment (ASDE). However, such equipment provides surveillance only, no discrete identification of aircraft on the surface being available. Also there is a need for a relatively high antenna tower and a relatively large rotation antenna system thereon.

Another approach to airport ground surveillance is a system described in U. S. Patent No. 3,872,474, issued March 18, 1974, to Arnold M. Levine and assigned to International Telephone and Telegraph Corporation, New York, NY, referred to as LOCAR (Localized Cable Radar) which comprises a series of small, lower powered, narrow pulses, transmitting radars having limited range and time sequenced along opposite sides of a runway ramp or taxiway. In another U. S. Patent No. 4,197,536, issued on April 8, 1980, to Arnold M. Levine, an airport surface identification and control system is described for aircraft equipped with ATCRBS (Air Traffic Control Radio Beacon System) and ILS (Instrument Landing System). However, these approaches are expensive, require special cabling and for identification purposes require expensive equipment to be included on the aircraft and other vehicles.

Another approach to vehicle identification such as types of aircraft by identifying the unique characteristic of the "footprint" presented by the configuration of wheels unique to a particular type of vehicle is described in U.S. Patent No. 3,872,283, issued March 18, 1975, to Gerald R. Smith et al. and assigned to The Cadre Corporation of Atlanta Georgia.

An automatic system for surveillance, guidance and fire-fighting at airports using infrared sensors is described in U. S. Patent No. 4,845,629, issued July 4, 1989 to Maria V. Z. Murga. The infrared sensors are arranged along the flight lanes and their output signals are processed by a computer to provide information concerning the aircraft movements along the flight lanes. Position detectors are provided for detecting the position of aircraft in the taxiways and parking areas. However, such system does not teach the use of edge lights along the runways and taxiways along with their associated wiring and it is not able to detect and avoid a possible vehicle incursion.

The manner in which the invention deals with the disadvantages of the prior art to provide a low cost infrared vehicle identification system will be evident as the description proceeds.

Summary of the Invention

Accordingly, it is therefore an object of this invention to provide a low cost infrared system that identifies aircraft or other vehicles on airport taxiways and runways.

It is also an object of this invention to provide at an airport a low cost aircraft or vehicle identification system using existing edge light assemblies and associated wiring along runways and taxiways.

It is another object of this invention to provide an infrared vehicle identification system that generates a graphic display of the airport showing the location of all ground traffic including direction and velocity data and identifies such ground traffic.

The objects are further accomplished by providing a vehicle identification system for identifying aircraft and other vehicles on surface pathways including runways and other areas of an airport comprising means disposed on the aircraft and other vehicles for transmitting identification message data, means disposed in each of a plurality of light assembly means on the airport for receiving and decoding the message data from the transmitting means, means for providing power to each of the plurality of light assembly means, means for processing the decoded identification message data generated by the receiving and decoding means in each of the plurality of light assembly means, means for providing data communication between each of the light assembly means and the processing means, and the processing means comprises means for providing a graphic display of the airport comprising symbols representing the aircraft and other vehicles, each of the symbols having the identification message data displayed. The transmitting means comprises means for creating unique message data which includes aircraft and flight identification, and infrared means coupled to the message creating means for transmitting a coded stream of the message data. The message data further includes position information. The receiving and decoding means comprises an infrared sensor. The receiving and decoding means comprises microprocessor means coupled to the infrared sensor for decoding the message data. The plurality of light assembly means are arranged in two parallel rows along runways and taxiways of the airport. The light assembly means comprises light means coupled to the lines of the power providing means for lighting the airport, vehicle sensing means for detecting aircraft or other vehicles on the airport, microprocessor means coupled to the receiving and decoding means, the light means, the vehicle sensing means and the data communication means for decoding the identification message data, and the data communication means being coupled to the microprocessor means and the lines of the power providing means. The symbols representing aircraft and other vehicles comprise icons having a shape indicating type of aircraft or vehicle. The processing means determines a location of the symbols on the graphic display of the airport in accordance with data received from the light assembly means.

The objects are further accomplished by a vehicle identification system for surveillance and identification of aircraft and other vehicles on an airport comprising a plurality of light circuits on the airport, each of the light circuits comprises a plurality of light assembly means, means for providing power to each of the plurality of light circuits and to each of the light assembly means, means in each of the light assembly means for sensing ground traffic on the airport, means disposed on the aircraft and other vehicles for transmitting identification message data, means disposed in each of the light assembly means for receiving and decoding the message data from the transmitting means, means for processing ground traffic data from the sensing means and decoded message data from each of the light assembly means for presentation on a graphic display of the airport, means for providing data communication between each of the light assembly means and the processing means, the processing means comprises means for providing such graphic display of the airport comprising symbols representing the ground traffic, each of the symbols having direction, velocity and the identification message data displayed. Each of the light circuits are located along the edges of taxiways or runways on the airport. The sensing means comprises infrared detectors. The transmitting means comprises means for creating unique message data which includes aircraft and flight identification, and infrared means coupled to the message creating means for transmitting a coded stream of the message data. The message data further comprises position information. The receiving and decoding means comprises an infrared sensor. The receiving and decoding means comprises microprocessor means coupled to the infrared sensor for decoding the message data. The plurality of light assembly means of the light circuits being arranged in two parallel rows along runways and taxiways of the airport. The light assembly means comprises light means coupled to the lines of the power providing means for lighting the airport, the ground traffic sensing means for detecting aircraft or other vehicles on the airport, microprocessor means coupled to the receiving and decoding means, the light means, the ground traffic sensing means and the data communication means for decoding the identification message data and processing a detection signal from the ground traffic sensing means, and the data communication means being coupled to the microprocessor means and the lines of the power providing means. The light assembly means further comprises a photocell means coupled to the microprocessor means for detecting the light intensity of the light means. The light assembly means further comprises a strobe light coupled to the microprocessor means. The processing means comprises redundant computers for fault tolerance operation. The symbols representing the ground traffic comprise icons having a shape indicating type of aircraft or vehicle. The processing means determines a location of the symbols on the graphic display of the airport in accordance with the data receive from the light assembly means. The processing means determines a future path of the ground traffic based on a ground clearance command, the future path being shown on the graphic display. The processing means further comprises means for predicting an airport incursion. The power providing means comprises constant current power means for providing a separate line to each of the plurality of light circuits, and network bridge means coupled to the constant current power means for providing a communication channel to the processing means for each line of the constant current power means.

The objects are further accomplished by providing a method of providing a vehicle identification system for identifying aircraft and other vehicles on surface pathways including runways and other areas of an airport comprising the steps of transmitting identification message data with means disposed on the aircraft and other vehicles, receiving and decoding the message data from the transmitting means with means disposed in each of a plurality of light assembly means on the airport, providing power to each of the plurality of light assembly means, processing the decoded identification message data generated by the receiving and decoding means in each of the plurality of light assembly means, providing data communication between each of the light assembly means and the processing means, and providing a graphic display of the airport with the processing means comprising symbols representing the aircraft and other vehicles, each of the symbols having the identification message data displayed. The step of transmitting identification message data comprises the steps of creating unique message data which includes aircraft and flight identification, and transmitting a coded stream of the message data with infrared means coupled to the message creating means. The step of transmitting message data further includes transmitting position information. The step of receiving and decoding the message data includes using an infrared sensor. The step of receiving and decoding the message data further comprises the step of coupling microprocessor means to the infrared sensor for decoding the message data. The step of receiving and decoding the message data with means disposed in the plurality of light assembly means further comprises the step of arranging the plurality of light assembly means in two parallel rows along runways and taxiways of the airport. The step of providing a graphic display comprising symbols representing aircraft and other vehicles further comprises the step of providing icons having a shape indicating type of aircraft or vehicle. The step of providing a graphic display comprises the step of determining a location of the symbols on the graphic display of the airport in accordance with data received from the light assembly means.

Brief Description of the Drawings

Other and further features of the invention will become apparent in connection with the accompanying drawings wherein:

FIG. 1 is a block diagram of an airport vehicle incursion avoidance system;

FIG. 2 is a block diagram of an edge light assembly showing a sensor electronics unit coupled to an edge light of an airfield lighting system;

FIG. 3 is a pictorial diagram of the edge light assembly showing the edge light positioned above the sensor electronics unit;

FIG. 4 is a diagram of an airfield runway or taxiway having a plurality of edge light assemblies positioned along each side of the runway or taxiway for detecting various size aircraft as shown;

FIG. 5 is a block diagram of the central computer system shown in FIG. 1;

FIG. 6 shows eleven network variables used in programming the microprocessor of an edge light assembly to interface with a sensor, a light and a strobe light;

FIG. 7 is a block diagram showing an interconnection of network variables for a plurality of edge light assemblies located on both sides of a runway, each comprising a sensor electronics unit 10 positioned along a taxiway or runway;

FIG. 8 shows a graphic display of a typical taxiway/runway on a portion of an airport as seen by an operator in a control tower, the display showing the location of vehicles as they are detected by the sensors mounted in the edge light assemblies located along taxiways and runways;

FIG. 9 is a block diagram of the data flow within the system shown in FIG. 1 and FIG. 5;

FIG. 10 is a pictorial diagram of an infrared identification system showing an IR transmitter mounted on an airplane wheel strut and an IR receiver mounted in an edge light assembly of an airport lighting system;

FIG. 11 is a block diagram of an IR transmitter of an IR vehicle identification system;

FIG. 12 shows a top view of the IR transmitter mounted on an airplane wheel strut providing a 195° area of coverage generated by an IR light emitting diode array in the IR transmitter;

FIG. 13 shows data fields of a coded data stream transmitted by the IR transmitter;

FIG. 14 is a block diagram of an IR receiver of the IR vehicle identification system;

FIG. 15 is a flow chart of an IR message routine which is a communication protocol continuously performed in an IR receiver microprocessor; and

FIG. 16 is a flow chart of a vehicle sensor routine which is continuously performed in an IR receiver microprocessor.

Description of the Preferred Embodiment

Referring to FIG. 1 a block diagram of an airport vehicle incursion avoidance system 10 is shown comprising a plurality of light circuits 18_{1-n}, each of said light circuits 18_{1-n} comprises a plurality of edge light assemblies 20_{1-n} connected via wiring 21_{1-n} to a lighting vault 16 which is connected to a central computer system 12 via a wide area network 14. Each of the edge light assemblies 20_{1-n} comprises an infrared (IR) detector vehicle sensor 50 (FIG. 2).

The edge light assemblies 20_{1-n} are generally located along side the runways and taxiways of the airport with an average 100 foot spacing and are interconnected to the lighting vault 16 by single conductor series edge light wiring 21_{1-n}. Each of the edge light circuits 18_{1-n} is powered via the wiring 21_{1-n} by a constant current supply 24_{1-n} located in the lighting vault 16.

Referring now to FIG. 1 and FIG. 2, communication between the edge light assemblies 20_{1-n} and the central computer system 12 is accomplished with LON Bridges 22_{1-n} interconnecting the edge light wiring 21_{1-n} with the Wide Area Network 14. Information from a microprocessor 44 located in each edge light assembly 20_{1-n} is coupled to the edge light wiring 21_{1-n} via a power line modem 54. The LON bridges 22_{1-n} transfers message information from the edge light circuits 18_{1-n} via the wiring 21_{1-n} to the wide area network 14. The wide area network 14 provides a transmission path to the central computer system 12. These circuit components also provide the return path communications link from the central computer system 12 to the microprocessor 44 in each edge light assembly 20_{1-n}. Other apparatus and methods, known to one of ordinary skill in the art, for data communication between the edge light assemblies 20_{1-n} and the central computer system 12 may be employed, such as radio techniques, but the present embodiment of providing data communication on the edge light wiring 21_{1-n} provides a low cost system for present airports. The LON Bridge 22 may be embodied by devices manufactured by Echelon Corporation of Palo Alto, California. The wide area network 14 may be implemented by one of ordinary skill in the art using standard Ethernet or Fiber Distributed Data Interface (FDDI) components. The constant current supply 24 may be embodied by devices manufactured by Crouse-Hinds of Winslow, Connecticut.

Referring now to FIG. 2 and FIG. 3, FIG. 3 shows a pictorial diagram of the edge light assembly 20_{1-n}. The edge light assembly 20_{1-n} comprises a bezel including an incandescent lamp 40 and an optional strobe light assembly 48 (FIG. 2) which are mounted above an electronics enclosure 43 comprising a vehicle sensor 50. The electronics enclosure 43 sits on the top of a tubular shaft extending from a base support 56. The light assembly bezel with lamp 40 and base support 56 may be embodied by devices manufactured by Crouse-Hinds of Winslow, Connecticut.

A block diagram of the contents of the electronics enclosure 43 is shown in FIG. 2 which comprises a coupling transformer 53 connected to the edge light wiring 21_{1-n}. The coupling transformer 53 provides power to both the incandescent lamp 40 via the lamp control triac 42 and the microprocessor power supply 52; in addition, the coupling transformer 53 provides a data communication path between the power line modem 54 and the LON Bridges 22_{1-n} via the edge light wiring 21_{1-n}. The microprocessor 44 provides the computational power to run the internal software program that controls the edge light assemblies 20_{1-n}. The microprocessor 44 is powered by the microprocessor power supply 52. Also connected to the microprocessor 44 is the lamp control triac 42, a lamp monitoring photo cell 46, the optional strobe light assembly 48, the vehicle sensor 50, and the data communications modem 54. The microprocessor 44 is used to control the incandescent edge light 40 intensity and optional strobe light assembly 48. The use of the microprocessor 44 in each light assembly 20_{1-n} allows complete addressable control over every light on the field. The microprocessor 44 may be embodied by a VLSI device manufactured by Echelon Corporation of Palo Alto, California 94304, called the Neuron® chip.

Still referring to FIG. 2, the sensor 50 in the present embodiment comprises an infrared (IR) detector and in other embodiments may comprise other devices such as proximity detectors, CCD cameras, microwave motion detectors, inductance loops, or laser beams. The program in the microprocessor 44 is responsible for the initial filtering of the sensor data received from the sensor 50 and responsible for the transmission of such data to the central computer system 12. The sensor 50 must perform the following functions: detect a stationary object, detect a moving object, have a range at least half the width of the runway or taxiway, be low power and be immune to false alarms. This system design does not rely on just one type of sensor. Since sensor fusion functions are performed within the central computer system 12, data inputs from all different types of sensors are acceptable. Each sensor relays a different view of what is happening on the airfield and the central computer system 12 combines them. There are a wide range of sensors that may be used in this system. As a new sensor type becomes available, it can be integrated into this system with a minimum of difficulty. The initial sensor used is an IR proximity detector based around a piezoelectric strip. These are the kind of sensors you use at home to turn on your flood lights when heat and/or movement is detected. When the sensor output provides an analog signal, an analog-to-digital converter readily known in the art may be used to interface with the microprocessor 44.

Another proximity detector that can be used is based around a microwave Gunn diode oscillator. These are currently in use in such applications as Intrusion Alarms, Door Openers, Distance Measurement, Collision Warning, Railroad Switching, etc. These types of sensors have a drawback because they are not passive devices and care needs to be taken to select frequencies that would not interfere with other airport equipment. Finally, in locations such as the hold position lines on taxiways, solid state laser and detector combinations could be used between adjacent taxiway lights. These sensor systems create a beam that when broken would identify the location of the front wheel of the airplane. This type of detector would be used in those locations where the absolute position of a vehicle was needed. The laser beam would be modulated by the microprocessor 44 to avoid the detector being fooled by any other stray radiation.

Referring to FIG. 2 and FIG. 4, a portion of an airport runway 64 or taxiway is shown having a plurality of edge light assemblies 20_{1-8} positioned along each side of the runway or taxiway for detecting various size airplanes or vehicles 60, 62. The dashed lines represent the coverage area of the sensors 50 located in each edge light assembly 20_{1-8} positioned along each side of the runway 64 or taxiway to insure detection of any airplane 60, 62 or other vehicles traveling on such runway 64 or taxiway. The edge light assemblies 20_{1-n} comprising the sensor 50 are logically connected together in such a way that an entire airport is sensitized to the movement of vehicles. Node to node communication takes place to verify and identify the location of the vehicles. Once this is done a message is sent to the central computer system 12 reporting the vehicles location. Edge lights assemblies (without a sensor electronics unit 43) and taxiway power wiring currently exist along taxiways, runways and open areas of airports, therefore, the sensor electronics unit 43 is readily added to existing edge lights and existing taxiway power wiring without the inconvenience and expense of closing down runways and taxiways while installing new cabling.

Referring now to FIG. 1, FIG. 5, FIG. 8 and FIG. 9, the central computer system 12 is generally located at a control tower or terminal area of an airport and is interconnected to the LON Bridges 22_{1-n} located in the lighting vault 16 with a Wide Area Network 14. The central computer system 12 comprises two redundant computers, computer #1 26 and computer #2 28 for fault tolerance, the display 30, speech synthesis units 29 & 31, alert lights 34, keyboard 27 and a speech recognition unit 33, all of these elements being interconnected by the wide area network 14 for the transfer of information. The two computers 26 and 28 communicate with the microprocessors 44 located in the edge light assemblies 20_{1-n}. Data received from the edge light assembly 20_{1-n} microprocessors 44 are used as an input to a sensor fusion software module 101 (FIG. 9) run on the redundant computers 26 and 28. The output of the sensor fusion software module 101 operating in the computers 26, 28 is used to drive the CRT display 30 which displays the location of each vehicle on the airport taxiway and runways as shown in FIG. 8. The central computer system 12 may be embodied by devices manufactured by IBM Corporation of White Plains, New York. The Wide Area Network 14 may be embodied by devices manufactured by 3Com Corporation of Santa Clara, California. The speech synthesis units 29, 31 and the speech recognition unit 33 may be embodied by devices manufactured by BBN of Cambridge, Massachusetts.

The speech synthesis unit 29 is coupled to a speaker 32. Limited information is sent to the speech synthesis unit 29 via the wide area network 14 to provide the capability to give an air traffic controller a verbal alert. The speech synthesis unit 31 is coupled to a radio 37 having an antenna 39 to provide the capability to give the pilots a verbal alert. The voice commands from the air traffic controller to the pilots are captured by microphone 35 and sent to the pilots via radio 36 and antenna 38. In the present embodiment a tap is made and the speech information is sent to both the radio 36 and the speech recognition unit 33 which is programmed to recognize the limited air traffic control vocabulary used by a controller. This includes airline names, aircraft type, the numbers 0-9, the name of the taxiways and runways and various short phrases such as "hold short", "expedite" and "give way to." The output of the speech recognition unit 33 is fed to the computers 26, 28.

Referring again to FIG. 2, the power line modem 54 provides a data communication path over the edge light wiring 21_{1-n} for the microprocessor 44. This two way path is used for the passing of command and control information between the various edge light assemblies 20_{1-n} and the central computer system 12. A power line transceiver module in the power line modem 54 is used to provide a data channel. These modules use carrier current approach to create the data channel. Power line modems that operate at carrier frequencies in the 100 to 450 Khz band are available from many manufacturers. These modems provide digital communication paths at data rates of up to 10,000 bits per second utilizing direct sequence spread spectrum modulation. They conform to FCC power line carrier requirements for conducted emissions, and can work with up to 55 dB of power line attenuation. The power line modem 54 may be embodied by a device manufactured by Echelon Corporation of Palo Alto, California 94304, called the PLT-10 Power Line Transceiver Module.

The data channel provides a transport layer or lowest layer of the open system interconnection (OSI) protocol used in the data network. The Neuron® chip which implements the microprocessor 44 contains all of the firmware required to implement a 7 layer OSI protocol. When interconnected via an appropriate medium the Neuron® chips automatically communicate with one another using a robust Collision Sense Multiple Access (CSMA) protocol with forward error corrections, error checking and automatic retransmission of missed messages (ARQ).

The command and control information is placed in data packets and sent over the network in accordance with the 7 Layer OSI protocol. All messages generated by the microprocessor 44 and destined for the central computer system 12 are received by the network bridge 22 via the power lines 21_{1-n} and routed to the central computer system 12 over the wide area network 14.

The Neuron® chip of the microprocessor 44 comprises three processors (not shown) and the firmware required to support a full 6 layer open systems interconnection (OSI) protocol. The user is allocated one of the processors for the application code. The other two processors give the application program access to all of the other Neuron® chips in the network. This access creates a Local Operating Network or LON. A LON can be thought of as a high level local area network LAN. The use of the Neuron® chip for the implementation of this invention, reduces the amount of custom hardware and software that otherwise would have to be developed.

Data from the sensor electronic unit 43 of the edge light assemblies 20_{1-n} is coupled to the central computer system 12 via the existing airport taxiway lighting power wiring 21. Using the existing edge light power line to transfer the sensor data into a LON network has many advantages. As previously pointed out, the reuse of the existing edge lights eliminates the inconvenience and expense of closing down runways and taxiways while running new cable and provides for a low cost system.

The Neuron® chip allows the edge light assemblies 20_{1-n} to automatically communicate with each other at the applications level. This is accomplished through network variables which allow individual Neuron® chips to pass data between themselves. Each Neuron® 'C' program comprises both local and network variables. The local variables are used by the Neuron® program as a scratch pad memory. The network variables are used by the Neuron® program in one of two ways, either as a network output variables or a network input variables. Both kinds of variables can be initialized, evaluated and modified locally. The difference comes into play in that once a network output variable is modified, network messages are automatically sent to each network input variable that is linked to that output variable. This variable linking is done at installation time. As soon as a new value of a network input variable is received by a Neuron® chip, the code is vectored off to take appropriate action based upon the value of the network input variable. The advantage to the program is that this message passing scheme is entirely transparent since the message passing code is part of the embedded Neuron® operating system.

Referring now to FIG. 6, eleven network variables have been identified for a sensor program in each microprocessor 44 of the edge light assemblies 20_{1-n}. The sensor 50 function has two output variables: prelim_detect 70 and confirmed_detect 72. The idea here is to have one output trigger whenever the sensor 50 detects movement. The other output does not trigger unless the local sensor and the sensor on the edge light across the runway both spot movement. Only when the detection is confirmed will the signal be fed back to the central computer system 12. This technique of confirmation helps to reduce false alarms in order to implement this technique the adjacent sensor 50 has an input variable called adj_prelim_detect 78 that is used to receive the other sensors prelim_detect output 70. Other input variables are upstream_detect 74 and downstream_detect 76 which are used when chaining adjacent sensors together. Also needed is a detector_sensitivity 80 input that is used by the central computer system 12 to control the detection ability of the sensor 50.

The incandescent light 40 requires two network variables, one input and the other an output variable. The input variable light_level 84 would be used to control the light's brightness. The range would be OFF or 0% all the way to FULL ON or 100%. This range from 0% to 100% would be made in 0.5% steps. Since the edge light assembly 20_{1-n} also contains the photocell 46, an output variable light_failure 84 is created to signal that the lamp did not obtain the desired brightness.

The strobe light 48 requires three input variables. The strobe-mode 86 variable is used to select either the OFF, SEQUENTIAL, or ALTERNATE flash modes. Since the two flash modes require a distinct pattern to be created, two input variables active_delay 88 and flash_delay 90 are used to time align the strobe flashes. By setting these individual delay factors and then addressing the Neuron® chips as a group, allows the creation of a field strobe pattern with just one command.

Referring now to FIG. 7, a block diagram of an interconnection of network variables for a plurality of edge light assemblies 20_{1-n} located on both sides of a runway is shown, each of the edge light assemblies 20_{1-n} comprising a microprocessor 44. Each Neuron® program in the microprocessor 44 is designed with certain network input and output variables. The user writes the code for the Neuron® chips in the microprocessor 44 assuming that the inputs are supplied and that the outputs are used. To create an actual network the user has to "wire up" the network by interconnecting the individual nodes with a software linker. The resulting distributed process is best shown in schematic form, and a portion of the network interconnect matrix is shown in Figure 7. The prelim_detect 70 output of a sensor node 44_1 is connected to the adj_primary_detect 92 input of the sensor node 44_4 across the taxiway. This is used as a means to verify actual detections and eliminate false reports. The communications link between these two nodes 44_1 and 44_4 is part of the distributed processing. The two nodes communicate among themselves without involving the central computer system 12. If in the automatic mode or if instructed by the controller, the system will also alert the pilots via audio and visual indications.

Referring again to FIG. 1 and FIG. 4, the central computer system 12 tracks the movement of vehicles as they pass from the sensor 50 to sensor 50 in each edge light assembly 20_{1-n}. Using a variation of a radar automatic track algorithm, the system can track position, velocity and heading of all aircraft or vehicles based upon the sensor 50 readings. New vehicles are entered into the system either upon leaving a boarding gate or landing. Unknown vehicles are also tracked automatically. Since taxiway and runway lights are normally across from each other on the pavement (as shown in FIG. 4 and FIG. 7), the microprocessor 44 in each edge lights assembly 20_{1-n} is programmed to combine their sensor 50 inputs and agree before reporting a contact. A further refinement is to have the microprocessor 44 check with the edge light assemblies 20_{1-n} on either side of them to see if their sensors 50 had detected the vehicle. This allows a vehicle to be handed off from sensor electronic unit 43 to sensor electronic unit 43 of each edge light assembly 20_{1-n} as it travels down the taxiway. This also assures that vehicle position reports remain consistent. Vehicle velocity may also be calculated by using the distance between sensors, the sensor pattern and the time between detections.

Referring to FIG. 5 and FIG. 8, the display 30 is a color monitor which provides a graphical display of the airport, a portion of which is shown in FIG. 8. This is accomplished by storing a map of the airport in the redundant computers 26 and 28 in a digital format. The display 30 shows the location of airplanes or vehicles as they are detected by the sensors 50 mounted in the edge light assemblies 20_{1-n} along each taxiway and runway or other airport surface areas. All aircraft or vehicles on the airport surface are displayed as icons, with the shape of the icons being determined by the vehicle type. Vehicle position is shown by the location of the icon on the screen. Vehicle direction is shown by either the orientation of the icon or by an arrow emanating from the icon. Vehicle status is conveyed by the color of the icon. The future path of the vehicle as provided by the ground clearance command entered via the controllers microphone 35 is shown as a colored line on the display 30. The status of all field lights including each edge light 20_{1-n} in each edge light circuit 18_{1-n} is shown via color on the display 30.

Use of object orientated software provides the basis for building a model of an airport. The automatic inheritance feature allows a data structure to be defined once for each object and then replicated automatically for each instance of that object. Automatic flow down assures that elements of the data base are not corrupted due to typing errors. It also assures that the code is regular and structured. Rule based object oriented programming makes it difficult to create unintelligible "spaghetti code." Object oriented programming allows the runways, taxiways, aircraft and sensors, to be decoded directly as objects. Each of these objects contains attributes. Some of these attributes are fixed like runway 22R or flight UA347, and some are variable like vehicle status and position.

In conventional programming we describe the attributes of an object in data structures and then describe the behaviors of the object as procedures that operate on those data structures. Object oriented programming shifts the emphasis and focuses first on the data structure and only secondarily on the procedures. More importantly, object oriented programming allows us to analyze and design programs in a natural manner. We can think in terms of runways and aircraft instead of focusing on either the behavior or the data structures of the runways and aircraft.

Table 1 shows a list of objects with corresponding attributes. Each physical object that is important to the runway incursion problem is modeled. The basic airplane or vehicle tracking algorithm is shown in Table 2 in a Program Design Language (PDL). The algorithm which handles sensor fusion, incursion avoidance and safety alerts is shown in a single program even though it is implemented as distributed system using both the central computer system 12 and the sensor microprocessors 44.

TABLE 1

OBJECT	ATTRIBUTE	DESCRIPTION
Sensor	Location	X & Y coordinates of sensor
	Circuit	AC wiring circuit name & number
	Unique_address	Net address for this sensor and its mate
	Lamp_intensity	0% to 100% in 0.5% steps
	Strobe_status	Blink rate/off
	Strobe-delay	From start signal
	Sensor_status	Detect/no detect
	Sensor_type	IR, laser, proximity, etc.
Runway	Name	22R, 27, 33L, etc.
	Location	X & Y coordinates of start of center line
	Length	In feet
	Width	In feet
	Direction	In degrees from north
	Status	Not_active, active_takeoff, active_landing, alarm
	Sensors (MV)	List of lights/sensors along this runway
	Intersections (MV)	List of intersections
	Vehicles	List of vehicles on the runway
Taxiway	Name	Name of taxiway
	Location	X & Y coordinates of start of center line
	Length	In feet
	Width	In feet
	Direction	In degrees from north
	Status	Not active, active, alarm
	Sensors (MV)	List of intersections
	Hold_Locations	List of holding locations
	Vehicles (MV)	List of vehicles on the runway

Intersection	Name	Intersection Name
	Location	Intersection of two center lines
	Status	Vacant/Occupied
	Sensors (MV)	List of sensors creating intersection border
Aircraft	Airline	United
	Model	727-200
	Tail-number	N3274Z
	Empty_weight	9.5 tons
	Freight_weight	2.3 tons
	Fuel_weight	3.2 tons
	Top_speed	598 mph
	V1_speed	100 mph
	V2_speed	140 mph
	Acceleration	0.23 g's
	Deceleration	0.34 g's

MV = Multi-variable or array

Table 2

```
while (forever)
|  if (edge light shows a detection)
|  |  if (adjacent light also shows a detection sensor fusion)
|  |  |  /* CONFIRMED DETECTION */
|  |  |  if (previous block showed a detection)
|  |  |  |  /* ACCEPT HANDOFF */
|  |  |  |  Update aircraft position and speed
|  |  |  else
|  |  |  |  /* MAY BE AN ANIMAL OR SERVICE TRUCK */
|  |  |  |  Alert operator to possible incursion
|  |  |  |  /* MAY BE AN AIRCRAFT ENTERING THE SYSTEM */
|  |  |  |  Start a new track
|  |  else
|  |  |  Request status from adjacent light
```

```
|   |   |   if (Adjacent light is OK)
|   |   |   |   /* NON CONFIRMED DETECTION */
|   |   |   else
|   |   |   |   Flag adjacent light for repair
|   |   |   endif
|   |   endif
|   endif
|   if (Edge light loses a detection AND status is OK)
|   |   if (Next block showed a detection)
|   |   |       /* PROPER HANDOFF */
|   |   else
|   |   |   if (vehicle speed > = takeoff)
|   |   |   |   Handoff to departure control
|   |   |   else
|   |   |   |   /* MISSING HANDOFF */
|   |   |   |   Alert operator to possible incursion
|   |   |   endif
|   |   endif
|   endif
|   /* CHECK FOR POSSIBLE COLLISIONS */
|   for (all tracked aircraft)
|   |   Plot future position
|   |   if (position conflict)
|   |   |       Alert operator to possible incursion
|   |   endif
|   endif
|   Update display
endwhile
```

Referring again to FIG. 1 and FIG. 2, the control of taxiway lighting intensity is usually done by placing all the lights on the same series circuit and then regulating the current in that circuit. In the present embodiment the intensity of the lamp 40 is controlled by sending a message with the light intensity value to the microprocessor 44 located within the light assembly 20_{1-n}. The message allows for intensity settings in the range of 0 to 100% in 0.5% steps. The use of photocell 46 to check the light output allows a return message to be sent if the bulb does not respond. This in turn generates a maintenance report on the light. The strobe light 48 provides an additional optional capability under program control of the microprocessor 44. Each of the microprocessors 44 in the edge light assemblies 20 is individually addressable. This means every lamp on the field is controlled individually by the central computer system 12.

The system 10 can be programmed to provide an Active Runway Indicator by using the strobe lights 48 in those edge light assemblies 20_{1-n} located on the runway 64 to continue the approach light "rabbit" strobe pattern all the way down the runway. This lighting pattern could be turned-on as a plane is cleared for landing and then turned-off after the aircraft has touched down. A pilot approaching the runway along an intersecting taxiway would be alerted in a clear and unambiguous way that the runway was active and should not be crossed.

If an incursion was detected the main computers 26, 28 could switch the runway strobe lights 48 from the "rabbit" pattern to a pattern that alternatively flashes either side of the runway in a wig-wag fashion. A switch to this pattern would be interpreted by the pilot of an arriving aircraft as a wave off and a signal to go around. The abrupt switch in the pattern of the strobes would be instantaneously picked up by the air crew in time for them to initiate an aborted landing procedure.

During Category III weather conditions both runway and taxiway visibility are very low. Currently radio based landing systems are used to get the aircraft from final approach to the runway. Once on the runway it is not always obvious which taxiways are to be used to reach the airport terminal. In system 10 the main computers 26,28 can control the taxiway lamps 40 as the means for guiding aircraft on the ground during CAT III conditions. Since the intensity of the taxiway lamps 40 can be controlled remotely, the lamps just in front of an aircraft could be intensified or flashed as a means of guiding it to the terminal.

Alternatively, a short sequence of the "rabbit" pattern may be programmed into the taxiway strobes just in front of the aircraft. At intersections, either the unwanted paths may have their lamps turned off or the entrance to the proper section of taxiway may flash directing the pilot to head in that direction. Of course in a smart system only those lights directly in front of a plane would be controlled, all other lamps on the field would remain in their normal mode.

Referring now to FIG. 9, a block diagram is shown of the data flow within the system 10 (as shown in FIG. 1 and FIG. 5). The software modules are shown that are used to process the data within the computers 26, 28 of the central computer system 12. The tracking of aircraft and other vehicles on the airport operates under the control of a sensor fusion software module 101 which resides in the computers 26, 28. The sensor fusion software module 101 receives data from the plurality of sensors 50, a sensor 50 being located in each edge light assembly 20_{1-n} which reports the heat level detected, and this software module 101 combines this information through the use of rule based artificial intelligence to create a complete picture of all ground traffic at the airport on a display 30 of the central computer system 12.

The tracking algorithm starts a track upon the first report of a sensor 50 detecting a heat level that is above the ambient background level of radiation. This detection is then verified by checking the heat level reported by the sensor directly across the pavement from the first reporting sensor. This secondary reading is used to confirm the vehicle detected and to eliminate false alarms. After a vehicle has been confirmed the sensors adjacent to the first reporting sensor are queried for changes in their detected heat level. As soon as one of the adjacent sensors detects a rise in heat level a direction vector for the vehicle can be established. This process continues as the vehicle is handed off from sensor to sensor in a bucket brigade fashion as shown in FIG. 7. Vehicle speed can be roughly determined by calculating the time between vehicle detection by adjacent sensors. This information is combined with information from a system data base on the location of each sensor to calculate the velocity of the target. Due to hot exhaust or jet blast, the sensors behind the vehicle may not return to a background level immediately. Because of these condition, the algorithm only uses the first four sensors (two on either side of the taxiway) to calculate the vehicles position. The vehicle is always assumed to be on the centerline of the pavement and between the first four reporting sensors.

Vehicle identification can be added to the track either manually or automatically by an automated source that can identify a vehicle by its position. An example would be prior knowledge of the next aircraft to land on a particular runway. Tracks are ended when a vehicle leaves the detection system. This can occur in one of two ways. The first way is that the vehicle leaves the area covered by the sensors 50. This is determined by a vehicle track moving in the direction of a gateway sensor and then a lack of detection after the gateway sensor has lost contact. A second way to leave the detection system is for a track to be lost in the middle of a sensor array. This can occur when an aircraft departs or a vehicle runs onto the grass. Takeoff scenarios can be determined by calculating the speed of the vehicle just before detection was lost. If the vehicle speed was increasing and above rotation speed then the aircraft is assumed to have taken off. If not then the vehicle is assumed to have gone on to the grass and an alarm is sounded.

Referring to FIG. 5 and FIG. 9, the ground clearance routing function is performed by the speech recognition unit 33 along with the ground clearance compliance verifier software module 103 running on the computers 26,28. This software module 103 comprises a vehicle identification routine, clearance path routing, clearance checking routine and a path checking routine.

The vehicle identification routine is used to receive the airline name and flight number (i.e. "Delta 374") from the speech recognition unit 33 and it highlights the icon of that aircraft on the graphic display of the airport on display 30.

The clearance path routine takes the remainder of the controller's phrase (i.e. "outer taxiway to echo, hold short of runway 15 Left") and provides a graphical display of the clearance on the display 30 showing the airport.

The clearance checking routine checks the clearance path for possible conflict with other clearances and vehicles. If a conflict is found the portion of the path that would cause an incursion is highlighted in a blinking red and an audible indication is given to the controller via speaker 32.

The path checking routine checks the actual path of the vehicle as detected by the sensors 50 after the clearance path has been entered into the computers 26, 28 and it monitors the actual path for any deviation. If this routine detects that a vehicle has strayed from the assigned course, the vehicle icon on the graphic display of the airport flashes and an audible indicator is given to the controller via speaker 32 and optionally the vehicle operator via radio 37.

The airport vehicle incursion avoidance system 10 operates under the control of safety logic routines which reside in the collision detection software module 104 running on computers 26, 28. The safety logic routines receive data from the sensor fusion software module 101 location program via the tracker software module 102 and interpret this information through the use of rule based artificial intelligence to predict possible collisions or runway incursions. This information is then used by the central computer system 12 to alert tower controllers, aircraft pilots and truck operators to the possibility of a runway incursion. The tower controllers are alerted by the display 30 along with a computer synthesized voice message via speaker 32. Ground traffic is alerted by a combination of traffic lights, flashing lights, stop bars and other alert lights 34, lamps 40 and 48, and computer generated voice commands broadcast via radio 36.

Knowledge based problems are also called fuzzy problems and their solutions depend upon both program logic and an interface engine that can dynamically create a decision tree, selecting which heuristics are most appropriate for the specific case being considered. Rule based systems broaden the scope of possible applications. They allow designers to incorporate judgement and experience, and to take a consistent solution approach across an entire problem set.

The programming of the rule based incursion detections software is very straight forward. The rules are written in English allowing the experts, in this case the tower personnel and the pilots, to review the system at an understandable level. Another feature of the rule based system is that the rules stand alone. They can be added, deleted or modified without affecting the rest of the code. This is almost impossible to do with code that is created from scratch. An example of a rule we might use is:

```
If (Runway_Status = Active)
        then (Stop_Bar_Lights = RED).
```

This is a very simple and straight forward rule. It stands alone requiring no extra knowledge except how Runway_Status is created. So let's make some rules affecting Runway_Status.

```
If (Departure = APPROVED) or (Landing = IMMINENT),
        then (Runway_Status = ACTIVE).
```

For incursion detection, another rule is:

```
If (Runway_Status = ACTIVE) and (Intersection = OCCUPIED),
        then (Runway_Incursion = TRUE).
```

Next, detect that an intersection of a runway and taxiway are occupied by the rules:

```
If (Intersection_Sensors = DETECT),
        then (Intersection = OCCUPIED).
```

To predict that an aircraft will run a Hold Position stop, the following rule is created:

```
If (Aircraft_Stopping_Distance > Distance_to_Hold_Position),
        then (Intersection = OCCUPIED).
```

In order to show that rules can be added without affecting the reset of the program, assume that after a demonstration of the system 10 to tower controllers, they decided that they wanted a "Panic Button" in the tower to override the rule based software in case they spot a safety violation on the ground. Besides installing the button, the only other change would be to add this extra rule.

```
If (Panic_button = PRESSED),
        then (Runway_Incursion = TRUE).
```

It is readily seen that the central rule based computer program is very straight forward to create, understand and modify. As types of incursions are defined, the system 10 can be upgraded by adding more rules.

Referring again to FIG. 9, the block diagram shows the data flow between the functional elements within the system 10 (FIG. 1). Vehicles are detected by the sensor 50 in each of the edge light assemblies 20_{1-n}. This information is passed over the local operating network (LON) via edge light wiring 21_{1-n} to the LON bridges 22_{1-n}. The individual message packets are then passed to the redundant computers 26 and 28 over the wide area network (WAN) 14 to the WAN interface 108. After arriving at the redundant computers 26 and 28, the message packet is checked and verified by a message parser software module 100. The contents of the message are then sent to the sensor fusion software module 101. The sensor fusion software module 101 is used to keep track of the status of all the sensors 50 on the airport; it filters and verifies the data from the airport and stores a representative picture of the sensor array in a memory. This information is used directly by the display 30 to show which sensors 50 are responding and used by the tracker software module 102. The tracker software module 102 uses the sensor status information to determine which sensor 50 reports correspond to actual vehicles. In addition, as the sensor reports and status change, the tracker software module 102 identifies movement of the vehicles and produces a target location and direction output. This information is used by the display 30 in order to display the appropriate vehicle icon on the screen.

The location and direction of the vehicle is also used by the collision detection software module 104. This module checks all of the vehicles on the ground and plots their expected course. If any two targets are on intersecting paths, this software module generates operator alerts by using the display 30, the alert lights 34, the speech synthesis unit 29 coupled to the associated speaker 32, and the speech synthesis unit 31 coupled to radio 37 which is coupled to antenna 39.

Still referring to FIG. 9, another user of target location and position data is the ground clearance compliance verifier software module 103. This software module 103 receives the ground clearance commands from the controller's microphone 35 via the speech recognition unit 33. Once the cleared route has been determined, it is stored in the ground clearance compliance verifier software module 103 and used for comparison to the actual route taken by the vehicle. If the information received from the tracker software module 102 shows that the vehicle has deviated from its assigned course, this software module 103 generates operator alerts by using the display 30, the alert lights 34, the speech synthesis unit 29 coupled to speaker 32, and the speech synthesis unit 31 coupled to radio 37 which is coupled to antenna 39.

The keyboard 27 is connected to a keyboard parser software module 109. When a command has been verified by the keyboard parser software module 109, it is used to change display 30 options and to reconfigure the sensors and network parameters. A network configuration data base 106 is updated with these reconfiguration commands. This information is then turned into LON message packets by the command message generator 107 and sent to the edge light assemblies 20_{1-n} via the WAN interface 108 and the LON bridges 22_{1-n}.

Referring now to FIG. 1 and FIG. 10, FIG. 10 shows a pictorial diagram of an infrared vehicle identification system 109 invention comprising an infrared (IR) transmitter 112 mounted on an airplane 110 wheel strut 111 and an IR receiver 128 which comprises a plurality of edge light assemblies 20_{1-n} of an airport lighting system also shown in FIG. 1. The combination of the IR transmitter 112 mounted on aircraft and/or other vehicles and a plurality of IR receivers 128 located along runways and taxiways form the infrared vehicle identification system 109 for use at airports for the safety, guidance and control of surface vehicles in order to provide positive detection and identification of all aircraft and other vehicles and to prevent runway incursions. Runway incursions generally occur when aircraft or other vehicles get onto a runway and conflict with aircraft cleared to land or takeoff on that same runway. All such incursions are caused by human error.

Referring now to FIG. 11, a block diagram of the IR transmitter 112 is shown comprising an embedded microprocessor 118 having DC power 114 inputs from the aircraft host or vehicle on which the IR transmitter 112 is mounted and an ID switch 116 within the aircraft for entering vehicle identification data which is received by the IR transmitter 112 on a serial line. Vehicle position information is provided to the IR transmitter 112 from a vehicle position receiver 117 which may be embodied by a global positioning system (GPS) receiver readily known in the art. The output of embedded microprocessor 118 feeds an IR emitter comprising a light emitting diode (LED) array 120. When power is applied to the IR transmitter 112, the microprocessor continuously outputs a coded data stream 121 (FIG. 13) which is transmitted by the IR LED array 120. The embedded microprocessor 118 may be embodied by microprocessor Model MC 6803 or equivalent manufactured by Motorola Microprocessor Products of Austin; Texas. The IR LED array 120 may be embodied by IR LED Devices manufactured by Harris Semiconductor of Melborne, Florida.

Referring now to FIG. 12, a top view of the IR transmitter 112 comprising the IR LED array 120 mounted on an airplane wheel strut 111 is shown. The IR LED array 120 comprises a plurality of high power LEDs each having a beam width of 15°. By placing thirteen LEDs in an array, a 195° area can be covered. The IR LED array 120 illuminates edge light assemblies 20_{1-4} along the edges of the runway 64. Each of the edge light assemblies 20_{1-4} comprises an IR receiver 128.

Referring now to FIG. 13, the coded data stream emitted from the IR transmitter 112 comprises six separate fields. The first field is called timing pattern 122 and comprises a set of equally spaced pulses. The second field is called unique word 123 which marks the beginning of a message. The third field is called character count 124 which specifies the number of characters in a message. The fourth field is called vehicle identification number 125. The fifth field is called vehicle position 126 and provides latitude and longitude information.

The sixth field is called message checksum 127. The equally spaced pulses of the timing pattern 122 allow the IR receiver 128 to calculate the baud rate of a transmitted message and automatically adjust its internal timing to compensate for either a doppler shift or an offset in clock frequency. The checksum 126 field allows the IR receiver 128 to find the byte boundary. The character count 124 field is used to alert the IR receiver 128 in the edge light assemblies 20_{1-4} as to the length of the message being received. The IR receiver 128 uses this field to determine when the message has ended and if the message was truncated.

The vehicle identification number 125 field comprises an airline flight number or a tail number of an aircraft or a license number of other vehicles. The actual number can be alpha-numeric since each character will be allocated eight (8) bits. An ASCII code which is known to those of ordinary skill in the art is an example of a code type that may be used. The only constraints on the vehicle ID number is that it be unique to the vehicle and that it be entered in the airport's central computer data base to facilitate automatic identification. The checksum 127 guarantees that a complete and correct message is received. If the message is interrupted for any reason, such as a blocked beam or a change in vehicle direction, it is instantly detected and the reception voided. This procedure reduces the number of false detects and guarantees that only perfect vehicle identification messages are passed on to the central computer system 12 at the airport tower.

Referring now to FIG.1, FIG. 2, FIG. 10 and FIG. 14, a block diagram of the IR receiver 128 is shown in FIG. 14 which comprises and IR sensor 130 connected to an edge light assembly 20_{1-n} shown in FIG. 1, FIG. 2 and FIG. 10, on an airport. In FIG. 14, only the relevant portions of FIG. 2 are shown, but it should be understood that all of the elements of the edge light assembly 20_{1-n} shown in FIG. 2 are considered present in FIG. 14. The IR receiver 128 comprises the IR sensor 130 which receives the coded data stream 121 (FIG. 13) from the transmitter 112. The output of the IR sensor 130 is fed to the microprocessor 44 for processing by an IR message routine 136 for detecting the data message. A vehicle sensor routine 138 in microprocessor 44 processes signals from the vehicle sensor 50 for detecting an aircraft or other vehicles. The IR message routine 136 is implemented with software within the microprocessor 44 as shown in the flow chart of FIG. 15. The vehicle sensor routine 138 is also implemented with software within the microprocessor 44 as shown in the flow chart of FIG. 16. The outputs of the IR message routine 136 and vehicle sensor routine 138 are processed by the microprocessor 44 which sends via the power line modem 54 the identified aircraft or vehicle and their position data over the edge light wiring 21_{1-n} communication lines to the central computer system 12 shown in FIG. 1 at the airport terminal or control tower. The IR sensor 130 may be embodied with Model RY5BD01 IR sensor manufactured by Sharp Electronics, of Paramus, New Jersey. The microprocessor 44 may be embodied by the VLSI Neuron® Chip, manufactured by Echelon Corporation, of Palo Alto, California.

Referring to FIG. 15, a flow chart of the IR message routine 136 is shown which is a communication protocol continuously performed in the microprocessor 44 of the IR receiver 128. After an IR signal is detected 150 the next action is transmitter acquisition or to acquire timing 152. The microprocessor 44 looks for the proper timing relationship between the received IR pulses. If the correct on/off ratio exists, the microprocessor 44 calculates the baud rate from the received timing and waits to acquire the unique word 156 signifying byte boundary and then checks for the capture of the character count 160 field byte. After the character count is known, the microprocessor 44 then captures each character in the vehicle ID 162 field and stores them away in a buffer. It then captures vehicle position 163 including latitude and longitude data. If the IR coded data stream is disrupted before all the vehicle ID characters are received, the microprocessor 44 aborts this reception try and returns to the acquisition or IR detected 150 state. After all characters have been received, the checksum 164 is calculated. If the checksum matches 166, then the message is validated and the vehicle ID relayed 168 to the central computer system 12. With this scheme the microprocessor 44 is implementing both the physical and a link layer of the OSI protocol by providing an error free channel.

Referring now to FIG. 16, a flow chart is shown of the vehicle sensor routine 138 software running on microprocessor 44. This software routine 138 runs as a continuous loop. An internal timer is continuously checked for a time out condition (timer = zero 170). As soon as the timer expires the analog value from sensor 50 is read (Read Sensor Value 171) by the microprocessor 44 and the timer is reset to the poll_time 172 variable downloaded by the central computer system 12. This sensor value is compared against a predetermined detection threshold 173 and downloaded by the central computer system 12. If the sensor value is less than the detection threshold, the microprocessor 44 sets the network variable prelim_detect to the FALSE state 174. If the sensor value is greater than the detection threshold the microprocessor 44 sets the network variable prelim_detect to the TRUE state 175. If a preliminary detection is declared, the program then checks to see what reporting mode 176 is in use. If all detections are required to be sent to the central computer system 12, then this sensor value 180 is sent. If only those readings that are different from the previous reading by a predetermined delta and download by the central computer system 12, then this check is made 177. If the change is greater than the delta 177, the program checks to see if it should confirm the detection 178 to eliminate any false alarms. If a confirmation is not required, then this sensor value 181 is sent. If in the confirmation mode, then the adjacent sensor's 179 preliminary network variable is checked. If the adjacent sensor has also detected the object, then the current sensor value 182 is sent.

This concludes the description of the preferred embodiment. However, many modifications and alterations will be obvious to one of ordinary skill in the art without departing from the spirit and scope of the inventive concept. Therefore, it is intended that the scope of this invention be limited only by the appended claims.

Claims

1. A vehicle identification system for identifying aircraft and other vehicles on surface pathways including runways and other areas of an airport comprising:
   means disposed on said aircraft and other vehicles for transmitting identification message data;
   means disposed in each of a plurality of light assembly means on said airport for receiving and decoding said message data from said transmitting means;
   means for providing power to each of said plurality of light assembly means;
   means for processing said decoded identification message data generated by said receiving and decoding means in each of said plurality of light assembly means;
   means for providing data communication between each of said light assembly means and said processing means; and
   said processing means comprises means for providing a graphic display of said airport comprising symbols representing said aircraft and other vehicles, each of said symbols having said identification message data displayed.

2. The vehicle identification system as recited in Claim 1 wherein said transmitting means comprises:
   means for creating a unique message data which includes aircraft and flight identification; and
   infrared means coupled to said message creating means for transmitting a coded stream of said message data.

3. The vehicle identification system as recited in Claim 3 wherein:
   said message data further includes position information.

4. The vehicle identification system as recited in Claim 1 wherein:
   said receiving and decoding means comprises an infrared sensor.

5. The vehicle identification system as recited in Claim 3 wherein:
   said receiving and decoding means comprises microprocessor means coupled to said infrared sensor for decoding said message data.

6. The vehicle identification system as recited in Claim 1 wherein:
   said plurality of light assembly means being arranged in two parallel rows along runways and taxiways of said airport.

7. The vehicle identification system as recited in Claim 1 wherein said light assembly means comprises:
   light means coupled to said lines of said power providing means for lighting said airport;
   vehicle sensing means for detecting aircraft or other vehicles on said airport;
   microprocessor means coupled to said receiving and decoding means, said light means, said vehicle sensing means and said data communication means for decoding said identification message data; and
   said data communication means being coupled to said microprocessor means and said lines of said power providing means.

8. The vehicle identification system as recited in Claim 1 wherein:
   said symbols representing aircraft and other vehicles comprise icons having a shape indicating type of aircraft or vehicle.

9. The vehicle identification system as recited in Claim 1 wherein:
   said processing means determines a location of said symbols on said graphic display of said airport in accordance with data received from said light assembly means.

10. A vehicle identification system for identifying aircraft and other vehicles on surface pathways including runways and other areas of an airport comprising:

means disposed on said aircraft and other vehicles for creating a unique message including aircraft and flight identification;

infrared means coupled to said message creating means for transmitting a coded stream of said message data;

infrared means disposed in each of a plurality of light assembly means on said airport for receiving said message data from said transmitting means;

microprocessor means coupled to said receiving means for decoding said message data;

means for providing power to each of said plurality of light assembly means;

means for processing said decoded message data generated by said decoding means in each of said plurality of light assembly means;

means for providing data communication between each of said light assembly means and said processing means; and

said processing means comprises means for providing a graphic display of said airport comprising symbols representing said aircraft and other vehicles, each of said symbols having said identification message data displayed.

11. The vehicle identification system as recited in Claim 10 wherein:

said message data further includes position information.

12. The vehicle identification system as recited in Claim 10 wherein:

said plurality of light assembly means being arranged in two parallel rows along runways and taxiways of said airport.

13. The vehicle identification system as recited in Claim 10 wherein said light assembly means comprises:

light means coupled to said lines of said power providing means for lighting said airport;

vehicle sensing means for detecting aircraft or other vehicles on said airport;

said microprocessor means coupled to said decoding means, said light means, said vehicle sensing means and said data communication means further processes a detection signal from said vehicle sensing means; and

said data communication means being coupled to said microprocessor means and said lines of said power providing means.

14. The vehicle identification system as recited in Claim 10 wherein:

said symbols representing aircraft and other vehicles comprise icons having a shape indicating type of aircraft or vehicle.

15. The vehicle identification system as recited in Claim 10 wherein:

said processing means determines a location of said symbols on said graphic display of said airport in accordance with data received from said light assembly means.

16. A vehicle identification system for surveillance and identification of aircraft and other vehicles on an airport comprising:

a plurality of light circuits on said airport, each of said light circuits comprises a plurality of light assembly means;

means for providing power to each of said plurality of light circuits and to each of said light assembly means;

means in each of said light assembly means for sensing ground traffic on said airport;

means disposed on said aircraft and other vehicles for transmitting identification message data;

means disposed in each of said light assembly means for receiving and decoding said message data from said transmitting means;

means for processing ground traffic data from said sensing means and decoded message data from each of said light assembly means for presentation on a graphic display of said airport;

means for providing data communication between each of said light assembly means and said processing means; and

said processing means comprises means for providing such graphic display of said airport comprising symbols representing said ground traffic, each of said symbols having direction, velocity and said identification message data displayed.

17. The vehicle identification system as recited in Claim 16 wherein:
each of said light circuits being located along the edges of taxiways or runways on said airport.

18. The vehicle identification system as recited in Claim 16 wherein:
said sensing means comprises infrared detectors.

19. The vehicle identification system as recited in Claim 16 wherein said transmitting means comprises:
means for creating unique message data which includes aircraft and flight identification; and
infrared means coupled to said message creating means for transmitting a coded stream of said message data.

20. The vehicle identification system as recited in Claim 19 wherein:
said message data further comprises position information.

21. The vehicle identification system as recited in Claim 16 wherein:
said receiving and decoding means comprises an infrared sensor.

22. The vehicle identification system as recited in Claim 21 wherein:
said receiving and decoding means comprises microprocessor means coupled to said infrared sensor for decoding said message data.

23. The vehicle identification system as recited in Claim 16 wherein:
said plurality of light assembly means of said light circuits being arranged in two parallel rows along runways and taxiways of said airport.

24. The vehicle identification system as recited in Claim 16 wherein said light assembly means comprises:
light means coupled to said lines of said power providing means for lighting said airport;
said ground traffic sensing means for detecting aircraft or other vehicles on said airport;
microprocessor means coupled to said receiving and decoding means, said light means, said ground traffic sensing means and said data communication means for decoding said identification message data and processing a detection signal from said ground traffic sensing means; and
said data communication means being coupled to said microprocessor means and said lines of said power providing means.

25. The vehicle identification system as recited in Claim 24 wherein:
said light assembly means further comprises a photocell means coupled to said microprocessor means for detecting the light intensity of said light means.

26. The vehicle identification system as recited in Claim 24 wherein:
said light assembly means further comprises a strobe light coupled to said microprocessor means.

27. The vehicle identification system as recited in Claim 16 wherein:
said processing means comprises redundant computers for fault tolerance operation.

28. The vehicle identification system as recited in Claim 16 wherein:
said symbols representing said ground traffic comprise icons having a shape indicating type of aircraft or vehicle.

29. The vehicle identification system as recited in Claim 16 wherein:
said processing means determines a location of said symbols on said graphic display of said airport in accordance with said data receive from said light assembly means.

30. The vehicle identification system as recited in Claim 16 wherein:
said processing means determines a future path of said ground traffic based on a ground clearance command, said future path being shown on said graphic display.

31. The vehicle identification system as recited in Claim 16 wherein:
said processing means further comprises means for predicting an airport incursion.

32. The vehicle identification system as recited in Claim 16 wherein said power providing means comprises:

constant current power means for providing a separate line to each of said plurality of light circuits; and

network bridge means coupled to said constant current power means for providing a communication channel to said processing means for each line of said constant current power means.

33. A method of providing a vehicle identification system for identifying aircraft and other vehicles on surface pathways including runways and other areas of an airport comprising the steps of:

transmitting identification message data with means disposed on said aircraft and other vehicles;

receiving and decoding said message data from said transmitting means with means disposed in each of a plurality of light assembly means on said airport;

providing power to each of said plurality of light assembly means;

processing said decoded identification message data generated by said receiving and decoding means in each of said plurality of light assembly means;

providing data communication on lines of said power providing means between each of said light assembly means and said processing means; and

providing a graphic display of said airport with said processing means comprising symbols representing said aircraft and other vehicles, each of said symbols having said identification message data displayed.

34. The method as recited in Claim 33 wherein said step of transmitting identification message data comprises the steps of creating unique message data which includes aircraft and flight identification; and

transmitting a coded stream of said message data with infrared means coupled to said message creating means.

35. The method as recited in Claim 34 wherein said step of transmitting message data further includes transmitting position information.

36. The method as recited in Claim 33 wherein said step of receiving and decoding said message data includes using an infrared sensor.

37. The method as recited in Claim 33 wherein said step of receiving and decoding said message data further comprises the step of coupling microprocessor means to said infrared sensor for decoding said message data.

38. The method as recited in Claim 33 wherein said step of receiving and decoding said message data with means disposed in said plurality of light assembly means further comprises the step of arranging said plurality of light assembly means in two parallel rows along runways and taxiways of said airport.

39. The method as recited in Claim 33 wherein said step of providing a graphic display comprising symbols representing aircraft and other vehicles further comprises the step of providing icons having a shape indicating type of aircraft or vehicle.

40. The method as recited in Claim 33 wherein said step of providing a graphic display comprises the step of determining a location of said symbols on said graphic display of said airport in accordance with data received from said light assembly means.

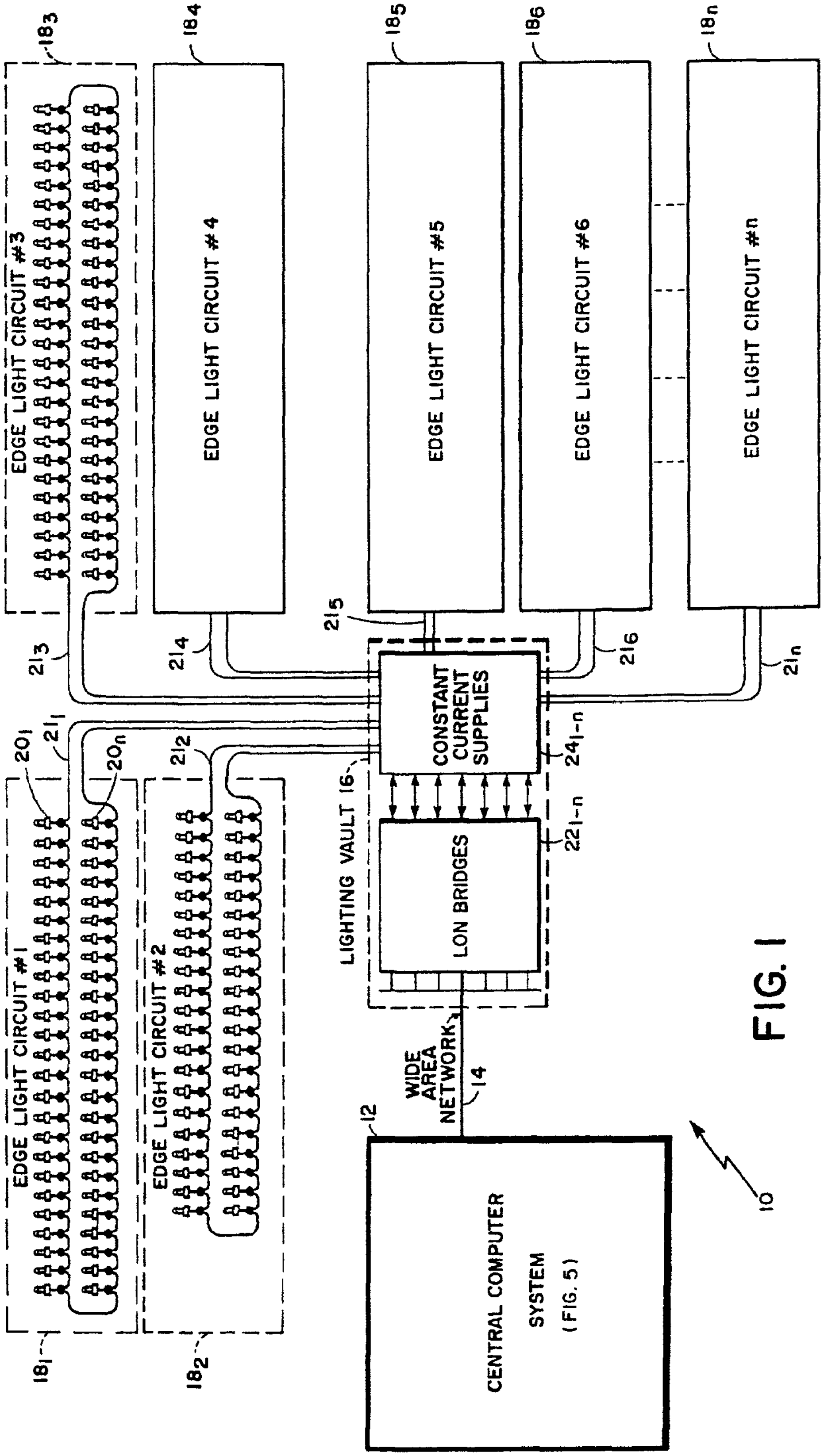
EDGE LIGHT CIRCUIT #1
EDGE LIGHT CIRCUIT #2
EDGE LIGHT CIRCUIT #3
EDGE LIGHT CIRCUIT #4
EDGE LIGHT CIRCUIT #5
EDGE LIGHT CIRCUIT #6
EDGE LIGHT CIRCUIT #n
CONSTANT CURRENT SUPPLIES
LON BRIDGES
LIGHTING VAULT 16
WIDE AREA NETWORK
14
12
10
CENTRAL COMPUTER SYSTEM
(FIG. 5)
18_1
18_2
18_3
18_4
18_5
18_6
18_n
20_1
20_n
21_1
21_2
21_3
21_4
21_5
21_6
21_n
22_{1-n}
24_{1-n}

FIG. 1

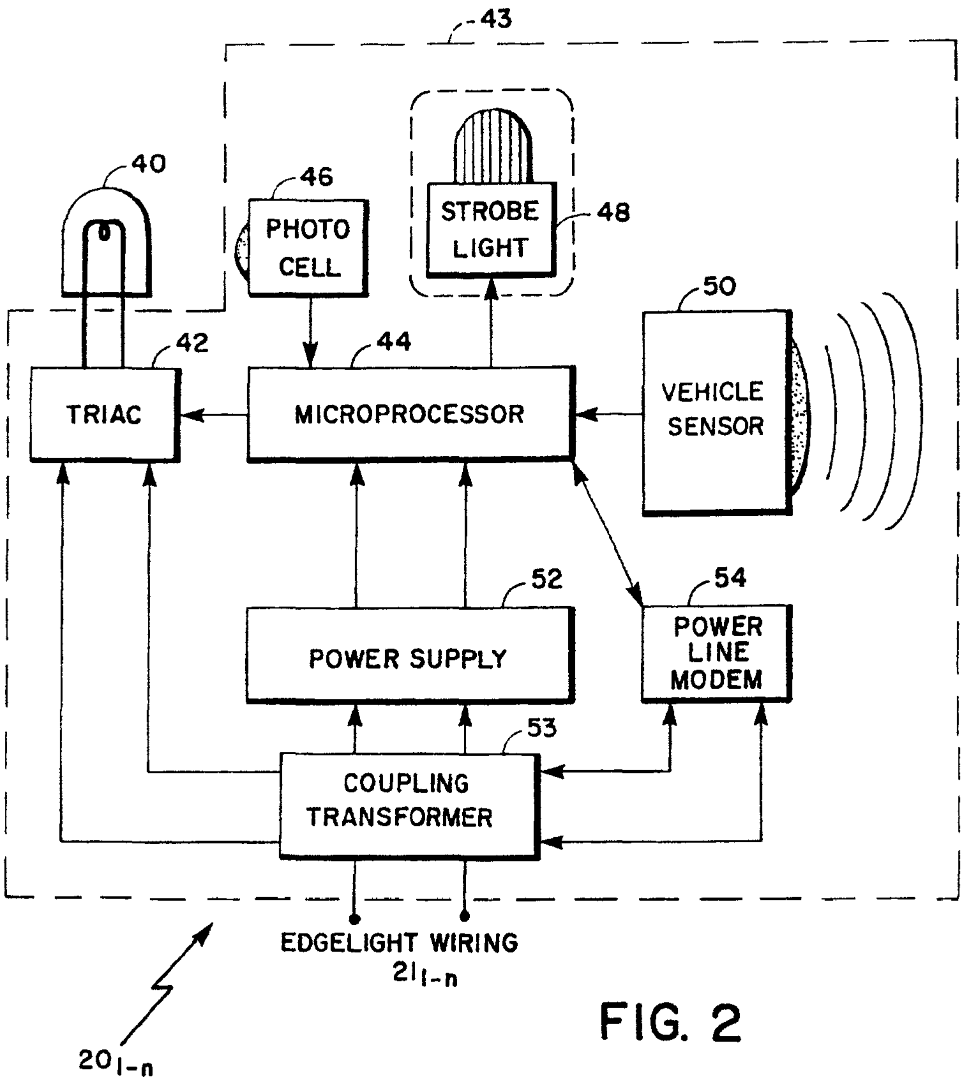
43
40
46
PHOTO CELL
STROBE LIGHT
48
50
42
44
TRIAC
MICROPROCESSOR
VEHICLE SENSOR
52
54
POWER SUPPLY
POWER LINE MODEM
53
COUPLING TRANSFORMER
EDGELIGHT WIRING
21_{1-n}
20_{1-n}

FIG. 2

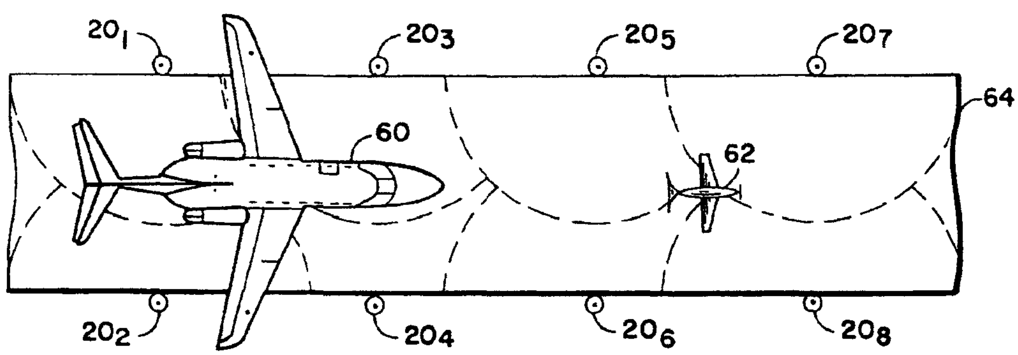
20_1
20_3
20_5
20_7
64
60
62
20_2
20_4
20_6
20_8

FIG. 4

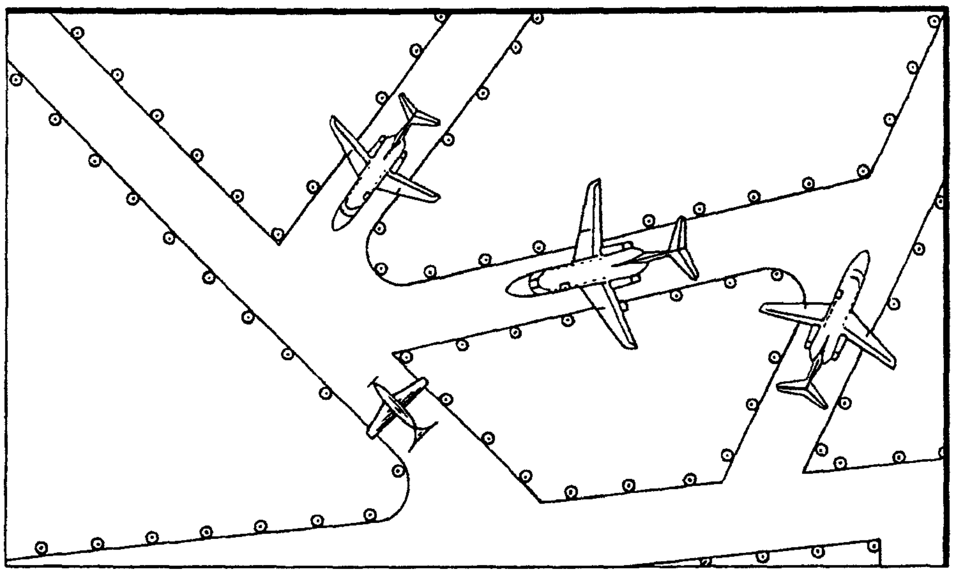

FIG. 8

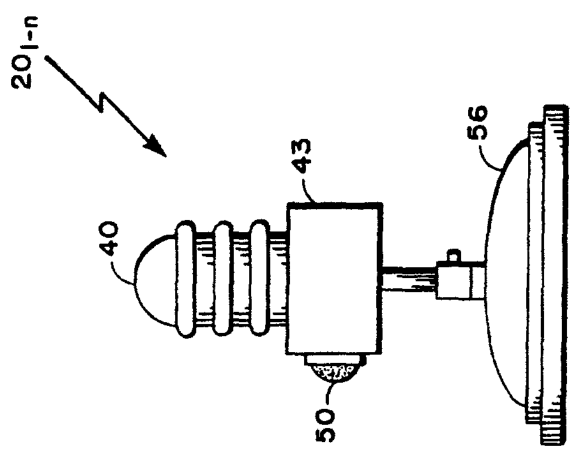

FIG. 3

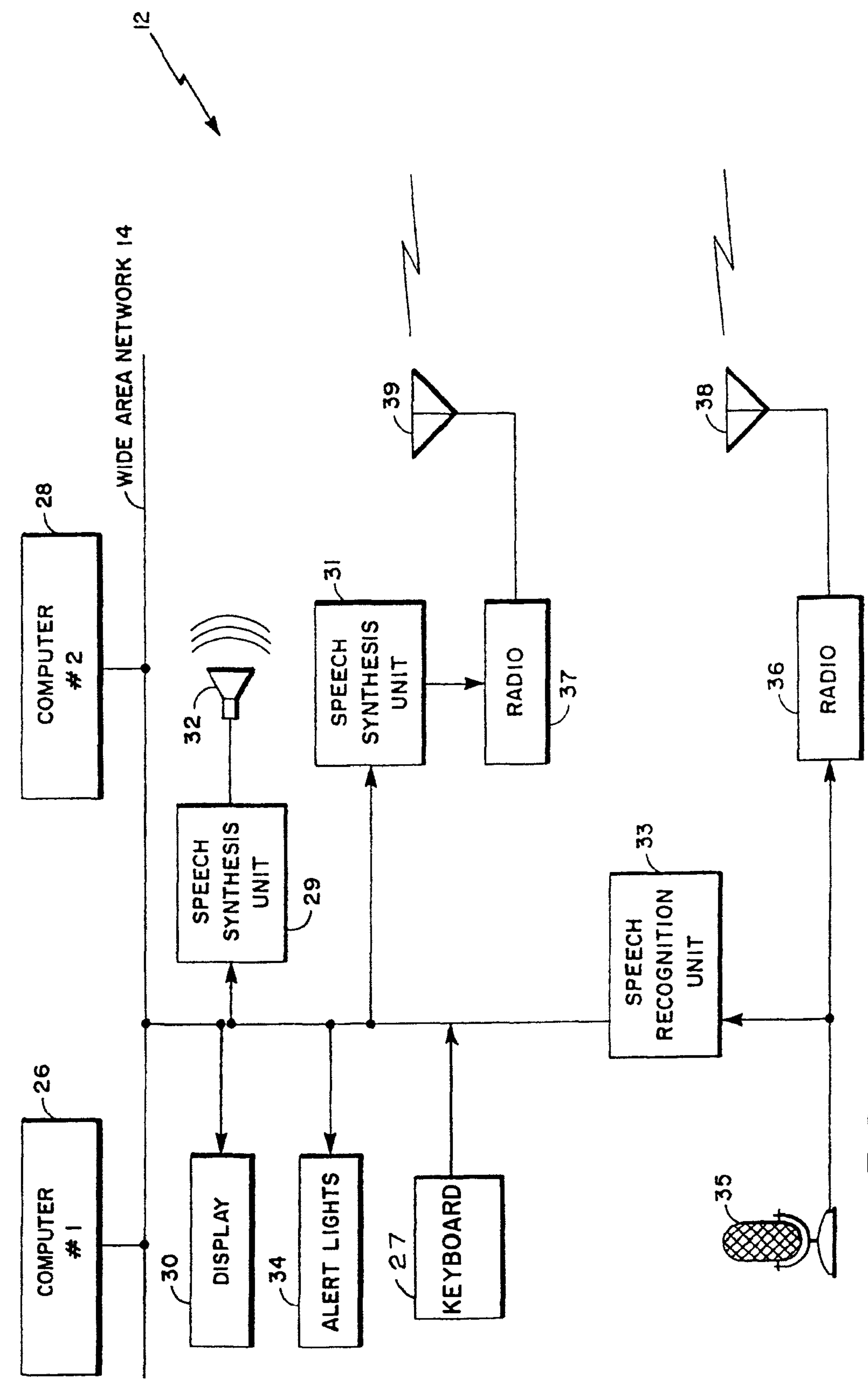
12
WIDE AREA NETWORK 14
COMPUTER #2
28
COMPUTER #1
26
SPEECH SYNTHESIS UNIT
29
32
SPEECH SYNTHESIS UNIT
31
RADIO
37
39
RADIO
36
38
SPEECH RECOGNITION UNIT
33
DISPLAY
30
ALERT LIGHTS
34
KEYBOARD
27
35

FIG. 5

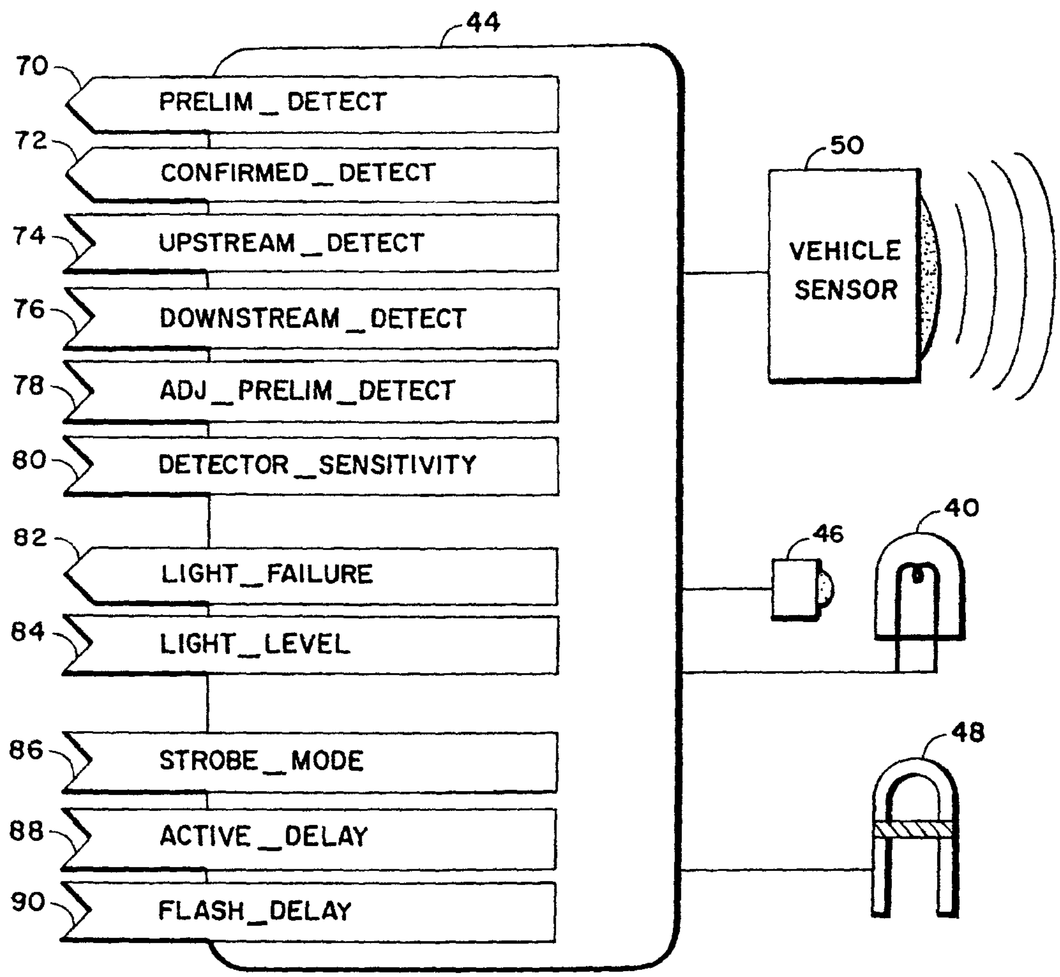
44
70
PRELIM _ DETECT
72
CONFIRMED _ DETECT
74
UPSTREAM _ DETECT
76
DOWNSTREAM _ DETECT
78
ADJ _ PRELIM _ DETECT
80
DETECTOR _ SENSITIVITY
82
LIGHT _ FAILURE
84
LIGHT _ LEVEL
86
STROBE _ MODE
88
ACTIVE _ DELAY
90
FLASH _ DELAY
50
VEHICLE
SENSOR
46
40
48

FIG. 6

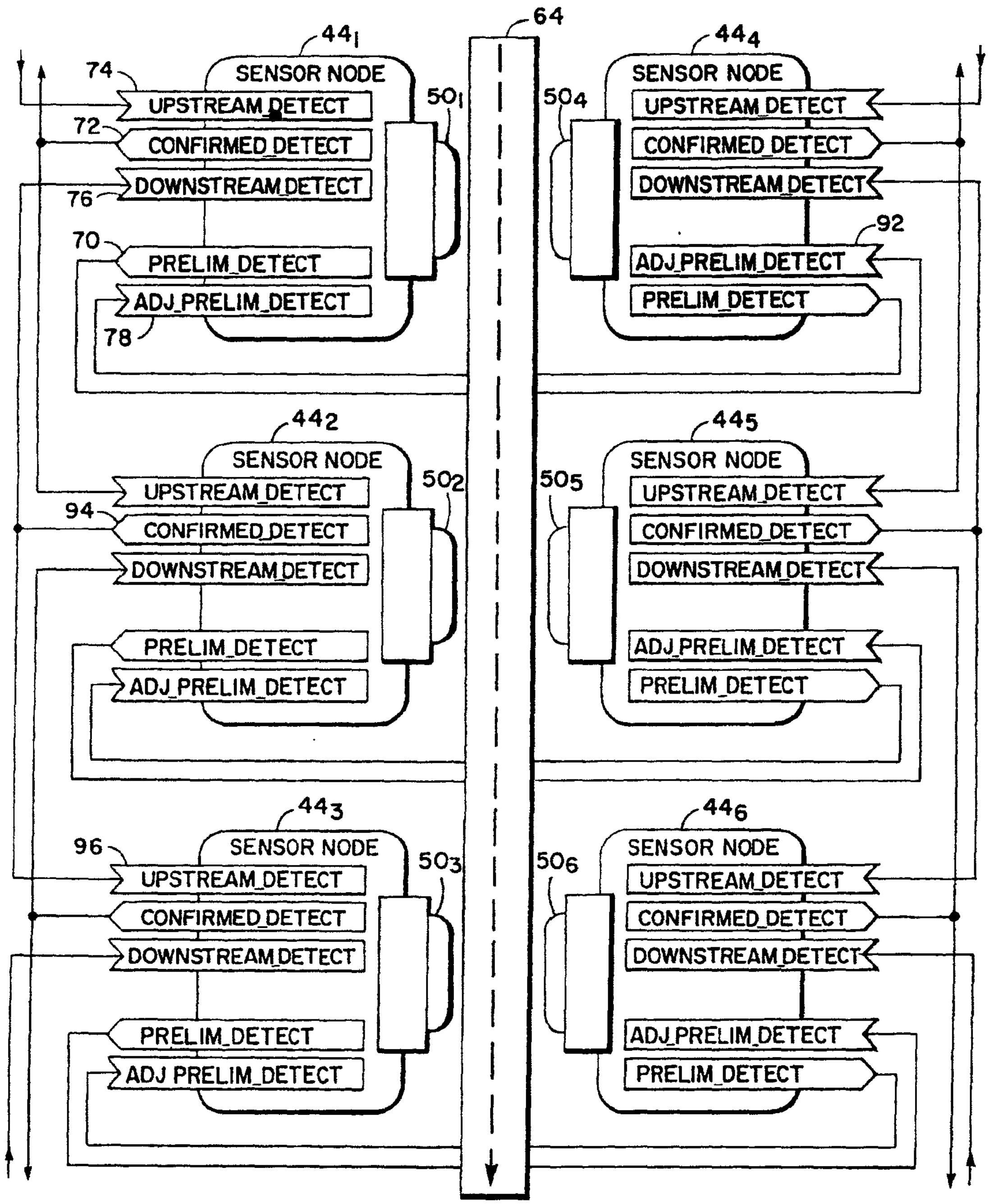
64
44_1
SENSOR NODE
74
UPSTREAM DETECT
72
CONFIRMED DETECT
DOWNSTREAM DETECT
76
70
PRELIM DETECT
ADJ PRELIM DETECT
78
50_1
44_4
SENSOR NODE
UPSTREAM DETECT
CONFIRMED DETECT
DOWNSTREAM DETECT
92
ADJ PRELIM DETECT
PRELIM DETECT
50_4
44_2
SENSOR NODE
UPSTREAM DETECT
94
CONFIRMED DETECT
DOWNSTREAM DETECT
PRELIM DETECT
ADJ PRELIM DETECT
50_2
44_5
SENSOR NODE
UPSTREAM DETECT
CONFIRMED DETECT
DOWNSTREAM DETECT
ADJ PRELIM DETECT
PRELIM DETECT
50_5
44_3
SENSOR NODE
96
UPSTREAM DETECT
CONFIRMED DETECT
DOWNSTREAM DETECT
PRELIM DETECT
ADJ PRELIM DETECT
50_3
44_6
SENSOR NODE
UPSTREAM DETECT
CONFIRMED DETECT
DOWNSTREAM DETECT
ADJ PRELIM DETECT
PRELIM DETECT
50_6

FIG. 7

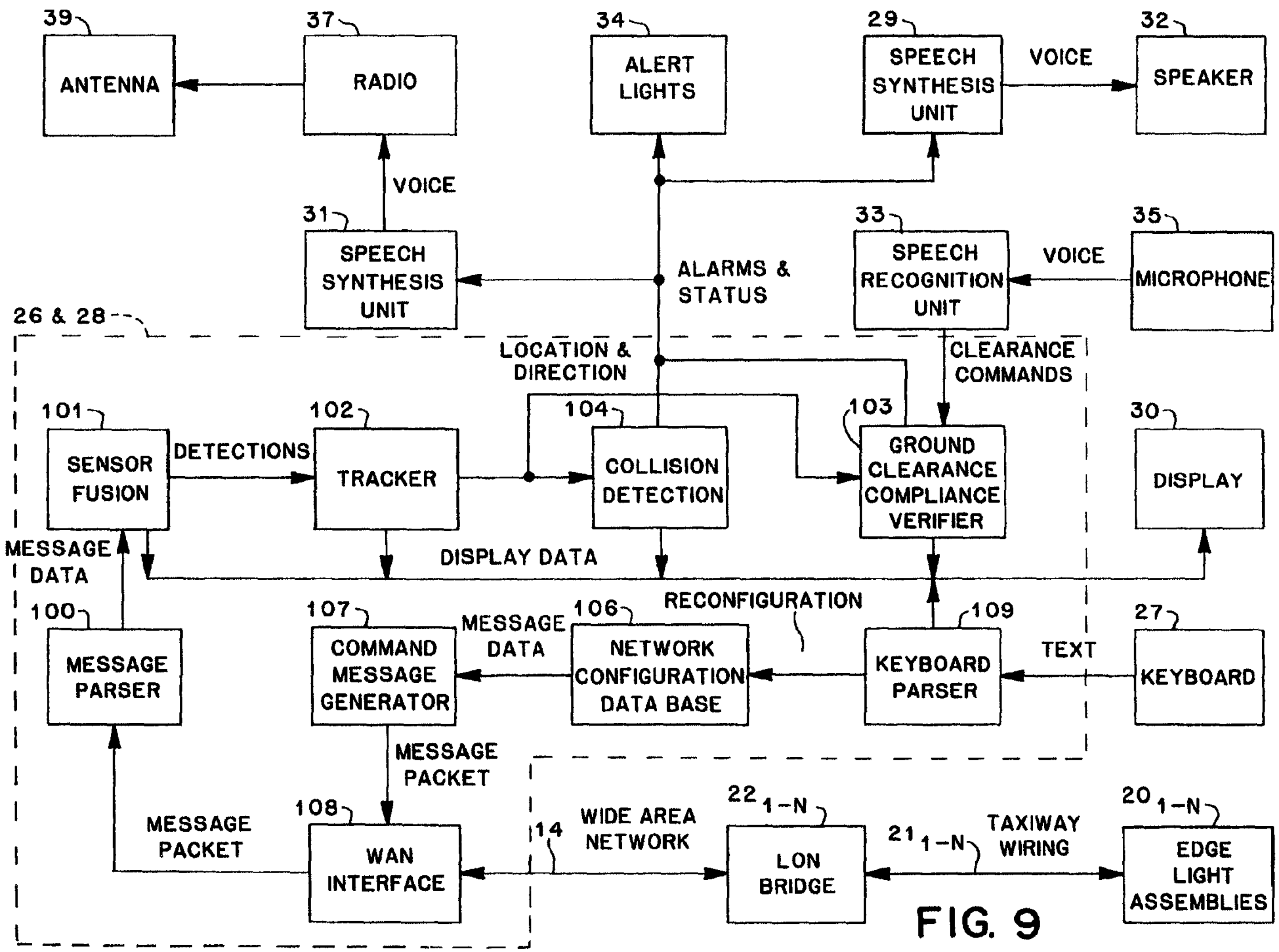
39 ANTENNA
37 RADIO
34 ALERT LIGHTS
29 SPEECH SYNTHESIS UNIT
VOICE
32 SPEAKER
VOICE
31 SPEECH SYNTHESIS UNIT
ALARMS & STATUS
33 SPEECH RECOGNITION UNIT
VOICE
35 MICROPHONE
26 & 28
LOCATION & DIRECTION
CLEARANCE COMMANDS
101 SENSOR FUSION
DETECTIONS
102 TRACKER
104 COLLISION DETECTION
103 GROUND CLEARANCE COMPLIANCE VERIFIER
30 DISPLAY
MESSAGE DATA
DISPLAY DATA
RECONFIGURATION
100 MESSAGE PARSER
107 COMMAND MESSAGE GENERATOR
MESSAGE DATA
106 NETWORK CONFIGURATION DATA BASE
109 KEYBOARD PARSER
TEXT
27 KEYBOARD
MESSAGE PACKET
MESSAGE PACKET
108 WAN INTERFACE
14 WIDE AREA NETWORK
22 1-N LON BRIDGE
21 1-N TAXIWAY WIRING
20 1-N EDGE LIGHT ASSEMBLIES

FIG. 9

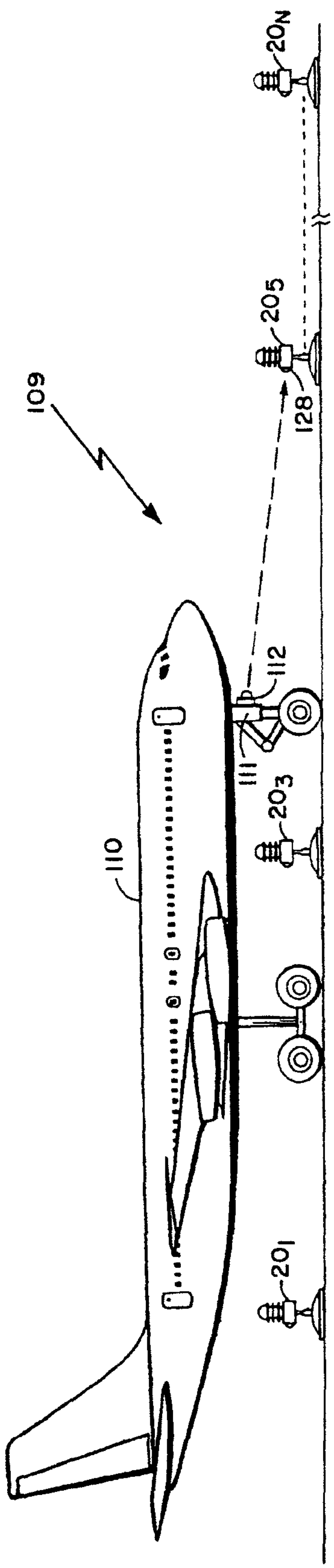
109
110
20N
205
128
112
111
203
201

FIG. 10

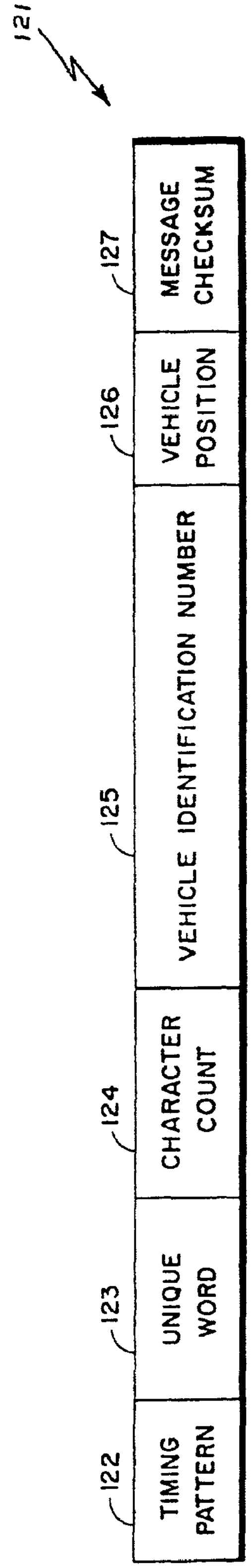
121
122
TIMING PATTERN
123
UNIQUE WORD
124
CHARACTER COUNT
125
VEHICLE IDENTIFICATION NUMBER
126
VEHICLE POSITION
127
MESSAGE CHECKSUM

FIG. 13

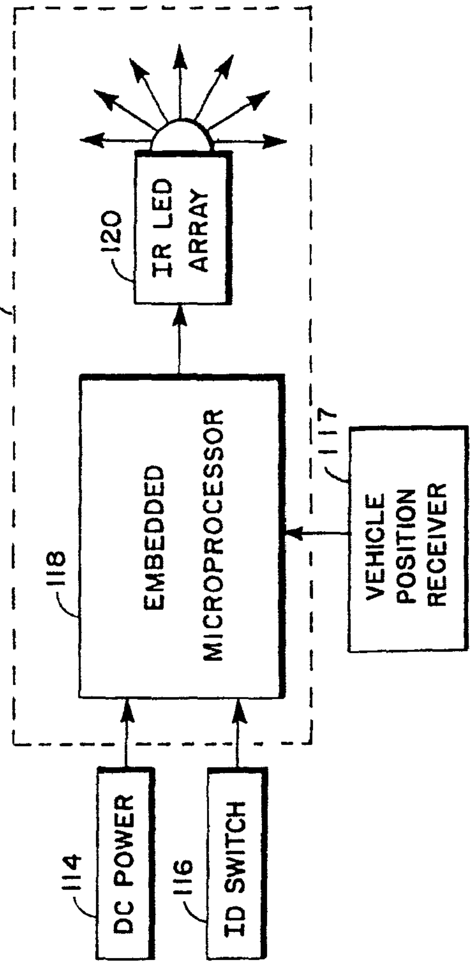
112
120
IR LED ARRAY
118
EMBEDDED MICROPROCESSOR
117
VEHICLE POSITION RECEIVER
114
DC POWER
116
ID SWITCH

FIG. 11

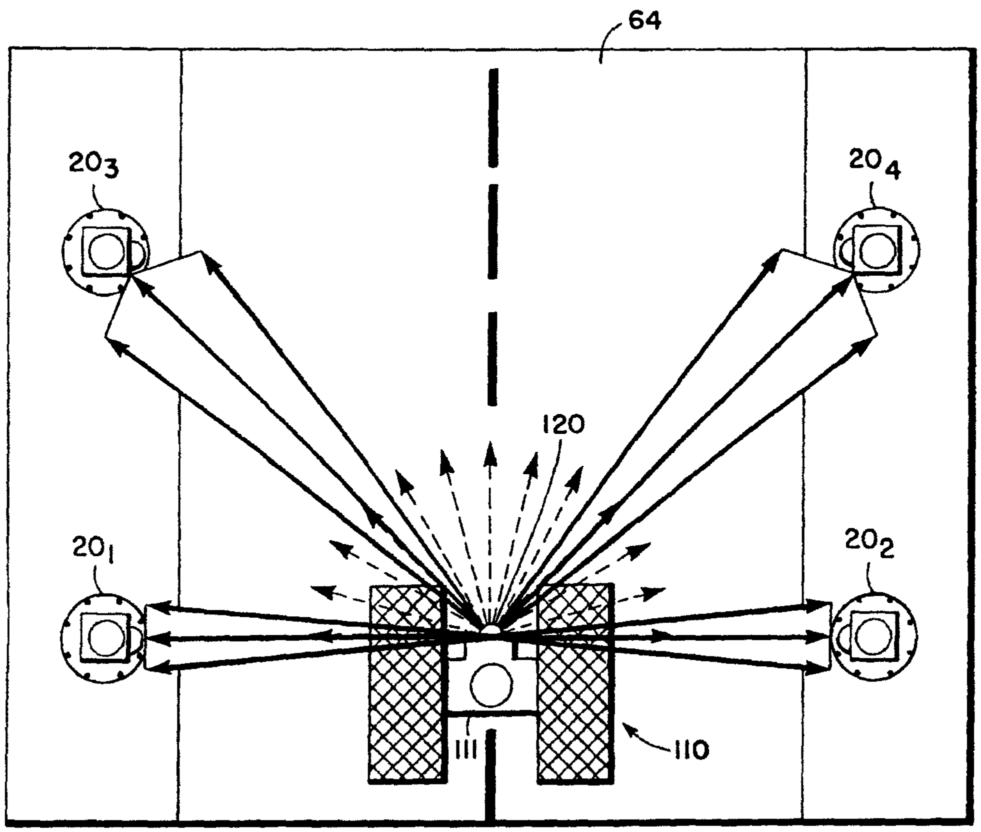

FIG. 12

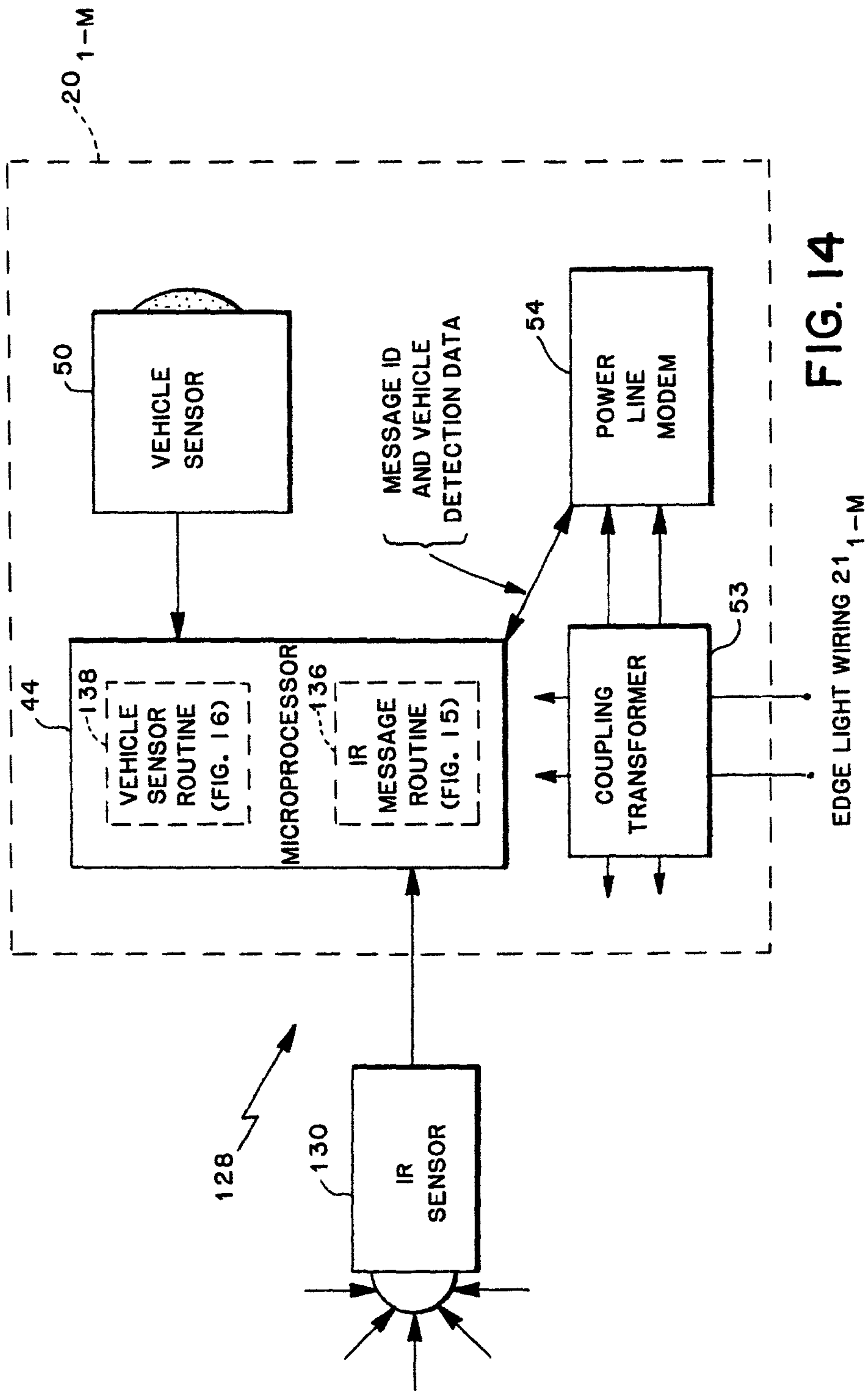
20 1–M
50
VEHICLE SENSOR
MESSAGE ID AND VEHICLE DETECTION DATA
54
POWER LINE MODEM
44
138
VEHICLE SENSOR ROUTINE (FIG. 16)
MICROPROCESSOR
136
IR MESSAGE ROUTINE (FIG. 15)
COUPLING TRANSFORMER
53
EDGE LIGHT WIRING 21 1–M
128
130
IR SENSOR

FIG. 14

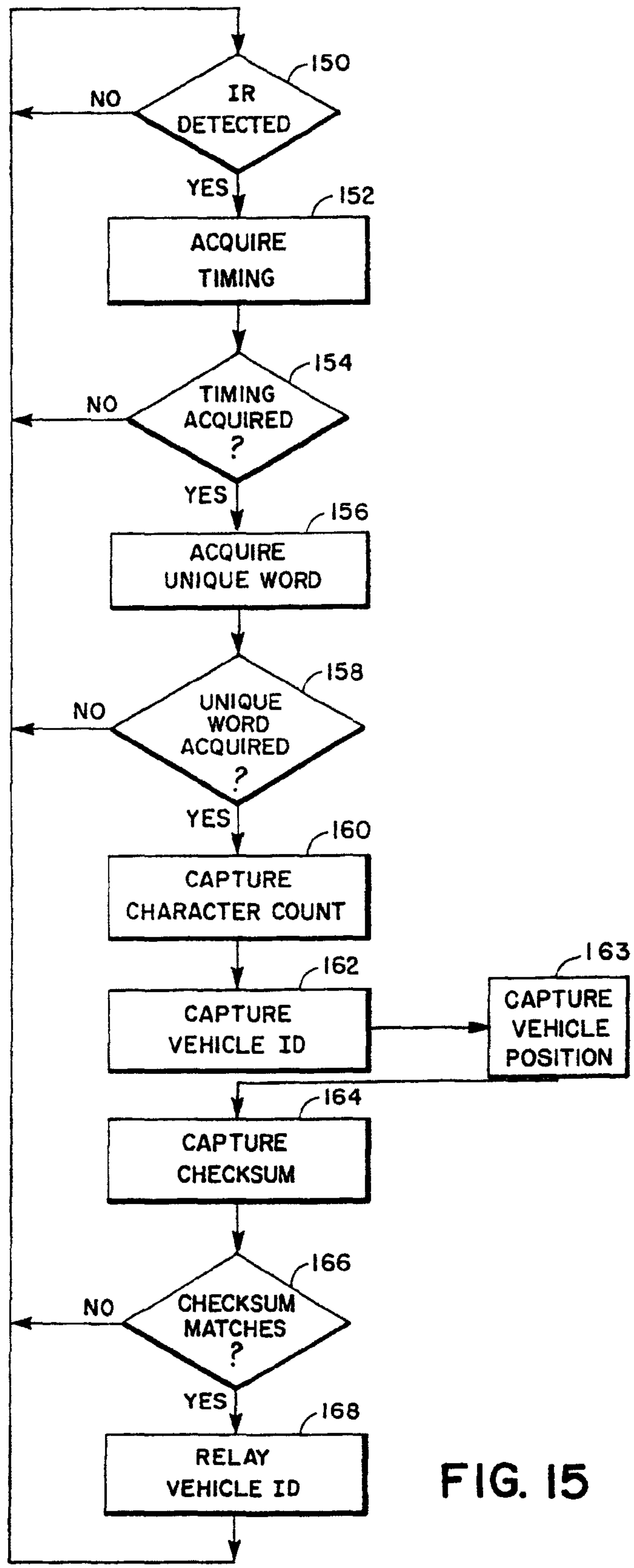
150
IR DETECTED
NO
YES
152
ACQUIRE TIMING
154
TIMING ACQUIRED ?
NO
YES
156
ACQUIRE UNIQUE WORD
158
UNIQUE WORD ACQUIRED ?
NO
YES
160
CAPTURE CHARACTER COUNT
162
CAPTURE VEHICLE ID
163
CAPTURE VEHICLE POSITION
164
CAPTURE CHECKSUM
166
CHECKSUM MATCHES ?
NO
YES
168
RELAY VEHICLE ID

FIG. 15

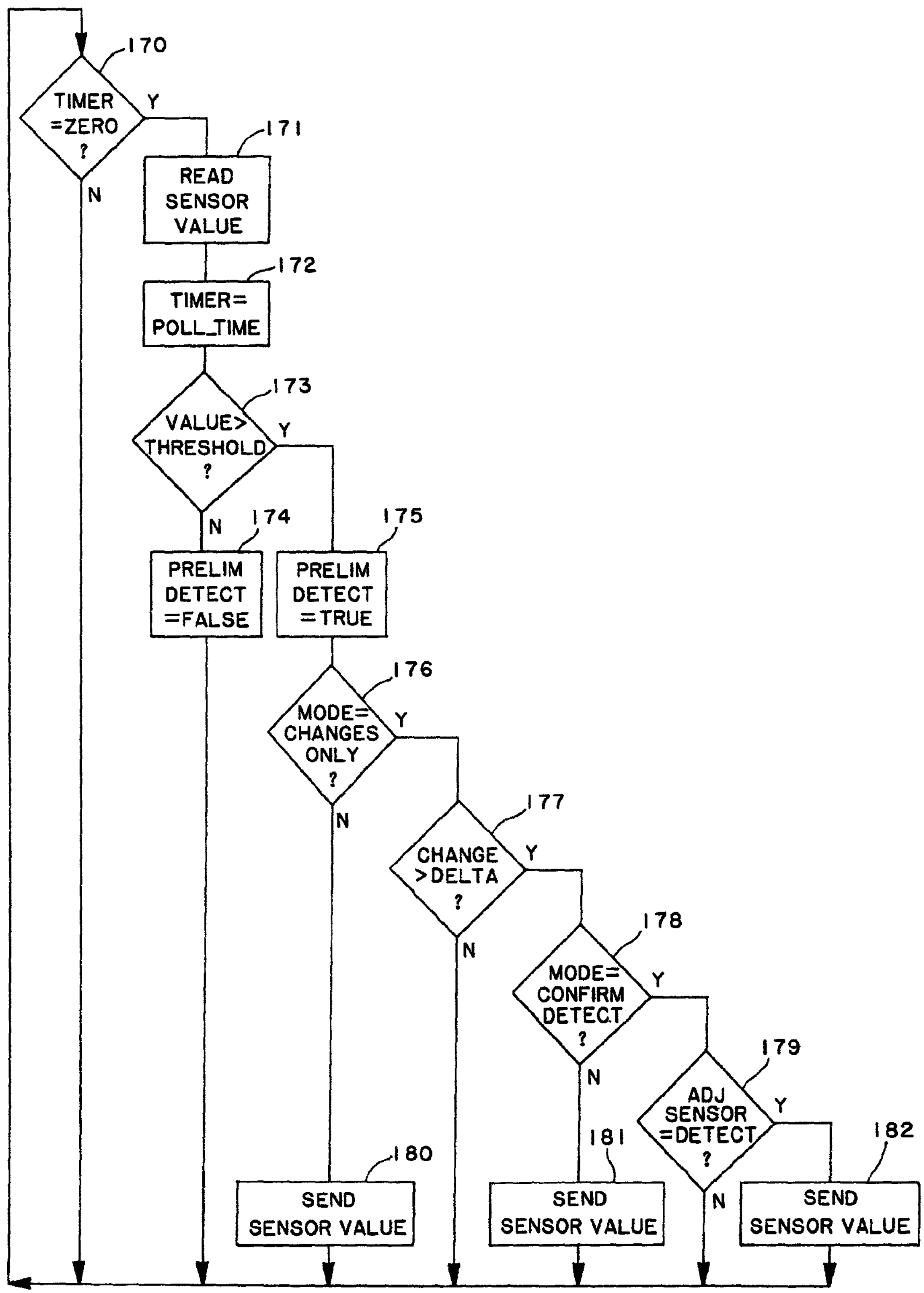
170
TIMER =ZERO ?
Y
N
171
READ SENSOR VALUE
172
TIMER= POLL_TIME
173
VALUE> THRESHOLD ?
Y
N
174
175
PRELIM DETECT =FALSE
PRELIM DETECT =TRUE
176
MODE= CHANGES ONLY ?
Y
N
177
CHANGE >DELTA ?
Y
N
178
MODE= CONFIRM DETECT ?
Y
N
179
ADJ SENSOR =DETECT ?
Y
N
180
SEND SENSOR VALUE
181
SEND SENSOR VALUE
182
SEND SENSOR VALUE

FIG. 16

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 1261

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
Y	US-A-3 855 571 (MASSA) * the whole document * ---	1-40	G08G5/06
Y	WO-A-90 04242 (SWEDISH AIRPORT TECHNOLOGY HB) * the whole document * ---	1-40	
Y	FR-A-2 620 551 (RINALDI) * the whole document * ---	2-5,10, 16,18, 21,22, 33,36,37	
Y	EP-A-0 209 397 (GENERAL DE INVESTIGACION Y DESARROLLO S.A.) * claims 1,5-13,23,27 *	7-9, 13-15, 24,39,40	
D	& US-A-4 845 629 (MURGA ET AL.) ---		
Y	US-A-4 093 937 (HABINGER) * column 2, line 3 - line 33 * ---	26	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
Y	US-A-3 706 969 (PAREDES) * column 3, line 18 - column 4, line 59 * * column 22, line 57 - column 23, line 28 * -----	30,31	G08G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 June 1994	Reekmans, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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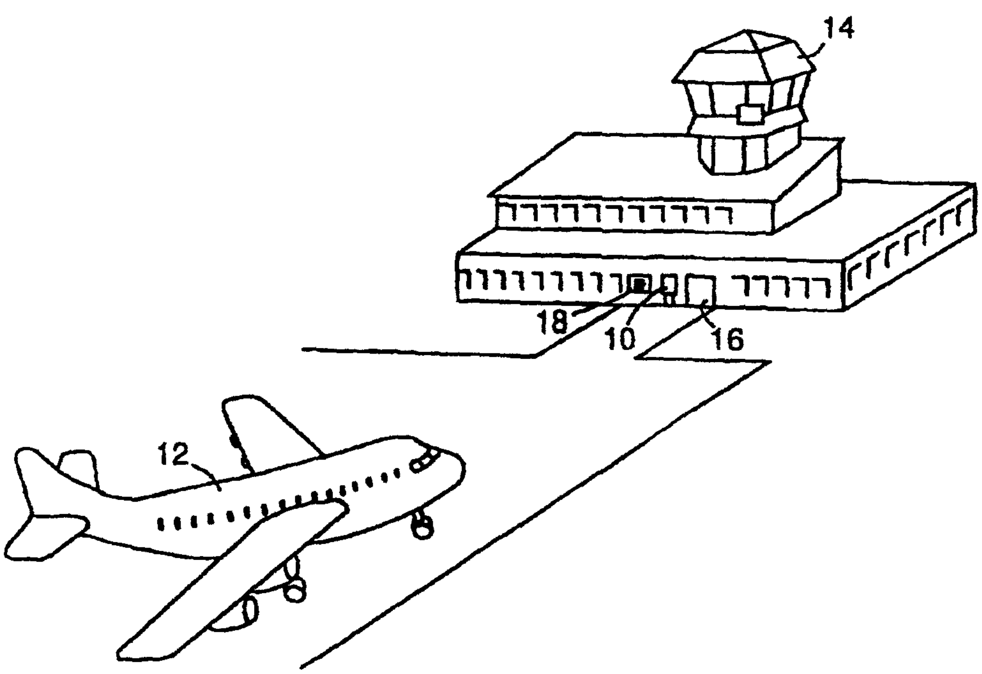

(57) Abstract

A system for detecting, identifying and docking aircraft using laser pulses to obtain a profile of an object in the distance. The system initially scans the area in front of the gate until it locates and identifies an object. Once the identity of the object is known, the system tracks the object. By using the information from the profile, the system can in real time display the type of airplane, the distance from the stopping point and the lateral position of the airplane.

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AIRCRAFT IDENTIFICATION AND DOCKING GUIDANCE SYSTEMS

BACKGROUND OF THE INVENTION

Field Of The Invention

This invention relates to systems for locating, identifying and tracking objects. More particularly, it relates to aircraft location, identification and docking guidance systems and to ground traffic control methods for locating and identifying objects on an airfield and for safely and efficiently docking aircraft at such airport.

Description Of Related Art

In recent years there has been a significantly increased amount of passenger, cargo and other aircraft traffic including take offs, landings and other aircraft ground traffic. Also there has been a marked increase in the number of ground support vehicles which are required to off load cargo, provide catering services and on going maintenance and support of all aircraft. With this substantial increase in ground traffic has come a need for greater control and safety in the docking and identification of aircraft on an airfield.

Examplary of prior art systems which have been poposed for detecting the presence of aircraft and other traffic on an airfield are those systems disclosed in U.S. Patent 4,995,102; European Patent No. 188 757; and PCT Published Applications W0 93/13104 and W0 93/15416.

However, none of those systems have been found to be satisfactory for detection of the presence of aircraft on an airfield, particularly, under adverse climatic conditions causing diminished visibility such as encountered under fog, snow or sleet conditions. Furthermore, none of the systems disclosed in the prior references are capable of identifying and verifying the specific configuration of an approaching aircraft. Still further, none of the prior systems provide adequate techniques for tracking and docking an aircraft at a designated stopping point such as an airport loading gate. Also. none of the prior systems have provided techniques which enable adequate calibration of the instrumentation therein.

Thus, it has been a continuing problem to provide systems which are sufficiently safe and reliable over a wide range of atmospheric conditions to enable detection of objects such as aircraft and other ground traffic on an airfield.

In addition, there has been a long standing need for systems which are not only capable of detecting objects such as aircraft, but which also provide for the effective identification of the detected object and verification of the identity of such object, for example, a detected aircraft with the necessary degree of cetainty regardless of prevailing weather conditions and magnitude of ground traffic.

There has also been a long standing, unfulfilled need for systems which are capable of accurately and efficiently tracking and guiding objects such as incoming aircraft to a suitable stopping point such as an airport loading gate. In addition, the provision of accurate and effective calibration techniques for such systems has been a continuing problem requiring resolution.

SUMMARY OF THE INVENTION

In order to overcome the foregoing problems, systems and methods are required which are capable of achieving accurate, safe, efficient and cost effective location of objects such as aircraft on an airfield and for proper identification and verification of the identity of such objects. In addition, systems and methods are required for tracking and docking guidance of objects such as aircraft, particularly, in a real time operating mode. Furthermore, systems and methods are required for calibration of such operating systems.

Accordingly, it is a primary object of the present invention to provide such systems and methods. In this regard, it is a specific object of the present invention to provide docking guidance systems whieh are capable of determining the precise position as well as verifying the identity of aircraft on an airfield. Another object of the invention is to provide information to an individual or individuals controlling the docking or parking of aircraft on an airfield via a display unit utilizing communications between the system and a personal computer and other methods for monitoring the overall method operation.

A further object is to provide the safety of digitally precise docking control and, also, to provide for implementation of such control in an extremely cost effect manner.

A still further object is to provide for the display of aircraft docking information for use by a pilot, co-pilot or other personnel docking an aircraft including information concerning the closing rate distance from an appropriate stopping point for the aircraft. Another significant object is to provide for the automatic comparison and determination that the aircraft positioning and incoming direction does not deviate from the appropriate path necessary for the particular type of aircraft being docked and. particularly, to provide visual feedback as to the closing distance in a countdown format from a display, positioned forward of the aircraft which contains the distance for docking. position to left or right of appropriate center line for docking and a check of the aircraft type.

Yet another object is to provide systems which not only provide azimuth guidance to either the pilot or the co-pilot, but also provide for scanning of the apron to enable appropriate and safe docking of an aircraft. Another object is to provide systems which are particularly sensitive so that accurate parking positions are achieved within extremely minimal tolerances.

A further object is to provide systems which are extremely flexible and allow for the implementation of new operational parameters such as adding new aircraft types, alternate or secondary parking stop positions and other related information in regard to identifying, guiding and docking aircraft on an airfield.

These and other objects of the invention are accomplished by providing systems and methods for detecting the presence of an object on an airfield employing light pulses such as laser pulses projected, for example, off of mirrors in the direction of an incoming object positioned within a capture zone on the airfield and collecting light pulses reflected off the object which indicates the presence of the object. Likewise, this technique enables the determination of the aircraft's position within the capture zone as well as the detection thereof.

The present invention also provides systems and methods for verifying the identity of the detected object which, for example, enables a determination that the correct type of aircraft is approaching the docking facility and is to be docked therein. Such verification systems and methods involve the projection of light pulses such as laser pulses in angular coordinates onto an object and collecting reflected pulses off of the object in a detection device which enables a comparison of the reflected pulses to be made with a profile corresponding to the shape of a known object in order to determine whether the detected shape corresponds to the known shape.

Furthermore, the present invention provides systems and methods for tracking incoming objects wherein light pulses such as laser pulses are projected onto an incoming object and the light reflected from the object is collected and employed in order to assertain the position of the object relative to an imaginary axial line projecting from a predetermined docking point and to detect the distance between the object and the predetermined point for purposes of determining the location of the object.

Thus, the present invention provides for the location or capture of an approaching aircraft and for the identification or recognition of its shape within a designated capture zone or control area which is essential in initiating an aircraft docking procedure. Thereafter, in accordance with the present invention, a display is provided which enables docking of the identified aircraft in an appropriate docking area for off loading of passengers, cargo and the like.

The present invention accomplishes these features while eliminating the heretofore standard need for sensors which must be embedded in the apron of the docking areas. This results in a significant reduction not only in installation time and associated costs but, also, reduces maintenance costs thereafter. Furthermore, this invention permits retrofitting of the present systems into existing systems without requiring apron construction and the accompanying interruption in use of the airport docking areas which has been required with prior devices previously used for docking guidance systems.

In preferred embodiments of the systems of the present invention, a pilot bringing an aircraft into a gate at an airport is provided with a real time display mounted, for example, above the gate which indicates the aircraft's position relative to the point where the pilot must start to brake the plane. Also displayed is the aircraft's lateral position compared to a predetermined line for a plane of its type to follow in order to most expeditiously arrive at the gate.

The software employed in the systems of the present invention preferably comprises four modules which perform the main computational tasks of the system and control the hardware. These modules include one for capture, one for identification, one for tracking and one for calibration of the system.

In a preferred embodiment of this invention, the capture module is employed to direct the devices for projecting light pulses to scan the area in front of a docking gate. Thus, when mirrors are employed to reflect and project pulses such as laser pulses, the capture module continues to direct the laser to scan this area until it detects an object entering the area. Once it detects an object, the capture module computes the distance and the angular position of the object and passes control onto the tracking module.

Once activated, the tracking module follows the incoming aircraft to the gate while providing information about its lateral location and distance relative to the desired stopping point. Using this information, the pilot can correct the course of the plane and brake at the precise point that will result in stopping the aircraft in a desired docking position in alignment with the gate. During the tracking, an identification module first scans the detected object to determine if its profile matches the reference profile of the type of aircraft expected. If the profiles do not match, the system informs the airport tower and a signal is transmitted for stopping the docking function.

Finally, the calibration module calibrates the distance and angular measurements to ensure that the readings of the detection devices such as a Laser Range Finder accurately correspond to the distance and angle of the aircraft. This module runs periodically during the capture and tracking modules to determine the continued accuracy of the system.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings wherein:

Fig 1	is a view illustrating the system as in use at an airport;
Fig 2	is a diagrammatic view illustrating the general componentry of a preferred system in accordance with the present invention;.
Fig 3	is a top plan view illustrating the detection area in front of a docking gate which is established for purposes of detection and identification of approaching aircraft;
Fig 4	is a flow chart illustrating the main routine and the docking mode of the system;
Fig 5	is a flow chart illustrating the calibration mode of the system;
Fig 6	is a view illustrating the components of the calibration mode;
Fig 7	is a flow chart illustrating the capture mode of the system;
Fig 8	is a flow chart illustrating the tracking phase of the system;
Fig 9	is a flow chart illustrating the height measuring phase of the system; and
Fig 10	is a flow chart illustrating the identification phase of the system.
Table I	is a preferred embodiment of a Horizontal Reference Profile Table which is employed to establish the identity of an aircraft in the systems of the present invention;
Table II	is a preferred embodiment of a Comparison Table which is employed in the systems of the present invention for purposes of effectively and efficiently docking an aircraft;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is now made to Figures 1-10 and Tables I-II, in which like numerals designate like elements throughout the several views. Throughout the following detailed description, numbered stages depicted in the illustrated flow diagrams are generally indicated by element numbers in parenthesis following such references

Referring to Fig. 1, the systems of the present invention generally designated 10 in the drawings provide for the computerized location of an object. verification of the identity of the object and tracking of the object, the object preferably being an aircraft 12. In operation, once the control tower 14 lands an aircraft 12, it informs the system that a plane is approaching the gate 16 and the type of aircraft (i.e., 747, L-1011, etc.) expected. The system 10 then scans the area in front of the gate 16 until it locates an object that it identifies as an airplane 12. The system 10 then compares the profile of the aircraft 12 with a reference profile for the expected type of aircraft. If the located aircraft does not match the expected profile, the system informs or signals the tower 14 and shuts down.

If the object is the expected aircraft 12, the system 10 tracks it into the gate 16 by displaying in real time to the pilot the distance remaining to the proper stopping point 29 and the lateral position 31 of the plane 12. The lateral position 31 of the plane 12 is provided on a display 18 allowing the pilot to correct the position of the plane to approach the gate 16 from the correct angle. Once the airplane 12 is at its stopping point 53, this fact is shown on the display 18 and the pilot stops the plane. Employing the system 10 of the present invention, it should be noted that once the plane 12 comes to rest, it is accurately aligned with the gate 16 requiring no adjustment of the gate 16 by the ground staff.

Referring to Fig. 2, the system 10 consists of a Laser Range Finder (LRF) 20, two mirrors 21, 22, a display unit 18, two step motors 24, 25, and a microprocessor 26. Suitable LRF products for use herein are sold by Laser Atlanta Corporation and are capable of emitting laser pulses and receiving the reflections of those pulses reflected off of distant objects and computing the distance to those objects.

The system 10 is arranged such that there is a connection 28 between the serial port of the LRF 20 and the microprocessor 26. Through this connection, the LRF 20 sends measurement data approximately every 1/400th of a second to the microprocessor 26. The hardware components generally designated 23 of the system 10 are controlled by the programmed microprocessor 26. In addition, the microprosessor 26 feeds data to the display 18. As the interface to the pilot, the display unit 18 is placed above the gate 16 to show the pilot how far the plane is from its stopping point 29, the type of aircraft 30 the system believes is approaching and the lateral location of the plane 31. Using this display, the pilot can adjust the approach of the plane 12 to the gate 16 to ensure the plane is on the correct angle to reach the gate. If the display 18 is showing the wrong aircraft type 30, the pilot can abort the approach before any damage is done. This double check ensures the safety of the passengers, plane and airport facilities because if the system tries to maneuver a larger 747 as if it was a 737, it likely will cause extensive damage.

In addition to the display 18, the microprocessor 26 processes the data from the LRF 20 and controls the direction of the laser 20 through its connection 32 to the step motors 24, 25. The step motors 24, 25 are connected to the mirrors 21, 22 and move them in response to instructions from the microprocessor 26. Thus, by controlling the step motors 24, 25, the microprocessor 26 can change the angle of the mirrors 21, 22 and aim the laser pulses from the LRF 20.

The mirrors 21, 22 aim the laser by reflecting the laser pulses outward over the tarmac of the airport. In the preferred embodiment, the LRF 20 does not move. The scanning by the laser is done with mirrors. One mirror 22 controls the horizontal angle of the laser while the other mirror 21 controls the vertical angle. By activating the step motors 24, 25, the microprocessor 26 controls the angle of the mirrors and thus the direction of the laser pulse.

The system 10 controls the horizontal mirror 22 to achieve a continuous horizontal scanning within a ±10 degree angle in approximately 0.1 degree angular steps which are equivalent to 16 microsteps per step with the Escap EDM-453 step motor. One angular step is taken for each reply from the reading unit, i.e., approximately every 2.5 ms. The vertical mirror 21 can be controlled to achieve a vertical scan between +20 and -30 degrees in approximately 0.1 degree angular steps with one step every 2.5 ms. The vertical mirror 21 is used to scan vertically when the nose height is being determined and when the aircraft 12 is being identified. During the tracking mode, the vertical mirror 21 is continuously adjusted to keep the horizontal scan tracking the nose tip of the aircraft 12.

Referring to Fig. 3, the system 10 divides the field in front of it by distance into three parts. The farthest section, from about 50 meters out, is the capture zone 50. In this zone 50, the system 10 detects the aircraft's nose and makes a rough estimate of lateral and longitudinal position of the aircraft 12. Inside the capture zone 50 is the identification area 51. In this area, the system 10 checks the profile of the aircraft 12 against a stored profile. The system 10 shows the lateral position of the aircraft 12 in this region, related to a predetermined line, on the display 18. Finally, nearest to the LRF 20 is the display or tracking area 52. In the display area 52, the system 10 displays the lateral and longitudinal position of the aircraft 12 relative to the correct stopping position with its highest degree of accuracy. At the end of the display area 52 is the stopping point 53. At the stopping point

53, the aircraft will be in the correct position at the gate 16.

In addition to the hardware and software, the system 10 maintains a database containing reference profiles for any type of aircraft it might encounter. Within this database, the system stores the profile for each aircraft type as a horizontal and vertical profile reflecting the expected echo pattern for that type of aircraft.

Referring to Table I, the system maintains the horizontal profile in the form of a Table I whose rows 40 are indexed by angular step and whose columns 41 are indexed by distance from the stopping position for that type of aircraft. In addition to the indexed rows, the table contains a row 42 providing the vertical angle to the nose of the plane at each distance from the LRF, a row 44 providing the form factor, k, for the profile and a row 45 providing the number of profile values for each profile distance. The body 43 of the Table I contains expected distances for that type of aircraft at various scanning angles and distances from the stopping point 53.

Theoretically, the 50 angular steps and the 50 distances to the stopping point 53 would require a Table I containing 50 x 50, or 2500, entries. However, the Table I will actually contain far fewer entries because the profile will not expect a return from all angles at all distances. It is expected that a typical table will actually contain between 500 and 1000 values. Well known programming techniques provide methods of maintaining a partially full table without using the memory required by a full table.

In addition to the horizontal profile, the system 10 maintains a vertical profile of each type of aircraft. This profile is stored in the same manner as the horizontal profile except its rows are indexed by angular steps in the vertical direction and its column index contains fewer distances from the stopping position than the horizontal profile. The vertical profile requires fewer columns because it is used only for identifying the aircraft 12 and for determining its nose height, which take place at a defined range of distances from the LRF 20 in the identification area 51. Consequently, the vertical profile stores only the expected echoes in that range without wasting data storage space on unneeded values.

The system 10 uses the previously described hardware and database to locate, identify and track aircraft using the following procedures:

Referring to Fig. 4, the software running on the microprocessor performs a main routine containing subroutines for the calibration mode 60, capture mode 62 and docking mode 64. The microprocessor first performs the calibration mode 60, then the capture mode 62 and then the docking mode 64. Once the aircraft 12 is docked, the program finishes. These modes are described in greater detail as follows:

Calibration Mode

To ensure system accuracy, the microprocessor 26 is programmed to calibrate itself in accordance with the procedure illustrated in Fig. 5 before capturing an aircraft 12 and at various intervals during tracking. Calibrating the system 10 ensures that the relationship between the step motors 24, 25 and the aiming direction is known. The length measuring ability of the LRF 20 is also checked

Referring to Fig. 6, for calibration, the system 10 uses a square plate 66 with a known position. The plate 66 is mounted 6 meters from the LRF 20 and at the same height as the LRF 20.

To calibrate, the system sets (a,ß) to (0,0) causing the laser to be directed straight forward. The vertical mirror 22 is then tilted such that the laser beam is directed backwards to a rear or extra mirror 68 which redirects the beam to the calibration plate 66. (100) The microprocessor 26 then uses the step motors 24, 25 to move the mirrors 21, 22 until it finds the center of the calibration plate 66. Once it finds the center of the calibration plate 66, the microprocessor 26 stores the angles (α_{cp},β_{cp}) at that point and compares them to stored expected angles. (102) The system 10 also compares the reported distance to the plate 66 center with a stored expected value. (102) If the reported values do not match the stored values, the microprocessor 26 changes the calibration constants, which determine the expected values, until they do. (104, 106) However, if any of these values deviate too much from the values stored at installation, an alarm is given. (108)

Capture Mode

Initially, the airport tower 14 notifies the system 10 to expect an incoming airplane 12 and the type of airplane to expect. This signal puts the software into a capture mode 62 as outlined in Fig. 8. In capture mode 62, the microprocessor 26 uses the step motors 24, 25 to direct the laser to scan the capture zone 50 horizontally for the plane 12. This horizontal scan is done at a vertical angle corresponding to the height of the nose of the expected type of aircraft at the midpoint of the capture zone 50.

To determine the correct height to scan, the microprocessor 26 computes the vertical angle for the laser pulse as:

$$\beta_f = \arctan [(H-h)/l_f]$$

where H = the height of the LRF 20 above the ground, h = the nose height of the expected aircraft, and l_f = the distance from the LRF 20 to the middle of the capture zone 50. This equation results in a vertical angle for the mirror 21 that will enable the search to be at the correct height at the middle of the capture zone 50 for the expected airplane 12.

Alternatively, the system 10 can store in the database values for β_f for different types of aircraft at a certain distance. However, storing β_f limits the flexibility of the system 10 because it can capture an aircraft 12 only at a single distance from the LRF 20.

In the capture zone 50 and using this vertical angle, the microprocessor 26 directs the laser to scan horizontally in pulses approximately 0.1 degree apart. The microprocessor 26 scans horizontally by varying α, the horizontal angle from a center line starting from the LRF 20, between $\pm\alpha_{max}$, a value defined at installation. Typically, α_{max} is set to 50 which, using 0.1 degree pulses, is equivalent to 5 degrees and results in a 10 degree scan.

The release of the laser pulses results in echoes or reflections from objects in the capture zone 50. The detection device of the LRF 20 captures the reflected pulses, computes the distance to the object from the time between pulse transmission and receipt of the echo, and sends the calculated distance value for each echo to the microprocessor 26. The micro processor 26 stores, in separate registers in a data storage device, the total number of echoes or hits in each 1 degree sector of the capture zone 50. (70) Because the pulses are generated in 0.1 degree intervals, up to ten echoes can occur in each sector. The microprocessor 26 stores these hits in variables entitled s_α where α varies from 1 to 10 to reflect each one degree slice of the ten degree capture zone 50.

In addition to storing the number of hits per sector, the microprocessor 26 stores, again in a data storage device, the distance from the LRF 20 to the object for each hit or echo. Storing the distance to each reflection requires a storage medium large enough to store up to ten hits in each 1 degree of the capture zone 50 or up to 100 possible values. Because, in many cases, most of the entries will be empty, well known programming techniques can reduce these storage requirements below having 100 registers always allocated for these values.

Once this data is available for a scan, the microprocessor 26 computes the total number of echoes, S_T, in the scan by summing the s_α's. The microprocessor 26 then computes S_M, the largest sum of echoes in three adjacent sectors. (72) In other words, S_M is the largestsum of $(S_{\alpha-1}, S_\alpha, S_{\alpha+1})$.

Once it computes S_M and S_T, the microprocessor 26 determines whether the echoes are from an incoming airplane 12. If S_M is not greater than 24, no airplane 12 has been found and the microprocessor 26 returns to the beginning of the capture mode 62. If the largest sum of echoes, S_M is greater than 24 (74), a "possible" airplane 12 has been located. If a "possible" airplane 12 has been located, the microprocessor checks if S_M/S_T is greater than 0.5 (76), or the three adjacent sectors with the largest sum contain at least half of all the echoes received during the scan.

If S_M/S_T is greater than 0.5, the microprocessor 26 calculates the location of the center of the echo. (78, 82) The angular location of the center of the echo is calculated as:

$$\alpha_t = \alpha_v + (S_{\alpha+1} - S_{\alpha-1})/(S_{\alpha-1} + S_\alpha + S_{\alpha+1})$$

where S_α is the S_α that gave S_M and a_v is the angular sector that corresponds to that S_α.

The longitudinal position of the center of the echo is calculated as:

$$l_t = (1/n) \, {}_{i=1}\Sigma^{10} \, l_{avi}$$

where the l_{avi} are the measured values, or distances to the object, for the pulses that returned an echo from the sector α_v and where n is the total number of measured values in this sector. (78, 82) Because the largest possible number of measured values is ten, n must be less than or equal to ten.

However, if $S_M/S_T < 0.5$, the echoes may have been caused by snow or other aircraft at close range. If the cause is an aircraft at close range, that aircraft is probably positioned fairly close to the centerline so it is assumed that α_t should be zero instead of the above calculated value and that l_t should be the mean distance given by the three middle sectors. (80) If the distance distribution is too large, the microprocessor 26 has not found an airplane 12 and it returns to the beginning of the capture mode 62. (81).

After calculating the position of the aircraft 12, the system 10 switches to docking mode 64.

Docking Mode

The docking mode 64, illustrated in Fig. 4, includes three phases, the tracking phase 84, the height measuring phase 86 and the identification phase 88. In the tracking phase 84, the system 10 monitors the position of the incoming aircraft 12 and provides the pilot with information about axial location 31 and distance from the stopping point 53 of the plane through the display 18. The system 10 begins tracking the aircraft 12 by scanning horizontally.

Referring to Fig. 8, during the first scan in tracking phase 84, the microprocessor 26 directs the LRF 20 to send out laser pulses in single angular steps, α, or, preferably, at 0.1 degree intervals between:

$$(\alpha_t - \alpha_p - 10) \text{ and } (\alpha_t + \alpha_p + 10)$$

where α_t is determined during the capture mode 62 as the angular position of the echo center and α_p is the largest angular position in the current profile column that contains distance values.

After the first scan, α is stepped back and forth with one step per received LRF value between:

$(\alpha_s - \alpha_p - 10)$ and $(\alpha_s + \alpha_p + 10)$

where α_s is the angular position of the azimuth determined during the previous scan.

During the tracking phase 84, the vertical angle, ß, is set to the level required for the identified craft 12 at its current distance from the LRF 20 which is obtained from the reference profile Table I . The current profile column is the column representing a position less than but closest to l_t.

The microprocessor 26 uses the distance from the stopping point 53 to find the vertical angle for the airplane's current distance on the profile Table I. During the first scan, the distance, l_t, calculated during the capture mode 62, determines the appropriate column of the profile Table I and thus the angle to the aircraft 12. For each subsequent scan, the microprocessor 26 uses the ß in the column of the profile Table I reflecting the present distance from the stopping point 53. (112)

Using the data from the scans and the data on the horizontal profile Table I, the microprocessor 26 creates a Comparison Table II . Referring to Table II the Comparison Table II is a two dimensional table with the number of the pulse. or angular step number, as the index 91, i, to the rows. Using this index, the following information, represented as columns of the table, can be accessed for each row: l_i 92, the measured distance to the object on this angular step, l_{ki} 93, the measured value compensated for the skew caused by the displacement (equal to l_i minus the quantity s_m, the total displacement during the last scan, minus the quantity i times s_p, the average displacement during each step in the last scan (i.e.) $l_i-(s_m-is_p)$), d_i 94, the distance between the generated profile and the reference profile (equal to r_{ij}, the profile value for the corresponding angle at the profile distance j, minus l_{ki}), a_i 95, the distance between the nose of the aircraft and the measuring equipment (equal to r_{j50}, the reference profile value at zero degrees, minus d_i). a_e 96, the estimated nose distance after each step (equal to a_m, the nose distance at the end of the last scan, minus the quantity i times s_p), a_d, the difference between the estimated and measured nose distance (equal to the absolute value of a_i minus a_e), and Note 97 which indicates the echoes that are likely caused by an aircraft.

During the first scan in the tracking phase 84, the system 10 uses the horizontal profile column representing an aircraft position, j, less than but closest to the value of l_t. For each new scan, the profile column whose value is less than but closest to $(a_m - s_m)$ is chosen where a_m is the last measured distance to the aircraft 12 and s_m is the aircraft's displacement during the last scan. Additionally, the values of the profile are shifted sideways by α_s to compensate for the lateral position of the aircraft. (112)

During each scan, the microprocessor 26 also generates a Distance Distribution Table (DDT). This table contains the distribution of a_i values as they appear in the Comparison Table II. Thus, the DDT has an entry representing the number of occurrences of each value of a_i in the Comparison Table II in 1 meter increments between 10 to 100 meters.

After every scan, the system 10 uses the DDT to calculate the average distance, a_m, to the correct stopping point 53. The microprocessor 26 scans the data in the DDT to find the two adjacent entries in the DDT for which the sum of their values is the largest. The microprocessor 26 then flags the Note 97 column in the Comparison Table II for each row containing an entry for a_i corresponding to either of the two DDT rows having the largest sum. (114)

The system 10 then determines the lateral deviation or offset. (116) The microprocessor 26 first sets:

$$2d = \alpha_{max} - \alpha_{min}$$

where α_{max} and α_{min} are the highest and lowest α values for a continuous flagged block of d_i values in the Comparison Table II. Additionally, the microprocessor 26 calculates:

$$Y_1 = \Sigma d_i$$

for the upper half of the flagged d_i in the block and:

$$Y2 = \Sigma d_i$$

for the lower half of the block. Using Y_1 and Y_2, "a" 116 is calculated as:

$$a = k \times (Y_1 - Y_2)/d^2$$

where k is given in the reference profile. If "a" exceeds a given value, preferably set to one, it is assumed that there is a lateral deviation approximately equal to "a". The l_i column of the Comparison Table II is then shifted "a" steps and the Comparison Table II is recalculated. This process continues until "a" is smaller than an empirically established value, preferably one. The total shift, α_s, of the l_i column is considered equal to the lateral deviation or offset. (116) If the lateral offset is larger than a predetermined value, preferably set to one, the profile is adjusted sideways before the next scan. (118, 120)

After the lateral offset is checked, the microprocessor 26. provides the total sideways adjustment of the profile, which corresponds to the lateral position 31 of the aircraft 12, on the display 18. (122)

The microprocessor 26 next calculates the distance to the nose of the aircraft, a_m, as:

$a_m = \Sigma(\text{flagged } a_i)/N$

where N is the total number of flagged a_i. From a_m, the microprocessor 26 can calculate the distance from the plane 12 to the stopping point 53 by subtracting the distance from the LRF 20 to the stopping point 53 from the distance to the nose of the aircraft. (124)

Once it calculates of the distance to the stopping point 53, the microprocessor 26 calculates the average displacement during the last scan, s_m. The displacement during the last scan is calculated as:

$S_m = a_{m-1} - a_m$

where a_{m-1} and a_m belong to the last two scans. For the first scan in tracking phase 84, S_m is set to 0.

The average displacement s_p during each step is calculated as:

$S_p = S_m / P$

where P is the total number of steps for the last scan cycle.

The microprocessor 26 will inform the pilot of the distance to the stopping position 53 by displaying it on the display unit 18, 29. By displaying the distance to the stopping position 29, 53 after each scan, the pilot receives constantly updated information in real time about how far the plane 12 is from stopping.

If the aircraft 12 is in the display area 52, both the lateral 31 and the longitudinal position 29 are provided on the display 18. (126, 128) Once the microprocessor 26 displays the position of the aircraft 12, the tracking phase ends.

Once it completes the tracking phase, the microprocessor 26 verifies that tracking has not been lost by checking that the total number of rows flagged divided by the total number of measured values, or echoes, in the last scan is greater than 0.5. (83) In other words, if more than 50% of the echoes do not correspond to the reference profile, tracking is lost. If tracking is lost and the aircraft 12 is greater than 12 meters from the stopping point, the system 10 returns to the capture mode 62. (85) If tracking is lost and the aircraft 12 is less than or equal to 12 meters from the stopping point 53, the system 10 turns on the stop sign to inform the pilot that it has lost tracking. (85, 87)

If tracking is not lost, the microprocessor 26 determines if the nose height has been determined. (130) If the height has not yet been determined, the microprosessor 26 enters the height measuring phase 86. If the height has already been determined, the microprocessor 26 checks to see if the aircraft has been identified. (132)

In the height measuring phase, illustrated in Fig. 9, the microprocessor 26 determines the nose height by directing the LRF 20 to scan vertically. The nose height is used by the system to ensure that the horizontal scans are made across the tip of the nose.

To check the nose height, the microprocessor 26 sets β to a predetermined value β_{max} and then steps it down in 0.1 degree intervals once per received/reflected pulse until it reaches β_{min}, another predetermined value. β_{min} and β_{max} are set during installation and typically are -20 and 30 degrees respectively. After β reaches β_{min} the microprocessor 26 directs the step motors 24, 25 up until it reaches β_{max} . This vertical scanning is done with α set to α_s , the azimuth position of the previous scan.

Using the measured aircraft distance, the microprocessor 26 selects the column in the vertical profile table closest to the measured distance. (140) Using the data from the scan and the data on the vertical profile table, the microprocessor 26 creates a Comparison Table II. Referring to Fig.4, the Comparison Table II is a two dimensional table with the number of the pulse, or angular step number, as an index 91, i, to the rows. Using this index, the following information, represented as columns of the table, can be accessed for each row: l_i 92, the measured distance to the object on this angular step, l_{ki} 93, the measured value compensated for the skew caused by the displacement (equal to l_i minus the quantity S_m, the total displacement during the last scan, minus the quantity i times s_p, the average displacement during each step in the last scan), d_i 94, the distance between the generated profile and thereference profile (equal to r_{ij}, the profile value for the corresponding angle at the profile distance j, minus l_{ki}), a_i 95, the distance between the nose of the aircraft and the measuring equipment (equal to r_{j50}, the reference profile value at zero degrees, minus d_i), a_e 96, the estimated nose distance after each step (equal to a_m, the nose distance at the end of the last scan, minus the quantity i times s_p). a_d, the difference between the estimated and measured nose distance (equal to the absolute value of a_i minus a_e), and Note 97 which indicates echoes that are likely caused by an aircraft 12.

During each scan, the microprocessor 26 also generates a Distance Distribution Table (DDT). This table contains the distribution of a_i values as they appear in the Comparison Table II. Thus, the DDT has an entry representing the number of occurrences of each value of a_i in the Comparison Table II in 1 meter increments between 10 to 100 meters.

After every scan, the system 10 uses the DDT to calculate the average distance, a_m, to the correct stopping point 53. The microprocessor 26 scans the data in the DDT to find the two adjacent entries in the DDT for which the sum of their values is the largest. The microprocessor 26 then flags the Note 97 column in the Comparison Table II for each row containing an entry for a_i corresponding to either of the two DDT rows having the largest sum. (142)

Once it completes the calculation of the average distance to the correct stopping point 53, the microprocessor 26 calculates the average displacement during the last scan, s_m. The displacement during the last scan is calculated as:

$$s_m = a_{m-1} - a_m$$

where a_{m-1} and a_m belong to the last two scans. For the first scan in tracking phase 84, s_m is set to 0. The average displacement s_p during each step is calculated as

$$s_p = s_m / P$$

where P is the total number of steps for the last scan cycle.

Calculating the actual nose height is done by adding the nominal nose height, predetermined height of the expected aircraft when empty, to the vertical or height deviation. Consequently, to determine the nose height, the system 10 first determines the vertical or height deviation. (144) Vertical deviation is calculated by setting:

$$2d = \beta_{max} - \beta_{min}$$

where β_{max} and β_{min} are the highest and lowest β value for a continuous flagged block of d_i values in the Comparison Table II. Additionally, the microprocessor 26 calculates:

$$Y_1 = \Sigma d_i$$

for the upper half of the flagged d_i in the block and:

$$Y_2 = \Sigma d_i$$

for the lower half of the block. Using Y_1 and Y_2, "a" is calculated as

$$a = k \times (Y_1 - Y_2)/d^2$$

where k is given in the reference profile. If "a"exceeds a given value, preferably one, it is assumed that there is a vertical deviation approximately equal to "a". The 1; column is then shifted "a" steps, the Comparison Table II is re-screened and "a" recalculated. This process continues until "a" is smaller than the given value, preferably one. The total shift, β_s of the l_i column is considered equal to the height deviation. (144) The β_j values in the vertical Comparison Table II are then adjusted as $\beta_j + \Delta\beta_j$ where the height deviation $\Delta\beta_j$ is:

$$\Delta\beta_j = \beta_s \times (a_{m\beta} + a_s) / (a_j + a_s)$$

and where $a_{m\beta}$ is the valid a_m value when $\beta_s$was calculated.

Once the height deviation is determined, the microprocessor 26 checks if it is bigger than a predetermined value, preferably one. (146) If the deviation is larger than that value, the microprocessor 26 adjusts the profile vertically corresponding to that offset. (148) The microprocessor 26 stores the vertical adjustment as the deviation from the nominal nose height. (150) The actual height of the aircraft is the nominal nose height plus the deviation. Once it completes the height measuring phase 86, the microprocessor 26 returns to the tracking phase 84.

If the microprocessor 26 has already determined the nose height, it skips the height measuring phase 86 and determines whether the aircraft 12 has been identified. (130, 132) If the aircraft 12 has been identified, the microprocessor 26 checks whether the aircraft 12 has reached the stop position. (134) If the stop position is reached, the microprocessor 26 turns on the stop sign and the system 10 has completed the docking mode 64. (136) If the aircraft 12 has not reached the stop position, the micro-processor 26 returns to the tracking phase 84. (134)

If the aircraft 12 is not identified, the microprocessor 26 checks whether the aircraft 12 is less than or equal to 12 meters from the stopping position 53. (133) If the aircraft 12 not more than 12 meters from the stopping position 53, the system 10 turns on the stop sign to inform the pilot that identi-fication has failed (135) After displaying the stop sign, the system 10 shuts down.

If the aircraft 12 is more than 12 meters from the stopping point 53; the micropro-cessor 26 enters the identification phase illustrated in Fig.10. (133, 88) In the identification phase 88, the microprocessor 26 creates a Comparison Table II to reflect the results of another vertical scan and the contents of the profile table. (152, 154) Another vertical scan is performed in the identification phase 88 because the previous scan may have provided sufficient data for height determination but not enough for identification. In fact, several scans may need to be done before a positive identification can be made. After calculating the vertical offset 156, checking that it is not too large 158 and adjusting the profile verti-cally corresponding to the offset 160 until the offset drops below a given amount, prefer-ably one, the microprocessor 26 calculates the average distance between marked echoes and the profile and the mean distance between the marked echoes and this average distance. (162)

The average distance d_m between the measured and corrected profile and the deviation T from this average distance is calculated after vertical and horizontal scans as follows:

$$d_m = \Sigma d_i/N$$
$$T = \Sigma\left|d_i - d_m\right| /N$$

If T is less than a given value, preferably 5, for both profiles, the aircraft 12 is judged to be of the correct type provided that a sufficient number of echoes are received. (164) Whether a sufficient number of echoes is received is based on.

N/size > 0.75

where N is the number of "accepted" echoes and "size" is the maximum number of values possible. If the aircraft 12 is not of the correct type, the microprocessor turns on the stop sign 136 and suspends the docking mode 64. Once the microprocessor 26 completes the identification phase 88, it returns to the tracking phase 84.

While the present invention has been described in connection with particular embodiments thereof, it will be understood by those skilled in the art that many changes may be made without departing from the true spirit and scope of the present invention as set forth in the following claims.

Table 1

41

	42	78.25	78	77.5	. .	23
	44	5	5	5.6		10
	45	1	2	3	. .	50
	0	xx	xx	xx	. .	xx
	1	xx	xx	xx	. .	xx
	2	xx	xx	xx	. .	xx
	3	xx	xx	xx	. .	xx
	4	xx	xx	xx	. .	xx
10	5	xx	xx	xx	.	xx
	6	xx	xx	xx	. .	xx
	7	xx	xx	xx	.	xx
	8	xx	xx	xx	. .	xx
	9	xx	xx	xx	.	xx
	.					
	.					
	.					
	50	xx	xx	xx	.	xx

43

Table II

91	92	93	94	95	96	97
i	l_i	l_{ki}	d_i	a_i	a_c	Note
1	xx	xx	xx	xx	xx	xx
2	xx	xx	xx	xx	xx	xx
3	xx	xx	xx	xx	xx	xx
4	xx	xx	xx	xx	xx	xx
5	xx	xx	xx	xx	xx	xx
6	xx	xx	xx	xx	xx	xx
.						
.						
.						
50	xx	xx	xx	xx	xx	xx
.						
.						
.						
100	xx	xx	xx	xx	xx	xx

WE CLAIM:

1. A system for verifying the shape of a detected object comprising:

means for projecting light pulses in angular coordinates onto an object;

means for collecting light pulses reflected off said object and for determining the detected shape of said object; and

means for comparing said detected shape with a profile corresponding to the shape of a known object and for determining whether said detected shape corresponds to said known shape.

2. The system of claim 1 wherein the light pulses are projected onto a mirror system with means for adjusting the mirror system to project the light pulses outwardly.

3. The system of claims 1- 2 wherein the profile corresponding to the shape of a known object comprises sets of expected reflected pulses at various distances from the stopping point.

4. The system of claims 1-3 further including means for detecting the presence of an object within a capture zone, said detection means comprising:

said adjustable mirror system projects said light pulses outwardly in a predetermined plane such that said projected light pulses will reflect off an object within a capture zone;

means for processing collected light pulses reflected off said object within the capture zone to enable detection of the presence of such object.

5. The system of claim 4 wherein said capture zone comprises an area within said plane of said projected light pulses, said area being defined as a predetermined angular configuration relative to an axis extending from said mirror system and at predetermined axial distances from said mirror system, said area being divided into multiple angular sectors defined by rays extending outwardly from said mirror system. 6. The system of claims 4-5 wherein said capture zone is repetitiously scanned with said light pulses projected in said predetermined plane until an object is detected based on the processing of said collected light pulses reflected off said object.

7. The system of claim 4-6 wherein said object is an airplane having a nose section positioned a predetermined vertical height above a surface of an airfield.

8. The system of claims 4-7 wherein said adjustable mirror system projects said light pulses at a predetermined angle relative to said surface of said airfield so that said light pulses intersect with said nose section of said airplane.

9. The system of claims 2-8 wherein said adjustable mirror system is operated by

step motors under the control of a programmed microprocessor

10. The system of claims 2-9 including a microprocessor for adjusting the mirror system so that the projected light pulses scan the capture zone and a data storage device for receiving data concerning the light pulses reflected off an object, said data storage device containing comparative information for comparison with the received data and said microprocessor employing said received data and said comparative information to determine whether an object has entered the capture zone.

11. The system of claim 10 wherein said received data includes the number of pulses reflected off a detected object in each sector of the capture zone and said comparative information includes data for determining the distance between a detected object and said means for collecting the light pulses.

12. The system of claims 9-10 wherein:

the microprocessor totals the number of reflected pulses in each scan of said capture zone;

said microprocessor determines the largest sum of reflected pulses for three adjacent sectors; and

said microprocessor determines that an object has been detected if the largest sum of reflected pulses for three adjacent sectors is at least a predetermined minimum number out of a total number of pulses projected within said three adjacent sectors and the number of reflected pulses in the three sectors with the largest sum is more than half of the total number of reflected pulses in the scan of said capture zone.

13. The system of claims 1-12 further including means for tracking an incoming object, said tracking means comprising:

means for detecting the position of said incoming object relative to an imaginary axial line projecting from a predetermined point and for detecting the distance between said object and said predetermined point whereby tracking of the location of said object is enabled.

14. The system of claim 13 wherein:

a comparison table is generated containing information about collected light pulses and said information is compared with a profile table indicating the shape of known objects;

a distance distribution table is generated recording the distribution of distances from the object to said collection means for each collected light pulse; and an average distance is calculated from the detected position of said object to a desired stopping position for said object

15. The system of claims 14 wherein:

the average distance to the stopping position is calculated by averaging the distance to said stopping position recorded for the entries in the comparison table corresponding to the two adjacent entries in the distance distribution table having the largest sum.

16. The system of claims 13-15 including a display indicating the distance from the object to a stopping point, the type of object and the location of the object compared to said imaginary axial line.

17. The system of claims 14-16 wherein the average stopping distance is communicated to a computer on board the aircraft allowing that computer to stop the aircraft when said aircraft reaches said stopping position.

18. The system of claims 1-17 further including means for directing said projected light pulses onto a calibration element positioned in a known angular direction and at a known distance from said means for directing said projected light for purposes of calibration of said system.

19. The system of claim 18 wherein the means for directing said projected light comprises a second mirror system.

20. The system of claims 18-19 wherein:

said light pulses are reflected off said object and are received at a detector;

determining a detected angular direction of the object relative to said light source based on said pulses received at said detector and in accordance with predetermined angular parameters;

comparing said detected angular direction with said known angular direction to determine whether said detected angular direction corresponds to said known angular direction.

21. The system of claim 20 further comprising:

adjusting the angular parameters if said detected angular direction and said known angular direction do not correspond so that the detected angular direction is caused to correspond essentially to the known angular direction.

22. The system of claims 20-21 further comprising:

determining the detected distance of the object from said light source based on predetermined distance parameters; comparing said detected distance with a known distance of said object from said light source to determine whether said detected distance corresponds to said known distance.

23. The system of claims 20-22 further comprising:

adjusting the distance parameters if said detected distance and said known distance do not correspond so that the detected distance is caused to correspond essentially to the known distance.

24. The system of claims 18-20 wherein the angular direction and distance of said calibration means from said means for directing said projected light in a horizontal plane are calibrated while the angular direction and distance of said calibration means from said means for directing said projected light in a vertical plane are held constant.

25. The system of claims 1-24 wherein said light pulses are laser light pulses.

26. The system of claims 1-25 wherein said profile is stored in a memory device.

27. A system for tracking an incoming object comprising:

means for generating light pulses;

means for projecting said pulses outwardly onto an incoming object and for reflecting said light pulses off said object;

means for collecting the light pulses reflected off of said object;

means for detecting the position relative to an imaginary axial line projecting from a predetermined point and for detecting the distance between said object and said predetermined point whereby tracking of the location of said object is enabled.

28. The tracking system of claim 27 wherein the light pulses are laser light pulses.

29. The tracking system of claim 27-28 wherein the light pulses are projected onto a mirror system with means for adjusting the mirror system to project the light pulses outwardly onto an incoming object.

30. The tracking system of claims 27-29 wherein a microprocessor provides the means for monitoring the location of said object.

31. The tracking system of claims 27-30 wherein

a comparison table is generated reflecting information about the laser scan and is compared with a profile table indicating the shape of known objects;

a distance distribution table is generated recording the distribution of distances from the nose of the object to the measuring device for each reflected pulse; and

an average distance to a desired stopping position is calculated.

32. The tracking system of claims 27-31 wherein
the average distance to the stopping position is calculated by averaging the distance to said stopping position recorded for the entries in the comparison table corresponding to the two adjacent entries in the distance distribution table having the largest sum.

33. The tracking system of claims 27-32 wherein a display shows the distance from the object to the stopping point, the type of object and the location of the object compared to center.

34. The tracking system of claims 27-33 wherein the average stopping distance is communicated to a computer on board the aircraft allowing that computer to stop the aircraft when said aircraft reaches said stopping position.

35. A method for verifying the shape of a detected object comprising:
projecting light pulses in angular coordinates onto an object;
reflecting said pulses back to a detector and determining the detected shape of the object based on said reflected pulses;
comparing said detected shape with a profile corresponding to the shape of a known object; and
determining whether said detected shape corresponds to said known shape.

36. The method of claim 35 wherein the profile corresponding to the shape of a known object comprises sets of expected reflected pulses at various distances from the stopping point.

37. The method of claim 35-36 wherein a microprocessor is programmed to identify an object.

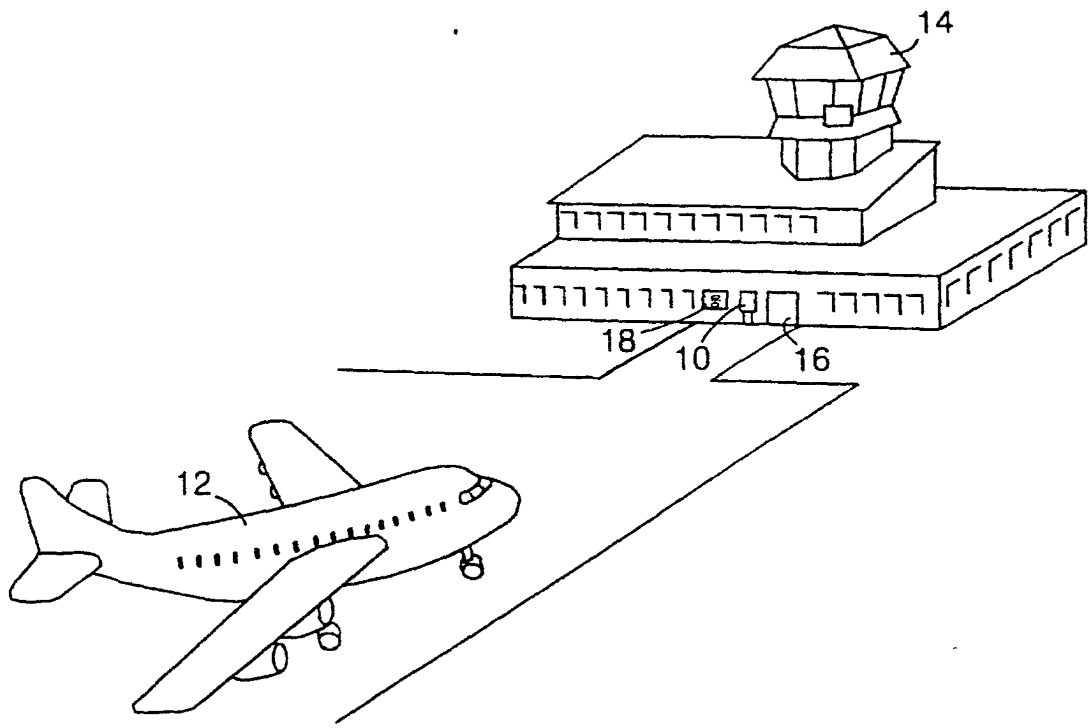

FIG.1

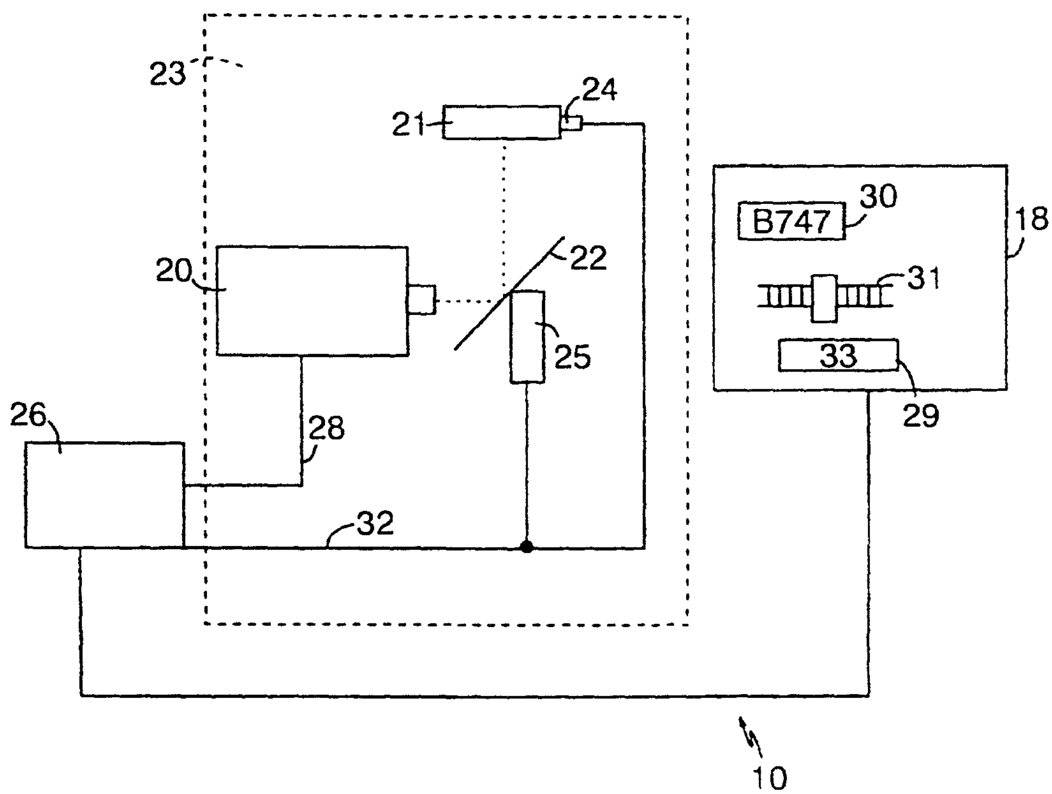

FIG.2

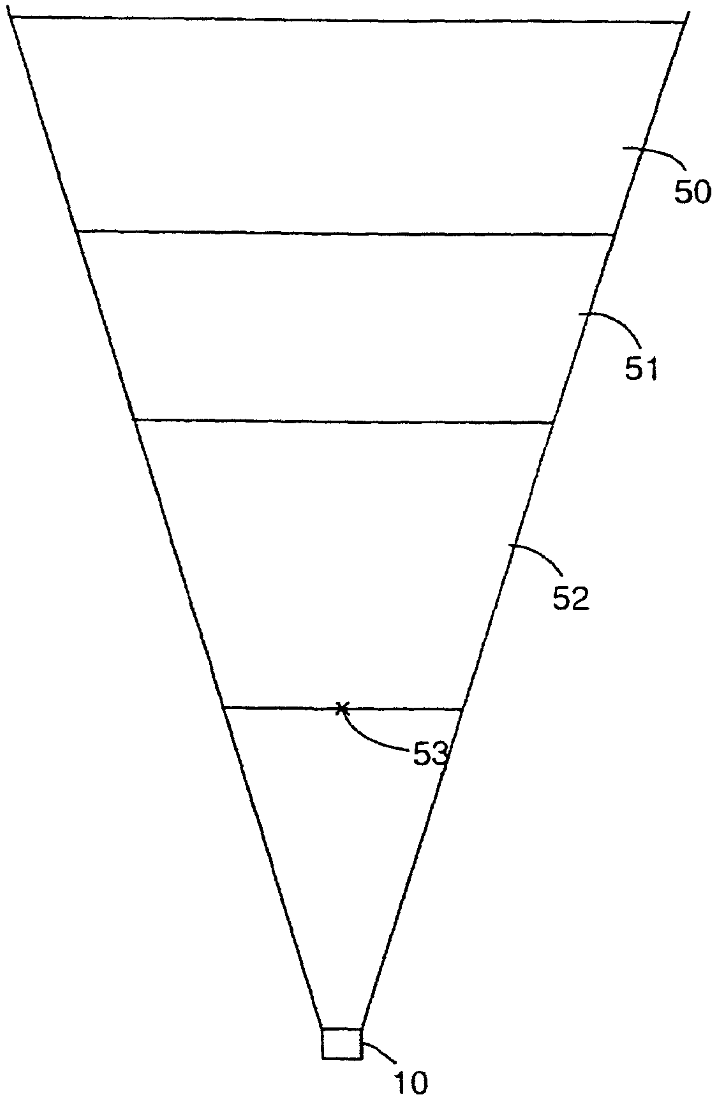

FIG.3

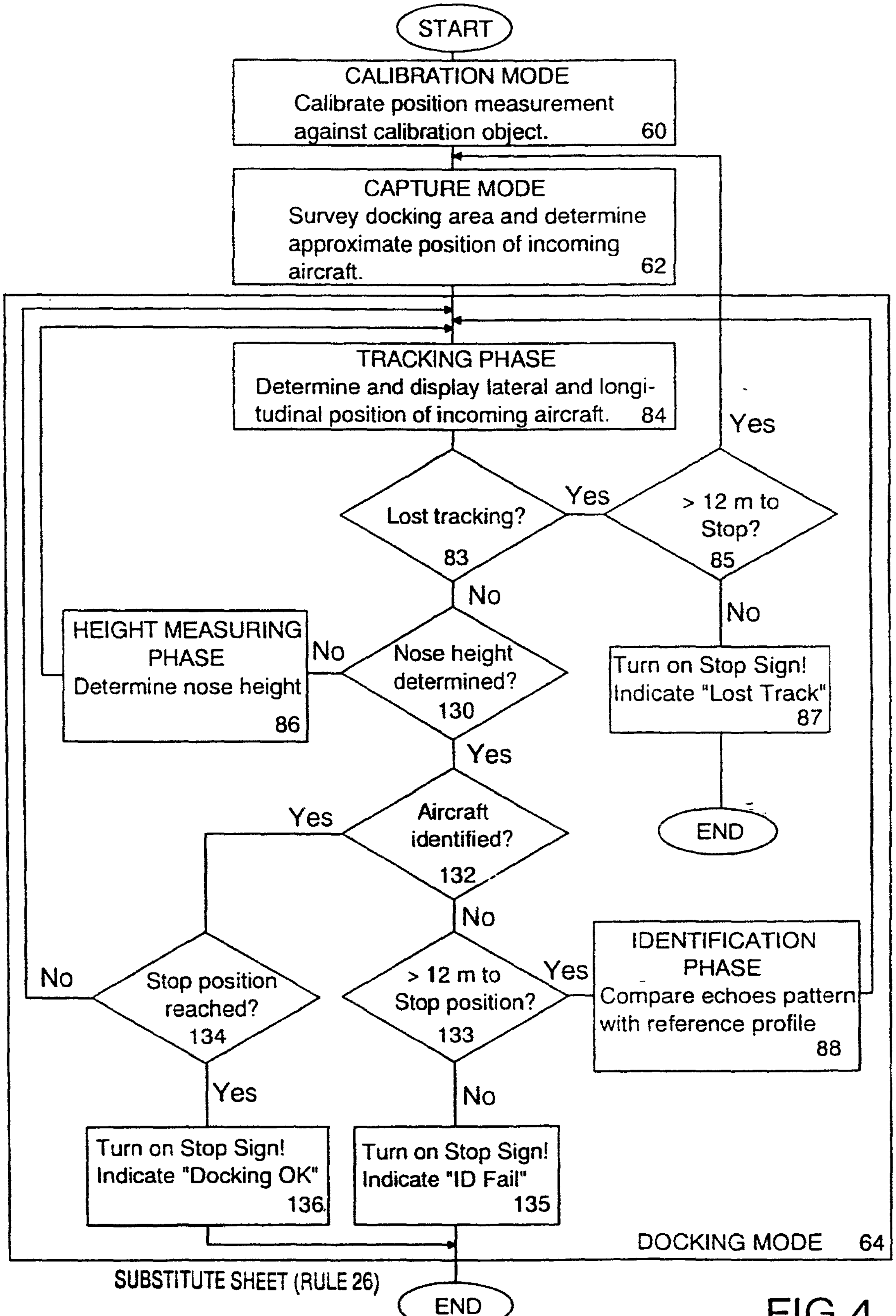

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FIG.4

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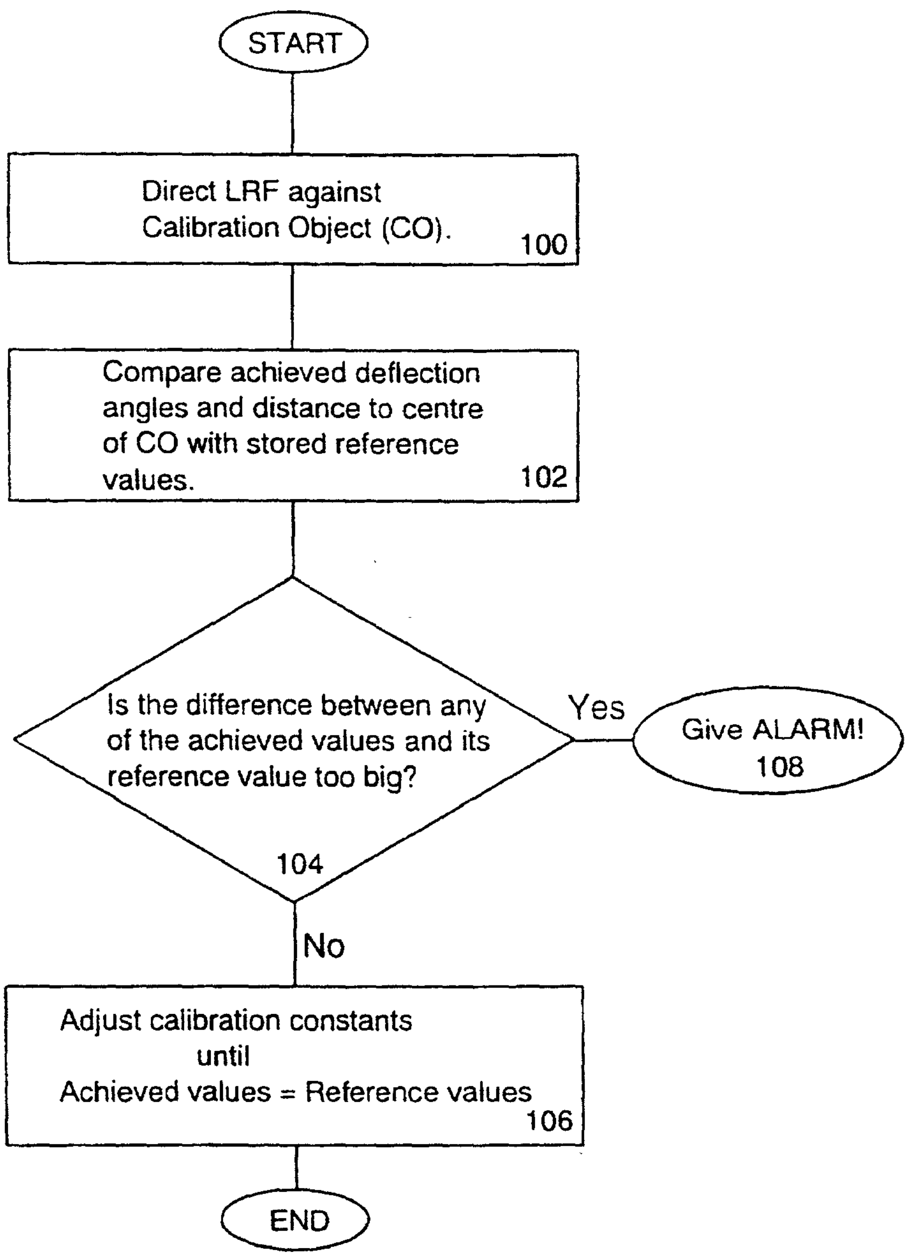

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FIG.5

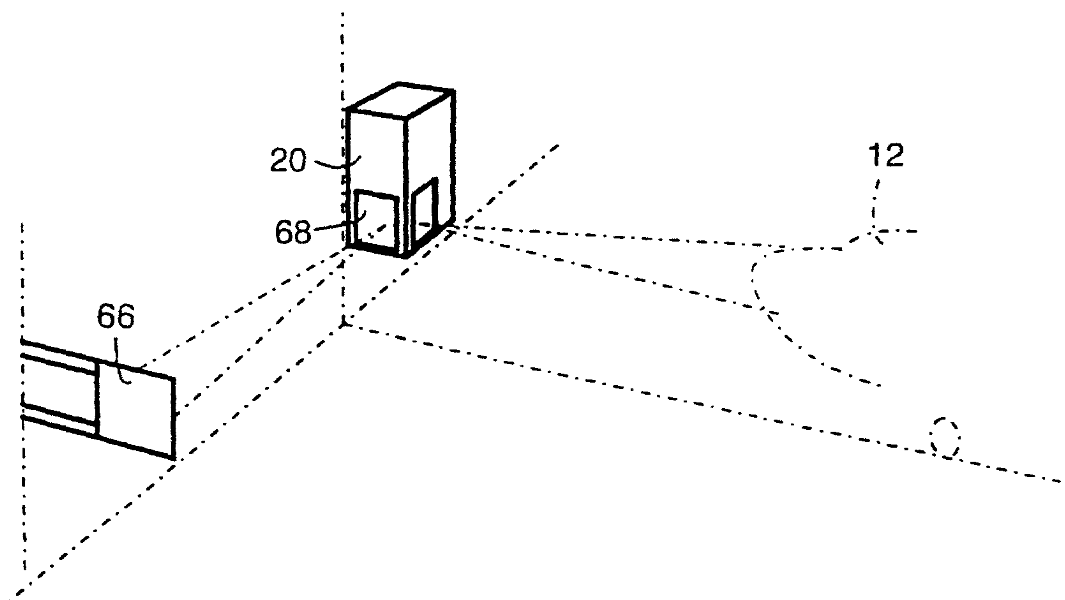

FIG.6

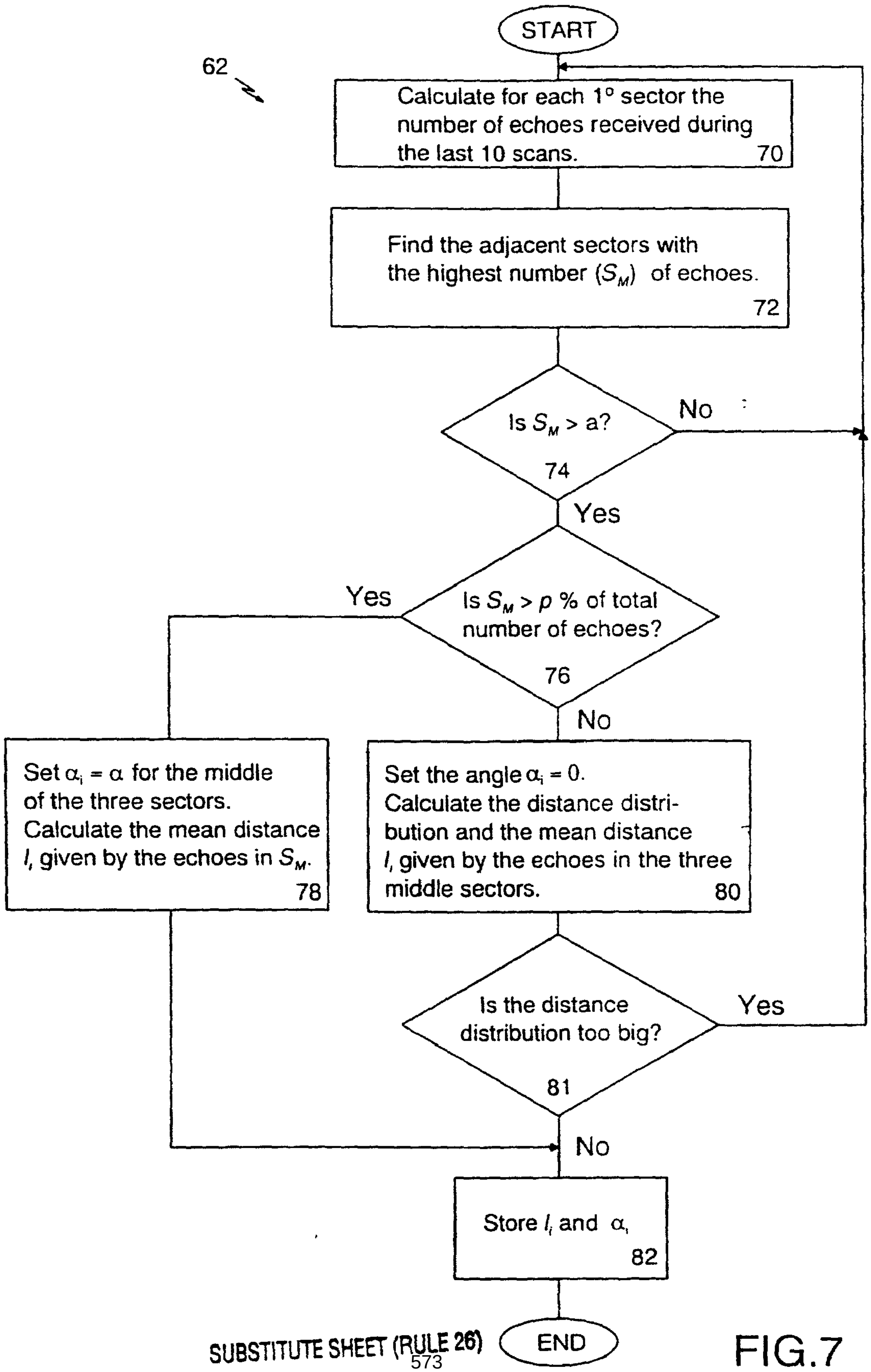
START
62
Calculate for each 1° sector the number of echoes received during the last 10 scans. 70
Find the adjacent sectors with the highest number (S_M) of echoes. 72
Is S_M > a? 74
No
Yes
Is S_M > p % of total number of echoes? 76
Yes
No
Set $\alpha_i = \alpha$ for the middle of the three sectors. Calculate the mean distance l_i given by the echoes in S_M. 78
Set the angle $\alpha_i = 0$. Calculate the distance distribution and the mean distance l_i given by the echoes in the three middle sectors. 80
Is the distance distribution too big? 81
Yes
No
Store l_i and α_i 82
END

FIG.7

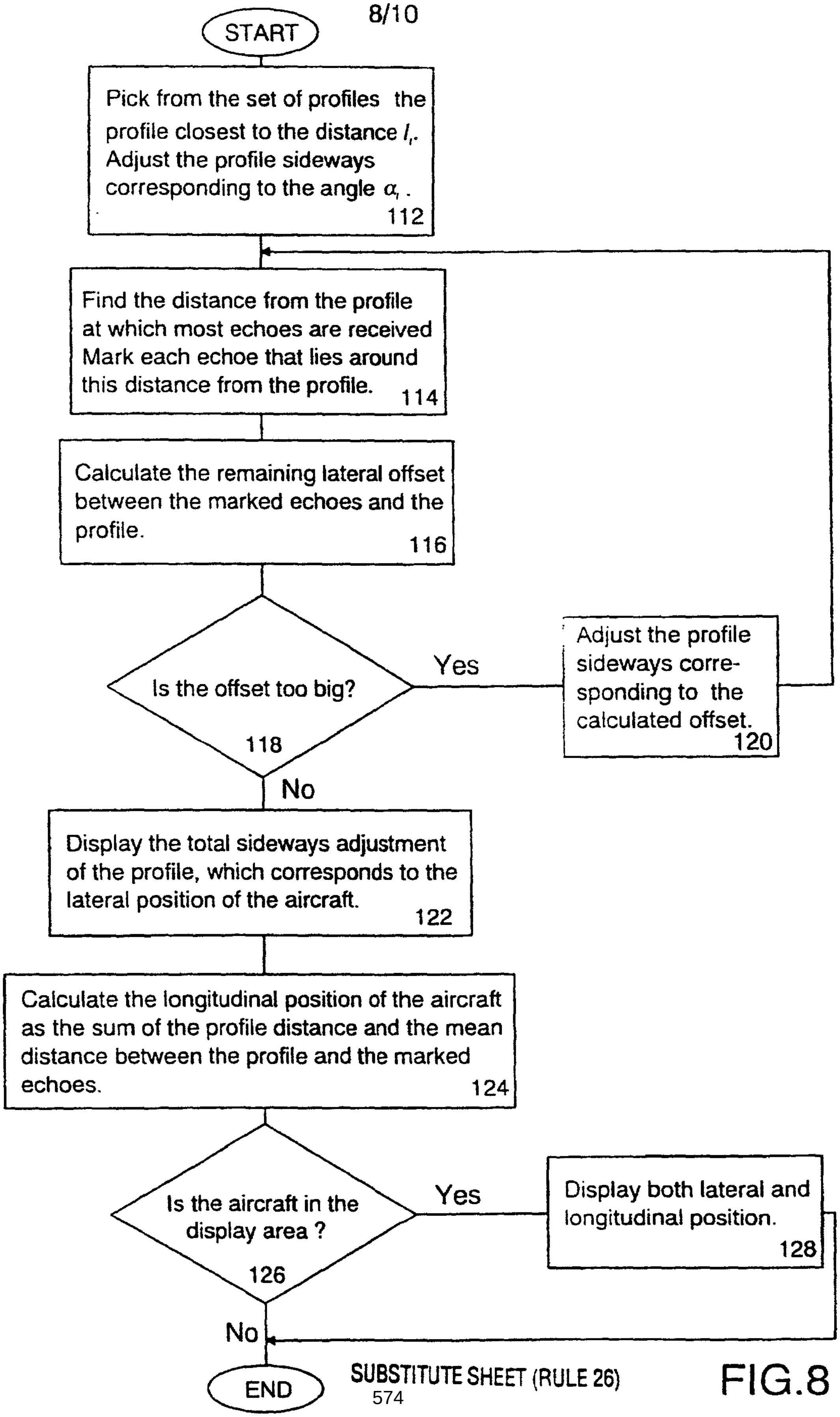
START
Pick from the set of profiles the profile closest to the distance l_i. Adjust the profile sideways corresponding to the angle α_i.
112
Find the distance from the profile at which most echoes are received Mark each echoe that lies around this distance from the profile.
114
Calculate the remaining lateral offset between the marked echoes and the profile.
116
Is the offset too big?
118
Yes
Adjust the profile sideways corre-sponding to the calculated offset.
120
No
Display the total sideways adjustment of the profile, which corresponds to the lateral position of the aircraft.
122
Calculate the longitudinal position of the aircraft as the sum of the profile distance and the mean distance between the profile and the marked echoes.
124
Is the aircraft in the display area ?
126
Yes
Display both lateral and longitudinal position.
128
No
END

FIG.8

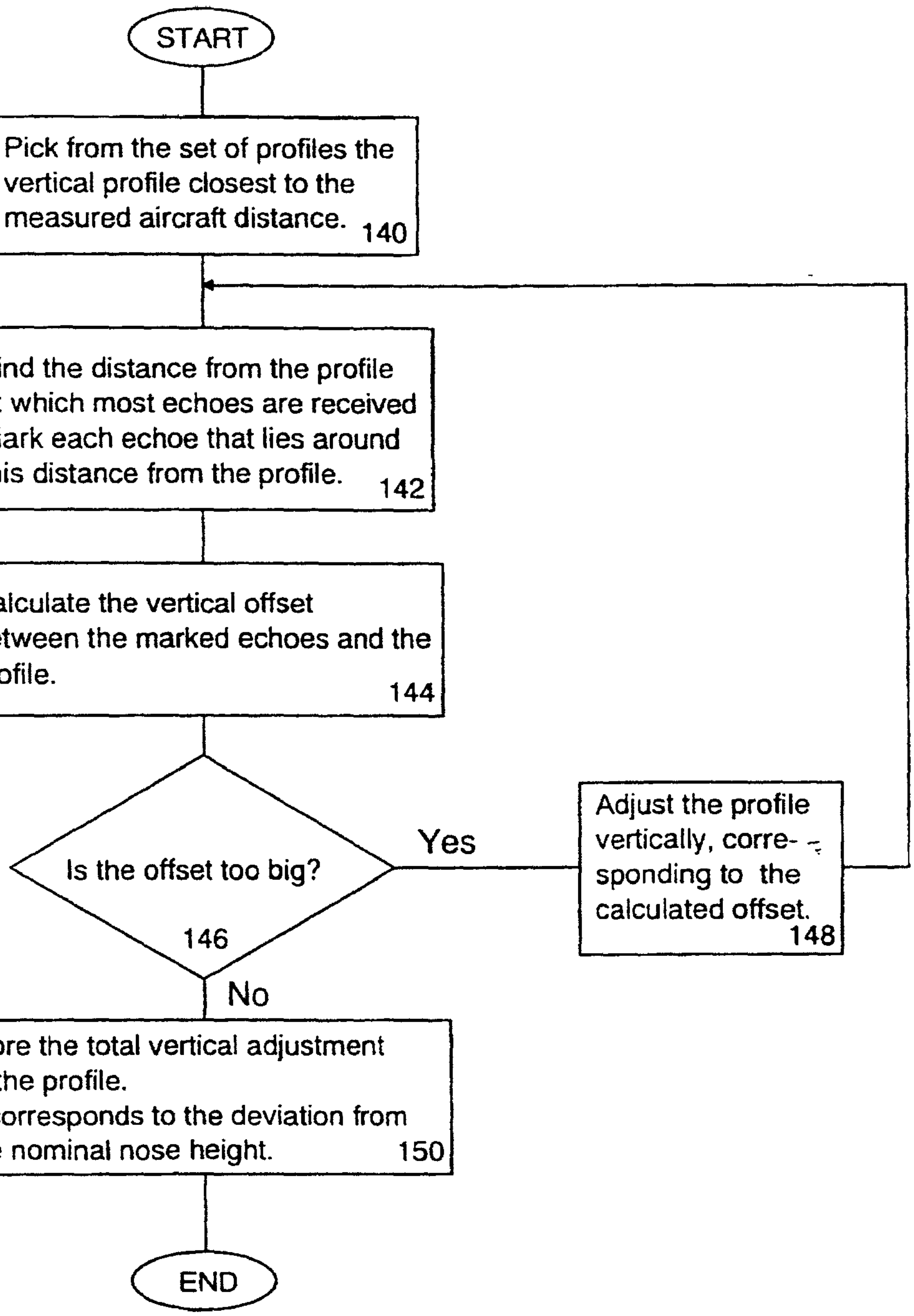
START
Pick from the set of profiles the vertical profile closest to the measured aircraft distance. 140
Find the distance from the profile at which most echoes are received Mark each echoe that lies around this distance from the profile. 142
Calculate the vertical offset between the marked echoes and the profile. 144
Is the offset too big? 146
Yes
Adjust the profile vertically, corre- sponding to the calculated offset. 148
No
Store the total vertical adjustment of the profile.
It corresponds to the deviation from the nominal nose height. 150
END

FIG.9

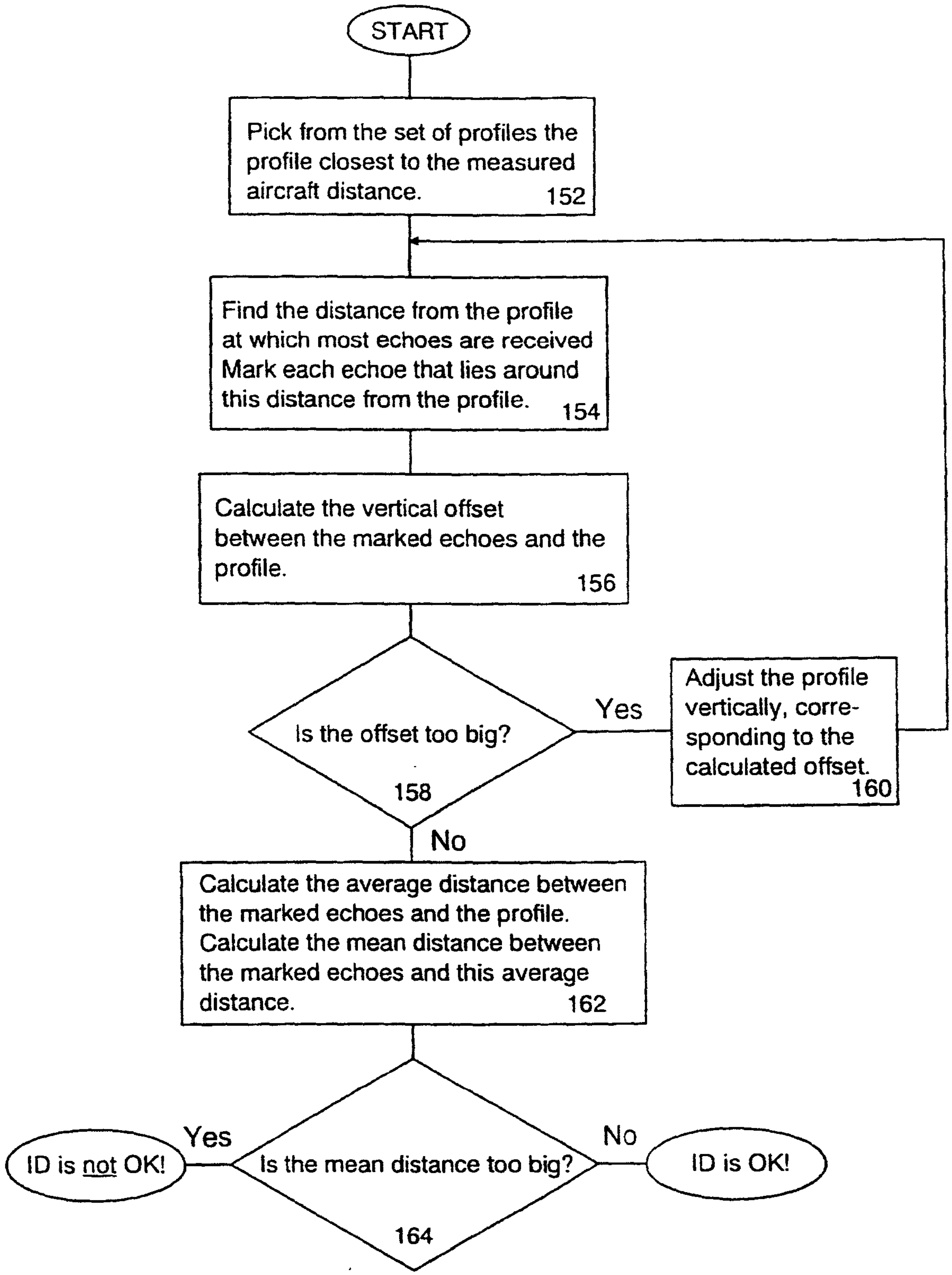
START
Pick from the set of profiles the profile closest to the measured aircraft distance. 152
Find the distance from the profile at which most echoes are received Mark each echoe that lies around this distance from the profile. 154
Calculate the vertical offset between the marked echoes and the profile. 156
Is the offset too big? 158
Yes
Adjust the profile vertically, corre-sponding to the calculated offset. 160
No
Calculate the average distance between the marked echoes and the profile. Calculate the mean distance between the marked echoes and this average distance. 162
Is the mean distance too big? 164
Yes
ID is not OK!
No
ID is OK!

FIG.10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/SE 94/00968

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G08G5/06 B64F1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G08G G08B B64F

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	DE,A,43 01 637 (DEUTSCHE AEROSPACE AG) 11 August 1994 see the whole document ---	1-11,13, 16,17, 25-30, 33,35-37
X	US,A,4 319 332 (MEHNERT) 9 March 1982	1-6,13, 16,18, 25-30, 35-37
A	see column 6, line 25 - line 45; figures 1,2 see column 8, line 15 - line 29 see column 11, line 14 - column 16, line 8; figures 5,6 see abstract; claims --- -/--	7,8,10, 11,33

[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 June 1995	22. 06. 95

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Reekmans, M

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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E	DATABASE WPI Section EI, Week 9514 Derwent Publications Ltd., London, GB; Class T04, AN 95-105467 & SE,A,9 301 843 (GUSTAVSSON K) , 13 December 1994 see abstract -----	1,4-8, 35,37

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. nal Application No
PCT/SE 94/00968

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		AU-B-	525309	28-10-82
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		FR-A,B	2424594	23-11-79
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DE-A-4009668	02-10-91	NONE		
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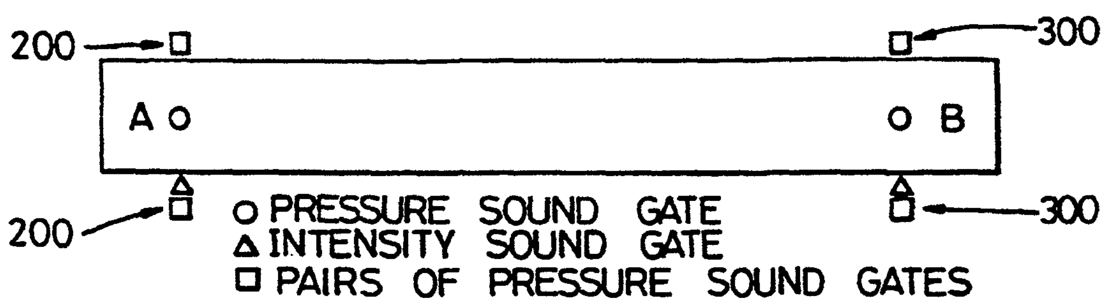

(57) Abstract

An airport noise monitoring system is disclosed comprising a pair of sound detectors (200, 300) installed in and spaced along a runway. A CPU monitors the output of each sound detector so as to recognize an output form from one (200) of the detectors characteristic of an aircraft flying overhead. A flag is assigned to any event giving rise to such an output form indicating the direction of motion of the aircraft, depending on the sound profile from the detector (300) other than the one providing the characteristic output form, and also indicating whether the aircraft is landing, taking off or flying by. Accurate timing and direction information may be obtained and accurately correlated with noise events detected around the airport, to identify noisy flights or carriers.

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AIRPORT NOISE MONITORING SYSTEM

This invention relates to airport noise monitoring systems, i.e. noise monitoring systems which are adapted to distinguish aircraft from other noise events. Once a noise event is attributed to an aircraft, the aircraft is identified from other information, which enables the carrier to be fined if the noise level exceeds an acceptable noise level.

Background to the invention

Airport noise monitoring systems commonly include a number of noise monitoring terminals distributed in and around the airport. Most current airport noise monitors use the technique of "Short Leq" for the acquisition of data, usually based upon a 62.5 ms long basic integration period. Short Leq allows the system to recognize an individual flight by its time history. Of course, not all noise monitoring terminals have a sufficiently good signal-to-noise ratio and in practice, many noise events are lost amongst other noise sources such as heavy vehicles or industrial plant. One measure of the efficiency of an aircraft noise monitoring system is how well it recovers signals in noisy conditions.

Cirrus Research plc produces a noise monitoring terminal which uses efficient aircraft-recognition algorithms. The algorithms are described in A. D. Wallis & R. W. Krug, "The Sydney and Brisbane Noise Terminals", Proc. WESTPRAC, pp. 492-499, Nov. 1991 and basically consist of multiple threshold detection with specified event durations. Experience has proven that this complex nine-parameter algorithm will recognise some 99% of scheduled or military aircraft correctly. In common with all systems, the Cirrus system does have a lower success rate for very quiet aircraft or in areas of high background noise.

With 100 flights per day, the system described above may incorrectly identify one flight per day and thus, before the noise events can be assigned to individual aircraft, something else must be brought in to reduce this recognition error rate, since at a major airport with over 1000 flights per day, even a 99% success rate is unacceptable.

Each airport has access to flight information - as displayed on the internal information boards - and this is often used as one of the correlation parameters in identification. However, if the airport has significant general aviation or private traffic, this information will be incomplete and significant events such as jet test flights will not be included. Thus, knowing that a noise event has taken place and that there was an incoming or outgoing flight at a similar time is still not adequate to enable the two to be correlated with a sufficient degree of confidence. The flight information data must be tied to a particular noise event with no significant possibility of error.

Summary of the invention

According to the present invention, a true take-off or landing time is attributed to each flight by appropriate sound detectors, and whether the aircraft is taking off or landing is recognised. An airport noise monitoring system according to the present invention comprises a pair of sound detectors to be installed in or on and spaced along a runway and means for monitoring the output of each sound detector so as to recognize an output form from either one of the detectors characteristic of an aircraft flying overhead, checking the output from the other sound detector representing time prior to and subsequent to the event giving rise to the characteristic output form for an output form indicative of the proximity of an aircraft and consequently assigning to the event a flag indicative of the direction of motion of the aircraft and whether it is taking off, flying by or landing. The output form from either of the detectors characteristic of an aircraft flying overhead may be recognized by the nine-parameter algorithm as discussed above.

Having sound detectors placed in or on the runway and recognizing and timing the passage of aircraft provides accurate information as to take-off or landing times, which may then be correlated with noise events detected by monitoring terminals elsewhere with a reasonable degree of certainty. The data from the sound detectors are now used in place of the airport flight time information to give a good event definition and only then is the flight time information added to enable individual flights to be recognised. In effect, the flight time information is required only to indicate the order in which the aircraft take off or land, rather than the exact time.

Preferably, the means for monitoring, checking and assigning is adapted to assign to the event a flag indicating that the direction of motion of the aircraft is away from the said one sound detector and towards the said other sound detector when the output from the said other sound gate includes an output form indicative of the proximity of an aircraft within a predetermined window of time subsequent to the event. Further, the means for monitoring, checking and assigning is preferably adapted to assign to the event a flag indicating that the aircraft is landing when the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead. When the said output form indicative of the proximity of an aircraft is characteristic of an aircraft flying overhead, the means for monitoring, checking and assigning will preferably assign to the event a flag indicating that the aircraft is flying by. The output form indicative of the proximity of an aircraft may be any output exceeding a predetermined noise level.

Similarly, the means for monitoring, checking and assigning is preferably adapted to assign to the event a flag indicating that the direction of motion of the aircraft is towards the said one sound detector and away from the said other sound detector when the output from the said other sound gate includes an output form indicative of the proximity of an aircraft within a predetermined window of time prior to the event. Further, the means for monitoring, checking and assigning is preferably adapted to assign to the event a flag indicating that the aircraft is taking off when the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead. Any output from the said other sound detector which has already been taken into account in assigning a flag indicative of the direction of motion of an aircraft giving rise to a previous event will preferably be disregarded by the means for monitoring, checking and assigning.

The noise monitoring system may further include a plurality of further sound detectors to be distributed in or around the airport and including means for monitoring the output of each noise detector so as to recognize an output form characteristic of an aircraft flying overhead and for correlating the events and flags recognized and assigned by the means for monitoring, checking and assigning with events giving rise to the characteristic output forms recognized by the means for monitoring the output of each further sound detector.

The means for monitoring the output of each further sound detector and/or the means for monitoring, checking and assigning may comprise one or more suitably programmed microprocessors.

The present invention also extends to a method of detecting an aircraft comprising monitoring the output of each of a pair of sound detectors installed in or on and spaced along a runway so as to recognize an output form from either one of the detectors characteristic of an aircraft flying overhead, checking the output from the other sound detector representing time prior to and subsequent to the event giving rise to the characteristic output form for an output form indicative of the proximity of an aircraft and assigning to an event giving rise to such a characteristic output form a flag indicative of the direction of motion of the aircraft and whether it is taking off, flying by or landing in dependence upon the output from the said other sound detector.

The method may include checking the output from the said other sound detector within a predetermined window of time subsequent to the event and assigning to the event a flag indicating that the direction of motion of the aircraft is away from the said one sound detector and towards the said other sound detector if that output includes an output form indicative of the proximity of an aircraft. In these circumstances, the method preferably includes assigning to the event a flag indicating that the aircraft is landing if the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead. Further, the method preferably includes assigning to the event a flag indicating that the aircraft is flying by if the said output form indicative of the proximity of an aircraft is characteristic of an aircraft flying overhead.

The method may include checking the output from the said other sound detector within a predetermined window of time prior to the event and assigning to the event a flag indicating that the direction of motion of the aircraft is towards the said one sound detector and away from the said other sound detector if that output includes an output form indicative of the proximity of an aircraft. In these circumstances, the method preferably includes assigning to the event a flag indicating that the aircraft is taking off if the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead. Preferably, any output from the said other sound detector which has already been taken into account in assigning a flag indicative of the direction of motion of an aircraft giving rise to a previous event is disregarded.

The method may further include monitoring the output of each of a plurality of further sound detectors distributed in or around the airport so as to recognize an output form characteristic of an aircraft flying overhead and correlating the events and flags recognized and assigned by monitoring and checking the outputs of the said pair of sound detectors with events giving rise to the characteristic output forms recognized by monitoring the output of each further sound detector.

The monitoring of the output of each further sound detector and/or the monitoring and checking of the output of the said pair of sound detectors and consequent assignment of flags may be accomplished by one or more suitably programmed microprocessors.

Brief description of the drawings

The present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 illustrates a simple sound detector with one pressure transducer;

Fig. 2 illustrates a more complex sound detector with provision for intensity measurement;

Fig. 3 is a schematic illustration of a runway with sound detectors installed;

Fig. 4 is a schematic illustration of the output from the two sound detectors when an aircraft is taking off; and

Fig. 5 is a corresponding illustration when the aircraft is landing.

Detailed description

The simple noise detector 10 illustrated in fig. 1 includes a pressure transducer 12, which in this example is a microphone. The output from the microphone is passed through a band-pass filter 14, which removes unwanted frequencies, leaving those which are generated by aircraft engines and provide the highest signal-to-noise ratio. The filtered signal then passes through a squarer 16 and is integrated by an integrator 18, operating over a 62.5 ms cycle, to provide a series of pulses representing the mean square average sound level during the preceding 62.5 ms. These pulses are digitised and stored in a memory or store 20 to be processed by a CPU 22 as described.

A more complex noise detector 110 is illustrated in fig. 2, including a pair of microphones 112, 114. The signals from the microphones are summed at 116 and 118, with one summation circuit 118 having the output from one microphone 114 inverted by inverter 120, thus outputting the difference between the two microphone signals. The signals pass through respective band-pass filters 122, 124 as described above and are then processed by an integrator 126, a pre-processor 128 and a CPU 130 to yield intensity, sound power and directionality information in the usual way. Again, a series of digitised pulses is stored in a memory or store 132 to be processed by a suitably programmed CPU 134.

Fig. 3 illustrates schematically the placement of the sound detectors on a runway. As can be seen, one sound detector 200 or possibly a pair of sound detectors 200 is placed at one end A of the runway and another sound detector 300 or pair of sound detectors 300 is placed at the other end B. Where a single detector is emplaced at each end of the runway, it is preferred that it be embedded in the runway surface. The separate detectors 200; 300 or pairs of detectors 200; 300 are able by virtue of their spacing along the runway to resolve the position of the aircraft at various times as it flies overhead and therefore determine its direction of flight.

Fig. 4 illustrates diagrammatically a typical output from two sound detectors 200; 300 positioned at points A and B on or in the runway when an aircraft is taking off in the direction A-B. As the aircraft taxis into place at one and A of the runway, the associated sound detector 200 detects the increased level of sound. However, the character of the sound detected by this detector 200 is quite different from that attributable to an aircraft passing overhead and accordingly, the sound level is simply stored in memory for future reference. As the aircraft begins its run along the runway, the sound level detected by the detector 200 diminishes with a characteristic slope. Although this slope could be used as a trigger for an attributable event, this is not preferred owing to inherent differences in the take-off patterns of various aircraft and flights and the fact that incoming aircraft could be mistaken for aircraft beginning their take-off. Rather, the characteristically diminishing sound level is again stored for future reference.

Once the aircraft has travelled sufficiently far down the runway, it takes off and subsequently passes over the second sound detector 300. The output from this detector 300 will have a form characteristic of an aircraft flying overhead and will be recognised as such by the processing electronics, i.e. the microprocessor. The recognition algorithm is as described above. Once this characteristic form has been recognised, the CPU will refer back to the stored sound levels from the first detector 200 within a predetermined window of time preceding the event at the second detector 300 and in doing so will encounter the high level of sound terminating in a characteristic slope. This will be recognised as indicating the presence of an aircraft at the first detector 200, and perhaps even the fact that it is beginning its take-off. Accordingly, this event will be timed and flagged as a take-off in the direction A-B.

Fig. 5 illustrates diagrammatically a typical output from two sound detectors 200; 300 positioned at points A and B on or in the runway when an aircraft is landing in the direction A-B. As the aircraft passes over the first sound detector 200, the output from this detector 200 will have a form characteristic of an aircraft flying overhead and will be recognised as such by the processing electronics, i.e. the microprocessor. Again, the recognition algorithm is as described above. Once this characteristic form has been recognised, the CPU will refer back to stored sound levels from the second detector 300 within a predetermined window of time preceding the event at the second detector 300 and in doing so will be unable to identify a high level of sound, which has not already been attributed to a previous event, indicating the presence of an aircraft at the second detector 300. Accordingly, the CPU will wait until the beginning of predetermined window of time and then inspect the output from the second detector.

After landing, the aircraft will run or taxi by the second detector 300, which detects the increased level of sound. The character of the sound detected by this detector 300 is quite different from that attributable to an aircraft passing overhead and accordingly, provided this sound level coincides with the window of time following the event at the first detector 200, this event will be timed and flagged as a landing in the direction A-B. In the unlikely event that both detectors show characteristic forms attributable to an aircraft flying overhead within the predetermined window of time from one another, the event will be flagged as a fly-by or abortive landing in the relevant direction.

Once the take-offs and landings are accurately timed and flagged, they may be correlated with high confidence levels with noise events detected by other noise monitoring stations in and around the airport, and the flights in question identified from airport information which is used to determine the order in which particular flights took off and landed.

CLAIMS

1. An airport noise monitoring system comprising a pair of sound detectors to be installed in or on and spaced along a runway and means for monitoring the output of each sound detector so as to recognize an output form from either one of the detectors characteristic of an aircraft flying overhead, checking the output from the other sound detector representing time prior to and subsequent to the event giving rise to the characteristic output form for an output form indicative of the proximity of an aircraft and consequently assigning to the event a flag indicative of the direction of motion of the aircraft and whether it is taking off, flying by or landing.

2. A noise monitoring system according to claim 1 in which the means for monitoring, checking and assigning is adapted to assign to the event a flag indicating that the direction of motion of the aircraft is away from the said one sound detector and towards the said other sound detector when the output from the said other sound gate includes an output form indicative of the proximity of an aircraft within a predetermined window of time subsequent to the event.

3. A noise monitoring system according to claim 2 in which the means for monitoring, checking and assigning is adapted to assign to the event a flag indicating that the aircraft is landing when the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead.

4. A noise monitoring system according to claim 2 or claim 3 in which the means for monitoring, checking and assigning is adapted to assign to the event a flag indicating that the aircraft is flying by when the said output form indicative of the proximity of an

aircraft is characteristic of an aircraft flying overhead.

5. A noise monitoring system according to any preceding claim in which the means for monitoring, checking and assigning is adapted to assign to the event a flag indicating that the direction of motion of the aircraft is towards the said one sound detector and away from the said other sound detector when the output from the said other sound gate includes an output form indicative of the proximity of an aircraft within a predetermined window of time prior to the event.

6. A noise monitoring system according to claim 5 in which the means for monitoring, checking and assigning is adapted to assign to the event a flag indicating that the aircraft is taking off when the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead.

7. A noise monitoring system according to claim 5 or claim 6 in which the means for monitoring, checking and assigning is adapted to disregard any output from the said other sound detector which has already been taken into account in assigning a flag indicative of the direction of motion of an aircraft giving rise to a previous event.

8. A noise monitoring system according to any preceding claim further including a plurality of further sound detectors to be distributed in or around the airport and including means for monitoring the output of each noise detector so as to recognize an output form characteristic of an aircraft flying overhead and for correlating the events and flags recognized and assigned by the means for monitoring, checking and assigning with events giving rise to the characteristic output forms recognized by the means

for monitoring the output of each further sound detector.

9. A noise monitoring system according to any preceding claim in which the means for monitoring the output of each further sound detector comprises one or more suitably programmed microprocessors.

10. A noise monitoring system according to any preceding claim in which the means for monitoring, checking and assigning comprises one or more suitably programmed microprocessors.

11. A method of detecting an aircraft comprising monitoring the output of each of a pair of sound detectors installed in or on and spaced along a runway so as to recognize an output form from either one of the detectors characteristic of an aircraft flying overhead, checking the output from the other sound detector representing time prior to and subsequent to the event giving rise to the characteristic output form for an output form indicative of the proximity of an aircraft and assigning to an event giving rise to such a characteristic output form a flag indicative of the direction of motion of the aircraft and whether it is taking off, flying by or landing in dependence upon the output from the said other sound detector.

12. A method according to claim 11 including checking the output from the said other sound detector within a predetermined window of time subsequent to the event and assigning to the event a flag indicating that the direction of motion of the aircraft is away from the said one sound detector and towards the said other sound detector if that output includes an output form indicative of the proximity of an aircraft.

13. A method according to claim 12 including assigning to the event a flag indicating that the aircraft is

landing if the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead.

14. A method according to claim 12 or claim 13 including assigning to the event a flag indicating that the aircraft is flying by if the said output form indicative of the proximity of an aircraft is characteristic of an aircraft flying overhead.

15. A method according to any one of claims 11-14 including checking the output from the said other sound detector within a predetermined window of time prior to the event and assigning to the event a flag indicating that the direction of motion of the aircraft is towards the said one sound detector and away from the said other sound detector if that output includes an output form indicative of the proximity of an aircraft.

16. A method according to claim 15 including assigning to the event a flag indicating that the aircraft is taking off if the said output form indicative of the proximity of an aircraft is not characteristic of an aircraft flying overhead.

17. A method according to claim 15 or claim 16 in which any output from the said other sound detector which has already been taken into account in assigning a flag indicative of the direction of motion of an aircraft giving rise to a previous event is disregarded.

18. A method according to any one of claims 11-17 further including monitoring the output of each of a plurality of further sound detectors distributed in or around the airport so as to recognize an output form characteristic of an aircraft flying overhead and correlating the events and flags recognized and

assigned by monitoring and checking the outputs of the said pair of sound detectors with events giving rise to the characteristic output forms recognized by monitoring the output of each further sound detector.

19. A method according to claim 18 in which the monitoring of the output of each further sound detector is accomplished by one or more suitably programmed microprocessors.

20. A method according to any one of claims 10-19 in which the monitoring and checking of the output of the said pair of sound detectors and consequent assignment of flags is accomplished by one or more suitably programmed microprocessors.

1/2

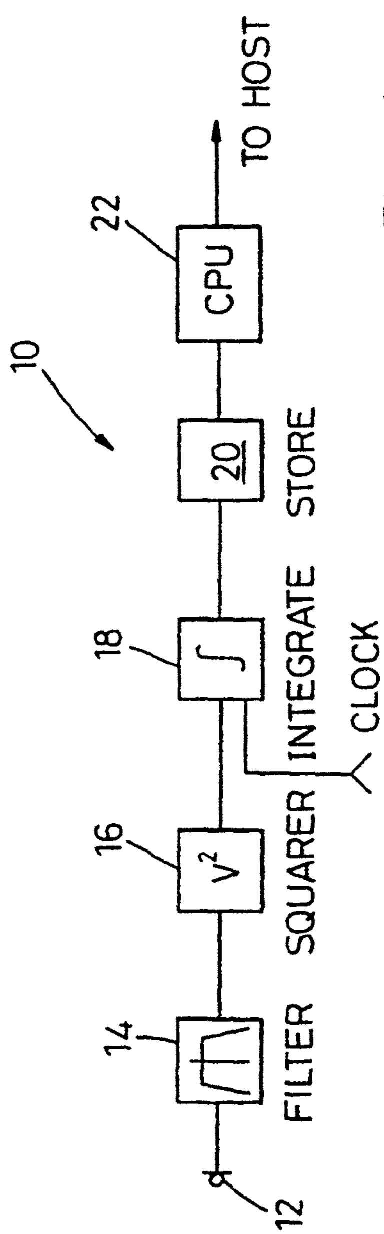

Fig. 1

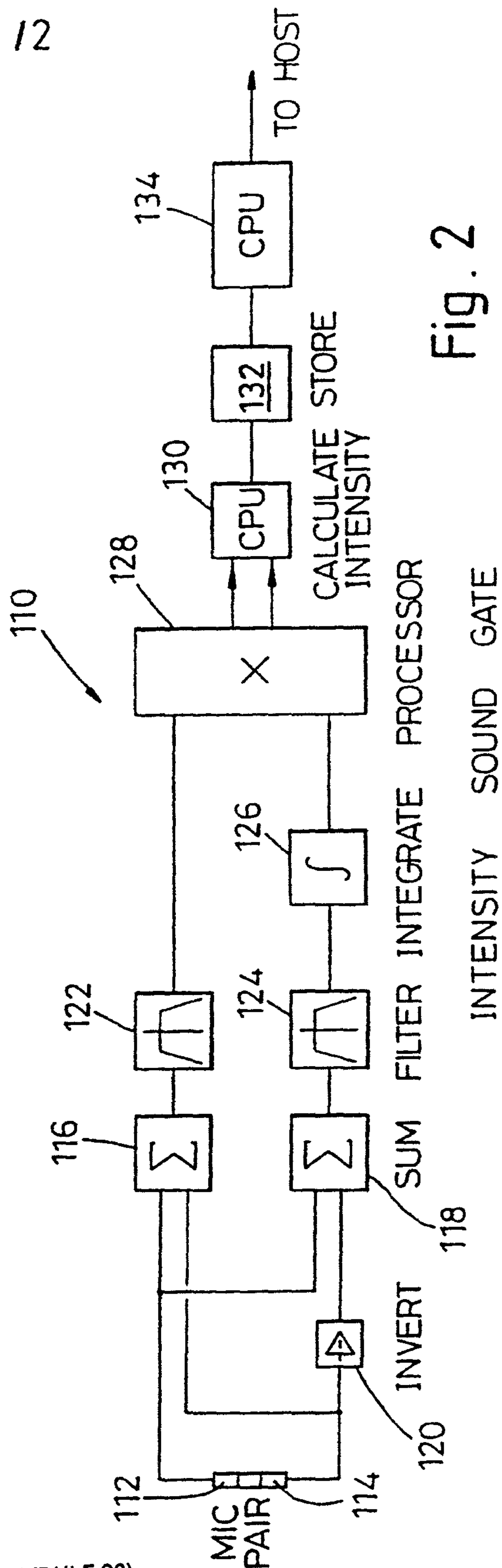

Fig. 2

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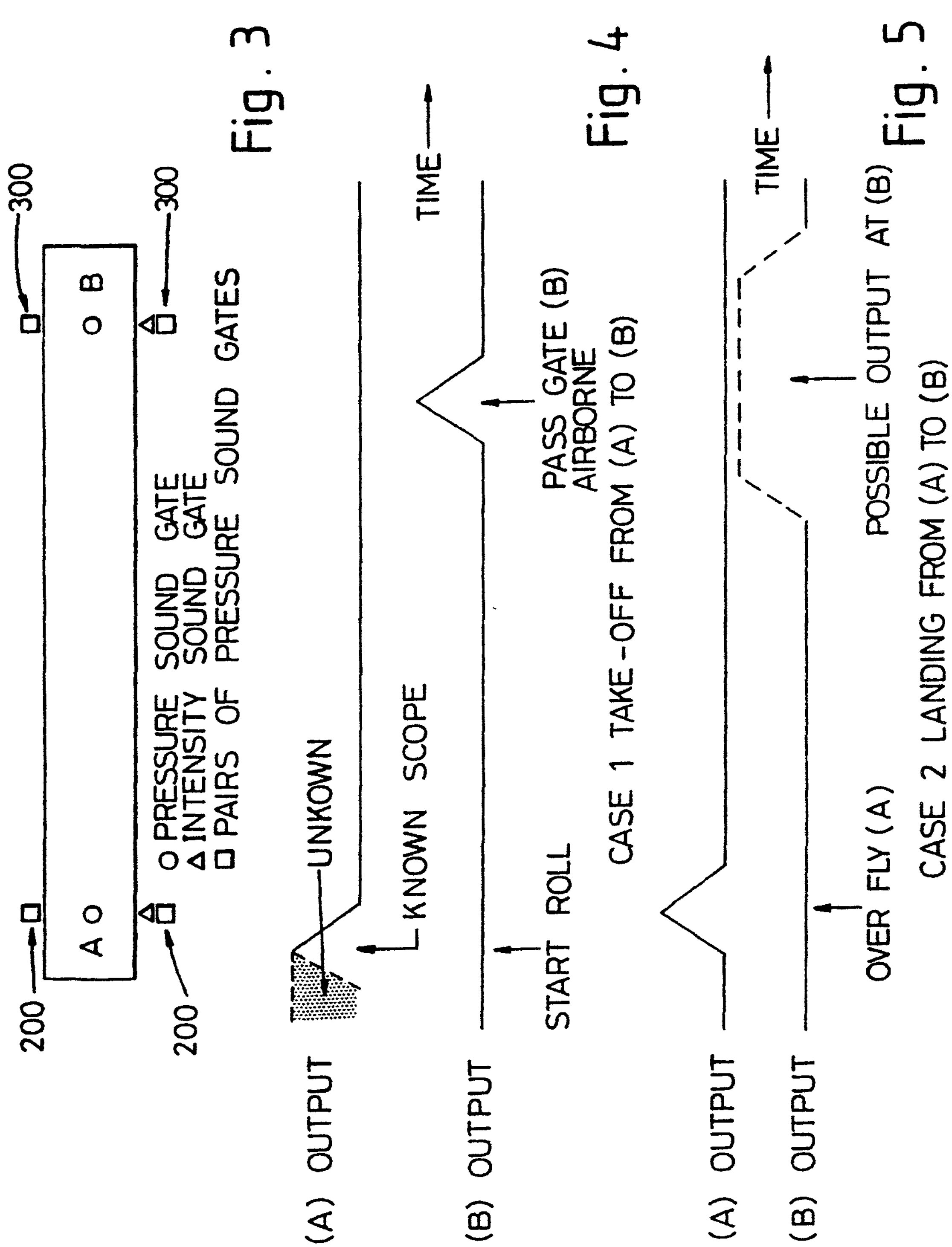

Fig. 3

Fig. 4

Fig. 5

INTERNATIONAL SEARCH REPORT

Inte ...nal Application No
PCT/GB 95/00820

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G01V1/00 G01H3/08

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G01V G01H

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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.
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X	J. WIGHT, P. DE HEERING, D. BALL, S. RADHAKANT 'Develpoment of a prototype aircraft counter- Phase I, A technical report prepared for the Transportation Development Centre, Montreal ,Quebec.' December 1987 , CANADIAN ASTRONAUTICS LIMITED , OTTAWA, CANADA see page 13-21 --- -/--	1,2,5,9

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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

Inte   nal Application No
PCT/GB 95/00820

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NOISE CONTROL ENGINEERING, vol. 5, no. 1, July 1975 - August 1975 USA, pages 36-40, W. K. CONNOR, B. K. COOPER 'Automatic airport noise monitoring system' Paragraph: "Aircraft detection". see page 39; figure 6	1
A	US-A-3 855 571 (MASSA F) 17 December 1974 see abstract	1
A	PATENT ABSTRACTS OF JAPAN vol. 008 no. 179 (P-295) ,17 August 1984 & JP,A,59 072028 (KOBAYASHI RIGAKU KENKYUSHO;OTHERS: 01) 23 April 1984, see abstract	1
A	US-A-5 189 425 (HACKEL RICHARD P ET AL) 23 February 1993 see abstract; figures 9-11	8

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inte[illegible]nal Application No
PCT/GB 95/00820

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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		FR-A-	2712705	24-05-95
		US-A-	5047995	10-09-91
US-A-3855571	17-12-74	NONE		
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Form PCT/ISA/210 (patent family annex) (July 1992)

JP1998-155040 (Nisshin Denki ; Pub.Jun.9,1998) (JP-A-10-155040)

[Title of the Invention] CALLING METHOD OF DIAL-UP CONNECTION COMMUNICATION EQUIPMENT AND SUPERVISORY CONTORL SYSTEM USING IT

[Abstract]

[Problem] To provide a calling method, which may surely call the communication equipment connected to the Internet network by dial-up and perform two-way communication securely in real time.

[Means for Resolution] The communication equipment 2 calls the communication equipment 3 through a telephone line 4 to transmit a connection request and its own public key to the communication equipment 3. On the other hand, the communication equipment 3 transmits its own public key to the communication equipment 2. After that, both of the communication equipment 2, 3 once disconnect the telephone line 4, and call neighboring providers 5, 6 to connect the same respectively to the Internet network 7. Both of the communication equipment 2, 3, encipher their own IP addresses in the current connection by the public key of the party to transmit it as an electronic mail to the electronic mail address of the party. Each of the communication equipment 2, 3 decodes the received electronic mail by its own privacy key to confirm the IP address of the party. After that, both of the communication equipment 2, 3 communicate through the Internet network 7 using the concerned IP address.

[Claims]

[Claim 1] A calling method of dial-up connection communication equipment, which is a method of calling dial-up connection communication equipment connected to a network by dial-up, comprising: a first process in which calling communication equipment transmits a connection request to dial-up connection communication equipment by a communication line provided separately from the network and capable of calling the dial-up connection communication equipment; a second process in which the dial-up connection communication equipment receiving the connection request is connected to the network by dial-up; and a third process in which the calling communication equipment and the dial-up connection communication equipment communicate with each other through the network.

[Claim 2] The calling method of dial-up connection communication equipment according to claim 1, wherein the third process includes: an encipher process in which the transmitting communication equipment between the calling communication equipment and the dial-up connection communication equipment enciphers and transmits at least part of the data transmitted in the third process; and a decoding process in which the receiving communication equipment decodes the enciphered data.

[Claim 3] The calling method of dial-up connection communication equipment according to claim 2, wherein the first process includes a process in which the calling communication equipment or the dial-up connection communication equipment informs the party at the other end of a key of cryptograph used in encipher.

[Claim 4] The calling method of dial-up connection communication equipment according to claim 1, 2 or 3, wherein the network is provided with a server for relaying the communication between the calling communication equipment and the dial-up connection communication equipment, and the third process includes: a process in which both of the above communication equipment inform the sever of their own identifications; a process in which both of the above communication equipment inform the server of the identification of the party at the other end to select the communication equipment of the party at the other end; and a process in which the server relays the communication between the selected communication equipment.

[Claim 5] The calling method of dial-up connection communication equipment according to claim 1, 2 or 3, wherein the network is a network which specifies a transmitting destination by an address in the network in transmitting data, and also assigns the dial-up connection communication equipment a temporary address in every connection, and the third process includes: a process in which the dial-up connection communication equipment obtains its own address in the current connection; a process in which the dial-up connection communication equipment informs the calling communication equipment of its own address by an electronic mail; and a process in which the calling communication equipment and the dial-up connection communication equipment specify the party at the other end by mutual addresses to communicate with each other.

[Claim 6] The calling method of dial-up connection communication equipment according to claim 1, 2, 3, 4 or 5, wherein after the third process, the calling method further includes a fourth process in which the calling communication equipment directly calls the dial-up connection communication equipment by the communication line to confirm whether or not the dial-up connection communication equipment normally disconnects the line from the communication line.

[Claim 7] A supervisory control system, comprising: a child station having facility equipment; and a parent station for controlling the facility equipment by communication with the child station, wherein the parent station includes: parent station communication means for calling the child station through a ring enable communication line to transmit a connection request, and then communicating with the child station through a network provided separately from the communication line, and the child station includes: child station communication means connected to the network by dialing up it on receiving the connection request through the communication line to communicate with the parent station through the network.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs]

This invention relates to a calling method of dial-up connection communication equipment connected to a network at need such as communication equipment connected to the

Internet network, for example, by dialing up it and a supervisory control system using it.

[0002]

[Prior Art]

As one of communication means, public telephone line network has been widely used. In this public telephone line network, prior to the communication, the connection (logical channel) is secured between the calling end and the called end to call the called party. In this type of connection mode communication system, the longer the channel is, the more the establishment of connection becomes difficult. Therefore, the public telephone line network generally adopts the rate system according to the communication distance.

[0003]

On the other hand, as new communication means, the Internet network has been spread rapidly in recent years. In the case of the Internet network, the communication equipment at the transmitting end creates datagrams by separating a data raw by each predetermined size upon transmitting data and transmits the same to the adjacent communication equipment. An address (IP address) in the Internet network of the communication equipment at the receiving end is added to each datagram. In the case of receiving the datagram, the communication equipment transmits the data to the communication equipment closer to the receiving end among the adjacent communication equipment according to the IP address of the transmitting destination (the receiving end). Thus, the transmit data can be sent to the receiving end without establishing the connection. In this type of connectionless mode communication system, both of the communication equipment at the transmitting end and at the receiving end do not grasp the channel between them. Therefore, in the case of the Internet network, frequently the rate system according to the quantity of data (the communication time) is adopted, or a fixed rate system is adopted at intervals of a predetermined period such as every year. Since both of rate systems are not susceptible to the distance between the transmitting end and the receiving end, in the long distance communication, especially in the communication with the foreign countries or the like, there is high possibility of reducing the communication cost by communication using the Internet network.

[0004]

Although the Internet network has been used the electronic mail, etc., for data communication mainly composed of characters heretofore, in recent years, with the improvement in bandwidth of the line, it has been used for two-way communication in real time between the communication equipment as well such as a video conferencing system and the Internet telephone.

[0005]

The methods of connecting the respective communication equipment to the Internet network are classified roughly into the connecting using a leased line and the dial-up connection. In the connection method using the leased line, a dedicated communication line is provided between the communication equipment and an Internet connecting firm (a provider) to thereby always connect each piece of communication equipment and the Internet network. In this case, since the communication equipment is always connected to the Internet network, an inherent IP address is assigned to the communication equipment. This method is adopted in the large companies and universities, and the users always pay fixed expenses as the maintenance costs for the communication line to the telephone company or the like.

[0006]

On the other hand, the dial-up connection is a method of connecting the communication equipment and the Internet network to each other in the case of requiring the connection to the Internet network. The connection to the Internet network is performed by communicating with the provider using the telephone line and relaying this communication by the provider. The provider assigns a free IP address as an IP address of the communication equipment when the communication equipment is put in the connecting state. Thus, the IP address can be shared among a plurality of pieces of communication equipment. Further, this method may dispense with the dedicated communication line between the respective pieces of the communication equipment. As a result, when the amount of communication is small, the connection can be done more inexpensively as compared with the leased line circuit. Accordingly, the dial-up connecting method is adopted mostly in a small firm and a personal house, which have comparatively smaller amount of communication. In this case, the electronic mail is stored by the provider, so the user verifies the arrival of the electronic mail by confirming a predetermined storage area in the provider at every connection.

[0007]

[Problems that the Invention is to Solve]

However, when the called communication equipment adopts the dial-up connection method, the calling communication equipment cannot determine whether or not the called end is connected to the Internet network beforehand. When the communication equipment at the called end is connected to the Internet network at the time of calling, the calling communication equipment can communicate with the called end, but if not so, both of the communication equipment cannot communicate with each other. Consequently, the connection cannot be made surely, resulting in the problem of insufficient quick responsiveness. This problem is critical in the case of speech communication similar to that on the ordinary telephone, in the case of a video conferencing system, and especially in the case of two-way communication in real time.

[0008]

Although this problem occurs when each communication equipment is connected not only to the Internet network but also to the network at need as in the case of personal computer communication, as described in the following, further problems are caused in the case of dial-up connection to the Internet network.

[0009]

To be concrete, the datagram is transmitted according to the respective communication equipment configuring the Internet network and the IP address of the transmitting destination included in the datagram. Consequently, in communication, the transmitting end has to grasp the IP address of the receiving end. In the dial-up connection method, however, the IP addresses of the respective pieces of communication equipment are not determined until they are connected to the provider. Consequently, the transmitting end cannot grasp the IP address of the receiving end beforehand as in the leased line connection method.

[0010]

In order to solve the above problem, a server having a fixed IP address has been installed heretofore for relaying the communication between the respective pieces of the communication equipment. In this case, the respective pieces of communication equipment start to communicate with the server after connection to the Internet network. When the respective pieces of communication equipment start to communication, the server relays the communication with the equipment at one end to that at the other end. In this case, the datagram transmitted to the IP address of the server is transferred to the communication equipment of the other party, so the respective pieces of communication equipment need not know the IP address of the other party. As a result, the communication can be performed without any obstacle even between the pieces of communication equipment connected to each other by dial-up.

[0011]

In the case of providing the server, however, it is necessary to maintain the server, resulting in newly causing the problem of requiring the maintenance cost. Further encountered is the problem that when the server is busy, even if the relevant communication equipment and the communication equipment of the other party are free, the communication cannot be performed. Further a method of searching for the other party of communication other in the server is not set up, so it is difficult to find a desired other party of communication. For example, at the moment, it is frequent to search for the other party by the following searching method. That is, the respective pieces of communication equipment register its own identifier in the server. The server displays a list of identifiers received, and the respective pieces of communication equipment select a desired other party from the list. According to this method, as the number of connectors increases, the more the time and trouble for searching increases.

[0012]

Further, even if the server is installed, the problem that when the communication equipment of the other party is not connected to the network, communication cannot be started remains unsolved.

[0013]

The invention has been made in the light of the above problems and it is an object of the invention to provide a calling method of communication equipment, which may improve the quick responsiveness of the communication equipment when the called communication equipment is connected to a network by dial-up.

[0014]

[Means for Solving the Problems]

According to the invention of claim 1, a calling method of dial-up connection communication equipment is a method of calling dial-up connection communication equipment connected to a network by dial-up, and it is characterized in that the method includes the following processes in order to solve the above problems.

[0015]

That is, the method includes: a first process in which calling communication equipment transmits a connection request to dial-up connection communication equipment by a communication line provided separately from the network and capable of calling the dial-up connection communication equipment; a second process in which the dial-up connection communication equipment receiving the connection request is connected to the network by dial-up; and a third process in which the calling communication equipment and the dial-up connection communication equipment communicate with each other through the network.

[0016]

As the above network, cited are connectionless mode network such as the Internet network and personal computer communication, and as the communication line, cited are a telephone line and a harbor radio.

[0017]

Generally the network, which cannot call the other party, is more easily achieved than the communication line, which can call the other party, such as the telephone line. Further, in the case where the communication equipment is connected to the network at need as in the dial-up connection, a channel between the network and the communication equipment and resources on the network such as an address can be shared by the other communication equipment and the other uses. Accordingly, the dialed-up connection communication equipment can be reduced in communication cost as compared with the case of directly communicating using the communication line and the case of connection to the network by a leased line.

[0018]

In the above constitution, before both of the calling communication equipment and the dial-up connection communication equipment communicate through the network, the calling communication equipment transmits a connection request to the dial-up connection communication equipment. Thus, even if the dial-up connection communication equipment is not connected to the network, in communication in the third process, it can be connected to the network. Accordingly, in the dial-up connection communication equipment, which can communicate at a low rate, communication can be surely started in a desired timing to enable real-time communication.

[0019]

According to the invention of claim 2, the calling method of dial-up connection communication equipment is characterized in that in the constitution of the invention as claimed in claim 1, the third process includes: an encipher process in which the transmitting communication equipment between the calling communication equipment and the dial-up connection communication equipment enciphers and transmits at least part of the data transmitted in the third process; and a decoding process in which the receiving communication equipment decodes the enciphered data.

[0020]

As the method used in encipher, various methods such as a method of using a common key of cryptograph to encipher and decoding and a method of enciphering using a public key and encoding using a privacy key different from the public key may be applied. Both of communication equipment acquire key of cryptograph such as a common key of cryptograph and the public key of the other party by a predetermined method such as communication in the first process or mail prior to the third process.

[0021]

In the case of communication through the network, there is the risk that the transmitted data is wiretapped or altered. Especially in the case of using the Internet network or the like as the network, the communication equipment at the calling end and the communication equipment at the receiving end cannot specify a data transmission channel, so that the degree of risk of communication jamming such as tapping is high.

[0022]

In the above constitution, however, among the communication contents, at least some contents are concealed from a third party other than the calling communication equipment and the dial-up connection communication equipment. As a result, the security to the communication jamming can be improved as compared with the case of transmitting a plaintext as it is without enciphering the communication contents.

[0023]

As the data to be enciphered, cited are the communication contents themselves, and the user names or addresses of both of communication equipment. However, as the amount of data to be enciphered increases, the load of both of the communication equipment increases, so that only part of the data may be enciphered in consideration of the signification of communication. Generally when the user name and address are heard by a third party, the significance of the communication contents is apt to be guessed. Accordingly, in the case of transmitting the user name and address prior to communication such as an image and voice, encryption of these is especially desired. Thus, the security to communication jamming can be improved without much increase in load of both of communication equipment.

[0024]

Further, according to the invention of claim 3, the calling method of dial-up connection communication equipment is characterized in that in the constitution of claim 2, the first process includes: a process in which the calling communication equipment or the dial-up connection communication equipment informs the party at the other end of a key of cryptograph used in encipher.

[0025]

In the case of using the public key in encipher, the party at the other end is informed of the public key corresponding to its own privacy key. In the case of enciphering using common key of cryptograph, the key of cryptograph is informed to the party at the other end.

[0026]

In the above constitution, the key of cryptograph is informed at every connection request, whereby even when the key of cryptograph is changed from that of the preceding communication, both of communication equipment can transmit and receive the enciphered data smoothly. In addition, both notification of connection request and sending of key of cryptograph are performed in a batch using the communication line. Accordingly, the time and trouble for connecting the communication line can be reduced as compared with the case of individually performing both of the above.

[0027]

Further, in the case of setting the key of cryptograph by mail or the like, the respective pieces of communication equipment have to set the key of cryptograph before use. The key of cryptograph is provided for each of communication equipment, so that especially when the number of parties to communicate increases, the time and trouble for setting increases. On the contrary, in the constitution as described in claim 3 of the invention, the key of cryptograph is informed in every connection, whereby it is not necessary to preset the respective keys of cryptograph, so that the time and trouble for setting can be reduced.

[0028]

The key of cryptograph is transmitted to the communication equipment of the party at the other end through the communication line, and the data enciphered by the key of cryptograph is transmitted through the network. Accordingly, when a third party attempts to interfere the communication, wire tapping of two-way communication is needed. As a result, the security to communication jamming can be improved as compared with the case of transmitting the key of cryptograph and data by single communication means.

[0029]

On the other hand, according to the invention of claim 4, the calling method of dial-up connection communication equipment is characterized in that in the constitution of the invention as claimed in claim 1, 2 or 3, the network is provided with a server for relaying the communication between the calling communication equipment and the dial-up connection communication equipment, and the third process includes: a process in which both of the above communication equipment inform the sever of their own identifications; a process in which both of the above communication equipment inform the server of the identification of the party at the other end to select the communication equipment of the party at the other end; and a process in which the server relays the communication between the selected communication equipment.

[0030]

As the network, cited is a connectionless mode network such as the Internet network. In this constitution, in enciphering in claim 2 or 3, the identifications of both of communication equipment are cited as especially suitable data.

[0031]

In the above constitution, similarly to claim 1, even when the dial-up connection communication equipment is not connected to the network, in communication in the third process, it can be connected to the network. Thus, both of communication equipment can surely start the communication in a desired timing through the server provided in the network. Even when the server makes public the identification, the user identification is enciphered and registered to thereby easily conceal the identifications of both of communication equipment from a third party.

[0032]

According to the invention of claim 5, the calling method of dial-up connection communication equipment is characterized in that in the constitution of the invention as described in claim 1, 2 or 3, the network is a network such as the Internet network, which specifies a transmitting destination by an address in the network in transmitting data, and also assigns the dial-up connection communication equipment a temporary address in every connection, and the third process includes: a process in which the dial-up connection communication equipment obtains its own address in the current connection; a process in which the dial-up connection communication equipment informs the calling communication equipment of its own address by an electronic mail; and a process in which the calling communication equipment and the dial-up connection communication equipment specify the party at the other end by mutual addresses to communicate with each other.

[0033]

In the case of the dial-up connection communication equipment, an address is undetermined until the connection to the network is made. Therefore, according to the conventional method, the calling communication equipment cannot grasp the address of the receiving end so that the dialed connections of communication equipment cannot communicate through the network.

[0034]

On the other hand, as in the constitution of the invention of claim 4, in the case of providing the network with the server for relaying the communication between both of communication equipment, even the dialed-up connections of communication equipment can communicate smoothly. In this case, however, the cost for separately providing the server and the maintenance cost are needed. Further, when the server is busy, there is the risk that both of communication equipment cannot communicate.

[0035]

On the contrary, in the constitution of the invention as described in claim 5, at the point of time the dial-up connection communication equipment determines its own address after connection to the network, it can inform the calling communication equipment of the address. Thus, both of communication equipment can communicate through the network without providing the server as in the constitution of claim 4. Accordingly, the cost required for communication can be further reduced as compared with the constitution of the invention described in claim 4, and also both of communication equipment can surely communicate regardless of congestion in the server.

[0036]

At the end of communication through the network, the dial-up connection communication equipment disconnects the connection to the network. In this case, when the dial-up connection communication equipment fails in disconnection of the line from the network, the dial-up connection communication equipment continues the connection to the network, so that the communication cost is raised against our desire. Especially, when no user is present in the periphery of the dial-up connection communication equipment such as the case where the dial-up connection communication equipment is a child station of a monitoring control system, failure in line disconnection is hard to grasp. Accordingly, when failure in line disconnection occurs, the period of time the dial-up connection communication equipment is connected to the network against out desire is apt to get longer, resulting in the high risk of increasing wasteful communication cost.

[0037]

On the contrary, according to the invention of claim 6, the calling method of dial-up connection communication equipment is characterized in that in the constitution of the invention described in claim 1, 2, 3, 4 or 5, after the third process, the calling method further includes a fourth process in which the calling communication equipment directly calls the dial-up connection communication equipment by the communication line to confirm whether or not the dial-up connection communication equipment normally disconnects the line connection to the communication line.

[0038]

In the above constitution, at the end of communicating with the dial-up connection communication equipment, the calling communication equipment confirms whether the line disconnection is successful or not by ring tone in direct calling. Thus, the calling communication equipment can surely recognize the line disconnection failure of the dial-up connection communication equipment. Accordingly, it is possible to take suitable measure such as the calling communication equipment's again designating the dial-up connection communication equipment to disconnect the line or the calling communication equipment's user leaving for the installation place of the dial-up connection communication equipment to disconnect the line. As a result, the occurrence of wasteful communication cost due to failure in line disconnection can be surely prevented.

[0039]

In the case of the communication line using ring tone different between the period the line is connected and the period the line is disconnected, the dial-up connection communication equipment is set so that call-in is not caused until a predetermined number of times of ring tone, and in conformation, the calling communication equipment discriminates the ring tone before it reaches the predetermined number of times, thereby confirming the disconnection of the line. In this case, when the calling communication equipment disconnects the line used for direct call before it reaches the predetermined number of times, the communication cost is not needed even when the dial-up connection communication equipment can normally disconnect the line from the network.

[0040]

When the calling method of dial-up connection communication equipment related to the invention of claim 1 is used, it is possible to construct a communication system, which may start the communication in a desired timing, and reduce the communication cost.

[0041]

In this case, in the supervisory control system, generally, a child station is installed in a place away from a parent station, and the parent station monitors and controls a number of child stations. Therefore, the cost for communication between the parent station and the child stations is liable to increase, and there is a strong demand toward reduction of communication cost. Especially, in the case where the data transmitted to the parent station by the child station is video data such as the case of monitoring the installation place, the amount of data is very large so that when the data is transmitted through a ring enable communication line, high communication cost is needed. On the other hand, in the supervisory control system, delay of designation is directly linked with escalation of an accident so that the child station has to instantaneously respond to designation of the parent station. Therefore, when the child station communicates with the parent station through the network only connected by dial-up connection, the child station cannot respond to the designation of the parent station and there is the risk of escalating the accident. As a result of these, in the monitor and control system, while the quick responsiveness of the child station to the designation of the parent station is kept, reduction of communication cost is strongly demanded.

[0042]

On the contrary, according to the invention of claim 7, in order to solve the above problem, a supervisory control system includes: a child station having facility equipment; and a parent station for controlling the facility equipment by communication with the child station, and the monitor and control system is characterized in that the parent station includes: parent station communication means for calling the child station through a ring enable communication line to transmit a connection request, and then communicating with the child station through a network provided separately from the communication line, and the child station includes: child station communication means connected to the network by dialing up it on receiving the connection request through the communication line to communicate with the parent station through the network.

[0043]

In the above constitution, the parent station communication means of the parent station calls the child station through a communication line such as a telephone at an arbitrary point of time such as a point of time user's designation is given. On the other hand, the child station communication means of the child station receives a connection request from the parent station and then sets up the connection to the network such as the Internet by dial-up connection. After that, the parent station and the child station transmit and receive the data through the network.

[0044]

In the above constitution, the child station is connected to the network by dial-up connection, which enables communication at a low rate, whereby the communication cost can be remarkably reduced as compared with the case where the child station and the parent station communicate using the communication line only. On the other hand, after the parent station calls the child station using the ring enable communication line, the data is transmitted and received through the network, so that the parent station can start communication with the child station in a desired timing. As a result of these, it is possible to achieve the supervisory control system, which may remarkably reduce the communication cost between the child station and the parent station while the child station can instantaneously respond to the designation of the parent station.

[0045]

[Mode for Carrying Out the Invention]

[First Embodiment] One embodiment of the invention will now be described according to Figs. 1 to 4. A calling method of dial-up connection communication equipment according to the present embodiment is a calling method applied to a communication system in which the calling end and the called end communicate through a telephone line and the Internet network and also at least the called communication equipment is connected to the Internet network by dial-up, and this is a preferable method especially for long-distance communication such as between Japan and the U.S.A. The dial-up connection is a method of connecting the communication equipment, which is not always connected to the network such as the Internet network, to the network when each of communication equipment determines to need connection.

[0046]

In the following, prior to the description of the above calling method and communication equipment for implementing the method, a communication system using the communication equipment will be described. That is, as shown in Fig. 1, a communication system 1 according to the present embodiment includes the above calling method, and the system is provided with communication equipment 2 and 3 which are at the calling end or at the called end, respectively. In the present embodiment, which communication equipment 2, 3 is at the calling end or at the called end is not especially determined, and both of communication equipment 2 and 3 have the functions of both the calling end and the called end as mentioned later. The communication equipment 2, 3 at the called end corresponds to the dial-up connection communication equipment described in the scope of the claims.

[0047]

Both of the communication equipment 2, 3 are respectively connected to a telephone line (a communication line) 4. The telephone line 4 is a digital line such as ISDN (Integrated Services Digital Network) or an analog line, and the respective communication equipment 2, 3 can inform a switchboard not shown of the telephone line 4 of the telephone number of the party at the other end by dialing. Thus, the respective communication equipment 2 and 3 can mutually call the party at the other end through the telephone line 4 to directly communicate with each other.

[0048]

The users of the respective communication equipment 2 and 3 join the Internet connection firms (provider) 5 or 6, and the communication equipment 2, 3 can respectively use the Internet network (network) 7 by dial-up connection. Since the communication equipment 2, 3 are respectively at the calling end in some case and at the called end in some case, both of providers 5, 6 are required to have the same function. In the following, although the provider 5 on the communication equipment 2 side will be described for the sake of convenience, the configuration of the provider 6 is the same.

[0049]

To be concrete, on receiving a connection request from the communication equipment 2 through the telephone line 4, the provider 5 causes the communication equipment to input ID showing an account (use capability) and a password preset by each ID. At the end of checking the account with the password, the provider 5 assigns a free IP address among its possessed addresses (IP addresses) on the Internet network 7 as a temporary IP address of the communication equipment 2. Thus, the communication equipment 2 can recognize its own IP address in current connection. As a result, the communication equipment 2 can create a data row (datagram) divided by each predetermined size, transmit the same to the provider 5, and discriminate the datagram addressed thereto out of the datagram received from the provider 5. The provider 5 transfers the datagram from the communication equipment 2 to the Internet network 7, and transmits the datagram from the Internet network 7 to the communication equipment 2. Thus, the communication equipment 2 can be connected to the Internet network 7 without any inherent IP address.

[0050]

The provider 5 shares the IP address and the connection line with the Internet network 7 among subscribers of dial-up connection. Accordingly, in the provider 5, the connection rate of the dial-up connection is often set to a lower rate as compared with the case where the communication equipment 2 holds an inherent IP address, and is always connected to the Internet network 7 through a leased communication line, that is, the case of leased line connection.

[0051]

The provider 5 is provided with an access point for communicating with the communication equipment 2 through the telephone line 4. The access point is disposed near to the communication equipment 2 such as the range of speech communication specified by local exchange code, and the communication equipment 2 can hold down the rate (telephone charge) of the telephone line 4 in communicating with the provider 5.

[0052]

Further, the provider 5 is a main server of the communication equipment 2 as well. To be concrete, the provider 5 previously assigns an electronic mail address to the communication equipment 2 and includes a storage area (a mail box) not shown corresponding thereto. The electronic mail addressed to the communication equipment 2 is delivered to the provider 5, and the provider 5 receives the electronic mail addressed to the communication equipment 2 and stores it in the corresponding mailbox. The provider 5 is always connected to the Internet network 7, and the IP address is always constant. Accordingly, the electronic mail is surely delivered whether the communication equipment 2 is connected to the Internet network 7 or not and regardless of the IP address in connection. Each of communication equipment 2 can read out an electronic mail addressed to itself from the mailbox in connection by dial-up.

[0053]

At present the Internet network has been spread widely and a number of providers have started to provide service. Most of these providers support dial-up connection and have a function of a mail server. Accordingly, the communication system 1 of the present embodiment can be easily configured by providing the communication equipment 2 and 3.

[0054]

The following description mainly deals with the case of transmitting both a voice and an image as in a video conference as configuration examples of the communication equipment 2 and 3. In the following, not only the case of transmitting both of a voice and an image but also the real-time transmission of data through the network such as the Internet network 7 by both communication equipment 2 and 3 are known generally as network conference.

[0055]

As to a method of achieving the respective pieces of communication equipment 2 and 3, although various configurations are considered as mentioned later, the description will now deal with the configuration in which the communication equipment 2(3) includes: a connector 2a (3a) controlling the connection between the telephone line 4 and the Internet network 7; and a computer 2b (3b) serving as an input/output device. In this configuration, the calling method of the present embodiment is implemented by the connector 2a. The communication equipment 2 and 3 are respectively provided with telephone sets 2c, 3c for ordinary speech communication except communication according to the above calling method. Since both of communication equipment 2 and 3 have the same configuration, in the following, for the sake of convenience, only the configuration of the communication equipment 2 will be described in detail.

[0056]

That is, the computer 2b includes an input device not shown such as a video camera and a microphone, wherein the voice and image of the user side can be transmitted as a digital data row to the connector 2a. Further, the computer 2b includes an output device (not shown) such as a monitor and a speaker, wherein the data row received from the communication equipment 3 through the connector 2a can be informed as an image and a voice to the user.

[0057]

The computer 2b and the connector 2a are connected to each other by a previously selected communication method such as RS232C, RS422A, IrDA or LAN, whereby data can be transmitted and received in two-way. As to the communication method between both, it doesn't matter whether wired or wireless, or digital or analog, and also what the communication speed and the communication standard are like if only two-way communication is enabled in real time.

[0058]

On the other hand, the connector 2a of the present embodiment, as shown in Fig. 2, includes: a flash memory 11 for storing a program for implementing the calling method of the present embodiment and various settings; an interface part 12 communicating with the computer 2b in the above predetermined communication method; a communicating IC (Integrated Circuit) 13 connected to the telephone line 4 and the telephone set 2c; a CPU (Central Processing Unit) 14 for controlling the whole connector 2a; and a RAM (Random Access Memory) 15 serving as a working storage. Further, a status display liquid crystal panel 16 is provided to display the status of the connector 2a such as the electronic mail address of the communication equipment 3. The respective members 11 to 16 are respectively connected to a bus 17, and the data is transmitted between the respective members through the bus 17.

[0059]

The above flash memory 11 is an electrically reloadable non-volatile memory, which stores a program for performing the operation mentioned later and various set points used in the concerned program. To be concrete, as the set points concerning the communication equipment 3, cited is a telephone number in a direct call. Further, the memory stores a password for identifying the communication equipment 2 by the communication equipment 3 in a direct call. The concerned password is previously transmitted to the communication equipment 3, and the communication equipment 3 can determine whether or not the password is a call from a regular user by checking. Further, as the set points concerning the provider 5, a telephone number of the provider 5, an account, a password and its own electronic main address are stored. Further, in the present embodiment, in communication through the Internet network 7, the communication equipment 2 and the communication equipment 3 communicate by enciphering at least part of the communication contents using the public key cryptosystem such as RSA code. Accordingly, the flash memory 11 stores a privacy key used in encipher and decoding and a public key as well. Naturally instead of the flash memory 11, non-volatile record means such as ROM (Read-Only Memory), a battery back-up

RAM or a hard disk may be used.

[0060]

The interface part 12 is an interface such as RS232 C interface according to a method of communication between the computer 2b and the connector 2a, and the CPU 14 can communicate with the computer 2b through the interface part 12.

[0061]

Further, the communicating IC 13 is an IC for MODEM, which may control the line connection/disconnection of the telephone line 4, and convert a data row processed by the CPU 14 from and to an electric signal transmitted through the telephone line 4. Further, according to the designation of the CPU 14, the telephone line 4 and the telephone set 2c can be connected to each other to ring the bell of the telephone set 2c.

[0062]

On the other hand, the CPU 14 controls the interface part 12 and the communicating IC 13 according to the program of the flash memory 11. To be concrete, the connector 2a can be directly communicated with the communication equipment 3 through the telephone line 4 by dialing a desired telephone number or connected to the Internet network 7 through the provider 5. Thus, the connector 2a can perform direct communication through the telephone line 4 and communication through the Internet network 7 in a predetermined order as mentioned later.

[0063]

The CPU 14 can control the computer 2b and the telephone set 2c through the interface part 12 or the communicating IC 13. Thus, the connector 2a can determine whether or not the computer 2b designates the connection through the Internet network 7 from the user by keying or the like, and a connecting destination. The connector 2a connects the telephone line 4 and the telephone set 2c to each other to perform ordinary speech communication.

[0064]

In the case of direct connection through the telephone line 4, the CPU 14 can transmit a predetermined message to the communication equipment 3 through the communicating IC 13, and also identify the message received from the communication equipment 3. The communication method between the communication equipment 2 and 3 is serial communication according to the standards V32, V32bis, V34, V21 or V22, in which a message can be transmitted and received between them.

[0065]

On the other hand, in the case where the communication equipment 2 and the provider 5 are connected to each other by dial-up, the CPU 14 transmits and receives datagram to and from the provider 5 through the communicating IC 13. Thus, the connector 2a can recognize the IP address in current connection and also transmits an electronic mail in a predetermined format. Further, the connector 2a confirms its own mailbox provided in the provider 5 in a predetermined period to determine whether or not the electronic mail from the communication equipment 3 arrives. When the electronic mail has arrived, the contents of the electronic mail are confirmed to recognize the IP address of the other party.

[0066]

In addition, in the case of connection through the Internet network 7, the CPU 14 controls the interface part 12 and the communicating IC 13 to relay the communication between the computer 2b and the Internet network 7. In the case where data is transmitted in a format different from that of datagram transmitted through the Internet network 7 such as a voice data row and an image data row between the computer 2b and the connector 2a, the CPU 14 converts both of them mutually. On the other hand, in the case of transmitting the datagram to the computer 2b, the CPU 14 passes the datagram as it is. Thus, the connector can smoothly relay the communication between the computer 2b and the Internet network 7.

[0067]

Further, the CPU 14 can encipher the data transmitted to the communication equipment 3 using the public key of the communication equipment 3 or decode the data received from the communication equipment 3 using its previously stored own privacy key.

[0068]

Although the computer 2b is in charge of input/output in the communication equipment 2 in the above description, the input/output device is not limited to this. As described above, as to the communication method between the input/output device such as the computer 2b and the connector 2a, it doesn't matter whether wired or wireless, or digital or analog, and also what the communication speed and the communication standard are like. Accordingly, various input devices such as a telephone set and a video camera can be used. In this case, however, the connector 2a need to convert the datagram transmitted by the Internet network 7 and the data between the telephone set 2c and the connector 2a mutually.

[0069]

Especially as shown in Fig. 3, in the case of using a telephone set 22c as an input device of communicating equipment 22, the telephone set 22c can be used both in speech communication through the Internet network 7 and ordinary speech communication. Further, it will be sufficient to provide a connector 22a between the telephone set 22c having the same configuration as the conventional one and the telephone line 4, the installation can be more facilitated as compared with the case of providing another input device.

[0070]

In this case, since the input device is only the telephone set 22c, it is necessary to discriminate between speed communication through the Internet network 7 and ordinary speed communication. Although a switch or the like is provided on the connector 22a, thereby designating the speech communication through the Internet network 7, the following method may be adopted to allow the user to discriminate between them using the telephone set 22c only. That is, the user presses a button for a preset register number of the party at the other end after the operation not used in the ordinary speech communication such as pressing the "#" button three times on lifting a telephone receiver. The connector 22a recognizes the above button operation according to a voice signal sent from the telephone set 22c to identify the occurrence of a connection request and the party at the other end. When speech communication with the other party is enabled through the Internet network 7, the user is notified by ringing a bell of the telephone set 22c or the like. On the other hand, when an ordinary telephone number is pressed, the connector 22a determines the ordinary speech communication according to a signal from the telephone set 22c, and passes the signal intact to the telephone line 4. Thus, the telephone set 22c can perform a direct call through the telephone line 4 similarly to the case without the connector 22a. Thus, as the operation for designating the communication through the Internet network 7, the operation not used ordinarily is assigned by the input device, whereby a connection request through the Internet network 7 and an ordinary communication connection request can be discriminated only by using the same input device as the conventional one.

[0071]

Although the above description deals with the case in which the computer 2b is in charge of input/output, and the connector 2a is in charge of controlling the connection order to the telephone line 4 or the Internet network 7 or encryption in the communication equipment 2, the role sharing between both members 2a, 2b is also not limited to this. For example, the processing of the connector 2a such as the above connection order control and the encryption may be mostly performed by the computer 2b. In this case, ordinary MODEM or a terminal adaptor of ISDN may be applied to the connector 2a.

[0072]

In Fig. 1 and Fig. 3, although the connector 2a (22a), the computer 2b and the telephone set 2c (22c) are respectively described as separate members for the sake of convenience of description, naturally they may be integrated. As an example of integration, cited are a domestic television set shown in Fig. 1, in which the connector 2a and the computer 2b are integrated and a telephone set shown in Fig. 3, in which the connector 22a and the telephone set 22c are integrated. Further, when a wireless telephone line is used as the telephone set 4, the above integrated telephone set may be constructed as a cellular phone. When a video camera is adopted as the input/output device and integrated with the connector 2a, it is possible to achieve the video camera, which may transmit an image and a video through the Internet network 7. In this case, more preferably a wireless telephone line is used so that the video camera is made portable. The selective combination of integration/separation or input/output device, and further wireless or wired telephone line 4 will achieve various configurations of communication equipment 2.

[0073]

The operation in the case where the communication equipment 2 calls the communication equipment 3 in the communication system 1 shown in Fig. 1 will now be described step by step according to the flowchart shown in Fig. 4.

[0074]

That is, when the user of the communication equipment 2 designates the communication equipment 2 to communicate with the communication equipment 3 by keying of the computer 2b, in the step S1a, the communication equipment 2 dials the telephone number of the communication equipment 3. Thus, the communication equipment 3 is called through the telephone line 4. In the following, the step S1a is abbreviated as S1a simply. Further, the processing conducted by the communication equipment 2 is indicated by adding a final letter (a) such as S1a, and the processing conducted by the communication equipment 3 is indicated by adding a final letter (b) such as S1b to discriminate between them.

[0075]

On the other hand, in the case of ready for communication, the user of the communication equipment 3 designates the communication equipment 3 to turn on "receive wait" by previously pressing a button or the like (S1b). When the "receive wait" is on state, the communication equipment 3 responds to a telephone call (S2b). As a result, the communication equipment 2 and the communication equipment 3 can start direct communication through the telephone line 4.

[0076]

On detecting the response of the communication equipment 3, the communication equipment 2 transmits a predetermined message such as " CALL CU-SEEME from user name of the communication equipment 2, PASSWORD: user's electronic mail address of the password communication equipment 2, public key of the communication equipment 2" to inform the communication equipment 3 of user name of the communication equipment 2, password, electronic mail address, and public key of the communication equipment 2 used in communication (S2a). The communication equipment 3 checks the combination of received user name and password with the previously stored combination to determine whether or not the party is a qualified communication party (S3b). When the party is not the qualified communication party, for example, when the user name or password is wrong, or the party at the other end speaks by a voice, the connector 3a of the communication equipment 3 rings the bell of the telephone set 3c to connect the telephone line 4 and the telephone set 3c (S4b). Thus, the user of the communication equipment 3 can talk with the party at the other end using the telephone set 3c. In this case, the following processing is not conducted.

[0077]

On the other hand, in the above S3b, when the qualified communication party is verified, the communication equipment 3 transmits a predetermined message such as "OK CU-SEEME from the user name of the communication equipment 3, user's electronic mail address of the communication equipment 3 and public key of the communication equipment 3" (S5b), and the communication equipment 2 receives the message (S3a). Thus, the communication equipment 2 can obtain the receipt of its own connection request by the communication equipment 3, the user name of the communication equipment 3, electronic mail address and the public key of the communication equipment 3 used in communication.

[0078]

After that, the communication equipment 2 and 3 disconnect their connection to the telephone line 4 (S4a, S6b), and start dialing-up a predetermined provider 5 or 6 (S5a, S7b).

In the respective communication equipment 2 and 3, the connectors 2a, 3a designate the computer 2b to start network conferencing software previously provided on the computer 2b such as CU-SEEME developed by Corel University (S6a, S8b).

[0079]

In the above S5a and S7b, when dial-up connection is successful, the communication equipment 2 and 3 obtain IP address for the current connection only from the respective providers 5, 6 (S7a, S9b). As a result, the respective communication equipment 2 and 3 can transmit the datagram to the Internet network 7.

[0080]

At this point of time, however, the communication equipment 2 and the communication equipment 3 do not grasp the IP address of the party at the other end so that the datagram addressed to the party at the other end cannot be generated. Therefore, although the communication equipment 2 and 3 can communicate with the equipment having the predetermined IP address such as the providers 5, 6, the communication between both of the communication equipment 2 and 3 cannot be started.

[0081]

Subsequently, the respective communication equipment 2 and 3 encipher their own names and own IP addresses using the public key sent from the party at the other end in the above S2a or S5b. After that, the communication equipment 2 and 3 transmit the cryptogram as an electronic mail to the electronic mail address of the party at the other end (S8a, S10b). Each electronic mail is enciphered by the public key of the party at the other end, so that it cannot be decoded without the privacy key held by the party at the other end.

[0082]

The communication equipment 2 and 3 monitor their own mailboxes provided on the providers 5, 6 at a predetermined period such as the intervals of five seconds. When the electronic mail arrives from the party at the other end, the communication equipment 2 and 3 read the electronic mail from the mailbox and perform decoding using their own privacy keys. Thus, the communication equipment 2 and 3 can obtain the name and IP address of the party at the other end (S9a, S11b).

[0083]

Further, on receiving the IP address of the party at the other end, the communication equipment 2 and 3 inform the network conferencing software of the IP address to call the party at the other end. Thus, at the network conferencing software, the communication is started (S10a, S12b).

[0084]

Each datagram includes the IP address of the transmitting end in addition to the IP address of the transmitting destination. Thus, when one communication equipment 2 (3) calls the communication equipment 3(2) of the party at the other end, the called network conferencing software can recognize the calling IP address based upon the received datagram. Accordingly, the communication can be started at the point of time one calls. To be concrete, when the processing of the above S10a starts earlier than the processing of the S12b, the communication equipment 3 need not to conduct the above processing S11b. Similarly when the above S12b starts earlier, the communication equipment 2 may omit the processing of the S9a. The network conferencing software is created to communicate even when they mutually call at the same time, so that even when each processing S9a, S11b is not omitted, the communication can be started smoothly.

[0085]

Further, at the point of time one communication equipment 2(3) calls the communication equipment 3(2) of the party at the other end, the communication can be started, so that during dial-up connection of both communication equipment 2 and 3, even if one of them does not transmit an electronic mail, both communication equipment 2 and 3 can start communication. However, when both communication equipment 2 and 3 transmit electronic mails, the communication can be started the moment the electronic mail of one of them arrives, so that the probability of more early starting the communication can be made higher as compared with the case where only one transmits an electronic mail.

[0086]

During the conference, the voice and image from the computer 2b are transmitted to the computer 3b through the connector 2a, the provider 5, the Internet network 7, the provider 6 and the connector 3a, and the voice and image from the computer 3b are transmitted in the opposite direction through the above path. Thus, the users of the communication equipment 2 and the communication equipment 3 can communicate by the network conference software (S10a, S12b). At the end of conference, the communication equipment 2 and 3 respectively disconnect dialed connection (S11a, S13b) to end the communication between the communication equipment 2 and 3.

[0087]

When the user at the receiving end is absent, for example, or when communication through the Internet network 7 is not desired, the connector 3a is designated to turn off "communication wait" by pressing a predetermined button or the like. In this case, the connector 3a makes the connection to the telephone set 3c unconditionally without conducting the processing of the S2 and subsequent steps.

[0088]

In the case of communication through the Internet network 7, it is unknown at the time of sending what the path of datagram transmitted by the communication equipment 2 and 3 is like to reach an address like, and the equipment constituting the Internet network 7 determines the next equipment to pass the datagram on receiving the datagram.

[0089]

Consequently, in the equipment where each datagram passes, the datagram is easily altered and copied, so that communication jamming is easily caused as compared with the case of direct communication through the telephone line 4. Especially in the case of transmitting the user name and IP address still in a plaintext by an electronic mail, the significance of communication can be judged from the user name so that the possibility that the subsequent communication is subjected to jamming as a priority becomes higher. On the other hand, arithmetic processing is essential to encryption and decoding, so that a higher throughput is demanded from the communication equipment 2 and 3 as compared with the case where encryption is not performed.

[0090]

Accordingly, in the present embodiment, in order to achieve compatibility between load in communication and security to jamming, only the contents of the electronic mail are enciphered. However, when further higher security to jamming is required, the communication contents are enciphered also during the communication period of the network communication software to thereby improve the security comparatively easily.

[0091]

Further, since the path for passing each datagram is not determined, it is difficult to assure the arrival time of the datagram. In a certain channel, when the amount of data exceeds the tolerance, there is the risk of losing datagram. In the communication system 1 of the present embodiment, however, in order to transmit the voice data and the image data, the communication equipment 2 and 3 are connected to the Internet network 7 through the communication line having enough communication capacity. When both providers 5, 6 are selected, a provider which connects both providers 5, 6 by a line having enough communication capacity is selected. Therefore, when the data amount is much smaller like an electronic mail as compared with the voice data and the image data, there is practically very low degree of risk of delay and loss. If an electronic mail does not arrive within a predetermined time, when the electronic mail is retransmitted, the possibility of delay and loss can be further reduced.

[0092]

Although both communication equipment 2 and 3 exchange electronic mail addresses between them through the telephone line 4 prior to the communication through the Internet network 7 in the present embodiment, this is not restrictive. For example, an electronic mail address of the party at the other end may be previously stored in the flash memory 11 shown in Fig. 2 or the like. The electronic mail address is, however, changed on the convenience of the user in some case. In that case, it takes the time and trouble for the user of the communication equipment 2, 3 to inform the party at the other end of a new electronic mail address every time they change the electronic mail address, and for the user of communication equipment 2, 3 at the other end to reset the received electronic mail address on the communication equipment 2, 3. On the contrary, in the present embodiment, the electronic mail addresses are mutually informed at every calling, whereby the time and trouble for changing the electronic mail address can be remarkably reduced.

[0093]

[Second Embodiment]

According to the first embodiment, as separate communication means from the telephone line 4, the Internet network 7 is used, and the communication equipment 2 and the communication equipment 3 directly communicate through the Internet network 7. On the contrary, as shown in Fig. 5, a communication system 31 of the present embodiment is the same as the first embodiment in that as a separate communication line from a telephone line 34, the Internet network 37 is used. However, the difference is that communication equipment 32 and communication equipment 33 communicate through a server 38 provided on the Internet network 37. In the communication system 31, the respective members of from the communication equipment 32 to the Internet network 37 have the substantially similar functions to those of the communication equipment 2 to the Internet network 7. Therefore, only the different parts will be described, and the description of the similar parts will be omitted.

[0094]

A server 38 provided in the communication system 31 of the present embodiment is called reflector, which has an inherent IP address and may relay the communication between the communication equipment 32 and 33 communicating with the server 38. To be concrete, the server 38 is provided with an area for storing combination of an IP address and identification of the current communicating equipment. When each of equipment informs the server 38 of the identification, the server 38 stores the combination of the IP address and identification of the equipment in the above area. Further, the server 38 may transmit a list of identifications from the above area according to equipment's request. Thus, each of equipment can know the identification of the current communication enabled equipment through the server 38. Further, the equipment specifies the identification to the server 38 to select a desired party at the other end of communication.

[0095]

The server 38 stores the IP addresses and identifications of all of equipment on storing the identification of the equipment. Therefore, the server 38 may transmit datagram received from one end to the IP address of the other end when the equipment specifies the party at the end of communication. The server 38 may transfer the datagram received from some equipment to two or more pieces of equipment. In this case, two or more pieces of equipment can communicate with each other.

[0096]

At present, various servers 38 are provided on the Internet network 37, and among them, some server 38 makes public its IP address to be used by unspecified individuals. Thus, these servers 38 are selected to easily constitute the above communication system 31.

[0097]

In the present embodiment, the hardware configurations of the communication equipment 32 and 33 are the same as those of the communication equipment 2 and 3 as shown in Fig. 1, and the operation varies with a difference in loaded software. Accordingly, in the following, the operation when the communication equipment 32 calls the communication equipment 33 will be described, and the description of the hardware configuration is omitted.

[0098]

As shown in the flowchart of Fig. 6, the calling method of the present embodiment includes steps (S21a to S31a and S21b to S33b) of conducting the same processing as those of step S1a to S11a and S1b to S13b shown in Fig. 4.

[0099]

However, although in specifying the party of communication at the other end, the communication equipment 32 and 33 mutually exchange IP addresses using electronic mails in the first embodiment, according to the present embodiment, the communication equipment 32 and 33 register predetermined identifications in the server 38 and select the identification of the party at the other end to specify the party of communication at the other end. Therefore, instead of the steps of exchanging their own IP addresses as in the steps S8a, S9a and S10b, S11b shown in Fig. 4, the following steps S28a, S29a and S30b, S31b are provided. In the S22a and S25b, the communication equipment 32 and 33 omit notification of an electronic mail address.

[0100]

That is, at the end of processing in the S27a and S29b, the communication equipment 32, 33 may transmit datagram including its own IP address to the Internet network 37 through the providers 35, 36. At this point of time, in the S22a or S25b, the public key and user name transmitted by the party at the other end are obtained.

[0101]

The communication equipment 32 and 33 encipher their user names by the public key. Further, the communication equipment 32, 33 inform the server 38 of the enciphered user names as identifications. The server 38 registers the combination of the identifications and IP addresses of the communication equipment 32, 33 (S28a, S30b). The server 38 can obtain the respective IP addresses according to the datagram transmitted when the communication equipment 32, 33 inform the identifications.

[0102]

In the present embodiment, the identifications of the communication equipment 32, 33 are enciphered and registered in the server 38. Accordingly, although a third party communicating with the server 38 can look at a list of identifications, the user names are unknown. As a result, similarly to the case of enciphering the electronic mail in the first embodiment, also in the present embodiment, the user name can be concealed from a third party.

[0103]

Subsequently, the communication equipment 32 and 33 cause a request for a list of identifications to the server 38. Further, the communication equipment 32 and 33 decode the respective identifications in the list using its own privacy key to select the identification in which a match between a previously informed user name and the decoding result occurs. After that, the communication equipment 32 and 33 inform the server 38 of the identification as the party of communication at the other end (S29a, S31b). The server 38 obtains one IP address from datagram used in notification, and obtains the other IP address from the IP address corresponding to the identification. After that, on receiving datagram from one of both IP addresses, the server 38 transfers the datagram to the other IP address. Thus, the communication equipment 32 and 33 may perform two-way communication even if they do not know the IP addresses mutually. In the present embodiment, similarly to the above first embodiment, during communication using the network conferencing software, the communication equipment 32 and 33 do not encipher the contents of communication to reduce the load in communication. However, the contents of communication are enciphered by the public key of the party at the other end also during the period to further improve the security to communication jamming.

[0104]

After the S29a, S31b, substantially similarly to the first embodiment, the communication equipment 32 and 33 perform two-way communication using the network conferencing software and then disconnect dialed connection at the end of a conference, thereby ending the communication.

[0105]

In the communication system 31 of the present embodiment, the server 38 relays the communication so that when the communication equipment 32 calls the communication equipment 33, mutually they do not require the IP address. It will be sufficient that both providers 35, 36 are not electronic mail servers of the communication equipment 32 and 33, and the communication equipment 32 and 33 cannot transmit and receive an electronic mail. Also in this case, the same effect as that of the present embodiment can be obtained.

[0106]

The communication equipment 32, 33 need to inform the identification to the IP address of the server 38 in the above S28a, S30b. This IP address may be previously stored in the flash memory 11 shown in Fig. 2, or make arrangements for it in the process of communication on the telephone line 34. Before registration in the above S28a, S30b, if a common server 38 is specified between the communication equipment 32 and 33, it does not matter how the server 38 is specified.

[0107]

[Third Embodiment]

According to the first and second embodiments, as communication means separate from direct communication using the telephone lines 4, 34, the Internet networks 7 and 37 are used. On the contrary, in the present embodiment, as separate communication means, the case of using personal computer communications will be described.

[0108]

As shown in Fig. 7, in a communication system 41 of the present embodiment, the users of communication equipment 42 and 43 enter the personal computer communications, and the communication equipments 42 and 43 telephone neighboring access points 45, 46 to be connected to a personal computer communication server 47 by dial-up.

[0109]

The personal computer communication server 47 communicates with the communication equipment 42 and 43 to provide predetermined services such as database retrieval. Further the personal computer communication server 47 of the present embodiment may relay the communication between both communication equipment 42 and 43 similarly to the server 38 shown in Fig. 5. Thus, two-way communication can be performed between both communication equipment 42 and 43 through the personal computer communication server 47.

[0110]

The personal computer communication server 47 administers the subscribers by ID or the like, and checks ID and password when the communication equipment 42 and 43 are connected through a telephone line 44 to identify the communication equipment 42 and 43, respectively, similarly to the provides 5 and 6 as shown in Fig. 11. However, differently from the case of communication through the Internet network 7 as in the communication system 1 shown in Fig. 1, in the communication system 41 shown in Fig. 7, the IDs of both communication equipments 42 and 43 are managed by the personal computer communication server 47. Accordingly, in the communication system 41, the communication party at the other end is specified by the respective IDs. The respective access points 45, 46 and the personal computer communication server 47 are connected to each other by leased lines 48, 48.

[0111]

Currently many the personal computer communication servers 47 are provided. Therefore, one of them is selected and the communication equipment 42, 43 are provided to comparatively easily constitute the communication system 41.

[0112]

The communication equipment 42 and 43 of the present embodiment are the substantially same hardware components as the communication equipment 2, 3 (22) shown in the first embodiment. However, the communication equipment 42 and 43 of the present embodiment transmit and receive data of a format corresponding to the communication mode with the personal computer communication server 47 when they are connected to the personal computer communication server 47. The transmission and receiving of the data of the format may be easily achieved by partially altering the hardware or software of the communication equipment 2 and 3.

[0113]

In the above configuration, when the communication equipment 42 calls the communication equipment 43, the communication system 41 is operated as shown in Fig. 8. That is, in the steps from S41a to S44a and from S41b to S46b, the communication equipment 42 conducts the same processing as that of Fig. 6 before communication through the personal computer communication server 47, thereby calling the communication equipment 43 through the telephone line 44 to transmit a connection request. At this time, both communication equipment 42 and 43 exchange public keys with each other.

[0114]

Subsequently, in the steps from S45a to S48a and from S47b to S50b, similarly to Fig. 6, both communication equipment 42 and 43 are respectively connected to the personal computer communication server 47 by dial-up to communicate through network conferencing software.

[0115]

In the present embodiment, however, the communication party at the other end is specified by using ID inherent to the communication equipment 42 and 43. Accordingly, the processing in the steps from S27a to S29a and from S29b to S31b is omitted. According to the present embodiment, in the S47a and S49b, in communication using the network conferencing software, both communication equipment 42 and 43 encipher and transmit the contents of communication using the public key of the party at the other end, which is exchanged with each other through the telephone line 44. The enciphered communication contents are decoded by its own previously held privacy key. Thus, the communication contents can be concealed from a third party.

[0116]

[Fourth embodiment]

The description of the above first to third embodiments deals with the configuration using the calling method of the dial-up connection communication equipment according to the invention even when communication equipment 2 (32, 42) calls the communication equipment 3 (33, 43), and on the contrary, even when the communication equipment 3 (33, 43) calls the communication equipment 2 (32, 42). However, the calling method of the dial-up connection communication equipment may be used only when the communication equipment at one end calls the other communication equipment.

[0117]

The case of using the calling method of dial-up connection communication equipment according to the invention only when the parent station calls the child station will now be described in detail by taking a monitor camera system (a supervisory control system) as an example. Although the Internet network or personal computer communications may be used as a network as shown in the first to third embodiments, the following description deals with the case of using the Internet network similarly to the first embodiment.

[0118]

That is, according to the present embodiment, a monitor camera system 51 is used for monitoring an unmanned parking garage, for example, and as shown in Fig. 9, the system includes: a parent station (calling communication equipment) 52 disposed in a head office and a child station (dial-up connection communication equipment) 53 disposed in each parking garage. The child station 53 is provided with a transmitter (child station communicating means) 53a for transmitting a video obtained by a monitor camera 53b … to the parent station 52, and the video obtained by each monitor camera 53b is sent to a receiver (parent station communicating means) 52a of the parent station 52 through the transmitter 53a of the child station 53. At the parent station 52, according to the video, whether the presence/absence of parking without permission is confirmed. Thus, all unmanned parking garages over the country can be monitored by only one head office. Accordingly, it is not necessary to dispatch monitoring staff members to the respective parking garages, so that the labor costs can be reduced. The charge of parking is collected once in a week, for example, by a local contracting staff member.

[0119]

To be more precise, the transmitter 53a of the child station 53 has the substantially same configuration as the connector 3a shown in Fig. 1. However, the difference is that in order to control a plurality of monitor cameras 53b, interfaces of the number corresponding to the number of monitor cameras 53b are provided. With this point, a function of recognizing a designation from the parent station 52 to select the monitor camera 53b designated to obtain a video, and designating the monitor camera 53b to obtain a video is assigned to the transmitter. Since the function can be achieved when the CPU 14 shown in Fig. 2 executes a predetermined program, the transmitter 53a can be achieved by the same hardware as that of the connector 3a.

[0120]

Further, each monitor camera 53b is disposed in a position to photograph a number plate of a vehicle parked in each parking space of the parking garage. The resolution of a video obtained by each monitor camera 53b is set to read the characters of the number plate. Each monitor camera 53b and the transmitter 53a are connected by a predetermined communication method as the computer 2b and the connector 2a shown in Fig. 1, whereby the monitor camera 53b can obtain a video according to the designation of the transmitter 53a, and the video data showing the obtained video can be transmitted to the transmitter 53a.

[0121]

Further, in the present embodiment, a wireless telephone system is used in part of the telephone line 54, and the transmitter 53a is connected to the parent station 52 or the provider 56 through a cellular phone set 53c. The wireless telephone system may utilize various systems such as a personal handy phone system (hereinafter referred to as PHS) and an automobile telephone system, and the child station 53 is provided with the cellular phone set 53c according to each system. Similarly to the connector 3a shown in Fig. 1, the transmitter 53a and the telephone line 54 may be directly connected to each other without utilizing the wireless telephone system.

[0122]

Thus, the child station 53 may directly communicate with the parent station 52 through the telephone line 54 similarly to the communication equipment 33 shown in Fig. 1, and it can be connected to the Internet network 57 through the telephone line 54 and the provider 56 by dial-up.

[0123]

On the other hand, the parent station 52 may communicate with the child station 53 by both the direct connection through the telephone line 54 and the connection through the Internet network 57 similarly to the communication equipment 2 shown in Fig. 1. The parent station 52 of the present embodiment is directly connected to the Internet network 57 by a leased line 58 differently from the communication equipment 2. Thus, the parent station 52 may call the child station 53 to communicate therewith using the calling method of the dial-up connection communication equipment according to the invention. Since the parent station 52 of the present embodiment is always connected to the Internet network 57 by the leased line 58, an inherent IP address is assigned to the parent station 52.

[0124]

To be concrete, the parent station 52 of the present embodiment is provided with a receiver 52a instead of the connector 2a shown in Fig. 1, and provided with a terminal 52b instead of the computer 2b and the telephone set 2c, which informs a video from the monitor camera 53b to a user and receives user's designation. The receiver 52a and the terminal 52b are connected by a predetermined communication method such as LAN similarly to the connector 2a and the computer 2b to perform bi-directional transmission and receiving of the data.

[0125]

The receiver 52a of the present embodiment includes a terminal adapter (TA) function, and it can be connected to an ISDN line through a digital line terminal device (DSU) not shown. The ISDN line is a digital line by which two lines (B channel) are simultaneously used by single subscriber contract. One line is monopolized to be connected to the Internet as a leased line 58, and the other line is used as the telephone line 54. The leased line 58 is not limited to this, but various lines such as a cable television line and an optical fiber can be used. When the ISDN line is used, however, both the leased line 58 and the telephone set 54 can be achieved by single subscriber contract, so that the parent station 52 may be achieved comparatively inexpensively.

[0126]

To be concrete, although the receiver 52a has the similar configuration to that of the connector 2a shown in Fig. 2 as shown in Fig. 10, S/T point interface (referred to S/T point I/F for short) 18 connected to the DSU is provided instead of the communicating IC 13. The S/T point I/F 18 can control setting/disconnection (line connection/disconnection) of a call according to the designation of the CPU 14, or convert a data row processed by the CPU 14 and an electric signal transmitted on the ISDN line to and from each other. Further the S/T point I/F 18 also may modulate the data row to be processed by the CPU 14 to a voice signal, and then transmit the voice signal on the ISDN line, demodulate the voice signal transmitted from the ISDN line, and convert it to the data row to be processed by the CPU 14. Thus, the receiver 52a can directly communicate with the transmitter 53a of the child station 53 through the telephone line 54. The communication method between the receiver 52a and the transmitter 53a is serial communication according to predetermined standards such as V32, V32bis, V34, V21 or V22, which may transmit and receive a message between them.

[0127]

Thus, the receiver 52a may directly call the child station 53 through the telephone line 54 and also communicate with the child station 53 through the leased line 58 and the Internet network 57.

[0128]

If the function as the whole of the parent station 52 is the same, it is possible to freely set the role sharing of the receiver 52a and the terminal 52b and whether or not both of them are integrally formed according to use, but the case where the receiver 52a acts as a server receiving a video from the monitor camera 53b will now be taken as an example and described. In this case, the video from each monitor camera 53b is stored in the receiver 52a, and the terminal 52b designates the receiver 52a to receive the video and display the video. On the other hand, when the user decides to obtain a video of a place where a certain monitor camera 53b is disposed, the terminal 52b discriminates the designation of the user by keying or the like, and informs the receiver 52a of an obtain request for a video to the monitor camera 53b. The receiver 52a discriminates the child station 53 corresponding to the monitor camera 53b according to the information from the terminal 52b, and calls the child station 53 by the calling method of the dial-up connection communication equipment according to the invention.

[0129]

The operation of the parent station 52 and the child station 53 in calling the child station 53 will now be described according to the flowchart shown in Fig. 11. Similarly to the flowcharts of the first to third embodiments, the step showing the operation of the calling, that is, parent station 52 is referred by a reference numeral to which a final letter (a) is added such as S61a, and the step showing the operation of the called, that is, child station 53 is referred by a reference numeral to which a final letter (b) is added.

[0130]

That is, at the parent station 52, the terminal 52b generates a receive request for obtaining a video from the monitor camera 53b according to the designation of the user and informs it to the receiver 52a (S61a). The receiver 52a retrieves the child station 53 corresponding to the monitor camera 53b according to the receive request to obtain the information for calling the child station 53 such as a telephone number and a password. Further, the receiver 52a telephones to the telephone number using a free line out of two ISDN lines to make a phone call to the transmitter 53a of the child station 53 (S62a). When the transmitter 53a responds to a telephone call (S61b), direction communication is enabled between the receiver 52a and the transmitter 53a by the telephone line 54.

[0131]

Further, in the S63a, when the receiver 52a informs the transmitter 53a of a predetermined password, the transmitter 53a verifies whether or not the received password is a predetermined notified password in the S62b, and if it is the notified password, a response message is transmitted to the receiver 52a.

[0132]

On receiving the response message, the receiver 52a gives a communication parameter (access information) used in connection through the Internet network 57 to the transmitter 53a in the S64a, and after receiving the communication parameter, the transmitter 53a disconnects the line connection with the telephone line 54 (S63b). Thus, the direction connection between the receiver 52a and the transmitter 53a is disconnected.

[0133]

The communication parameter transmitted in the above S64a includes dial-up information used for dial-up connection of the transmitter 53a such as a telephone number of the nearest provider 56 of the transmitter 53a, an account of the provider 56 and a password. The receiver 52a may inform each transmitter 53a of previously associated dial-up information, and for example, the receiver 52a may confirm the position of the transmitter 53a and inform the dial-up information corresponding to the transmitter 53a using the service of the radio communication system for informing both of the calling end and called end of the current position of the terminal.

[0134]

Further, the communication parameter includes the information used in transmitting video data through the Internet network 57 such as a key of cryptograph, the IP address of the receiver 52a, log-in name for ftp (File Transfer Protocol), and a communication start condition. To be more precise, the above key of cryptograph is a key of cryptograph used in enciphering the video data by the transmitter 53a, which is a throwaway type varying with every connection. The communication start condition shows a condition in connecting the transmitter 53a to the receiver 52a through the Internet network 57, and the following conditions are cited. When a first condition is selected, the receiver 52a calls the transmitter 53a on the telephone line 54, and the moment the communication is disconnected, the child station 53 starts the communication. When a second condition is selected, the transmitter 53a automatically starts the communication at fixed time intervals or at a specified time. Further, when a third condition is selected, in the case where some abnormality is sensed by a sensor (not shown) connected to the transmitter 53a, the transmitter 53a automatically starts the communication. In addition, when a fourth condition is selected, the transmitter 53a always performs the image processing for the video from each monitor camera 53b, and in the case where a predetermined change appears in the video, it automatically starts the communication. When a fifth condition is selected, in the case where a call is received from an ordinary telephone set (not shown) through the telephone line 54, the transmitter 53a automatically starts the communication after the connection with the telephone set is disconnected.

[0135]

When direct communication between the receiver 52a and the transmitter 53a is disconnected in the above S63b, the transmitter 53a is on standby until the communication start conditions informed in the above S64a are satisfied (S64b).

[0136]

When the communication conditions are satisfied, the transmitter 53a designates the monitor camera 53b to take a photograph or selects the latest video from the videos transmitted from the monitor camera 53b to obtain the video data from the monitor camera 53b, and enciphers the same using the key of cryptograph informed in the above S64a. Further, the transmitter 53a is dialed up and connected to the Internet network 57 through the provider 56 specified in the S64a (S65b). Thus, an IP address is assigned and the transmitter 53a is connected to the Internet network 57. The receiver 52a is always connected to the Internet network 57 through the leased line 58.

[0137]

Subsequently, in the S66b, the transmitter 53a causes a request for ftp connection to the receiver 52a through the Internet network 57 (S66b). The ftp connection request is caused by transmitting a predetermined command to the IP address of the receiver 52a informed in the above S64a.

[0138]

Further, on receiving the ftp connection request, the receiver 52a transmits a random number to the transmitter 53a on a login name input screen (S65a). Since the IP address of the transmitter 53a is not determined until it is assigned in the above S65b, the receiver 52a cannot estimate the IP address of the transmitter 53a. However, the datagram, which is transmitted to the receiver 52a when the transmitter 53a causes a request for ftp connection in the above S66b, includes the IP address of the transmitter 53a as an IP address at the transmitting end. Accordingly, the receiver 52a may transmit arbitrary data to the transmitter 53a through the Internet network 57 without any hindrance by transmitting the datagram to the IP address.

[0139]

Further, the transmitter 53a enciphers the received random number using the key of cryptograph informed in the above S64a to generate a password, and transmits the password to the receiver 52a (S67b). On the other hand, the receivers 52a determines whether or not the received password is a password, which corresponds to the login name and is enciphered using the password informed in the above S64a. When it is the password, which corresponds to the login name and is correctly enciphered, the transmitter 53a is acknowledged to be a regular party at the other end (S66a).

[0140]

The acknowledged transmitter 53a transmits the video data enciphered in the above S65b to the receiver 52a by an ftp protocol (S68b). The video data reaches the receiver 52a through the Internet network 57, and the receiver 52a receives the enciphered video data (S67a). Further, at the completion of transmission, the transmitter 53a disconnects the line connection with the provider 56 (S69b). Thus, the communication between the receiver 52a and the transmitter 53a through the Internet network 57 is completed.

[0141]

Further, the receiver 52a telephones the transmitter 53a to confirm whether or not the line connection between the transmitter 53a and the provider 56 is normally disconnected according to a ring tone. To be concrete, the transmitter 53a is set so that when a telephone call is received, call-in does not occur until ring tone is sounded predetermined number of times such as once or twice. As a result, when the receiver 52a calls up the transmitter 53a, ring tone is sounded a predetermined number of times. In the ordinary telephone line 54, the ring tone varies with whether or not the called transmitter 53a is connected to the line. Accordingly, the receiver 52a may confirm whether or not the line connection between the transmitter 53a and the provider 56 is disconnected according to the ring tone.

[0142]

For example, when an ordinary ring tone indicating that the line is not busy is sounded, the receiver 52a determines that the transmitter 53a is correctly disconnected from the Internet network 57. On the other hand, when a tone "a dah dah" indicating that the line is busy rings, the receiver 52a determines that the transmitter 53a is now connected to the Internet network 57. In this case, the receiver 52a transmits a disconnection command or the like to the IP address of the transmitter 53a, which communicated through the Internet network 57 a little while ago, thereby designating line disconnection to the transmitter 53a. In response to the information of the receiver 52a, the user of the terminal 52b may leave for the installation place of the monitor camera 53b to disconnect the line.

[0143]

In either case, the parent station 52 may grasp the failure in disconnection at the child station 53 to take suitable measures. As a result, the generation of wasteful communication cost due to failure in line disconnection can be surely prevented. When the receiver 52a stops a telephone call before the predetermined number of times, the telephone charges is free.

[0144]

In the S69a, the receiver 52a decodes the received video data and transmits the decoded video data to second equipment such as a terminal 52b shown in Fig. 9 by ftp protocol. Thus, the video data is displayed on the terminal 52b, and the user of the terminal 52b may confirm the video of the installation place of the monitor camera 53b.

[0145]

As a result, even when the child station 53 is dialed up and connected, the parent station 52 may confirm the video from the monitor camera 53b at an arbitrary point of time, and when any abnormality is found, such as when parking without permission is found, a specified monitor camera 53b may be monitored as a priority. Accordingly, the parking space where parking without permission is found is surrounded by a fence or information to that effect is given to a security company to take measures corresponding to the abnormality.

[0146]

As described above, the communication equipment constituting the Internet network 57 receives datagram from the neighboring communication equipment regardless of the IP address of the transmitting communication equipment. Accordingly, the receiver 52a may receive the video data from a plurality of transmitters 53a through the Internet network 57 when the throughput of the receiver 52a and the communication capacity of the leased line 58 are within the limits. Further, the receiver 52a may maintain the connection through the Internet network 57 and the direct connection through the telephone line 54 at the same time. Accordingly, the receiver 52a may dial up to a second transmitter 53a to designate acquisition of a video even while the video data is received through the Internet network 57.

[0147]

The description of the respective steps deals with the case where the video obtained by the monitor camera 53b is transmitted to the receiver 52a through the Internet network 57. When it is difficult to transmit data through the Internet network 57, such as when the provider 56 is congested, the transmitter 53a may dial up the receiver 52a to transmit a video by the direct communication through the telephone line 54. In this case, access to the Internet network 57 and encryption are not needed, so that the transmitter 53a can transmit a video to the receiver 52a at an earlier time.

[0148]

Although the receiver 52a and the transmitter 53a transmit the video data using the ftp protocol in the above respective steps, this is not restrictive. If it is a method of transmitting the data through the Internet network 57, the video data may be transmitted using the other methods such as an electronic mail. According to the ftp protocol, however, it is possible to surely confirm whether or not the data is transmitted by both of the receiver 52a and the transmitter 53a. Therefore, when data transmission fails, it is possible to take suitable measures, such as retransmission of data.

[0149]

Further, although the receiver 52a confirms whether or not the line connection of the transmitter 53a is disconnected according to a ring tone in the above S68a, this is not restrictive. For example, the receiver 52a may dial up to the transmitter 53a to directly communicate with each other, thereby confirming whether or not the line connection is disconnected. In the case of confirming the disconnection of the line according to a ring tone, however, the communication cost is free so that the communication cost can be further reduced as compared with the case of direct communication.

[0150]

An example of cost in managing the monitor camera system 51 will be simply described. In the above monitor camera system 51, since the number plate is confirmed according to the video obtained from the monitor camera 53b, after being compressed, a video with high precision as much as about 500 kilo-byte per sheet is needed. Accordingly, in the case of performing direct communication for the video using ISDN line whose data transmission speed is 64 k bps, it takes about 62 sec to transmit one sheet of video. In this case, when the parent station 52 and the child station 53 are located in Tokyo and Nagoya, respectively, the communication cost is about 40 yen. As a result, supposing that the frequency of obtaining a video is one time per hour, about 350,400 yen is needed for one year. On calculating the cost in the case of performing direct communication by analog line whose transmission speed is 33.6 kbps under the same conditions, as about 120 sec is needed for one time transmission, the communication cost is about 120 yen per time and about 700,800 yen is needed for one year. In the case of connecting the child station 53 to the Internet network 57 by a leased line, in recent years, about 400,000 yen is needed for using the leased line for one year.

[0151]

On the contrary, in the case of communication through the Internet network 7, when the provider 6 is within the range of speech communication with the child station 53 at the local telephone charge, the time required for one time transmission is within 180 sec, so the communication cost per time is 10 yen and it is about 87,600 yen for one year. Further, when the charge for the provider 6 is about 60,000 yen for one year, the communication cost per year is about 147,600 yen. As a result, in the above monitor camera system 51, the communication cost per child station 53 can be remarkably reduced by about 560,000 yen (about 79%) as compared with that in the case of direct communication using an ordinary line, and by about 200,000 yen (about 57%) as compared with that in the case of ISDN. Further, as the precision and number of sheets of video required by the parent station 52 or the communication frequency increases, the communication cost becomes relatively lower in the monitor camera system 51. On the other hand, as compared with the case where the child station 53 is connected by the leased line, the communication cost per child station 53 can be reduced by about 250,000 yen (about 63%) per year in the monitor camera system 51.

[0152]

The above communication cost is a merely example, so it largely varies with the rate system of the communication line used, and the rate system of the provider 6. As described above, in the respect of equipment required for communication, the communication cost can be easily reduced in the network more than in the communication line. Further, even in the case of communication using the network, the communication cost can be easily reduced in the dial-up connection more than in the connection using the leased line. Thus, the communication cost of the above monitor camera system 51 is often remarkably low as compared with both the case where the child station 53 is connected by the leased line and the case where the parent station 52 and the child station 53 are directly communicated.

[0153]

[Fifth Embodiment]

The description of the fourth embodiment deals with the case where the parent station 52 is always connected to the Internet network 57 by the leased line 58. On the contrary, as shown in Fig. 12, the description of the present embodiment will deal with the case where a parent station 52 is, similarly to the communication equipment 2 shown in Fig. 1, dialed up and connected to the Internet network 57 through a provider 55.

[0154]

The receiver 52a of the present embodiment has the same hardware configuration as that of the fourth embodiment, so that in communicating with a child station 53, one of two ISDN lines is used to achieve dial-up connection to the provider 55. The other components of the monitor camera system 51 such as the child station 53 have the same construction as that of the fourth embodiment. Therefore, the members having the same functions as those of the fourth embodiment are designated by the same reference numerals to omit the description. The operation of the parent station 52 and the child station 53 will now be described in detail according to the flowchart shown in Fig. 13.

[0155]

In the present embodiment, in addition to the steps shown in Fig. 11, both steps S71a and S72a are provided. In the S71a provided after the S61a, the receiver 52a is dialed up and connected to the Internet network 57 through the provider 55 when it is not connected to the Internet network 57. Thus, the receiver 52a can obtain its own IP address informed in the subsequent S64a.

[0156]

The receiver 52a is connected to the ISDN line. Accordingly, in the above S62a, while the receiver 52a is still connected to the Internet network 57, it may call a transmitter 53a using the other line. As a result, the IP address assigned to the receiver 52a in the above S71a is assigned to the receiver 52a after the S64b as well.

[0157]

On the other hand, in the S72a provided after S67a, the receiver 52a disconnects the line connection from the provider 55. Thus, the receiver 52a is disengaged from the Internet network 57.

[0158]

In the above configuration, the receiver 52a is dialed up and connected to the Internet network 57. Accordingly, as compared with the fourth embodiment in which the receiver 52a is connected by the leased line 58, the communication cost can be further reduced.

[0159]

In the above configuration, when the second to fifth conditions that the receiver 52a cannot manage the communication start point are selected among the communication start conditions informed in the above S64a, sometimes the receiver 52a is not connected to the Internet network 57 in transmitting a video by the transmitter 53a. Accordingly, in the case of selecting these conditions, the transmitter 53a has to call the receiver 52a using the calling method of dial-up connection communication equipment according to the invention. In this case, the receiver 52a and the transmitter 53a inform the party at the other end of its own IP address using an electronic mail or through a server as shown in the first and second embodiments.

[0160]

Although the description of the fourth and fifth embodiments deals with the case where photographing is designated to the monitor camera of the unmanned parking garage to obtain a photographed video as an application example of a monitor camera system, the monitor camera system of the invention is not limited to this, but it may be used in various purposes. For example, when the monitor camera is disposed in buildings and warehouses possessed in various places all over the country, the management firms may monitor the buildings and warehouses from one office as the parent station. Similarly, it may be applied to the purpose for monitoring unmanned shops and unmanned convenience store in a drive-in from a head office. Further, it may be used when a banking agency manages unmanned shop or an electric company manages an unmanned transformer substation or dam at remote places from a head office. Further, when the monitor camera is disposed in a delivery place, the condition of the delivery place can be known at the head office of a device maker, so that the monitor camera can be made useful for remote maintenance for delivered devices. When the unmanned cameras are disposed in volcanoes of various places, the volcanic activities of these may be monitored from the Research Laboratories of the Universities. The monitor cameras are disposed in the first-food shops, restaurants and convenience chain stores and the data obtained by photographing the respective interiors of the stores are transmitted to the head office, whereby various market information pieces such as customer attendance, the number of customers, constitution, age group or seated places by each time zone, can be acquired at the head office.

[0161]

In either case, it is not necessary to dispatch a monitoring staff member, so that the labor costs can be reduced. In addition, the monitor data can be transmitted through a network such as the Internet so that the communication cost can be remarkably reduced as compared with the case of using the communication line such as a telephone line. Further, since the monitor camera is called by the communication line, the parent station may designate the monitor camera to acquire a video at a desired point of time. As a result of these, it is possible to achieve the monitor camera system, which may acquire a video at an arbitrary point of time at a little budget.

[0162]

Although the description of the fourth and fifth embodiments deals with the case where a controlled system of the child station 53 is the monitor camera 53b, this is not restrictive. The invention may be applied to the monitor control system in which various pieces of equipment are controlled systems such as the case where the child station 53 transmits the data acquired using various sensors to the parent station 52, or the case where the child station 53 controls a motor and a pump according to the designation of the parent station 52. However, when the amount of data transmitted is large as in the case where the monitor camera 53b transmits the acquired video, the time required for communication is long so that when the data is transmitted by direct communication using the communication line, the communication cost rises sharply. Therefore, the effect in applying the invention to the monitor camera system 51 especially becomes larger.

[0163]

As shown in the first to fifth embodiments, respectively, the calling method of dial-up connection communication equipment is the calling method applied to the communication system in which the calling communication equipment and called communication equipment are respectively connected to the telephone line, and at least the called communication equipment is dialed up and connected to the network such as the Internet network and personal computer communications through the telephone line, and it is characterized in that before communication through the network, the calling communication equipment transmits a connection request to the called communication equipment using the telephone line.

[0164]

Thus, even when the called communication equipment is not connected to the network, in communication through the network, the called communication equipment can be connected to the network. Accordingly, both of communication equipment may surely start the communication in a desired timing. Thus, as compared with the prior art, the quick responsiveness of the called communication equipment can be improved to achieve real-time communication.

[0165]

Further, at least the called communication equipment is dialed up and connected to the network. Therefore, the cost in communication through the network can be remarkably reduced as compared with the case of connection to the network through the leased line and the case of direct communication through the telephone line. Especially, in the case where there is a long way between the places for installing both of communication equipment as in the foreign countries or the like, the cost in the case of direct communication through the telephone line is very high, so the effect of the invention is great.

[0166]

Although the description of the respective embodiments deals with the case where both of communication equipment are dialed up and connected, this is not restrictive. As in the fourth embodiment, for example, when at least the called communication equipment is the dial-up connected communication system, the same effect as those of the first to fifth embodiments can be obtained.

[0167]

Although the calling communication equipment informs a connection request by the telephone line in the above respective embodiments, this is not restrictive. The other communication lines such as a harbor radio may be used. When the equipment can inform a connection request to the called end, the same effect as those of the respective embodiments can be obtained.

[0168]

Although the description of the respective embodiments deals with the case where the calling communication equipment calls one piece of communication equipment, this is not restrictive, but two or more pieces of communication equipment may be called. Similarly to the case of calling one piece of communication equipment, two or more pieces of communication equipment are called in order by the telephone line, whereby a number of pieces of communication equipment can communicate at the same time on the network. In this case, the user of the calling communication equipment is a convener of a conference. In this case, network conferencing software enabling two or more pieces of communication equipment to communicate at the same time is needed, but generally this type of product has been already used.

[0169]

Although the communication equipment of each embodiment enciphers at least part of data transmitted by the network such as the user name and the communication contents, this is not restrictive. In communication through the network, the data may be transmitted still in the plaintext without enciphering.

[0170]

In the case of transmitting the data still in the plaintext, however, there is the risk that the data transmitted through the network is tapped or altered. Especially, in the case of using the Internet network as the network, the transmitting communication equipment and the receiving communication equipment cannot specify a data transmission channel. Consequently, wiretapping is easy so that the risk of communication jamming is high.

[0171]

On the contrary, in the above respective embodiments, in transmitting the data through the network, at least part of data is enciphered by various keys of cryptograph such as a public key of the party at the other end and a common key of cryptograph. Thus, at least part of the data can be concealed from a third party, which is not a regular communication party, so that the security to communication jamming can be improved.

[0172]

As the data to be enciphered, cited are the communication content itself, and user names and addresses of both communication equipment. As the amount of data to be enciphered increase, the load of both communication equipment increase, so only part of data may be enciphered in consideration of significance of communication. Generally, when the user name and address are heard by a third party, the significance of the communication content is easily estimated. Accordingly, as shown in the first and second embodiments, in the case of transmitting the user name and address prior to the communication of an image and a voice, especially preferably these are enciphered. Thus, the security to communication jamming can be improved without much increase in load of both of communication equipment.

[0173]

As a method in which each communication equipment obtains a key of cryptograph, various methods are considered. The key of cryptograph may be previously informed to the party at the other end by the other communication means such as by mail, and stored in storage means of each communication equipment such as the flash memory 11 shown in Fig. 2. In this case, however, the user of each of communication equipment has to set the key of cryptograph informed from the party at the other end to each of communication equipment prior to communication. Since the key of cryptograph is provided for every communication equipment, as the communication party at the other end is increased in number, the time and trouble for setting is increased. Further, the key of cryptograph should be changed at need to improve the security to communication jamming. Accordingly, the user of each of communication equipment has to inform a new key of cryptograph to all of the parties at the other end every time its own key of cryptograph is changed.

[0174]

On the contrary, according to the above respective embodiments, the key of cryptograph is informed through the communication line at the time of causing a connection request. When the key of cryptograph includes a public key and a privacy key, the public keys are exchanged through the communication line. On the other hand, in the case of using the common public key, it will be sufficient that the communication equipment at one end informs it to the other communication equipment. In this configuration, the key of cryptograph is informed at every connection request, so that even when the key of cryptograph is changed from that in the preceding communication, correction is easy. Accordingly, the key of cryptograph can be easily changed at every connection request, so that the security to communication jamming can be further improved. In addition, both notification of a connection request and sending of a key of cryptograph are performed in a batch using the telephone line. Thus, as compared with the case of individually performing both of them, the time and trouble for connecting the telephone line can be reduced.

[0175]

Further, the key of cryptograph and the enciphered data are transmitted by separate communication means. Accordingly, when a third party attempts to cause communication jamming, it is necessary to tap both of communications, so that the security to communication jamming can be more improved as compared with the case of transmitting the key of cryptograph and the data by single communication means. As the communication line, it is preferable to use the communication line comparatively hard to hear such as the telephone line for preventing wiretapping of the key of cryptograph.

[0176]

In the case where both of communication equipment communicate with each other through a server provided on the network as in the second embodiment, in addition to the above, it is necessary that both of communication equipment register the identifications in the server, and both of communication equipment inform the identification of the party at the other end to the server to select the communication party at the other end.

[0177]

In this case, the identification registered in the server is open to the public, so that when the user name is registered intact, there is the risk of lowering the security to communication jamming. Further, it takes time and trouble to select a desired identification among the identifications registered in the server. In this case, it will be sufficient that the above public key is used to encipher the user name and register it in the server. Thus, the user name can be concealed from a third party.

[0178]

In the configuration where the server is provided as in the second embodiment, the cost for separately providing the server and maintenance cost are needed. Further, when the server is congested, there is the risk of disabling both of communication equipment from communicating.

[0179]

On the contrary, the first embodiment provides a method in which both of communication equipment can directly communicate with each other through the network differently from the second embodiment. To be concrete, the method includes a process in which in dial-up connection, the called communication equipment acquires its own address, and transmits it to the calling communication equipment by an electronic mail. Thus, differently from the second embodiment, both of communication equipment can communicate through the network without especially providing a server. As a result, the cost required for communication can be further reduced. Further, both of communication equipment can surely communicate regardless of congestion of the server.

[0180]

When the communication through the network is ended, the dial-up connection communication equipment is disconnected from the network. In this case, when the dial-up connection communication equipment fails in line disconnection from the network, the dial-up connection communication equipment is continuously connected to the network, so that the communication cost rises sharply as undesired. Especially, when a user is absent in the periphery of the dial-up connection communication equipment, for example, when the dial-up connection communication equipment is the child station of the monitor control system, failure in line disconnection is hardly grasped. Consequently, when failure in line disconnection occurs, the period of time the dial-up connection communication equipment is connected to the network as undesired is apt to be long so that there is a large risk of increasing the wasteful communication cost.

[0181]

On the contrary, as in the fourth and fifth embodiments, the calling communication equipment calls the dial-up connection communication equipment through the communication line after the end of communication through the network to confirm whether or not the dial-up connection is normally disconnected. As a result, the wasteful communication cost due to failure in line disconnection can be reduced.

[0182]

As one example of a communication system to which the calling method of dial-up connection communication equipment according to the invention is applied, the description of the first to third embodiments deal with the Internet telephone system in which a video and a voice are transmitted, and the description of the fourth and fifth embodiments deals with the supervisory control system such as the monitor camera system. This is, however, not restrictive. The Internet VPN (Virtual Private Network) is constructed and widely applied in the case of transmitting and receiving arbitrary data.

[0183]

By using the calling method of the dial-up connection communication equipment, the communication can be started in a desired timing, and also the communication system, which may reduce the communication cost can be constructed, so that when the quick responsiveness is strongly demanded as in the Internet telephone system and the supervisory control system, especially it is preferable.

[0184]

To be concrete, in the supervisory control system, generally the child station is installed in a place remote from the parent station, and the parent station supervises and control a number of child stations. Consequently, the cost in communication between the parent station and the child stations is apt to increase, so the reduction of the communication cost is strongly demanded. On the other hand, in the supervisory control system, a delay of designation is directly connected with escalation of an accident, so that the child station has to immediately respond to designation of the parent station. Consequently, when the child station communicates with the parent station only through the dialed-up and connected network, the child station cannot respond to the designation of the parent station, resulting in the risk of escalating an accident. As a result of these, in the supervisory control system, it is strongly requested to reduce the communication cost while maintaining the quick responsiveness of the child station to the designation of the parent station. Therefore, when the parent station calls the child station, the application of the calling method of the dial-up connection communication equipment according to the invention is especially effective.

[0185]

[Advantage of the Invention]

According to the invention of claim 1, the calling method of the dial-up connection communication equipment, as described above, includes: a first process in which the calling communication equipment transmits a connection request to the dial-up connection communication equipment by the communication line provided separately from the network and capable of calling the dial-up connection communication equipment; a second process in which the dial-up connection communication equipment receiving the connection request is connected to the network by dial-up; and a third process in which the calling communication equipment and the dial-up connection communication equipment communicate with each other through the network.

[0186]

In the above constitution, even when the dial-up connection communication equipment is not connected to the network, in communication in the third process, the dial-up connection communication equipment can be connected to the network. Therefore, the invention produces the effect of surely starting the communication in a desired timing and achieving real-time communication in the dial-up connection communication equipment, which may communicate at a low rate.

[0187]

According to the invention of claim 2, in the calling method of the dial-up connection communication equipment, as described above, in the constitution of the invention described in claim 1, the third process includes: an encipher process in which the transmitting communication equipment between the calling communication equipment and the dial-up connection communication equipment enciphers and transmits at least part of the data transmitted in the third process; and a decoding process in which the receiving communication equipment decodes the enciphered data.

[0188]

In the above constitution, at least part of the communication content is concealed from a third party other than the calling communication equipment and the dial-up connection communication equipment by encryption. As a result, the invention produces the effect of improving the security to communication jamming as compared with the case of transmitting the communication content still in a plaintext without enciphering.

[0189]

According to the invention of claim 3, in the calling method of the dial-up connection communication equipment, in the constitution of the invention described in claim 2, the first process includes: a process in which the calling communication equipment or the dial-up connection communication equipment informs the party at the other end of a key of cryptograph used in encipher.

[0190]

In the above constitution, both notification of a connection request and sending of a key of cryptograph are performed in a batch. Thus, the invention produces the effect of transmitting the key of cryptograph at every connection without any increase in time and trouble for connecting the communication line, and reducing the time and trouble when the key of cryptograph is changed.

[0191]

Further, the key of cryptograph and the enciphered data are transmitted by separate communication means. As a result, the effect of further improving the security to communication jamming such as wiretapping and alteration of data is also produced.

[0192]

According to the invention of claim 4, in the calling method of the dial-up connection communication equipment, as described above, in the constitution of the invention described in claim 1, 2 or 3, the third process includes: a process in which both of the above communication equipment inform the sever of their own identifications; a process in which both of the above communication equipment inform the server of the identification of the party at the other end to select the communication equipment of the party at the other end; and a process in which the server relays the communication between the selected communication equipment.

[0193]

Therefore, the invention produces the effect that both of communication equipment may surely start the communication in a desired timing through the server provided on the network to achieve real-time communication.

[0194]

According to the invention of claim 5, in the calling method of the dial-up connection communication equipment, as described above, in the constitution of the invention described in claim 1, 2 or 3, the third process includes: a process in which the dial-up connection communication equipment obtains its own address in the current connection; a process in which the dial-up connection communication equipment informs the calling communication equipment of its own address by an electronic mail; and a process in which the calling communication equipment and the dial-up connection communication equipment specify the party at the other end by mutual addresses to communicate with each other.

[0195]

Therefore, both of communication equipment may communicate through the network without especially providing the server as in the constitution of claim 4. As a result, in addition to the effect of the invention described in claim 4, the invention produces the effect of further reducing the cost required for communication and surely performing communication regardless of congestion of the server.

[0196]

According to the invention of claim 6, as described above, in the constitution of the invention described in claim 1, 2, 3, 4 or 5, the calling method of the dial-up connection communication equipment further includes: a fourth process in which the calling communication equipment directly calls the dial-up connection communication equipment by the communication line to confirm whether or not the dial-up connection communication equipment normally disconnects the line from the communication line, after the third process.

[0197]

Therefore, the invention produces the effect that the calling communication equipment can surely recognize failure in line disconnection of the dial-up connection communication equipment to surely prevent the generation of wasteful communication cost due to failure in line disconnection.

[0198]

According to the invention of claim 7, the supervisory control system is, as described above, configured so that the parent station includes: the parent station communication means for calling the child station through a ring enable communication line to transmit a connection request, and then communicating with the child station through a network provided separately from the communication line, and the child station includes: the child station communication means connected to the network by dialing up it on receiving the connection request through the communication line to communicate with the parent station through the network.

[0199]

In the above constitution, after the parent station communication means calls the child station using a ring enable communication line, the child station communication means is connected to the network by dial-up connection which enables communication at a low rate to transmit and receive the data through the network. As a result, the invention produces the effect of achieving the supervisory control system, which may remarkably reduce the communication cost between the child station and the parent station, while the child station can immediately respond to the designation of the parent station.

[Brief Description of the Drawings]

[Fig. 1] Fig. 1 is a block diagram showing the configuration of the principal part of the whole communication system according to one embodiment of the invention.

[Fig. 2] Fig. 2 is a block diagram showing the configuration of the principal part of a connector provided on the calling and called communication equipment of the above communication system.

[Fig. 3] Fig. 3 is a block diagram showing the connecting relationship of communication equipment according to one embodiment of the invention.

[Fig. 4] Fig. 4 is a flowchart showing the operation of both of calling and called communication equipment in calling in the above communication system.

[Fig. 5] Fig. 5 is a block diagram showing the configuration of principal part of the whole communication system according to another embodiment of the invention.

[Fig. 6] Fig. 6 is a flowchart showing the operation of both the calling end and the called end in calling in the above communication system.

[Fig. 7] Fig. 7 is a block diagram showing the configuration of the principal part of the whole communication system according to still another embodiment of the invention.

[Fig. 8] Fig. 8 is a flowchart showing the operation of both the calling end and the called end in calling in the communication system.

[Fig. 9] Fig. 9 is a block diagram showing the configuration of the principal part of a supervisory control system according to still another embodiment of the invention.

[Fig. 10] Fig. 10 is a block diagram showing the configuration of the principal part of a receiver in the above supervisory control system.

[Fig. 11]Fig. 11 is a flowchart showing the operation when the parent station calls the child station in the above supervisory control system.

[Fig. 12] Fig. 12 is a block diagram showing the configuration of the principal part of a supervisory control system according to still another embodiment.

[Fig. 13] Fig. 13 is a flowchart showing the operation when the parent station calls the child station in the supervisory control system.

[Description of the Reference Numerals and Signs]

2, 22, 32, 42: communication equipment

3, 33, 43: communication equipment (dial-up connection communication equipment)

4, 34, 44, 54: telephone line (communication line)

7, 37, 57: Internet network (network)

38: server

48, 58: line (network)

52: parent station (communication equipment)

52a: receiver (parent station communication means)

53: child station (dial-up connection communication equipment)

53a: transmitter (child station communication means)

FIG. 1:
U.S.A
JAPAN
2a: CONNECTOR
3a: CONNECTOR
4: TELEPHONE LINE
5, 6: PROVIDER
7: INTERNET NETWORK

FIG. 2:
TO TELEPHONE SET
TO COMPUTER
4: TELEPHONE LINE
11: FLASH MEMORY
12: INTERFACE PART
13: COMMUNICATING IC
16: STATUS DISPLAY LIQUID CRYSTAL PANEL

FIG. 3:
4: TELEPHONE LINE
22a: CONNECTOR

FIG. 4:
- PROCESSING OF COMMUNICATION EQUIPMENT 2
START
S1a: CALL THE COMMUNICATION EQUIPMENT 3 ON THE PHONE.
S2a: TRANSMIT PASSWORD, ELECTRONIC MAIL ADDRESS AND PUBLIC KEY OF COMMUNICATION EQUIPMENT 2.
S3a: RECEIVE MESSAGE OF THE PARTY AT THE OTHER END.
S4a: DISCONNECT THE PHONE.
S5a: DIAL-UP CONNECTION
S6a: START NETWORK CONFERENCING SOFTWARE.
S7a: ACQUIRE ITS OWN IP ADDRESS.
S8a: TRANSMIT ELECTRONIC MAIL IN WHICH ITS OWN IP ADDRESS IS ENCIPHERED.
S9a: DECODE IP ADDRESS OF THE PARTY AT THE OTHER END.
S10a: NETWORK CONFERENCE
S11a: DISCONNECT DIAL-UP CONNECTION.
END

- PROCESSING OF COMMUNICATION EQUIPMENT 3
S1b: RECEIVE WAIT, ON
S2b: RESPONSE ON THE PHONE.
S3b: THE PARTY AT THE OTHER END IS VERIFIED?
S4b: CONNECT THE TELEPHONE SET.
S5b: TRANSMIT A CONNECT ENABLE MESSAGE, AND PUBLIC KEY AND ELECTRONIC MAIL ADDRESS OF COMMUNICATION EQUIPMENT 3.
S6b: DISCONNECT THE PHONE.
S7b: DIAL-UP CONNECTION
S8b: START NETWORK CONFERENCING SOFTWARE.
S9b:
ACQUIRE ITS OWN IP ADDRESS.
S10b: TRANSMIT ELECTRONIC MAIL IN WHICH ITS OWN IP ADDRESS IS ENCIPHERED.
S11b: DECODE IP ADDRESS OF THE PARTY AT THE OTHER END.
S12b: NETWORK CONFERENCE
S13b: DISCONNECT DIAL-UP CONNECTION.

FIG. 5:
U.S.A.
JAPAN
32a: CONNECTOR
33a: CONNECTOR
34: TELEPHONE LINE
35, 36: PROVIDER
37: INTERNET NETWORK
38: SERVER

FIG. 6:
- PROCESSING OF COMMUNICATION EQUIPMENT 32
START
S21a: CALL THE COMMUNICATION EQUIPMENT 33 ON THE PHONE.
S22a: TRANSMIT PASSWORD AND PUBLIC KEY OF COMMUNICATION EQUIPMENT 32.
S23a: RECEIVE MESSAGE OF THE PARTY AT THE OTHER END.
S24a: DISCONNECT THE PHONE.
S25a: DIAL-UP CONNECTION
S26a: START NETWORK CONFERENCING SOFTWARE.
S27a: ACQUIRE ITS OWN IP ADDRESS.
S28a: ENCIPHER ITS OWN IDENTIFICATION AND REGISTER IT IN SERVER.

S29a: SELECT THE IDENTIFICATION OF THE PARTY AT THE OTHER END.
S30a: NETWORK CONFERENCE
S31a: DISCONNECT DIAL-UP CONNECTION.
END

- PROCESSING OF COMMUNICATION EQUIPMENT 33
S21b: RECEIVE WAIT, ON
S22b: RESPONSE ON THE PHONE.
S23b: THE PARTY AT THE OTHER END IS VERIFIED?
S24b: CONNECT THE TELEPHONE SET.
S25b: TRANSMIT A CONNECT ENABLE MESSAGE, AND PUBLIC KEY OF COMMUNICATION EQUIPMENT 33.
S26b: DISCONNECT THE PHONE.
S27b: DIAL-UP CONNECTION
S28b: START NETWORK CONFERENCING SOFTWARE.
S29b: ACQUIRE ITS OWN IP ADDRESS.
S30b: ENCIPHER ITS OWN IDENTIFICATION AND REGISTER IT IN SERVER.
S31b: SELECT THE IDENTIFICATION OF THE PARTY AT THE OTHER END.
S32b: NETWORK CONFERENCE
S33b: DISCONNECT DIAL-UP CONNECTION.

FIG. 7:
U.S.A
JAPAN
42a, 43a: CONNECTOR
44: TELEPHONE LINE
45, 46: ACCESS POINT
47: PERSONAL COMPUTER COMMUNICATIONS SERVER

FIG. 8:
- PROCESSING OF COMMUNICATION EQUIPMENT 42
START
S41a: CALL THE COMMUNICATION EQUIPMENT 43 ON THE PHONE.
S22a: TRANSMIT PASSWORD AND PUBLIC KEY OF COMMUNICATION EQUIPMENT 42.
S43a: RECEIVE MESSAGE OF THE PARTY AT THE OTHER END.
S44a: DISCONNECT THE PHONE.
S45a: DIAL-UP CONNECTION
S46a: START NETWORK CONFERENCING SOFTWARE.
S47a: ENCIPHER THE COMMUNICATION CONTENT BY NETWORK

CONFERENCING SOFTWARE AND COMMUNICATE.
S48a: DISCONNECT DIAL-UP CONNECTION.
END

- PROCESSING OF COMMUNICATION EQUIPMENT 43
S41b: RECEIVE WAIT, ON
S42b: RESPONSE ON THE PHONE.
S43b: THE PARTY AT THE OTHER END IS VERIFIED?
S44b: CONNECT THE TELEPHONE SET.
S45b: TRANSMIT A CONNECT ENABLE MESSAGE, AND PUBLIC KEY OF COMMUNICATION EQUIPMENT 43.
S46b: DISCONNECT THE PHONE.
S47b: DIAL-UP CONNECTION
S48b: START NETWORK CONFERENCING SOFTWARE.
S49b: ENCIPHER THE COMMUNICATION CONTENT BY NETWORK CONFERENCING SOFTWARE AND COMMUNICATE.
S50b: DISCONNECT DIAL-UP CONNECTION.

FIG. 9:
52a: RECEIVER
53a: TRANSMITTER
54: TELEPHONE LINE
56: PROVIDER
57: INTERNET NETWORK

FIG. 10:
TO ISDN LINE THROUGH DSU.
TO COMPUTER.
11: FLASH MEMORY
12: INTERFACE PART
13: S/T POINT I/F
16: STATUS DISPLAY LIQUID CRYSTAL PANEL

FIG. 11:
- PROCESSING OF PARENT STATION
START
S61a: CAUSE A RECEIVE REQUEST.
S62a: CALL TRANSMITTER ON THE PHONE.
S63a: INFORM PASSWORD.
S64a: INFORM COMMUNICATION PARAMETER.

S65a: TRANSMIT RANDOM NUMBER TO TRANSMITTER ON LOGIN NAME INPUT SCREEN.
S66a: ACKNOWLEDGE TRANSMITTER BY PASSWORD.
S67a: RECEIVE ENCIPHERED VIDEO DATA.
S68a: CALL TRANSMITTER ON THE PHONE, AND CONFIRM LINE DISCONNECTION ACCORDING TO RING TONE.
S69a: DECODE VIDEO DATA.
END

-PROCESSING OF CHILD STATION
S61b: RESPONSE ON THE PHONE.
S62b: VERIFY PASSWORD, AND TRANSMIT RESPONSE MESSAGE.
S63b: RECEIVE COMMUNICATION PARAMETER AND DISCONNECT THE PHONE.
S64b: WAIT FOR COMMUNICATION START CONDITION.
S65b: ACQUIRE A VIDEO, ENCIPHER AND DIAL-UP CONNECTION.
S66b: ftp CONNECTION REQUEST TO RECEIVER.
S67b: TRANSMIT PASSWORD CREATED BY ENCIPHERING RANDOM NUMBER TO RECEIVER.
S68b: TRANSMIT ENCIPHERED VIDEO DATA.
S69b: DISCONNECT DIAL-UP CONNECTION.
END

FIG. 12:
52a: RECEIVER
53, 53a: TRANSMITTER
54: TELEPHONE LINE
55, 56: PROVIDER
57: INTERNET NETWORK

FIG. 13:
- PROCESSING OF PARENT STATION
START
S61a: CAUSE A RECEIVE REQUEST.
S71a: DIAL-UP CONNECTION
S62a: CALL TRANSMITTER ON THE PHONE.
S63a: INFORM PASSWORD.
S64a: INFORM COMMUNICATION PARAMETER.
S65a: TRANSMIT RANDOM NUMBER TO TRANSMITTER ON LOGIN NAME INPUT SCREEN.
S66a: ACKNOWLEDGE TRANSMITTER BY PASSWORD.

S67a: RECEIVE ENCIPHERED VIDEO DATA.
72a: DISCONNECT DIAL-UP CONNECTION.
S68a: CALL TRANSMITTER ON THE PHONE, AND CONFIRM LINE DISCONNECTION ACCORDING TO RING TONE.
S69a: DECODE VIDEO DATA.
END

-PROCESSING OF CHILD STATION
S61b: RESPONSE ON THE PHONE.
S62b: VERIFY PASSWORD, AND TRANSMIT RESPONSE MESSAGE.
S63b: RECEIVE COMMUNICATION PARAMETER AND DISCONNECT THE PHONE.
S64b: WAIT FOR COMMUNICATION START CONDITION.
S65b: ACQUIRE A VIDEO, ENCIPHER AND DIAL-UP CONNECTION.
S66b: ftp CONNECTION REQUEST TO RECEIVER.
S67b: TRANSMIT PASSWORD CREATED BY ENCIPHERING RANDOM NUMBER TO RECEIVER.
S68b: TRANSMIT ENCIPHERED VIDEO DATA.
S69b: DISCONNECT DIAL-UP CONNECTION.
END

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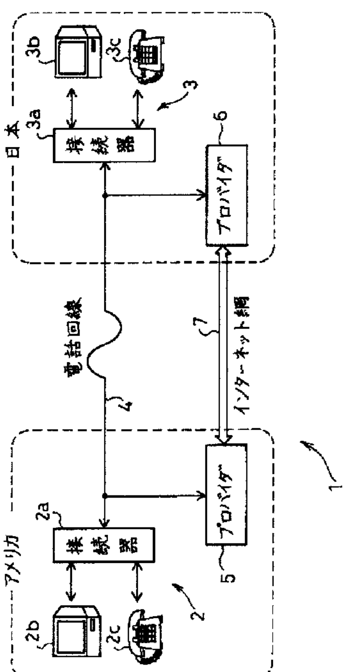
(54)【発明の名称】　ダイアルアップ接続通信機器の呼び出し方法、および、それを用いた監視制御システム

(57)【要約】

【課題】　インターネット網へダイアルアップ接続する通信機器を確実に呼び出し、安全にリアルタイム双方向通信できる呼び出し方法を提供する。

【解決手段】　通信機器２は、電話回線４を介して通信機器３を呼び出し、接続要求と自らの公開鍵とを通信機器３へ伝える。一方、通信機器３は、自らの公開鍵を通信機器２へ送出する。その後、両通信機器２・３は、電話回線４を一度切断し、近隣のプロバイダ５・６を呼び出して、インターネット網７にそれぞれ接続する。両通信機器２・３は、現接続時における自らのＩＰアドレスを相手の公開鍵で暗号化し、電子メールとして、相手の電子メールアドレスへ送信する。各通信機器２・３は、受信した電子メールを自らの秘密鍵で復号して、相手のＩＰアドレスを確認する。その後、両通信機器２・３は、当該ＩＰアドレスを用いて、インターネット網７で通信する。



【特許請求の範囲】

【請求項1】ネットワークへダイアルアップ接続されるダイアルアップ接続通信機器の呼び出し方法であって、

上記ネットワークとは別に設けられ、上記ダイアルアップ接続通信機器を呼び出し可能な通信回線によって、発呼側の通信機器がダイアルアップ接続通信機器へ接続要求を伝える第1工程と、

接続要求を受けたダイアルアップ接続通信機器が、上記ネットワークへダイアルアップ接続する第2工程と、

上記ネットワークを介して、発呼側の通信機器とダイアルアップ接続通信機器とが通信する第3工程とを含んでいることを特徴とするダイアルアップ接続通信機器の呼び出し方法。

【請求項2】上記第3工程は、上記発呼側の通信機器およびダイアルアップ接続通信機器のうちで送信側の通信機器が、当該第3工程にて送出するデータの少なくとも一部を暗号化して送出する暗号工程と、

受信側の通信機器が、暗号化されたデータを復号する復号工程とを含んでいることを特徴とする請求項1記載のダイアルアップ接続通信機器の呼び出し方法。

【請求項3】上記第1工程は、発呼側の通信機器あるいはダイアルアップ接続通信機器が、暗号化の際に使用される暗号鍵を相手に通知する工程を含んでいることを特徴とする請求項2記載のダイアルアップ接続通信機器の呼び出し方法。

【請求項4】上記ネットワークには、発呼側の通信機器とダイアルアップ接続通信機器との間の通信を中継するサーバが設けられており、

上記第3工程は、上記両通信機器が、自らを示す登録名を上記サーバへそれぞれ通知する工程と、

上記両通信機器が、相手の登録名を上記サーバへ通知して、相手の通信機器を選択する工程と、

上記サーバが選択された通信機器間の通信を中継する工程とを含んでいることを特徴とする請求項1、2または3記載のダイアルアップ接続通信機器の呼び出し方法。

【請求項5】上記ネットワークは、データを伝送する際、当該ネットワークにおけるアドレスによって送信先を特定すると共に、

ダイアルアップ接続通信機器に対して、接続毎に臨時のアドレスを割り当てるネットワークであり、

上記第3工程は、ダイアルアップ接続通信機器が、現接続における自らのアドレスを取得する工程と、

電子メールによって、ダイアルアップ接続通信機器が、発呼側の通信機器へ自らのアドレスを通知する工程と、

発呼側の通信機器およびダイアルアップ接続通信機器が、互いのアドレスにより相手を特定して通信する工程とを含んでいることを特徴とする請求項1、2または3記載のダイアルアップ接続通信機器の呼び出し方法。

【請求項6】さらに、上記第3工程の後で、上記発呼側の通信機器がダイアルアップ接続通信機器を上記通信回線にて直接呼び出して、当該ダイアルアップ接続通信機器が当該通信回線との回線接続を正常に切断したか否かを確認する第4工程を含んでいることを特徴とする請求項1、2、3、4または5記載のダイアルアップ接続通信機器の呼び出し方法。

【請求項7】設備機器を有する子局と、当該子局との通信によって上記設備機器を制御する親局とを備えた監視制御システムにおいて、

上記親局は、呼び出し可能な通信回線を介して上記子局を呼び出し、接続要求を伝えた後で、上記通信回線とは別に設けられたネットワーク経由で上記子局と通信する親局通信手段を備え、

上記子局は、上記通信回線を介して、上記接続要求を受け取った後で、上記ネットワークにダイアルアップ接続して、当該ネットワーク経由で上記親局と通信する子局通信手段を備えていることを特徴とする監視制御システム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、例えば、ダイアルアップ接続によって、インターネット網に接続する通信機器など、必要なときにネットワークに接続されるダイアルアップ接続通信機器の呼び出し方法、および、それを用いた監視制御システムに関するものである。

【0002】

【従来の技術】通信手段の1つとして、公衆電話回線網は、従来より広く用いられている。この公衆電話回線網では、通信に先立って、ネットワーク側が発呼側と被呼側との間でコネクション（論理的な通信パス）を確保して、被呼側を呼び出す。このようなコネクション型の通信システムでは、通信路が長い程、コネクションの確立が困難になる。したがって、公衆電話回線網は、一般に、通信距離に応じた料金体系を採用している。

【0003】一方、近年では、新たな通信手段として、インターネット網が急速に普及しつつある。インターネット網の場合、送信側の通信機器は、データを送信する際に、データ列を所定の大きさ毎に区切ってデータグラムを作成し、近隣の通信機器へ送出する。各データグラムには、受信側の通信機器のインターネット網におけるアドレス（ＩＰアドレス）が付加されている。データグラムを受け取った場合、送信先（受信側）のＩＰアドレスに基づいて、通信機器は、近隣の通信機器のうち、受信側に近い方の通信機器へデータを送出する。これにより、コネクションを確立しなくても、送信側のデータは受信側へ届けられる。このようなコネクションレス型の通信システムでは、送信側および受信側の通信機器は、いずれも両者間の通信パスを把握していない。したがって、インターネット網の場合は、データ量（通信時間）に応じた料金体系、あるいは、1年毎など、所定の期間毎に一定の料金体系を採用していることが多い。両料金

体系は、送信側と受信側との距離に影響を受けないので、特に、海外との通信など、長距離の通信では、インターネット網を利用して通信することによって、通信費用を削減できる可能性が高い。

【0004】上記インターネット網は、従来は、電子メールなど、文字主体のデータ通信に使用されていたが、近年では、回線の帯域幅の向上に伴って、ビデオ会議システムやインターネット電話など、通信機器間でのリアルタイム双方向通信にも利用されている。

【0005】ところで、上記インターネット網に各通信機器を接続する方法は、専用線による接続と、ダイアルアップ接続との2つに大別できる。専用線による接続方法は、通信機器と、インターネット接続業者（プロバイダ）との間に、専用の通信線を用意して、各通信機器とインターネット網とを常時接続する方法である。この場合、インターネット網に常時接続されているため、通信機器には固有のＩＰアドレスが割り当てられる。この方法は、大きな会社や大学などで採用されており、使用者は、通常、通信線の維持費用として、電話会社などに一定の費用を支払っている。

【0006】一方、ダイアルアップ接続は、インターネット網に接続したいときに、通信機器とインターネット網とを接続する方法である。インターネット網への接続は、電話回線などを利用して、プロバイダと通信し、この通信をプロバイダが中継することによって行われる。プロバイダは、通信機器が接続されたとき、当該通信機器のＩＰアドレスとして、空いているＩＰアドレスを割り当てる。これにより、複数の通信機器間でＩＰアドレスを共用できる。また、この方法では、各通信機器との間に専用の通信回線も不要である。この結果、通信量が少ない場合には、専用線回線に比べて安価に利用できる。したがって、ダイアルアップ接続方法は、小さな会社や個人宅など、通信量が比較的少ない場合に採用されることが多い。この場合、電子メールは、プロバイダが蓄積しており、使用者は、接続毎にプロバイダ内の所定の記憶領域を確認するなどして、電子メールの到着を確認する。

【0007】

【発明が解決しようとする課題】しかしながら、被呼側の通信機器がダイアルアップ接続方法を採用していた場合、発呼側の通信機器は、被呼側がインターネット網に接続されているか否かを事前に判定できない。もし、発呼時において、被呼側の通信機器がインターネット網に接続されていれば、発呼側の通信機器は、被呼側と通信できるが、そうでない場合には、両通信機器は、通信できない。したがって、確実に接続されるとは限らず、即応性に欠けるという問題点を有している。この問題は、通常の電話と同様に通話しようとしている場合や、ビデオ会議システムの場合など、特に、リアルタイムで双方向通信しようとしている場合には致命的となる。

【0008】なお、この問題は、インターネット網に限らず、パソコン通信の場合など、各通信機器が必要に応じてネットワークに接続する場合であれば発生するが、以下に示すように、インターネット網へダイアルアップ接続する場合には、さらなる問題点が発生する。

【0009】具体的には、インターネット網を構成する各通信機器、データグラムに含まれている送信先のＩＰアドレスに基づいて、当該データグラムを伝送する。したがって、通信するにあたって、送信側は、受信側のＩＰアドレスを把握している必要がある。ところが、ダイアルアップ接続方法では、各通信機器のＩＰアドレスは、それぞれのプロバイダと接続するまで決定されない。したがって、送信側は、専用線接続方法のように、受信側のＩＰアドレスを予め把握しておくことができない。

【0010】そこで、従来は、この問題を解決するために、各通信機器間の通信を中継するために、固定のＩＰアドレスを持つサーバを設置している。この場合、各通信機器は、インターネット網に接続した後、上記サーバと通信を開始する。各通信機器が通信を開始すると、サーバは、一方との通信を他方へ中継する。この場合、サーバのＩＰアドレスへ送出したデータグラムが相手の通信機器へ転送されるので、各通信機器は、相手のＩＰアドレスを知る必要がない。この結果、ダイアルアップ接続している通信機器間であっても、何ら支障なく通信できる。

【0011】ところが、サーバを設けた場合には、サーバを維持する必要があり、維持費用がかかるという問題が新たに発生する。また、サーバが混んでいた場合には、自通信機器と相手の通信機器とが空いていても通信できないという問題も派生する。さらに、サーバ内で通信相手を探す方法が確立されておらず、所望の通信相手を見つけることが困難である。例えば、現時点では、以下のような探索方法によって、相手を探すことが多い。すなわち、各通信機器は、サーバへ自らの名称を登録する。サーバは、受け取った名称のリストを表示し、各通信機器は、そのリスト内から所望の相手を選択する。この方法では、接続者数が増えるに従って、探索時の手間が増大する。

【0012】また、サーバを設置したとしても、相手の通信機器がネットワークに接続されていなければ、通信を開始できないという問題点は、依然として解決されていない。

【0013】本発明は、上記の問題点を鑑みてなされたものであり、その目的は、被呼側の通信機器がネットワークにダイアルアップ接続されている場合に、当該通信機器の即応性を向上できる通信機器の呼び出し方法を提供することにある。

【0014】

【課題を解決するための手段】請求項１の発明に係るダ

イアルアップ接続通信機器の呼び出し方法は、ネットワークへダイアルアップ接続されるダイアルアップ接続通信機器の呼び出し方法であって、上記課題を解決するために、以下の各工程を含んでいることを特徴としている。

【００１５】すなわち、上記ネットワークとは別に設けられ、上記ダイアルアップ接続通信機器を呼び出し可能な通信回線によって、発呼側の通信機器がダイアルアップ接続通信機器へ接続要求を伝える第１工程と、接続要求を受けたダイアルアップ接続通信機器が、上記ネットワークへダイアルアップ接続する第２工程と、上記ネットワークを介して、発呼側の通信機器とダイアルアップ接続通信機器とが通信する第３工程とを含んでいる。

【００１６】なお、上記ネットワークとしては、例えば、インターネット網など、コネクションレス型のネットワークや、パソコン通信などが挙げられ、上記通信回線としては、例えば、電話回線や船舶無線などが挙げられる。

【００１７】一般に、相手を呼び出せないネットワークは、電話回線など、相手を呼び出し可能な通信回線などに比べて実現が容易である。また、ダイアルアップ接続のように、通信機器が必要に応じてネットワークに接続する場合には、ネットワークと通信機器との通信路と、例えば、アドレスなど、ネットワーク上の資源とを他の通信機器や他の用途と共用できる。したがって、ダイアルアップ接続された通信機器は、上記通信回線を用いて直接通信する場合、および、ネットワークと専用線にて接続される場合に比べて、通信費用の低減が可能である。

【００１８】上記構成では、発呼側の通信機器とダイアルアップ接続通信機器との両通信機器が、ネットワークを介して通信する前に、発呼側の通信機器は、ダイアルアップ接続通信機器へ接続要求を伝える。これにより、ダイアルアップ接続通信機器がネットワークに接続されていない場合であっても、上記第３工程における通信時には、ネットワークへ接続させることができる。それゆえ、安い料金で通信可能なダイアルアップ接続通信機器において、所望のタイミングで確実に通信を開始でき、リアルタイム通信が可能になる。

【００１９】また、請求項２の発明に係るダイアルアップ接続通信機器の呼び出し方法は、請求項１記載の発明の構成において、上記第３工程は、上記発呼側の通信機器およびダイアルアップ接続通信機器のうちで送信側の通信機器が、当該第３工程にて送出するデータの少なくとも一部を暗号化して送出する暗号工程と、受信側の通信機器が、暗号化されたデータを復号する復号工程とを含んでいることを特徴としている。

【００２０】なお、暗号化する際に使用する方法は、暗号化と復号とで共通の暗号鍵を使用する方法や、公開鍵を用いて暗号化し、公開鍵とは別の秘密鍵を用いて復号する方法など、種々の方法を適用できる。また、両通信機器は、第３工程に先立って、例えば、上記第１工程での通信、あるいは、郵送など、所定の方法により、共通の暗号鍵や相手の公開鍵などの暗号鍵を取得している。

【００２１】ネットワークを介して通信する場合、伝送されるデータは、盗聴あるいは改ざんされる虞れがある。特に、ネットワークとして、インターネット網などを使用する場合には、発信側および受信側の通信機器がデータの伝送路を指定できないため、盗聴など、通信の妨害の危険性は大きい。

【００２２】ところが、上記構成では、通信内容のうち、少なくとも一部は、暗号化によって、発呼側の通信機器およびダイアルアップ接続通信機器以外の第三者から隠蔽されている。この結果、通信内容を暗号化せず、平文のまま伝送する場合に比べて、通信妨害に対する安全性を向上できる。

【００２３】なお、暗号化するデータは、例えば、通信内容そのもの、両通信機器の使用者名あるいはアドレスなどが挙げられる。ただし、暗号化するデータ量が増大するに従って、両通信機器の負担が増大するので、通信の重要度を考慮して、一部のデータのみを暗号化してもよい。一般に、使用者名やアドレスなどが第三者に傍聴されると、通信内容の重要性を推測されやすい。したがって、画像や音声などの通信に先立って、使用者名やアドレスなどを送信する場合には、これらを暗号化することが特に望まれる。これにより、両通信機器の負担を余り増加させることなく、通信妨害に対する安全性を向上できる。

【００２４】さらに、請求項３の発明に係るダイアルアップ接続通信機器の呼び出し方法は、請求項２記載の発明の構成において、上記第１工程は、発呼側の通信機器あるいはダイアルアップ接続通信機器が、暗号化の際に使用される暗号鍵を相手に通知する工程を含んでいることを特徴としている。

【００２５】なお、暗号化の際に公開鍵を使用する場合、相手には、自らの秘密鍵に対応した公開鍵が通知される。また、共通の暗号鍵を用いて暗号化する場合、当該暗号鍵が相手に通知される。

【００２６】上記構成では、接続要求毎に暗号鍵を通知するので、前回通信したときと暗号鍵を変更した場合であっても、何ら支障なく、両通信機器は、暗号化したデータを送受できる。加えて、通信回線を用いて、接続要求の通知と暗号鍵の送付との双方を一括して行っている。したがって、両者を個別に行う場合に比べて、通信回線を接続する手間を削減できる。

【００２７】さらに、例えば、郵送などによって、暗号鍵を設定する場合、各通信機器は、使用前に暗号鍵を設定する必要がある。暗号鍵は、それぞれの通信機器毎に用意されるので、特に、通信相手の数が増加すると、設定時の手間も増大する。これに対して、請求項３記載の

発明の構成では、接続毎に暗号鍵を通知しており、各暗号鍵を予め設定する必要がないので、設定時の手間を削減できる。

【0028】また、暗号鍵は、通信回線を介して、相手の通信機器へ伝送され、当該暗号鍵にて暗号化されたデータは、ネットワークを介して伝送される。したがって、第三者が通信の妨害を試みる場合、双方の通信を傍受する必要がある。この結果、単一の通信手段にて、暗号鍵とデータとを送信する場合に比べて、通信妨害に対する安全性を向上できる。

【0029】一方、請求項4の発明に係るダイアルアップ接続通信機器の呼び出し方法は、請求項1、2または3記載の発明の構成において、上記ネットワークには、発呼側の通信機器とダイアルアップ接続通信機器との間の通信を中継するサーバが設けられており、上記第3工程は、上記両通信機器が、自らを示す登録名を上記サーバへそれぞれ通知する工程と、上記両通信機器が、相手の登録名を上記サーバへ通知して、相手の通信機器を選択する工程と、上記サーバが選択された通信機器間の通信を中継する工程とを含んでいることを特徴としている。

【0030】なお、上記ネットワークとしては、例えば、インターネット網など、コネクションレス型のネットワークが挙げられる。また、この構成では、上記請求項2あるいは3で暗号化する際、特に適したデータとして、両通信機器の登録名が挙げられる。

【0031】上記構成では、請求項1と同様に、ダイアルアップ接続通信機器がネットワークに接続されていない場合であっても、上記第3工程における通信時には、ネットワークへ接続させることができる。これにより、両通信機器は、ネットワークに設けられたサーバを介して、所望のタイミングで確実に通信を開始できる。なお、サーバが登録名を公開する場合であっても、使用者名を暗号化して登録することによって、両通信機器の使用者名を第三者から容易に隠蔽できる。

【0032】また、請求項5の発明に係るダイアルアップ接続通信機器の呼び出し方法は、請求項1、2または3記載の発明の構成において、上記ネットワークは、例えば、インターネット網など、データを伝送する際、当該ネットワークにおけるアドレスによって送信先を特定すると共に、ダイアルアップ接続通信機器に対して、接続毎に臨時のアドレスを割り当てるネットワークであり、上記第3工程は、ダイアルアップ接続通信機器が、現接続における自らのアドレスを取得する工程と、電子メールによって、ダイアルアップ接続通信機器が、発呼側の通信機器へ自らのアドレスを通知する工程と、発呼側の通信機器およびダイアルアップ接続通信機器が、互いのアドレスにより相手を特定して通信する工程とを含んでいることを特徴としている。

【0033】ところで、ダイアルアップ接続通信機器の場合には、ネットワークと接続するまでアドレスが未定である。したがって、従来の方法では、発信側の通信機器が受信側のアドレスを把握できず、ダイアルアップ接続された通信機器同士は、ネットワークを介して通信できない。

【0034】一方、請求項4記載の発明の構成のように、両通信機器間の通信を中継するサーバをネットワークに設ける場合には、ダイアルアップ接続された通信機器同士であっても、何ら支障なく通信できる。ところが、この場合には、サーバを別に設ける費用や維持費などが必要となる。また、サーバが混み合っている場合には、両通信機器間で通信できなくなる虞れがある。

【0035】これに対して、請求項5記載の発明の構成では、ダイアルアップ接続通信機器は、ネットワークに接続した後、自らのアドレスが確定した時点で、発呼側の通信機器へ当該アドレスを通知できる。これにより、請求項4の構成のように、サーバを設けることなく、両通信機器は、ネットワークを介して通信できる。したがって、請求項4記載の発明の構成に比べて、通信に要する費用をさらに削減できると共に、サーバの混雑に関わらず、両通信機器は、確実に通信できる。

【0036】ところで、ネットワークを介する通信が終了すると、ダイアルアップ接続通信機器は、ネットワークとの接続を切断する。ここで、ダイアルアップ接続通信機器がネットワークとの回線切断に失敗すると、当該ダイアルアップ接続通信機器は、ネットワークに接続され続けるので、通信費用が不所望に高騰する。特に、例えば、ダイアルアップ接続通信機器が監視制御システムの子局である場合など、ダイアルアップ接続通信機器の周囲に使用者がいない場合には、回線切断に失敗したことを把握しにくい。したがって、回線切断に失敗した場合、当該ダイアルアップ接続通信機器が不所望にネットワークに接続される期間が長くなりがちであり、無駄な通信費用が増大する虞れが大きい。

【0037】これに対して、請求項6の発明に係るダイアルアップ接続通信機器の呼び出し方法は、請求項1、2、3、4または5記載の発明の構成において、さらに、上記第3工程の後で、上記発呼側の通信機器がダイアルアップ接続通信機器を上記通信回線にて直接呼び出して、当該ダイアルアップ接続通信機器が当該通信回線との回線接続を正常に切断したか否かを確認する第4工程を含んでいることを特徴としている。

【0038】上記構成において、発呼側の通信機器は、ダイアルアップ接続通信機器との通信が終了すると、例えば、直接呼び出した際の呼出し音などによって、回線切断の成否を確認する。これにより、発呼側の通信機器は、ダイアルアップ接続通信機器の回線切断失敗を確実に認識できる。したがって、例えば、発呼側の通信機器がダイアルアップ接続通信機器へ回線切断を再度指示したり、発呼側の通信機器の使用者がダイアルアップ接続

通信機器の設置場所へ赴いて回線を切断するなど、適切な処置を講じることができる。この結果、回線切断の失敗に起因する無駄な通信費用の発生を確実に防止できる。

【００３９】なお、回線が接続されている期間と、回線が切断されている期間とで異なった呼出し音を用いる通信回線の場合は、所定回数の呼出し音があるまで着呼しないように、ダイアルアップ接続通信機器を設定すると共に、確認時において、発呼側の通信機器が呼出し音を当該所定回数までに識別することによって、回線の切断を確認できる。この場合、発呼側の通信機器が上記所定回数までに直接呼び出しに使用した回線を切断すれば、ダイアルアップ接続通信機器がネットワークとの回線を正常に切断できた場合であっても通信費用は不要である。

【００４０】ところで、請求項１の発明に係るダイアルアップ接続通信機器の呼び出し方法を用いると、所望のタイミングで通信の開始が可能で、かつ、通信費用を削減できる通信システムを構築できる。

【００４１】ここで、監視制御システムでは、一般に、子局が、親局から離れた場所に設置されており、かつ、親局が数多くの子局を監視制御する。したがって、親局と子局とが通信する際の費用は、増大しがちであり、通信費用の削減が強く要求されている。特に、設置場所を監視する場合など、子局が親局へ送出するデータが映像データの場合、データ量が極めて多いので、呼び出し可能な通信回線を介して当該データを伝送すると、高い通信費用が必要になる。一方、監視制御システムでは、指示の遅れが事故の拡大に直結するので、子局は、親局の指示に即座に応答しなければならない。したがって、ダイアルアップ接続により接続されるネットワークのみを介して、子局が親局と通信する場合、子局が親局の指示に即応できず、事故を拡大させる虞れがある。これらの結果、監視制御システムでは、親局の指示に対する子局の即応性を保ったまま、通信費用を削減することが強く求められている。

【００４２】これに対して、請求項７の発明に係る監視制御システムは、上記課題を解決するために、設備機器を有する子局と、当該子局との通信によって上記設備機器を制御する親局とを備えた監視制御システムにおいて、上記親局は、呼び出し可能な通信回線を介して上記子局を呼び出し、接続要求を伝えた後で、上記通信回線とは別に設けられたネットワーク経由で上記子局と通信する親局通信手段を備え、上記子局は、上記通信回線を介して、上記接続要求を受け取った後で、上記ネットワークにダイアルアップ接続して、当該ネットワーク経由で上記親局と通信する子局通信手段を備えていることを特徴としている。

【００４３】上記構成において、親局の親局通信手段は、例えば、使用者の指示があった時点などの任意の時点で、電話などの通信回線を介して子局を呼び出す。一方、子局の子局通信手段は、親局からの接続要求を受け取った後、ダイアルアップ接続によって、例えば、インターネットなどのネットワークとの接続を確立する。その後、親局と、子局とは、ネットワークを介してデータを送受する。

【００４４】上記構成では、子局が、安い料金で通信可能なダイアルアップ接続によって、ネットワークと接続されているので、通信回線のみを用いて、子局が親局と通信する場合に比べて、通信費用を大幅に削減できる。一方、呼び出し可能な通信回線を用いて、親局が子局を呼び出した後、ネットワークを介して、データの送受信が行われるので、親局は、所望のタイミングで子局との通信を開始できる。これらの結果、親局の指示に対して、子局か即応可能でありながら、子局と親局との間の通信費用を大幅に削減可能な監視制御システムを実現できる。

【００４５】

【発明の実施の形態】

〔第１の実施形態〕本発明の一実施形態について図１ないし図４に基づいて説明すると以下の通りである。本実施形態に係るダイアルアップ接続通信機器の呼び出し方法は、発呼側と被呼側とが電話回線およびインターネット網を介して通信でき、かつ、少なくとも被呼側の通信機器がインターネット網へダイアルアップ接続されている通信システムに適用される呼び出し方法であって、例えば、日本とアメリカとなど、長距離で通信する際に特に好適な方法である。なお、ダイアルアップ接続とは、通信機器がインターネット網などのネットワークと常時接続されておらず、各通信機器が必要と判断したときに、ネットワークと接続する方法である。

【００４６】以下では、上記呼び出し方法、および、これを実施する通信機器について説明する前に、当該通信機器が使用される通信システムについて説明する。すなわち、図１に示すように、本実施形態に係る通信システム１は、上記呼び出し方法を具備し、発呼側あるいは被呼側となる通信機器２および３を備えている。本実施形態では、各通信機器２・３のいずれが発呼側になるか被呼側になるかは、特に決められておらず、両通信機器２・３は、後述するように、発呼側および被呼側双方の機能を有している。なお、被呼側となる通信機器２・３が、特許請求の範囲に記載のダイアルアップ接続通信機器に対応する。

【００４７】上記両通信機器２・３は、それぞれ電話回線（通信回線）４に接続されている。上記電話回線４は、例えば、ＩＳＤＮ（ Integrated Services Digital Network）などのデジタル回線、あるいはアナログ回線などであり、各通信機器２・３は、例えば、ダイアルを回すなどして、図示しない電話回線４の交換機へ相手先の電話番号を通知できる。これにより、各通信機器２・

3は、電話回線4を介して、互いに相手を呼び出し、直接通信できる。

【0048】また、各通信機器2・3の使用者は、インターネット接続業者（プロバイダ）5あるいは6に加入しており、通信機器2・3は、ダイアルアップ接続によって、インターネット網（ネットワーク）7をそれぞれ使用できる。各通信機器2・3は、発呼側になる場合と被呼側になる場合とがあるので、両プロバイダ5・6には、同じ機能が要求される。以下では、説明の便宜上、通信機器2側のプロバイダ5について説明するが、プロバイダ6の構成も同様である。

【0049】具体的には、プロバイダ5は、電話回線4を介して通信機器2から接続要求を受けた場合、アカウント（使用資格）を示すＩＤと、各ＩＤ毎に予め設定されたパスワードとを入力させる。アカウントとパスワードとの照合が終わると、プロバイダ5は、自らが保有しているインターネット網7上におけるアドレス（ＩＰアドレス）のうち空いているＩＰアドレスを、当該通信機器2の臨時のＩＰアドレスとして割り当てる。これにより、通信機器2は、現接続時における自らのＩＰアドレスを認識できる。この結果、通信機器2は、所定の大きさ毎に区切られたデータ列（データグラム）を作成してプロバイダ5へ送出したり、プロバイダ5から受け取ったデータグラムのうち、自分宛のデータグラムを識別できる。プロバイダ5は、通信機器2からのデータグラムをインターネット網7へ転送し、インターネット網7からのデータグラムを通信機器2へ送出する。これにより、通信機器2は、固有のＩＰアドレスを持たなくてもインターネット網7へ接続できる。

【0050】プロバイダ5は、ダイアルアップ接続による加入者の間で、ＩＰアドレスやインターネット網7との接続回線などを共有している。したがって、プロバイダ5において、ダイアルアップ接続の接続料金は、通信機器2が固有のＩＰアドレスを保持し、専用の通信回線を介してインターネット網7と常時接続している場合、すなわち、専用回線接続の場合に比べて安く設定されていることが多い。

【0051】また、プロバイダ5は、電話回線4を介して通信機器2と通信するために、アクセスポイントを備えている。アクセスポイントは、例えば、市内局番で通話できる範囲内など、通信機器2の近隣に配されており、通信機器2は、プロバイダ5と通信する際、電話回線4の使用料（通話料）を安く抑えることができる。

【0052】さらに、プロバイダ5は、通信機器2のメールサーバでもある。具体的には、プロバイダ5は、通信機器2に、電子メールアドレスを予め割り当てており、これに対応した図示しない記憶領域（メールボックス）を備えている。通信機器2宛の電子メールは、プロバイダ5へ配送され、プロバイダ5は、通信機器2宛の電子メールを受け取って、対応するメールボックスに蓄積する。プロバイダ5は、インターネット網7に常時接続されており、そのＩＰアドレスは、常に一定である。したがって、通信機器2がインターネット網7に接続されているか否か、および、接続時のＩＰアドレスに関わらず、電子メールは確実に配送される。各通信機器2は、ダイアルアップ接続した際に、自分宛の電子メールを上記メールボックスから読み出すことができる。

【0053】現在、インターネット網は、広く普及しつつあり、多くのプロバイダがサービスを開始している。これらのプロバイダの多くは、ダイアルアップ接続をサポートしており、メールサーバの機能を備えている。したがって、通信機器2および3を設けることによって、本実施形態に係る通信システム1を容易に構成できる。

【0054】続いて、各通信機器2・3の構成例として、例えば、ビデオ会議などのように音声と画像との双方を伝送する場合を中心に説明する。なお、以下では、音声と画像との双方を伝送する場合に限らず、両通信機器2・3が、インターネット網7などのネットワークを介して、リアルタイムにデータを伝送することをネットワーク会議と総称する。

【0055】また、各通信機器2・3の実現方法としては、後述するように種々の構成が考えられるが、ここでは、通信機器2（3）が、電話回線4およびインターネット網7との接続を制御する接続器2ａ（3ａ）と、入出力装置となるコンピュータ2ｂ（3ｂ）とを備えている構成について説明する。この構成では、本実施形態に係る呼び出し方法は、接続器2ａが実施している。また、各通信機器2・3には、上記呼び出し方法による通信以外の通常通話用に、電話器2ｃ・3ｃがそれぞれ設けられている。なお、両通信機器2・3は、同様の構成を有しているので、以下では、説明の便宜上、通信機器2の構成についてのみ詳細に説明する。

【0056】すなわち、コンピュータ2ｂは、例えば、ビデオカメラやマイクなど、図示しない入力装置を備えており、使用者側の音声や画像などをデジタルのデータ列として接続器2ａへ伝送できる。また、コンピュータ2ｂは、モニタやスピーカーなどの出力装置（図示せず）を備えており、接続器2ａを介し、通信機器3から受け取ったデータ列を画像や音声として使用者に通知できる。

【0057】コンピュータ2ｂと接続器2ａとの間は、例えば、ＲＳ２３２ＣやＲＳ４２２Ａ、ＩｒＤＡ、あるいは、ＬＡＮなど、予め選択された通信方法によって接続されており、双方向にデータを送受できる。なお、両者間の通信方法は、リアルタイムに双方向通信が可能であれば、有線／無線、あるいは、デジタル／アナログ、通信速度や通信規格を問わない。

【0058】一方、本実施形態に係る接続器2ａは、図2に示すように、本実施形態に係る呼び出し方法を実施するプログラムや各種設定などを記憶するＦｌａｓｈメ

モリ１１と、上記所定の通信方法でコンピュータ２ｂと通信するインターフェース部１２と、電話回線４および電話器２ｃと接続されている通信用ＩＣ（ Integrated Circuit ）１３と、接続器２ａ全体を制御するＣＰＵ（Central Processing Unit）１４と、作業用の記憶領域となるＲＡＭ（ Random Access Memory ）１５とを備えている。さらに、例えば、通信機器３の電子メールアドレスなど、接続器２ａの状態を表示するために、状態表示液晶パネル１６が設けられている。各部材１１ないし１６は、それぞれバス１７に接続されており、各部材間のデータは、バス１７を介して伝送される。

【００５９】上記Ｆｌａｓｈメモリ１１は、電気的に書換え可能な不揮発性のメモリであって、後述する動作を行うプログラムと、当該プログラムにて使用する各種設定値とか格納されている。具体的には、通信機器３に関する設定値としては、直接呼び出す際の電話番号などが挙げられる。さらに、直接呼び出す際に、通信機器３が通信機器２を識別するためのパスワードも格納されている。当該パスワードは、予め通信機器３にも伝えられており、通信機器３は、このパスワードを照合することによって、正規の使用者からの呼び出しか否かを判定できる。また、プロバイダ５に関する設定値として、プロバイダ５の電話番号、アカウント、パスワード、および自分の電子メールアドレスが格納されている。さらに、本実施形態では、インターネット網７を介して通信する際、通信機器２と通信機器３とは、例えば、ＲＳＡ符号などの公開鍵暗号方式を用いて、通信内容の少なくとも１部を暗号化して通信する。したがって、Ｆｌａｓｈメモリ１１は、暗号化および復号化の際に使用する秘密鍵および公開鍵も記憶している。なお、当然ながら、Ｆｌａｓｈメモリ１１に代えて、ＲＯＭ（ Read-Only Memory ）やバッテリバックアップされたＲＡＭ、あるいは、ハードディスクなど、不揮発性を有する記録手段を用いてもよい。

【００６０】また、インターフェース部１２は、例えば、ＲＳ２３２Ｃインターフェースなど、コンピュータ２ｂと接続器２ａとの通信方法に応じたインターフェースであり、ＣＰＵ１４は、当該インターフェース部１２を介して、コンピュータ２ｂと通信できる。

【００６１】さらに、上記通信用ＩＣ１３は、例えば、モデム用のＩＣなどであって、電話回線４の回線接続／切断を制御したり、ＣＰＵ１４が処理するデータ列と電話回線４を伝送される電気信号とを相互に変換したりできる。また、ＣＰＵ１４の指示に応じて、電話回線４と電話器２ｃとを接続して、電話器２ｃのベルを鳴らすこともできる。

【００６２】一方、ＣＰＵ１４は、Ｆｌａｓｈメモリ１１のプログラムに従って、インターフェース部１２および通信用ＩＣ１３を制御する。具体的には、接続器２ａは、所望の電話番号をダイアルして、電話回線４を介して、通信機器３と直接通信したり、プロバイダ５を介して、インターネット網７に接続したりできる。これにより、接続器２ａは、後述するように、電話回線４を介した直接通信と、インターネット網７を介した通信とを所定の順番で行うことができる。

【００６３】また、ＣＰＵ１４は、インターフェース部１２あるいは通信用ＩＣ１３を介して、コンピュータ２ｂや電話器２ｃを制御できる。これにより、接続器２ａは、コンピュータ２ｂが、例えば、キー入力などによって、使用者からインターネット網７を介した接続を指示されたか否か、および、接続先などを判定できる。また、接続器２ａは、電話回線４と電話器２ｃとを接続して、通常通話を行うことができる。

【００６４】電話回線４を介して直接接続されている場合、ＣＰＵ１４は、通信用ＩＣ１３を介して、通信機器３へ所定のメッセージを送出すると共に、通信機器３から受信したメッセージを識別できる。通信機器２・３間の通信方法は、例えば、Ｖ３２，Ｖ３２ｂｉｓ、Ｖ３４、Ｖ２１、あるいはＶ２２などの規格に応じたシリアル通信であり、両者間でメッセージを送受できる。

【００６５】一方、通信機器２とプロバイダ５とかダイアルアップ接続されている場合、ＣＰＵ１４は、通信用ＩＣ１３を介して、プロバイダ５とデータグラムを送受する。これにより、接続器２ａは、現接続時のＩＰアドレスを認識すると共に、所定の形式の電子メールを送出できる。さらに、接続器２ａは、プロバイダ５に設けられた自分のメールボックスを所定の周期で確認して、通信機器３からの電子メールが到着しているか否かを判定する。電子メールが到着していた場合は、電子メールの内容を確認して、相手のＩＰアドレスを認識できる。

【００６６】加えて、インターネット網７を介して接続している場合、ＣＰＵ１４は、インターフェース部１２および通信用ＩＣ１３を制御して、コンピュータ２ｂとインターネット網７との間の通信を中継する。なお、コンピュータ２ｂと接続器２ａとの間において、例えば、音声データ列や画像データ列そのものなど、インターネット網７にて伝送されるデータグラムと異なる形式でデータが伝送されている場合、ＣＰＵ１４が両者を相互変換する。一方、コンピュータ２ｂとの間でデータグラムが伝送される場合は、ＣＰＵ１４は、当該データグラムをそのまま通過させる。これにより、接続器２ａは、コンピュータ２ｂとインターネット網７との間で、何ら支障なく通信を中継できる。

【００６７】また、ＣＰＵ１４は、通信機器３の公開鍵を用いて、通信機器３へ送出するデータを暗号化したり、予め記憶されている自らの秘密鍵を用いて、通信機器３から受け取ったデータを復号したりできる。

【００６８】なお、上記の説明では、通信機器２において、コンピュータ２ｂが入出力を担当しているが、入出力装置は、これに限るものではない。上述したように、

コンピュータ２ｂなどの入出力装置と接続器２ａとの間のデータの伝送方法は、無線／有線、アナログ／デジタル、あるいは通信速度や通信規格などを問わない。したがって、電話器やビデオカメラなど、種々の入力装置を使用できる。ただし、この場合には、接続器２ａは、インターネット網７で伝送されるデータグラムと、電話器２ｃおよび接続器２ａ間のデータとを、相互に変換する必要がある。

【００６９】特に、図３に示すように、通信機器２２の入力装置として、電話器２２ｃを使用する場合には、インターネット網７を介した通話と通常の通話との双方で電話器２２ｃを使用できる。また、従来と同様の構成の電話器２２ｃと、電話回線４との間に、接続器２２ａを接続するだけでよいので、他の入力装置を設ける場合に比べて設置が容易になる。

【００７０】この場合は、入力装置が電話器２２ｃのみなので、インターネット網７を介した通話と、通常の通話とを区別する必要がある。これは、接続器２２ａにスイッチなどを設けて、インターネット網７を介した通話を指示してもよいが、例えば、以下に示す方法を用いることによって、使用者は、電話器２２ｃのみを用いて両者を区別できる。すなわち、使用者は、受話器を取った後、”＃”ボタンを３回押すなど、通常の通話では使用しない操作をした後、予め設定された相手の登録番号のボタンを押す。接続器２２ａは、電話器２２ｃから送られてくる音声信号によって、これらのボタン操作を認識し、接続要求の発生と、相手先とを識別する。そして、インターネット網７を介して、相手と通話が可能になると、例えば、電話器２２ｃのベルを鳴らすなどして、使用者に通知する。一方、通常の電話番号が押されると、接続器２２ａは、電話器２２ｃからの信号によって、通常の通話と判定し、電話回線４へ当該信号をそのまま通過させる。これにより、電話器２２ｃは、接続器２２ａがない場合と同様に、電話回線４を介して直接通話できる。このように、インターネット網７を介した通信を指示する操作として、入力装置で、通常使用しない操作を割り当てることによって、従来と同様の入力装置のみを用いて、インターネット網７を介した接続要求と、通常の通信接続要求と区別できる。

【００７１】また、上記の説明では、通信機器２において、コンピュータ２ｂが入出力を担当し、例えば、電話回線４あるいはインターネット網７と接続する順番の制御や、暗号化などを接続器２ａが担当しているが、両部材２ａ・２ｂの役割分担も、これに限るものではない。例えば、上記接続の順番制御や暗号化など、接続器２ａの処理の殆どを、コンピュータ２ｂが行ってもよい。この場合は、接続器２ａは、通常のモデムやＩＳＤＮのターミナルアダプタなどを流用できる。

【００７２】なお、図１および図３では、説明の便宜上、接続器２ａ（２２ａ）、コンピュータ２ｂ、および電話器２ｃ（２２ｃ）をそれぞれ別の部材として記載しているが、当然ながら一体化してもよい。一体化の例としては、図１に示す接続器２ａとコンピュータ２ｂとが一体となった家庭用テレビ、あるいは、図３に示す接続器２２ａと電話器２２ｃとを一体に形成した電話器などが挙げられる。さらに、電話回線４として、無線の電話回線を使用すると、上記一体型の電話器を携帯電話として構成することもできる。また、入出力装置としてビデオカメラを採用し、接続器２ａと一体化すると、インターネット網７を介して、画像や音声などを送出できるビデオカメラが実現できる。この場合、無線電話回線を使用すると、携帯できるので、さらに好適である。一体／別体、あるいは、入出力装置、さらには、電話回線４が無線か有線かなどを組み合わせると、通信機器２は、種々の構成が考えられる。

【００７３】次に、図１に示す通信システム１において、通信機器２が通信機器３を呼び出す場合の動作を、図４に示すフローチャートに基づき、各ステップ毎に説明すると以下の通りである。

【００７４】すなわち、通信機器２の使用者が、例えば、コンピュータ２ｂのキー入力などによって、通信機器３との通信を通信機器２へ指示すると、ステップＳ１ａにおいて、通信機器２は、通信機器３の電話番号をダイアルする。これにより、通信機器３は、電話回線４を介して呼び出される。なお、以下では、ステップＳ１ａを単にＳ１ａのように略称する。また、通信機器２が行う処理には、Ｓ１ａのように末尾にａを示し、通信機器３が行う処理には、Ｓ１ｂのように末尾にｂを付加して、両者を区別する。

【００７５】一方、通信してもよい場合、通信機器３の使用者は、例えば、予めボタンを押すなどして、受信ウェイトのオンを通信機器３へ指示している（Ｓ１ｂ）。通信機器３は、受信ウェイトがオンの場合、電話の呼び出しに応答する（Ｓ２ｂ）。この結果、通信機器２と通信機器３とは、電話回線４を介して直接通信を開始できる。

【００７６】通信機器２は、通信機器３の応答を検出すると、例えば、”ＣＡＬＬ　ＣＵ－ＳＥＥＭＥ　ｆｒｏｍ　通信機器２の使用者名　ＰＡＳＳＷＯＲＤ：パスワード通信機器２の使用者の電子メールアドレス　通信機器２の公開鍵”など、所定のメッセージを送出して、通信機器２の使用者名、パスワード、電子メールアドレス、および通信時に使用する通信機器２の公開鍵を通信機器３に通知する（Ｓ２ａ）。通信機器３は、受け取った使用者名とパスワードとの組み合わせを予め記憶している組み合わせと照合して、正規の通信相手か否かを判定する（Ｓ３ｂ）。使用者名やパスワードが誤っている場合や、相手が音声によって通話している場合など、正規の通信相手では無い場合、通信機器３の接続器３ａは、電話器３ｃのベルを鳴らして、電話回線４と電話器

３ｃとを接続する（Ｓ４ｂ）。これにより、通信機器３の使用者は、電話器３ｃを用いて相手と話すことができる。この場合は、以降の処理は行われない。

【００７７】一方、上記Ｓ３ｂにおいて、正規の通信相手であることが確認できると、通信機器３は、例えば、"ＯＫ　ＣＵ－ＳＥＥＭＥ　ｆｒｏｍ　通信機器３の使用者名　通信機器３の使用者の電子メールアドレス　通信機器３の公開鍵"など、所定のメッセージを送出し（Ｓ５ｂ）、通信機器２は、当該メッセージを受け取る（Ｓ３ａ）。これにより、通信機器２は、自らの接続要求を通信機器３が受け取ったこと、通信機器３の使用者名、電子メールアドレス、および、通信時に使用する通信機器３の公開鍵を取得できる。

【００７８】その後、通信機器２および３は、それぞれ電話回線４との接続を切り（Ｓ４ａ・Ｓ６ｂ）、所定のプロバイダ５あるいは６へダイアルアップ接続を開始する（Ｓ５ａ・Ｓ７ｂ）。また、各通信機器２・３において、接続器２ａ・３ａは、コンピュータ２ｂへ指示して、例えば、コーレル大学が開発したＣＵ－ＳＥＥＭＥなど、コンピュータ２ｂに予め用意されているネットワーク会議ソフトを起動させる（Ｓ６ａ・Ｓ８ｂ）。

【００７９】上記Ｓ５ａおよびＳ７ｂにおいて、ダイアルアップ接続に成功すると、各通信機器２・３は、それぞれのプロバイダ５・６から、現接続限りのＩＰアドレスを取得する（Ｓ７ａ・Ｓ９ｂ）。この結果、各通信機器２・３は、インターネット網７へデータグラムを送出できるようになる。

【００８０】ただし、現時点では、通信機器２および通信機器３は、相手のＩＰアドレスを把握しておらず、相手宛のデータグラムを生成できない。したがって、各通信機器２・３は、プロバイダ５・６など、所定のＩＰアドレスを有する機器とは通信できるが、両通信機器２・３間の通信を開始できない。

【００８１】続いて、各通信機器２・３は、上記Ｓ２ａあるいはＳ５ｂにて相手から送られてきた公開鍵を用いて、自らの名前と自らのＩＰアドレスとを暗号化する。その後、各通信機器２・３は、当該暗号文を電子メールとして、相手先の電子メールアドレスへ送出する（Ｓ８ａ・Ｓ１０ｂ）。各電子メールは、相手先の公開鍵で暗号化されており、相手が保持している秘密鍵を用いないと復号できない。

【００８２】また、各通信機器２・３は、例えば、５秒間隔など、所定の周期で、プロバイダ５・６に設けられた自分のメールボックスを監視している。相手からの電子メールが到着すると、各通信機器２・３は、上記メールボックスから当該電子メールを読み出して、自らの秘密鍵を用いて暗号を解読する。これにより、各通信機器２・３は、相手の名前とＩＰアドレスとを取得できる（Ｓ９ａ・Ｓ１１ｂ）。

【００８３】さらに、各通信機器２・３は、相手のＩＰアドレスを取得すると、ネットワーク会議ソフトへ当該ＩＰアドレスを通知し、相手を呼び出す。これにより、ネットワーク会議ソフトにて通信が開始される（Ｓ１０ａ・Ｓ１２ｂ）。

【００８４】ところで、各データグラムには、送信先のＩＰアドレスの他にも、送信側のＩＰアドレスが含まれている。これにより、一方の通信機器２（３）が相手の通信機器３（２）を呼び出した場合、被呼側の上記ネットワーク会議ソフトは、受信したデータグラムに基づいて、発呼側のＩＰアドレスを認識できる。したがって、一方が呼び出した時点で通信を開始できる。具体的には、上記Ｓ１０ａの処理がＳ１２ｂの処理よりも早く開始された場合には、通信機器３は、上記Ｓ１１ｂを行う必要がない。同様に、上記Ｓ１２ｂの方が早い場合には、通信機器２は、上記Ｓ９ａの処理を省略できる。なお、上記ネットワーク会議ソフトは、双方が同時に呼び出した場合でも通信できるように作成されているので、上記各処理Ｓ９ａ・Ｓ１１ｂを省略しない場合であっても、何ら支障なく通信を開始できる。

【００８５】さらに、一方の通信機器２（３）が相手の通信機器３（２）を呼び出した時点で、通信を開始できるので、両方の通信機器２・３がダイアルアップ接続している場合には、いずれか一方は、電子メールを発信しなくても、両通信機器２・３は、通信を開始できる。ただし、両通信機器２・３が電子メールを発信した場合は、いずれか一方の電子メールが到着した時点で通信を開始できるので、一方のみが電子メールを発信する場合に比べて、通信開始をより早く開始できる確率が高くなる。

【００８６】会議中は、コンピュータ２ｂからの音声および画像は、接続器２ａ、プロバイダ５、インターネット網７、プロバイダ６、および接続器３ａを介して、コンピュータ３ｂへ送られており、コンピュータ３ｂからの音声および画像は、上記経路を逆方向に送られている。これにより、通信機器２と通信機器３との使用者は、ネットワーク会議ソフトにより通信できる（Ｓ１０ａ・Ｓ１２ｂ）。会議が終了すると、各通信機器２・３は、それぞれダイアルアップ接続を切断し（Ｓ１１ａ・Ｓ１３ｂ）、通信機器２・３間の通信が終了する。

【００８７】また、例えば、受信側の使用者が不在の場合や、インターネット網７を介した通信を受けたくない場合には、例えば、所定のボタンを押すなどして、接続器３ａへ通信ウェイトのオフを指示している。この場合は、接続器３ａは、上記Ｓ２以降の処理を行わず、電話器３ｃへ無条件に接続する。

【００８８】ところで、インターネット網７を介して通信する場合、各通信機器２・３が送出したデータグラムは、送出時点において、どのような経路を通って宛て先に到達するか不明であり、インターネット網７を構成する機器は、データグラムを受け取った時点で、次にデー

タグラムが通過する機器を決定する。

【００８９】したがって、各データグラムが通過した機器において、データグラムの改変や複写などが容易であり、電話回線４を介して直接通信する場合に比べて通信を妨害しやすい。特に、使用者名とＩＰアドレスとを電子メールにて平文のまま送出した場合は、使用者名から通信の重要性を判断しやすいため、以後の通信が重点的に妨害される可能性が高くなる。一方、暗号処理や復号処理は、演算処理が不可欠であるので、暗号化しない場合と比較すると、各通信機器２・３には、高い処理能力が要求される。

【００９０】したがって、本実施形態では、通信時の負担と、妨害に対する安全性とを両立するために、電子メールの内容のみを暗号化している。ただし、妨害に対して、さらに高い安全性が要求される場合には、ネットワーク通信ソフトの通信期間も通信内容を暗号化することによって、比較的容易に安全性を向上できる。

【００９１】また、各データグラムが通過する経路が決まっていないため、データグラムの到着時刻の保証が困難である。また、ある通信路において、データ量が許容範囲を越えると、データグラムが失われる虞れがある。ただし、本実施形態に係る通信システム１では、音声データや画像データを伝送するために、各通信機器２・３は、インターネット網７と十分な通信容量を有する通信回線を介して接続している。また、両プロバイダ５・６を選択する際、両プロバイダ５・６間が十分な通信容量を有する回線で接続されているようなプロバイダを選択している。したがって、電子メールのように、音声データや画像データに比べてデータ量が極めて少ない場合には、遅延や損失の危険性は、実用上十分低い値になっている。なお、所定の時間内に電子メールが到着しない場合に電子メールを再送すれば、遅延や損失の可能性をさらに低減できる。

【００９２】なお、本実施形態では、両通信機器２・３は、インターネット網７での通信に先立って、電話回線４にて互いの電子メールアドレスを交換しているが、これに限るものではない。例えば、図２に示すＦｌａｓｈメモリ１１などに相手の電子メールアドレスを予め記憶しておいてもよい。ただし、電子メールアドレスは、使用者の都合によって、変更する場合がある。この場合、各通信機器２・３の使用者は、電子メールアドレスを変更する度に、相手に新しい電子メールアドレスを通知すると共に、相手の通信機器２・３の使用者は、受け取った電子メールアドレスを、それぞれの通信機器２・３へ設定しなおす手間が生じる。これに対して、本実施形態では、発呼毎に、互いの電子メールアドレスを通知しているので、電子メールアドレス変更時の手間を大幅に削減できる。

【００９３】〔第２の実施形態〕上記第１の実施形態は、電話回線４とは別の通信手段として、インターネット網７を使用し、通信機器２と通信機器３とがインターネット網７により直接通信するものである。これに対して、図５に示すように、本実施形態に係る通信システム３１は、電話回線３４とは別の通信回線として、インターネット網３７を使用する点では、第１の実施形態と同様である。ただし、通信機器３２と通信機器３３とが、インターネット網３７上に設けられたサーバ３８を介して通信する点が異なっている。なお、通信システム３１では、通信機器３２ないしインターネット網３７の各部材は、図１に示す通信機器２ないしインターネット網７と略同様の機能を有している。したがって、異なっている部分のみ説明し、同様の部分の説明は省略する。

【００９４】本実施形態に係る通信システム３１に設けられたサーバ３８は、リフレクタなどと呼ばれており、固有のＩＰアドレスを有し、サーバ３８と通信している通信機器３２・３３間の通信を中継できる。具体的には、サーバ３８には、現在通信している機器のＩＰアドレスと登録名との組み合わせを格納する領域が設けられている。各機器がサーバ３８へ登録名を通知すると、サーバ３８は、当該機器のＩＰアドレスと登録名との組み合わせを上記領域に格納する。また、サーバ３８は、各機器の要求に応じて、上記領域から登録名のリストを送出できる。これにより、各機器は、サーバ３８を介して、現在通信可能な機器の登録名を知ることができる。さらに、機器は、サーバ３８へ登録名を指定して、所望の通信相手を選択できる。

【００９５】サーバ３８は、機器の登録名を格納した時点で、全機器のＩＰアドレスと登録名と記憶している。したがって、サーバ３８は、機器が通信相手を指定した場合、一方から受け取ったデータグラムを他方のＩＰアドレスへ送出できる。なお、サーバ３８は、ある機器から受け取ったデータグラムを複数の機器へと転送できる。この場合は、複数の機器間での通信が可能になる。

【００９６】現在、インターネット網３７上には、種々のサーバ３８が設けられており、その中には、不特定多数の機器で使用できるように、ＩＰアドレスを公開しているサーバ３８も存在している。したがって、これらのサーバ３８を選択することによって、上記通信システム３１を容易に構成できる。

【００９７】本実施形態では、各通信機器３２・３３のハードウェア構成は、図１に示す通信機器２・３と同様であり、搭載されているソフトウェアの相違によって、動作が異なっている。したがって、以降では、通信機器３２が通信機器３３を呼び出す際の動作について説明し、ハードウェア構成については説明を省略する。

【００９８】図６のフローチャートに示すように、本実施形態に係る呼び出し方法は、図４に示すステップＳ１ａないしＳ１１ａおよびＳ１ｂないしＳ１３ｂと同様の処理を行うステップ（Ｓ２１ａないしＳ３１ａ、およびＳ２１ｂないしＳ３３ｂ）を備えている。

【0099】ただし、第1の実施形態において各通信機器32・33が通信相手を特定する際に、電子メールを用いて、互いのIPアドレスを交換していたのに対して、本実施形態では、各通信機器32・33は、サーバ38へ所定の登録名を登録し、相手の登録名を選択して、通信相手を特定している。したがって、図4に示すS8a・S9a、およびS10b・S11bのように、自らのIPアドレスを互いに交換するステップに代えて、以下に示す各ステップ、S28a・S29a、およびS30b・S31bが設けられている。また、S22aおよびS25bにおいて、各通信機器32・33は、電子メールアドレスの通知を省略している。

【0100】すなわち、S27aおよびS29bの処理を終了した時点において、各通信機器32・33は、それぞれのプロバイダ35・36を介して、インターネット網37へ、自らのIPアドレスを含むデータグラムを送出できる。また、この時点では、S22aあるいはS25bで相手が送出した公開鍵および使用者名を取得している。

【0101】各通信機器32・33は、それぞれの使用者名を上記公開鍵によって暗号化する。さらに、各通信機器32・33は、暗号化された使用者名を登録名として、サーバ38へ通知する。サーバ38は、各通信機器32・33の登録名とIPアドレスとの組み合わせを登録する（S28a・S30b）。サーバ38は、各通信機器32・33が登録名の通知時に送出したデータグラムなどに基づいて、それぞれのIPアドレスを取得できる。

【0102】本実施形態では、各通信機器32・33の登録名は、暗号化されてサーバ38に登録されている。したがって、サーバ38と通信している第三者は、登録名のリストを見ることができるけれど、使用者名を知ることができない。この結果、第1の実施形態にて電子メールを暗号化した場合と同様に、本実施形態においても、使用者名を第三者から隠蔽できる。

【0103】次に、各通信機器32・33は、サーバ38へ登録名のリストを要求する。さらに、各通信機器32・33は、リスト中の各登録名を、自分の秘密鍵を用いて復号して、予め通知されている使用者名と復号結果とが一致する登録名を選択する。その後、各通信機器32・33は、通信相手として、当該登録名をサーバ38へ通知する（S29a・S31b）。サーバ38は、通知の際に使用されるデータグラムなどから一方のIPアドレスを取得し、登録名に対応するIPアドレスから他方のIPアドレスを取得する。その後、サーバ38は、上記両IPアドレスの一方からデータグラムを受け取ると、他方のIPアドレスへデータグラムを転送する。これにより、各通信機器32・33は、互いのIPアドレスを知らなくても、互いに双方向に通信できる。本実施形態では、上述の第1の実施形態と同様に、ネットワーク会議ソフトによる通信中、各通信機器32・33は、通信内容を暗号化せず、通信時の負担を低減している。しかしながら、相手の公開鍵を用いて、当該期間中も通信内容を暗号化することによって、通信妨害に対する安全性をさらに向上できる。

【0104】S29a・S31b以降は、第1の実施形態と略同様に、両通信機器32・33は、ネットワーク会議ソフトを用いて双方向通信した後、会議の終了と共にダイアルアップ接続を切断して、通信が終了する。

【0105】本実施形態に係る通信システム31では、サーバ38が通信を中継しているので、通信機器32が通信機器33を呼び出す際、互いのIPアドレスを必要としない。したがって、両プロバイダ35・36は、それぞれの通信機器32・33の電子メールサーバでなくてもよく、通信機器32・33は、電子メールを送受できなくてもよい。この場合でも、本実施形態と同様の効果が得られる。

【0106】各通信機器32・33は、上記S28a・S30bにおいて、サーバ38のIPアドレスへ登録名を通知する必要がある。このIPアドレスは、例えば、図2に示すFlashメモリ11などに予め記憶していてもよいし、電話回線34での通信中に打合せてもよい。上記S28a・S30bでの登録前に、通信機器32・33間で、共通のサーバ38が指定されていれば、サーバ38の指定方法は問わない。

【0107】〔第3の実施形態〕上記第1および第2の実施形態は、電話回線4・34による直接通信とは別の通信手段として、インターネット網7・37を使用している。これに対して、本実施形態では、別の通信手段として、パソコン通信を利用する場合について説明する。

【0108】図7に示すように、本実施形態に係る通信システム41において、各通信機器42・43の使用者は、パソコン通信に加入しており、通信機器42・43は、近隣のアクセスポイント45・46まで電話し、パソコン通信サーバ47にダイアルアップ接続できる。

【0109】パソコン通信サーバ47は、通信機器42・43と通信して、例えば、データベース検索など、所定のサービスを提供している。さらに、本実施形態に係るパソコン通信サーバ47は、図5に示すサーバ38と同様に、両通信機器42・43間の通信を中継できる。これにより、両通信機器42・43間は、パソコン通信サーバ47を介して、双方向に通信できる。

【0110】パソコン通信サーバ47は、図1に示すプロバイダ5・6と同様に、加入者をIDなどによって管理しており、各通信機器42・43が電話回線44を介して接続した場合に、IDおよびパスワードを照合して、それぞれの通信機器42・43を識別する。ただし、図1に示す通信システム1のように、インターネット網7を介して通信する場合とは異なり、図7に示す通信システム41では、両通信機器42・43のIDが、

いずれもパソコン通信サーバ４７により管理されている。したがって、当該通信システム４１では、それぞれのＩＤによって通信相手を特定する。なお、各アクセスポイント４５・４６とパソコン通信サーバ４７との間は、専用の回線４８・４８で互いに接続されている。

【０１１１】現在、上記パソコン通信サーバ４７は、数多く設けられている。したがって、その中の一つを選択し、通信機器４２・４３を設けることによって、比較的容易に通信システム４１を構成できる。

【０１１２】本実施形態に係る通信機器４２・４３は、第１の実施形態に示す通信機器２・３（２２）と略同様のハードウェア構成である。ただし、本実施形態に係る通信機器４２・４３は、パソコン通信サーバ４７に接続されている場合、当該パソコン通信サーバ４７との通信方式に応じた形式のデータを送受する。なお、当該形式のデータの送受は、通信機器２・３のハードウェアあるいはソフトウェアを一部変更するだけで容易に実現できる。

【０１１３】上記構成において、通信機器４２が通信機器４３を呼び出す際、通信システム４１は、図８に示すように動作する。すなわち、Ｓ４１ａないしＳ４４ａ、および、Ｓ４１ｂないしＳ４６ｂにおいて、通信機器４２は、パソコン通信サーバ４７を介して通信する前に、図６と同様の処理を行い、電話回線４４を介して通信機器４３を呼び出して接続要求を伝える。この際、両通信機器４２・４３は、互いの公開鍵を交換する。

【０１１４】続いて、Ｓ４５ａないしＳ４８ａ、およびＳ４７ｂないしＳ５０ｂにおいて、図６と同様に、両通信機器４２・４３は、それぞれパソコン通信サーバ４７へダイアルアップ接続して、ネットワーク会議ソフトを介して通信する。

【０１１５】ただし、本実施形態では、各通信機器４２・４３に固有のＩＤを用いて通信相手を指定する。したがって、図６に示すＳ２７ａ～Ｓ２９ａ、および、Ｓ２９ｂ～Ｓ３１ｂの処理は、省かれている。また、本実施形態では、Ｓ４７ａおよびＳ４９ｂにおいて、ネットワーク会議ソフトで通信する際、両通信機器４２・４３は、電話回線４４を介して、予め交換した相手の公開鍵を用いて、通信内容をそれぞれ暗号化して送出する。また、暗号化された通信内容は、予め保持している自らの秘密鍵を用いて復号する。これにより、通信内容を第三者から隠蔽できる。

【０１１６】〔第４の実施形態〕上記第１ないし第３の実施形態では、通信機器２（３２・４２）が通信機器３（３３・４３）を呼び出すときであっても、これとは逆に、通信機器３（３３・４３）が通信機器２（３２・４２）を呼び出すときであっても、本発明に係るダイアルアップ接続通信機器の呼び出し方法が使用される構成について説明している。しかしながら、本発明に係るダイアルアップ接続通信機器の呼び出し方法は、一方の通信機器が他方の通信機器を呼び出すときのみに使用してもよい。

【０１１７】以下では、監視カメラシステム（監視制御システム）を例にして、親局側が子局側を呼び出す際のみに、本発明に係るダイアルアップ接続通信機器の呼び出し方法を使用する場合について詳細に説明する。なお、ネットワークとしては、第１ないし第３の実施形態に示すように、インターネット網やパソコン通信などを利用できるが、以下では、第１の実施形態と同様に、インターネット網を用いた場合を例にして説明する。

【０１１８】すなわち、本実施形態に係る監視カメラシステム５１は、例えば、無人駐車場の監視などに用いられるものであって、図９に示すように、本社に配された親局（発呼側の通信機器）５２と、各駐車場に配された子局（ダイアルアップ接続通信機器）５３とを備えている。当該子局５３には、監視カメラ５３ｂ…が取得した映像を親局５２へ送出する送信装置（子局通信手段）５３ａか設けられており、各監視カメラ５３ｂが取得した映像は、子局５３の送信装置５３ａを介して、親局５２の受信装置（親局通信手段）５２ａへ送られる。親局５２では、当該映像に基づいて、無断駐車の有無が確認される。これにより、本社１か所のみで、全国の無人駐車場を監視できる。したがって、各駐車場に監視のための人材を派遣する必要がなく、人件費を削減できる。なお、料金回収は、例えば、週１回、地元の契約社員などによって回収される。

【０１１９】より詳細には、上記子局５３の送信装置５３ａは、図１に示す接続器３ａと略同様の構成である。ただし、複数の監視カメラ５３ｂを制御するために、監視カメラ５３ｂの数に応じた数のインターフェースを備えている点が異なっている。また、これに伴って、親局５２からの指示を認識して、映像の取得が指示された監視カメラ５３ｂを選択し、当該監視カメラ５３ｂに映像の取得を指示する機能が付されている。ただし、当該機能は、例えば、図２に示すＣＰＵ１４が所定のプログラムを実行することによって実現できるため、上記接続器３ａと同様のハードウェアによって、送信装置５３ａを実現できる。

【０１２０】また、上記各監視カメラ５３ｂは、駐車場の各駐車スペースに駐車した車両のナンバープレートを撮影可能な位置に配されている。また、各監視カメラ５３ｂが取得可能な映像の解像度は、ナンバープレートの文字を読み取り可能な程度に設定されている。各監視カメラ５３ｂおよび上記送信装置５３ａは、例えば、図１に示すコンピュータ２ｂおよび接続器２ａのように、所定の通信方法によって接続されており、監視カメラ５３ｂは、送信装置５３ａの指示に応じて映像を取得できると共に、取得した映像を示す映像データを送信装置５３ａへ送出できる。

【０１２１】さらに、本実施形態では、電話回線５４の

一部に無線電話システムが使用されており、送信装置５３ａは、携帯電話器５３ｃを介して、親局５２あるいはプロバイダ５６と接続される。無線電話システムは、例えば、パーソナル・ハンディホン・システム（以下では、ＰＨＳと称する）や自動車電話システムなど、種々のシステムが利用可能であり、子局５３には、各システムに応じた携帯電話器５３ｃが設けられる。なお、図１に示す接続器３ａと同様に、無線電話システムを利用せずに、送信装置５３ａと電話回線５４とを直接接続してもよい。

【０１２２】これにより、子局５３は、図１に示す通信機器３３と同様に、電話回線５４を介して親局５２と直接通信できると共に、電話回線５４およプロバイダ５６を介して、インターネット網５７へダイアルアップ接続できる。

【０１２３】一方、上記親局５２は、図１に示す通信機器２と同様に、電話回線５４を介する直接接続と、インターネット網５７を介する接続との双方によって、子局５３と通信可能である。ただし、本実施形態に係る親局５２は、上記通信機器２とは異なり、専用線５８にて、インターネット網５７と直接接続されている。これにより、親局５２は、本発明に係るダイアルアップ接続通信機器の呼び出し方法を用いて、子局５３を呼び出して通信できる。なお、本実施形態に係る親局５２が専用線５８にてインターネット網５７に常時接続されているので、親局５２には、固有のＩＰアドレスが割り当てられている。

【０１２４】具体的には、本実施形態に係る親局５２は、図１に示す接続器２ａに代えて、受信装置５２ａが設けられており、コンピュータ２ｂ・電話器２ｃに代えて、監視カメラ５３ｂからの映像を使用者に報知すると共に、使用者の指示を受け取る端末５２ｂが設けられている。受信装置５２ａおよび当該端末５２ｂは、上記接続器２ａおよびコンピュータ２ｂと同様に、例えば、ＬＡＮなど、所定の通信方法によって接続されており、双方向にデータを送受できる。

【０１２５】本実施形態に係る受信装置５２ａは、ターミナルアダプタ（ＴＡ）機能を具備するものであって、図示しないデジタル回線終端装置（ＤＳＵ）を介して、ＩＳＤＮ回線と接続可能に構成されている。ＩＳＤＮ回線は、単一の加入者契約で、２つの回線（Ｂチャネル）を同時使用可能なディジタル回線であり、一方の回線が、専用線５８としてインターネットに接続するために専有されており、他方が電話回線５４として使用される。なお、専用線５８は、これに限らず、ケーブルテレビ回線や、光ファイバなど、種々の回線を使用できる。ただし、ＩＳＤＮ回線を使用すると、単一の加入者契約によって、専用線５８と電話回線５４との双方を実現できるので、比較的安価に親局５２を実現できる。

【０１２６】具体的には、図１０に示すように、受信装置５２ａは、図２に示す接続器２ａと類似した構成であるが、通信用ＩＣ１３に代えて、上記ＤＳＵに接続されるＳ／Ｔ点インターフェース（Ｓ／Ｔ点Ｉ／Ｆと略称する）１８が設けられている。当該Ｓ／Ｔ点Ｉ／Ｆ１８は、ＣＰＵ１４の指示に基づいて、呼の設定／切断（回線接続／切断）を制御したり、ＣＰＵ１４が処理するデータ列と、ＩＳＤＮ回線上を伝送される電気信号とを相互に変換できる。また、Ｓ／Ｔ点Ｉ／Ｆ１８は、ＣＰＵ１４が処理するデータ列を音声信号に変調した後で、ＩＳＤＮ回線上に送出し、ＩＳＤＮ回線から送られてきた音声信号を復調して、ＣＰＵ１４が処理するデータ列に変換することもできる。これにより、受信装置５２ａは、子局５３の送信装置５３ａと電話回線５４を介して直接通信できる。受信装置５２ａと送信装置５３ａとの間の通信方法は、例えば、Ｖ３２，Ｖ３２ｂｉｓ、Ｖ３４、Ｖ２１、あるいはＶ２２など、所定の規格に応じたシリアル通信であり、両者間でメッセージを送受できる。

【０１２７】これにより、受信装置５２ａは、電話回線５４を介して子局５３を直接呼び出しできると共に、専用線５８およびインターネット網５７を介して、子局５３と通信できる。

【０１２８】なお、親局５２全体としての機能が同じであれば、用途に応じて、受信装置５２ａと端末５２ｂとの役割分担や、両者が一体に形成されているか否かなどを自由に設定できるが、以下では、受信装置５２ａが監視カメラ５３ｂからの映像を受け取るサーバとして働く場合を例にして説明する。この場合は、各監視カメラ５３ｂからの映像は、受信装置５２ａに蓄積され、端末５２ｂは、受信装置５２ａに指示して、これらの映像を受け取り、当該映像を表示する。一方、使用者が、ある監視カメラ５３ｂが配置されている場所の映像を取得したいと判断した場合、端末５２ｂは、例えば、キー入力などによって、使用者の指示を識別し、当該監視カメラ５３ｂに対する映像の取得要求があったことを受信装置５２ａへ通知する。受信装置５２ａは、端末５２ｂからの通知に基づいて、監視カメラ５３ｂに対応する子局５３を識別し、本発明に係るダイアルアップ接続通信機器の呼び出し方法を用いて当該子局５３を呼び出す。

【０１２９】以下では、子局５３を呼び出す際における親局５２および子局５３の動作について、図１１に示すフローチャートに基づき説明する。なお、上記第１ないし第３の実施形態に係るフローチャートと同様に、発呼側、すなわち、親局５２の動作を示すステップは、例えば、Ｓ６１ａなど、末尾に”ａ”を付した符号にて参照し、被呼側、すなわち、子局５３の動作を示すステップは、末尾に”ｂ”を付した符号にて参照する。

【０１３０】すなわち、親局５２において、端末５２ｂは、例えば、使用者の指示などに応じて、監視カメラ５３ｂからの映像を取得したいことを示す受信要求を生成

し、受信装置５２ａに通知する（Ｓ６１ａ）。受信装置５２ａは、当該受信要求に基づいて、当該監視カメラ５３ｂに対応する子局５３を検索して、例えば、電話番号や暗証番号など、当該子局５３を呼び出すための情報を取得する。さらに、受信装置５２ａは、２つのＩＳＤＮ回線のうちの空いている回線を用いて、上記電話番号に電話をかけ、子局５３の送信装置５３ａを電話呼び出しする（Ｓ６２ａ）。送信装置５３ａが電話呼び出しに応答すると（Ｓ６１ｂ）、受信装置５２ａと送信装置５３ａとの間で、電話回線５４を介する直接通信が可能になる。

【０１３１】さらに、Ｓ６３ａにおいて、受信装置５２ａが送信装置５３ａに予め定められた暗証番号を通知すると、Ｓ６２ｂにおいて、送信装置５３ａは、受け取った暗証番号が予め定められた正規の暗証番号であるか否かを認証し、正規の暗証番号の場合、受信装置５２ａへ応答メッセージを送出する。

【０１３２】応答メッセージを受け取ると、受信装置５２ａは、Ｓ６４ａにて、インターネット網５７を介して接続する際に用いられる通信パラメータ（アクセス情報）を、送信装置５３ａに連絡し、送信装置５３ａは、当該通信パラメータを受け取った後、電話回線５４との回線接続を切断する（Ｓ６３ｂ）。これにより、受信装置５２ａと送信装置５３ａとの間の直接接続は切断される。

【０１３３】上記Ｓ６４ａにて送出される通信パラメータは、例えば、送信装置５３ａの最寄りのプロバイダ５６の電話番号と、並びに、プロバイダ５６のアカウントおよびパスワードなど、送信装置５３ａがダイアルアップ接続する際に使用するダイアルアップ情報を含んでいる。なお、受信装置５２ａは、各送信装置５３ａに予め対応付けられたダイアルアップ情報を通知してもよいし、例えば、無線通信システムが発呼側と被呼側との双方に端末の現在位置を通知するサービスなどを用いて、受信装置５２ａが送信装置５３ａの位置を確認し、送信装置５３ａに応じたダイアルアップ情報を通知してもよい。

【０１３４】さらに、上記通信パラメータには、例えば、暗号鍵と、受信装置５２ａのＩＰアドレスと、ｆｔｐ（ File Transfer Protocol ）用のログイン名と、通信開始の条件となど、インターネット網５７を介して、映像データを伝送する際に用いられる情報が含まれている。より詳細には、上記暗号鍵は、送信装置５３ａが映像データを暗号化する際に使用する暗号鍵であり、各接続毎に異なる使い捨てのものが使用される。また、通信開始の条件は、インターネット網５７を介して、送信装置５３ａが受信装置５２ａへインターネット網５７を介して接続する際の条件を示すものであり、例えば、以下に示す条件が挙げられる。第１の条件が選択された場合、受信装置５２ａが送信装置５３ａを電話回線５４にて呼び出し、直接通信が切断された後、子局５３は、即座に通信を開始する。また、第２の条件が選択された場合、送信装置５３ａは、一定の時間間隔や指定した時間にて、自動的に通信を開始する。さらに、第３の条件が選択されると、送信装置５３ａは、送信装置５３ａに接続されたセンサ（図示せず）にて、何か異常を関知した場合に、自動的に通信を開始する。加えて、第４の条件か選択されると、送信装置５３ａは、各監視カメラ５３ｂからの映像を常時画像処理し、映像に所定の変化が現れた場合に、自動的に通信を開始する。また、第５の条件が選択されると、送信装置５３ａは、図示しない通常の電話器（図示せず）から電話回線５４を介して呼び出しを受けた場合、当該電話器との接続が切断された後で、自動的に通信を開始する。

【０１３５】上記Ｓ６３ｂにて、受信装置５２ａと送信装置５３ａとの間の直接通信が切断されると、送信装置５３ａは、上記Ｓ６４ａにて通知された通信の開始条件が満たされるまで待機する（Ｓ６４ｂ）。

【０１３６】通信条件が満たされると、送信装置５３ａは、例えば、監視カメラ５３ｂに写真を撮影するように指示したり、あるいは、監視カメラ５３ｂから送られている映像のうち、最近の映像を選択するなどして、監視カメラ５３ｂからの映像データを取得し、上記Ｓ６４ａにて通知された暗号鍵を用いて暗号化する。さらに、送信装置５３ａは、上記Ｓ６４ａにて指示されたプロバイダ５６を介して、インターネット網５７へダイアルアップ接続する（Ｓ６５ｂ）。これにより、ＩＰアドレスが割り当てられ、送信装置５３ａは、インターネット網５７に接続される。なお、受信装置５２ａは、専用線５８を介してインターネット網５７へ常時接続されている。

【０１３７】続いて、Ｓ６６ｂにて、送信装置５３ａは、インターネット網５７を介して受信装置５２ａへｆｔｐ接続を要求する（Ｓ６６ｂ）。なお、ｆｔｐ接続要求は、例えば、上記Ｓ６４ａにて通知された受信装置５２ａのＩＰアドレスへ所定のコマンドを送出するなどして要求される。

【０１３８】また、受信装置５２ａは、ｆｔｐ接続要求を受けると、ログイン名入力画面にて、乱数を送信装置５３ａに送信する（Ｓ６５ａ）。なお、送信装置５３ａのＩＰアドレスは、上記Ｓ６５ｂにて割り当てられるまで決定していないので、受信装置５２ａは、送信装置５３ａのＩＰアドレスを予め予測することができない。しかしながら、上記Ｓ６６ｂにて、送信装置５３ａがｆｔｐ接続を要求する際に受信装置５２ａへ送出したデータグラムには、送信元のＩＰアドレスとして、送信装置５３ａのＩＰアドレスが含まれている。したがって、当該ＩＰアドレスへデータグラムを送信することによって、受信装置５２ａは、何ら支障なく、インターネット網５７を介して送信装置５３ａへ任意のデータを送信できる。

【０１３９】さらに、送信装置５３ａは、上記Ｓ６４ａにて通知された暗号鍵を用いて、受け取った乱数を暗号化して、パスワードを生成し、受信装置５２ａへ当該パスワードを送出する（Ｓ６７ｂ）。一方、受信装置５２ａは、受け取ったパスワードが、ログイン名に対応し、かつ、上記Ｓ６４ａにて通知したパスワードを用いて暗号化されたパスワードであるか否かを判定する。そして、ログイン名に対応して正しく暗号化されたパスワードであった場合、送信装置５３ａが正規の相手であると承認する（Ｓ６６ａ）。

【０１４０】承認された送信装置５３ａは、上記Ｓ６５ｂにて暗号化した映像データをｆｔｐプロトコルにて受信装置５２ａへ送信する（Ｓ６８ｂ）。当該映像データは、インターネット網５７を介して、受信装置５２ａへ到達し、受信装置５２ａは、暗号化された映像データを受け取る（Ｓ６７ａ）。さらに、送信が完了すると、送信装置５３ａは、プロバイダ５６との回線接続を切断する（Ｓ６９ｂ）。これにより、受信装置５２ａと送信装置５３ａとの間のインターネット網５７を経由した通信は完了する。

【０１４１】さらに、受信装置５２ａは、送信装置５３ａへ電話をかけて、呼出し音に基づいて、送信装置５３ａとプロバイダ５６との間の回線接続が、正常に切断されているか否かを確認する（Ｓ６８ａ）。具体的には、送信装置５３ａは、電話呼出しを受けた場合、例えば、１～２回など、所定の回数の呼出し音がなるまで、着呼しないように設定されている。この結果、受信装置５２ａが送信装置５３ａへ電話をかけた場合、所定数回の呼出し音が鳴らされる。通常の電話回線５４では、被呼側となる送信装置５３ａが回線接続しているか否かによって呼出し音が異なる。したがって、受信装置５２ａは、呼出し音によって、送信装置５３ａとプロバイダ５６との回線接続が切断されているか否かを確認できる。

【０１４２】例えば、話し中ではないことを示す通常の呼出し音が鳴った場合、受信装置５２ａは、送信装置５３ａがインターネット網５７への接続を正しく切断できたと判断する。一方、話し中を示すツーツーという音が鳴った場合、受信装置５２ａは、送信装置５３ａがインターネット網５７へ接続中であると判断する。この場合、受信装置５２ａは、例えば、先程まで通信していた送信装置５３ａのＩＰアドレスへ、インターネット網５７経由で切断コマンドを送出するなどして、送信装置５３ａへ回線切断を指示できる。また、受信装置５２ａの通知に応えて、端末５２ｂの使用者が、監視カメラ５３ｂの設置場所へ赴いて回線接続を切断するなどしてもよい。

【０１４３】いずれの場合であっても、親局５２側は、子局５３における回線切断の失敗を把握して、適切な処置を講じることができる。この結果、回線切断の失敗に起因する無駄な通信費用の発生を確実に防止できる。なお、上記所定の回数までに、受信装置５２ａが電話呼出しを中止すれば、通話料金は無料である。

【０１４４】また、Ｓ６９ａにおいて、受信装置５２ａは、受け取った映像データを復号し、ｆｔｐプロトコルにて、例えば、図９に示す端末５２ｂなどの他の機器へ、復号された映像データを送出する。これにより、映像データは、端末５２ｂに表示され、端末５２ｂの使用者は、監視カメラ５３ｂの設置場所の映像を確認できる。

【０１４５】この結果、子局５３がダイアルアップ接続されている場合であっても、親局５２は、任意の時点で、監視カメラ５３ｂからの映像を確認できると共に、例えば、無断駐車を発見したときなど、何らかの異常があったとき、特定の監視カメラ５３ｂを重点的に監視できる。したがって、無断駐車されている駐車スペースを柵などで囲ったり、警備会社に連絡するなど、異常に応じた処理を講じることができる。

【０１４６】ところで、上述したように、インターネット網５７を構成する通信機器は、送信元の通信機器のＩＰアドレスに拘わらず、近隣の通信機器からデータグラムを受け取っている。したがって、受信装置５２ａは、受信装置５２ａの処理能力および専用線５８の通信容量の範囲内であれば、複数の送信装置５３ａからの映像データをインターネット網５７経由で受け取ることができる。さらに、受信装置５２ａは、インターネット網５７経由の接続と、電話回線５４を介した直接接続とを同時に維持できる。したがって、受信装置５２ａは、インターネット網５７経由で映像データを受け取っている間であっても、他の送信装置５３ａを電話呼出しして、映像の取得を指示できる。

【０１４７】なお、上記各ステップでは、監視カメラ５３ｂが取得した映像をインターネット網５７経由で受信装置５２ａへ送出する場合について説明している。ただし、例えば、プロバイダ５６が混雑している場合など、インターネット網５７経由のデータ伝送が難しい場合、送信装置５３ａは、受信装置５２ａを電話呼出しして、電話回線５４を介した直接通信によって映像を伝送することもできる。この場合は、インターネット網５７へのアクセスや暗号化を必要としないため、送信装置５３ａは、より速い時点で、受信装置５２ａに映像を伝送できる。

【０１４８】また、上記各ステップにおいて、受信装置５２ａおよび送信装置５３ａは、ｆｔｐプロトコルを用いて、映像データを伝送しているが、これに限るものではない。インターネット網５７経由でデータを伝送できる方法であれば、例えば、電子メールなど、他の方法を用いて映像データを伝送できる。ただし、ｆｔｐプロトコルでは、受信装置５２ａおよび送信装置５３ａの双方で、データを伝送できたか否かを確実に確認できる。したがって、データ伝送に失敗した場合にデータを再送す

るなど、適切な処置を講ずることができる。

【０１４９】さらに、上記Ｓ６８ａでは、受信装置５２ａは、呼出し音によって、送信装置５３ａの回線接続が切断されているか否かを確認しているが、これに限るものではない。例えば、受信装置５２ａが送信装置５３ａを電話呼出しして直接通信することによって、回線接続が切断されているか否かを確認してもよい。ただし、呼出し音によって回線接続の切断を確認した場合、通信費用がかからないので、直接通信する場合に比べて、通信費用をさらに削減できる。

【０１５０】ここで、上記監視カメラシステム５１を運営する際の費用の一例について、簡単に説明する。上記監視カメラシステム５１では、監視カメラ５３ｂから得られた映像に基づいてナンバープレートを確認するので、例えば、圧縮後で、１枚あたり約５００ｋｂｙｔｅ程度の高精度な映像が必要である。したがって、データの伝送速度が６４ｋｂｐｓのＩＳＤＮ回線を用いて、当該映像を直接通信する場合、１枚の映像の伝送には、約６２秒程度必要とする。ここで、親局５２と子局５３とが東京と名古屋とに配されている場合には、通信費用が４０円程度となる。この結果、映像の取得頻度を１時間に１回程度とすると、１年間で、約３５０，４００円程度必要となる。同様の条件で、伝送速度が３３．６ｋｂｐｓのアナログ回線にて直接通信する場合の費用を算出すると、１回の伝送に、１２０秒程度で必要であることから、通信費用は、１回あたり、１２０円程度、１年で、約７００，８００円程度が必要となる。また、子局５３が専用線にてインターネット網５７へ接続する場合、最近では、年間４０万円程度の専用線利用料が必要となる。

【０１５１】これに対して、インターネット網７経由であれば、プロバイダ６が子局５３と市内通話料金で通話可能な範囲内にあれば、１回の伝送に要する時間が１８０秒以内であることから、１回あたりの通信費用は、１０円となり、１年で、約８７，６００円程度となる。さらに、プロバイダ６の利用料金を１年あたり６０，０００円程度とすると、１年あたりの通信費用は、１４７，６００円程度となる。この結果、上記監視カメラシステム５１において、１か所の子局５３あたりの通信費用は、通常回線にて直接通信する場合に比べて、約５６万円程度（約７９％）、ＩＳＤＮの場合に比べても、約２０万円（約５７％）程度と大幅に削減できる。さらに、親局５２で必要とする映像の精度や枚数、あるいは通信頻度が増えるに伴って、監視カメラシステム５１の通信費用の方が、より割安となる。また、子局５３が専用線接続する場合と比較すると、上記監視カメラシステム５１において、１か所の子局５３あたりの通信費用は、年間で約２５万円（約６３％）程度削減できる。

【０１５２】なお、上述の通信費用は、あくまで一例であり、使用する通信回線の料金体系や、プロバイダ６の料金体系などによって大きく異なる。ただし、上述したように、通信に要する設備などの面から、通信回線よりもネットワークの方が通信費用を削減しやすい。さらに、ネットワークにて通信する場合でも、専用線による接続よりも、ダイアルアップ接続の方が通信費用を削減しやすい。したがって、上記監視カメラシステム５１の通信費用は、子局５３が専用線接続する場合、および、親局５２と子局５３とが直接通信する場合のいずれと比べても、大幅に廉価であることが多い。

【０１５３】〔第５の実施形態〕上記第４の実施形態では、親局５２が専用線５８によってインターネット網５７に常時接続されている場合について説明している。これに対して、図１２に示すように、本実施形態では、親局５２が、図１に示す通信機器２と同様に、プロバイダ５５を介してインターネット網５７へダイアルアップ接続する場合について説明する。

【０１５４】なお、本実施形態に係る受信装置５２ａは、第４の実施形態と同じハードウェア構成であり、子局５３と通信する際、２本のＩＳＤＮ回線のうちの一方を用いて、プロバイダ５５へダイアルアップ接続する。また、子局５３など、監視カメラシステム５１の残余の構成は、第４の実施形態の構成と同様である。したがって、第４の実施形態と同じ機能を有する部材には、同じ参照番号を付して説明を省略し、以下では、親局５２および子局５３の動作について、図１３に示すフローチャートに基づき詳細に説明する。

【０１５５】すなわち、本実施形態では、図１１に示す各ステップに加えて、Ｓ７１ａおよびＳ７２ａの両ステップが設けられている。Ｓ６１ａの後に設けられたＳ７１ａにおいて、受信装置５２ａは、インターネット網５７と接続されていない場合、プロバイダ５５を介して、インターネット網５７にダイアルアップ接続する。これにより、受信装置５２ａは、続くＳ６４ａにて通知する自らのＩＰアドレスを得ることができる。

【０１５６】なお、受信装置５２ａは、ＩＳＤＮ回線に接続されている。したがって、上述のＳ６２ａにおいて、受信装置５２ａは、一方の回線にて、インターネット網５７との接続を保ったまま、他方の回線を用いて送信装置５３ａを呼び出すことができる。この結果、上記Ｓ７１ａにて受信装置５２ａに割り当てられたＩＰアドレスは、Ｓ６４ｂ以降も受信装置５２ａに割り当てられている。

【０１５７】一方、Ｓ６７ａの後に設けられたＳ７２ａにおいて、受信装置５２ａは、プロバイダ５５との回線接続を切断する。これにより、受信装置５２ａは、インターネット網５７から切り離される。

【０１５８】上記構成では、受信装置５２ａがインターネット網５７へダイアルアップ接続している。したがって、受信装置５２ａが専用線５８にて接続される第４の実施形態に比べて、さらに、通信費用を削減できる。

【０１５９】なお、上記構成では、上述のＳ６４ａにて通知した通信開始条件のうち、受信装置５２ａが通信開始時点を管理できない第２ないし第５の条件を選択すると、送信装置５３ａが映像を送信しようとしたときに受信装置５２ａがインターネット網５７へ接続されていない場合がある。したがって、これらの条件を選択する場合、送信装置５３ａは、本発明に係るダイアルアップ接続通信機器の呼び出し方法を用いて、受信装置５２ａを呼び出す必要がある。この場合、受信装置５２ａおよび送信装置５３ａは、第１ないし第２の実施形態に示すように、電子メールを利用したり、サーバを経由するなどして、自らのＩＰアドレスを相手に通知する。

【０１６０】ところで、上記第４および第５の実施形態では、監視カメラシステムの適用例として、無人駐車場の監視カメラに撮影を指示し、撮影した映像を取得する場合を例にして説明したが、本発明に係る監視カメラシステムは、これに限らず、種々の用途に使用できる。例えば、全国のあちこちに保有するビルや倉庫に監視カメラを配置すれば、管理会社は、親局となる１か所の事務所から、ビルや倉庫を監視できる。同様に、ドライブインの無人店舗や無人のコンビニを、本社から監視する用途にも適用できる。また、金融機関が無人店舗を管理したり、電力会社が、遠隔地の無人変電所やダムなどを本社から管理したりする際にも使用できる。さらに、装置の納入場所に監視カメラを配すれば、装置メーカの本社にて、納入場所の状態を知ることができるので、納入した装置をリモートメンテナンスする際に役立てることができる。あるいは、各地の火山に無人カメラを配置すれば、大学の研究所から、これらの火山活動を監視することもできる。また、ファーストフード、レストラン、コンビニチェーンなどに監視カメラを配し、各店舗内部を撮影したデータを本社へ送信することによって、時間帯毎の客入り、客人数、構成、年齢層、あるいは、座る場所など、種々のマーケット情報を本社にて収集できる。

【０１６１】いずれの場合であっても、監視するための人材を派遣する必要がないので、人件費を削減できる。加えて、監視したデータは、インターネットなどのネットワークを介して伝送されるので、電話回線などの通信回線を使用する場合に比べて通信費用を大幅に削減できる。さらに、通信回線にて監視カメラを呼び出すので、親局は、所望の時点において、監視カメラに映像の取得を指示できる。これらの結果、任意の時点の映像を取得可能な監視カメラシステムを少ない予算で実現できる。

【０１６２】また、上記第４および第５の実施形態では、子局５３の制御対象が監視カメラ５３ｂである場合を例にして説明しているが、これに限るものではない。例えば、子局５３が、各種センサなどを用いて取得したデータを親局５２へ送出する場合や、親局５２の指示に基づいて、子局５３が、モータやポンプなどを制御する場合など、種々の機器を制御対象とする監視制御システムに本発明を適用できる。ただし、監視カメラ５３ｂが取得した映像を伝送する場合のように、伝送されるデータ量が多い場合は、通信に要する時間が長いので、通信回線による直接通信にて当該データを送出すると、通信費用か高騰する。したがって、監視カメラシステム５１に本発明を適用した場合の効果は特に大きくなる。

【０１６３】上記第１ないし第５の各実施形態に示すように、ダイアルアップ接続通信機器の呼び出し方法は、発呼側および被呼側の通信機器が、それぞれ電話回線に接続されていると共に、少なくとも被呼側の通信機器が、当該電話回線を介して、インターネット網やパソコン通信などのネットワークにダイアルアップ接続される通信システムに適用される呼び出し方法であり、ネットワークを介して通信する前に、電話回線を用いて、発呼側の通信機器が被呼側の通信機器へ接続要求を伝えることを特徴としている。

【０１６４】これにより、被呼側の通信機器がネットワークに接続されていない場合であっても、ネットワークを介して通信する際には、被呼側の通信機器をネットワークへ接続させることができる。したがって、両通信機器は、所望のタイミングで確実に通信を開始できる。これにより、従来に比べて、被呼側の通信機器の即応性を向上でき、リアルタイム通信が可能となる。

【０１６５】また、少なくとも被呼側の通信機器は、ダイアルアップ接続によってネットワークに接続されている。したがって、ネットワークを介して通信する際の費用は、専用線を介してネットワークに接続する場合や、電話回線を介して直接通信する場合に比べて、大幅に低減できる。特に、海外など、両通信機器を設置している場所が離れている場合には、電話回線を介して直接通信する場合の費用は、極めて高いので効果が大きい。

【０１６６】なお、上記各実施形態では、両通信機器がそれぞれダイアルアップ接続する場合について説明したが、これに限るものではない。例えば、第４の実施形態に示すように、少なくとも被呼側の通信機器がダイアルアップ接続する通信システムであれば、第１ないし第５の各実施形態と同様の効果が得られる。

【０１６７】また、上記各実施形態では、発呼側の通信機器が電話回線を用いて接続要求を通知しているが、これに限るものではない。例えば、船舶無線など、他の通信回線を用いてもよい。被呼側に接続要求を通知できるものであれば、各実施形態と同様の効果が得られる。

【０１６８】さらに、上記各実施形態では、発呼側の通信機器が１台の通信機器を呼び出す場合について説明しているが、これに限らず、複数の通信機器を呼び出してもよい。１台の通信機器を呼び出す場合と同様に、複数の通信機器を順番に電話回線で呼び出すことによって、多数の通信機器がネットワーク上で同時に通信できる。この場合、発呼側の通信機器の使用者が会議の招集者となる。なお、この場合、複数の通信機器が同時に通信可

能なネットワーク会議ソフトが必要となるが、このような製品は、既に一般的に使用されている。

【０１６９】ところで、上記各実施形態に係る通信機器は、使用者名や通信内容など、ネットワークで伝送するデータの少なくとも一部を暗号化しているが、これに限るものではない。ネットワークで通信する際、特に暗号を施さず、平文のままデータを送出してもよい。

【０１７０】ただし、平文のままデータを送出する場合、ネットワークを伝送されるデータは、盗聴あるいは改ざんされる虞れがある。特に、ネットワークとして、インターネット網などを使用する場合には、発信側および受信側の通信機器がデータの伝送路を指定できない。したがって、盗聴などが容易で、通信を妨害される危険性が高い。

【０１７１】これに対して、上記各実施形態では、ネットワークでデータを送信する際、例えば、相手の公開鍵や共通の暗号鍵など、種々の暗号鍵によって、データの少なくとも一部を暗号化している。これにより、正規の通信相手ではない第三者から、データの少なくとも一部を隠蔽できるので、通信妨害に対する安全性を向上できる。

【０１７２】なお、暗号化するデータは、例えば、通信内容そのもの、両通信機器の使用者名あるいはアドレスなどが挙げられる。ただし、暗号化するデータ量が増大するに従って、両通信機器の負担が増大するので、通信の重要度を考慮して、一部のデータのみを暗号化してもよい。一般に、使用者名やアドレスなどが第三者に傍聴されると、通信内容の重要性を推測されやすい。したがって、第１および第２の実施形態に示すように、画像や音声などの通信に先立って、使用者名やアドレスなどを送信する場合には、これらを暗号化することが特に望まれる。これにより、両通信機器の負担を余り増加させることなく、通信妨害に対する安全性を向上できる。

【０１７３】各通信機器が暗号鍵を取得する方法は、種々の方法が考えられる。例えば、郵送など、他の通信手段によって、予め相手に通知し、例えば、図２に示すＦｌａｓｈメモリ１１など、各通信機器の記憶手段へ格納しておいてもよい。ただし、この場合、各通信機器の使用者は、通信に先立って、相手から通知された暗号鍵を、それぞれの通信機器へ設定する必要がある。暗号鍵は、各通信機器毎に用意されるので、通信相手が増加するに従って、設定時の手間も増大する。さらに、暗号鍵は、通信妨害に対する安全性を向上させるために、必要に応じて変更しなければならない。したがって、各通信機器の使用者は、自らの暗号鍵を変更する度に、全ての通信相手に対して、新たな暗号鍵を通知する必要がある。

【０１７４】これに対して、上記各実施形態では、接続要求時に通信回線にて、暗号鍵を通知している。なお、暗号鍵が公開鍵と秘密鍵とから構成されている場合は、通信回線にて、互いの公開鍵を交換する。また、共通の暗号鍵を用いる場合には、一方の通信機器が他方に通知すればよい。この構成では、接続要求毎に暗号鍵を通知するので、前回通信したときと暗号鍵を変更した場合であっても訂正が容易である。したがって、接続要求毎に暗号鍵を容易に変更でき、通信妨害に対する安全性をさらに向上できる。加えて、電話回線を用いて、接続要求の通知と暗号鍵の送付との双方を一括して行っている。したがって、両者を個別に行う場合に比べて、電話回線を接続する手間を削減できる。

【０１７５】さらに、暗号鍵と暗号化されたデータとは、互いに異なる通信手段によって伝送される。したがって、第三者が通信の妨害を試みる場合、双方の通信を傍受する必要があり、単一の通信手段にて、暗号鍵とデータとを送信する場合に比べて、通信妨害に対する安全性を向上できる。なお、通信回線としては、暗号鍵の盗聴を防止するために電話回線など、比較的傍受しにくい通信回線を使用することが望まれる。

【０１７６】ところで、第２の実施形態に示すように、両通信機器がネットワークに設けられたサーバを介して通信する場合には、上記構成に加えて、両通信機器がサーバに登録名を登録し、両通信機器が相手の登録名をサーバへ通知して、通信相手を選択する必要がある。

【０１７７】この場合、サーバに登録された登録名は、公開されているので、使用者名をそのまま登録すると、通信妨害に対する安全性を低下させる虞れがある。また、サーバに登録されている登録名のうち、所望の登録名を選択する際に手間がかかる。この場合には、上記公開鍵を用いて使用者名を暗号化して、サーバに登録すればよい。これにより、使用者名を第三者から隠蔽できる。

【０１７８】ところで、第２の実施形態に示すように、サーバを設ける構成では、サーバを別に設ける費用や維持費などが必要となる。また、サーバが混み合っている場合には、両通信機器間で通信できなくなる虞れがある。

【０１７９】これに対して、第１の実施形態では、上記第２の実施形態とは異なり、両通信機器が互いにネットワークを介して直接通信できる方法を提供している。具体的には、ダイアルアップ接続した際、被呼側の通信機器が自らのアドレスを取得し、電子メールにて発呼側の通信機器へ送信する工程が設けられている。これにより、第２の実施形態とは異なり、特にサーバを設けることなく、両通信機器は、ネットワークを介して通信できる。この結果、通信に要する費用をさらに削減できる。また、サーバの混雑に関わらず、両通信機器は、確実に通信できる。

【０１８０】ところで、ネットワークを介する通信が終了すると、ダイアルアップ接続通信機器は、ネットワークとの接続を切断する。ここで、ダイアルアップ接続通

信機器がネットワークとの回線切断に失敗すると、当該ダイアルアップ接続通信機器は、ネットワークに接続され続けるので、通信費用が不所望に高騰する。特に、例えば、ダイアルアップ接続通信機器が監視制御システムの子局である場合など、ダイアルアップ接続通信機器の周囲に使用者がいない場合には、回線切断に失敗したことを把握しにくい。したがって、回線切断に失敗した場合、当該ダイアルアップ接続通信機器が不所望にネットワークに接続される期間が長くなりがちであり、無駄な通信費用が増大する虞れが大きい。

【０１８１】これに対して、第４および第５の実施形態に示すように、上記発呼側の通信機器は、ネットワーク経由の通信が終了した後で、通信回線を介して、ダイアルアップ接続通信機器を呼び出し、正常にダイヤルアップ接続が切断されたことを確認している。この結果、回線切断の失敗に起因する無駄な通信費用を削減できる。

【０１８２】ところで、本発明に係るダイアルアップ接続通信機器の呼び出し方法を適用する通信システムの一例として、上記第１ないし第３の実施形態では、映像や音声などを伝送するインターネット電話システムについて説明し、第４および第５の実施形態では、監視カメラシステムなどの監視制御システムについて説明しているが、これに限るものではない。インターネットＶＰＮ（ Virtual Private Network) を構築して、任意のデータを送受する場合に広く適用できる。

【０１８３】たたし、当該ダイアルアップ接続通信機器の呼び出し方法を用いることによって、所望のタイミングで通信の開始が可能で、かつ、通信費用の削減できる通信システムを構築できるので、例えば、インターネット電話システムや監視制御システムなどのように、即応性が強く要求される場合に、特に好適である。

【０１８４】具体的には、監視制御システムでは、一般に、子局が、親局から離れた場所に設置されており、かつ、親局が数多くの子局を監視制御する。したがって、親局と子局とが通信する際の費用は、増大しがちであり、通信費用の削減が強く要求されている。一方、監視制御システムでは、指示の遅れが事故の拡大に直結するので、子局は、親局の指示に即座に応答しなければならない。したがって、ダイアルアップ接続により接続されるネットワークのみを介して、子局が親局と通信する場合、子局が親局の指示に即応できず、事故を拡大させる虞れがある。これらの結果、監視制御システムでは、親局の指示に対する子局の即応性を保ったまま、通信費用を削減することが強く求められている。したがって、親局が子局を呼び出す際に、本発明に係るダイアルアップ接続通信機器の呼び出し方法を適用した場合、特に効果的である。

【０１８５】

【発明の効果】請求項１の発明に係る通信ダイアルアップ接続通信機器の呼び出し方法は、以上のように、ネットワークとは別に設けられ、上記ダイアルアップ接続通信機器を呼び出し可能な通信回線によって、発呼側の通信機器がダイアルアップ接続通信機器へ接続要求を伝える第１工程と、接続要求を受けたダイアルアップ接続通信機器が、上記ネットワークへダイアルアップ接続する第２工程と、上記ネットワークを介して、発呼側の通信機器とダイアルアップ接続通信機器とが通信する第３工程とを含んでいる構成である。

【０１８６】上記構成では、ダイアルアップ接続通信機器がネットワークに接続されていない場合であっても、上記第３工程における通信時には、当該ダイアルアップ接続通信機器をネットワークへ接続させることができる。それゆえ、安い料金で通信可能なダイアルアップ接続通信機器において、所望のタイミングで確実に通信を開始でき、リアルタイムに通信できるという効果を奏する。

【０１８７】請求項２の発明に係るダイアルアップ接続通信機器の呼び出し方法は、以上のように、請求項１記載の発明の構成において、上記第３工程は、上記発呼側の通信機器およびダイアルアップ接続通信機器のうちで送信側の通信機器が、当該第３工程にて送出するデータの少なくとも一部を暗号化して送出する暗号工程と、受信側の通信機器が、暗号化されたデータを復号する復号工程とを含んでいる構成である。

【０１８８】上記構成では、通信内容のうち、少なくとも一部は、暗号化によって、発呼側の通信機器およびダイアルアップ接続通信機器以外の第三者から隠蔽されている。この結果、通信内容を暗号化せず、平文のまま伝送する場合に比べて、通信妨害に対する安全性を向上できるという効果を奏する。

【０１８９】請求項３の発明に係るダイアルアップ接続通信機器の呼び出し方法は、請求項２記載の発明の構成において、上記第１工程は、発呼側の通信機器あるいはダイアルアップ接続通信機器が、暗号化の際に使用される暗号鍵を相手に通知する工程を含んでいる構成である。

【０１９０】上記構成では、接続要求の通知と暗号鍵の送付との双方を一括して行っている。これにより、通信回線の接続する手間を増加させることなく、暗号鍵を接続毎に伝送でき、暗号鍵を変更した場合の手間を削減できるという効果を奏する。

【０１９１】さらに、暗号鍵と暗号化されたデータとは、互いに異なる通信手段によって伝送される。この結果、盗聴やデータの改ざんなど、通信妨害に対する安全性をさらに向上できるという効果を併せて奏する。

【０１９２】請求項４の発明に係るダイアルアップ接続通信機器の呼び出し方法は、以上のように、請求項１、２または３記載の発明の構成において、上記第３工程は、上記両通信機器が、通信を中継するサーバへ自らを示す登録名をそれぞれ通知する工程と、上記両通信機器

が、相手の登録名を上記サーバへ通知して、相手の通信機器を選択する工程と、上記サーバが選択された通信機器間の通信を中継する工程とを含んでいる構成である。

【０１９３】それゆえ、両通信機器は、ネットワークに設けられたサーバを介して、所望のタイミングで確実に通信を開始でき、リアルタイムに通信できるという効果を奏する。

【０１９４】請求項５の発明に係るダイアルアップ接続通信機器の呼び出し方法は、以上のように、請求項１、２または３記載の発明の構成において、上記第３工程は、ダイアルアップ接続通信機器が、現接続における自らのアドレスを取得する工程と、電子メールによって、ダイアルアップ接続通信機器が、発呼側の通信機器へ自らのアドレスを通知する工程と、発呼側の通信機器およびダイアルアップ接続通信機器が、互いのアドレスにより相手を特定して通信する工程とを含んでいる構成である。

【０１９５】それゆえ、請求項４の構成のように、特にサーバを設けることなく、両通信機器は、ネットワークを介して通信できる。この結果、請求項４記載の発明の効果に加えて、通信に要する費用をさらに削減できると共に、サーバの混雑に関わらず、確実に通信できるという効果を奏する。

【０１９６】請求項６の発明に係るダイアルアップ接続通信機器の呼び出し方法は、以上のように、請求項１、２、３、４または５記載の発明の構成において、さらに、上記第３工程の後で、上記発呼側の通信機器がダイアルアップ接続通信機器を上記通信回線にて直接呼び出して、当該ダイアルアップ接続通信機器が当該通信回線との回線接続を正常に切断したか否かを確認する第４工程を含んでいる構成である。

【０１９７】それゆえ、発呼側の通信機器は、ダイアルアップ接続通信機器の回線切断失敗を確実に認識でき、回線切断の失敗に起因する無駄な通信費用の発生を確実に防止できるという効果を奏する。

【０１９８】請求項７の発明に係る監視制御システムは、以上のように、親局は、呼び出し可能な通信回線を介して上記子局を呼び出し、接続要求を伝えた後で、上記通信回線とは別に設けられたネットワーク経由で上記子局と通信する親局通信手段を備え、上記子局は、上記通信回線を介して、上記接続要求を受け取った後で、上記ネットワークにダイアルアップ接続して、当該ネットワーク経由で上記親局と通信する子局通信手段を備えている構成である。

【０１９９】上記構成において、親局通信手段が呼び出し可能な通信回線を用いて子局を呼び出した後、子局通信手段は、安価に通信が可能なダイアルアップ接続にてネットワークに接続し、当該ネットワークを介して、データを送受する。この結果、親局の指示に対して、子局が即応可能でありながら、子局と親局との間の通信費用を大幅に削減可能な監視制御システムを実現できるという効果を奏する。

【図面の簡単な説明】

【図１】本発明の一実施形態を示すものであり、通信システム全体の要部構成を示すブロック図である。

【図２】上記通信システムの発呼側および被呼側の通信機器に設けられた接続器の要部構成を示すブロック図である。

【図３】上記通信機器の一変形例を示すものであり、通信機器の接続関係を示すブロック図である。

【図４】上記通信システムにおいて、呼び出し時における発呼側および被呼側双方の通信機器の動作を示すフローチャートである。

【図５】本発明の他の実施形態を示すものであり、通信システム全体の要部構成を示すブロック図である。

【図６】上記通信システムにおいて、呼び出し時における発呼側および被呼側双方の動作を示すフローチャートである。

【図７】本発明のさらに他の実施形態を示すものであり、通信システム全体の要部構成を示すブロック図である。

【図８】上記通信システムにおいて、呼び出し時における発呼側および被呼側双方の動作を示すフローチャートである。

【図９】本発明のさらに他の実施形態を示すものであり、監視制御システムの要部構成を示すブロック図である。

【図１０】上記監視制御システムにおいて、受信装置の要部構成を示すブロック図である。

【図１１】上記監視制御システムにおいて、親局が子局を呼び出す際の動作を示すフローチャートである。

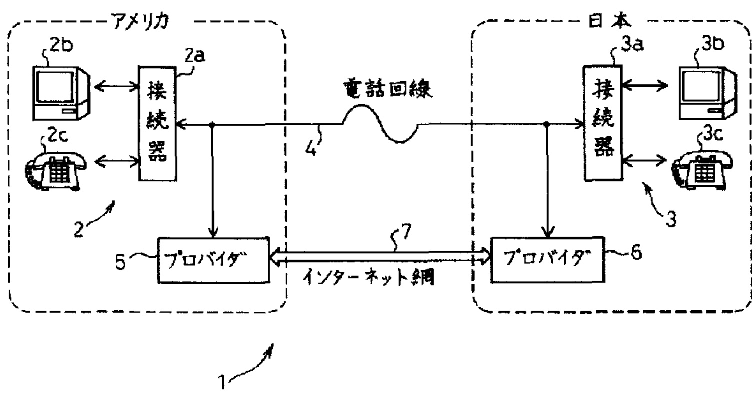
【図１２】本発明のさらに他の実施形態を示すものであり、監視制御システムの要部構成を示すブロック図である。

【図１３】上記監視制御システムにおいて、親局が子局を呼び出す際の動作を示すフローチャートである。

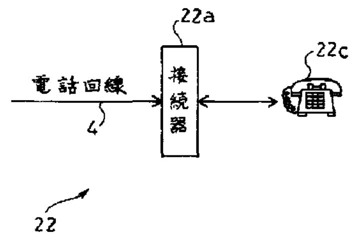
【符号の説明】

２・２２・３２・４２	通信機器
３・３３・４３	通信機器（ダイアルアップ接続通信機器）
４・３４・４４・５４	電話回線（通信回線）
７・３７・５７	インターネット網（ネットワーク）
３８	サーバ
４８・５８	回線（ネットワーク）
５２	親局（通信機器）
５２ａ	受信装置（親局通信手段）
５３	子局（ダイアルアップ接続通信機器）
５３ａ	送信装置（子局通信手段）

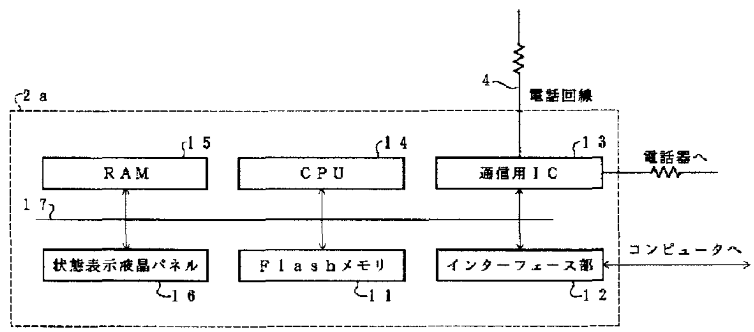
【図1】


アメリカ
日本
2b
2a
接続器
2c
電話回線
3a
3b
接続器
3c
4
2
3
5
プロバイダ
7
インターネット網
プロバイダ
6
1

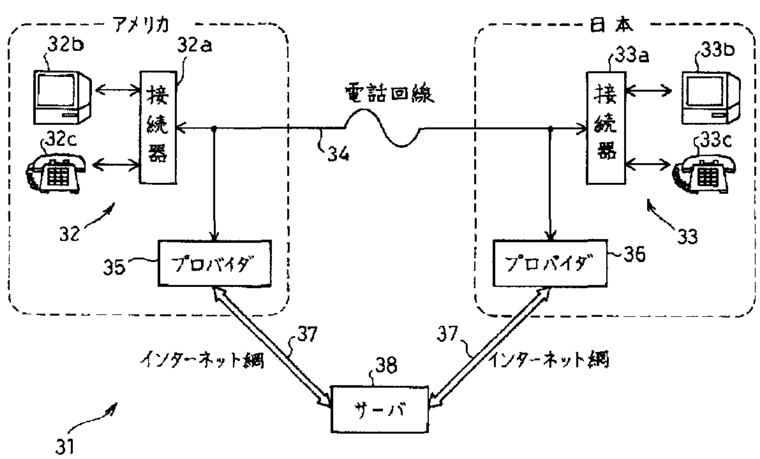
【図3】


22a
22c
電話回線
4
接続器
22

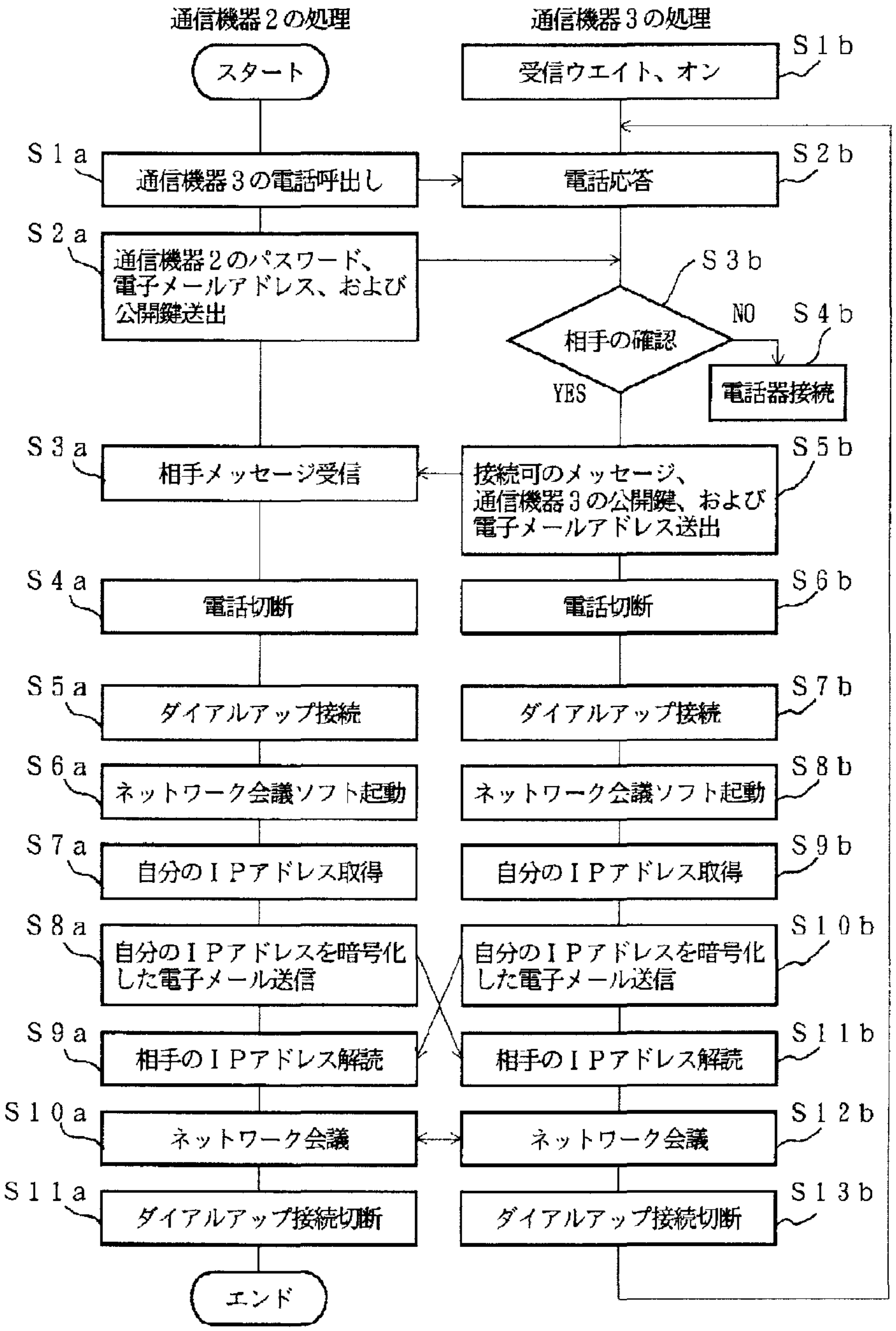
【図2】


4
電話回線
2 a
1 5
RAM
1 4
CPU
1 3
通信用ＩＣ
電話器へ
1 7
状態表示液晶パネル
1 6
Ｆｌａｓｈメモリ
1 1
インターフェース部
1 2
コンピュータへ

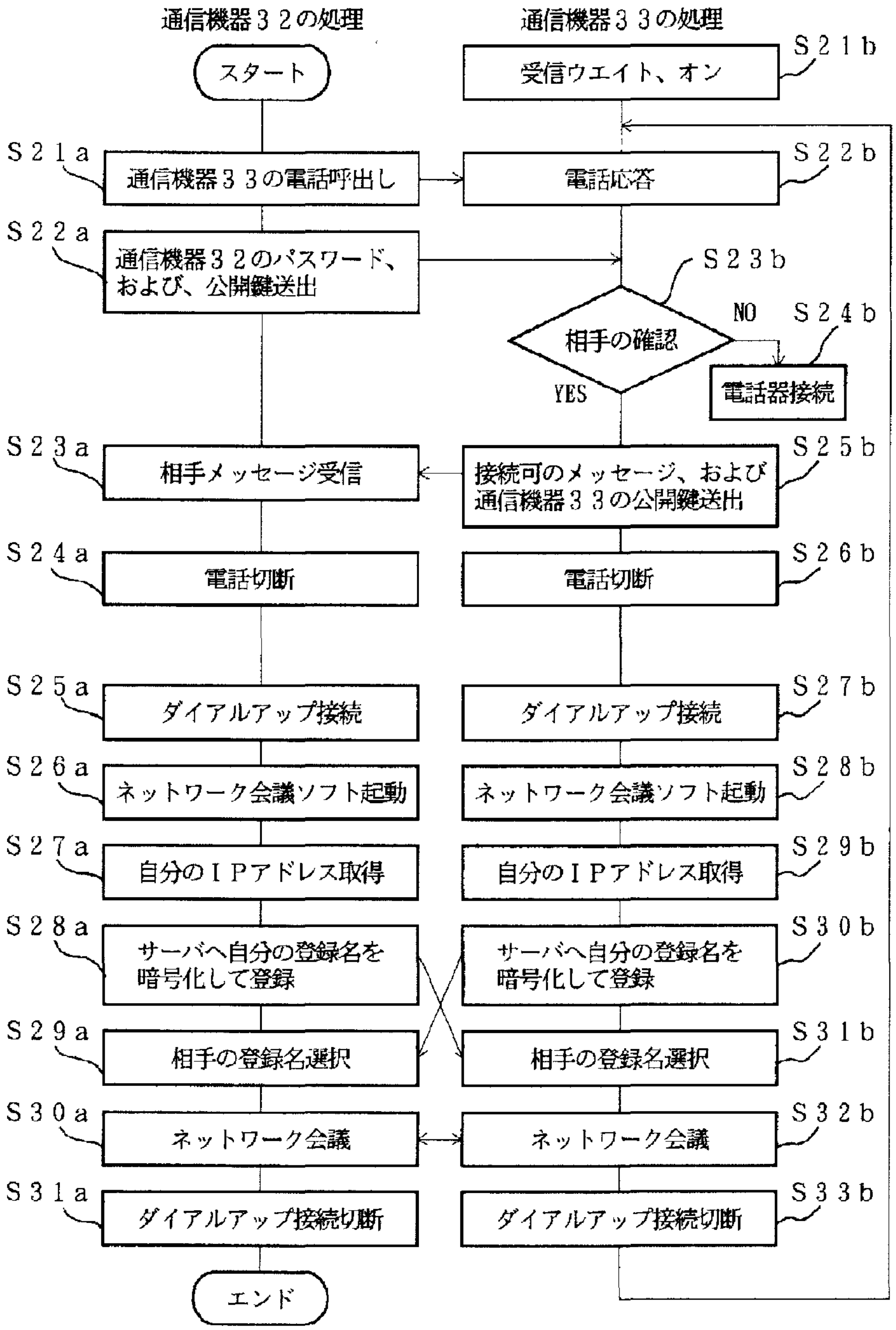
【図5】


アメリカ
日本
32b
32a
接続器
32c
電話回線
34
33a
33b
接続器
33c
32
33
35
プロバイダ
プロバイダ
36
37
インターネット網
38
サーバ
37
インターネット網
31

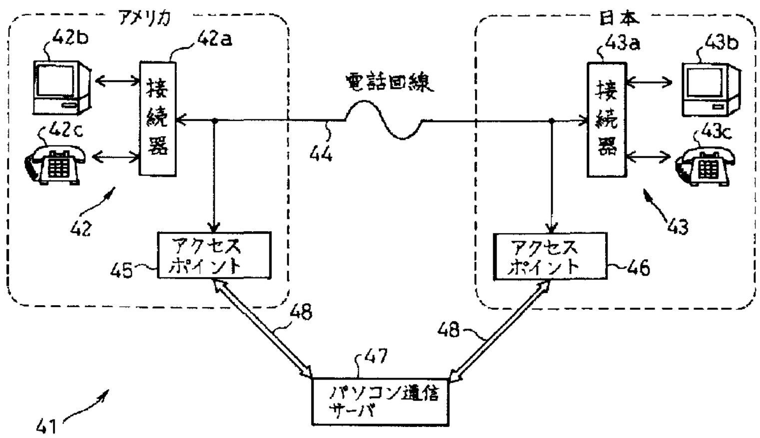
【図４】


通信機器２の処理
通信機器３の処理
スタート
受信ウエイト、オン
S１b
S１a
通信機器３の電話呼出し
電話応答
S２b
S２a
通信機器２のパスワード、電子メールアドレス、および公開鍵送出
S３b
相手の確認
NO
S４b
電話器接続
YES
S３a
相手メッセージ受信
接続可のメッセージ、通信機器３の公開鍵、および電子メールアドレス送出
S５b
S４a
電話切断
電話切断
S６b
S５a
ダイアルアップ接続
ダイアルアップ接続
S７b
S６a
ネットワーク会議ソフト起動
ネットワーク会議ソフト起動
S８b
S７a
自分のＩＰアドレス取得
自分のＩＰアドレス取得
S９b
S８a
自分のＩＰアドレスを暗号化した電子メール送信
自分のＩＰアドレスを暗号化した電子メール送信
S１０b
S９a
相手のＩＰアドレス解読
相手のＩＰアドレス解読
S１１b
S１０a
ネットワーク会議
ネットワーク会議
S１２b
S１１a
ダイアルアップ接続切断
ダイアルアップ接続切断
S１３b
エンド

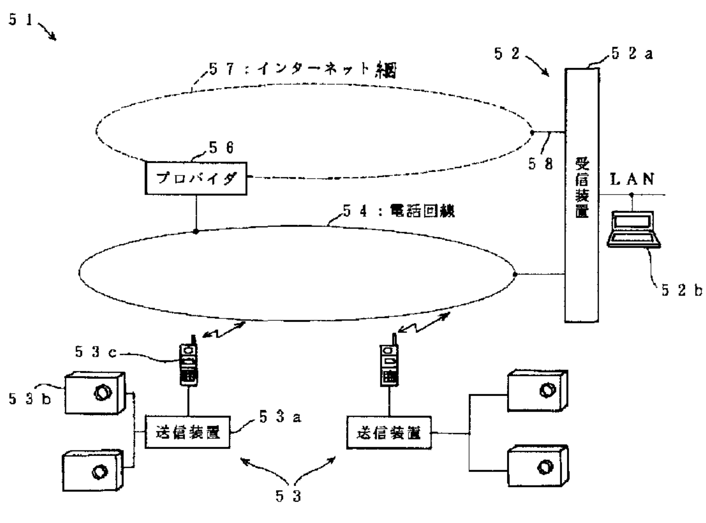
【図６】


通信機器３２の処理
通信機器３３の処理
スタート
受信ウエイト、オン
S２１b
S２１a
通信機器３３の電話呼出し
電話応答
S２２b
S２２a
通信機器３２のパスワード、および、公開鍵送出
S２３b
相手の確認
NO
S２４b
電話器接続
YES
S２３a
相手メッセージ受信
接続可のメッセージ、および通信機器３３の公開鍵送出
S２５b
S２４a
電話切断
電話切断
S２６b
S２５a
ダイアルアップ接続
ダイアルアップ接続
S２７b
S２６a
ネットワーク会議ソフト起動
ネットワーク会議ソフト起動
S２８b
S２７a
自分のＩＰアドレス取得
自分のＩＰアドレス取得
S２９b
S２８a
サーバへ自分の登録名を暗号化して登録
サーバへ自分の登録名を暗号化して登録
S３０b
S２９a
相手の登録名選択
相手の登録名選択
S３１b
S３０a
ネットワーク会議
ネットワーク会議
S３２b
S３１a
ダイアルアップ接続切断
ダイアルアップ接続切断
S３３b
エンド

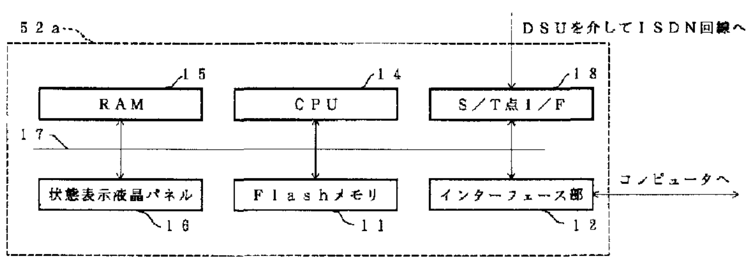
【図７】


アメリカ
日本
42b
42a
接続器
42c
42
電話回線
44
43a
接続器
43b
43c
43
アクセスポイント
45
アクセスポイント
46
48
48
47
パソコン通信サーバ
41

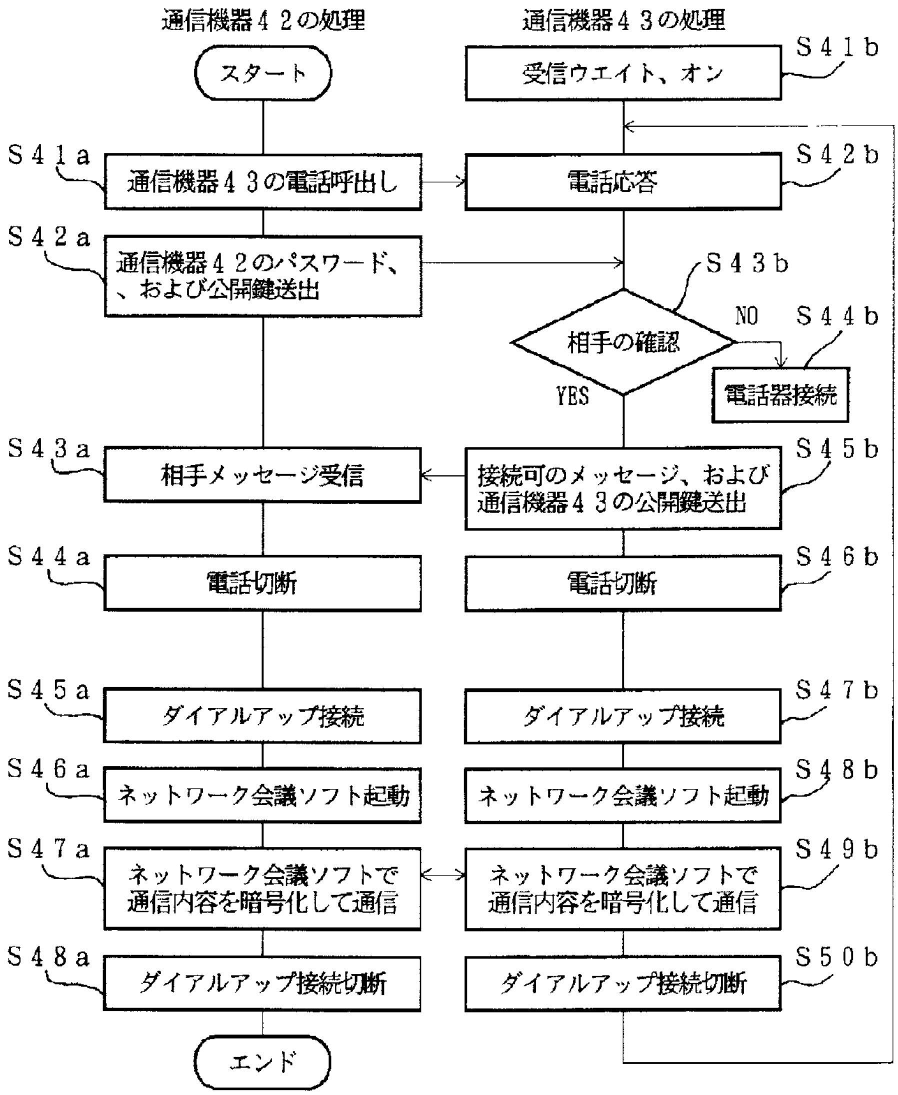
【図９】


５１
５７：インターネット網
５２
５２ａ
５６
プロバイダ
５８
受信装置
ＬＡＮ
５４：電話回線
５２ｂ
５３ｃ
５３ｂ
送信装置
５３ａ
送信装置
５３

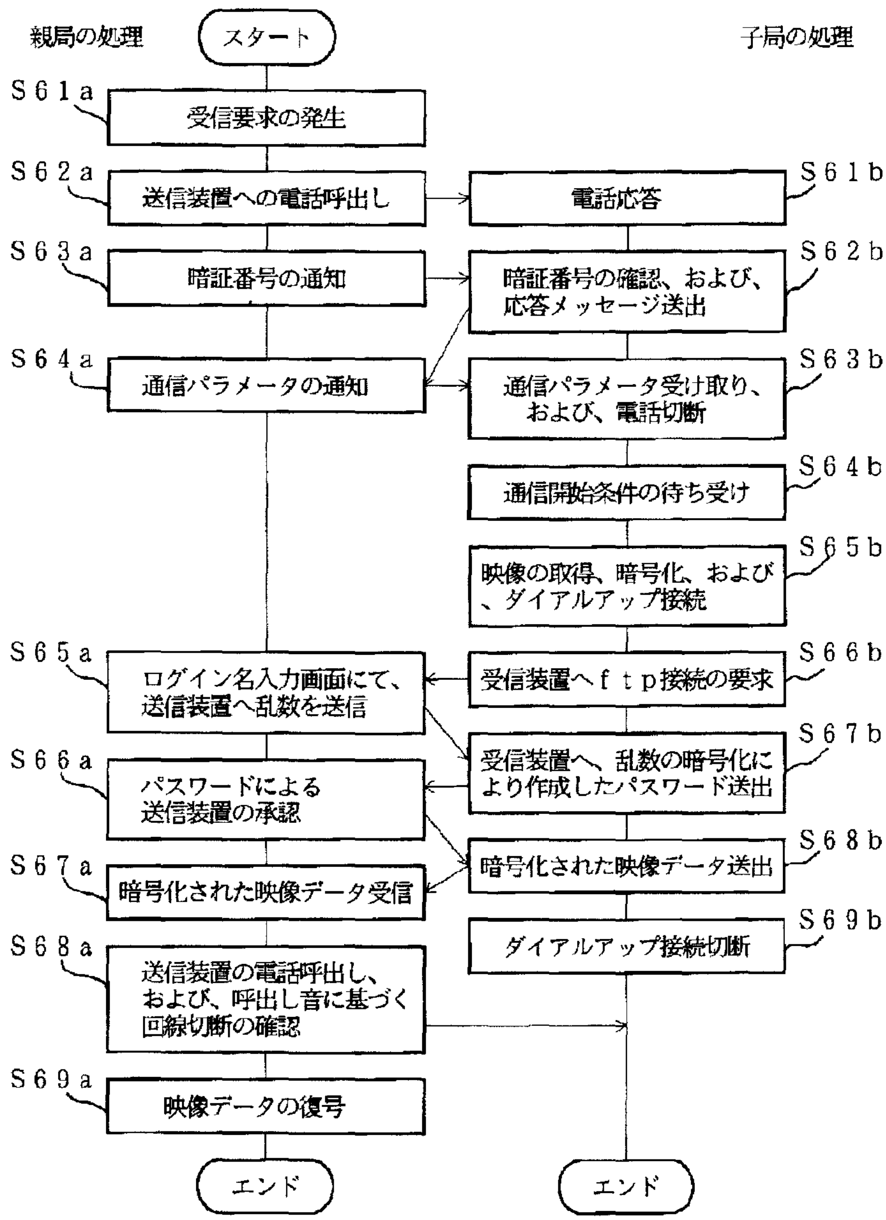
【図１０】


５２ａ
ＤＳＵを介してＩＳＤＮ回線へ
ＲＡＭ
１５
ＣＰＵ
１４
Ｓ／Ｔ点Ｉ／Ｆ
１８
１７
状態表示液晶パネル
１６
Ｆｌａｓｈメモリ
１１
インターフェース部
１２
コンピュータへ

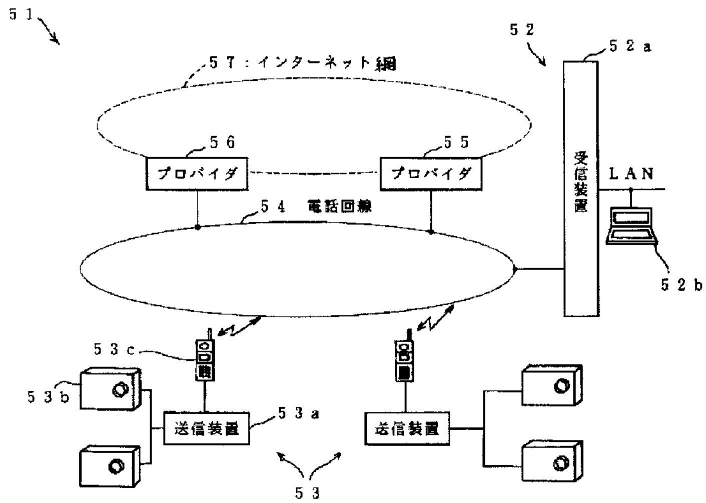
【図8】


通信機器４２の処理
通信機器４３の処理
スタート
S41a
通信機器４３の電話呼出し
S42a
通信機器４２のパスワード、、および公開鍵送出
S43a
相手メッセージ受信
S44a
電話切断
S45a
ダイアルアップ接続
S46a
ネットワーク会議ソフト起動
S47a
ネットワーク会議ソフトで通信内容を暗号化して通信
S48a
ダイアルアップ接続切断
エンド
S41b
受信ウエイト、オン
S42b
電話応答
S43b
相手の確認
NO
YES
S44b
電話器接続
S45b
接続可のメッセージ、および通信機器４３の公開鍵送出
S46b
電話切断
S47b
ダイアルアップ接続
S48b
ネットワーク会議ソフト起動
S49b
ネットワーク会議ソフトで通信内容を暗号化して通信
S50b
ダイアルアップ接続切断

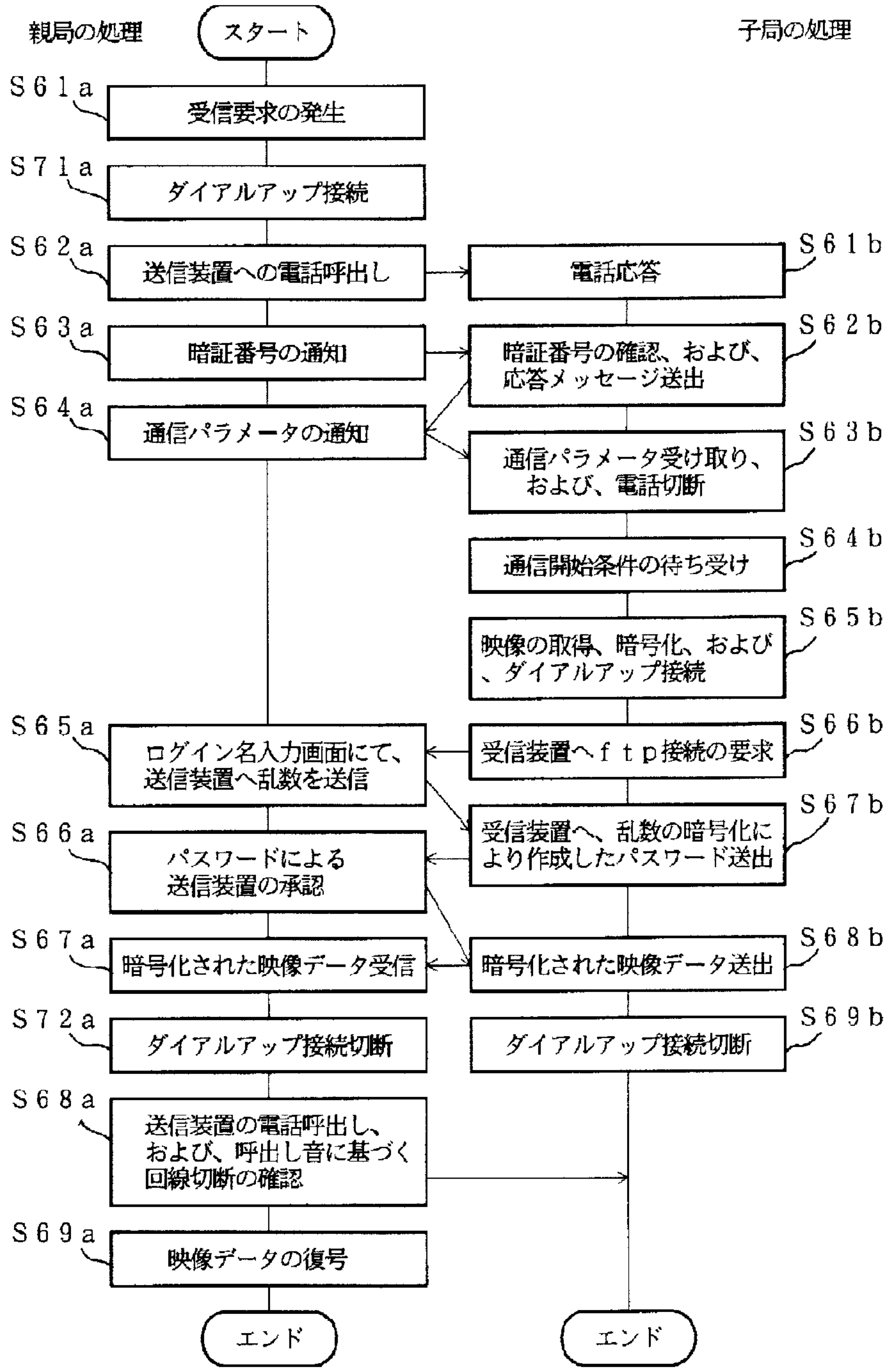
【図11】


親局の処理
スタート
子局の処理
S61a
受信要求の発生
S62a
送信装置への電話呼出し
S61b
電話応答
S63a
暗証番号の通知
S62b
暗証番号の確認、および、応答メッセージ送出
S64a
通信パラメータの通知
S63b
通信パラメータ受け取り、および、電話切断
S64b
通信開始条件の待ち受け
S65b
映像の取得、暗号化、および、ダイアルアップ接続
S65a
ログイン名入力画面にて、送信装置へ乱数を送信
S66b
受信装置へftp接続の要求
S67b
受信装置へ、乱数の暗号化により作成したパスワード送出
S66a
パスワードによる送信装置の承認
S68b
暗号化された映像データ送出
S67a
暗号化された映像データ受信
S69b
ダイアルアップ接続切断
S68a
送信装置の電話呼出し、および、呼出し音に基づく回線切断の確認
S69a
映像データの復号
エンド
エンド

【図１２】


５１
５２
５２ａ
５７：インターネット網
５６
プロバイダ
５５
プロバイダ
受信装置
ＬＡＮ
５４　電話回線
５２ｂ
５３ｃ
５３ｂ
送信装置
５３ａ
送信装置
５３

【図１３】


親局の処理
スタート
子局の処理
S６１a
受信要求の発生
S７１a
ダイアルアップ接続
S６２a
送信装置への電話呼出し
S６１b
電話応答
S６３a
暗証番号の通知
S６２b
暗証番号の確認、および、応答メッセージ送出
S６４a
通信パラメータの通知
S６３b
通信パラメータ受け取り、および、電話切断
S６４b
通信開始条件の待ち受け
S６５b
映像の取得、暗号化、および、ダイアルアップ接続
S６５a
ログイン名入力画面にて、送信装置へ乱数を送信
S６６b
受信装置へｆｔｐ接続の要求
S６７b
受信装置へ、乱数の暗号化により作成したパスワード送出
S６６a
パスワードによる送信装置の承認
S６７a
暗号化された映像データ受信
S６８b
暗号化された映像データ送出
S７２a
ダイアルアップ接続切断
S６９b
ダイアルアップ接続切断
S６８a
送信装置の電話呼出し、および、呼出し音に基づく回線切断の確認
S６９a
映像データの復号
エンド
エンド

フロントページの続き

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	3/42			11/20	101B
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(54)[TITLE OF THE INVENTION]

INTERACTIVE GRAPHICS DELIVERY SYSTEM

(57)[ABSTRACT]

[Problem to be solved]

To provide a system for delivering interactive graphics, which can deliver a real circumstance on an arbitrary position through an image in real time to a user.

[Solution]

The present system includes an image input means that is provided at each spot in order to input interactive graphics on many spots that can be disclosed to a public; an image transmission means for transmitting each interactive graphics to be inputted from these respective image input means with a wire or without a wire; an interactive spot data base for recording an identification data in order to identify respective spots each other while relating them to a predetermined key; a key input means for inputting the predetermined key; a retrieving means for retrieving the identification data of an interactive graphics at the corresponding spot from the interactive spot data base on the basis of the key inputted from this key input means; an image receiving means for receiving the corresponding interactive graphics from each image transmission means on the basis of the identification data retrieved by this retrieving means; and a display means for outputting this received interactive graphics.

[Claim(s)]

[Claim 1]

An interactive graphics delivery system, comprising:

an image input means that is provided at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively;

a map database means for recording respective spots on a map and interactive graphics identification data in order to identify the respective interactive graphics from each other while relating them with each other;

an image importing means for importing the corresponding interactive graphics from the image input means on line on the basis of the interactive graphics identification data corresponding to a certain spot on the map that is displayed by the map database means; and

a display means for displaying the interactive graphics that is imported by this image importing means in real time.

[Claim 2]

An interactive graphics delivery system, comprising:

an image input means that is provided at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively;

a map database means for recording respective spots on a map and interactive graphics identification data in order to identify the respective interactive graphics from each other while relating them with each other;

a map data extracting means for extracting map data in order to indicate a map of a predetermined area including a live spot of the corresponding interactive graphics from the map database means, when a certain interactive graphics is displayed, using interactive graphics identification data for identifying that interactive graphics as a key; and

a display means for displaying a map on the basis of the map data that is extracted by this map data extracting means.

[Claim 3]

An interactive graphics delivery system, comprising:

an image input means that is provided at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively;

an interactive graphics identification database means for recording interactive graphics identification data in order to identify the respective interactive graphics from each other while relating them to retrieving data composed of a character string, a symbol string, a figure, or an image or the like;

a retrieving data input means for inputting the retrieving data composed of the character string, the symbol string, the figure, or the image or the like;

an interactive graphics identification data selecting means for selecting one or plural interactive graphics identification data that are related with each other from the interactive graphics identification database means on the basis of the retrieving data inputted from this retrieving data input means;

an image importing means for importing the corresponding interactive graphics from the image input means on line on the basis of this selected interactive graphics identification data; and

a display means for displaying the interactive graphics that is imported by this image importing means.

[Claim 4]

The interactive graphics delivery system according to Claims 1, 2, or 3,

wherein the image input means picks up images that are seen from the respective live spots toward plural directions, respectively; and

the interactive graphics identification data in order to identify the respective interactive graphics from each other is composed of position data for indicating a position of each live spot where the image input means is installed and directional data for showing a direction in which that image input means shots an image.

[Claim 5]

An interactive graphics delivery system, comprising:

an image input means that is provided at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively;

an interactive graphics identification data recording means for recording interactive graphics identification data in order to identify the respective interactive graphics from each other;

a present position specifying means for specifying a present position of a user;

an interactive graphics identification data selecting means for selecting the interactive graphics identification data in order to specify the interactive graphics on one or plural live spots that are near the present position of the user;

an image importing means for importing the corresponding interactive graphics on the basis of this selected interactive graphics identification data; and a display means for displaying the interactive graphics that is imported by this image importing means in real time.

[Claim 6]

The interactive graphics delivery system according to Claim 5,

wherein the image input means picks up images that are seen from the respective live spots toward plural directions, respectively; and

the interactive graphics identification data in order to identify the respective interactive graphics from each other is composed of position data for indicating a position of each live spot where the image input means is installed and directional data for showing a direction in which that image input means shots an image;

the present position specifying means includes a means for specifying the present position of the user and a means for specifying a progress direction of the user; and

the interactive graphics identification data selecting means selects the interactive graphics identification data that is composed of the position data showing a position of a live spot, which is located in a direction of the progressing side of the user from the present position of the user and is near the present position of the user, and the directional data showing the progressing side of the user on the basis of the present position of the user and the progress direction of the user that are specified by the present position specifying means.

[Claim 7]

The interactive graphics delivery system according to any one of Claims 1 to 6, further comprising:

a marking means for marking a portion that is designated by a user in the interactive graphics displayed by the display means in order to distinguish the portion from other portions.

[Claim 8]

The interactive graphics delivery system according to any one of Claims 1 to 7, further comprising:

a voice input means that is disposed in the vicinity of the image input means, for inputting a voice generated on a live spot where the image input means is disposed or on its periphery in real time; and

a voice output means that is disposed in the vicinity of the display means, for outputting a voice from the voice input means.

[Claim 9]

The interactive graphics delivery system according to any one of Claims 1 to 8, further comprising:

an aroma input means that is disposed in the vicinity of the image input means and is composed of an aroma sensor and a means for converting a signal from this aroma sensor into digital data of an aroma, for inputting an aroma on a live spot where the image input means is disposed or on its periphery;

a converting means for converting the aroma data from the aroma input means into fragrance blending data for generating an aroma similar to that aroma; and

an aroma generating means that is disposed in the vicinity of the display means, for generating a desired aroma by blending the fragrance from the fragrance blending data.

[0001]

[Detailed Description of the Invention]

[Technical Field to which the Invention Belongs]

The present invention relates to a delivering interactive graphics system, which can deliver a real circumstance in real time of each spot while relating the interactive graphics to a map or the like. In addition, the present invention relates to a system for displaying a map including a spot of the interactive graphics from the interactive graphics.

[0002]

[Prior Art]

Conventionally, there has been a system for recording images at respective spots in a recording medium such as a CD-ROM or a hard disk, retrieving them on the basis of retrieving data such as a predetermined key word, and then, displaying them.

[0003]

[Problems that the Invention is to Solve]

However, these images recorded in the recording medium are "past images" (they are not "fresh images"). Therefore, this involves a problem such that a user only can see "old (not fresh)" images although a real scene is changing day by day depending on season's transition, a weather of a day, and a condition of a construction work of a road and a building. In addition, assuming that the images recorded in the recording medium are just updated, these images do not respond to a user's wish that the user wishes to see a real condition of the present moment. Further, there is a problem such that it is very expensive to frequently update the image data with respect to the recording medium.

[0004]

The present invention has been made taking the foregoing problems into consideration and an object of which is to provide a delivering interactive graphics system, which can deliver a real circumstance on an arbitrary position through an image in real time to a user. In addition, according to the present invention, another object of the present invention is also to provide a system for displaying a map including a spot of the interactive graphics from the interactive graphics.

[0005]

[Means for Solving the Problems]

(Related Art)

As a related art that is identified by the present inventor, the followings are considered. They are identified by the present inventor when the present application (the application after an internal priority date under Patent Law Section 41) has been filed although it is not clear if they are "the prior arts" of the present invention (if it is publicly-known before a priority date (June 11, 1996)).

(a) According to "Weekly Diamond, additional volume 1996. 8 Internet Super Time Management" issued by Diamond Corporation, the following description is given, namely, "In Internet, there are many cases that a TV camera is fixed and simultaneous reporting of a sight spot is provided. In the future, you will be able to see a real image of world's heritage such as Sphinx and a hill overlooking Himaraya and a sight spot such as the Arc de Triomphe in Paris" (in this document, P.76).

"How about putting a camera on a lobby or an entrance of a hotel, making the camera on-line, and seeing the hotel via a remote controller? A person will see that the hotel is crowded or happen to see his or her acquaintance there on the web. Such on-line camera is increasing on the web." (in this document, P. 82)

As an introduction of a website of Internet, "A History Street http://www.kiis.or/rekishi/ Keiko Hata, You can take a walk in Ise, Asuka, Nara, Kyoto, Osaka, and Kobe that are main scene spots of a history street according to captures and photos (not less than 100) (snip) You can access each item by means of retrieving by area and by age and selection via a mouse (a clickable map) on the map. At present, the information is given only through the captures and the photos, however, (in the future) we are offering you a moving image and voice information" (in the document, P. 133).

(b) According to an article entitled as "Completely use a magic box and overturn a view of a world" in Nippon Keizai News Paper dated on June 16, 1996, the following is given in the article for introducing Mr. Masaki Fujihata, a computer artist. Namely, "Recently, he is immersed in a project using Internet together with students at Keio University where he is teaching. For example, he is trying to deliver an image of Mt. Fuji at 24 hours real time through a camera put in Shonan Fujisawa Campus. Worldwide access users can change a direction of the camera through their PC at home and can zoom in".

(c) According to "Weekly Diamond" issued on August 31, 1996 by Diamond Corporation, on P. 84, the following is given in the article entitled "Diary of Super Filling, Virtual Tour of Map and Photo (written by Yukio Noguchi). Namely, "there is 'a virtual tour' in Internet. If you click a map appearing on a screen, the photo at this point will appear".

(d) In an advertisement column of Nippon Keizai News Paper dated on September 3, 1996, there is a description entitled "Map Information System with a high operability Sumitomo Denko Systems", and it says, "A digital road map exclusively for Windows 95, 'AtlaMate/Windows 95 edition', which has been developed and sold by Sumitomo Denko Systems (snip). This product allows a still image, a moving image, and a voice to be given on a map as a multimedia function."

In addition, in the specification of "AtlaMate/Windows 95 edition" in this advertisement article, the following description is given. "Abundant Registration Function, It can register a still image such as a photo, a moving image such as a video, and a voice or the like on a map"

(e) According to an article entitled as "Completely Use Internet, Feel nature at home" in Nippon Keizai News Paper dated on September 30, 1996, the following is given. Namely, "in cooperation with NEC, Sakawa-machi in Kochi Prefecture opened 'Sakawa Internet Broadcasting Station' which allows a user to enjoy a natural scenery through Internet by a live broadcast. Setting a camera on a top of Mt. Kokuzo at this town (675 meters above sea level) and freely moving a camera from a PC at home or at office, the user can enjoy a scenery from Cape Asizuri to Cape Muroto. This broadcasting center was opened at Sakawa Jibasangyo center. Transmitting an image from a camera without a wire to a camera control apparatus of Nagano Chominkan, which is a facility established by a town and is located at a base separated from the camera about 3 km, a still image is delivered on Internet. Freely remotely controlling the camera from a PC, the user can enjoy a panorama about 300 degrees in a horizontal direction and about 60 degrees in a vertical direction in a zoom of the maximum 10 times. An address of the Internet broadcasting center is http://www/meshnet.or.jp/sakawa/. NEC expands the Internet broadcasting center nationwide from May. NEC will open the Internet broadcasting center on Matsumae-cho, Bibae-cho, and Saroma-cho of Hokkaido and they are setting cameras on scene spots and beauty spots more than 100 within 2 to 3 years".

As described above, there are various arts relating to the present invention. However, although any of them relates to the present invention, the present invention further develops these related arts and these related arts do not deny novelty of the present invention.

[0006]

In order to solve the problems of the above-mentioned conventional arts, a delivering interactive graphics system according to the present invention is as follows:

(1) The delivering interactive graphics system according to the present invention comprises an image input means that is provided at each live spot, for inputting interactive graphics on many live spots that can be disclosed to a public in real time, respectively; an interactive graphics identification database means for recording the interactive graphics identification data in order to identify the respective interactive graphics of the respective live spots from each other while relating and matching them to each point on the map of the map database, respectively; a retrieving means for retrieving the corresponding one or plural interactive graphics identification data from the interactive graphics identification database means on the basis of the spot that is designated on the map of the map database; an image importing means for importing the corresponding interactive graphics in real time with a wire or without a wire on the basis of the interactive graphics identification data that is retrieved by this retrieving means (for importing the corresponding interactive graphics according to a method for transmitting it through a network or accessing it by a browsing software for Internet and browsing it or the like); and a display means for outputting an interactive graphics that is imported by this image importing means (a moving image or a still image).

(2) In addition, the present invention may comprise an image input means that is provided

at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively; an interactive graphics identification database means for recording a map database for recording a map and coordinate data for specifying respective spots on the map, the coordinate data in the map database, and the interactive graphics identification data for identifying the respective interactive graphics while relating and matching them each other; a retrieving means for retrieving one or plural spots on the map corresponding to or relating to the live spot of the interactive graphics from the interactive graphics identification database, when a certain interactive graphics is displayed, using interactive graphics identification data for identifying that interactive graphics as a key; a map data extracting means for extracting map data in order to indicate a map of a predetermined area including the spot on the map that is retrieved by this retrieving means; and a display means for outputting a map by means of map data that is extracted by this map data extracting means.

(3) Further, the delivering interactive graphics system according to the present invention comprises an image input means that is provided at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively; an interactive graphics identification database means for recording interactive graphics identification data in order to identify the respective interactive graphics from each other while relating them with a key composed of a character string, a symbol string, a figure, or an image or the like; a key input means for inputting the key composed of the character string, the symbol string, the figure, or the image or the like; a retrieving means for retrieving the corresponding one or plural interactive graphics identification data from the interactive graphics identification database means on the basis of the key that is inputted from this key input means; an image importing means for importing the corresponding interactive graphics on the basis of the interactive graphics identification data that is retrieved by this retrieving means (including the case of browsing it by a browser for Internet when it is transmitted by a network); and a display means for outputting an interactive graphics (a moving image or a still image) that is imported by this image importing means.

(4) In addition, according to the present invention, the image input means may pick up images in plural directions from one live spot (for example, the case of picking up an image when one camera is pivoted to be located in certain plural directions or the case of

picking up an image at the same time providing plural video cameras in plural directions, respectively), and it is preferable that the interactive graphics identification data for specifying the respective interactive graphics is composed of the position data showing the positions of respective live spots where the image input means is disposed and the directional data showing the direction in which the image input means shots the image.

(5) In addition, the present invention comprises an image input means that is provided at each live spot in order to constantly input interactive graphics on many live spots that can be disclosed to a public in real time, respectively; an interactive graphics identification data recording means for recording interactive graphics identification data (composed of the coordinate data of the latitude data and the longitude data or the like) in order to identify the respective interactive graphics from each other; a present position specifying means (a conventional publicly-known GPS receiver and the like) for specifying a present position of a user; an interactive graphics identification data selecting means for selecting one or plural interactive graphics identification data corresponding or relating to one or plural live spots that are near the present position of the user on the basis of the present position of the user (composed of the coordinate data of the latitude data and the longitude data or the like) that is specified by this present position specifying means; an image importing means (including the case of accessing it and browsing it through a network and the case of transmitting it or the like) for importing the corresponding interactive graphics on line on the basis of this selected interactive graphics identification data; and a display means for displaying an interactive graphics (a moving image or a still image) that is imported by this image importing means in real time.

(6) In addition, according to the present invention, the image input means picks up images that are seen from the respective live spots toward plural directions, respectively, as same as the above-described (4); the interactive graphics identification data in order to identify the respective interactive graphics from each other is composed of position data for indicating a position of each live spot where the image input means is installed and directional data for showing a direction in which that image input means shots an image; the present position specifying means includes a means for specifying the present position of the user and a means for specifying a progress direction of the user; and the interactive graphics identification data selecting means selects the interactive graphics spot identification data in order to specify the interactive graphics (a moving image or a still

image), which is located in a direction of the progressing side of the user from the present position of the user and is near the present position of the user, and copies a direction near the progress direction of the user on the basis of the data showing the present position of the user that is specified by the present position specifying means (the position coordinate data composed of the latitude data and the longitude data or the like) and the data showing the progress direction of the user that are specified by the present position specifying means.

(7) In addition, according to the present invention, it is preferable that a marking means for marking a portion that is designated by a user in the interactive graphics (a moving image or a still image) displayed by the display means in order to distinguish this portion from other portions.

(8) In addition, according to the present invention, it is preferable that the image input means may also comprise a means for inputting a voice that is generated on that spot in real time.

(9) In addition, the present invention may further comprise an aroma input means that is provided in the vicinity of the image input means and is configured by an aroma sensor and a means for converting a signal from this aroma sensor into aroma digital data, for inputting an aroma on the spot where the image input means is disposed or an aroma around the spot; a converting means for converting the aroma data from this aroma input means into fragrance blending data for generating an aroma similar to that aroma; and an aroma generating means that is disposed in the vicinity of the display means, for generating a desired aroma by the fragrance blending data. Further, in this (9), the above-described "converting means for converting the aroma data into the fragrance blending data for generating an aroma similar to that aroma" is directly connected to the aroma input means. This converting means may be connected to the aroma generating means via the computer communication network or may be directly connected to the aroma generating means via the input means and the computer communication network .[0007]

[Mode for Carrying Out the Invention]

First Embodiment:

Next, with reference to Figs. 1 to 4, the first embodiment according to the present invention will be described. In Fig. 1, a reference numeral 1 denotes a personal computer (PC) used by a user and the personal computer 1 is configured by a control apparatus 2 made of a CPU and a communication modem or the like; a hard disk apparatus 3 in which a computer program and data are recorded, a CD-ROM drive 5 for driving a CD-ROM 4 in which the computer program and the data are recorded; a key board 6 and a mouse 6a for inputting the data; a display 7 for outputting an image; and a speaker 8 for outputting a voice.

[0008]

The control apparatus 2 is connected to a computer for a relay service 11 via a public circuit for a computer communication network 10 such as Internet. To this computer for a relay service 11, computers (servers) 14, 14a, and 14b are connected, which serve to control video cameras 12, 12a, and 12b and sound collecting microphones 13, 13a, and 13b, which are disposed on many live spots respectively, for recording the data from these video cameras 12 and sound collecting microphones 13, and allowing the user to browse the data via a communication network. The image data and the voice data inputted by these many video cameras 12 and microphones 13 or the like can be transmitted to the user via the computers 14 and the computer for a relay service 11 according to need from the user. Further, four video cameras 12 are installed on respective live spots, respectively, and these four video cameras are preferably installed so as to shoot the images in four directions including east, west, south, and north, respectively.

[0009]

In addition, the computer for a relay service 11 is also connected to many other computers for a relay service 12. For example, the user connected to a certain computer for a relay service 11 can import the inputted data from other computer for a relay service 12 or the like via this computer for a relay service 11 and from the video camera and the microphone via the computer (the server) connected to the computer 11. In this case, as a method for importing an image and a voice, various methods are available such as a method for adding the information from the video camera and the microphone to an electronic mail and a method for importing a website by a browser software for Internet by the user, which website is opened on a computer communication network so as to deliver the input information of the video camera and the microphone (namely, a method for using a website on a computer communication network like a hard disk of a personal computer at the user side) or the like.

[0010]

According to this first embodiment, in the CD-ROM 4, a map database for recording the map data and the address data for specifying each spot on this map relating them with each other; an interactive graphics database for recording this address data with the image identification data for identifying the interactive graphics of respective live spots (respective places where the video camera 12 and the microphone 13 are installed) relating and corresponding them with each other; a reproduction program for reproducing these map databases; a retrieving program for retrieving the interactive graphics database; and a program for importing the interactive graphics corresponding to the retrieved interactive graphics identification data from this retrieved interactive graphics identification data and displaying it are recorded.

[0011]

It is assumed that a user who lives in Osaka now wishes to see a sunset in the coastline of Shonan beach, in Kanagawa Prefecture that is his or her home town, in summer. In this case, for example, it is assumed that the user reproduces the map database to display the map of a predetermined area including Shonan beach on a screen and then, the user clicks the spot of Shonan beach on this screen by means of the mouse 6a. Then, on the basis of this input, the control apparatus 2 will retrieve the address data corresponding to the spot on this map from the spot database. After that, on the basis of this retrieved address data, the control apparatus 2 will retrieve the interactive graphics identification data indicating the interactive graphics of the corresponding live spot from the interactive graphics database. Then, on the basis of this retrieved interactive graphics identification data, accessing the computer for a relay service 11 and importing the image data and the voice data from the video camera and the microphone installed on the live spot corresponding to the interactive graphics identification data (the video camera and the microphone installed in a direction corresponding to an image pickup direction when the interactive graphics identification data also specifies the image pickup direction) on line, they are outputted from the display 7 and the speaker 8 in real time. The image and the voice to be outputted in this case are the image and the voice in real time of the present time, so that the user can get feeling and impression as if the user is actually present at this spot. Conventionally, for example, there has been a CD-ROM capable of recording the image of a beach, for example, Shonan beach, retrieving it from a key word and outputting it, and the images recorded in these CD-ROM are shot by a professional cameraman on the best time (for example, a time when a sunset is most beautiful) from the best angle. On the contrary, the image given in this embodiment may be shot on a rainy day or a cloudy day or on a time when you cannot see the best scenery. However, since this image is "the image at this moment and at this instance (namely, the image that is never seen), the user can feel "realistic sensation" and "impression". In other words, when the user "wishes to see a sunset of Shonan beach now", unless he or she can see not the past recorded image of "sunset on Shonan beach" but the image of "sunset on Shonan beach at this moment", the user cannot get a strong impression. This embodiment can meet this user's wish.

[0012]

Further, the constitution of the embodiment that has been explained with reference to Fig. 1 will be explained again with reference to Fig. 2. Fig. 2 illustrates the constitution of the embodiment functionally and conceptually. In Fig. 2, a reference numeral 32 denotes an interactive graphics input unit constituted of a video camera and a microphone for inputting an interactive graphics and a voice of each spot in real time, which is connected to a computer communication network (a computer communication network) 30. A reference numeral 24 denotes a CD-ROM, in which the map database 26, its reproduction program and its retrieving program; the interactive graphics identification database 25 and its retrieving program; and a program for importing the corresponding interactive graphics from the interactive graphics identification data via the communication network or the like are recorded. In addition, in Fig. 2, a reference numeral 21 denotes a map database reproducing unit for reproducing the map database 26 which is recorded in the CD-ROM 24; and a reference numeral 22 denotes a control unit for controlling a display unit 27 and a speaker 28 upon receipt of a signal from this map database reproducing unit 21 and outputting predetermined image and voice. In addition, a reference numeral 23 denotes a retrieving unit for retrieving the identification data of the corresponding interactive graphics from the interactive graphics identification database 25 on the basis of the address data on the spot which is designated by the user (click it by a mouse) on the screen on which the map database is reproduced. Controlling an image importing unit (for example, an apparatus for recording a browser which is a software for viewing a website of Internet and executing it) 26 and accessing an image input unit 32 via a communication circuit for a computer communication network 30, the control unit 22 may import the interactive graphics and the voice from the image input unit 32 in real time on line. The control unit 22 may output these interactive graphics and voice that are imported on line by means of the display unit 27 and the speaker 28 in real time while relating them with the reproduced image (the map image) from the map database 26.

[0013]

Next, a screen to be displayed by the display 7 being controlled by the control apparatus 2 shown in Fig. 1 will be described with reference to Fig. 3 and Fig. 4. As shown in Fig. 3, on an upper half part 7a of the display 7, the interactive graphics is displayed and on a lower half part 7b thereof, the map is displayed. When using this first embodiment, at first, driving the CD-ROM 4 shown in Fig. 1, the user may display a desired map on the lower half part 7b of the display 7 from the map database. For example, by retrieving the map data from a key word such as a name of a place, the map in the map database recorded in the CD-ROM 4 may be displayed (such an art has been publicly known). Then, according to the present embodiment, for example, as shown in a, b, c, d, e, f, and g of Fig. 4, points showing each spot are colored in a predetermined color (for example, red) to be displayed on this displayed map. Among respective points of a, b, c, d, e, f, and g of Fig. 4, a, b, c and e of Fig. 4 are corresponding to the video camera 12 and the microphone 13 in Fig. 1. In other words, according to the first embodiment, the video camera 12 in Fig. 1 is configured by four video cameras that are installed on the positions of a, b, c, and d so as to pick up images in different directions, respectively. In addition, the microphone 13 in Fig. 1 is configured by four microphones that are installed so as to collect sounds in different directions, respectively. In other words, explaining the video camera 12, among four video cameras configuring the video camera 12, the video camera installed on the position a in Fig. 4 picks up an image in West (a left direction) in the figure so as to generate an interactive graphics having the image identification data of "1428A". In addition, the video camera installed on the position b in Fig. 4 picks up an image in South (a lower direction) in the figure so as to generate an interactive graphics having the image identification data of "1428B". In addition, the video camera installed on the position c in Fig. 4 picks up an image in East (a right direction) in the figure so as to generate an interactive graphics having the image identification data of "1428C". In addition, the video camera installed on the position d in Fig. 4 picks up an image in North (an upper direction) in the figure so as to generate an interactive graphics having the image identification data of "1428D". In addition, among respective points represented by a, b, c, d, e, f, and g of Fig. 4, e, f, and g of Fig. 4 are corresponding to the video camera 12a and the microphone 13a in Fig. 1. In other words, according to the first embodiment, the video camera 12a in Fig. 1 is configured by three video cameras that are installed on the positions of e, f, and g in Fig. 4 so as to pick up images in different directions, respectively. In addition, the microphone 13a in Fig. 1 is configured by three microphones that are installed so as to collect sounds in different directions, respectively. In other words, with respect to the video camera 12a, among three video cameras configuring the video camera 12a, the video camera installed on the position e in Fig. 4 picks up an image in North-West (a left upper direction) in the figure so as to generate an interactive graphics having the image identification data of "1429A". In addition, the video camera installed on the position f in Fig. 4 picks up an image in East-South (a right lower direction) in the figure so as to generate an interactive graphics having the image identification data of "1429B". In addition, the video camera installed on the position g in Fig. 4 picks up an image in East (a right direction) in the figure so as to generate an interactive graphics having the image identification data of "1429C". As described above, according to the embodiment to be explained with reference to Fig. 4, a combination of the address data for identifying each spot on the map ("1428" and "1429" or the like) and the data ("A" "B" "C" "D" or the like) showing the image pickup direction of each video camera on the same live spot and the interactive graphics identification data for identifying the interactive graphics on each spot ("1428A" and "1429A" or the like) are recorded while relating them with each other. More specifically, according to the example shown in Fig. 4, four interactive graphics identification data indicating four pickup image directions, namely, "1428A", "1428B", "1428C" and "1428D", respectively, are recorded corresponding to one address data "1428" on the map (the address data for identifying the area of a center cross point in Fig. 4). In addition, three interactive graphics identification data indicating three pickup image directions, namely, "1429A", "1429B", and "1429C", respectively, are recorded corresponding to one address data "1429" on the map (the address data for identifying the area of a left point in Fig. 4). Further, according to the example shown in Fig. 4, the interactive graphics identification data (for example, “1428A”) is configured by a combination of the address data (for example, “1428”) on the map and the directional data (for example, “A”), however, according to the present invention, it is not always necessary to use the address data on the map in the interactive graphics identification data as it is. For example, making the address data on the map into the address data (or the coordinate data) configured by equally spacing the entire map, the interactive graphics identification data may be configured by a combination of the identification code (for example, a serial number of the order of setting of the video camera) on a certain spot where the video camera is installed in practice and the directional data.

[0014]

According to the example shown in Fig. 4, the identification data of the interactive graphics that is obtained when each video camera 12 and each microphone 13 input an image and a voice, respectively (here, a term of “an interactive graphics” is used as a meaning including both of the image data inputted by the video camera and the voice data inputted by the microphone in principle) is configured by the data indicating the spot and a direction in which the video camera 12 is shooting an image (this direction is identical with a direction in which the microphone 13 tries to collect a sound). In other words, the interactive graphics are identified by each spot and its image pickup direction each other and “the interactive graphics identification data” is configured by the data indicating each spot and the data indicating a direction of image pickup and sound collection. Therefore, even on the same spot, if the direction of shooting an image (a direction such as East, West, South, and North or the like) is different, it becomes a different interactive graphics having different identification data. Explaining this with reference to Fig. 4, a spot having the address data (1428A) represented by “a” in Fig. 4 corresponds to the interactive graphics having the image identification data, namely, (1428A), and the interactive graphics indicating this identification data, namely, (1428A) is an image made by shooting the scenery in an A direction (a left direction in the figure) from the spot of “a” in Fig. 4. In addition, the spot on the map having the address data (1428B) represented by “b” in Fig. 4 corresponds to the interactive graphics having the identification data, namely, (1428B), and the interactive graphics indicating this identification data named as (1428B) is an image made by shooting the scenery in a B direction (a lower direction in the figure) from the spot of “b” in Fig. 3. In addition, the spot on the map having the address data (1428C) represented by “c” in Fig. 4 corresponds to the interactive graphics having the identification data, namely, (1428C), and the interactive graphics indicating this identification data named as (1428C) is an image made by shooting the scenery in a C direction (a right direction in the figure) from the spot of “c” in Fig. 4. In addition, a spot represented by “d” in Fig. 4 having the address data named as (1428D) corresponds to the interactive graphics having the identification data named as (1428D) one-on-one, and the interactive graphics indicating this identification data named as (1428D) is an image made by shooting the scenery in a D direction (an upper direction in the figure) from the spot of “d” in Fig. 4. Further, in Fig. 4, the spot represented by “e” having the address data (1429A) corresponds to the interactive graphics having the identification data, and the interactive graphics indicating this identification data named as (1429A) is an image made by shooting the scenery in an A direction (a left upper direction in the figure) from the spot of “e” in Fig. 4. In addition, in Fig. 4, the spot represented by “f” having the address data (1429B) corresponds to the interactive graphics having the identification data, and the interactive graphics indicating this identification data named as (1429B) is an image made by shooting the scenery in a B direction (a right lower direction in the figure) from the spot of “f” in Fig. 4. In addition, in Fig. 4, the spot represented by “g” having the address data (1429C) corresponds to the interactive graphics having the identification data, and the interactive graphics indicating this identification data named as (1429C) is an image made by shooting the scenery in a C direction (a right direction in the figure) from the spot of “g” in Fig. 4.

[0015]

As seen from the above description, according to the example shown in Fig. 4, a reference numeral 1428 denotes the address data on the map indicating the area of this cross point (in this example shown in Fig. 4, the area of this cross point is referred to as “a live spot”), and A, B, C, an D indicate a direction of shooting an image (and collecting a sound) from the cross point area (the live spot). Likewise, according to the example in Fig. 4, a reference numeral 1429 denotes the address data on the map indicating the cross point area on the left on the map, and A, B, and C indicate a direction of shooting an image (and collecting sound) from the cross point area. According to the example shown in Fig. 4, the identification data of the interactive graphics is configured by a combination of the address data (“1428” and “1429” or the like) indicating a position of each live spot on the map and the data indicating the direction (A, B, C, and D or the like).

[0016]

Accordingly, if the user wishes to visit the place, for example, the area of the cross point indicated by 1428 in Fig. 4 and he or she "wishes to know the condition of this cross point now (crowded or not, what person is walking in what clothes or the like) and in order to know this, wishes to see the interactive graphics", the user may click any spot among a to d on the map shown in Fig. 4 by means of a pointing device such as a mouse. Then, the interactive graphics identification data corresponding to the address data on the map is retrieved by means of the control apparatus 2 (from the interactive graphics database), and on the basis of this retrieved interactive graphics identification data, the corresponding interactive graphics is imported via the computer communication network to be displayed on the upper half part 7a of the display 7.

[0017]

In addition, obtaining a road between the place where the user wishes to visit and the place where the user is present now on the map (this has been realized conventionally by a public-known art), the user also may indicate the interactive graphics on the spot on its route by rotation (for example, assuming that a display time of one interactive graphics to be five seconds, a next interactive graphics will be displayed by rotation for each five seconds). In addition, when the user is driving a car, obtaining the present position information on the map from the positioning information received by a GPS receiver and obtained from various sensors (this has been realized conventionally by a public-known art) and obtaining the identification data of the interactive graphics from the spot corresponding to the present position of himself or herself obtained on the map, the user also may import the corresponding interactive graphics through a server on the network on the basis of the identification data (for example, the computer for a relay service 11 shown in Fig. 1) and may display it. Thereby, the user can check if the present position on the map (the present position that is presumed by the GPS receiver or depending on the information from a sensor) is identical with the real present position or not with eyes. In other words, if the interactive graphics displayed on the display 7 is identical with the real scenery obtained when the user sees the outside from the inside of a car on the basis of the interactive graphics identification data that is obtained as described above, it can be said that there is no measurement error and the present position presumed by the GPS is correct.

However, if they are not identical, the presumed present position is not correct.

[0018]

Further, the control apparatus 2 may be connected to the computer for a relay service 11 without a wire, the computer for a relay service 11 may be connected to each video camera 12 and each microphone 13 without a wire, and “the map database”, “the interactive graphics database”, these retrieving programs, and map database reproduction programs may be imported from the server (the computer) on the network such as the computer for a relay service 11 or the like without being read from the CD-ROM 4. Particularly, as described above, in the case of using the personal computer 1 shown in Fig. 1 in a moving car (when the user himself or herself is driving a car, in the case of obtaining the present position information on the map displayed on the screen from the positioning information received by a GPS receiver and obtained from various sensors and displaying this “an interactive graphics on the live spot corresponding to the present position of the user himself or herself and in an image pickup direction corresponding to a progress direction of the user himself or herself” on the display 7 of the personal computer 1), it is necessary to transmit or receive the data between the control apparatus 2 of the personal computer 1 and the computer for a relay service without a wire.

[0019]

Second Embodiment:

Next, with reference to Fig. 1, the second embodiment according to the present invention will be described. In Fig. 1, a reference numeral 1 denotes a personal computer (PC) used by a user and the personal computer 1 is configured by a control apparatus 2 made of a CPU and a communication modem or the like; a hard disk apparatus 3 in which a computer program and data are recorded, a CD-ROM drive 5 for driving a CD-ROM 4 in which the computer program and the data are recorded; a key board 6 for inputting the data; a display 7 for outputting an image; and a speaker 8 for outputting a voice. The control apparatus 2 is connected to a computer for a relay service 11 via a public circuit 10. To this computer for a relay service 11, video cameras 12 and sound collecting microphones 13 are connected via a computer (server) 14. The image data and the voice data inputted by these many video cameras 12 and microphones 13 or the like can be transmitted to the user via the computers 14 and the computer for a relay service 11 according to need from the user. In addition, many video cameras 12 and sound collecting microphones 13 can be identified each other depending on the identification data. Accordingly, further, the interactive graphics and the voice from respective cameras 12 and respective sound collecting microphones 13 can be identified with each other. In addition, the image data and the voice data inputted from these many video cameras 12 and microphones 13 or the like can be browsed by the user via the computer for a relay service 11 on line (for example, the user can browse these data by using a browser of a software for viewing a website of Internet). In addition, the computer for a relay service 11 is also connected to many other computers for a relay service 12 or the like. For example, the user connected to the computer for a relay service can import the data, which are inputted from the video camera and the microphone connected to other computers for a relay service 12 or the like, from other computers for a relay service 12 or the like via the computer for a relay service 11.

[0020]

According to the second embodiment, in the CD-ROM 4, an interactive graphics database relating the image identification data for identifying the interactive graphics of respective spots (respective places where the video camera 12 and the microphone 13 are installed) with many key words each other; and a program for retrieving the image identification data from these key words are recorded. The key word recorded in this interactive graphics database may include various things, for example, a name of a place, a category of a place (beach, street corner, harbor town, mountain, intersection, building, restaurant, stage theater, theater, sport facility, baseball field, hot spring, and temple or the like), a category of action (sport, play, cinema, eating, and walk or the like). It is assumed that a user who lives in Osaka now wishes to see a sunset in summer, at Shonan beach, on a coastline, in Kanagawa Prefecture that is his or her home town. In this case, for example, if the user inputs key words such as "Kanagawa Prefecture, Summer, Shonan-beach, Coastline, Sunset" or the like, on the basis of these inputted key words, the control apparatus 2 will retrieve the corresponding interactive graphics identification data from among the interactive graphics identification data recorded in the CD-ROM 4. Then, on the basis of this retrieved interactive graphics identification data, accessing to the computer for a relay service 11 and importing the image data and the voice data from the video camera and the microphone that are installed on the spot corresponding to this identification data in real time, the user can output them from the display 7 and the speaker 8. The image and the voice to be outputted in this case are the image and the voice in real time of the present time, so that the user can get feeling and impression as if the user is actually present at the spot.

[0021]

In addition, in the same way, according to the second embodiment, if the user inputs key words such as "temple, Kyoto", the control apparatus 2 will retrieve a plurality of image identification data corresponding to these key words and will display them on the display 7 by rotation. In addition, for example, if the user in a long-term hospitalization wishes to visit hot springs of each spot in Kyushu, although he or she cannot visit in practice, if the user inputs key words such as "each place of Kyushu, visit hot springs", retrieving a plurality of image identification data corresponding to these key words and receiving the image corresponding to these identification data in practice, then, the control apparatus 2 will display them on the display 7 by rotation. This allows the user to be capable of getting the impression as same as when he or she visits there in practice although he or she does not visit there. Thus, it can be also said that this second embodiment is a system which can realize "a virtual travel", whereby the user can get the impression as same as when he or she visits there in practice although he or she actually does not visit there.

[0022]

Likewise, if the user wishes to try out the food at various restaurants at a harbor town in Yokohama, inputting key words of "Yokohama, a harbor town, and trying out the food at various restaurants", the control apparatus 2 will retrieve the corresponding plural image identification data on the basis of these key words and will import the data of the interactive graphics from plural respective spots corresponding the these key words (in this case, if the setting the video camera and the microphone in the restaurant is allowed to offer the image to the public, the user can know the status of the inside of the restaurant, for example, a level of congestion of customers and an atmosphere of a restaurant or the like). In addition, in the same way, if the user wishes to visit stage theaters (baseball fields) throughout Japan, inputting key words of "Japan, visiting stage theaters (baseball fields)", the control apparatus 2 will retrieve the corresponding image identification data on the basis of these key words, and then, the control apparatus 2 will output the interactive graphics corresponding to these key words in real time. In this case, if each stage theater or each baseball field accepts transmission of the content of a play (or the content of a match) only for a predetermined time, the user can watch the content of this play (or the match) as if in place of an index even only for a predetermined time.

[0023]

Third Embodiment:

Next, the third embodiment according to the present invention will be described. The third embodiment is provided with the followings in addition to the constitution of the above-described first embodiment. At first, an aroma input apparatus is provided in the vicinity of the video camera 12 and the microphone 13. This aroma input apparatus is provided with an aroma sensor and a coding unit for coding a signal from this aroma sensor into digital data. The aroma sensor is configured by the existing plural aroma sensors and all of the aroma amount detection values from respective sensors are provided to the coding unit (an encoder). The coding unit (the encoder) may code the provided aroma amount detection value. This coded aroma data (the digital data) is recorded in a recording apparatus, and then, a remote user can browse and import the data in real time via the computer communication network. Further, it is preferable that a plurality of the aroma sensors is prepared for each kind of aroma so that the information which can reproduce the original aroma of the field site faithfully can be obtained. Next, on the user side is provided a converter for converting the browsed and imported aroma data (the digital data) into fragrance blending data in order to generate the aroma which is similar to the aroma of the field site and an aroma generator, which is disposed in the vicinity of the display 7 (Fig. 1), for blending a fragrance from the fragrance blending data and generating a desired aroma. At first, the above-described "a converter for converting the browsed and imported aroma data (the digital data) into fragrance blending data for generating an aroma similar to the aroma of a field site" will be described below. The converter may convert a pattern of the detection value of each aroma sensor into a pattern of the output value of each fragrance. More specifically, with respect to each of various kinds of aromas, when the user allows the aroma sensor to detect the aroma, the value of the detection value has been searched and recorded in advance. Then, from the data recording a relation between this aroma and the detection value pattern of the aroma sensor and the data recording relation between each aroma and a (component) of fragrance, a pattern of a detection value of each aroma sensor and a pattern of an output value of plural kinds of fragrances are recorded being related with each other. The converter may convert the pattern of the output value of the (component) of the fragrance (this becomes "the fragrance blending data"). Explanation thereof in more detail is as follows. In the converter, a sensor fragrance amount conversion table in which a relation between the detection value of the aroma sensor when each aroma is detected by the aroma sensor and the output value of each fragrance when this aroma is generated by the aroma generator to be described later has been recorded in advance. Then, the converter may convert the detection value for each aroma sensor into the output value for each fragrance with reference to this sensor fragrance amount conversion table on the basis of the detection value data of the aroma sensor.

[0024]

Next, the "aroma generator for generating a desired aroma by blending a fragrance from the fragrance blending data" will be described below. Preparing plural kinds of fragrances in advance, on the basis of the "fragrance blending data" (the above-described fragrance output pattern data, namely, the data indicating how much the aroma component is generated from each fragrance), the aroma generator may generate required kinds of aroma components (the component from the fragrance) by a required amount. As a configuration of the aroma generator, a stationary type for spreading the aroma in the entire space in a certain space and an individual portable type for allowing a person who wears the aroma generator near a user's nose or in a user's nose only to sense the aroma are considered. For example, as the stationary type, the followings are considered. In other words, aligning containers in which fragrances are contained on a bottom of a box and attaching a cover which can arbitrarily adjust an area where a fragrance contacts air to each container, an air blower is installed on the rear side of the box if needed. Then, in accordance with the data of the above-described "fragrance output pattern", a degree of opening and closing of the cover of the container of each corresponding fragrance is adjusted. In addition, with respect to the portable type, the basic configuration may be the same as that of the stationary type, however, downsizing the basic configuration of the stationary type, the portable type can be attached in the vicinity of a nose of the user by a head supporter such as a headpiece type, a head set type, an eyeglass type, and a mask type or the like. Further, according to this third embodiment, the side of the personal computer 1 is provided with the above-described "converter for converting the coded aroma data which is browsed and imported into the fragrance blending data for generating the aroma similar to the aroma of the field site", however, the present invention is not limited to this. For example, the converter may be disposed on the spot where the video camera 12 and the microphone 13 on the field site are installed and the apparatus may be disposed in the computer (server) for a relay service 11 on the computer network. In addition, the art of "having data, recording, establishing a communication, and reproducing of an aroma" that has been described according o the above-described third embodiment is a prior art disclosed, for example, in Japanese Patent-Application Laid-Open No. 7-55742 or the like.

[0025]

Forth Embodiment:

Figure 5 is a block diagram showing a fourth embodiment of the present invention. In Fig. 5, a reference numeral 21 denotes a liquid crystal display (LCD). In addition, in Fig. 5, a reference numeral 22 denotes a Grobal Positioning System (GPS) receiver that has been conventionally put on the market, which measures a delay time of an electric wave from an artificial earth satellite and obtains the present position of the user depending on a distance from an orbit. This GPS receiver 22 may include a GPS receiving antenna for receiving a GPS electric wave to be transmitted from the artificial earth satellite and a position identifying unit (configured by a CPU) for identifying the present position from this GPS electric wave as latitude data and longitudinal data. The GPS antenna may receive an electric wave from the GPS satellite, for example, 1.5 GHz and may transmit the signal thereof to the position identifying unit. The position identifying unit may receive electric waves of four or more satellites which can receive the electric wave among the GPS satellites in operation, obtain the present position at a receiving point and calculate the latitude data and the longitude data on the basis of a distance between each satellite and the receiving point which is calculated from the known position of the satellite and the received electric wave. Further, the detailed constitution and the using method of the above-described GPS receiver 2 has been conventionally publicly-known (for example, refer to JP-A-5-45171, JP-A-7-30654, and JP-A-8-94735 or the like), so that the detailed description is herein omitted. In addition, in Fig. 5, a reference numeral 26 denotes a progress direction input unit for measuring the progress direction (East, West, South, and North or the like) when the user is traveling on foot, by a vehicle, and by a railroad or the like, using an earth magnetism or the like and obtaining the progress direction. According to this forth embodiment, "the present position specifying means" of the user according to the present invention is configured by the GPS receiver 22 and the progress direction input unit 26. In addition, in Fig. 5, a reference numeral 23 denotes a control unit for receiving the coordinate data (the latitude data and the longitude data) as the present position information from the GPS receiver 22 and the data in the progress direction from the progress direction input unit 26, selecting the corresponding satellite image, and displaying it on the LCD 21. This control unit is configured by a personal computer or the like.

[0026]

In addition, in Fig. 5, a reference numeral 24 denotes a server (computer) for a map database that is connected to the control unit 23 via a public circuit network for a computer communication 20 such as Internet. This server (computer) for a map database 24 may record, for example, a map of all over Japan as a data base while relating it to the position identification data such as coordinate data (the latitude data and the longitude data), a name of a place, a name of a facility, and identification data of the facility (a telephone number of the facility) or the like. This server for a map database 24 is connected to the control unit 23 via the public circuit network 20 on line. Further, it is desirable that this public circuit network 20 may include not only a wire communication network but also a wireless communication network such as a portable telephone network, a personal handy phone system (PHS) network, an automobile telephone network and an artificial earth satellite communication network or the like.

[0027]

In addition, in Fig. 5, a reference numeral 25 denotes an interactive graphics input unit that is connected to the public circuit network for a computer communication 20 such as Internet and this interactive graphics input unit 20 is configured by a plurality of digital video cameras disposed on each live spot for inputting the interactive graphics in plural directions on each live spot (the interactive graphics seen in plural directions from respective live spot), respectively, on a steady basis, and a computer for providing an interactive graphics for providing the digital image data from these digital video cameras to a plurality of users who are accessing on line via a computer communication network such as Internet. This computer for providing an interactive graphics may record the interactive graphics at respective spots as a data base as being related to the position identification data such as the coordinate data (the latitude data and the longitudinal data), a name of a place, a name of a facility, and the identification data of the facility (a telephone number of the facility or the like) and the directional data such as East, West, South, and North or the like. This computer for providing an interactive graphics is connected to the control unit 3 by the communication network 20 on line. Further, it is desired that this communication network 20 may include not only a wire communication network but also a wireless communication network such as a portable telephone network, a personal handy phone system (PHS) network, an automobile telephone network and an artificial earth satellite communication network or the like.

[0028]

The control unit 23 may access to the server for a map database 24 based on an instruction by means of an input apparatus such as the key board 26 or the mouse 27 and the like by the user and may import the data of a map on a predetermined area including a spot (a spot indicated by the input apparatus) desired by the user so as to display this data on the LCD 21. In addition, when the user indicates an arbitrary spot of the displayed map by means of the mouse 27 and directs a display of the interactive graphics of a predetermined area including this spot, the control unit 23 may access to the interactive graphics identification database 25 including the computer for providing an interactive graphics of respective live spots and may import the data of the interactive graphics of the corresponding predetermined area on line so as to display this interactive graphics on the LCD 21 in real time. In addition, when the user desires the display of the corresponding interactive graphics or the map including this live spot by inputting the name of the place, the name of the facility, and the identification data of the facility that the user desires to display, the control unit 23 may access to the interactive graphics identification database 25 or the server for a map database 24 and may import the corresponding interactive graphics and the corresponding map on line so as to display them on the LCD 21. In addition, when the user instructs to display an interactive graphics on the live spot in a direction toward a progress direction from the present point where the user himself or herself is located and located nearest and which is seen in its progress direction, the control unit 23 may receive the user's present position and the progress direction as the coordinate data (the latitude data and the longitudinal data) from the GPS receiver 22 and the progress direction input unit 26 and the directional date. Then, on the basis of this coordinate data and this directional data, the control unit 23 may access to the interactive graphics identification database 25 of the corresponding respective interactive graphics and may be provided with the corresponding interactive graphics on line so as to display it on the LCD 21. Further, in this case, as a method whereby the control unit 23 receives the corresponding interactive graphics from the image input apparatus 25, various methods may be available, for example, a method for directly accessing to each of the image input apparatuses 25 of respective places by a browsing software for a conventional Internet and a method for demanding the image input apparatus 25 to transmit the corresponding interactive graphics data as a file attached to an electronic mail and receiving the transmission or the like.

[0029]

In addition, according to this fourth embodiment, in the case that a certain interactive graphics is displayed on the LCD 21, when the user orders to make a predetermined marking only a certain portion in the displayed interactive graphics, for example, only a specific building, a specific bridge, and a specific road, so that this portion can be easily distinguished from other portions, the control unit 23 may include a means (a program) which can mark that portion so as to be highlighted from other portions. As marking in this case, various methods, for example, a method for dying the portion by a different color and coloring it, a method for hatching only this portion, and a method for displaying that portion by a solid line that is thicker than other portion or the like are available.

[0030]

Fifth Embodiment:

Next, Figure 6 is a block diagram showing a fifth embodiment of the present invention. In Fig. 6, since reference numerals 21, 22, 23, 26, and 27 are the same as those in Fig. 4, the explanations thereof are herein omitted. In Fig. 6, a reference numeral 34 denotes a CD-ROM player (a reproducer) that is connected to the control apparatus 23, and a reference numeral 35 denotes a CD-ROM to be read by the CD-ROM player 34. In the CD-ROM 35, for example, the map database having the map of the entire Japan recorded in connection with the position identification data such as coordinate data (the latitude data and the longitude data), a name of a place, a name of a facility, and facility identification data or the like is recorded. In addition, in Fig. 6, a reference numeral 31 denotes an image input apparatus that is connected to the computer communication network 30 such as Internet and the image input apparatus 31 is the same as the image input apparatus 25. The control unit 3 is capable of reading a map of a predetermined area including a position that is desired by the user and displaying it on the LCD 1 by reading the CD-ROM 15 by means of the CD-ROM player 14. In addition, the control unit 3 can import an interactive graphics in a predetermined direction that is desired by the user from a live spot that is desired by the user and can display it on the LCD 21 by accessing an image input apparatus 31 via the computer communication network 30. In addition, when the user commands to "display an interactive graphics on the live spot in a direction toward a progress direction from the present point where the user himself or herself is located and located nearest and which is shot from that spot toward a progress direction of the user himself or herself", the control unit 23 may receive the user's present position as the coordinate data (the latitude data and the longitudinal data) from the GPS receiver 22 and may receive the data in the progress direction of the user from the progress direction input unit 26. Then, on the basis of this coordinate data and the progress directional data, by accessing the image input apparatus 31, the control unit 23 may read the data of the interactive graphics at a live spot near the corresponding coordinate data and in a direction near the progress direction of the user on line so as to display this interactive graphics on the LCD 21 in real time.

[0031]

[Advantage of the Invention]

(1) According to the interactive graphics delivery system of the present invention, the user can see the status of the spot at the present time in an interactive graphics, for example, only by designating the desired spot by means of a pointing device (for example, by clicking with a mouse) while watching a map. In addition, the user can display the interactive graphics corresponding to the desired spot continuously by means of the computer without designation by the pointing device each time if the spot identification data of plural spots of which interactive graphics the user desires to display are set to be inputted in series by a computer program. Therefore, here, the user can also experience "a virtual trip" to obtain the same impression as that when the user visits there although he or she does not actually

visit there while watching the map. In addition, for example, the user can compete with others on "a hunt for treasure" game in the world of the computer communication network in the world at the same time. The content of this game is that the users across the globe are searching one treasure while watching the interactive graphics of each spot in the world from the map of the entire world. In addition, by combining the conventional GPS receiver with the invention of Claim 1, the following effects can be obtained. Namely, if the user commands to read out the map of a predetermined area including the present position from the map database on the basis of the present position obtained from the GPS receiver (the coordinate data of the latitude data and the longitude data), display it, and import the interactive graphics of that spot on line by clicking the present position (the coordinate data) indicated on that displayed map or the spot near it, it can be checked if the present position obtained from the GPS receiver is correct or not with no measurement error. In other words, if the displayed interactive graphics coincides with that seen from the present position of the user in fact, it is possible to determine that the present position from the GPS receiver is correct (conventionally, it has been difficult for the user to check if the present position obtained from the GPS receiver is correct or not by himself of herself).

(2) Further, according to the interactive graphics delivery system of the present invention, the user can display the spot on the corresponding map from the identification data of the interactive graphics while seeing the interactive graphics on a certain spot, so that the user can easily know where the place where the user can see the interactive graphics is located (the name of a place or a facility and the like).

(3) Further, according to the interactive graphics delivery system of the present invention, the user can see the interactive graphics of one or plural spots corresponding to that retrieving data in real time on that place by inputting the retrieving data composed of a character string. Particularly, it is possible to offer "a virtual travel" which allows the user to see the actual scene at this moment on remote plural positions in series in real time.

(4) According to the present invention, if the interactive graphics identification data for specifying each interactive graphics is composed of the position data indicating

the position of each live spot where the image input means is installed and the directional data indicating the direction in which that image input means shots the image, it becomes possible to offer a different interactive graphics depending on a direction in which the user sees even from the same spot. Then, it is possible to offer the interactive graphics which can reproduce a "live actual scene" in more detail and in real time.

(5) In addition, according to the present invention, obtaining the present position of the user by means of a present position specifying means such as the GPS receiver, the interactive graphics of the live spot corresponding to this obtained present position is imported to be displayed. Accordingly, the user can use the GPS receiver, for example, in the following manner. Namely, when he or she is moving by a car, obtaining the present position by means of the GPS receiver, the user can see the spot on the map corresponding to that present position on the map of a screen (the system for this has been put into practical use as a map routing and drive guiding system to a destination for a car). In addition, at the same time, the user obtains the present position information from the GPS receiver and accesses to the corresponding image input means via the communication network. Then, the user imports the interactive graphics corresponding to the present position on line and displays it on the screen. Thereby, the user checks if the present position displayed on the map (many systems for displaying the present position of the user to be measured by the GPS receiver using an arrow on the map of the screen has been already put on the market) coincides with the interactive graphics or not while watching the map having the route to the destination listed thereon. Then, if the present position displayed on the map coincides with the interactive graphics, it is possible to check if the present position obtained from the GPS receiver is correct without a measurement error. If they do not coincide with each other, the user can see that the present position obtained from the GPS receiver is wrong. Further, without depending on the invention set forth in Claim 5 described here, by combining the conventional GPS receiver with the invention set forth in Claim 1, it is also possible to obtain the same effect as Claim 5 (as described above). In other words, the user himself or herself can check if the present position obtained from the GPS receiver is correct or not if the user reads out the map of a

predetermined area including the present position from the map database on the basis of the present position obtained from the GPS receiver, display it, and by clicking the spot near the present position indicated on that displayed map, imports the interactive graphics of one or plural spots near the spot clicked by the mouse on line.

(6) In addition, according to the present invention, the image input means picks up the image seen toward plural directions from respective live spots. The live spot identification data for identifying respective live spots from each other is composed of the position data indicating the position of each live spot where the image input means is installed and the directional data indicating the direction in which that image input means shots the image. The present position specifying means includes the means for specifying the present position of the user and the means for specifying the progress direction of the user. The live spot identification data selecting means may indicate the live spot near (nearest) the present position of the user on the basis of the present position of the user that is specified by the present position specifying means (the coordinate data and the like, with latitude data and the longitude data) and the progress direction of the user (East, West, South, and North or the like) and may select the live spot identification data in a direction near (nearest) the progress direction of the user. Therefore, the user traveling by a car or the like can see the interactive graphics corresponding to the present position obtained from the GPS receiver at the same time while seeing the present position of the user himself or herself on the map displayed on the screen (the present position of the user himself or herself obtained from the GPS receiver is displayed by an arrow). Therefore, the user can check if the present position on the map measured by the GPS is actually correct or not by checking the spot on the map with the interactive graphics.

(7) In addition, according to the present invention, by providing a marking means for marking so as to distinguish the portion designated by the user in the interactive graphics displayed by the display means from other portion, only a certain portion (for example, specific building, bridge, road, river, and park or the like) in the interactive graphics (it may be a moving image or a still image), so that it is possible to process the interactive graphics into a formation that is easily seen

depending on the user's object.

(8) In addition, according to the present invention, by including the means for inputting a voice generated on that spot into the image input means in real time, this inputted voice is imported with a wire or without a wire in real time (including the case of browsing it by a browser for Internet and the case of transmitting it by the communication network or the like). Thereby, the user can know not only the interactive graphics (a live image of the actual scene, a moving image or a still image) but also "a live voice of the actual scene".

(9) In addition, according to the present invention, further, by including an aroma input means for inputting aroma of the spot where the image input means is installed or its surrounding aroma, which is configured by an aroma sensor and a means for converting a signal from this aroma sensor into aroma digital data; a means for converting the aroma data from this aroma input means into fragrance blending data for generating an aroma similar to that aroma; and an aroma generating means for generating a desired aroma by blending a fragrance from the fragrance blending data, the user can sense not only the interactive graphics and an real voice but also can sense an actual aroma of the actual scene in real time in a remote place.

[Brief Description of the Drawing(s)]

[FIG. 1]

FIG. 1 is a view showing a configuration of hardware of a first embodiment or a second embodiment according to the present invention.

[FIG. 2]

FIG. 2 is a view showing a conceptual configuration of the first embodiment or the second embodiment according to the present invention.

[FIG. 3]

FIG. 3 is a view showing the constitution of a display of the first embodiment according to the present invention.

[FIG. 4]

FIG. 4 is a view showing an example of a map that is displayed on a display according to the first embodiment in the present invention.

[FIG. 5]

FIG. 5 is a block diagram showing a fourth embodiment according to the present invention.

[FIG. 6]

FIG. 6 is a block diagram showing a fifth embodiment according to the present invention.

[Description of the Reference Numerals and Signs]

1: personal computer (PC)

2: control apparatus

3: hard disk apparatus

4: CD-ROM

5: CD-ROM drive 5

6: key board

7: display

7a: upper half part of display

7b: lower half part of display

8: speaker

10: public circuit

11: computer for relay service

12, 12a, 12b: video camera

13, 13a, 13b: microphone

21: LCD

22: GPS receiver

23: control unit

24: server for map database (computer)

25: image input apparatus

26: key board

27: mouse

30: computer communication network

31: image input apparatus

34: CD-ROM player

35: CD-ROM

(1) CAMERA, MICROPHONE
(2) SERVER
(3) COMPUTER FOR RELAY SERVICE
(4) CONTROL APPARATUS
(5) CD-ROM DRIVE
(6) DISPLAY
(7) SPEAKER
(8) KEY BOARD
(9) MOUSE
(10) FIG. 1
(11) FIG. 3
(12) IMAGE, MAP
(13) FIG. 4
(14) STATION
(15) TOWN

(1) FIG. 2
(2) IMAGE INPUT UNIT
(3) IMAGE IMPORTING UNIT
(4) CONTROL UNIT
(5) DISPLAY UNIT, SPEAKER
(6) MAP DATABASE REPRODUCING UNIT
(7) RETRIEVING UNIT
(8) MAP DATABASE
(9) LIVE-ACTION IDENTIFICATION DATABASE
(10) FIG. 5
(11) PROGRESS DIRECTION INPUT UNIT
(12) GPS RECEIVER
(13) CONTROL UNIT
(14) LIQUID CRYSTAL DISPLAY
(15) KEY BOARD, MOUSE
(16) PUBLIC CIRCUIT

(17) SERVER FOR MAP DATABASE (COMPUTER)

(18) IMAGE INPUT APPARATUS

(19) FIG. 6

(20) CD-ROM PLAYER

(21) INTERNET

(22) IMAGE INPUT APPARATUS

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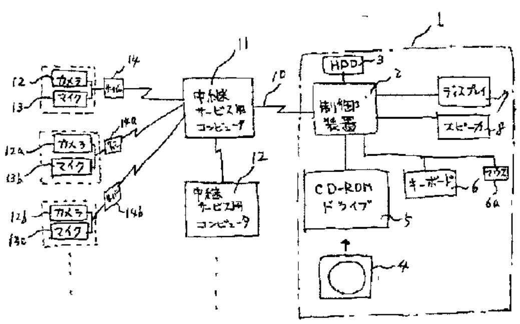
(54)【発明の名称】　実況映像提供システム

(57)【要約】

【課題】　ユーザーに、任意の地点の実際の状況を映像でリアルタイムに提供することができる実況の映像を提供するシステムを提供する。

【解決手段】　公衆への開示が可能な多数の地点の実況映像を入力するために各地点に設けられた映像入力手段と、これらの各映像入力手段から入力される各実況映像を無線又は有線で送信する映像送信手段と、前記各地点を互いに識別するための識別データを、所定のキーと関連付けながら、記録する実況地点データベースと、前記の所定のキーを入力するキー入力手段と、このキー入力手段から入力されたキーに基づいて前記実況地点データベースから対応する地点の実況映像の識別データを検索する検索手段と、この検索手段により検索された識別データに基づいて、対応する実況映像を前記各映像送信手段から受信する映像受信手段と、この受信された実況映像を出力する表示手段とからなる。



【特許請求の範囲】

【請求項1】　公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点にそれぞれ設けられた映像入力手段と、
地図上の各地点と、前記各実況映像を互いに識別するための実況映像識別データとを、互いに対応付けながら、記録する地図データベース手段と、
前記地図データベース手段により表示された地図上のある地点に対応する実況映像識別データに基づいて、該当する実況映像を該当の前記映像入力手段からオンラインで取り込む映像取り込み手段と、
この映像取り込み手段により取り込まれた実況映像をリアルタイムに表示する表示手段と、からなる、実況映像提供システム。

【請求項2】　公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点にそれぞれ設けられた映像入力手段と、
地図上の各地点と、前記各実況映像を互いに識別するための実況映像識別データとを、互いに対応付けながら、記録する地図データベース手段と、
ある実況映像を表示している場合に、その実況映像を識別する実況映像識別データをキーとして、前記地図データベース手段から、該当する実況映像の実況地点を含む所定領域の地図を示すための地図データを抽出する地図データ抽出手段と、
この地図データ抽出手段により抽出された地図データに基づいて地図を表示する表示手段と、からなる、実況映像提供システム。

【請求項3】　公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点にそれぞれ設けられた映像入力手段と、
前記各実況映像を互いに識別するための実況映像識別データを、文字列・記号列・図形又は映像などから成る検索データと関連付けながら、記録する実況映像識別データベース手段と、
前記の文字列・記号列・図形又は映像などから成る検索データを入力する検索データ入力手段と、
この検索データ入力手段から入力された検索データに基づいて、前記実況映像識別データベース手段から、関連する一つ又は複数の実況映像識別データを選択する実況映像識別データ選択手段と、
この選択された実況映像識別データに基づいて、該当する実況映像をオンラインで取り込む映像取り込み手段と、
この映像取り込み手段により取り込まれた実況映像を表示する表示手段と、からなる、実況映像提供システム。

【請求項4】　請求項1，2又は3において、
前記映像入力手段は、前記各実況地点から複数の方向に向かって見える映像をそれぞれ撮像するものであり、
前記各実況映像を互いに識別するための実況映像識別データは、前記映像入力手段が設けられた各実況地点の位置を示す位置データと、その映像入力手段が撮影する方向を示す方向データと、から構成されている、ことを特徴とする実況映像提供システム。

【請求項5】　公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点にそれぞれ設けられた映像入力手段と、
前記各実況映像を互いに識別するための実況映像識別データを記録する実況映像識別データ記録手段と、
ユーザーの現在位置を特定する現在位置特定手段と、
この現在位置特定手段により特定されたユーザーの現在位置に基づいて、前記実況映像識別データ記録手段から、前記ユーザーの現在位置の近くにある一つ又は複数の実況地点の実況映像を特定するための実況映像識別データを選択する実況映像識別データ選択手段と、
この選択された実況映像識別データに基づいて、該当する実況映像をオンラインで取り込む映像取り込み手段と、
この映像取り込み手段により取り込まれた実況映像をリアルタイムに表示する表示手段と、からなる、実況映像提供システム。

【請求項6】　請求項5のシステムにおいて、
前記映像入力手段は、前記各実況地点から複数の方向に向かって見える映像をそれぞれ撮像するものであり、
前記各実況映像を互いに識別するための実況映像識別データは、前記映像入力手段が設けられた各実況地点の位置を示す位置データと、その映像入力手段が撮像する方向を示す方向データと、から構成されており、
前記現在位置特定手段は、ユーザーの現在位置を特定する手段とユーザーの進行方向を特定する手段とを含んでおり、
前記実況映像識別データ選択手段は、前記現在位置特定手段により特定されたユーザーの現在位置及びユーザーの進行方向に基づいて、ユーザーの現在位置からユーザーの進行する側の方向に存在する実況地点であってユーザーの現在位置に近い実況地点の位置を示す位置データと、ユーザーの進行方向を示す方向データと、から成る実況映像識別データを、選択するものである、ことを特徴とする実況映像提供システム。

【請求項7】　請求項1から6までのいずれかにおいて、さらに、
前記表示手段により表示された実況映像の中のユーザーが指定した部分に対して、他の部分と区別するためのマーキングをするためのマーキング手段を備えたことを特徴とする実況映像提供システム。

【請求項8】　請求項1から7までのいずれかにおいて、さらに、
前記映像入力手段の近傍に備えられ、前記映像入力手段が設置された実況地点又はその周辺に発生している音声をリアルタイムに入力する音声入力手段と、

前記表示手段の近傍に備えられ、前記音声入力手段からの音声が出力される音声出力手段と、が備えられている、実況映像提供システム。

【請求項９】　請求項１から８までのいずれかにおいて、さらに、

前記映像入力手段の近傍に備えられ、匂いセンサと、この匂いセンサからの信号を匂いのデジタルデータに変換する手段とから構成され、前映像入力手段の設置された実況地点又はその周辺の匂いを入力するための匂い入力手段と、

この匂い入力手段からの匂いデータを、その匂いに近似した匂いを発生させるための芳香剤調合データに変換する変換手段と、

前記表示手段の近傍に備えられ、前記芳香剤調合データから芳香剤を調合して所望の匂いを発生させる匂い発生手段と、を含む実況映像提供システム。

【０００１】

【発明の詳細な説明】

【発明の属する技術分野】本発明は、各地点のリアルタイムの実況映像を地図等に関連させて提供することができる、実況映像提供システムに関する。また本発明は、前記実況映像から、その実況映像の地点を含む地図を表示させるシステムに関する。

【０００２】

【従来の技術】従来より、各地点の映像をＣＤ－ＲＯＭ又はハードディスクなどの記録媒体に記録しておき、それを所定のキーワード等の検索データに基づいて検索して表示するシステムが存在している。

【０００３】

【発明か解決しようとする課題】しかしながら、これらの記録媒体に記録された映像は、「過去のもの」である（「生のもの」ではない）。そのため、実際の景色などは、季節の移り変わり、その日の天候、道路や建物の工事状況などにより、日々刻々変遷していくものであるのに、ユーザーが見ることができるのは「古い（新鮮でない）」ものでしかないという問題がある。また、仮にその記録媒体に記録された映像が更新直後のものだとしても、「今現在のこの瞬間のリアルタイムの状況を見たい」というユーザーの希望に応えることはできない。さらに、記録媒体への映像データの更新を頻繁に行うことは非常にコストがかかってしまうという問題もある。

【０００４】本発明はこのような従来技術の問題点に着目してなされたもので、ユーザーに、任意の地点の実際の状況を映像でリアルタイムに提供することかできる実況映像提供システムを提供することを目的とする。また、本発明では、逆に、前記実況映像から、その実況映像の地点を含む地図を表示させるシステムを提供することをも目的とする。

【０００５】

【課題を解決するための手段】

（関連技術）本発明の「従来技術」に該当するかどうか（本願の「優先日（１９９６年6月１１日）」より前から公知の事実であるかどうか）は明らかではないが、本願（特許法４１条の国内優先日主張を伴う後の出願）の出願日の時点で本発明者が認識している「関連技術」としては、次のようなものが存在している。

（イ）ダイヤモンド社発行「週間ダイヤモンド別冊　１９９６．８号　インターネット超時間術」では、次のような記述がある。「インターネットではいま、テレビカメラを据えて、観光名所を同時中継しているケースが多くなってきた。自宅の机の上から、スフィンクスの前とか、パリ凱旋門、ヒマラヤを望む丘など世界的な文化遺産、観光名所のジャストナウを、やがて眺めることができるだろう。」（同書　７６頁）

「ホテルがロビーや玄関前にカメラを置いて、そのカメラをオンラインにしてリモコンで見るというのはどうですか。ウェブでそれを見て、「けっこう混んでるな」とか「おっ、あいつがいる」とか。そういうオンラインのカメラというのはウェブ上にも増えつつあるんです。」（同書　８２頁）

インターネットのホームページの紹介として、「歴史街道　ｈｔｔｐ：／／www．ｋｉｉｓ．ｏｒ／ｒｅｋｉｓｈｉ／　泰　忠子さん

歴史街道のメインルートである伊勢、飛鳥、奈良、京都、大阪、神戸を説明文と写真（１００枚以上）で散策することができます。（中略）各項目へのアクセスは地域別、時代別による検索と地図上でのマウスによる選択（クリッカブルマップ）があります。現在の情報提供は説明文と写真のみですが、（今後は）動画や音声情報も提供していく予定です。」（同書　１３３頁）

（ロ）１９９６年6月１６日付け日本経済新聞は、「魔法の箱を駆使　世界の見方覆す」とい見出しの記事で、コンピュータ・アーティスト藤幡正樹氏を紹介する記事の中で、次のように述べている。「最近は教鞭をとる慶応大学の学生らとインターネットを使ったプロジェクトに没頭している。例えば湘南藤沢キャンパスに取り付けたカメラが写す富士山の映像を、２４時間リアルタイムで発信する試みを始めた。１日千人に上る世界中からのアクセス・ユーザーは、自分のパソコンでカメラの向きを変えたり、ズームインしたりすることもできる。」

（ハ）ダイヤモンド社により１９９６年8月３１につ発行された「週間ダイヤモンド」の８４頁には、「超整理日記　地図と写真の仮想旅行術（野口悠紀雄）」という記事の中に、次のような記載がある。「インターネットで「バーチャル・ツアー」というものがある。画面に出ている地図をクリックすると、その地点の写真が現れるというものだ。」

（ニ）１９９６年9月３日付け日本経済新聞の広告欄において、「操作性高まる地図情報システム　住友電工システムズ」という見出しで、次のような記述がある。

「住友電工システムズがこの度開発、販売したWindows95専用デジタル道路地図「AtlaMate／Windows95版」は、…。（中略）　同製品はマルチメディア機能として、地図上に静止画や動画、音声の張り付けが可能となっている。」
また、この広告欄の中の「AtlaMate／Windows95版」の仕様書の記載の中に、次のような記載がある。「豊富な登録機能　写真などの静止画、ビデオなどの動画、また音声などを地図上に登録可能」
（ホ）1996年9月30日付け日本経済新聞は、「インターネット活用　自宅で自然を感じて」とい見出しの記事で、次のように述べている。「高知県佐川町はNECと共同で、インターネットで自然の風景を生中継で楽しめる「さかわインターネット放送局」を開設した。同町の虚空蔵山（標高675m）山頂にカメラを設置し、自宅や職場のパソコンからカメラを自由に動かして、足摺岬から室戸岬までの眺望を楽しめる。佐川地場産センターに開局した。カメラの映像を約3km離れたふもとの町営施設、永野町民館のカメラ制御装置に無線で伝送し、静止画像をインターネット上に提供する。パソコンからカメラを自由に遠隔操作し、左右約300度、上下約60度のパノラマを最大10倍のズームで楽しめる。インターネット放送局のアドレスはhttp：//www/meshnet. or. jp/sakawa/　NECは5月からインターネット放送局を全国展開している。北海道の松前町、美瑛町、佐呂間町で開局し、2～3年以内に100ケ所の観光地、景勝地にカメラを設置する計画。」
以上のように、本発明に関連する技術は、さまざまものがある。しかし、これらはいずれも、本発明と関連しているが、本発明はこれらの関連技術をさらに発展させたものであり、これらの関連技術は本発明の進歩性を否定するものではない。
【0006】前述のような従来技術の課題を解決するための本発明による実況映像提供システムは、次のようなものである。
(1)本発明による実況映像提供システムは、公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点に設けられた映像入力手段と、前記各実況地点の実況映像を互いに識別するための実況映像識別データを、地図データベースの地図上の各地点とそれぞれ関連・対応付けながら、記録する実況映像識別データベース手段と、前記地図データベースの地図上で指定された地点に基づいて、前記実況映像識別データベース手段から、対応する一つ又は複数の実況映像識別データを検索する検索手段と、この検索手段により検索された実況映像識別データに基づいて、対応する実況映像をリアルタイムに無線又は有線で取り込む（ネットワークで送信させること又はインターネット用ブラウジング・ソフトウェアでアクセスして閲覧することなどの方法により取り込む）映像取り込み手段と、この映像取り込み手段により取り込まれた実況映像（動画又は静止画）を出力する表示手段と、からなるものである。
(2)また本発明は、公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点に設けられた映像入力手段と、地図とその地図上の各地点を特定するための座標データとを記録する地図データベースと、前記地図データベースの中の座標データと、前記各実況映像を互いに識別するための実況映像識別データとを、互いに関連又は対応付けながら、記録する実況映像識別データベース手段と、ある実況映像を表示している場合に、その実況映像を互いに識別する実況映像識別データをキーとして、前記実況映像識別データベースから、その実況映像の実況地点に対応又は関連する一つ又は複数の地図上の地点を検索する検索手段と、この検索手段により検索された地図上の地点を含む所定領域の地図を示す地図データを抽出する地図データ抽出手段と、この地図データ抽出手段により抽出された地図データにより地図を出力する表示手段と、からなるものである。
(3)また、本発明による実況映像提供システムは、公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するために各実況地点に設けられた映像入力手段と、前記各実況映像を互いに識別するための実況映像識別データを、文字列・記号列・図形又は映像などから成るキーと関連付けながら、記録する実況映像識別データベース手段と、前記の文字列・記号列・図形又は映像などから成るキーを入力するキー入力手段と、このキー入力手段から入力されたキーに基づいて、前記実況映像識別データベース手段から、関連する一つ又は複数の実況映像識別データを検索する検索手段と、この検索手段により検索された実況映像識別データに基づいて、対応する実況映像を取り込む（ネットワークより送信させるとインターネット用ブラウザーにより閲覧する場合なとを含む）映像取り込み手段と、この映像取り込み手段により取り込まれた実況映像（動画又は静止画）を出力する表示手段と、からなるものである。
(4)なお、本発明において、前記映像入力手段は一つの実況地点から複数の方向の映像を撮像するものであり（例えば、一つのビデオカメラを旋回してある複数の方向に来たときに撮像する場合や、複数のビデオカメラを複数の方向にそれぞれ備え付けて同時に撮像する場合など）、前記各実況映像を特定するための実況映像識別データは、前記映像入力手段が設けられた各実況地点の位置を示す位置データとその映像入力手段が撮影する方向を示す方向データとから構成されていることが望ましい。
(5)また本発明は、公衆への開示が可能な多数の実況地点の実況映像をそれぞれリアルタイムに常時入力するた

めに各実況地点にそれぞれ設けられた映像入力手段と、前記各実況映像を互いに識別するための実況映像識別データ（緯度データ及び経度データの座標データなどから成る）を記録する実況映像識別データ記録手段と、ユーザーの現在位置を特定する現在位置特定手段（従来より公知のＧＰＳ受信機など）と、この現在位置特定手段により特定されたユーザーの現在位置（緯度データ及び経度データの座標データなどから成る）に基づいて、その現在位置に近い一つ又は複数の実況地点に対応又は関連する一つ又は複数の実況映像識別データを選択する実況映像識別データ選択手段と、この選択された実況映像識別データに基づいて、対応する実況映像をオンラインで取り込む（ネットワークを介してアクセスして閲覧する場合と送信させる場合などを含む）映像取り込み手段と、この映像取り込み手段により取り込まれた実況映像（動画又は静止画）をリアルタイムに表示する表示手段と、からなるものである。

(6)また、本発明では、前記映像入力手段は、上記(4)と同様に、前記各実況地点から複数の方向に向かって見える映像をそれぞれ撮像するものであり、前記各実況映像を互いに識別するための実況映像識別データは、前記映像入力手段が設けられた各実況地点の位置を示す位置データとその映像入力手段が撮影する方向を示す方向データと、から構成されており、前記現在位置特定手段は、ユーザーの現在位置を特定する手段とユーザーの進行方向を特定する手段とを含んでおり、前記実況映像識別データ選択手段は、前記現在位置特定手段により特定されたユーザーの現在位置を示すデータ（緯度データ及び経度データから成る位置座標データなど）及び進行方向を示すデータ（東西南北など）に基づいて、ユーザーの現在位置からユーザーの進行する方向に位置し且つユーザーの現在地点に近い位置にある実況地点の実況映像であってしかもユーザーの進行方向に近い方向を写す実況映像（動画又は静止画）を特定するための実況映像地点識別データを選択するものである。

(7)また、本発明では、前記表示手段に表示された実況映像（動画又は静止画）の中のユーザーが指定した部分に対して他の部分と区別するためのマーキングをするためのマーキング手段を備えるのがよい。

(8)また、本発明において、前記映像入力手段は、その地点において発生している音声をリアルタイムに入力する手段をも備えているのがよい。

(9)また本発明では、さらに、前記映像入力手段の近傍に備えられ、匂いセンサと、この匂いセンサからの信号を匂いデジタルデータに変換する手段とから構成され、前映像入力手段の設置された地点又はその周辺の匂いを入力するための匂い入力手段と、この匂い入力手段からの匂いデータを、その匂いに近似した匂いを発生させるための芳香剤調合データに変換する変換手段と、前記表示手段の近傍に備えられ、前記芳香剤調合データから芳香剤を調合して所望の匂いを発生させる匂い発生手段と、を含むのがよい。なお、この(9)において、前記の「その匂いに近似した匂いを発生させるための芳香剤調合データに変換する変換手段」は、前記匂い入力手段と直接に接続され、この変換手段がコンピュータ通信ネットワークを介して前記匂い発生手段に接続されていてもよいし、あるいは、前記入力入力手段とコンピュータ通信ネットワークを介して接続され、この変換手段が直接に前記匂い発生手段に接続されていてもよい。

【０００７】

【発明の実施の形態】

実施形態１．次に、図１～４を参照して、本発明の実施形態１を説明する。図１において、１はユーザーが使用するパーソナルコンピュータ（パソコン）で、ＣＰＵ及び通信モデム等より成る制御装置２と、コンピュータプログラム及びデータが記録されたハードディスク装置３と、コンピュータプログラム及びデータが記録されたＣＤ－ＲＯＭ４を駆動するためのＣＤ－ＲＯＭドライブ５と、データ入力するためのキーボード６及びマウス６ａと、画像を出力するためのディスプレイ７と、音声を出力するためのスピーカ８とより、構成されている。

【０００８】前記制御装置２は、インターネット等のコンピュータネットワーク用公衆回線１０を介して、中継サービス用コンピュータ１１に接続されている。この中継サービス用コンピュータ１１には、多数の実況地点にそれぞれ設置されたビデオカメラ１２，１２ａ，１２ｂ及び集音マイク１３，１３ａ，１３ｂを制御し且つこれらのビデオカメラ１２及び集音マイク１３からのデータを記録し通信ネットワークを介して閲覧させるためのコンピュータ（サーバー）１４，１４ａ，１４ｂが、接続されている。これらの多数のビデオカメラ１２及びマイク１３等により入力された映像データ及び音声データは、ユーザー側からの要求により、コンピュータ１４及び中継サービス用コンピュータ１１を介して、ユーザー側に送信できるようになっている。なお、前記ビデオカメラ１２は、各実況地点において、それぞれ４個ずつ設置され、それらの４個のビデオカメラは、それぞれ東西南北の４つの方向の映像を撮像するように、設置されていることが望ましい。

【０００９】また、前記中継用サービスコンピュータ１１は、他の多数の中継用サービスコンピュータ１２などとも接続されており、例えば、ある中継サービス用コンピュータ１１に接続されたユーザーは、この中継サービス用コンピュータ１１を介して他の中継サービス用コンピュータ１２などとから、それに接続されたコンピュータ（サーバー）を介してビデオカメラ及びマイクから入力されたデータを取り込めるようになっている。この場合の映像や音声の取り込みの方法は、そのビデオカメラやマイクからの情報を電子メールに添付させて送信させる方法や、そのビデオカメラ及びマイクの入力情報を提供

するためのホームページがコンピュータ・ネットワーク上に開設されており、このホームページをユーザー側がインターネット用のブラウザー・ソフトウェア（閲覧ソフト）により取り込みにいく方法（いわば、コンピュータ・ネットワーク上のホームページをユーザー側のパソコンのハードディスクのように使用する方法）などの様々な方法が有り得る。

【００１０】この実施形態１では、前記ＣＤ－ＲＯＭ４には、地図データとこの地図上の各地点を特定するためのアドレスデータとを関連させて記録する地図データベースと、このアドレスデータと、前記各実況地点（前記ビデオカメラ１２及びマイク１３が設置された各場所）の実況映像を識別するための映像識別データとを、互いに関連付け・対応付けて記録する実況映像データベースと、これらの前記地図データベースを再生する再生プログラムと、前記実況映像データベースを検索する検索プログラムと、この検索された実況映像識別データからそれに対応する実況映像を取り込んで表示するためのプログラムとが、記録されている。

【００１１】今、例えば大阪に住んでいるユーザーが、「自分の故郷の神奈川県の夏の湘南海岸の海岸線に沈む夕陽の景色を見たい」と考えたとする。その場合、例えば、ユーザーが地図データベースを再生させて湘南海岸を含む所定領域の地図を画面表示させ、その画面上で前記の湘南海岸の地点をマウス６ａでクリックしたとする。すると、制御装置２は、この入力に基づいて、前記地点データベースから、この地図上の地点に対応するアドレスデータを検索する。そして、この検索されたアドレスデータに基づいて、前記実況映像データベースから、対応する実況地点の実況映像を示す実況映像識別データを検索する。そして、この検索された実況映像識別データに基づいて、中継サービス用コンピュータ１１にアクセスして、前記の実況映像識別データに対応する実況地点に設置されたビデオカメラ及びマイク（且つ、前記実況映像識別データが撮像方向をも特定したものであるときは、その撮像方向と対応する方向に設置されたビデオカメラ及びマイク）からの映像データ及び音声データをオンラインで取り込んで、ディスプレイ７及びスピーカ８によりリアルタイムに出力する。このとき出力される映像及び音声は、現時点のリアルタイムの映像及び音声なので、ユーザーはあたかもその現場に実際にいるような感覚・感動を得ることができる。すなわち、従来からも、例えば湘南海岸などの海岸の映像を記録し、それらをキーワードなどで検索して出力できるＣＤ－ＲＯＭなどは存在している。そして、これらのＣＤ－ＲＯＭに記録された映像は、プロのカメラマンが絶好の日和・時刻（例えば夕陽のきれいな時刻）の絶好の角度から美しく撮影したものである。これに対して、この実施形態で提供される映像は、雨天のときも曇りのときもあるし、時刻も絶好の景色が見られる時刻ではないかもしれない。しかし、ユーザーにとっては、「今この時点・この瞬間の映像（二度とない映像）である」ということが、ひとつの「臨場感」「感動」を生むことになる。つまり、「今、湘南海岸に沈む夕陽を見たい」とユーザーが思った場合、過去の記録に過ぎない記録された「湘南海岸の夕陽」の映像ではなく、「今この瞬間の湘南海岸の夕陽」の映像を見られなければ、ユーザーにとっては大きな感動は得られない。この実施形態はこのようなユーザーの希望に答えることができるものなのである。

【００１２】なお、ここで、以上の図１について説明した実施形態の構成を図２を参照してもう一度説明する。この図２は、実施形態の構成を機能的・概念的に示したものである。図２において、符号３２は、コンピュータネットワーク（コンピュータ通信網）３０に接続され、各地の実況映像と音声をリアルタイムに入力するためのビデオカメラ及びマイクから成る実況映像入力部である。また、符号２４は、前記地図データベース２６とその再生プログラムとその検索プログラム、前記実況映像データベース２５とその検索プログラム、及び前記実況映像識別データから通信ネットワークを介して該当する実況映像を取り込むためのプログラムなどが記録されたＣＤ－ＲＯＭである。また図２において、２１は前記ＣＤ－ＲＯＭ２４に記録された前記地図データベース２６を再生するための地図データベース再生部、２２はこの地図データベース再生部２１からの信号を受けて表示部２７及びスピーカ２８を制御して所定の画像及び音声を出力する制御部である。また２３は、前記制御部２２からの信号を受けて、前記地図データベースが再生された画面上でユーザーが指定（マウスでクリック）した地点のアドレスデータに基づいて、前記実況映像データベース２５から、対応する実況映像の識別データを検索する検索部である。制御部２２は、この検索部２３からの実況映像の識別データに基づいて、映像取り込み部（例えばインターネットのホームページ閲覧用ソフトウェアであるブラウザーを記録し実行する装置）２６を制御して、コンピュータネットワーク用通信回線３０を介して映像入力部３２にアクセスし、そこから、オンラインで、リアルタイムの実況映像及び音声を取り込む。制御部２２は、このオンラインで取り込まれた実況映像と音声を、前記地図データベース２６からの再生画像（地図画像）と関連させながら、前記表示部２７及びスピーカ２８によりリアルタイムに出力させる。

【００１３】次に、前記の図１の制御装置２に制御されながら、前記ディスプレイ７により表示される画面を、図３及び図４に基づいて説明する。前記ＣＤ－ＲＯＭ４に記録された各プログラムにより、ディスプレイ７には、図３に示すように、その上半分７ａに実況映像が表示され、その下半分７ｂに地図が表示されるようになっている。この実施形態１を使用するときは、ユーザーは、まず図１の前記ＣＤ－ＲＯＭ４を駆動して、前記地

図データベースから前記ディスプレイ７の下半分７ｂに希望する地図を表示させる。ＣＤ－ＲＯＭ４に記録された地図データベースの中のどの部分の地図を表示させるかは、例えば、地名などのキーワードから地図データを検索して表示させればよい（このような技術は従来より公知である）。そして、本実施形態では、この表示された地図には、例えば図４のア、イ、ウ、エ、オ、カ、キに示すように、各地点を示す点が所定の色（例えば赤色）に着色されて表示されている。これらの図４のア、イ、ウ、エ、オ、カ、キで示す各点の中で、図４のア、イ、ウ、及びエは、図１のビデオカメラ１２及びマイク１３に対応している。すなわち、この実施形態１では、図１のビデオカメラ１２は、それぞれ互いに異なる方向を撮像するように図１のア、イ、ウ、及びエの位置に設置された４個のビデオカメラにより構成されている。また、図１のマイク１３は、それぞれ互いに異なる方向を集音するように設置された４個のマイクにより構成されている。つまり、ビデオカメラ１２について説明すると、ビデオカメラ１２を構成する４個のビデオカメラの中で、図４のアの位置に設置されたビデオカメラは、図の西方向（左方向）に向けて撮像しており、“１４２８Ａ”の映像識別データを有する実況映像を生成する。また、図１のイの位置に設置されたビデオカメラは、図の南方向（下方向）に向けて撮像しており、“１４２８Ｂ”の映像識別データを有する実況映像を生成する。また、図１のウの位置に設置されたビデオカメラは、図の東方向（右方向）に向けて撮像しており、“１４２８Ｃ”の映像識別データを有する実況映像を生成する。また、図１のエの位置に設置されたビデオカメラは、図の北方向（上方向）に向けて撮像しており、“１４２８Ｄ”の映像識別データを有する実況映像を生成する。また、前記の図４のア、イ、ウ、エ、オ、カ、キで示す各点の中で、図４のオ、カ、及びキは、図１のビデオカメラ１２ａ及びマイク１３ａに対応している。すなわち、この実施形態１では、図１のビデオカメラ１２ａは、それぞれ互いに異なる方向を撮像するように図４のオ、カ、及びキの位置に設置された３個のビデオカメラにより構成されている。また、図１のマイク１３ａは、それぞれ互いに異なる方向を集音するように設置された３個のマイクにより構成されている。つまり、ビデオカメラ１２ａについて説明すると、ビデオカメラ１２ａを構成する３個のビデオカメラの中で、図１のオの位置に設置されたビデオカメラは、図の北西方向（左上方向）に向けて撮像しており、“１４２９Ａ”の映像識別データを有する実況映像を生成する。また、図４のカの位置に設置されたビデオカメラは、図の東南方向（右下方向）に向けて撮像しており、“１４２９Ｂ”の映像識別データを有する実況映像を生成する。また、図４のキの位置に設置されたビデオカメラは、図の東方向（右方向）に向けて撮像しており、“１４２９Ｃ”の映像識別データを有する実況映像を生成する。以上のように、この図１を参照して説明する実施形態では、地図上の各地点を識別するためのアドレスデータ（“１４２８”や“１４２９”など）と同一実況地点での各ビデオカメラの撮像方向を示すデータ（“Ａ”“Ｂ”“Ｃ”“Ｄ”など）との組合せと、各地点の実況映像を識別するための実況映像識別データ（“１４２８Ａ”や“１４２９Ａ”など）とを、互いに対応させて記録している。より詳細に述べると、この図４の例では、地図上の１つのアドレスデータ“１４２８”（図４の中央の交差点の領域を識別するアドレスデータ）については、“１４２８Ａ”“１４２８Ｂ”“１４２８Ｃ”及び“１４２８Ｄ”の４つの撮像方向をそれぞれ示す４つの実況映像識別データが、対応させて記録されている。また、地図上の１つのアドレスデータ“１４２９”（図１の図示左側の交差点の領域を識別するアドレスデータ）については、“１４２９Ａ”“１４２９Ｂ”及び“１４２９Ｃ”の３つの撮像方向を示す３つの実況映像識別データが、対応させて記録されている。なお、この図４の例では、実況映像識別データ（例えば“１４２８Ａ”）を、地図上のアドレスデータ（例えば“１４２８”）と方向データ（例えば“Ａ”）との組合せにより構成しているが、本発明では、必ずしも、実況識別データの中に地図上のアドレスデータをそのまま使用する必要はない。例えば、地図上のアドレスデータは地図全体を均等に割り付けて構成した番地データ（又は座標データ）とし、実況映像識別データはビデオカメラが実際に取り付けてある地点の識別コード（例えば、ビデオカメラの設置順の連続番号）と方向データとの組合せにより構成する、などのようにすることもできる。

【００１４】この図４の例では、前記各ビデオカメラ１２及びマイク１３がそれぞれ映像及び音声を入力して得られる実況映像（ここでの「実況映像」という用語は、原則として、ビデオカメラで入力した映像データとマイクで入力した音声データとの両者を含む意味で使用している）の識別データには、その地点を示すデータとそのビデオカメラ１２か撮影している方向（これはマイク１３か集音しようとする方向と一致している）とから、構成されている。つまり、実況映像は、各地点とその撮像方向とで互いに識別されており、「実況映像識別データ」は、各地点を示すデータと撮影又は集音の方向を示すデータとから、構成されている。だから、同じ地点でも、撮影する方向（東西南北などの方向）が違えば別の識別データを有する別の実況映像となる。このことを図４で説明すると、図４の“ア”で示すアドレスデータ（１４２８Ａ）を有する地点は、（１４２８Ａ）という映像識別データを有する実況映像と対応しており、この（１４２８Ａ）という識別データを示す実況映像は、図４の“ア”の地点からＡの方向（図面に向かって左の方向）を撮影した映像である。また、図４の“イ”で示す

アドレスデータ（１４２８Ｂ）を有する地図上の地点は、（１４２８Ｂ）という識別データを有する実況映像と対応しており、この（１４２８Ｂ）という識別データを示す実況映像は、図３の“イ”の地点からＢの方向（図面に向かって下の方向）を撮影した映像である。また、図４の“ウ”で示すアドレスデータ（１４２８Ｃ）を有する地点は、（１４２８Ｃ）という識別データを有する実況映像と対応しており、この（１４２８Ｃ）という識別データを示す実況映像は、図４の“ウ”の地点からＣの方向（図面に向かって右の方向）を撮影した映像である。また、（１４２８Ｄ）というアドレスデータを有する図４の“エ”で示す地点は、（１４２８Ｄ）という識別データを有する実況映像と１対１に対応しており、この（１４２８Ｄ）という識別データを示す実況映像は、図１の“エ”の地点からＤの方向（図面に向かって上の方向）を撮影した映像である。さらに、図４において、アドレスデータ（１４２９Ａ）を有する“オ”で示す地点は、（１４２９Ａ）という識別データを有する実況映像と対応しており、この（１４２９Ａ）という識別データを示す実況映像は、図４の“オ”の地点からＡの方向（図面に向かって左上の方向）を撮影した映像である。また、図４の（１４２９Ｂ）というアドレスデータを有する“カ”で示す地点は、（１４２９Ｂ）という識別データを有する実況映像と対応しており、この（１４２９Ｂ）という識別データを示す実況映像は、図４の“カ”の地点からＢの方向（図面に向かって右下の方向）を撮影した映像である。また、図１の（１４２９Ｃ）というアドレスデータを有する“キ”で示す地点は、（１４２９Ｃ）という識別データを有する実況映像と対応しており、この（１４２９Ｃ）という識別データを示す実況映像は、図４の“キ”の地点からＣの方向（図面に向かって右の方向）を撮影した映像である。

【００１５】以上から分かるように、この図４の例では、１４２８は、図４の地図の中央に位置する交差点の領域（この図４の例では、この交差点の領域を「実況地点」という言葉で呼んでいる）を示す地図上のアドレスデータであり、Ａ，Ｂ，Ｃ，Ｄはその交差点領域（実況地点）からの撮影（及び集音）の方向を示している。また同様に、図４の例では、１４２９は、図４の地図の左端の交差点の領域（実況地点）を示す地図上のアドレスデータであり、Ａ，Ｂ，Ｃはその交差点（実況地点）内の各場所からの撮影（及び集音）の方向を示している。また、この図４の例では、実況映像の識別データは、前記地図上の各実況地点の位置を示すアドレスデータ（“１４２８”，“１４２９”など）と前記方向を示すデータ（Ａ，Ｂ，Ｃ，Ｄなど）との組合せにより、構成されている。

【００１６】したがって、ユーザーは、この図４の地図を見ながら、自分がこれから行きたいと思う場所が例えば図１の１４２８で示す交差点の領域だとして、「今、この交差点の状況はどうなっているか（混雑しているのかどうか、どういう人達がどういう服装で通行しているのか、など）知りたい、そのために実況映像を見たい」と思えば、図４で示す地図上のア～エの地点のいずれかをマウスなどのポインティングデバイスでクリックすればよい。すると、前記制御装置２により、その地図上のアドレスデータに対応する実況映像識別データが検索され（前記実況映像データベースから）、この検索された実況映像識別データに基づいて、該当する実況映像がコンピュータ・ネットワークを介して取り込まれて、ディスプレイ７の上半分７ａに表示される。

【００１７】またユーザーは、これから自分が行きたいと思う場所と今自分が居る場所との間の交通経路を地図上で求めて（これは従来から公知の技術で既に実現されている）、その経路上にある地点の実況映像を順番に表示していく（一つの実況映像の表示時間を例えば５秒として、５秒毎に次の実況映像を順番に表示していく）こともできる。またユーザーは、自分が自動車を運転しているとき、ＧＰＳ受信機で受信した測位情報や各種のセンサにより得た測位情報から現在の位置を地図上で求め（これは従来より公知の技術で既に実現されている）、その地図上で求めた自分の現在位置に対応する地点から、前記実況映像の識別データを求めて、その識別データに基づいてネットワーク上のサーバー（例えば図１の中継サービス用コンピュータ１１）を通して対応する実況映像を取り込んで表示する、こともできる。これにより、ユーザーは、地図上の現在位置（ＧＰＳ受信機やセンサからの情報に基づいて推測した現在位置）と実際の現在位置とが本当に一致しているのかどうかを目視により確認することができる。つまり、上記のようにして求められた実況映像識別データに基づいてディスプレイ７に表示された実況映像と自分が自動車の内部から外部を見て得られる実際の景色とが一致していれば、前記のＧＰＳにより推測した現在位置は計測誤差がなく正しいということになるか、一致していなければ前記の推測した現在位置は正しくないということになる。

【００１８】なお、前記制御装置２と中継サービス用コンピュータ１１の接続は無線でもよいこと、前記中継サービス用コンピュータと各ビデオカメラ１２及びマイク１３との接続も無線でもよいこと、及び、前記「地図データベース」、「実況映像データベース」、これらの検索プログラム、及び地図データベース再生プログラムは、ＣＤ－ＲＯＭ４から読み取るのではなく、前記中継サービス用コンピュータ１１などのネットワーク上のサーバー（コンピュータ）から取り込むようにしてもよい。特に、上記のように、図１のパソコン１を移動中の自動車内で使用する場合（自分が自動車を運転しているとき、ＧＰＳ受信機で受信した測位情報や各種のセンサにより得た測位情報から現在の位置を画面表示された地図上で求め、この「自分の現在位置に対応する実況地点

の実況映像で且つ自分の進行方向に対応する撮像方向の実況映像」を、パソコン１のディスプレイ７に表示させる場合）は、前記パソコン１の制御装置２と前記中継サービス用コンピュータとの間は無線で送受信する必要がある。

【００１９】実施形態２．次に、本発明の実施形態２を図１により説明する。図１において、１はユーザーが使用するパーソナルコンピュータ（パソコン）で、ＣＰＵ及び通信モデム等より成る制御装置２と、コンピュータプログラム及びデータが記録されたハードディスク装置３と、コンピュータプログラム及びデータが記録されたＣＤ－ＲＯＭ４を駆動するためのＣＤ－ＲＯＭドライブ５と、データ入力するためのキーボード６と、画像を出力するためのディスプレイ７と、音声を出力するためのスピーカ８とより、構成されている。前記制御装置２は、公衆回線１０を介して、中継サービス用コンピュータ１１に接続されている。この中継サービス用コンピュータ１１には、多数の地点にそれぞれ設置されたビデオカメラ１２及び集音マイク１３が、コンピュータ（サーバー）１４を介して、接続されている。これらの多数のビデオカメラ１２及びマイク１３等により入力された映像データ及び音声データは、ユーザーからの要求により、前記コンピュータ（サーバー）１４及び中継サービス用コンピュータ１１を介して、ユーザーに送信できるようになっている。また、図１の多数のビデオカメラ１２及び集音マイク１３は、識別データにより互いに識別できるようになっている。したがって、また、各ビデオカメラ１２及び集音マイク１３からの実況映像及び音声は、互いに識別できるようになっている。また、これらの多数のビデオカメラ１２及びマイク１３等により入力された映像データ及び音声データは、ユーザーからの要求により、中継サービス用コンピュータ１１を介して、ユーザーがオンラインで閲覧できるようになっている（例えば、インターネット・ホームページ閲覧用ソフトウェアのブラウザーを使用して、閲覧できるようになっている）。また、前記中継用サービスコンピュータ１１は、他の多数の中継用サービスコンピュータ１２などとも接続されており、例えば、中継サービス用コンピュータに接続されたユーザーは、この中継サービス用コンピュータ１１を介して他の中継サービス用コンピュータ１２などから、それに接続されたビデオカメラ及びマイクから入力されたデータを取り込めるようになっている。

【００２０】この実施形態２では、前記ＣＤ－ＲＯＭ４には、前記各地点（前記ビデオカメラ１２及びマイク１３か設置された各場所）の実況映像を識別するための映像識別データと多数のキーワードとを互いに関連付けた実況映像データベースと、これらのキーワードから前記映像識別データを検索するプログラムとが、記録されている。この実況映像データベースに記録されているキーワードには、地名、場所のジャンル（海岸、町角、港町、山、交差点、建物、レストラン、劇場、映画館、スポーツ施設、野球場、温泉、寺院など）、行動のジャンル（スポーツ、演劇、映画、食事、散歩など）、などの様々なものが含まれている。今、例えば大阪に住んでいるユーザーが、「自分の故郷の神奈川県の夏の湘南海岸の海岸線に沈む夕陽の景色を見たい」と考えたとする。その場合、例えば、ユーザーが前記キーボード６により「神奈川県、夏、湘南海岸、海岸線、夕陽」などのキーワードを入力すると、制御装置２は、これらの入力されたキーワードに基づいて、ＣＤ－ＲＯＭ４に記録された実況映像識別データの中から対応するものを検索する。そして、この検索された実況映像識別データに基づいて、中継サービス用コンピュータ１１にアクセスして、その識別データに対応する地点に設置されたビデオカメラ及びマイクからの映像データ及び音声データをリアルタイムに取り込んで、ディスプレイ７及びスピーカ８から出力することができる。このとき出力される映像及び音声は、現時点のリアルタイムの映像及び音声なので、ユーザーはあたかもその現場に実際にいるような感動を得ることができる。

【００２１】また、同様に、この実施形態２では、ユーザーが例えば「寺院、京都」というキーワードを入力すれば、前記制御装置２がそれに該当する複数の映像識別データを検索し、それらを順次ディスプレイ７に表示する。また、例えば長期入院しているユーザーが、実際には行けないが「九州各地の温泉巡りをしてみたい」と思えば、「九州各地、温泉巡り」などのキーワードを入力すれば、前記制御装置２が、それに該当する複数の映像識別データを検索し、それらの識別データに対応する実際映像を受信して、順次ディスプレイ７に表示する。これは、ユーザーにとっては、実際には行っていないのに実際に行っているのと同じ感動を得ることができる。このように、この実施形態２は、ユーザーにとってあたかも旅行に行っていないの行っているのと同様の感動を得られる「バーチァル・トラベル（仮想旅行）」を実現できるシステムであると言える。

【００２２】また同様に、ユーザーが「横浜の港町を食べ歩きしたい」と思えば、「横浜、港町、食べ歩き」というキーワードを入力すれば、前記制御装置２がこれらのキーワードに基づいて対応する複数の映像識別データを検索し、これらに対応する複数の前記各地点からの実況映像のデータを取り込んでくれる（この場合、公衆への映像提供を承諾したレストランの内部に前記ビデオカメラとマイクを設置しておけば、その内部の状況、例えば客の今の混み具合や店内の雰囲気なども知ることができる）。また、同様に、ユーザーが「日本全国の劇場巡り（野球場巡り）をしてみたい」と思えば、「日本、劇場巡り（野球場巡り）」というキーワードを入力すれば、前記制御装置２がこれらのキーワードに基づいて対応する映像識別データを検索し、それらに対応する実況

映像をリアルタイムに出力してくれる。この場合、各劇場又は各野球場に、所定時間のみ劇の内容（又は試合内容）の送信を承諾してもらっておけば、ユーザーは所定時間のみではあるが、その劇（又は試合）の内容を言わばインデックス代わりに見ることができる。

【００２３】実施形態３．次に、本発明の実施形態３を説明する。この実施形態３では、前記の実施形態１の構成に加えて、次のようなものが備えられている。まず、前記ビデオカメラ１２やマイク１３の近傍に備えられた匂い入力装置が備えられている。この匂い入力装置には、匂いセンサと、この匂いセンサからの信号を匂いのデジタルデータにコード化するコード化部が備えられている。前記匂いセンサは、既存の複数の匂いセンサから構成され、各センサからの匂い量検出値はすべて前記コード化部（エンコーダ）に供給される。コード化部（エンコーダ）では、この供給された匂い量検出値を符号化する。この符号化された匂いデータ（デジタルデータ）は、記録装置に記録されると共に、遠隔のユーザーが、コンピュータ通信ネットワーク網を介してリアルタイムに閲覧し取り込めるようになっている。なお、前記の匂いセンサは、感知できる匂いの種類毎に複数用意しておき、できるだけ現場の元の匂いを忠実に再現できるだけの情報を得られるようにすることが望ましい。次に、ユーザー側には、前記の閲覧し取り込んだ匂いデータ（デジタルデータ）を、現場の匂いに近似した匂いを発生させるための芳香剤調合データに変換する変換装置と、前記ディスプレイ７（図１）の近傍に備えられ、前記芳香剤調合データから芳香剤を調合して所望の匂いを発生させる匂い発生装置と、が備えられている。まず、前記の「前記閲覧し取り込んだ匂いデータ（デジタルデータ）を、現場の匂いに近似した匂いを発生させるための芳香剤調合データに変換する変換装置」を説明する。前記変換装置は、各匂いセンサの検出値のパターンを各芳香剤の出力値のパターンに変換する。より具体的には、様々な種類の匂いのそれぞれについて、その匂いを匂いセンサに検出させると検出値がどのような値をとるかを予め調査・記録しておく。そして、この匂いと匂いセンサの検出値パターンとの関係を記録したデータと、各匂いと芳香剤（の成分）との関係を記録したデータとから、各匂いセンサの検出値のパターンと複数種類の芳香剤の出力値のパターンとを対応付けて記録しておくようにする。前記変換装置は、この対応付けられた情報に基づいて、匂いセンサの検出値のパターンを芳香剤（の成分）の出力値のパターン（これが「芳香剤調合データ」となる）に変換するものである。このことをより詳細に述べると、次のとおりである。前記変換装置には、各匂いを匂いセンサで検出したときの匂いセンサの検出値と、その匂いを後述の匂い発生装置で発生させるときの各芳香剤の出力値との対応関係が記録されたセンサ芳香剤量変換テーブルが、予め記録されている。そして、変換装置は、前記匂いセンサの検出値データに基づいて、このセンサ芳香剤量変換テーブルを参照して、各匂いセンサ毎の検出値を各芳香剤毎の出力値に変換する。

【００２４】次に、前記の「前記芳香剤調合データから芳香剤を調合して所望の匂いを発生させる匂い発生装置」を説明する。匂い発生装置は、予め複数種類の芳香剤を用意しておき、前記の「芳香剤調合データ」（前記の芳香剤出力パターンデータ。各芳香剤からの匂い成分をどれだけ発生させるかを示すデータ）に基づいて、必要な種類の匂いの成分（芳香剤からの成分）を必要な分量だけ発生させる。匂い発生装置の形態としては、ある空間中においてその空間全体に匂いを行き渡らせる据置型のものと、ユーザーの鼻の付近又は鼻の中に装着して装着した人にのみ匂いを感得させる個人携帯型のものと、か考えられる。例えば、前記の据置型のものとしては、次のようなものが考えられる。すなわち、箱の底に芳香剤の入った容器を並べて、芳香剤と空気とが接する面積を任意に調整できる蓋を各容器に付けておき、箱の後ろ側には、必要に応じて送風機を設ける。そして、前記の「芳香剤出力パターン」のデータに応じて、各芳香剤の成分を所定量ずつ放出できるように、対応する各芳香剤の容器の蓋の開閉具合を調節する。また、前記携帯型のものについては、基本的構成は据置型のものと同様でよいが、これを小型化し、これをヘルメット型、ヘッドセット型、メガネ型、マスク型などの頭部支持具によりユーザーの鼻の付近に装着できるようにする。なお、この実施形態３では、前記の「前記閲覧し取り込んだ符号化された匂いデータを、現場の匂いに近似した匂いを発生させるための芳香剤調合データに変換する変換装置」をユーザー側のパソコン１側に備えるようにしているが、本発明ではこれに限られるものではなく、例えば、現場のビデオカメラ１２やマイク１３が設置された地点に備えるようにしてもよいし、コンピュータ・ネットワーク上の中継サービス用コンピュータ（サーバー）１１に備えるようにしてもよい。また、以上の実施形態３で説明した「匂いのデータ化、記録、通信、及び再生」の技術は、例えば特開平７－５５７４２号公報などに開示された公知の技術である。

【００２５】実施形態４．図５は本発明の実施形態４を示すブロック図である。図５において、２１は液晶ディスプレイ（ＬＣＤ）である。また図５において、２２は従来より市販されているＧＰＳ（Ｇｒｏｂａｌ　Ｐｏｓｉｔｉｏｎｉｎｇ　Ｓｙｓｔｅｍ）受信機で、人工衛星からの電波の遅延時間を計測し、軌道からの距離からユーザーの現在位置を求めるためのものである。このＧＰＳ受信機２２は、人工衛星から送信されるＧＰＳ電波を受信するＧＰＳ受信アンテナと、このＧＰＳ電波から現在位置を緯度データ及び経度データとして認識する位置認識部（ＣＰＵにより構成される）を含んでいる。前記ＧＰＳアンテナは、ＧＰＳ衛星からの例えば１．５ＧＨ ｚの電波を受信し、その信号を前記位置認識部に送る。前記位置認識部では、稼働中のＧＰＳ衛星のうち受信可能な４個以上の衛星の電波を受信し、既知である衛星の位置と受信電波とから算出した各衛星ー受信点間の距離とを基にして、受信点の現在位置を取得し、緯度データ及び経度データを算出する。なお、以上のＧＰＳ受信機２の詳細な構成及び使用方法は従来より公知である（例えば、特開平５－４５１７１号公報、特開平７－３０６０５４号公報、特開平８－９４７３５号公報などを参照）ので、詳細な説明は省略する。また、図５において、２６は進行方向入力部で、ユーザーが徒歩、車両、鉄道などにより移動中のときのその進行方向（東西南北など）を地磁気などを利用して計測しその進行方向を求める進行方向入力部である。この実施形態４では、前記ＧＰＳ受信機２２と進行方向入力部２６とにより、本発明によるユーザーの「現在位置特定手段」を構成している。また図５において、２３はこのＧＰＳ受信機２２からの現在位置情報としての座標データ（緯度データ及び経度データ）と前記進行方向入力部２６からの進行方向データを受け取り、該当する衛星画像を選択し、それを前記ＬＣＤ２１に表示するための制御部で、パーソナル・コンピュータなどにより構成されている。

【００２６】また、図５において、２４は、前記制御部２３とインターネットなどのコンピュータ通信用公衆回線網２０を介して接続された地図データベース用サーバー（コンピュータ）である。この地図用サーバー２４は、例えば日本全国の地図を、座標データ（緯度データ及び経度データ）、地名、施設名、施設の識別データ（施設の電話番号など）などの位置識別データと関連付けながら、データベースとして記録している。この地図用サーバー２４は、公衆回線網２０により前記制御部２３とオンラインで接続されている。なお、この公衆回線網２０は、有線通信網だけでなく、携帯電話網、ＰＨＳ（パーソナル・ハンディホン・システム）網、自動車電話網及び人工衛星通信網などの無線通信網をも含むものであることが望ましい。

【００２７】また図５において、２５は、インターネットなどのコンピュータ通信用公衆回線網２０に接続された実況映像入力装置で、各実況地点それぞれ設けられ、各実況地点における複数方向の実況映像（各実況地点から複数方向に向かって見える実況映像）をそれぞれリアルタイムに常時入力する複数のデジタル・ビデオカメラと、これらのデジタル・ビデオカメラからのデジタル映像データを、インターネットなどのコンピュータ通信網を介してアクセスして来た複数のユーザーに対してオンラインで提供するための実況映像提供用コンピュータと、から構成されている。この実況映像提供用コンピュータは、各地点の実況映像を、座標データ（緯度データ及び経度データ）、地名、施設名、施設の識別データ（施設の電話番号など）などの位置識別データ及び東西南北などの方向データと関連付けながら、データベースとして記録している。この実況映像提供用コンピュータは、前記通信網２０により前記制御部３とオンラインで接続されている。なお、この通信網２０は、有線通信網だけでなく、携帯電話網、ＰＨＳ（パーソナル・ハンディホン・システム）網、自動車電話網及び人工衛星通信網などの無線通信網をも含むものであることが望ましい。

【００２８】制御部２３は、ユーザーのキーボード２６又はマウス２７などの入力装置による指示により、前記地図用サーバー２４にアクセスして、そこから、ユーザーが希望する地点（前記入力装置で指定した地点）を含む所定領域の地図のデータをオンラインで取り出して、ＬＣＤ２１に表示させる。また、前記制御部２３は、ユーザーがこの表示された地図の任意の地点をマウス２７で指示しその地点を含む所定領域の実況映像の表示を指令したとき、前記各実況地点の前記実況映像提供用コンピュータを含む映像入力装置２５にアクセスして、該当する所定領域の実況映像のデータをオンラインで取り出して、その実況映像をＬＣＤ２１にリアルタイムに表示させる。また、制御部２３は、ユーザーが、例えば、表示を希望する地点の地名、施設名、施設の識別データなどを入力して該当する実況地点の実況映像又はその実況地点を含む地図の表示を希望したとき、前記映像入力装置２５又は地図用サーバー２４にアクセスして、該当する実況映像又は地図をオンラインで取り出して、それらをＬＣＤ２１に表示させる。また、制御部２３は、ユーザーが自分が現在居る現在地点から進行方向に向かう方向で且つ最も近くの場所にある実況地点の実況映像であって、その進行方向に向かって見える実況映像を表示せよと指令したときは、前記ＧＰＳ受信機２２及び進行方向入力部２６からユーザーの現在位置及び進行方向を座標データ（緯度データ及び経度データ）及び方向データとして受け取り、その座標データ及び方向データに基づいて、該当する前記各実況地点の映像入力装置２５にアクセスして、オンラインで該当の実況映像の提供を受けて、ＬＣＤ２１に表示させる。なお、この場合の、前記制御部２３が前記映像入力装置２５から該当する実況映像の提供を受ける方法としては、従来のインターネット用のブラウジング・ソフトウェア（閲覧ソフトウェア）などによりこの各地の映像入力装置２５にそれぞれ直接アクセスして取り込む方法と、前記映像入力装置２５に対して該当する実況映像データを電子メールに添付したファイルとして送信してもらうように依頼してその送信により受け取る方法など、様々な方法が有り得る。

【００２９】また、この実施形態４では、前記制御部２３は、ユーザーが、ある実況映像が前記ＬＣＤ２１に表示されているとき、その表示された実況映像の中のある部分だけを、例えば特定の建築物や特定の橋や特定の道路などの部分だけを、他の部分と見分けやすいように所

定のマーキングをしたいと指令したときは、その部分を他と異なって目立つようにマーキングできる手段（プログラム）を含むのがよい。この場合のマーキングは、例えば、他と異なる色で着色して色別する方法、その部分のみに網掛け処理を行う方法、その部分を他の部分よりも太い実線で表示する方法、などの様々な方法がある。

【００３０】実施形態５．次に、図６は本発明の実施形態５を示すブロック図である。図６において、符号２１，２２，２３，２６，２７は図１におけると同様なので説明を省略する。図６において、３４は制御部２３に接続されたＣＤ－ＲＯＭプレーヤ（再生装置）、３５はこのＣＤ－ＲＯＭプレーヤ３４に読み取れらるＣＤ－ＲＯＭである。このＣＤ－ＲＯＭ３５には、例えば日本国の全体の地図を、座標データ（緯度・経度データ）、地名、施設名、施設識別データなどの位置識別データと関連付けて記録した地図データベースが記録されている。また図６において、３１は、インターネットなどのコンピュータ通信網３０に接続された映像入力装置で、図４の映像入力装置２５と同様のものである。前記制御部３は、前記ＣＤ－ＲＯＭプレーヤ１４によりＣＤ－ＲＯＭ１５を読み取ることにより、ユーザーが希望する位置を含む所定領域の地図を読み取ってＬＣＤ１に表示させることができる。また、前記制御部３は、前記コンピュータ通信網３０を介して映像入力装置３１にアクセスすることにより、ユーザーが希望する実況地点からのユーザーが希望する所定方向の実況映像を取り込み、ＬＣＤ２１に表示させることができる。また、制御部２３は、ユーザーが、「自分が現在居る現在地点から進行方向に向かう方向にある地点で且つ現在地点から最も近い実況地点の実況映像であって、その地点から自分の進行方向に向かって撮像した実況映像を、表示せよ」と指令したときは、前記ＧＰＳ受信機２２からユーザーの現在位置を座標データ（緯度データ及び経度データ）として受け取り、且つ、前記進行方向入力部２６からユーザーの進行方向のデータを受け取り、その座標データ及び進行方向データに基づいて、前記映像入力装置３１にアクセスして、該当の座標データに近い場所にある実況地点のもので且つユーザーの進行方向に近い方向の実況映像のデータをオンラインで読み取り、その実況映像をリアルタイムにＬＣＤ２１に表示させる。

【００３１】

【発明の効果】

(1)本発明による実況映像提供システムによれば、ユーザーは、地図を見ながら、例えば希望の地点をポインティングデバイスで指定する（例えばマウスでクリックする）だけで、その地点の今の現時点の状況を実況映像で見ることができる。また、ユーザーは、いちいちポインティングデバイスで指定しなくても、予めコンピュータプログラムで実況映像を希望する複数の地点の地点識別データを順次入力するようにしておけば、コンピュータにより次々と希望する地点に対応する実況映像を表示させることができる。よって、ここでも、ユーザーは地図を見ながら、実際には行っていないのに実際に行っているのと同じ感動を得られる「バーチァル・トラベル（仮想旅行）」を実現できるようになる。また、例えば、全世界の地図から全世界の各地の実況映像をみながら、全世界のユーザーが一つの宝を探していくというような、コンピュータ通信ネットワークの世界の中での「宝探し」ゲームを世界中で同時に競うことも可能になる。また従来より存在しているＧＰＳ受信機と請求項１の発明とを組み合わせることによって、次のような効果を得ることかできる。すなわち、ユーザーがＧＰＳ受信機からの現在位置（緯度データと経度データの座標データ）に基づいて地図データベースから現在位置を含む所定領域の地図を読み出して表示し、その表示された地図上に表示された現在位置（座標データ）又はそれと近い地点をユーザーかマウスでクリックしてその地点の実況映像をオンラインで取り出すように指令すれば、ＧＰＳ受信機からの現在位置か計測誤差などがなく正しいものかどうかを確認できる。つまり、表示された実況映像がユーザーの現在の位置から実際に見えるものと一致していれば、ＧＰＳ受信機からの現在位置は正しいものと判定できる（従来は、ユーザーは、地図だけでは、ＧＰＳ受信機による現在位置か正しいかどうかを自分で確かめることが困難だった）。

(2)また、本発明による実況映像提供システムによれば、ユーザーは、ある地点の実況映像を見ながら、その実況映像の識別データから、対応する地図上の地点を表示させることができるので、ある実況映像を見て、その実況映像か見える場所が地図上のどこなのか（どういう地名・施設名なのかなど）を、容易に知ることができるようになる。

(3)また本発明による実況映像提供システムによれば、ユーザーは、自分の希望する文字列等により構成される検索データを入力することにより、その検索データに対応する一つ又は複数の地点の実況映像を、その場でリアルタイムに見ることが可能になる。特に、遠隔の複数の地点における今この瞬間の実況を映像でリアルタイムに順次見ることができる「バーチャル・トラベル（仮想旅行）」を提供できるようになる。

(4)なお、本発明において、前記各実況映像を特定するための実況映像識別データを、前記映像入力手段が設けられた各地点を示す位置データとその映像入力手段が撮影した方向を示す方向データとから構成するようにすれば、同じ地点でも、見る方向によって異なる実況映像を提供できるようになり、「生の現場」をより詳細にリアルタイムに再現できる実況映像を提供できるようになる。

(5)また本発明では、ユーザーの現在位置をＧＰＳ受信機なとの現在位置特定手段により求め、この求められた

現在位置に対応する実況地点の実況映像をオンラインで取り出して表示するようにしている。したがって、ユーザーは、例えば、次のような使い方が可能になる。例えば、自分が車両などに乗って移動しているとき、ＧＰＳ受信機により自分の現在位置を求めて、その現在位置に対応する地図上の地点を地図画面上で見る（このためのシステムは、従来より、自動車用の目的地までのルートの地図探索・運転案内システムとして実用化されている）。また、同時に、ユーザーは、ＧＰＳ受信機からの現在位置を求め、通信ネットワークを介して該当する映像入力手段にアクセスし、現在位置に対応する実況映像をオンラインで取り出して画面上に表示させて見る。これにより、ユーザーは、目的地へのルートを記載した地図を見ながら、地図上に表示されている現在位置（ＧＰＳ受信機により計測されるユーザーの現在位置が画面の地図上に矢印などで表示されるシステムは自動車の運転案内システムとして既に多数市販されている）と実況映像とが一致しているかどうかを確認し、一致していれば、ＧＰＳ受信機からの現在位置が計測誤差なく正しいことを確認できる。また一致していなければ、ＧＰＳ受信機からの現在位置が間違っていることが分かる。なお、ここで述べた請求項５の発明によらずとも、従来より存在しているＧＰＳ受信機と請求項１の発明とを組み合わせることによっても、請求項５と同様の効果を得ることはできる（上述のとおり）。すなわち、ユーザーがＧＰＳ受信機からの現在位置に基づいて地図データベースから現在位置を含む所定領域の地図を読み出して表示し、その表示された地図の現在位置に近い地点をマウスでクリックし、そのマウスでクリックした地点に近い一つ又は複数の実況地点の実況映像をオンラインで取り出すようにすれば、ＧＰＳ受信機からの現在位置が正しいかどうかをユーザー自身が確認できる。

(6)また、本発明では、前記映像入力手段は、前記各実況地点から複数の方向に向かって見える映像を撮像するものであり、前記各実況地点を互いに識別するための実況地点識別データは、前記映像入力手段が設けられた各実況地点の位置を示す位置データとその映像入力手段が撮影する方向を示す方向データとから構成されており、前記現在位置特定手段は、ユーザーの現在位置を特定する手段とユーザーの進行方向を特定する手段とを含んでおり、前記実況地点識別データ選択手段は、前記現在位置特定手段により特定されたユーザーの現在位置（緯度データ及び経度データによる座標データなど）及びユーザーの進行方向（東西南北など）に基づいて、ユーザーの現在位置に（最も）近い実況地点を示し且つユーザーの進行方向に（最も）近い方向の実況地点識別データを選択するものである。よって、車両などで移動中のユーザーは、画面に表示された地図上の自分の現在位置（ＧＰＳ受信機からの自分の現在位置が矢印などで表示される）を見ながら、同時に、前記ＧＰＳ受信機からの現在位置に対応する実況映像を見ることができ、地図上の地点と実況映像とを照らし合わせて、ＧＰＳにより計測された地図上の現在位置が本当に正しいかどうかを確認することができる。

(7)また、本発明では、前記表示手段に表示された実況映像の中のユーザーが指定した部分に対して他の部分と区別するためのマーキングをするためのマーキング手段を備えることにより、実況映像（動画でも静止画でもよい）の中のある部分（例えば、特定の建造物、橋、道路、河川、公園など）のみをマーキングできるので、実況映像を自分の目的に応じて見やすい形に加工できるようになる。

(8)また、本発明において、前記映像入力手段に、その地点において発生している音声をリアルタイムに入力する手段をも含ませ、これらの入力された音声をそれぞれリアルタイムに無線又は有線で取り込む（インターネット用ブラウザーによる閲覧する場合や通信ネットワークにより送信させる場合などを含む）ことにより、ユーザーは、実況映像（現場の生の映像。動画又は静止画）だけでなく、「現場の生の音声」をも併せて知ることが可能になる。

(9)また本発明では、さらに、前記映像入力手段の近傍に備えられ、匂いセンサと、この匂いセンサからの信号を匂いデジタルデータに変換する手段とから構成され、前映像入力手段の設置された地点又はその周辺の匂いを入力するための匂い入力手段と、この匂い入力手段からの匂いデータを、その匂いに近似した匂いを発生させるための芳香剤調合データに変換する手段と、前記表示手段の近傍に備えられ、前記芳香剤調合データから芳香剤を調合して所望の匂いを発生させる匂い発生手段と、を含むようにすることにより、ユーザーは、前記の実況映像と実際の音声だけでなく、現場の実際の匂いをも、リアルタイムに遠隔地において感得することができるようになる。

【図面の簡単な説明】

【図１】　本発明の実施形態１又は２のハードウェア構成を示す図である。

【図２】　本発明の実施形態１又は２の概念的構成を示す図である。

【図３】　本発明の実施形態１のディスプレイの構成を示す図である。

【図４】　本発明の実施形態１においてディスプレイに表示される地図の一例を示す図である。

【図５】　本発明の実施形態４を示すブロック図である。

【図６】　本発明の実施形態５を示すブロック図である。

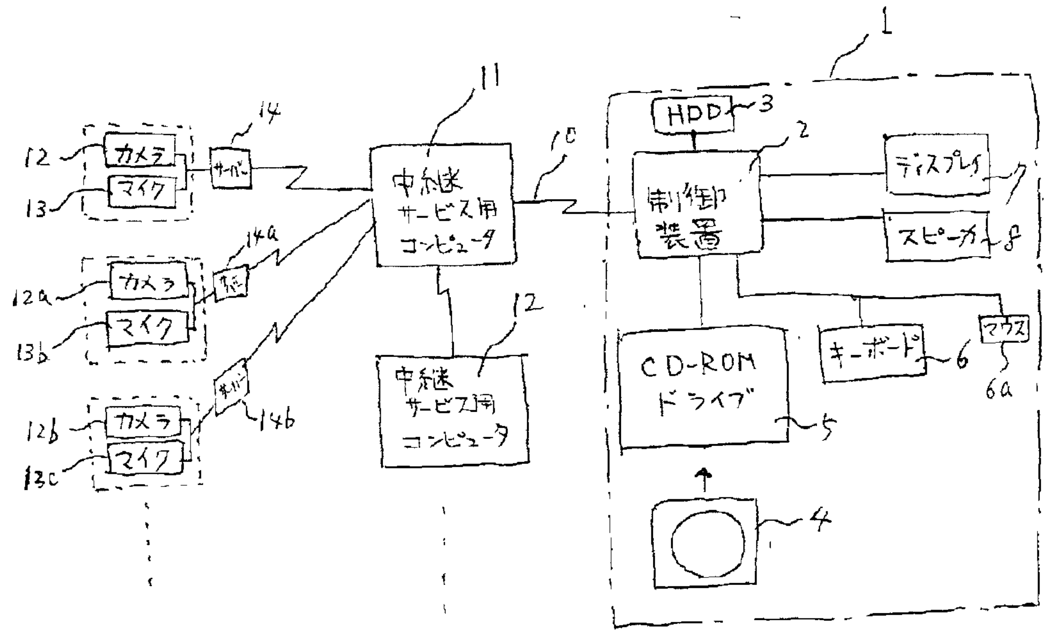
【符号の説明】

1　パーソナルコンピュータ（パソコン）

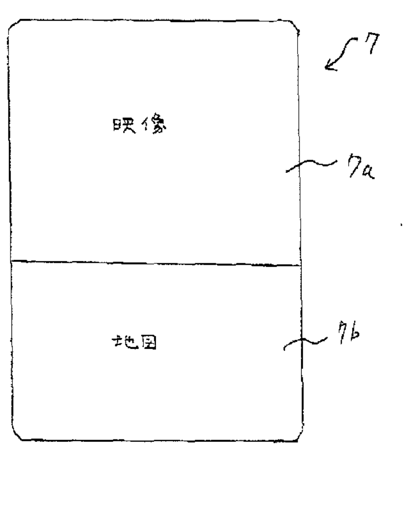
2　制御装置

３　ハードディスク装置
４　ＣＤ－ＲＯＭ
５　ＣＤ－ＲＯＭドライブ５
６　キーボード
７　ディスプレイ
７ａ　ディスプレイの上半分
７ｂ　ディスプレイの下半分
８　スピーカ
１０　公衆回線
１１　中継サービス用コンピュータ
１２，１２ａ，１２ｂ　ビデオカメラ
１３，１３ａ，１３ｂ　マイク
２１　ＬＣＤ．　２２　ＧＰＳ受信機．　２３　制御部．２４　地図データベース用サーバー（コンピュータ）．２５　映像入力装置．　２６　キーボード．　２７　マウス．３０　コンピュータ通信網．　３１　映像入力装置．３４　ＣＤ－ＲＯＭプレーヤ．　３５　ＣＤ－ＲＯＭ

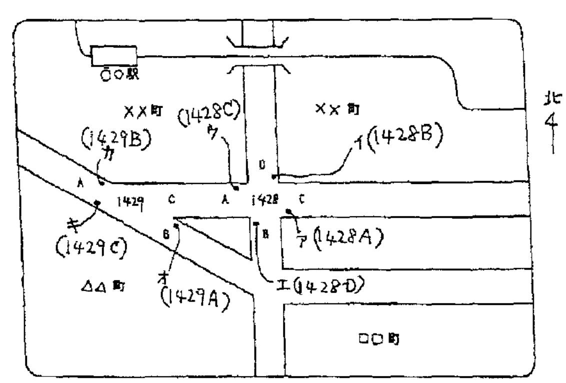
【図１】



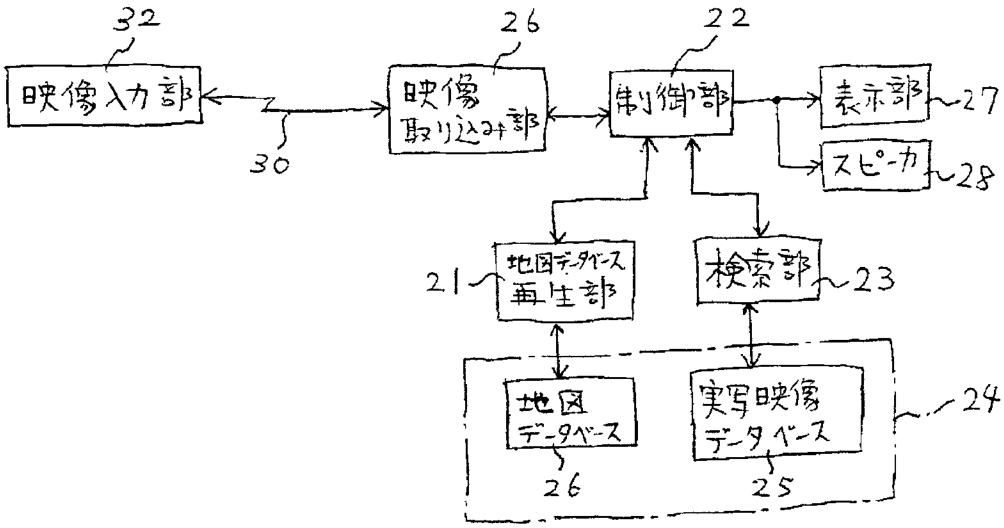
【図３】



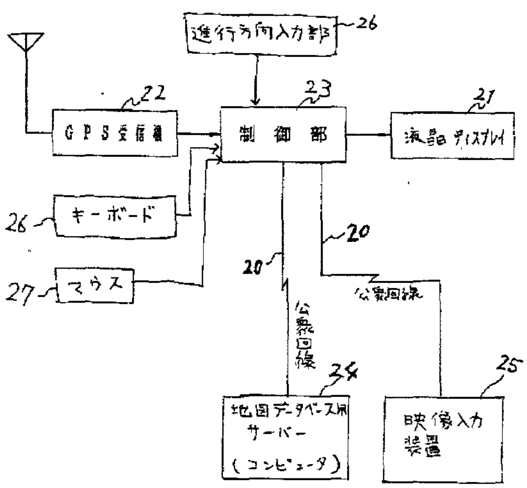
【図４】



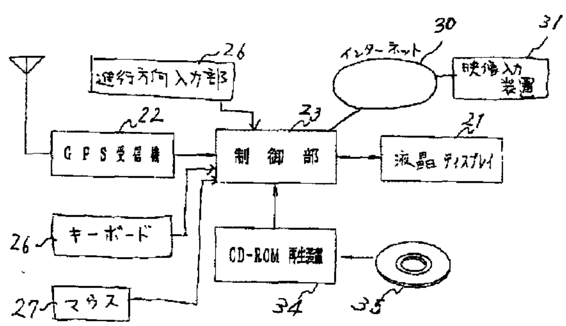
【図２】


32
映像入力部
30
26
映像取り込み部
22
制御部
表示部
27
スピーカ
28
21
地図データベース再生部
検索部
23
地図データベース
26
実写映像データベース
25
24

【図５】


進行方向入力部
26
22
GPS受信機
23
制御部
21
液晶ディスプレイ
26
キーボード
27
マウス
20
20
公衆回線
公衆回線
34
地図データベース用サーバー（コンピュータ）
25
映像入力装置

【図６】


26
進行方向入力部
30
インターネット
31
映像入力装置
22
GPS受信機
23
制御部
21
液晶ディスプレイ
26
キーボード
CD-ROM再生装置
34
35
27
マウス

Electronic Patent Application Fee Transmittal

Application Number:	11617509
Filing Date:	28-Dec-2006
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Filer:	Jeffrey Darryl Hunt
Attorney Docket Number:	06-0719
Filed as Large Entity	

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
	Total in USD ($)			**180**

Electronic Acknowledgement Receipt

EFS ID:	2329311
Application Number:	11617509
International Application Number:	
Confirmation Number:	4247
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Customer Number:	67589
Filer:	Jeffrey Darryl Hunt
Filer Authorized By:	
Attorney Docket Number:	06-0719
Receipt Date:	17-OCT-2007
Filing Date:	28-DEC-2006
Time Stamp:	01:44:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$180
RAM confirmation Number	3566
Deposit Account	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)

1	Information Disclosure Statement (IDS) Filed	pg1.pdf	54074 5b165559a33ea9b564daa6f7fee232fc9dd67d5e	no	1
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Information:					
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Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
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Warnings:					
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This is not an USPTO supplied IDS fillable form					
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Information:					

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9	Foreign Reference	002-11160424.pdf	661133 b7f74469b13f747e72e38ea0692536933a5355c6	no	11
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10	Foreign Reference	003-6301898.pdf	1423843 a606829901a93fd7daac153294af29c2348bf70e	no	24
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Total Files Size (in bytes):	39908805

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 7

Complete if Known	
Application Number	11/617,509
Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

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 or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 5,867,804	02-02-1999	Pilley, et al	
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		US- 5,689,442	11-18-1997	Swanson	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(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[6]
		EP785,536	07-23-1997	Ferri, et al		
		WO97,37336	10-08-1997	Auty. et al		
		EP232,031	08-12-1987	Hale		
		EP613,109	08-31-1994	Hoover		
		WO96/12265	04-25-1996	Milgard		
		WO95/27910	10-19-1995	Wallis		

Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 4 of 7

Complete if Known	
Application Number	11/617,509
Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

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 or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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		US- 5,714,948	02-03-1998	Farmakis,et al	
		US- 5,627,753	05-06-1997	Brankin, et al	
		US- 4,857,912	08-15-1989	Everett, Jr. et al	
		US- 6,259,475	07-10-2001	Ramachandran, et al	
		US- 5,440,337	08-08-1995	Henderson, et al	
		US- 6,282,488	08-28-2001	Castor, et al	
		US- 5,508,736	04-16-1996	Cooper	
		US- 5,469,371	11-21-1995	Bess	
		US- 5,243,530	09-07-1993	Stanifer, et al	
		US- 5,268,698	12-07-1993	Smith, Sr. et al	
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		US- 2005/0055727	03-10-2005	Creamer, et al	
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		US- 5,938,706	08-17-1999	Feldman	
		US- 6,078,850	06-20-2000	Kane, et al	
		US- 6,549,130	04-15-2003	Joso	
		US- 5,091,780	02-25-1992	Pomerleau	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(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[6]
		JP-A-10-155040	06-09-1998	Nisshin Denki		
		JP-HEI-10-66058	03-06-1998	Masanobu Kujirada		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 5 of 7

Complete if Known	
Application Number	11/617,509
Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

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 or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 5,666,157	09-09-1997	Avid	
		US- 6,424,370	07-23-2002	Courtney	
		US- 6,504,479	01-07-2003	Lemons	
		US- 6,628,835	09-30-2003	Brill	
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		US- 6,385,772	05-07-2002	Courtney	
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		US- 5,642,285	06-24-1997	Woo	
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Sheet 6 of 7

Complete if Known	
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Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

U. S. PATENT DOCUMENTS

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		US-			

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 7

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		EP613,110	08-31-1994	Hoover		
		EP613,111	08-31-1998	Tenpei		
		EP744,630	11-27-1996	Atul		
		WO90/04242	04-19-1990	Norman, et al		
		WO98/52174	11-19-1999	Hatjassalo		
		EP532,110	03-17-1993	Raimondi		

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
	§	
David A. Monroe	§	
	§	
Serial No.: 11/617,509	§	Docket No. 06-0719
Filed: December 28, 2006	§	
	§	
for: **APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM**	§ § § §	

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

AMENDMENT IN RESPONSE TO NON-FINAL OFFICE ACTION MAILED OCTOBER 4, 2007

In response to the Non-final Office Action Mailed October 4, 2007, applicant respectfully requests entry of this Amendment in the application. Applicant submits that this amendment presents no new matter. Applicant respectfully submits that this Amendment places the claims in condition for allowance, or in better condition for appeal. Submitted herewith is an Information Disclosure Statement.

Amendments begin on page 2 of this paper.

Remarks begin on page 24 of this paper.

AMENDMENTS

Amendments to Specification

Replace paragraph 0049, which reads:

[0049] Turning now to Fig.1, the simplest embodiment of the invention incorporates a standard analog or digital camera device 10 for capturing a visual image in the typical fashion. The camera 10 may be operator activated as indicated at 12, or may be programmed to be activated at selected intervals or in response to certain conditions. For example, a motion detector may be utilized to activate the camera 10 in a surveillance installation. Once activated, the camera 10 captures a visual image in typical fashion through a lens (see lens 192, for example, in Fig. 7A). In the illustrated embodiment, the captured image is then transmitted to a gray scale bit map memory device 16, from which it is output to a half-tone conversion scheme 18 to be input into a binary bit map 20 for formatting the captured image in a configuration suitable for transmission via a Group-III facsimile system. The signal generated at 22 by the binary bit map 20 is input into a Group-III encoding and compression network 24 for generating an input signal at 26 which is introduced into a Group III protocol transmission device 28. The output at 30 of the transmission device 28 is then transmitted into any standard transmission interface such as, by way of example, hard line telephonic transmission, cellular transmission, radio signal, satellite transmission or other transmission system 32 via a modem or similar device, as needed (as diagrammatically illustrated at 29), to be received via a compatible interface by a remote Group-III receiving system 34. The Group III receiving system 34 is a typical Group-III facsimile system comprising a Group-III receiver 36, decoder and decompressor 38 and binary bit map 40, from which a facsimile hard copy such as plain paper copy may be generated.

with the following new paragraph:

[0049] Turning now to Fig.1, the simplest embodiment of the invention incorporates a standard analog or digital camera device 10 for capturing a visual image in the typical fashion. The camera 10 may be operator activated as indicated at 12, or may be programmed to be activated at

PAGE 6/29 * RCVD AT 1/5/2008 12:56:00 AM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/8 * DNIS:2738300 * CSID:5122618959 * DURATION (mm-ss):07-40

selected intervals or in response to certain conditions. For example, a motion detector may be utilized to activate the camera 10 in a surveillance installation. Once activated, the camera 10 captures a visual image in typical fashion through a lens (see lens 192, for example, in Fig. 7A). In the illustrated embodiment, the captured image is then transmitted to a gray scale bit map memory device 16, from which it is output to a half-tone conversion scheme 18 to be input into a binary bit map 20 for formatting the captured image in a configuration suitable for transmission via a Group-III facsimile system. The signal generated at 22 by the binary bit map 20 is input into a Group-III encoding and compression network 24 for generating an input signal at 26 which is introduced into a Group III protocol transmission device 28. The output at 30 of the transmission device 28 is then transmitted into any standard transmission interface such as, by way of example, hard line telephonic transmission, cellular transmission, radio signal, satellite transmission or other transmission system 32 via a modem or similar device, as needed ~~(as diagrammatically illustrated at 29)~~, to be received via a compatible interface by a remote Group-III receiving system 34. The Group III receiving system 34 is a typical Group-III facsimile system comprising a Group-III receiver 36, decoder and decompressor 38 and binary bit map 40, from which a facsimile hard copy such as plain paper copy may be generated.

Replace paragraph 51 which reads:

[0051] The embodiment of Fig. 2 is similar to Fig. 1, but incorporates a memory and optional operator viewer system. The image is captured by the camera 10 and conditioned by the gray scale bit map 16, as in Fig. 1. In this embodiment, the output 44 of the bit map 16 is input into a standard digital memory device 46 for later recall. This configuration is particularly well suited for applications where near real time transmission of the image either is not required or is not desirable. It will be noted that with the exception of the insertion of the memory device 46 and the optional viewer device 48, the capture and transmission system of Fig. 2 is identical to that shown and described in Fig. 1. Once the image is captured by the camera 10 and is presented at 44 to the memory device 46, it is stored for later recall and transmission. The specific type of memory device is optional and may include, for example, an SRAM device, a DRAM, Flash RAM, hard drive, floppy disk, PCMCIA format removable memory (see, for example, the PCMCIA card 50 in Fig. 7A), writeable optical media or other storage device. The memory may

PAGE 7/29 * RCVD AT 1/5/2008 12:56:00 AM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/8 * DNIS:2738300 * CSID:5122618959 * DURATION (mm-ss):07-40

selectively capture images, as indicated by the operator interface/capture interface 52, or may be programmed to selectively capture periodic images or all images. In the embodiment in Fig. 2, an optional viewer device 48 is provided. This permits the operator to recall and view all or selective images before transmission, as indicated by the operator interface/recall interface 54. This permits the operator to review all images retained in the memory 46 and transmit selective images, as desired, to the Group-III transmission system. The remainder of the system of Fig. 2 operates in the same manner as the configuration shown and described in Fig. 1.

with the following new paragraph:

[0051] The embodiment of Fig. 2 is similar to Fig. 1, but incorporates a memory and optional operator viewer system. The image is captured by the camera 10 and conditioned by the gray scale bit map 16, as in Fig. 1. In this embodiment, the output 44 of the bit map 16 is input into a standard digital memory device 46 for later recall. This configuration is particularly well suited for applications where near real time transmission of the image either is not required or is not desirable. It will be noted that with the exception of the insertion of the memory device 46 and the optional viewer device 48, the capture and transmission system of Fig. 2 is identical to that shown and described in Fig. 1. Once the image is captured by the camera 10 and is presented at 44 to the memory device 46, it is stored for later recall and transmission. The specific type of memory device is optional and may include, for example, an SRAM device, a DRAM, Flash RAM, hard drive, floppy disk, PCMCIA format removable memory (see, for example, the PCMCIA card [50] <u>72</u> in Fig. 7A), writeable optical media or other storage device. The memory may selectively capture images, as indicated by the operator interface/capture interface 52, or may be programmed to selectively capture periodic images or all images. In the embodiment in Fig. 2, an optional viewer device 48 is provided. This permits the operator to recall and view all or selective images before transmission, as indicated by the operator interface/recall interface 54. This permits the operator to review all images retained in the memory 46 and transmit selective images, as desired, to the Group-III transmission system. The remainder of the system of Fig. 2 operates in the same manner as the configuration shown and described in Fig. 1.

PAGE 8/29 * RCVD AT 1/5/2008 12:56:00 AM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/8 * DNIS:2738300 * CSID:5122618959 * DURATION (mm-ss):07-40

Replace paragraph 53 which reads:

[0053] Fig. 4 illustrates the use of the image capture and/or retention configured in any of the optional embodiments of Figs. 1-3 and adapted for use in combination with any of a variety of transmitting and receiving schemes such as, by way of example, the Group-III system shown in Figs. 1-3, a modem, direct connection to a personal computer, serial or parallel transmission, or any selected transmitting/receiving protocol. This illustration demonstrates the versatility of the system once the image has been captured, converted and conditioned by the image capture device of the subject invention. Specifically, once the image is captured by the camera 10 and conditioned by the gray scale bit map 16, it may be stored and transmitted, or transmitted "real time" via any transmitting and receiving scheme. A shown in Fig. 4 the image capture device includes the memory device 46 and the optional viewer 48 for incorporating maximum capability. However, any of the schemes of Fig. 1-3 would be suitable for producing a transmittable signal. In the embodiment shown, a format select interface switch 60 is positioned to receive the fully conditioned signal on line 59. This would permit either automated or manual selection of the transmitting protocol, including the Group-III facsimile system previously described in connection with Figs. 1-3, as indicated by selecting format select switch 60 position A; or PC modem protocol as illustrated by the JPEG compressor 62 and protocol generator 64, as indicated by selecting format select switch position B; or the wavelet compressor and PC modem protocol, as illustrated by the wavelet compressor 66 and PC modem protocol generator 68 by selecting switch position C, or any selected conversion network 65, (if needed) with a compatible compressor 67 (if needed) and compatible protocol generator 75 (if needed), as indicated by switch position D; or a serial protocol scheme 77, with serial drivers 79 directly to a hardwired personal computer 81 by selecting switch position E. Of course, it will be readily understood by those skilled in the art that one or a plurality of transmitting protocols may be simultaneously selected. Depending on the protocol selected, the signal output is generated at the selected output module and introduced to a communication interface module 83 via a modem or other device, as needed, for transmission via a transmission system to a compatible receiving station such as the Group-III facsimile device 34, the personal computer 85, the video telephone 89, and/or other server or receiving device 91 for distribution.

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with the following new paragraph:

[0053] Fig. 4 illustrates the use of the image capture and/or retention configured in any of the optional embodiments of Figs. 1-3 and adapted for use in combination with any of a variety of transmitting and receiving schemes such as, by way of example, the Group-III system shown in Figs. 1-3, a modem, direct connection to a personal computer, serial or parallel transmission, or any selected transmitting/receiving protocol. This illustration demonstrates the versatility of the system once the image has been captured, converted and conditioned by the image capture device of the subject invention. Specifically, once the image is captured by the camera 10 and conditioned by the gray scale bit map 16, it may be stored and transmitted, or transmitted "real time" via any transmitting and receiving scheme. A shown in Fig. 4 the image capture device includes the memory device 46 and the optional viewer 48 for incorporating maximum capability. However, any of the schemes of Fig. 1-3 would be suitable for producing a transmittable signal. In the embodiment shown, a format select interface switch 60 is positioned to receive the fully conditioned signal on line 59. This would permit either automated or manual selection of the transmitting protocol, including the Group-III facsimile system previously described in connection with Figs. 1-3, as indicated by selecting format select switch 60 position A; or PC modem protocol as illustrated by the JPEG compressor 62 and protocol generator 64, as indicated by selecting format select switch position B; or the wavelet compressor and PC modem protocol, as illustrated by the wavelet compressor 66 and PC modem protocol generator 68 by selecting switch position C, or any selected conversion network 65, (if needed) with a compatible compressor 67 (if needed) and compatible protocol generator 75 (if needed), as indicated by switch position D; or a serial protocol scheme 77, with serial drivers 79 directly to a hardwired personal computer [81] <u>181</u> by selecting switch position E. Of course, it will be readily understood by those skilled in the art that one or a plurality of transmitting protocols may be simultaneously selected. Depending on the protocol selected, the signal output is generated at the selected output module and introduced to a communication interface module [83] <u>183</u> via a modem or other device, as needed, for transmission via a transmission system to a compatible receiving station such as the Group-III facsimile device 34, the personal computer 85, the video telephone 89, and/or other server or receiving device 91 for distribution.

Replace paragraph 66 which reads:

[0066] In order to send a facsimile transmission over a typical Group-III Facsimile system, the multiplexer 82 is switched to the processor 86 such that the RAM address is generated by the processor 82 instead of the video address generator signal. In the facsimile transmitting mode, the processor addresses the RAM and manipulates the data representing each frame image. For example, the processor will perform the gray scale to half tone conversion described in connection with Fig. 1-4 to prepare the signal for facsimile transmission. The processor can also perform image compression and output the image as a gray scale. In the facsimile transmission mode, once the half-tone conversion is completed, the processor executes a code for performing a bi-level compression of the data and the signal representing the frame data is output over line 90, through the multiplexer 81 and over the processor bus 87 to the processor 86, then to modem 104 for transmission. Other memory and processor configurations could be used without departing from the scope and spirit of the invention, as will be recognized by those skilled in the art.

with the following new paragraph:

[0066] In order to send a facsimile transmission over a typical Group-III Facsimile system, the multiplexer 82 is switched to the processor 86 such that the RAM address is generated by the processor [82] <u>86</u> instead of the video address generator signal. In the facsimile transmitting mode, the processor <u>86</u> addresses the RAM and manipulates the data representing each frame image. For example, the processor <u>86</u> will perform the gray scale to half tone conversion described in connection with Fig. 1-4 to prepare the signal for facsimile transmission. The processor <u>86</u> can also perform image compression and output the image as a gray scale. In the facsimile transmission mode, once the half-tone conversion is completed, the processor <u>86</u> executes a code for performing a bi-level compression of the data and the signal representing the frame data is output over line 90, through the multiplexer 81 and over the processor bus 87 to the processor 86, then to modem 104 for transmission. Other memory and processor configurations could be used without departing from the scope and spirit of the invention, as will be recognized by those skilled in the art.

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Amendments to Claims

This Listing of Claims replaces all listings, and versions, of claims in the application.

LISTING OF CLAIMS

Claims 1-42 are canceled.

43. (new) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data; and

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device, movement by the user of the portable housing commonly moving the display.

44. (new) The apparatus according to claim 43 and further comprising:

the processing platform including at least one processor.

45. (new) The apparatus according to claim 43 and further comprising:

the portable housing including a handset.

46. (new) The apparatus according to claim 43 and further comprising:

a microphone supported by the portable housing, the microphone being associated with the mobile phone;

a speaker supported by the portable housing, the speaker being associated with the mobile phone.

47. (new) The apparatus according to claim 43 and further comprising:

the mobile phone being selectively operable to send to a remote recipient a wireless transmission, the wireless transmission conveying a voice transmission.

48. (new) The apparatus according to claim 43 and further comprising:

the mobile phone being selectively operable to receive from a remote sender an incoming wireless transmission, the incoming wireless transmission conveying at least one of:

incoming compressed digital image data,
an incoming voice transmission, and
both incoming compressed digital image data and an incoming voice transmission.

49. (new) The apparatus according to claim 43 and further comprising:

a camera supported by the portable housing, the camera including the image collection device.

50. (new) The apparatus according to claim 43 and further comprising:

the image collection device being suitable to provide the visual image data in digital format.

51. (new) The apparatus according to claim 43 and further comprising:

the image collection device being suitable to provide the visual image data in analog format;

an analog to digital converter supported by the portable housing, the analog to digital converter being suitable to receive the visual image data in analog format, the being suitable to provide the visual image data in digital format.

the display including an LCD, the LCD being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

64. (new) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device, movement by the user of the portable housing commonly moving the display.

65. (new) The apparatus according to claim 64 and further comprising:

the display including at least one of:

a viewfinder, and

a display screen apart from the viewfinder.

52. (new) The apparatus according to claim 43 and further comprising:

the display including a viewfinder, the viewfinder being suitable to receive the visual image data, the viewfinder being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

53. (new) The apparatus according to claim 52 and further comprising:

the viewfinder being suitable to receive the visual image data in digital format.

54. (new) The apparatus according to claim 52 and further comprising:

the viewfinder being suitable to receive the visual image data in analog format.

55. (new) The apparatus according to claim 43 and further comprising:

the display including a display screen, the display screen being defined apart from a viewfinder, the display screen being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

56. (new) The apparatus according to claim 55 and further comprising:

the display including an LCD, the LCD being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

57. (new) The apparatus according to claim 56 and further comprising:

the LCD being suitable to receive the visual image data in digital format.

58. (new) The apparatus according to claim 43 and further comprising:

at least one transmission protocol algorithm embodied in suitable media;

a processing platform associated with the at least one transmission protocol algorithm, the associated processing platform being operable to execute the at least one transmission protocol algorithm, the associated processing platform being provided the compressed visual image data, execution of the at least one transmission protocol algorithm providing the compressed visual image data in a transmission format, the visual image data in a transmission format being compatible with the mobile phone for wireless transmission by the mobile phone.

59. (new) The apparatus according to claim 58 and further comprising:

the mobile phone being operable according to a specified wireless transmission protocol, the at least one transmission protocol algorithm providing the visual image data in a compatible data transmission format, the compatible data transmission format being compatible with the specified wireless transmission protocol.

60. (new) The apparatus according to claim 59 and further comprising:

at least one transmission protocol algorithm embodied in suitable media;

a processing platform associated with the at least one transmission protocol algorithm, the associated processing platform being operable to execute the at least one transmission protocol algorithm, execution of the at least one transmission protocol algorithm providing compressed visual image data in a compatible format, the compatible format being compatible with at least one transmission protocol, the compressed visual image data in a compatible format being suitable for transmission by the mobile phone according to at least one wireless transmission protocol.

61. (new) The apparatus according to claim 43 and further comprising:

the portable housing including a first housing section, the image collection device being supported by the first housing section,
the portable housing including a second housing section, the display being supported by the second housing section,
the first housing section being adjoined to the second housing section,
the second housing section being movable in common with the first housing section when the first housing section is moved by the user,
the first housing section being movable in common with the second housing section when the second housing section is moved by the user,
the first housing section being supported for movement relative to the second housing section,
the image collection device being movable in common with the first housing section relative to the display when the first housing section is moved relative to the second housing section.

62
~~61~~. (new) The apparatus according to claim 62 and further comprising:

the first housing section being supported for pivotal movement relative to the second housing section about a pivot axis.

63. (new) The apparatus according to claim 43 and further comprising:

the image collection device being supported by the portable housing in fixed relation to the display.

66. (new) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the retained visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device, movement by the user of the portable housing commonly moving the display.

67. (new) The apparatus according to claim 66 and further comprising:

the display including at least one of:

a viewfinder, and

a display screen apart from the viewfinder.

68. (new) A mobile handset comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data; and

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data.

69. (new) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the retained visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being selectively operable to send to a remote recipient a wireless image transmission, the wireless transmission conveying the compressed digital image data, the mobile phone being selectively operable to send to a remote recipient a wireless voice transmission, the mobile phone being selectively operable to receive from a remote sender an incoming wireless image transmission; and

the display being operable to display for viewing by a user a perceptible visual image of the incoming wireless image transmission.

70. (new) The apparatus according to claim 69 and further comprising:

the display including at least one of:

a viewfinder, and

a display screen apart from the viewfinder.

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71. (new) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide in digital format visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive the visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

at least one compression algorithm embodied at least in part in suitable programmed media, the media being supported by the portable housing;

at least one processor supported by the portable housing, the at least one processor being operable to execute the at least one compression algorithm, the at least one processor being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

at least one display supported by the portable housing, the at least one display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from at least one of:

the visual image data in digital format, and

the retained visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data.

72. (new) Apparatus according to claim 71 and further comprising:

the image collection device including an analog to digital converter, the analog to digital converter being operable to provide the visual image data in digital format.

73. (new) The apparatus according to claim 71 and further comprising:

the at least one display including at least one of:

a viewfinder, and

a display screen apart from the viewfinder.

74. (new) Apparatus comprising:

a mobile phone, the mobile phone having a housing;

an image capture device supported by the housing, the image capture device providing a captured image;

a display supported by the housing, the display being operable to display the captured image;

a processor supported by the housing, the processor being operable to process digital image data of the captured image, the processor being operable to provide processed image data;

memory associated with the processor for storing the processed image data; and

a user interface enabling a user to select for transmission a captured image, the respective processed image data being provided to the mobile phone for transmission to a recipient.

75. (new) The apparatus according to claim 74 and further comprising:

removable memory apart from the memory, said removable memory being suitable to be removably housed in the housing for storing processed image data, the processed image data corresponding to a plurality of the captured images.

76. (new) The apparatus according to claim 74 and further comprising:

the display being operable to display as images generated from incoming processed image data received via the mobile phone.

REMARKS

Claims 1-42 are canceled. Claims 43-76 are new. Applicant respectfully requests examination and allowance of claims 43-76 in view of these Remarks. No new matter is introduced by the requested amendment. The amendments are believed to place the claims in condition for allowance, or in better condition for appeal.

Replacement Drawing

Responsive to the objections to the drawings, one (1) sheet of Replacement Drawings and a respective marked up drawing sheet is submitted to show corrections made in FIG. 4. FIG. 4 has been amended to clarify reference characters 68, 181 and 183. Paragraphs 51 and 53 have been amended to correspond correctly with FIG. 4 as amended.

The Examiner also objected to reference characters 81 and 83 in FIG. 5. Paragraph 66 has been amended to correspond correctly to FIG. 5, and FIG. 4 has been amended as described in the previous paragraph to clarify that only the data multiplexer identified by reference character 81 in FIG. 5 remains correct.

Amendments to Specification

Paragraphs 0049, 0051, 0053 and 0066 have been amended to correct the inaccuracies cited by the Examiner.

Objections for Informalities

The informalities in claims 3 and 5 are moot, because these claims are canceled.

Rejections Under 35 USC §102

Claims 1, 2, 4-12, 21, 23-27 and 30-36 are rejected under 35 USC §102(b) as anticipated by Hassan 5,550,646. Claims 1-3 are rejected under 35 USC §102(e) as anticipated by Wertsberger

6,072,600. Claims 1, 21, and 36-42 are rejected under 35 USC §102(e) as anticipated by Parulski 5,666,159.

Claims 1-42 are canceled, which renders moot these rejections.

Rejections Under 35 USC §103

Claims 13-18, and 29 are rejected under 35 USC §103(a) as obvious over Hassan 5,550,646 in view of Ross 5,546,194. Claims 19 and 20 are rejected under 35 USC §103(a) as obvious over Hassan 5,550,646 in view of Ross 5,546,194 and further in view of Wertsberger 6,072,600. Claim 22 is rejected under 35 USC §103(a) as obvious over Hassan 5,550,646 in view of Shibata 5,689,300. Claim 28 is rejected under 35 USC §103(a) as obvious over Hassan 5,550,646 in view of Bradley 5,995,041.

Claims 1-42 are canceled, which renders moot these rejections.

Conclusion

Applicant respectfully requests examination and allowance of claims 43-76. The undersigned is available to discuss any issue regarding this application at 512-499-8900.

Respectfully submitted,

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Date: January 4, 2008

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ENCLOSURES (Check all that apply)

- [ ] Fee Transmittal Form
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  - [ ] After Final
  - [ ] Affidavits/declaration(s)
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Amendment in 11/617,509 - 25 pages
Transmittal form - 1 sheet
Replacement Drawings - 1 sheet
Redlined Drawings - 1 sheet
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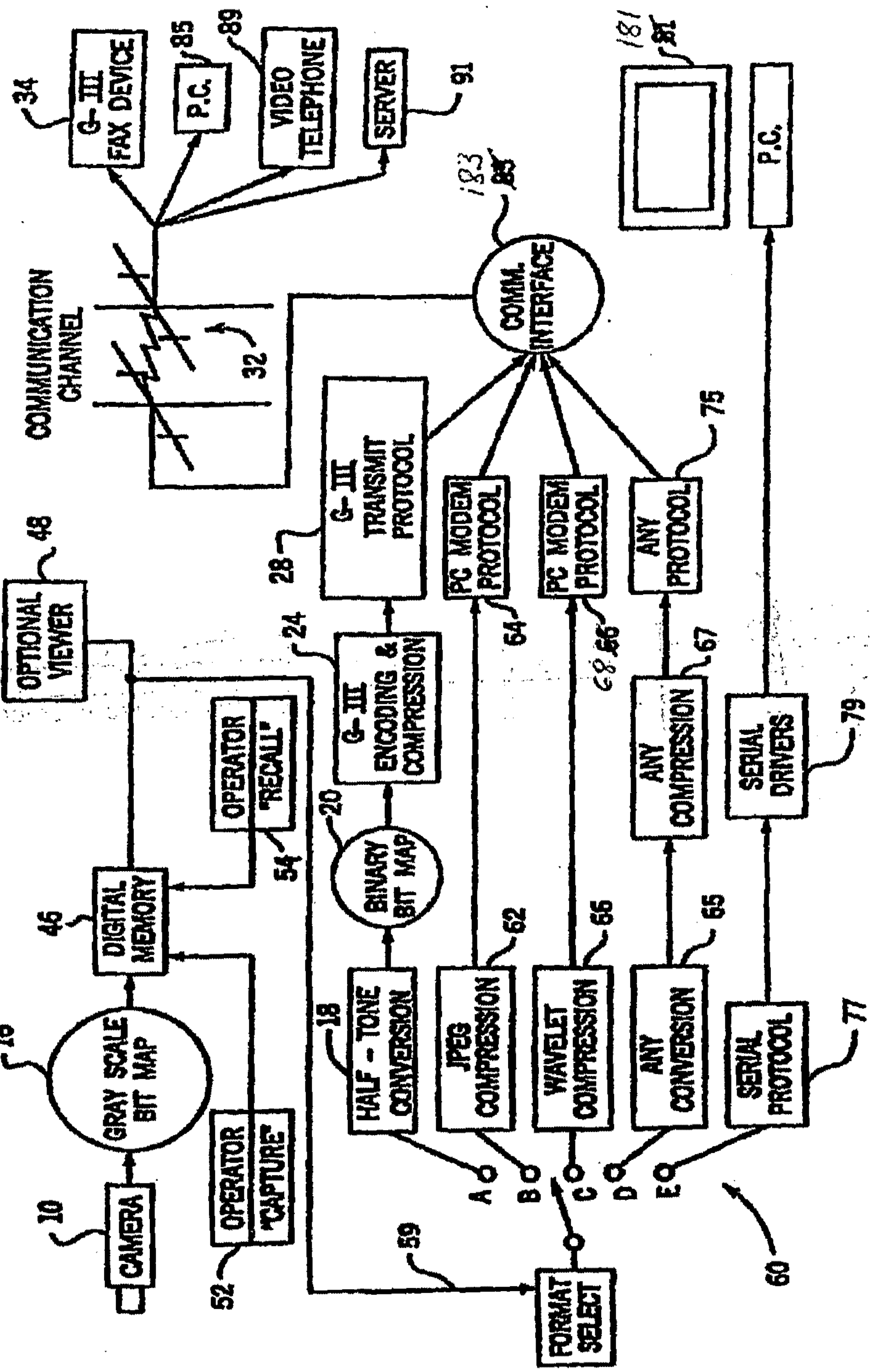
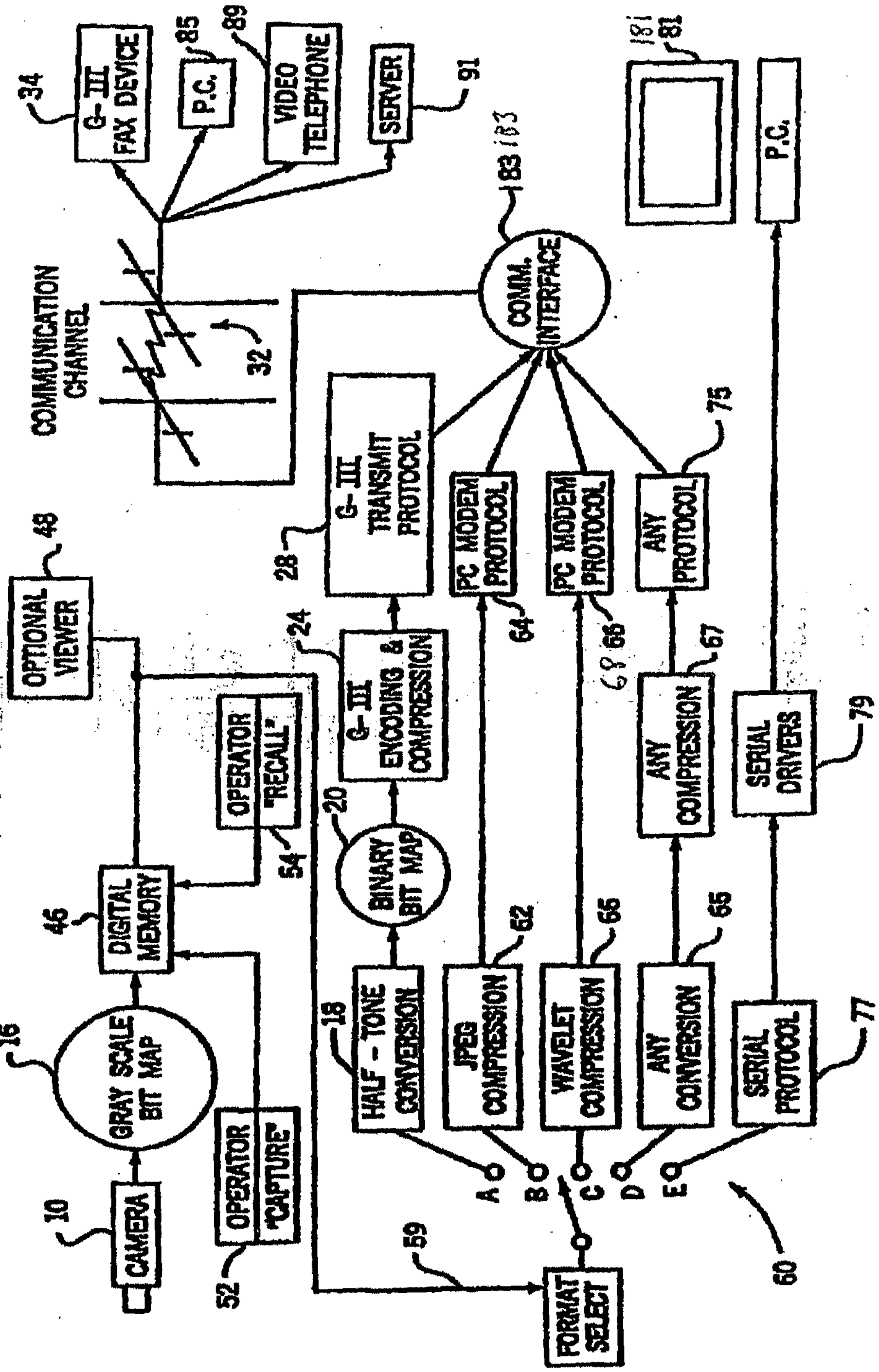
CORRECTION ILLUSTRATED/REDLINED VERSION

FIG. 4



"REPLACEMENT SHEET"

FIG. 4



PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/617,509	Filing Date 12/28/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	01/04/2008	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 34	Minus	** 42	= 0	X $ =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 7	Minus	***3	= 4	X $ =		OR	X $210=	840
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**840**

AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	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.

Legal Instrument Examiner:
Carolyn E. Thomas

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

67589 7590 01/30/2008
MOORE LANDREY
1609 SHOAL CREEK BLVD
AUSTIN, TX 78701

EXAMINER	
SAFAIPOUR, HOUSHANG	
ART UNIT	PAPER NUMBER
2625	

MAIL DATE	DELIVERY MODE
01/30/2008	PAPER

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

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

NOTICE REQUIRING EXCESS CLAIMS FEES	Application No. 11/617,509	Applicant(s) MONROE, DAVID A	
		Art Unit 1648	

The excess claim(s) filed on 04 January, 2008 is not accompanied by the appropriate payment of excess claims fees set forth in 37 CFR 1.16(h)-(j) or 1.492(d)-(f). Excess claims fees are required for each claim in independent form in excess of three (§ 1.16(h)), each claim (whether dependent or independent) in excess of twenty (note that § 1.75(c) indicates how multiple dependent claims are considered for fee calculation purposes) (§ 1.16(i)), and each application that contains a multiple dependent claim (§ 1.16(j)).

Since the application is not under a final rejection, applicant is given a time period of **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, to submit either: (1) the fee payment of $, or (2) an amendment in compliance with 37 CFR 1.121 that cancels the excess claim(s), in order to avoid ABANDONMENT. Extensions of this time period may be granted under 37 CFR 1.136, unless the excess claim(s) was presented in a preliminary amendment.

☐ 1 The funds in Deposit Account No. are insufficient to cover the entire fee due. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

☐ 2. The Credit Card payment to cover the entire fee due to Account **(Card type + last 4 digits ONLY)** was refused. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

☒ 3. The amendment that includes the excess claim(s) has not been entered, since applicant has failed to remit (or authorize charge to a Deposit Account or Credit Card) the fee as indicated on the attached Patent Application Fee Determination Record (PTO/SB/06). Remittance or authorization is due within the time period set forth in this notice.

☐ 4. The fee submitted in this application is insufficient. A balance of $ is due for presentation of excess claims (37 CFR 1.16(h)-(j) or 1.492(d)-(f)).

☒ 5. Other.

Explanation (*Provide specific details of the required correction in order to assist the applicant. Indicate whether a service charge has been added to the fee due*): EXCESS INDEPENDENT CLAIMS FEES AMOUNTING TO $840.00 IS REQUIIRED. SEE WORKSHEET ATTACH.

THE AMOUNT OF THE FEE(S) DUE IS SUBJECT TO CHANGE, GENERALLY ON OCTOBER 1 OF EACH YEAR (37 CFR 1.16, 1.21 & 1.492). THE **AMOUNT OF THE FEE(S) DUE IS DETERMINED AS OF THE DATE A COMPLETE REPLY WITH THE APPROPRIATE FEE(S) IS RECEIVED BY THE OFFICE** (37 CFR 1.8 & 1.10). BECAUSE THE AMOUNT DUE IS SUBJECT TO CHANGE, IT IS RECOMMENDED THAT APPLICANT CHECK THE CURRENT FEE SCHEDULE WHICH IS AVAILABLE ON THE USPTO'S WEBSITE AT: ***http://www.uspto.gov/web/offices/ac/qs/ope/fees.htm***

Service Charges: There is a $50 service charge for processing each payment refused (including a check returned "unpaid") or charged back by a financial institution (37 CFR 1.21(m)). There is a $25.00 service charge for each month when the balance of a deposit account is below $1000 at the end of the month (37 CFR 1.21(b)(2)).

Technical Support Staff (TSS): Carolyn E. Thomas Phone Number: 5712720558

Note to TSS: Please do NOT use this notice if the application is under a final rejection.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

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EXAMINER	
SAFAIPOUR, HOUSHANG	
ART UNIT	**PAPER NUMBER**
2625	

MAIL DATE	DELIVERY MODE
01/30/2008	PAPER

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PTOL-90A (Rev. 04/07)

NOTICE REQUIRING EXCESS CLAIMS FEES	Application No. 11/617,509	Applicant(s) MONROE, DAVID A
		Art Unit 1648

The excess claim(s) filed on 04 January, 2008 is not accompanied by the appropriate payment of excess claims fees set forth in 37 CFR 1.16(h)-(j) or 1.492(d)-(f). Excess claims fees are required for each claim in independent form in excess of three (§ 1.16(h)), each claim (whether dependent or independent) in excess of twenty (note that § 1.75(c) indicates how multiple dependent claims are considered for fee calculation purposes) (§ 1.16(i)), and each application that contains a multiple dependent claim (§ 1.16(j)).

Since the application is not under a final rejection, applicant is given a time period of **ONE (1) MONTH or THIRTY (30) DAYS** from the mailing date of this notice, whichever is longer, to submit either: (1) the fee payment of $ 840.00, or (2) an amendment in compliance with 37 CFR 1.121 that cancels the excess claim(s), in order to avoid ABANDONMENT. Extensions of this time period may be granted under 37 CFR 1.136, unless the excess claim(s) was presented in a preliminary amendment.

☐ 1 The funds in Deposit Account No. are insufficient to cover the entire fee due. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

☐ 2. The Credit Card payment to cover the entire fee due to Account **(Card type + last 4 digits ONLY)** was refused. The balance is due within the time period set forth in this notice. See note below regarding the appropriate service charge.

☐ 3. The amendment that includes the excess claim(s) has not been entered, since applicant has failed to remit (or authorize charge to a Deposit Account or Credit Card) the fee as indicated on the attached Patent Application Fee Determination Record (PTO/SB/06). Remittance or authorization is due within the time period set forth in this notice.

☐ 4. The fee submitted in this application is insufficient. A balance of $ is due for presentation of excess claims (37 CFR 1.16(h)-(j) or 1.492(d)-(f)).

☒ 5. Other.

Explanation (*Provide specific details of the required correction in order to assist the applicant. Indicate whether a service charge has been added to the fee due*): AN EXCESS CLAIM FEE FOR FOUR(4) ADDITIONAL INDEPENDENT CLAIMS (LARGE ENTITY) IS DUE, AMOUNTING TO $840.00. SEE ATTACHMENT.

THE AMOUNT OF THE FEE(S) DUE IS SUBJECT TO CHANGE, GENERALLY ON OCTOBER 1 OF EACH YEAR (37 CFR 1.16, 1.21 & 1.492). THE **AMOUNT OF THE FEE(S) DUE IS DETERMINED AS OF THE DATE A COMPLETE REPLY WITH THE APPROPRIATE FEE(S) IS RECEIVED BY THE OFFICE** (37 CFR 1.8 & 1.10). BECAUSE THE AMOUNT DUE IS SUBJECT TO CHANGE, IT IS RECOMMENDED THAT APPLICANT CHECK THE CURRENT FEE SCHEDULE WHICH IS AVAILABLE ON THE USPTO'S WEBSITE AT: ***http://www.uspto.gov/web/offices/ac/qs/ope/fees.htm***

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Technical Support Staff (TSS): Carolyn E. Thomas Phone Number: 5712720558

Note to TSS: Please do NOT use this notice if the application is under a final rejection.

PTO/SB/06 (07-06)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	
11/617,509	12/28/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
			TOTAL			TOTAL	

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

APPLICATION AS AMENDED – PART II

AMENDMENT

01/04/2008	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 34	Minus	** 42	= 0	X $ =		OR	X $50=	0
Independent (37 CFR 1.16(h))	* 7	Minus	***3	= 4	X $ =		OR	X $210=	840
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**840**

AMENDMENT

	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	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.

Legal Instrument Examiner:
Carolyn E. Thomas

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	11617509
Filing Date:	28-Dec-2006
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Filer:	Jeffrey Darryl Hunt
Attorney Docket Number:	06-0719

Filed as Large Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Independent claims in excess of 3	1201	4	210	840
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

784

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**840**

Electronic Acknowledgement Receipt

EFS ID:	2821392
Application Number:	11617509
International Application Number:	
Confirmation Number:	4247
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Customer Number:	67589
Filer:	Jeffrey Darryl Hunt
Filer Authorized By:	
Attorney Docket Number:	06-0719
Receipt Date:	06-FEB-2008
Filing Date:	28-DEC-2006
Time Stamp:	14:00:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$ 840
RAM confirmation Number	7932
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)

1	Fee Worksheet (PTO-06)	fee-info.pdf	8190 d2e6adccc70e96284504a7b94881f96ff02c88b0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	8190		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

67589 7590 12/12/2008
MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701

EXAMINER	
SAFAIPOUR, HOUSHANG	

ART UNIT	PAPER NUMBER
2625	

MAIL DATE	DELIVERY MODE
12/12/2008	PAPER

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

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/617,509	MONROE, DAVID A	
	Examiner	Art Unit	
	HOUSHANG SAFAIPOUR	2625	

-- 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) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 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 _04 January 2008_.

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) _43-76_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _43-76_ 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:

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)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's amendment has been entered. Applicant has canceled claims 1-42 and has added new claims 43-76.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 43-51, 64, 66, 68, 69, 71, 72 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hassan (US 5,550,646), and further in view of Sizer, II (US 6,036,086).

Regarding claims 43, 64, 66, 68, 69, 71 and 74 Hassan discloses apparatus comprising:

a portable housing, the portable housing being wireless (110, fig. 1);

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view (col. 2, lines 39-49);

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data (col. 4 lines 18-31);

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format (col. 4 lines 32-64), an input device supported by the portable housing, the input device being operable by the user (col. 4 lines 1-17);

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format (col. 4 lines 54-64);

media supported by the portable housing, the media being suitable to embody at least one compression algorithm (col. 4 lines 46-48);

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression "algorithm providing compressed visual image data (col. 3 lines 47-54 and col. 4 lines 43-48); and

Hassan indicates that if image capture device is “provided with a cellular telephone capability” (col. 3 line 1017) pictures stored in the camera can be transmitted to any conventional facsimile machine. Sizer, by the same assignee as Hassan, discloses a cellular telephone (110) as an portable image capture device with scanning capability. Therefore it would have been obvious to a person of ordinary skill in the art to combine the image capture device 110 as disclosed by Hassan with the image capture device (cellular telephone 110) as disclosed by Sizer to read and transmit to a remote recipient a wireless transmission.

movement by the user of the portable housing commonly moving the image collection device, movement by the user of the portable housing commonly moving the display (the combined image capture device (cellular phone 10) includes the display and the image collection device (cell phone, camera and scanner) .

Regarding claim 44, Hassan discloses the apparatus according to claim 43 and further comprising:

the processing platform including at least one processor (microcontroller 205, col. 3 lines 25-27).

Regarding claim 45, Hassan discloses the apparatus according to claim 43 and further comprising:

the portable housing including a handset (cell phone 110).

Regarding claim 46, combination of Hassan and Sizer discloses the apparatus according to claim 43 and further comprising:

a microphone supported by the portable housing, the microphone being associated with the mobile phone; a speaker supported by the portable housing, the speaker being associated with the mobile phone (Sizer, col. 5 lines 21-35).

Regarding claim 47, combination of Hassan and Sizer discloses the apparatus according to claim 43 and further comprising:

the mobile phone being selectively operable to send to a remote recipient a wireless transmission, the wireless transmission conveying a voice transmission (Sizer, col. 5 lines 49-60).

Regarding claim 48, Hassan discloses the apparatus according to claim 43 and further comprising:

the mobile phone being selectively operable to receive from a remote sender an incoming wireless transmission, the incoming wireless transmission conveying at least one of:

incoming compressed digital image data,

an incoming voice transmission (Sizer col. 5 lines 29-35), and

both incoming compressed digital image data and an incoming voice transmission.

Regarding claim 49, Hassan discloses the apparatus according to claim 43 and further comprising:

a camera supported by the portable housing, the camera including the image collection device (Hassan, fig. 1, camera 110).

Regarding claim 50, Hassan discloses the apparatus according to claim 43 and further comprising:

the image collection device being suitable to provide the visual image data in digital format (abstract).

Regarding claims 51 and 72, Hassan discloses the apparatus according to claim 43 and further comprising:

the image collection device being suitable to provide the visual image data in analog format; an analog to digital converter supported by the portable housing, the analog to digital converter being suitable to receive the visual image data in analog format, the being suitable to provide the visual image data in digital format (abstract and col. 1 lines 47-52);

the display including an LCD, the LCD being operable to display for viewing by a user a perceptible visual image, the-perceptible visual image being generated from the visual image data (col. 4 lines 18-31).

Claims 52-63, 65, 67, 70 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hassan (US 5,550,646), in view of Sizer, II (US 6,036,086) and further in view of Jachimowicz (US 6,243,056).

Regarding claims 52, 65, 67, 70 and 73 combination of Hassan and Sizer does not explicitly disclose a view finder. Jachimowicz discloses a cell phone with a display including a viewfinder, the viewfinder being suitable to receive the visual image data, the viewfinder being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data (fig. 10, col. 6 lines 30-37). Therefore it would have been obvious to a person of ordinary skill in the art to include this feature in combined cell phone of Hassan and Sizer to add capability of viewing images by an operator.

53. The apparatus according to claim 52 and further comprising: the viewfinder being suitable to receive the visual image data in digital format (Jachimowicz, col. 4 lines 7-10).

54. The apparatus according to claim 52 and further comprising: the viewfinder being suitable to receive the visual image data in analog format (Jachimowicz, col. 4 lines 7-10).

55. The apparatus according to claim 43 and further comprising:

the display including a display screen, the display screen being defined apart from a viewfinder, the display screen being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data (Jachimowicz, col. 6 lines 30-37).

56. The apparatus according to claim 55 and further comprising:

the display including an LCD, the LCD being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data (Hassan, col. 5 line 37).

57. The apparatus according to claim 56 and further comprising: the LCD being suitable to receive the visual image data in digital format (Hassan Abstract).

58. The apparatus according to claim 43 and further comprising: at least one transmission protocol algorithm embodied in suitable media (Hassan col. 4 line 54 to col. 5 line 10);

a processing platform associated with the at least one transmission protocol algorithm, the associated processing platform being operable to execute the at least one transmission protocol algorithm, the associated processing platform being provided the compressed visual image data, execution of the at least one transmission protocol algorithm providing the compressed visual image data in a transmission format, the visual image data in a transmission format being compatible with the mobile phone for wireless transmission by the mobile phone (please refer to claim 43).

59. The apparatus according to claim 58 and further comprising:

the mobile phone being operable according to a specified wireless transmission protocol, the at least one transmission protocol algorithm providing the visual image data in a compatible data transmission format, the compatible data transmission format being compatible with the specified wireless transmission protocol (Hassan col. 4 line 54 to col. 5 line 10).

60. The apparatus according to claim 59 and further comprising:

at least one transmission protocol algorithm embodied in suitable media;

a processing platform associated with the at least one transmission protocol algorithm, the associated processing platform being operable to execute the at least one transmission protocol algorithm, execution of the at least one transmission protocol algorithm providing compressed visual image data in a compatible format, the compatible format being compatible with at least one transmission protocol, the compressed visual image data in a compatible format being suitable for transmission by the mobile phone according to at least one wireless transmission protocol (please refer to claim 43 and also (Hassan col. 4 line 54 to col. 5 line 10 and col. 4 lines 43-64).

61. The apparatus according to claim 43 and further comprising:

the portable housing including a first housing section, the image collection device being supported by the first housing section,

the portable housing including a second housing section, the display being supported by the second housing section,

the first housing section being adjoined to the second housing section (fig. 1),

the second housing section being movable in common with the first housing section when the first, housing section, is moved by the user (fig. 1),

the first housing section being movable in common with the second housing section when the second housing section is moved by the user (fig. 1),

the first housing section being supported for movement relative to the second housing section (fig. 1),

the image collection device being movable in common with the first housing section relative to the display when the first housing section is moved relative to the second housing section (Jachimowicz discloses the structure of the cell phone as shown in fig. 1 with reference to bodies 11 and 12 being hingably or pivotally attached. Col. 2 lines 43 to col. 3 line 24).

62. The apparatus according to claim 62 and further comprising:

the first housing section being supported for pivotal movement relative to the second housing section about a pivot axis (Jachimowicz, fig. 1).

63. The apparatus according to claim 43 and further comprising:

the image collection device being supported by the portable housing in fixed relation to the display (combination of Hassan, Sizer and Jachimowicz) .

Claims 75 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hassan (US 5,550,646), in view of Sizer, II (US 6,036,086) and further in view of Rostoker (US 6,035,212).

Regarding claim 75, combination of Hassan and Sizer does not disclose a removable memory. Rostoker discloses such feature (col. 9, lines 17-35). Therefore it would have been obvious to a person of ordinary skill in the art to include this feature in combination cell phone of Hassan and Sizer to provide additional memory.

Regarding claim 76, the combination of Hassan and Sizer disclose a display as discussed previously.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Houshang Safaipour whose telephone number is (571)272-7412. The examiner can normally be reached on Mon.-Fri. from 6:00am to 2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Coles can be reached on (571)272-7402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

Notice of References Cited

Application/Control No. 11/617,509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A	
Examiner HOUSHANG SAFAIPOUR	Art Unit 2625	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,035,212	03-2000	Rostoker et al.	455/552.1
*	B	US-6,243,056	06-2001	Jachimowicz et al.	345/82
*	C	US-6,036,086	03-2000	Sizer et al.	235/375
*	D	US-5,550,646	08-1996	Hassan et al.	358/442
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

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	N					
	O					
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	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*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.

Index of Claims	**Application/Control No.** 11617509	**Applicant(s)/Patent Under Reexamination** MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	**Art Unit** 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/06/2008								
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Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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CLAIM		DATE								
Final	Original	12/06/2008								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11617509	MONROE, DAVID A
	Examiner	**Art Unit**
	HOUSHANG SAFAIPOUR	2625

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CLAIM		DATE								
Final	Original	12/06/2008								
	73	✓								
	74	✓								
	75	✓								
	76	✓								

Search Notes	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

SEARCHED

Class	Subclass	Date	Examiner
358	1.15, 402, 403, 407, 442, 468, 474	12/5/08	HS

SEARCH NOTES

Search Notes	Date	Examiner
East	12/5/08	HS

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

PTO/SB/08A (10-07)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 7

Complete if Known	
Application Number	11/617,509
Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

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 or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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		US- 5,530,440	06-25-1996	Denzer, et al	
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		EP532,110	03-17-1993	Raimondi		

Examiner Signature	/Houshang Safaipour/	Date Considered	12/08/2008

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Attorney Docket Number	06-0719

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(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[6]

Examiner Signature	/Houshang Safaipour/	Date Considered	12/08/2008

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		JP-HEI-10-66058	03-06-1998	Masanobu Kujirada		

Examiner Signature	/Houshang Safaipour/	Date Considered	12/08/2008

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 5 of 7

Complete if Known	
Application Number	11/617,509
Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

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 or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 5,666,157	09-09-1997	Avid	
		US- 6,424,370	07-23-2002	Courtney	
		US- 6,504,479	01-07-2003	Lemons	
		US- 6,628,835	09-30-2003	Brill	
		US- 6,646,676	11-11-2003	DeGrace	
		US- 6,002,427	12-14-1999	Kipust	
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		US- 6,385,772	05-07-2002	Courtney	
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		US- 6,069,655	05-03-2000	Seeley	
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		US- 5,111,291	05-05-1992	Erickson	
		US- 4,910,692	03-20-1990	Outram	
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		US- 5,751,346	05-12-1998	Dozler	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] -Number[4] -Kind Code[5] *(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[6]

Examiner Signature	/Houshang Safaipour/	Date Considered	12/08/2008

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Sheet 1 of 7

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Attorney Docket Number	06-0719

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		US- 4,163,283	07-31-1979	Darby	
		US- 4,179,695	12-18-1979	Levine, et al	
		US- 4,179,536	04-08-1980	Levine	
		US- 4,516,125	05-07-1989	Schwab, et al	
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		US- 4,845,629	07-04-1989	Murge	
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		US- 5,321,615	06-14-1994	Frisbie, et al	
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		US- 5,400,031	03-21-1995	Fitts	
		US- 5,408,330	04-18-1995	Squicciarini, et al	
		US- 5,448,243	09-05-1995	Bethke, et al	

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		JP9-251599	04-16-1999	Mastake, et al		
		JP11-160424	06-18-1999	Tenpei		
		JP6-301898	10-28-1994	Hoover		
		JP9-282600	10-31-1997	Hasegawa, et al		
		EP209,397	07-07-1993	Murga, et al		
		EP220,752	05-06-1987	Julin, et al.		

Examiner Signature	/Houshang Safaipour/	Date Considered	12/08/2008

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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	"5191601".pn.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2007/11/26 12:05
S2	25	("4258387" | "4330797" | "4856045" | "4928300" | "5036390").PN. OR ("5191601").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2007/02/05 12:18
S3	42	(cell cellular mobile video) adj (phone telephone) and ((memory stor$3 buffer) near3 (image text picture)) near5 (display$3 near3 (trasmit$4 forward $3 send$3))	US-PGPUB; USPAT; EPO; JPO	OR	ON	2007/02/08 16:00
S4	0	((cellular adj telephone) and signals and visual and compatible and housing and integral and camera and within and display and memory).clm.	US-PGPUB; USPAT; EPO; JPO	OR	ON	2007/11/26 12:07
S5	1	"7365871".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/01 10:11
S6	1	"5550646".pn.	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/01 10:45
S7	9976	(cell portable cellular) near5 (camera ccd scan $4) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/01 12:01
S8	300	((cell portable cellular) adj (phone telephone)) near5 (camera ccd scan$4) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/01 12:01
S9	7	((cell portable cellular) adj (phone telephone)) near5 ((camera ccd scan$4) near5 (within inside integral)) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/01 12:08

S10	62	("4654514" | "4835372" | "4857716" | "4937853" | "4952785" | "5047614" | "5057677" | "5157687" | "5171977" | "5288976" | "5289378" | "5299116" | "5324922" | "5334824" | "5359182" | "5465291" | "5594226" | "5661291"). PN. OR ("6036086"). URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2008/12/01 12:52
S11	19	S10 and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/01 12:53
S12	10	((cell portable cellular) adj (phone telephone)) near5 ((display$3 lcd) near5 (within inside integral)) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/02 09:14
S13	15	((cell portable cellular) adj (phone telephone)) near5 (display$3 near3 image) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/02 09:17
S14	657	((cell portable cellular) adj (phone telephone)) and (flash removable) near3 (memory storage) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/02 13:55
S15	26	(((cell portable cellular) adj (phone telephone)) with (flash removable)) near3 (memory storage) and @ad<"19980112"	US-PGPUB; USPAT; USOCR	OR	ON	2008/12/02 13:55

12/8/2008 10:12:44 AM
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 7 of 7

Complete if Known	
Application Number	11/617,509
Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		April, 1966, Apollo Unified S-Band System, NASA-Goddard Space Flight Center, Greenbelt, Maryland	
		November 24, 1976, TELEXIS ViaNet General Information Booklet Version 1.3	
		2000, ViaNet 3000 Administrator's Manual Version 1.1- NetXpress Video by TELEXIS, Kanata, Ontario, Canada	
		1999 Vianet 3000 Operator Manual Version 1.0 - NetXpress Video by TELEXIS, Kanata, Ontario, Canada	
		1999 ViaNet 3000 Administrator Manual Version 1.0 - NetXpress Video by TELEXIS, Kanata, Ontario, Canada	
		1999 ViaNet 3000 Instruction Manual Operator's Revision 1 - NetXpress Video by TELEXIS, Kanata, Ontario, Canada	

Examiner Signature	/Houshang Safaipour/	Date Considered	12/08/2008

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Sheet 3 of 7

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Filing Date	December 28, 3006
First Named Inventor	David A Monroe
Art Unit	2625
Examiner Name	
Attorney Docket Number	06-0719

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		US- 5,867,804	02-02-1999	Pilley, et al	
		US- 5,917,405	06-29-1999	Joso	
		US- 5,926,210	07-20-1999	Hackett, et al	
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		US- 6,092,008	07-18-2000	Bateman	
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		US- 6,282,488	08-28-2001	Castor, et al	
		US- 6,462,697	10-08-2002	Klamer, et al	
		US- 5,933,098	08-03-1999	Haxton	
		US- 5,689,442	11-18-1997	Swanson	

FOREIGN PATENT DOCUMENTS

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		EP785,536	07-23-1997	Ferri, et al		
		WO97,37336	10-08-1997	Auty. et al		
		EP232,031	08-12-1987	Hale		
		EP613,109	08-31-1994	Hoover		
		WO96/12265	04-25-1996	Milgard		
		WO95/27910	10-19-1995	Wallis		

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:		§		
		§		
	DAVID A. MONROE, ET AL	§		
		§		
Filed:	December 28, 2006	§	Art Unit:	2625
		§		
Serial No.:	11/617,509	§	Examiner:	Houshang Safaipour
		§		
For:	APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM	§	Docket No.:	06-0719

RESPONSE TO FINAL OFFICE ACTION DATED DECEMBER 12, 2008

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

Dear Sir:

Responsive to the Final Office Action Mailed December 12, 2008, please enter and consider the "Affidavit of David A. Monroe Under 37 CFR 1.131", which is submitted herewith. A request for one month extension of time is requested in this submission via EFS-Web.

Amendments begin on page 2.

Remarks begin on page 14.

AMENDMENTS

Amendments to Claims

This listing of claims shall replace all previous versions, and listings, of claims in the application.

Listing of Claims:

1- 42. (canceled).

43. (currently amended) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital ~~formal~~ format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the. memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data; and

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device,

movement by the user of the portable housing commonly moving the display.

44. (previously presented) The apparatus according to claim 43 and further comprising:

the processing platform including at least one processor.

45. (previously presented) The apparatus according to claim 43 and further comprising:

the portable housing including a handset.

46. (previously presented) The apparatus according to claim 43 and further comprising:

a microphone supported by the portable housing, the microphone being associated with the mobile phone;

a speaker supported by the portable housing, the speaker being associated with the mobile phone.

47. (previously presented) The apparatus according to claim 43 and further comprising:

the mobile phone being selectively operable to send to a remote recipient a wireless transmission, the wireless transmission conveying a voice transmission.

48. (previously presented) The apparatus according to claim 43 and further comprising:

the mobile phone being selectively operable to receive from a remote sender an incoming wireless transmission. the incoming wireless transmission conveying at least one of:

incoming compressed digital image data,

an incoming voice transmission, and

both incoming compressed digital image data and an incoming voice transmission.

49. (previously presented) The apparatus according to claim 43 and further comprising:

a camera supported by the portable housing. the camera including the image collection device.

50. (previously presented) The apparatus according to claim 43 and further comprising:

the image collection device being suitable to provide the visual image data in digital format.

51. (previously presented) The apparatus according to claim 43 and further comprising:

the image collection device being suitable to provide the visual image data in analog format:

an analog to digital converter supported by the portable housing. the analog to digital converter being suitable to receive the visual image data in analog format, the being suitable to provide the visual image data in digital format.

the display including an LCD. the LCD being operable to display for viewing by a user a perceptible visual image. the perceptible visual image being generated from the visual image data.

52. (previously presented) The apparatus according to claim 43 and further comprising:

the display including a viewfinder, the viewfinder being suitable to receive the visual image data, the viewfinder being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

53. (previously presented) The apparatus according to claim 52 and further comprising:

the viewfinder being suitable to receive the visual image data in digital formal.

54. (previously presented) The apparatus according to claim 52 and further comprising:

the viewfinder being suitable to receive the visual image data in analog format.

55. (previously presented) The apparatus according to claim 43 and further comprising:

the display including a display screen, the display screen being defined apart from a viewfinder, the display screen being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

56. (previously presented) The apparatus according to claim 55 and further comprising:

the display including an LCD, the LCD being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data.

57. (previously presented) The apparatus according to claim 56 and further comprising:

the LCD being suitable to receive the visual image data in digital format.

58. (previously presented) The apparatus according to claim 43 and further comprising;

at least one transmission protocol algorithm embodied in suitable media;

a processing platform associated with the at least one transmission protocol algorithm, the associated processing platform being operable to execute the at least one transmission protocol algorithm, the associated processing platform being provided the compressed visual image data, execution of the at least one transmission protocol algorithm providing the compressed visual image data in a transmission format, the visual image data in a transmission format being compatible with the mobile phone for wireless transmission by the mobile phone.

59. (previously presented) The apparatus according to claim 58 and further comprising:

the mobile phone being operable according to a specified wireless transmission protocol, the at least one transmission protocol algorithm providing the visual image data in a compatible data transmission format, the compatible data transmission format being compatible with the specified wireless transmission protocol.

60. (previously presented) The apparatus according to claim 59 and further comprising:

at least one transmission protocol algorithm embodied in suitable media;

a processing platform associated with the at least one transmission protocol algorithm, the associated processing platform being operable to execute the at least one transmission protocol algorithm, execution of the at least one transmission protocol algorithm providing compressed visual image data in a compatible format, the compatible format being compatible with at least one transmission protocol, the compressed visual image data in a compatible format being suitable for transmission by the mobile phone according to at least one wireless transmission protocol.

61. (previously presented) The apparatus according to claim 43 and further comprising:

the portable housing including a first housing section, the image collection device being supported by the rust housing section,

the portable housing including a second housing section, the display being supported by the second housing section,

the first housing section being adjoined to the second housing section,

the second housing section being movable in common with the first housing section when the first housing section is moved by the user,

the first housing section being movable in common with the second housing section when the second housing section is moved by the user,

the first housing section being supported for movement relative to the second housing section,

the image collection device being movable in common with the first housing section relative to the display when the first housing section is moved relative to the second housing section.

62. (previously presented) The apparatus according to claim 62 and further comprising:

the first housing section being supported for pivotal movement relative to the second housing section about a pivot axis.

63. (previously presented) The apparatus according to claim 43 and further comprising:

the image collection device being supported by the portable housing in fixed relation to the display.

64. (previously presented) Apparatus comprising:

a portable housing, the portable housing being wireless:

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by tile portable housing, the display being operable to display for viewing by a user a perceptible visual image of the 1ield of view, the perceptible visual image being generated from the visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device,

movement by the user of the portable housing commonly moving the display.

65. (previously presented) The apparatus according to claim 64 and further comprising:

the display including at least one of:

a viewfinder, and

a display screen apart from the viewfinder.

66. (previously presented) Apparatus comprising:

a portable housing, the portable housing being wireless:

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing. the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by. the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression a1goritlun providing compressed visual image data;

a display supported by the portable housing, the display being operable to display tor viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the retained visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission. the wireless transmission conveying the compressed digital image data; and

movement by the user of .the portable housing commonly moving the image collection device,

movement by the user of the portable housing commonly moving the display,

67. (previously presented) The apparatus according to claim 66 and further comprising:

the display including at least one of:

a viewfinder, and

a display screen apart from the viewfinder.

68. (previously presented) A mobile handset comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing. the image collection device being operable to provide visual image data of a field of view;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image, the perceptible visual image being generated from the visual image data;

memory supported by the portable housing. the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data; and

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data.

69. (previously presented) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by the portable housing, the display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the retained· visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being selectively operable to send to a remote recipient a wireless image transmission, the wireless transmission conveying the compressed digital image data, the mobile phone. being selectively operable to send to a remote recipient a wireless voice transmission, the mobile phone being selectively operable to receive from a remote sender an incoming wireless image transmission; and

the display being operable to display for viewing by a user a perceptible visual image of the incoming wireless image transmission.

70, (previously presented) The apparatus according to claim 69 and further comprising:

the display including at least one of:

a viewfinder. and

a display screen apart from the viewfinder.

71. (previously presented) Apparatus comprising:

a portable housing, the portable housing being wireless;

an image collection device supported by the portable housing, the image collection device being operable to provide in digital format visual image data of a field of view;

memory supported by the portable housing. the memory being suitable lo receive the visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing. the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

at least one compression algorithm embodied at least in part in suitable programmed media, the media being supported by the portable housing;

at least one processor supported by the portable housing, the at least one processor being operable to execute the at least one compression algorithm, the at least one processor being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

at least one display supported by the portable housing, the at least one display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from at least one of:

the visual image data in digital format, and

the retained visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed .digital image data.

72. (previously presented) Apparatus according to claim 71 and further comprising:

the image collection device including an analog to digital converter, the analog to digital converter being operable to provide the visual image data in digital formal.

73. (previously presented) The apparatus according to claim 71 and further comprising:

the at least one display including at least one of:

a viewfinder; and

a display screen apart from the viewfinder.

74. (previously presented) Apparatus comprising:

a mobile phone, the mobile phone having a housing;

an image capture device supported by the housing, the image capture device providing a captured image;

a display supported by the housing, the display being operable to display the captured image;

a processor supported by the housing, the processor being operable to process digital image data of the captured image, the processor being operable to provide processed image data;

memory associated with the processor for storing the processed image data; and a user interface enabling a user to select for transmission a captured image, the respective processed image data being provided to the mobile phone for transmission to a recipient.

75. (previously presented) The apparatus according to claim 74 and further comprising:

removable memory apart from the memory, said removable memory being suitable to be removably housed in the housing for storing processed image data, the processed image data corresponding to a plurality of the captured images.

76. (previously presented) The apparatus according to claim 74 and further comprising:

the display being operable to display as images generated from incoming processed image data received via the mobile phone.

REMARKS

Claims 43-76 are pending. Claim 43 has been amended herein. Claims 1-42 were previously canceled. Applicant requests reconsideration in view of these Remarks.

Submitted herewith is the "Affidavit of David A. Monroe Under 37 CFR 1.131" dated December 27, 2004, which was previously filed in parent Application 10/336,470. The instant application is a continuation of 10/336,470, as shown by the Preliminary Amendment and Application Data Sheet filed in the instant application. Applicant respectfully submits that the "Affidavit of David A. Monroe Under 37 CFR 1.131" establishes conception of the subject matter specified in claims 43-76 not later than March 18, 1993, and diligence in reducing to practice the claimed subject matter.

Rejections Under 37 CFR §103(a)

Applicant respectfully submits that, in view of the accompanying "Affidavit of David A. Monroe Under 37 CFR 1.131", the subject matter specified in claims 43-76 overcomes the rejections under 37 CFR §103(a). This is because the "Affidavit of David A. Monroe Under 37 CFR 1.131" clearly establishes that the subject matter specified in claims 43-76, and supported in the specification, predates each of the cited references (Hassan, Sizer, Jachimowicz, Rostoker). Accordingly, these references do not form a proper basis to reject claims 43-76, because each one has an effective date as a reference which is later than March 18, 1993. Accordingly, Applicant respectfully submits that claims 43-76, as herein amended, are allowable.

Applicant requests issuance of a Notice of Allowance for claims 43-76 in view of these Remarks. The undersigned is available by phone to discuss any issue regarding this application at (512) 499-8900. The Commissioner is authorized to deduct any fee, or any underpayment, from Moore Landrey Deposit Account 50-4128.

Respectfully submitted,

/Jeffrey D. Hunt/

Jeffrey D. Hunt, Reg. 38,189

Date: March 13, 2009

CUSTOMER # 67589
MOORE LANDREY, L.L.P.
1609 Shoal Creek Blvd., Ste. 100
Austin, Texas 78701
Telephone: (512) 499-8900
Facsimile: (512) 320-8906

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
	§	
David A. Monroe	§	Group Art Unit: 2622
	§	
Serial No.: 10/336,470	§	Examiner: Joseph R. Pokrzywa
	§	
Filed: January 3, 2003	§	
	§	
For: **APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM**	§	

AFFIDAVIT OF DAVID A. MONROE UNDER 37 CFR 1.131

David A. Monroe, being duly sworn, states as follows:

1. I am over 21 years of age and am competent to make this declaration.

2. I am the named inventor of the applications for patent, U.S. Serial Nos. 10/326,503 and 10/338,470, each of which have an effective filing date of January 12, 1998.

3. During the prosecution of these applications I have become aware of a number of patents and publications which may be relevant to the scope of my invention. These patents and publications (the "131 Prior Art") have an effective prior art date which is earlier than my filing date but later than the date of the invention in each of the respective applications.

4. Some, but not all of the 131 Prior Art has been cited by the Examiner during prosecution of each of the subject applications. However, in the interest of thoroughness I desire to disclose all of the 131 Prior Art known to me at this time. The relevant 131 Prior Art is as follows:

Patent/Publication	Earliest Effective Date	Cited by Examiner
U.S. Pat. No. 5,546,194	March 23, 1994	SN 10/336,470
U.S. Pat. No. 5,550,654	May 13, 1994	SN 10/336,470
U.S. Pat. No. 5,689,300	November 18, 1997	SN 10/336,470
U.S. Pat. No. 5,754,227	September 28, 1994	NOT CITED

U.S. Pat. No. 5,854,694	October 17, 1995	NOT CITED
U.S. Pat. No. 5,893,037	December 9, 1994	NOT CITED
U.S. Pat. No. 5,517,683	January 18, 1995	NOT CITED
U.S. Pat. No. 5,711,013	January 18, 1995	NOT CITED
U.S. Pat. No. 5,666,159	April 24, 1995	SN 10/336,470
U.S. Pat. No. 5,793,416	December 29, 1995	SN 10/326,503
U.S. Pat No. 5,825,408	March 18, 1994	SN 10/326,503
U.S. Pat. No. 5,893,037	December 9, 1994	SN 10/326,503
U.S. Pat. No. 5,929,901	October 6, 1997	NOT CITED
U.S. Pat. No. 5,995,041	December 30, 1996	SN 10/336,470
U.S. Pat. No. 5,969,750	September 4, 1996	SN 10/326,503
U.S. Pat. No. 6,072,600	January 30, 1996	SN 10/336,470
U.S. Pat. No. 5,806,005	May 10, 1996	SN 10/326,503
U.S. Pat. No. 5,864,766	August 13, 1996	NOT CITED
U.S. Pat. No. 6,043,839	January 12, 1998	NOT CITED
U.S. Pat. No. 6,085,112	November 7, 1996	NOT CITED
U.S. Pat. No. 6,111,863	December 29, 1995	SN 10/326,503
U.S. Pat. No. 6,122,526	April 24, 1997	NOT CITED
PCT Publication WO 97/26744	July 24, 1997	SN 10/326,503
U.S. Pat. No. 6,181,954	January 12, 1998	SN 10/326,503
U.S. Pat. No. 6,452,626	October 6, 1997	NOT CITED

5. The earliest effective date of any of the 131 Prior Art is March 18, 1994. My invention date for each of the inventions shown and described in the subject applications is more than one year earlier than the earliest effective date of any of the 131 Prior Art, namely, earlier than March 18, 1993. This is supported by the schematic drawings Exhibits 10 and 11, that are dated earlier than March 18, 1993, and by the design renderings and sketches contained in Exhibits 7, 8, and 9, all of which are dated earlier than March 18, 1993.

6. During the period from the date of the inventions to the filing date of January 12, 1998 I was diligent in pursuing the invention and did not abandon the inventions. During this period the invention conceived and shown in Exhibits 6-16 was continually refined and revised, primarily in an effort to achieve a viable commercial product that met all the requirements of the inventions while at the same time being feasible. Commercial success demanded meeting both acceptable performance criteria and financial (cost) criteria.

7. I began working with the concept of sending image data over transmission systems as early as 1983, In 1983 I developed the "PhotoPhone™", a pioneering desktop device ultimately was extensively used and thrived as an early "tele-radiology" system for the transmission of medical X-Ray images, see Exhibit 1.

8. In 1985 I started a company called PhotoTelesis that focused on extending the PhotoPhone to specific Government applications. In 1986 I extended this desktop technology to enable transmission over radio circuits, including cellular. This was done by the addition of a cellular/radio interface circuit board called "CIS", see Exhibit 2. On May 26, 1986, a press release was released that discussed several new products that were announced at the Armed Forces Communication and Electronics Associations in Washington, D.C. The Com-RIT ™ product included the CIS board and provided image transmission from a desktop unit over mobile telephones and portable satellite terminals, see Exhibit 3.

9. Over the next several years, I developed several Remote Image Transceivers or R.I.T.'s for the United States Military, see Exhibit 4, and as shown and described in the 1987 Business Plan of my company PhotoTelesis, see Exhibit 5. In 1989 I conceived the circuitry for a concept model R.I.T. which could be handheld, see Exhibit 6. Over the next several years I continued to develop the handheld R.I.T. while continuing to work on, develop and build the military R.I.T. systems such as those shown in the 1986 Business Plan,Exhibit 5. Evidence of this continuing effort is the design concept drawings of Exhibits 7 and 8, dated 1990. Additional concepts were generated during 1991 (Exhibit 9). In addition, in 1991, the first detailed schematic was generated (Exhibit 10), which would permit a prototype circuit to be built.

10. I perceived that a small, handheld image RIT was needed and in 1989 I conceived the circuit architecture for a concept model R.I.T. that could be handheld, see Exhibit 6. This design, although functionally viable, was in practice power hungry and slow in performance. Over the next several years I continued my efforts to develop the handheld R.I.T. while continuing to work on, develop and build the larger specialized tactical military R.I.T. systems such as those shown in the 1987 Business Plan, Exhibit 5. Evidence of this continuing effort are the design concept drawings generated in corroboration with an industrial designer shown in Exhibits 7 and 8, dated 1990. In addition, in 1991 I developed the enhanced architecture that enabled the first detailed schematic (Exhibit 10), which would permit a higher performance and low-power prototype circuit to be built.

11. In 1992, the first comprehensive circuit was completed for a handheld R.I.T., as shown in Exhibit 11. This circuit became Fig. 8 of U.S. Application No. 10/336,470. Continued work done in 1992 on a packaging modification that would be more desirable to Government Customers, as is shown in Exhibits 12 and 13. Some of the design concepts of the 1992 and earlier period were also included in the Government model as was shown in the Application. Compare, for example, Fig. 6 in the application to the 1992 concept drawings Exhibits 12 and 13.

12. Over the next several years, 1993-1997, Photo-Telesis became the standard R.I.T. for Government tactical image transmission. The tactical systems developed and commercialized by PhotoTelesis were employed by the U.S. Government in many systems. Many of the products developed and sold by PhotoTelesis followed the concepts shown and described in the 1987 Business Plan (Exhibit 5).

13. During this time, I continued to be interested in and continued to develop the concept of a true handheld R.I.T. product. In fact, I came up with a formal proposal of a handheld R.I.T. in 1995 and put together a concept proposal in November, 1995 (Exhibit 14), using secure radio transmission. Ultimately this project was never Government funded, I went on to fund and develop a commercially feasible handheld R.I.T. that was first publicly disclosed in late 1997 and first sold to the Government in 1998.

14. While the proposal shown in Exhibit 14 did not feature a cellular telephone compatible R.I.T., it was architecturally consistent and a development stepping-stone toward that goal. The final product incorporated my design concepts of 1993 and earlier, and did include cellular telephone compatibility. A first prototype of this product is embodied in physical Exhibit 15. Physical Exhibit 15, which was shown to the Examiner in charge of prosecution of each subject cases during an interview, is a prototype of the first commercial embodiment of the invention. This was completed in mid-1997 and was first publicly disclosed sometime early 1998. Photographs of this one-of-a-kind prototype are contained in this record as Exhibit 15.

15. The circuitry for supporting the product resulting from the 1995 proposal is provided in the schematics of Exhibit 16, which ultimately became Fig. 5 of Application No. 10/326,503.

16. The product based on the prototype (Exhibit 15 and Exhibit 16) was put into production and sold to the Government. One of the production units, Physical Exhibit 17 as is photographed in Exhibit 17, was demonstrated transmitting over cellular telephone to the Examiner.

17. As shown by the Exhibits attached hereto, I conceived the invention at least as early as March 18, 1993 and worked diligently in developing a commercially viable product culminating in the first commercial handheld R.I.T. in late 1997. This handheld R.I.T. used cellular telephone transmission technology, as evidenced by Exhibits 15-17 as first conceived and document as early as March 18, 1993, see Exhibits (6 -13).

18. The subject applications were timely filed, being within one year of the first public disclosure of the inventions, and in fact, prior to any public disclosure.

19. The above facts establish reduction to practice prior to the earliest effective dates of the 131 Prior Art, or as a minimum, establish conception of the invention prior to the earliest effective date of the 131 Prior Art coupled with due diligence from prior to this date to a subsequent reduction of practice culminating in the prototype of the commercial embodiment Exhibit 15 in mid-1997.

Further affiant sayeth naught.

Executed this 27th day of December, 2004, by:

David A. Monroe

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
	§	
David A. Monroe	§	Group Art Unit: 2622
	§	
Serial No.: 10/336,470	§	Examiner: Joseph R. Pokrzywa
	§	
Filed: January 3, 2003	§	
	§	
For: **APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM**	§	

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Exhibit 1 **PhotoPhone Transmission System - 1983**

Exhibit 2 **Circuit Board**

Exhibit 3 **Press Release FOCIS System - 1986**

Exhibit 4 **Brief Case Telecommunication**

Exhibit 5 **Phototelesis Business Plan (1987)**

Exhibit 6 **Circuitry Sketch for a Concept Model R.I.T. – Handlheld - 1989**

Exhibit 7 **Design Concept Drawing - 1990**

Exhibit 8 **Design Concept Drawing - 1990**

Exhibit 9 **3-D Design - 1991**

Exhibit 10 **Detailed Schematic - 1991**

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Exhibit 14 **MicroRIT Proposal - 1995**

Exhibit 15 **Photos of Physical Exhibit - Handheld R.I.T. - 1997**

Exhibit 16 **Schematics – 1997**

Exhibit 17 **Photos of Production Model - 1998**

5/26/86

PHOTOTELESIS

Remote Image Transmission Systems

OK DAM

OK

Press Release

For Immediate Release

PhotoTelesis and Image Data Sign Agreement

Secure Remote Image Transmission over Telephone & Tactical Transceivers

May 26, 1986. San Antonio, TX. Secure video image transmission between any remote sites over telephone, wireless radio and satellite circuits are now possible through an agreement between Image Data Corporation, makers of the commercial Photophone, and PhotoTelesis.

PhotoTelesis is a San Antonio based video systems integration company supplying video teleconferencing rooms, video teleconferencing equipment and specializing in image transmission equipment for government applications. The agreement makes PhotoTelesis the ~~official vendor of~~ Photophones specially adapted for Government applications.

PhotoTelesis introduced three new product lines at the Armed Forces Communcation and Electronics Association annual Convention and Exposition May 27, 28, and 29 at the Washington D.C. Convention Center. Three special versions of the commercially successful Photophone are produced and marketed by PhotoTelesis. All enable freeze frame monochrome video pictures to be transmitted in seconds over various carriers. They are called RITs - for Remote Image Transceivers.

Tac-RIT™ transmits images over secure tactical line of sight and satellite receivers. Since the units are compatible with current standard military radio transceivers, fast reliable visual communication can now be added to tactical communication and command centers.

Sec-RIT™ is compatible with secure (encrypted) COMSEC gear, including STU II, STU III, and PSV (Personal Secure Voice) secure telephones over common dial-up lines.

801 Lincoln Center 7800 IH 10 West San Antonio, Texas 78230 (512) 349-2020

The PhotoTelesis units offer the additional advantages of allowing voice and video over the same channel, enabling discussion of the picture. An interactive pointer controlled by either party allows discussion of the document as though the two parties were across the table from each other rather than half-way around the world.

PhotoTelesis will introduce three new product lines of RITs at the Armed Forces Communication and Electronics Association annual Convention and Exposition May 27, 28, and 29 at the Washington D.C. Convention Center.

Tac-RIT™ transmits images over secure tactical line of sight and satellite receivers. Since the units are compatible with current standard military radio transceivers, fast reliable visual communication can now be added to tactical communication and command centers.

Sec-RIT™ is compatible with secure (encrypted) COMSEC gear, including STU II, STU III, and PSV (Personal Secure Voice) secure telephones over common dial-up lines.

Com-RIT™ provides compatibility with non-secure mobile cellular telephones and private portable carrier satellite communication systems.

PhotoTelesis is a San Antonio based video systems integration company supplying video teleconferencing rooms, video teleconferencing equipment and specializing in image transmission equipment for government applications.

PHOTOTELESIS
Business Plan

1987

PHOTOTELESIS Business Overview Copy #_______

January 27, 1987

The information contained in this memorandum concerning image transmission products for government applications is furnished to the recipient on a confidential basis for the recipient's exclusive use. By acceptance of this confidential memorandum the recipient agrees not to transmit, divulge, reproduce, or make available to anyone other than himself, this confidential memorandum and any exhibits and documents supplied in connection therewith. *Violation of this confidentiality requirement may place the recipient and the preparers of this document in violation of the Texas and Federal securities laws and the applicable securities laws of other states.*

Any decision to invest in this enterprise should be deferred until the recipient has had the opportunity to review a confidential private placement memorandum now in the process of completion which will describe the specific terms under which an investment may be made and the substantial risks involved in any such investment in addition to any risks which may be described herein.

Prior to the sale of any securities related to the corporation described herein, the preparers of this memorandum will undertake to make available to the recipient hereof the same kind of information that is specified in Schedule A of the Securities Act of 1933, to the extent such persons possess such information or can acquire it without unreasonable effort or expense.

Signature

PHOTOTELESIS Business Overview Copy #_______

January 27, 1987

The information contained in this memorandum concerning image transmission products for government applications is furnished to the recipient on a confidential basis for the recipient's exclusive use. By acceptance of this confidential memorandum the recipient agrees not to transmit, divulge, reproduce, or make available to anyone other than himself, this confidential memorandum and any exhibits and documents supplied in connection therewith. *Violation of this confidentiality requirement may place the recipient and the preparers of this document in violation of the Texas and Federal securities laws and the applicable securities laws of other states.*

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Signature

CONTENTS

EXECUTIVE SUMMARY

Overview
The charter of PHOTOTELESIS is to provide advanced image communications and processing systems to the U.S. Federal Government market. These systems are being developed using proprietary technology and integration of industry-standard components. The company provides total solutions to its customers including development, integration, manufacturing, marketing, support and training, using resources within the company as well as external contract resources.

The PHOTOTELESIS product line permits the capture, manipulation, storage and communication of images, documents and graphics using advanced techniques which permit communication to take place over ordinary voice grade telephone lines or specialized radio or satellite circuits.

The company specializes in providing products which may be connected to U.S. Government approved encryption devices, permitting secure (scrambled) operation over a variety of existing equipment designed for secure voice communications. PHOTOTELESIS also provides specialized packaging of its products to meet needs in desktop, airborne, naval and vehicular environments.

The company's objective is to develop its business to achieve annual revenues of over $7 million by the end of fiscal 1991, with pre-tax earnings of $1.6 million.

Company Background
PHOTOTELESIS was founded in September, 1985 to address specific vertical markets with image communications product needs. The company conducted extensive test marketing before selecting the Federal Government sector as the most promising area to develop. After consulting many high-level users within policy-making groups, the company generated product requirements which it felt would address broad needs within selected government departments and agencies.

The products developed from these requirements were announced at a major trade conference in May of 1986, and active marketing began. Initial product shipments commenced in June of 1986.

In the fall of 1986 the company completed development of its business strategy, assembled the executive team, and began work on a business plan to solicit funding for a significant expansion of marketing and manufacturing activities.

EXECUTIVE SUMMARY

The PHOTOTELESIS management team brings together broad skills in the management of high technology companies, as well as specific expertise in the development and marketing of image communications and processing systems. The company intends to focus its personnel on the key activities of marketing, product development, and administration, while utilizing outside contractors for manufacturing, certain specialized engineering, contract development and technical publications.

Market Potential
PHOTOTELESIS conducted intensive market research in 1986 in selected segments of the Federal Government market, and concluded that a significant opportunity exists for the company's products. Key indicators in forming this conclusion include:

- An identified and unfulfilled need for low cost image communications to support the development of major program-level initiatives in Communications, Command, Control and Intelligence systems (known as C^3I) for defense-related applications. The current budget calls for expenditures of $17.4 billion in fiscal 1987 to support major programs.

- The planned deployment of a new generation of secure and mobile communications equipment for the D.O.D. arena, with program-level expenditures on the order of billions of dollars in the next five years.

- The burgeoning market for products designed to government standards for handling classified information, called TEMPEST, presently estimated at $350 million and expected to double or triple in size by 1990.

- The absence of significant entrenched competition in providing packaged image systems to Department of Defense and related markets.

- The trend toward use of commercial equipment as opposed to high cost procurement of MIL-SPEC components.

The above indicators prompted PHOTOTELESIS management to test market reaction to its image communications technology and determine the applications, feature requirements and price points necessary for success in the targeted markets.

These activities resulted in the identification of highly receptive user groups in the following government departments:

- Department of Defense
- Executive Office of the President
- Department of Energy
- Department of Justice
- Department of Treasury
- NASA

PHOTOTELESIShas made revenue shipments of evaluation quantities to target customers during 1986 and has received orders for additional equipment for delivery in 1987. In addition, high-level user groups have been identified in each of the above departments who are prospects for sale in 1987.

Marketing Strategy

PHOTOTELESIS sells its products directly to major accounts in its target markets through government purchasing contracts, and plans to offer its products on the G.S.A. (General Services Administration) price lists. The company will also develop indirect marketing channels through Prime Contractors, Sales Representatives, and Value Added Resellers who specialize in government electronics marketing.

The company markets "top down" by identifying major program initiatives in high-level policy-making groups, and selling "seed units" to elite users who can set requirements for large volume contracts in the future.

PHOTOTELESIS management believes that rapid deployment of its image communications technology in high-level user groups will lead to the company's products becoming a defacto standard, as new users develop who require compatible technology. This strategy will provide a significant barrier to future competition in the image communications arena.

EXECUTIVE SUMMARY

Product Line Overview

The PHOTOTELESIS products are known as Remote Image Transceivers, or R.I.T.'s. The RIT is based on technology and components purchased on an O.E.M. basis from Image Data Corporation, who markets their product as The Photophone™.

The company has developed three versions of the RIT which are specialized for its target markets:

Desktop Products The company provides desktop RIT's which offer specialized communications options for secure, radio, or cellular operation, and provides an advanced high-resolution camera and shipping cases as standard features. A version of the desktop secure product is being developed for use in classified applications which require special design features and certification by the National Security Agency.

ATR-RIT Products This product is a repackaging of the desktop technology into an industry standard Aircraft Transport Racking (ATR) form factor suitable for mounting in aircraft, marine or mobile environments. The ATR-RIT is offered with both secure and non-secure communications options and may be powered by an optional battery pack or available DC power. The ATR-RIT permits image communications to take place from field locations such as battlefields, airspace or intelligence monitoring sites where conventional packaging techniques would be impractical.

Briefcase Products Test marketing has uncovered a great interest in a portable or "briefcase" version of the RIT for both secure and non-secure applications where portability is a necessity. The packaging technology for the ATR-RIT will be adapted for the briefcase products, yielding a package that will fit inside a standard briefcase form factor, including display, keypad, electronics, battery pack and communications interface. This product will siignificantly increase the market potential of the RIT technology and push the product into applications in which image communications has not heretofore been available. Target field applications include infantry, disaster recovery, paramedic, construction, survelliance and security.

EXECUTIVE SUMMARY

Financial Overview

PHOTOTELESIS anticipates that revenues from its presently identified markets will be in excess of $13 million over the next three years, with near break-even profitability achieved during 1987 on revenue of $1.6 million. Pretax profits are planned to grow to $1.6 million by the end of calendar 1989 on revenues of $7.2 million. These forecasts assume penetration of presently identified markets only and do not include substantial potential for the company's products in other markets which have been tested.

The company's financial projections assume that the corporation is funded with $750,000 by the end of May, 1987. The funds will be used to expand marketing and product development activities, and to ramp up volume manufacturing through a subcontractor.

Notes

The Company

ABOUT THE COMPANY

History

Founded
PHOTOTELESIS was founded in SEPTEMBER 1985 and was chartered as a Texas Corporation in January 1987. The business purpose of the corporation is to address specific vertical markets with customized video transmission products.

Test Marketing
Specific product concepts were successfully test marketed at policy-making levels within NASA, the Pentagon, and Federal law enforcement agencies. User groups within each market sector were also consulted, and specific product specifications were derived.

Product Announcement
The first products were announced at the Armed Forces Communication & Electronics Association (AFCEA) 1986 International Conference & Exhibition in Washington, D.C. in May of 1986.

Development
The first product prototypes, Sec-RIT and ATR-RIT, were completed in January of 1987.

Orders and Shipments
Shipment of the Com-RIT product to the FBI occurred in June of 1986. Initial orders for Sec-RIT and ATR-RIT were taken in October and November of 1986, respectively.

Organization
Additional marketing and financial expertise were added when it became apparent the business opportunity was there. In December of 1986, a corporate strategy and business plan were developed.

NOTE: See product literature in this package for more details about specific products.

ABOUT THE COMPANY

Strategy

Our business strategy
Our business strategy is to take commercially available, "off-the-shelf" products, add our own technology, packaging, and marketing expertise, then sell to our customers. We will make use of contract personnel when appropriate to keep overhead costs down. Here's how it works:

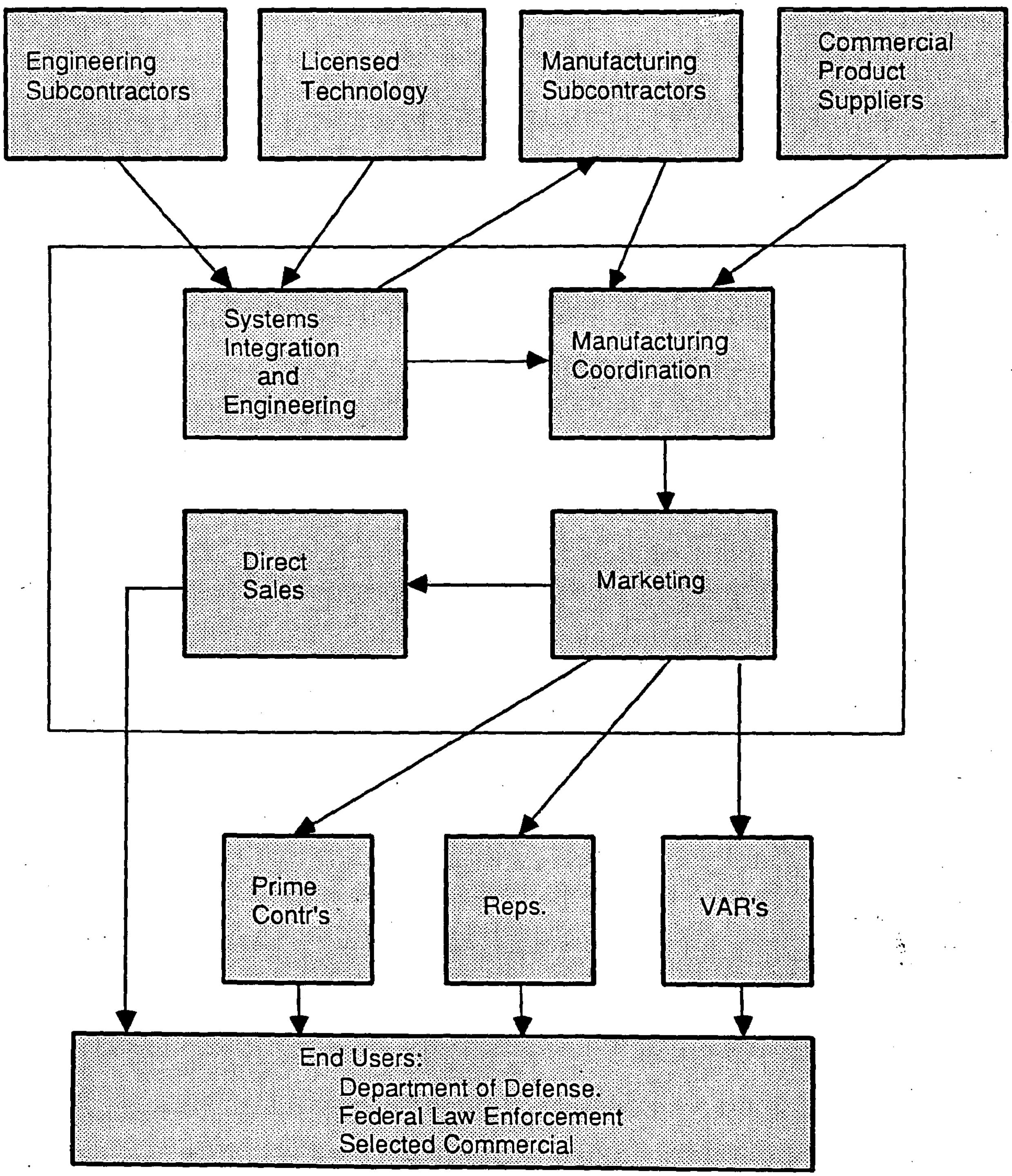
Suppliers
Suppliers provide us with commercially available products, such as

- Image communication subassemblies
- Video equipment
- PC's and PC peripheral equipment.

PHOTOTELESIS
Then we add our own technology and packaging to create our product. And we market these products to our vertical market sector.

Contract Personnel
We use contract professionals where possible. In particular, this is appropriate for legal work, certain engineering work, technical publications, documentation, advertising, and manufacturing.

As a result, we can produce specialized products from off-the-shelf products at very competitive prices. We offer these products through a variety of distribution channels. By using contractors where possible for our needs, we greatly reduce overhead costs.



PHOTOTELESIS–CONFIDENTIAL

ABOUT THE COMPANY

Organization

Present Organization
Presently our staff includes:

- David Monroe, President
- Larry Glidewell, Marketing and Sales
- George Leonard, Marketing and Sales
- Mike Huffman, Finance and Administration
- Eric Schweppe, Engineering

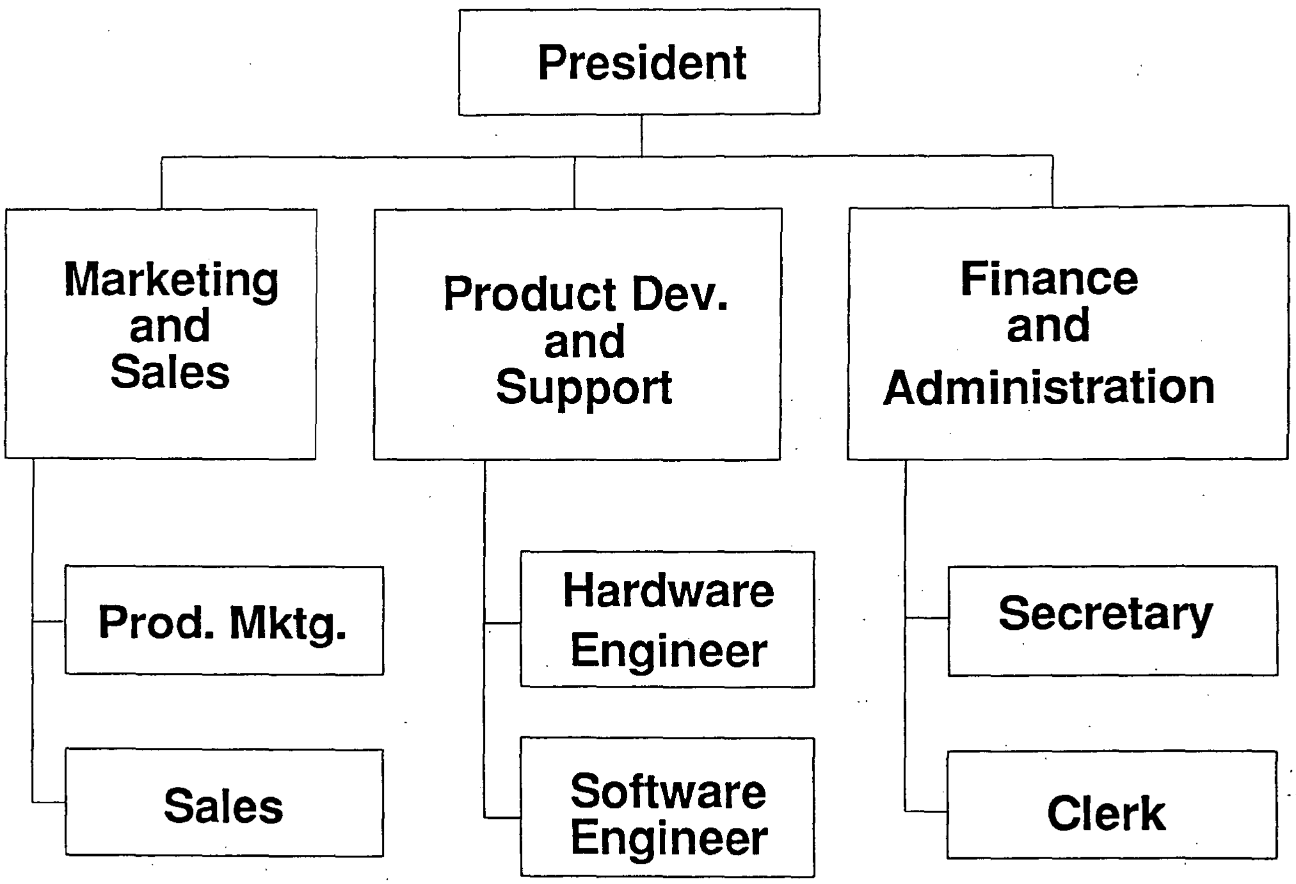
Planned Expansion
During 1987, we plan to add these staff functions:

- Hardware Engineer
- Software Engineer
- Secretary
- Clerk

External Functions
These functions will be handled by contract personnel:

- Manufacturing
- Government Contract Development
- Customer Service
- Accounting and Legal
- Technical Publications and Documentation
- Engineering Services

Organization Chart



ABOUT THE COMPANY

Management Profiles

The PHOTOTELESIS executive team contains the key strengths in management, finance, engineering and marketing that are required for success in the high technology systems field. This section presents brief profiles of each individual on the team.

David A. Monroe
David Monroe, 34, has worked as an engineer and scientist throughout his career, from individual contributor positions progressing to President and Founder of PHOTOTELESIS Corporation.

Prior to starting PHOTOTELESIS, Mr. Monroe was Vice President and Co-Founder of Image Data Corporation, where he developed the PHOTOPHONE video telephone product from concept through manufacturing startup and product introduction.

Mr. Monroe was previously Vice President of Office Graphics Systems of Datapoint Corporation, where he was responsible for the management of several of Datapoint's most complex development programs, including the company's Laser Printer, Color Graphics System, Impact Printers and Facsimile products. Prior to Datapoint, Mr. Monroe was Principal Engineer with Mnemonics, Inc., a San Antonio and Sunnyvale-based startup in the field of solid state memory systems.

As President, Mr. Monroe brings vital skills in management of high-technology startups, including research and development, product and market strategy, and general management of electronics and computer products companies.

Mr. Monroe's educational background includes Undergraduate curricula in Physics and Computer Science, University of Kansas, 1970-1973, Wharton Short Course on Finance, 1979, and AMA Management Course, 1980.

Management Profiles

Larry P. Glidewell

Mr. Glidewell, 35, has a varied professional background in communications, organizational development, training, and marketing. Mr. Glidewell created the marketing function at PHOTOTELESIS to conduct the market research and test marketing required to define the business opportunities for the company's technology.

Prior to PHOTOTELESIS, Mr. Glidewell was a partner in Interactive Video Solutions in San Antonio, where he developed the marketing opportunity for computer controlled laser videodisc technology in the military and goverment markets. Mr. Glidewell previously was Founder and President of MAP Development in Houston, which was a pioneer in the use of interactive video and computer aided instruction for the oil and gas industry. Prior to this, Mr. Glidewell held management positions at NL Industries and Modern Management Methods in industrial and business training and development.

Mr. Glidewell's background provides the company with key strengths in management, business and marketing, as well as specific expertise in the application of high technology videodisk and teleconferencing systems in business.

Mr. Glidewell's educational background includes a B.S. in Communication, 1973, and an M.A. in Organizational Development, 1975, both from Oklahoma State University.

ABOUT THE COMPANY

Management Profiles

Michael L. Huffman
Mr. Huffman, 37, has an extensive background in finance, accounting, administration, and planning. Mr. Huffman joined PHOTOTELESIS to assume the management of the financial and administrative operations for the company.

Prior to this, he was Director of Finance and Administration for Network Standards Corporation in San Antonio, where he managed all financial, accounting and administrative operations for the company. Previously, Mr. Huffman held management positions in finance and administration at Datapoint Corporation, where he was actively involved in both marketing and product development functions. Prior to this, he held positions in financial analysis and business development with Duncan Smith Co. and Electronic Data Systems.

Mr. Huffman brings excellent credentials and experience to the company in the management of finance, accounting and planning functions, with specific expertise in high technology businesses.

Mr. Huffman's educational background includes a Bachelor of Arts and a Bachelor of Science in Civil Engineering from Bucknell University, 1972, and an MBA in Finance and Management from the University of Texas, 1978.

George L. Leonard

Mr. Leonard, 37, has a varied background in high technology electronic systems that includes product development, product management, marketing and sales. He joined PHOTOTELESIS to provide additional emphasis in the marketing and sales of the company's products.

Prior to joining the company, Mr. Leonard was Director of Marketing and Sales, Advanced Products Division, for Datapoint Corporation, where he managed the market research, introduction and marketing activities for a new generation of desktop networked video conferencing equipment. Previously, Mr. Leonard held various management positions in product marketing, product development and planning for Datapoint's office automation product line. Prior to this, Mr. Leonard was engaged in product development and engineering management at Basic Four Corporation, Panhandle Eastern Pipeline, and GeoSource International.

Mr. Leonard brings key skills to the company in sales, marketing, and product management, with specific expertise in the field of desktop video conferencing.

Mr. Leonard's educational background includes a Bachelor of Science, Electrical Engineering, 1972, and a Master of Electrical Engineering, 1973, both from Rice University.

Notes

The Market

Initial Marketing Contacts

In the fall of 1985 PHOTOTELESIS became interested in the possible application of video telephone technology in the Department of Defense. Through an association with General Doyle Larson, USAF (Ret.), introductions were made to Donald Latham, Assistant Secretary of Defense, Communication, Command, Control, and Intelligence.

After an initial briefing on the product in Washington, Mr. Latham was sufficiently impressed with the product that he arranged a briefing with General Rice, Chief of Joint Special Operations Command, and General Perroots, Director of the Defense Intelligence Agency, and their staffs, to introduce them to the image transmission capabilities that PHOTOTELESIS had to offer. This meeting, although scheduled for only twenty minutes, lasted for two and a half hours.

What We Learned

The need for image transmission was well known at the policy levels represented in the briefings, and there was significant interest expressed for products which could provide this need. Mr. Latham was a strong proponent for the military buying and, if necessary, modifying existing commercial equipment rather than incurring the time and expense of developing specifications for bid with large companies that specialize in custom government products. Our product not only fit his model of acquisition and cooperation with the corporate sector, but also fulfilled a need within the C3I (Communication, Command, Control, and Intelligence) community, which is involved in communications across all branches of the military.

We learned that several changes to the standard desktop product would be necessary for widespread use within the C3I arena. First, the unit would have to be made compatible with standard encryption devices (known as COMSEC, for Secure Communications), already in use in the military. Second, the product would have to be modified to meet a government standard known as TEMPEST, in order to permit it to handle classified information in a manner that could not be detected electronically by enemy groups.

We also presented a prototype of a portable image transceiver which fit in a briefcase. There was a great deal of interest in this product for use in the field where small size, battery power and radio or satellite communications is required.

THE MARKET

Background

Results

Based on the positive reception to our product concept, we were given points of contact within specific user groups and encouraged to discuss our capabilities and their requirements for image transmission products. We concluded that discussions and demonstrations with these groups would allow us to test whether there was indeed a market opportunity for our products.

Test Marketing

Objectives

The enthusiastic reception to our products in the C3I market convinced us that a project should be initiated to test the overall market firsthand. The use of image transmission technology in this market was so new that there was no market research data readily available, but we determined that collecting primary market data from potential users would be even more valuable. The objectives of the market test were to determine

- the user needs and potential volume for image transmission products
- how the government would go about purchasing the products
- what competitive products might already exist
- what features and pricing would be required

Initial Product Demonstrations

Initial user groups that were contacted within the C3I community included the National Security Agency, Joint Chiefs of Staff, Special Operations Command Atlantic (SOCLANT), FBI, NASA, Secret Service, White House Communications, Defense Communications Agency, Defense Intelligence Agency, and groups from the Department of the Army. We held additional briefings in Washington with Army Intelligence, Drug Enforcement Administration, U.S. Postal Investigation Service, Voice of America, Joint Special Operations Agency, and Army Psychological Operations.

The information that was collected from presenting the product to these user groups confirmed that there was a substantial market opportunity for off-the-shelf image transmission equipment. The requirements for COMSEC compatibility and TEMPEST certification were also validated by these groups. We also collected additional information on the need for units that could operate in mobile or portable applications, communicating imagery back to a central "base station" Many groups indicated that the product concept and price range was superior to other imaging products available to the government, and that in fact there was no incumbent product in widespread use.

Placement of First Units

The test marketing activities led directly to purchases of initial units from the FBI and Army groups located at Ft. Eustis and Ft. Belvoir. Ft. Bragg SOCLANT, who provided valuable information in defining product features and assistance in compatibility testing, took delivery of the first two prototype encryption-compatible units, which would later become the Sec-RIT. The FBI purchased two units for evaluation, including the first delivery of a unit later called the Com-RIT that could transmit images from a vehicle over cellular telephone. An Army group awarded us a contract for a unit that could be mounted on an aircraft and transmit images over satellite-based secure voice equipment to a distant command center.

Conclusions - the Opportunity

Several conclusions were evident from the market test. First, there appeared to be a substantial immediate market opportunity in the groups that were sampled for a relatively low-cost, off the shelf image transceiver. Although the purpose of our test marketing was to gather information, we received orders in addition. There did not appear to be substantial entrenched competiton for encryption-compatible image transceivers that could operate over existing voice communications facilities. Although more market data was needed to properly measure the total opportunity, there was enough primary data available from talking to prospects and initial customers to justify moving ahead with a major product announcement.

Conclusions - Product Requirements

Second, specific product modifications in the packaging and communications areas were mandatory to allow interested groups to use even evaluation quantities of units. We concluded that three product families would be required:

• desktop units, for command centers and other stationary installations

• mobile units, for use in vehicle, aircraft or marine platforms

• portable units, for personal use anywhere in the field

Each of these families had to operate over existing secure voice communications systems, and at least the desktop units would have to meet TEMPEST standards to address the broad market. We also saw needs for networking these products together, to allow for multi-site briefings or access to remote image databases.

We concluded that this product line could meet broad-based needs in defense or federal law enforcement markets, where, combined with existing communications, complete image networks could be constructed. This concept is illustrated in the accompanying diagram.

Conclusions - Applications
Many of the applications that we found for our products are in the intelligence community for use by analysts who deal with image-based information on a daily basis. While the specific applications of our users are classified, some of the areas of use include :

- real-time collection and dissemination of reconnaissance imagery from video or radar-based sources
- remote access to documents, drawings, maps, or technical illustrations
- multi-site briefings with graphic support
- communication of images from stationary imaging systems to remote sites
- remote access to image archives for personnel identification, medical records, or intelligence files
- real-time visual access for remote expert consultation and problem solving

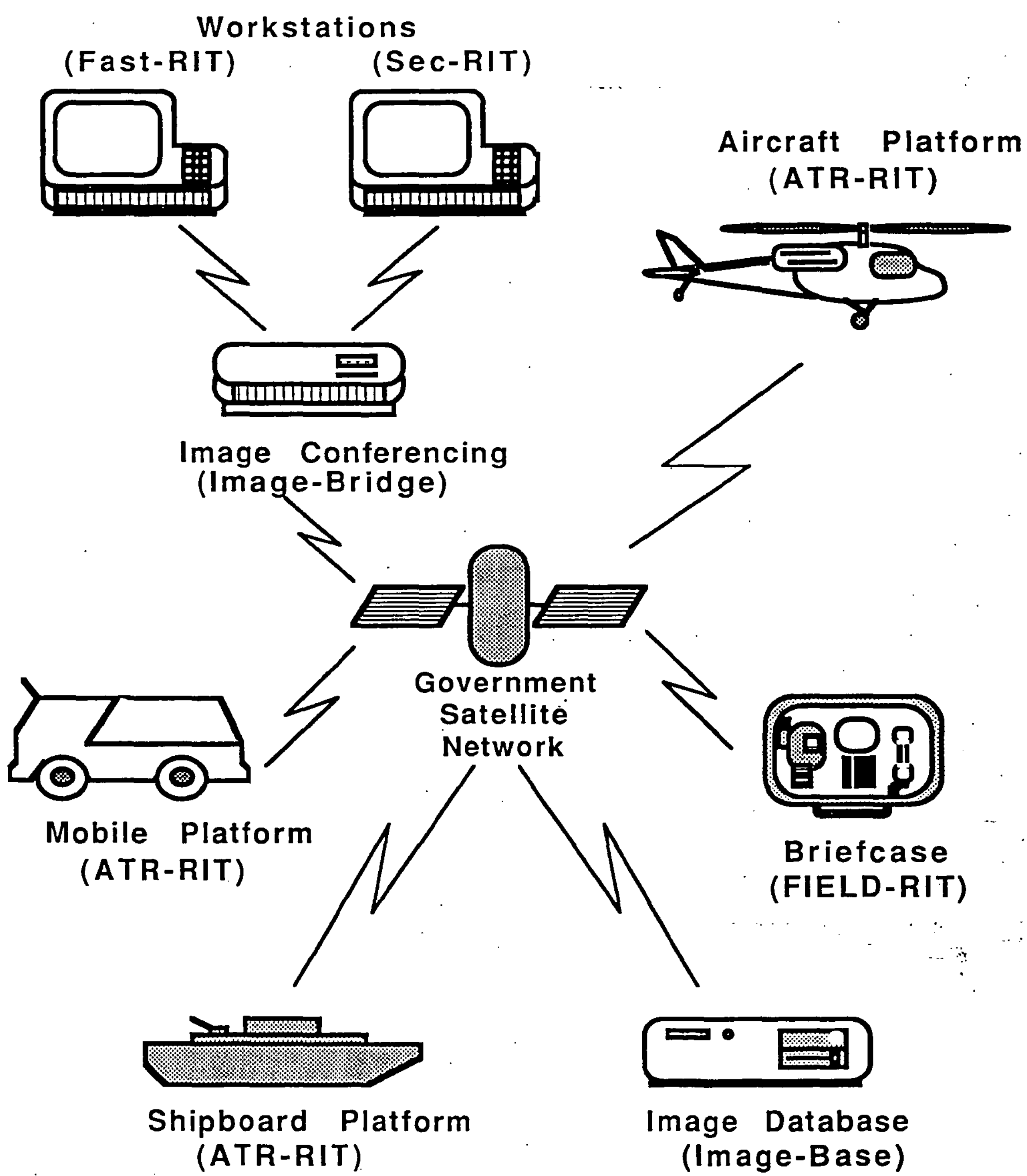
Conclusions - Marketing
We discovered that the user community that was interested in our products was tightly knit because of common requirements, so that initial success in one group could spread by word of mouth to other groups with similar needs. *As a result, it looked like a small but highly focused marketing effort could be highly productive.*

We also discovered that interoperability, a term for the ability of different communications or computer equipment to work together, is a key factor for market success. Because of the different custom imaging systems we found installed, there is no widespread interoperability in place between groups. *We concluded that marketing*

THE MARKET

Test Marketing

This diagram illustrates our products in a typpical customer appiication.



success with one group could lead to requirements for new groups to have compatible equipment.

We also concluded that our marketing success depended on working through a triangular relationship of policy makers, user groups, and contracting officers or acquisition groups. Understanding the overall direction of government programs and gaining the support of the policy makers allows us to select key user groups to address. Placing evaluation, or "seed" units in these groups gains us influence in the development of specifications for future volume contracts. Finally, working through the acquisition groups to win major contracts for our products can create substantial barriers to future competition.

In short, we had found a market niche that had immediate requirements, had funds available to spend, and could be successfully penetrated by a small, aggressive company that could be more responsive to user needs than the established government contractors.

During the test marketing project we demonstrated our products to over thirty user groups who have an application which they are interested in pursuing. These groups form the basis for our 1987 forecast, which is detailed in the Marketing section that follows.

Announcement

In May of 1986, PHOTOTELESIS announced the Sec-RIT and Com-RIT product lines, as well as future directions in portable and TEMPEST qualified units. The products were announced at a major military trade show known as AFCEA (Armed Forces Communications and Electronics Association). There was strong user interest at the show, resulting in over fifty qualified leads for future business. Press releases were published in magazines targeted at both defense and communications audiences which have to date resulted in over 250 leads for Com-RIT and Sec-RIT products. Copies of our press releases may be found in the Appendix.

Market Statistics

Introduction

During the test marketing campaign, we concluded that additional data should be gathered on the size of the markets we were interested in, and on major policy directions in the Department of Defense that were influencing the market and might be advantageous to us in the future. Since no research reports on image communications equipment in the military was readily available to us, we began to collect statistics through a variety of sources, including books, articles, newspaper stories and personal interviews with highly placed individuals in the military.

Our primary focus remained the C3I market: Command, Control, Communications and Intelligence. Within that umbrella term for all D.O.D. communications programs, we identified three major government programs that were relevant to our market thrust:

- TEMPEST qualified products
- STU-III Secure Telephone Units
- Mobile Subscriber Equipment

Each of these programs is described on the following pages, including forecasts of future market opportunity. Then we will draw conclusions about their importance to our marketing direction.

THE MARKET

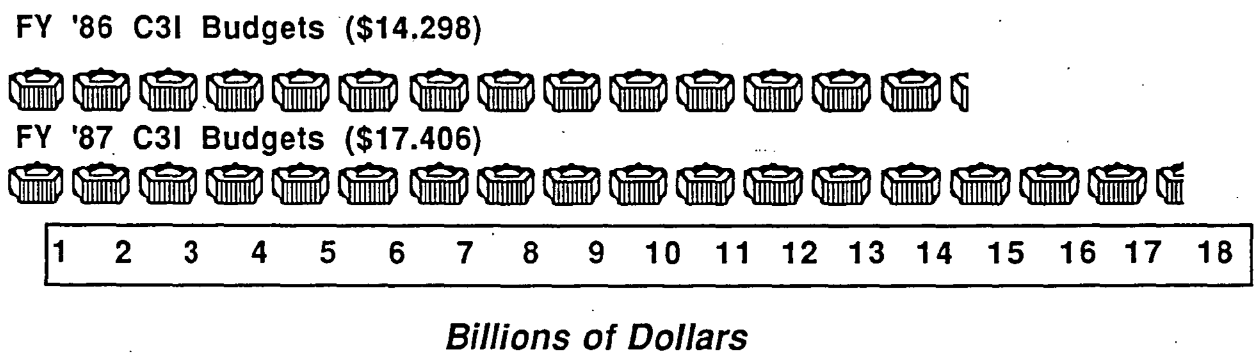
Market Statistics

Command, Control, Communications and Intelligence (C3I)

Programs that involve D.O.D secure communications in all branches of the Military are grouped into this classification for administrative control. The Assistant Secretary for C3I reports to the Secretary of Defense, and oversees all policies and budgets regarding agencies, programs, and acquisitions of equipment.

Deployment is accomplished through the Joint Chiefs of Staff to all Military service Command, Control, Communications and Intelligence branches through their world-wide organizational structure composed of CINC's (Commanders in Chief) representing regional and strategic commands. Departments of Army, Navy, Air Force, and Marines may have individual programs, but C3I seeks to ensure inter-service and NATO compatibility.

The growth of budgets for C3I programs provides a broad market opportunity for adding our secure image communications products to D.O.D.secure communications systems.



Source: C3I Handbook, P. 262, Defense Electronics, 1986.

TEMPEST

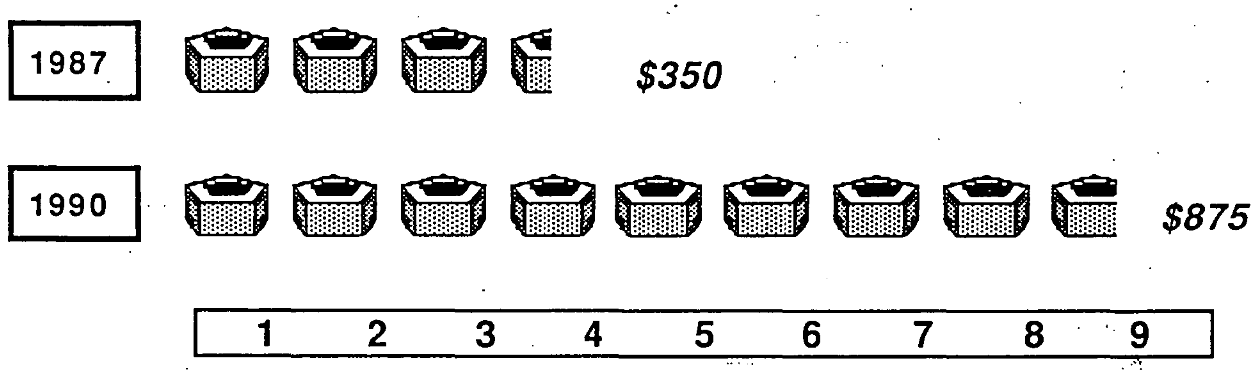
TEMPEST is the Federal government's word for the countermeasures taken on electronic and data processing equipment to prevent them from emitting electronic signals that can be detected by unauthorized persons. TEMPEST requirements are quite common in the Federal government, thus creating an opportunity for TEMPEST qualified image transmission systems.

TEMPEST equipment is required in many office environments in the U.S. Federal government which deal with classified information, and for almost all non-tactical applications outside the U.S. TEMPEST-qualified products command a high price premium in the market compared to comparable commercial versions.

"Government and industry officials are forecasting a steady demand for TEMPEST equipment and services over the next five to ten years.

Current expenditures are $350 million, a number that might easily double or triple by the end of the decade."

We will provide TEMPEST-compatible desktop and portable Remote Image Transceivers to take advantage of the tremendous growth in this market area.



Millions of Dollars

Source: C3I Handbook, Pp 181-200, Defense Electronics, 1986.

THE MARKET

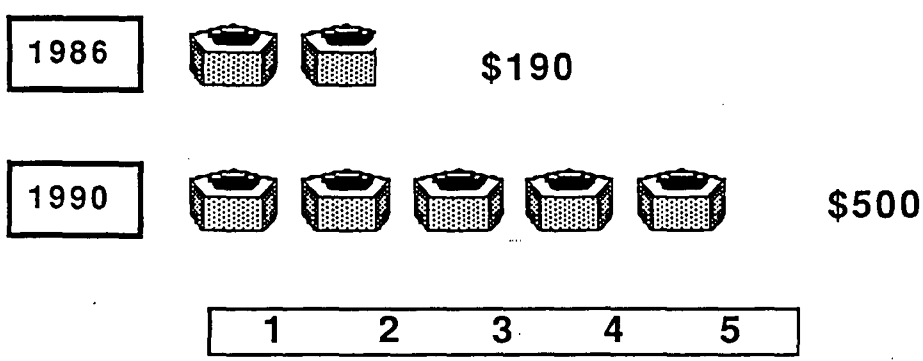
Market Statistics

Secure Telephone Units
STU-III is the acronym for the third-generation Secure Telephone Unit program. This program extends to all Federal agencies and contractors, creating a tremendous market opportunity for encryption-compatible desktop image transceivers.

Special Secure Telephone Units (STU's) are being developed and produced under a National Security Agency sponsored program. Initial contracts let in 1986 worth $190 million will allow the secure telephone market to expand from the current STU-II's to up to 50,000 new STU-III's. Ten thousand units will be produced per month and will sell for around $2000. Initial contracts were let to RCA ($84.7M), AT&T ($55.2M) and Motorola ($50.1M). Industry estimates forecast a market size of $500 million by 1990, resulting in an installed base of up to 500,000 units over the next ten years.

Our Sec-RIT product is designed for compatibility with STU-III, opening a vast new market for us as these telephone systems come into use. ***For example, if five percent of the expected STU-III desktops are candidates for image transmission, that represents a total available market of 25,000 units over the next ten years.***

Contracts in Place and Future Growth



Millions of Dollars

Source: The NewYork Times, Tuesday, July 8, 1986
Defense Electronics, March, 1987.

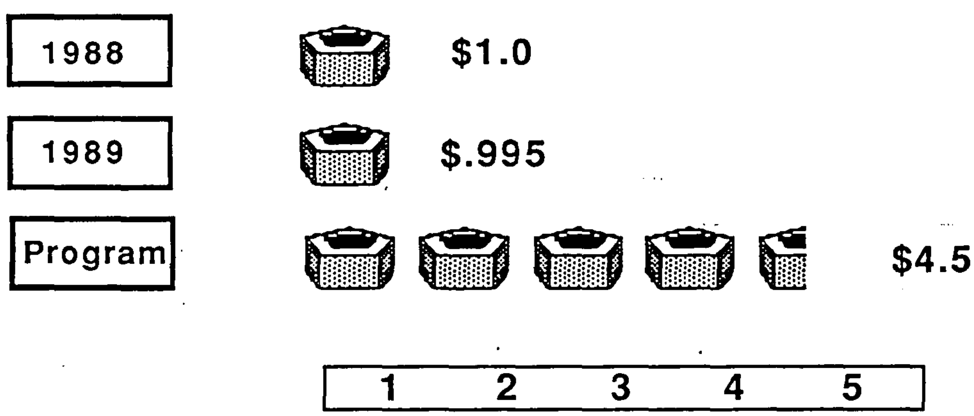
Mobile Subscriber Equipment

The Mobile Subscriber Equipment (MSE) program is a new U.S. Army program which provides vehicular and man-portable communications equipment.

The largest procurement of tactical communications equipment in history, MSE is often described as "the Army's Cellular System". With initial operation scheduled for 1988, the program will provide a worldwide secure switched network for voice, data, teletype, and facsimile communications for digital radio telephone users, switched system subscribers, information processing facilities, and combat-net radio users. This program is slated for expenditures of $1.0 billion in Fiscal 1988 and $995 million in Fiscal 1989. Total program expenditures are expected to top $4.5 billion.

Our ATR-RIT and briefcase product families will be compatible with these new cellular systems. ***If the market for image transmission is only one percent the size of the totoal MSE market, it represents a $10 million opportunity for us in 1988 alone.***

MSE Program Expenditures



Billions of Dollars

Source: C3I Handbook, P.119, Defense Electronics, 1986; Microwave Journal, February 1987.

Conclusions

Our investigation into these major programs has yielded several important conclusions:

First, the overall C3I market is receiving major funding for communications equipment and is projected to have strong future growth. We have developed direct contacts to policy makers in this arena who are enthusiastic supporters for our products. Moreover, C3I has the organizational focus across all branches to allow us to market our products using a top-down approach without needing a large direct sales force.

Second, the market for TEMPEST equipment is growing at a rapid pace and is projected to continue to do so over the next five to ten years. This indicates a ready market for TEMPEST-compatible versions of our products, important because the broad market opportunities for us are in applications which demand TEMPEST certification.

Third, the STU-III market indicates a major shift in thinking about COMSEC, or Secure Communications, in the Federal Government, from a few expensive units in limited locations to a broad deployment across all branches of the government that deal in classified information. Since these units are just now beginning to appear in the market and are being manufactured in very large quantities, we are well positioned with our COMSEC and future TEMPEST-compatible product line on the leading edge of an important new market.

Fourth, the projected growth in the Mobile Subscriber Equipment market points to a vastly increased emphasis on world-wide military communications in the field. We are well positioned to take advantage of this new market with our secure mobile and portable products.

Taken in total, we have concluded that these programs point to a major market being formed for products which are compatible with the new generation of secure communications equipment. Our research points to strong growth in this market over the next five years, creating a total available market measured in the billions of dollars, and tens of thousands of "sockets" into which we can plug our products. We have already made significant strides in developing compatible products for this market and have focused our marketing resources on tracking and penetrating major contract opportunities for our image-based product line.

Notes

Competition

Introduction
A key factor in assessing the market opportunity for the PHOTOTELESIS product line is the presence of competition, particularly in the areas of image transmission systems that offer COMSEC compatibility, can operate over existing voice communications facilities, and are offered in TEMPEST versions. One of our best sources of competitive information is our own customers, who have consistently told us that our product concept is unique in the market.

We realize, however, that there are many communications products and systems in the federal government that are competing for contract dollars, even though they may cover a wide diversity of features and price points. This section takes a look at the competitive environment that currently exists and draws several conclusions that influence our marketing strategy.

Video Conferencing Products
Currently, video transmission in the Federal arena is primarily confined to full-motion (i.e. closed circuit television) systems. These systems are installed in expensive, custom conference rooms for use between high-level management groups. The cost per room is usually in the range of $100-250 thousand, and the cost per hour of use ranges from $250-750. Communications lines which can handle the high speed video information between rooms are highly specialized and in short supply. Although some of these rooms operate over encrypted circuits, security remains a significant problem. Some rooms utilize lower-cost freeze-frame equipment which can send still pictures over standard telephone lines, but the equipment is customized for each installation and, like the full-motion systems, complex to operate.

Tactical Imaging Requirements
Many groups within the Federal government deal with image-based information on a routine basis. Military and law enforcement groups who collect images in the field often record the images on video tape, which must then be delivered by courier. Alternately, they use conventional camera technology, which must be developed and printed before the images can be couriered to their destination or sent by facsimile.

The advantages of video transmission are that any image, whether it be a document, object, person, or scene, can be captured instantly from any video camera source. Once captured, the image, now in digital form, is compressed and sent over a standard voice-grade communications circuit.

COMPETITION
Products

Key factors in applying this technology are:

- the resolution, or clarity, of the image received, including documents, objects, persons, or scenes
- the speed at which an image can be transmitted
- the ability of the transmission device to achieve error-free communication
- the ability to use all types of voice communications circuits, including telephone, radio, and satellite, in both secure and non-secure modes
- the ability to operate the device in fixed, mobile and portable environments
- the ability to transmit classified information without risk of electronic detection
- ease of use to minimize training time
- low cost to acquire and operate
- reliability
- off-the-shelf availability

Freeze-Frame Video Transmission Systems
There are two principal vendors providing commercial video image transmission systems to the Federal Government: Interrand Corportation and Colorado Video. There are also two main vendors providing military equipment: Dalmo-Victor (division of Singer), and E-Systems. Detailed comparisons of these products against the PHOTOTELESIS products are presented in tabular form at the end of this section. A few salient points are worth noting here:

- The commercial products, which have been used mainly in conference room applications, are not known to have government-supplied encryption interface capabilities, operate only on standard telephone circuits, are not offered in TEMPEST form, and are not available in versions which can be used in mobile or portable applications.

- The military products are very expensive, not available off-the-shelf, do not operate in a network which permits multi-point briefings or remote image database retrieval, are difficult to use, and are not offered in compatible desktop versions.

In short, although some competitive features are offered by each product, no one product meets all the required characteristics defined above.

Facsimile Products
Facsimile technology provides a way to electronically scan flat images, such as documents or photographs, and send them over ordinary telephone lines. Facsimile technology is capable of high resolution, or image clarity, for black and white images, but suffers in comparison to video techniques where the image has many intermediate levels of gray, such as images of objects, people, or scenes. Facsimile devices attempt to accomodate for this deficiency by using a technique called *half-toning,* which uses closely spaced patterns of black and white dots to simulate shades of gray.

Two military facsimile devices currently in use are the Tactical Field Fax, available from various manufacturers under D.O.D. contract, and the MDFT, manufactured under federal contract by Video Masters. These devices are compared to the PHOTOTELESIS products in a table at the end of this section. The main conclusions of this comparison are as follows:

- Facsimile devices are the preferred alternative for the transmission of documents only, where their high resolution and low cost are significant advantages.

- Facsimile is poorly suited to other kinds of imagery, since the image must first be captured and printed by some other means before it can be fed into the facsimile scanner, a time-consuming process which also degrades the image. Facsimile transfer does not faithfully reproduce the shades of gray in an image, which is vital in many tactical applications including personnel identification, reconnaissance imagery, etc. Therefore, video techniques will be preferred when one device must be usable with a variety of image sources.

- Facsimile protocols are sensitive to communications line quality; "drop-outs" on the line can cause portions of the image to be destroyed, necessitating resending the entire image. The PHOTOTELESIS products use a coding technique known as forward error correction for error-free transmission over a wide range of line quality.

COMPETITION

Products

Desktop Products

Feature	PHOTOTELESIS	INTERRAND	COLORADO VID.
Resolution (pixels)	592x440x128	640X480X256	512x480x256
Speed (seconds)	10-40	10 for partial resolution 80 for full resolution	25
Error Correction	block transmission forward error correction	error checked	no
Transmission	telephone, radio, cellular, satellite	telephone	telephone
Encryption Compatible	yes, programmable	unknown	unknown
Packaging	desktop,mobile, portable	desktop or console	rack mount
Ease of Use	menu based, helps	manual controls	manual controls
Cost	$10,000-24,500	$11,000-75,000	$15,000 est.
Availability	off-the-shelf	off-the-shelf	off-the-shelf

Note: Data sheets are included in the Appendices.

COMPETITION
Products

Military Products

Feature	PHOTOTELESIS	DALMO-VICTOR	E-SYSTEMS
Resolution (pixels)	592x440x128	256x256X256	512X480X256
Speed (seconds)	10-40	3-180	120
Error Correction	block transmission forward error correction	yes	none specified
Transmission	telephone, radio, cellular, satellite	radio, satellite	radio, satellite
Encryption Compatible	yes, programmable	yes	yes
Packaging	desktop,mobile, portable	mobile	two man portable
Ease of Use	menu, help screens	manual controls	manual controls
Cost	$18,500-24,500	$50-100,000	unknown
Availability	off-the-shelf	special order	unknown

Note: Data sheets are included in the Appendices.

COMPETITION
Products

Facsimile Products

Feature	PHOTOTELESIS	FIELD FAX	MDFT
Resolution (pixels)	592x440 per image	204x19per inch	75-300 per inch
Gray Scale	128 levels	4-16 levels	5-33 levels
Input Medium	high res. camera	flat scanner	flat scanner
Speed (seconds)	10-40	7-15	15
Error Correction	block transmission forward error correction	none	none
Transmission	telephone, radio, cellular, satellite	radio, satellite	radio, satellite
Encryption Compatible	yes, programmable	yes	yes
Packaging	desktop,mobile, portable	rack mount, 110v.	two suitcase portable
Ease of Use	menu, help screens	manual controls	manual controls
Cost	$18,500-24,500	$7800-16,800	unknown
Availability	off-the-shelf	D.O.D. contract	unknown

Note: Data Sheets are included in the Appendices.

COMPETITION
Conclusions

We have drawn several conclusions from our analysis of the competition:

First, the PHOTOTELESIS approach to image transmission is clearly different and superior to other solutions on the market. We believe that we uniquely meet all the requirements for success stated earlier:

- we offer high resolution combined with full gray-scale capability that gives excellent image clarity with a variety of subject material
- our transmission protocols achieve error-free communication even with marginal communications channel quality
- we can send a typical image over encrypted circuits in 20-30 seconds, and over standard telephone lines in under 10 seconds
- we use a wide variety of voice communications circuits and encryption devices
- we can operate in fixed, mobile and portable environments
- our TEMPEST version will permit us to transmit classified information without risk of electronic detection
- we offer ease of use through simplified control panels and menu-based operation
- our products are low cost to acquire and operate
- our design has proven reliability
- we offer off-the-shelf availability

Second, although there are different, incompatible products available which meet some of the needs above, our product line meets them all in one family of interoperable products.

Third, we believe that we can minimize competitive threats from other companies with substantially greater resources than ours by

- offering products which are tailored to meet specific user needs by providing compatibility with a wide range of communications systems and encryption devices
- offering a range of compatible product solutions which can work together
- providing products at attractive price points
- concentrating on penetrating key applications early and establishing our products as the standard, thus locking out competition with incompatible communications protocols

Notes

Marketing

Customer Model
We view our customers and prospects in groups which may be represented as a market pyramid. In an emerging market, penetration occurs at the top of the pyramid where there are a limited number of innovative groups who are eager to purchase state-of-the-art technology. Moving down the pyramid we find larger groups of users, but they are more risk-averse and depend on a more established market before they will commit to purchase. Relating this model to our own customers, we see the market pyramid in four broad groupings:

Advocates
Product advocates are willing to take standard products for Test & Evaluation, then upgrade to meet full requirements. Purchase volumes: 2 units per order.

Early initiators
These users must have encryption-compatible units, but do not need to meet all feature requirements initially. Their applications are limited to CONUS (Continental U.S.) operations, since TEMPEST qualification is required for most work off-shore. Purchase volumes: 2-6 units per order

Test bed users
These groups must prove their products through their own testing and evaluation. Then they will use them in a "test bed" or representative tactical application. They will do their own TEMPEST testing if required. Purchase volumes: 6-30 units per order.

Large groups with established requirements
Volume orders (30-500 units) over a period of time on open contract, through GSA schedule, or in conjunction with a large contract for other equipment. Many applications will require full TEMPEST certification. Contracts are usually associated with a major program, e.g. STU III, MSE etc.

The Role of Product Advocates
The product advocates mentioned at the top of the market pyramid are extremely important to us as we penetrate new application areas for our products. These users are well known for their expertise in communications and have sufficient "clout" to purchase test and evaluation units. They make their reputation by being the first to use a product in a new area, and are eager to participate in product demonstrations to other user groups. They become "inside salesmen" for the product and are invaluable in establishing early successes. We have developed such champions in each of the initial user groups we have sold into and view their role as an important element of our marketing strategy.

Sales Process
We have found that successful sales of our products follow this pattern:

- We identify a potential user group through referrals from policy makers or other user groups. They might be identified by their function within a service group or their association with a major communications program.

- Our customers must meet the following qualifications:

    - funds presently budgeted for imaging systems, either on a line-item or discretionary basis
    - defined requirements in place which either fit our products or can be influenced
    - a high priority assigned to the project
    - active involvement of a contracting officer or acquisition group
    - a visible product advocate

- After initial contact by telephone, and assuming the group meets our qualification criteria, we send out a letter and documentation package tailored to their application.

- A follow-up call after the literature is delivered tests interest and identifies specific applications and requirements. A demonstration and briefing is arranged, at headquarters or the customer site.

- The demonstration briefing is held, with participation from key decision makers and their staff. The demonstration is tailored to their applications. We ask for an order for test and evaluation (T&E) units.
- Based on immediate funds availability, the T&E units are purchased and used internally to evaluate the group's broader requirements.

- Based on use of the T&E units, the user groups develop written requirements and assign a contracting officer to develop the contract. Key issues involving contract type, price, quantitiy, contract options for future purchases, and options for other groups to purchase from the same contract are negotiated. More information about contract development is contained in a later section.

Our strategy is to use the above process as a model for our direct marketing activities, tracking the progress of each account through the steps outlined above. In this way we plan to minimize unproductive use of our marketing resources and maximize our focus on accounts that can be developed into volume contracts for our products.

Pricing Strategy

We have set our product pricing based on a value-added premium to the commercial PHOTOPHONE product offered by Image Data Corporation, and our analysis of the competition in our market segment. Our goal is to achieve high product gross margins while offering our products at a substantial price advantage to present competition. Our ability to achieve these opposing goals of high margins and price leadership reflects our belief that we have developed and can defend a market niche that has very attractive potential profitability.

Our financial model assumes that our pricing declines by 10% in the second year after product introduction, and 5% per year thereafter, to account for the effects of emerging competition and continued price reductions in the commercial market. We believe that our gross margins will not be eroded by this price reduction due to manufacturing cost efficiencies as our shipment volumes increase.

Commercial Product

Our Fast-RIT product is priced competitively with the PHOTOPHONE at $10,000, including high-resolution solid state camera and shipping case.

Secure Desktop Products

Our Sec-RIT product is priced at $18,500. We do not offer the secure interface as an optional upgrade to the Fast-RIT since the price premium is greater than the market would bear for an encryption interface alone. We estimate that the TEMPEST Sec-RIT, when introduced in 1988, will have a list price of $28,000, reflecting the substantial premium that TEMPEST products command in the marketplace.

Mobile Products

The ATR Sec-RIT carries a list price of $24,480. Although a high margin product, this price is much lower than anything presently offered in today's market.

Briefcase Products

We estimate that the Field Sec-RIT, when introduced in 1988, will have a list price of $18,500, slightly higher than the 1988 price for the Sec-RIT of $16,650. We believe that offering this product at only a slight price premium to our desktop product, while providing substantial additional functionality, will serve to stimulate this new segment of our market. This product will be introduced in a TEMPEST version in 1989 for $28,000.

Options and Spare Parts

Each of our products are offered with optional features such as encryption interface cables and video printers. Many of our customers also require on-site quantities of spare parts. While these contribute to our revenues and profitability, our financial model does not include them.

Discounting

Our published pricing does not include discounts for volume purchases. We anticipate that all volume purchases of our units will be by contract, and prefer to negotiate these on a case-by-case basis. We believe we can minimize volume discounting in the initial years due to the lack of substantial direct competition and the relatively small size of anticipated purchase contracts during the Test and Evaluation and Test Bed phases of our market development.

Price and Gross Margin Summary

Product	List Price	Gross Margin %
Fast-RIT	$10,000	41
Sec-RIT	$18,500	67
ATR *Sec*-RIT	$24,480	81
Field *Sec*-RIT	$18,500 (est.)	75
TEMPEST *Sec*-RIT	$28,000 (est.)	70
TEMPEST Field *Sec*-RIT	$28,000 (est.)	70

Background
During our test marketing project we demonstrated our products to a number of user groups, some of whom became customers or placed orders in 1986. We started 1987 with a sales backlog and a growing list of groups who are interested in purchasing our products now that they have reached production status. We also have a list of groups who are interested in our products and are waiting for a product demonstration. Additional prospects have been identified who have received our literature, read a press release, or seen us at a conference. We are well positioned as our marketing activities expand in 1987 with an exisiting customer base and a database of qualified prospects to address.

This is our sales status as of the end of March, 1987:

Current Customers
We have three customer accounts presently in our target markets.

Groups with Orders Pending
A total of five customers have orders presently in progress, one of which is presently booked.

Qualified Prospects
We have demonstrated our products to 42 user groups who have applications for and interest in our products.

Target Organizations
Our database contains over 70 organizations in our target market known to have applications for imaging products. We believe that many of these organizations will yield multiple interested user groups as we address them.

Press Release Responses
We presently have 67 responses from our ***Sec*-RIT** press release to pursue.

Introduction

In this section we will discuss our model of the sales cycle for our products, how we develop our forecasts from this model, the prospect list we are targeting, and our detailed forecasts. We will present our a monthly forecast by product for 1987 and yearly for 1988-1991.

Sales Cycle Model

Purchasing practices in the Federal Government market differ substantially from the commercial market. We have already described the sales process in a previous section. The sales cycle model takes each step of this process and maps it against an approximate timeframe to complete each step. This model has been tested against our experience over the last year and by consultation with individuals who are experienced with government procurement, both on the user and vendor sides:

Prospect Identification

We have at present over 70 groups identified in the Department of Defense, Executive Office of the President, Department of Energy, Department of Justice, Department of the Treasury, and NASA.

Step 1: Prospect Qualification

We qualify the prospect through an initial telephone call before and after sending our product literature. *Elapsed time: one to two weeks.*

Step 2: Demonstration Briefing

Setting up and conducting the demonstration for the key decision makers and their staffs. *Elapsed time: two to four weeks.*

Note: In many cases the first two steps may occur without our direct involvement, as present custmers interest related user groups in our products.

Step 3: Test and Evaluation Units

We close an order for two test and evaluation units and ship to the customer. *Elapsed time: three months.*

Step 4: Contract for Test Bed

Once the test and evalution units are in place, we work with the user group to define their requirements, begin a dialog with the acquisition group who issues the contract, and then go through the contract submission and evaluation process. During this step we strive to influence the requirements and work toward a streamlined method of contracting (sole source or limited competition). *Elapsed time: five months.*

Step 5: Delivering Test Bed Units

This step involves our lead times and the delivery schedule specified on the contract. *Elapsed time: three months.*

Step 6: Volume Contract

A large contract, or Basic Ordering Agreement, is a lengthy process that results in a competitive contract. This type of contract may involve volumes in the hundreds of units. *Elapsed time: one year.*

In summary, we plan on a four month process with a new account to close and ship our first order for two units, and an additional five months to turn on a contract for ten additional units. A year later we have the opportunity to win a large contract for volumes in the hundreds of units.

Forecast Development Assumptions

We have made the following assumptions in the development of our forecasts:

- We have developed our forecasts by mapping the sales cycle model defined above against our prospect list.
- We expect that approximately forty percent of our revenues for 1987 will come from "test bed" contracts from a few key customers who presently have test and evaluation units in place. We expect that the other sixty percent will come from initial shipments of test and evaluation units to new customers.
- During 1988 we expect the initial seed units to develop into test beds, and additional test and evaluation units for new accounts.
- We have not forecasted large contract volumes until 1989.
- Our forecasts assume that our first year revenues are entirely generated through direct sales.
- During 1987 we will develop indirect channels of distribution which we expect to contribute to our revenues in 1988-1991.

MARKETING

Forecasts

- Our forecasts are for our primary encryption-compatible image transceivers for the government market. Sale of networking products, or sale of non-secure versions of our products into the commercial market, are not included. Spare parts and options, such as cables or video printers, are also not included. Therefore we believe that there is upside potential in our forecasts.

Prospect List

Although we have a large prospect list already generated, we expect from past history that we will add many new prospects through customer referrals, trade shows, advertising, and future marketing partnerships with companies who will represent or resell our products. During our test marketing, we developed a list of over thirty qualified prospects for our products, by agency, department, and contact point.This list is highly proprietary and is therefore not presented here.

The following organizations within the Federal Government represent the market from which our present and future prospects are taken:

- **Department of Defense**
  - Joint Chiefs of Staff
  - National Military Command System
  - Joint Special Operations Agency
  - Joint Special Operations Command
  - Joint Tactical Command, Control, & Communications Agency
  - Unified and Specified Commands (Commanders in Chief)
    - CINCLANT
    - CINCPAC
    - CINCEUR
    - US SOUTHCOM
    - NORAD
    - Space Command
    - Strategic Air Command
    - Tactical Air Command
    - Military Airlift Command
  - National Security Agency
  - Defense Intelligence Agency
  - Defense Communications Agency
  - **Department of the Army**
    - Army Intelligence
    - Army Special Operations
    - Information Systems Command
    - Training & Doctrine Command
    - CECOM

- **Department of the Navy**
  - Navy Intelligence
  - Information Systems Command
  - SEALS
- **Department of the Air Force**
  - Information Systems Command
  - Command, Commmunications, Control and Computers
  - Air Force Intelligence
  - Air Force Special Operations
- **Department of the Marine Corps**
  - Marine Intelligence

- **Executive Office of the President**
  - White House Communications Agency
  - Central Intelligence Agency
- **Department of Energy**
  - Los Alamos Labs
  - Sandea Labs
- **Department of Justice**
  - Federal Bureau of Investigation
  - Drug Enforcement Adminstration
- **Department of the Treasury**
  - Secret Service
- **N A S A**
  - N A S A Headquarters
  - Johnson Space Center
  - Goddard Space Flight Center
  - Jet Propulsion Laboratories
  - Kennedy Space Center
  - Vandenberg AF
  - White Sands Test Facility
  - Ames Research Center
  - International Tracking Stations
    - Goldstone Tracking Station
    - Madrid Tracking Station
    - Australia Tracking Station

MARKETING

Forecasts

Shipment Forecast - 1987
The accompanying chart presents our forecast for 1987. We have made additional assumptions in developing this forecast:

- Shipments for January-May reflect units to present customers and prospects who have been waiting for test and evaluation units. No active marketing occurs during this interval, pending availability of funding to expand marketing activities.
- Shipments of 10 units per month for June-August assume that we are awarded a contract for a "test bed" for our **ATR-RIT**.
- Shipments of 8 units per month for August-November are test and evaluation units placed in 20 user groups that are presently identified. It is assumed that active marketing to these groups begins in May, 1987 after the corporation is funded to expand marketing activities.
- Shipment volumes are forecasted for two products only: the ***Sec*-RIT** and the **ATR-RIT**.

PHOTOTELESIS 1987 SHIPMENT FORECAST

Prod.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Sec RIT	0	1	2	2	1	3	3	7	8	8	18	0	53
ATR RIT	0	1	0	1	0	7	7	11	0	0	0	0	27
Total	0	2	2	3	1	10	10	18	8	8	18	0	80
Cum.	0	2	4	7	8	18	28	46	54	62	80	80	80

MARKETING

Forecasts

Shipment Forecast for 1987-1991
Our five-year shipment forecast is presented in the accompanying chart, including the summary from the 1987 results. Assumptions specific to this forecast are as follows:

- In 1988 we assume that the test and evalution units placed in 1987 grow into test bed units, yielding approximately 200 units from the initial 20 customers. In addition, we develop 20 new customers who order initial test and evaluation units.

- No major contract volumes are forecasted for 1988, but it is assumed that contracts are bid starting in 1988 which will account for significant growth in volumes from 1989 through 1991.

- We begin shipments of our **Field *Sec*-RIT**, or military briefcase product, the first quarter of 1988.

- Our TEMPEST desktop units begin shipments mid-year in 1988. This is followed by our briefcase TEMPEST unit in the first quarter of 1989. Shipments of our non-TEMPEST ***Sec*-RIT** declines as the TEMPEST units become dominant.

- Shipments of the ***Fast*-RIT** product are flat over the forecast period, reflecting a modest level of non-secure product demand, predominately through listing on the Government Services Administration price lists.

MARKETING

Forecasts

PRODUCT SHIPMENTS 1987-1991

Product/Year	87	88	89	90	91	Total
Fast-RIT	0	50	50	50	50	200
Sec-RIT	53	150	100	50	0	353
ATR Sec-RIT	27	100	250	500	700	1577
Field Sec-RIT	-	70	150	300	500	1020
TEMPEST Sec-RIT	-	30	150	500	1000	1680
TEMPEST Field-RIT	-	-	100	200	300	600
Total Shipments	80	400	800	1600	2550	5783

MARKETING

Distribution

Distribution Strategy
Our distribution strategy combines direct sales methods using our own personnel and indirect methods using resellers.

Direct Sales
PHOTOTELESIS personnel are responsible for direct sales. We intend for direct sales to provide the bulk of our business in 1987 because

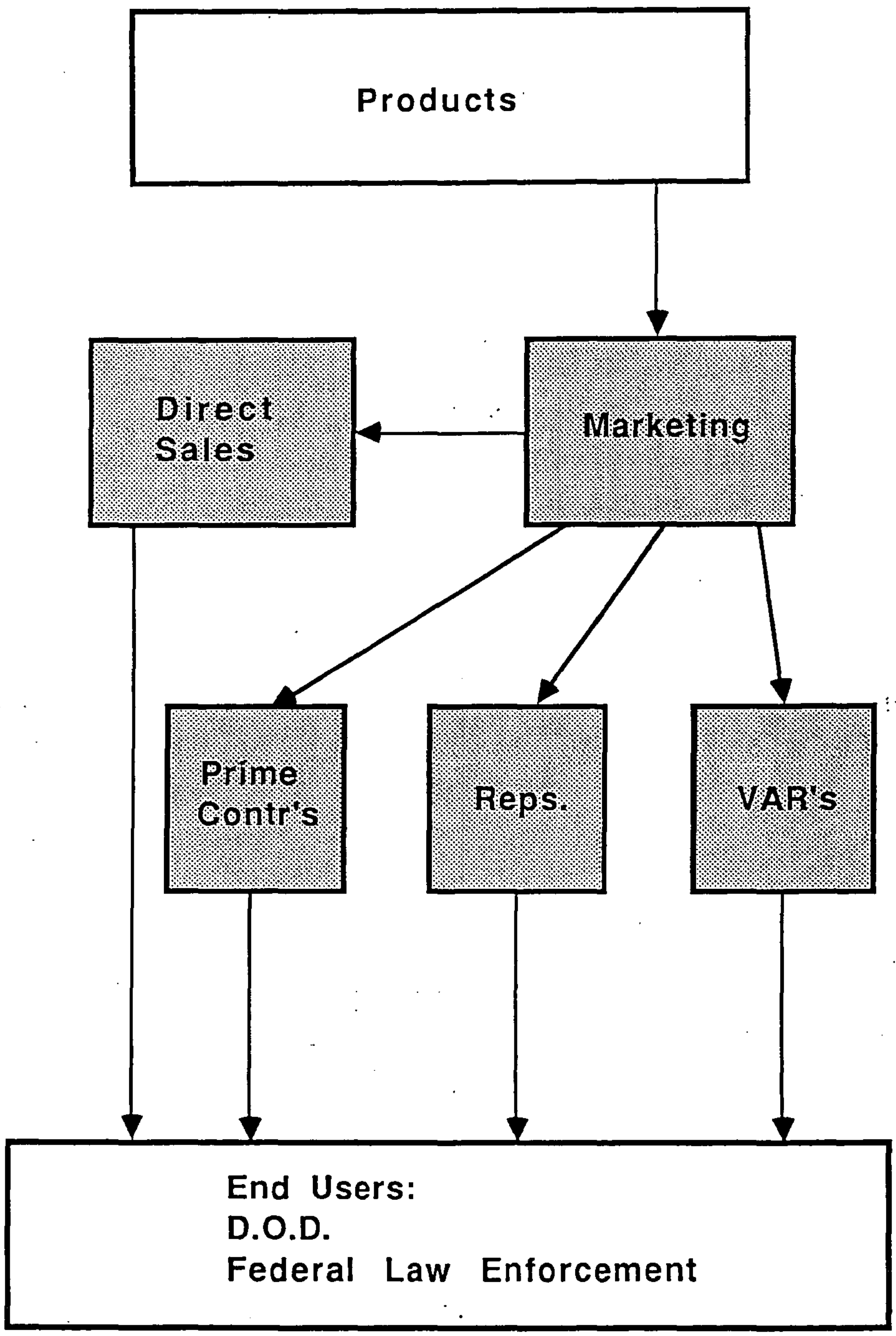
- our technology is new and complex
- we can provide closer customer contact and better support
- we realize greater profits

Indirect Sales
We will use indirect sales channels to increase our market penetration without a large increase in marketing and sales overhead. We will select resellers who are well known in our markets, can support our volume requirements, and are willing to provide the level of support and service our customers demand. These indirect channels include

- Manufacturers Representatives
- Value-Added Resellers
- Prime Contractors

MARKETING
Distribution

This diagram illustrates our distribution strategy:



Small Department of Defense Contracts
Department of Defense purchases for $25,000 or less are handled through oral or brief written requests, known as Request for Quotations (RFQ's). The successful quoter is issued a purchase order, and compliance with the order constitutes contract acceptance and fulfillment. The contracting officer has the discretion to choose how widely the RFQ is solicited.

This procedure can be used by our prospects and customers on a limited basis when purchasing test and evaluation units, although two of our encrypted Sec-RIT or ATR-RIT products exceed the $25,000 order maximum.

Bids and Proposals
However, although these purchase orders represent nearly 98 percent of DOD's contract actions, they are only 20 percent of the procurement dollars spent. The other 80 percent involve formal solicitation procedures that require written offers called sealed bids or competitive proposals. Sealed bids are sought by means of **Invitations for Bids (IFBs)**; competitive proposals are sought by **Requests for Proposals (RFPs)**.

Because major RFPs and IFBs are complex to administer, it may take up to a year for a large contract to be awarded. Shortcuts have been developed which permit the timeframe to be shortened for situations where there is only one source or a limited number of sources for the product or service.

Competitive Unpublished Contracts: Some contracts which have a value under $1 million can avoid publishing the proposed procurement in the government's Commerce Business Daily newspaper. This shortens the procurement cycle and also limits the number of possible responses.

Sole Source Contracts: In very limited circumstances, where a contract requirement can only be filled by one vendor, the contracting office can greatly speed up the puchase by soliciting only one contractor. This method is usually restricted to contracts of $125,000 or less.

We expect that most contracts for our products will be IFBs or RFPs; based on experience, we believe that our product uniqueness will allow many contracts for test and evaluation units or test beds to use a streamlined process.

Unsolicited Proposals

Some contracts result from unsolicited proposals submitted by groups who feel they have an innovative and unique method or approach to accomplish a DOD mission. We have used this approach in one instance during our test marketing and plan to continue its use as our marketing activities expand.

General Services Administration Contracts

A special type of contract is administered through the General Services Administration (GSA), which provides catalog purchasing abilities on a pre-negotaited basis to government and government-related groups. Many groups who are interested in our products have expressed a desire to be able to purchase limited quantities through the GSA. Orders under GSA are typically limited to $50,000, although this ceiling can be waived under selected circumstances. We plan to introduce our product on the GSA's New Products Listing this year and have applied for a new listing category for image transmission products for future use.

The following chart summarizes the types of contracts described above, the approximate contract lead time, and the typical per order dollar ceiling.

This chart summarizes the types of contracts that the government will use to purchase our products.

Contract Type	Lead Time	Per Order Limit
Purchase Order	2-3 months	$25,000
Bid and Proposal -SoleSource	3-6 months	$125,000
Bid and Proposal -Competitive Unpublished	3-6 months	$1 million
Bid and Proposal - Competitive Published	up to 1 year	no limit
General Services Administration	none - prenegotiated	$50,000

Notes

Technology

TECHNOLOGY

PHOTOTELESIS Proprietary

Proprietary Technology

We have developed proprietary technology which enables us to meet the needs of our customers for image communications products. Our investment in market research, and our products which reflect that research, represent our uniqueness in the market and the principal barrier to future competition.

We presently own the following proprietary technology:

- COMSEC (secure communicatons) interface designs which enable us to connect with government-supplied encryption devices

- RF-shielded packaging, which enables us to work in environments which process sensitive information

- Radio interface designs, which enable us to connect to non-secure radios and cellular telephones

- Low-power-consumption electronics designs, which enable us to work with DC and battery power

- ATR (Aircraft Transport Racking) packaging, which enables us to work in vehicular environments such as aircraft, ships, and land vehicles.

We are presently developing technology for...

- briefcase packaging
- image database systems
- TEMPEST qualification.

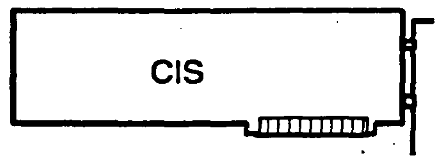
TECHNOLOGY

PHOTOTELESIS Proprietary

Our proprietary technology is contained in these subsystems and products:

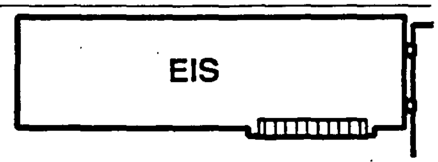
Communication Interface Subsystem

Cellular
Satellite
Two-way Radio



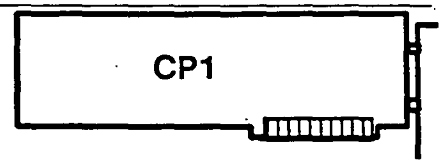
Encryption Interface Subsystem

Ground to Air
Satellite
Line of Sight



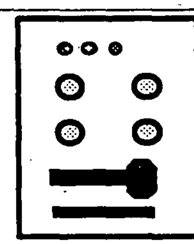
Control Processor I

Forward Error Correction
Custom communications software
Remote control capability



ATR Package

Aircraft Transport Racking spec.
DC or battery power
Ruggedized
Cellular or
Secure



Field Package

Briefcase Portable
Battery powered
Cellular or
Secure

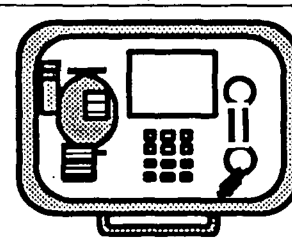
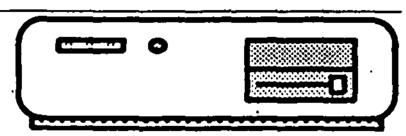


Image Data Base

Software Database
Multi-user
Telephone or Secure



TECHNOLOGY

Licensed

We buy certain off-the-shelf equipment and license certain technology from Image Data Corporation.

Specific technology we presently license from Image Data includes:

- Processor design
- Video subsystem design
- Software design.

Our unique value added lies in:

- Communications subsystems
- Packaging
- Specialized software.

Notes

Products

In this section of the business plan we will introduce our products. We will provide a rationale as to how we arrived at our product mix. Then we will give you specific information about each of the products. Finally, we will provide a product availablility schedule showing our product timetable.

Promotional literature containing further information about our products is included in this package for your information.

About our products

Basically, our products consist of a matrix of packaging and communications options. Not all combinations are offered because not all combinations make sense. Essentially, we provide configurations to suit the practical requirements of the government's various combinations of applications and communications requirements.

PRODUCTS

Strategy

Our product strategy
Our product strategy begins with commercially available products, to which we add significant proprietary value. These enhanced products become our product line.

Core Technology
We begin with standard, "off-the-shelf" technology from Image Data Corporation:

- PHOTOPHONE™
- PHOTOBRIDGE™
- PHOTOGATE™

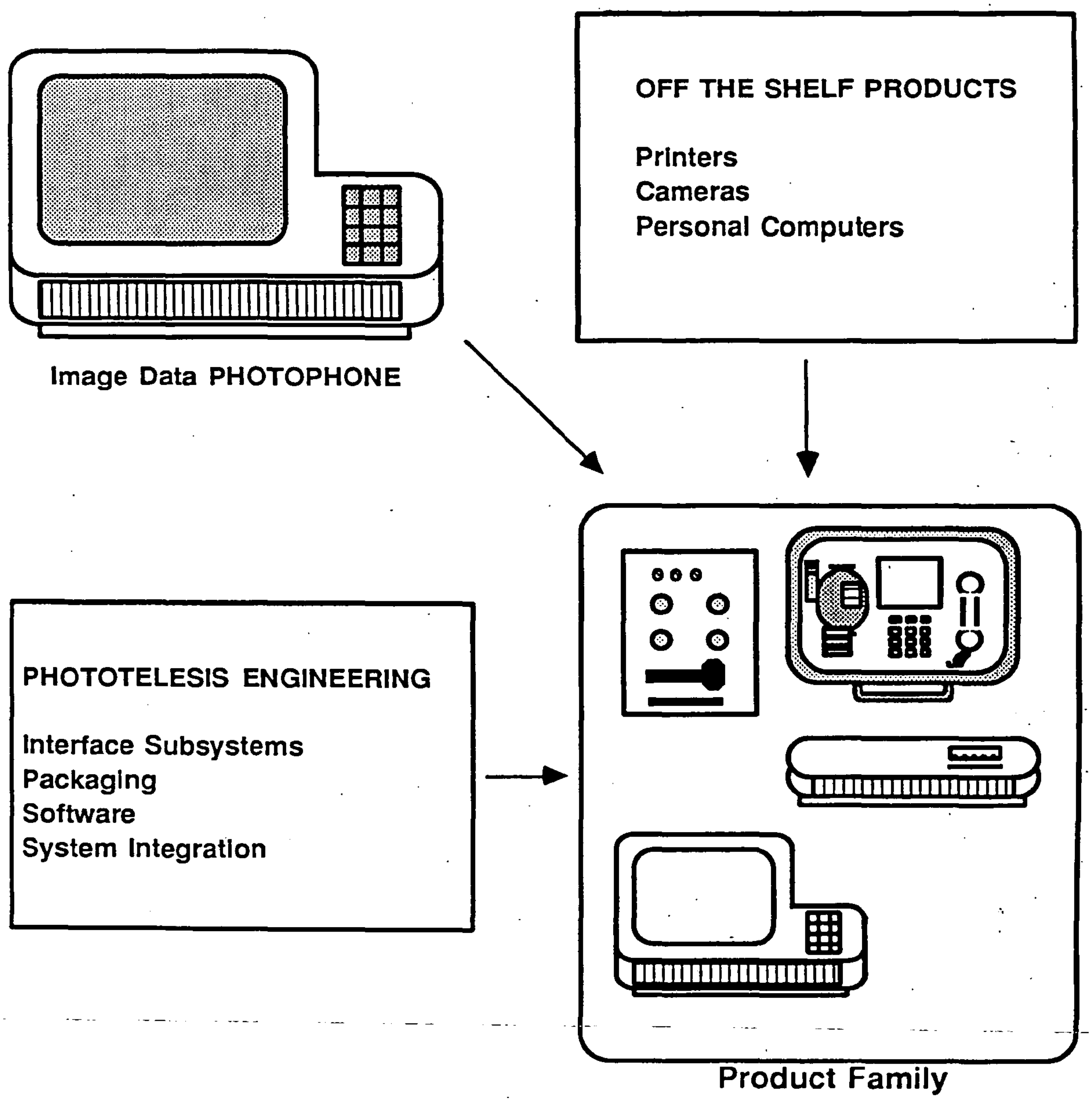
Added Technology
Then, after acquiring off the shelf base units, we develop new designs based on technology licensed from Image Data, integrate off-the-shelf OEM components, and then add our proprietary technology.

Result
The resulting products and systems comprise the PHOTOTELESIS product family. This strategy is illustrated on the facing page.

PRODUCTS

Strategy Illustration

Here, in graphic form, is the product strategy discussed on the previous page.

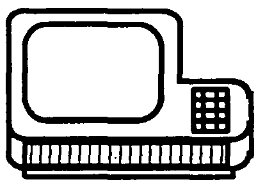


PRODUCTS

Packaging Options

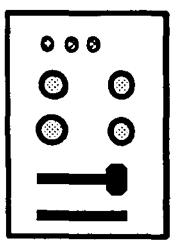
Different appications require different packages; our product line meets those requirements.

Desktop Products:



Our desktop family allows image communications in the office, acting as a "base station" for remote units located in the field.

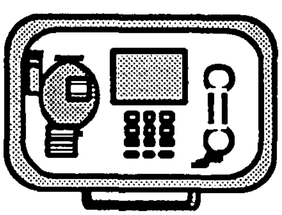
ATR *Products*



Our ATR family puts image communications to work in the field, where it may be mounted on:
- aircraft,
- shipboard, or
- in a vehicle.

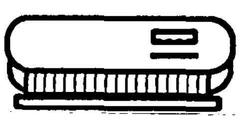
We offer both secure and non-secure versions for many types of existing communications systems.

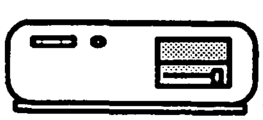
Briefcase Products



Our briefcase family is the ultimate in portable image communications, with battery operation and a full range of secure and non-secure communications options.

Network Products





We meet needs for networking images with:

- ImageBridge, for image conferencing, and
- ImageBase, for remote image storage and retrieval.

MicroRIT™ Proposal

Table of Contents

SECTION 1

EXECUTIVE SUMMARY

MicroRIT™ Proposal

2 November 1995

EXECUTIVE SUMMARY

This unsolicited proposal describes a state-of-the-art image transmitter that is specifically designed for field agent applications with handheld and vehicle mounted digital/secure radios. The MicroRIT image transmitter will capture and transmit high quality monochrome or color images over typical radio circuits, such as the Government Saber Secure Radio on the B-Radio net or commercial cellular phone circuits. The MicroRIT is unique because it can transmit a high quality image in ten to twenty seconds from a unit that is small, low power, and *low cost*. This unique capability is currently unavailable and is crucial for field law enforcement applications.

This MicroRIT miniaturized image transmitter proposal is submitted by PhotoTelesis, a Business of Texas Instruments Incorporated. The PhotoTelesis group is a world leader in Tactical Image Transmission technology, and Texas Instruments (TI) is a world leader in Digital Signal Processing technology and Micro Electronics technology. The proven track records and technology bases of the PhotoTelesis/TI combined team places this technically challenging program well within reach.

1.0 The PhotoTelesis Organization Background:

PhotoTelesis has a 10 year history of specialization in Government tactical image transmission. PhotoTelesis is the leader in tactical transmission of monochrome or color imagery, captured from either television or digital cameras over Government secure radios, Government satellite circuits, and commercial cellular and satellite radios.

The company has installed more than 1000 systems within the Army, Navy, Air Force, Special Operations, Federal Law Enforcement, and Intelligence groups. These systems have been used in classified and unclassified operations. The PhotoTelesis name has become well known as the leader in the tactical image transmission field.

The PhotoTelesis comprehensive product line provides users with a full complement of hardware and software, to support operation from various platforms, including:

⇒ Man Portable Applications
⇒ Covert Operations
⇒ Aircraft Platforms
⇒ Ground Vehicle Platforms
⇒ Portable Base Stations
⇒ Fixed Base Stations

The tactical communications functions of the PhotoTelesis products include:

⇒ Distribution of images, text and data over all government secure voice bandwidth circuits.
⇒ Database Archiving of stored images and text data.
⇒ Traditional Data Processing activities in MS-DOS and Windows
⇒ Interoperability with Government NITFS 2.0 "National Imagery Transmission Systems"

Distinctive Competence

A unique blend of Independent Research and Development, combined with commercial off-the-shelf technology, has allowed PhotoTelesis to offer products with innovative designs and superior performance at competitive prices. The modular construction of products allows easy technology insertion of hardware and software enhancements lowering life cycle costs.

The success of PhotoTelesis can be attributed to a commitment to service and providing solutions to our customer problems. Our reputation has been earned by focusing our expertise in the following key areas:

• **Reliable/Dependable Transmission of Data.** Imagery and Data can be sent from a harsh tactical environment where air time for transmissions is limited. Users depend upon their equipment to transmit images and data reliably over wideband SATCOM or narrowband communication channels. To compensate for natural and man-made noise, PhotoTelesis' proprietary protocols incorporate error correction techniques and compression algorithms that provide both efficient and reliable transmissions. These message and image transmission protocols are specifically designed for noisy narrow-band radio communications, and are currently heavily used in operations involving Command, Control, Communications, and Intelligence (C4I) applications.

• **Ease of Operation for the User.** The operational simplicity and versatility of both hardware and software design allow non-technical user compatibility with a wide range of cryptologic devices, secure telephones, and radios. The systems are designed to be automatically configured by cable connections reducing hardware damage by operator error. The equipment is built with user friendly interfaces (GUI) or a menu driven screen.

• **Products for Various Platforms.** The company has focused on customer requirements to develop, with IR&D funds, products used on various platforms, i.e., vehicle, aircraft, and man-portable units. This has resulted in building a repertoire of off-the-shelf products for Aircraft, Special Operations, and Law Enforcement.

• **Rapid Product Development.** PhotoTelesis has reduced the time and cost of product development, from product definition through design, development, and pilot production. This is accomplished by significant technology re-use, in conjunction with strong specialized skill sets of the engineering team. The majority of the PhotoTelesis products have been sold as Non-

Developed-Items on Indefinite Delivery Order or Fixed Priced Contracts, thus reducing customer financial and technical risks.

1.1 Texas Instruments (TI) Incorporated Background:

Texas Instruments has diverse capability in micro-electronics, Government, commercial, and consumer products. TI is a high technology company with sales or manufacturing operations in more than 30 countries; a major supplier of integrated high performance EO based fire control systems, high performance processors, thermal sensors, missile systems, and radar components to the U.S. Department of Defense (DoD). The MicroRIT program will utilize several key TI capabilities:

TI is a world leader in Digital Signal Processing (DSP) technology. The DSP is key to the MicroRIT's small size, low power, and low cost. Commercial technology and the capability for high volume production also provide opportunity for significant unit cost reductions, allowing for *extensive* deployment of the technology at a *very affordable* cost.

1.2 The Combined PhotoTelesis/Texas Instruments Team:

On August 18, 1995, PhotoTelesis Corporation was acquired by Texas Instruments Incorporated. PhotoTelesis' expertise with tactical image transmission combined with the financial strength of Texas Instruments offer our customers innovative and cost effective tactical imaging product solutions.

PhotoTelesis and Texas Instruments have a two year continuing history of cooperation and teaming on other Government imagery programs, including the US Army Hunter Sensor Suite program and the Lightweight Video Reconnaissance System (LVRS) program.

PhotoTelesis/Texas Instruments is excited about the opportunity to provide new state-of-the-art capability through more closely integrated efforts on the part of all team members.

1.3 The Program Background:

Tactical Imagery has proven to be the most efficient and quickest means to distribute critical information to the decision maker. Imagery in the field can provide agents with near-real time secure surveillance that improves their situational awareness, suspect identification capability, and thus, reduces allocation of limited personnel resources. Unfortunately, both military and commercial products used for transmission of Tactical Imagery are currently unsuitable for law enforcement because the military products are too large and too expensive, and the commercial products are too large and are not capable of operation over Government tactical radio circuits.

Current generation Remote Image Transceivers (RIT's) manufactured by PhotoTelesis are in operation over the Motorola digital radio systems owned by the Government for the purpose of transmitting secure (encrypted) imagery from mobile platforms to fixed sites.

Still Imagery is being transmitted using the SABER II, with the Secure INDICTOR option, at 12Kbps. A primary requirement of maintaining minimum data transmission times and a quick restoration of the radio-to-voice communications have been met in product demonstrations of this capability. At a recent test, using the PhotoTelesis man-pack TAC-RIT, monochrome images at a resolution 592 by 440, 8-bit pixels were transmitted in 8 seconds using Wavelet compression, and 21 seconds using industry standard JPEG compression.

This proposal describes an engineering program that miniaturizes the PhotoTelesis current capability into a very small, covert, low power Remote Image Transmitter (MicroRIT) *specifically* designed for agent use. The primary goals for field agent use are:

- ⇒ Very Small Size (Cellular phone size)
- ⇒ Low Power (2-4 watts)
- ⇒ Simple User Interface
- ⇒ Fast Transmission Time
- ⇒ Monochrome or Color Use

SECTION 2

TECHNICAL APPROACH

TECHNICAL APPROACH

Until the advent of small, low power digital signal processor (DSP) semiconductors, the MicroRIT was unfeasible. Now, however, such DSP's allow the design of very small, but highly sophisticated data acquisition and processing devices. In fact, the DSP component is the heart of the MicroRIT, controlling all aspects of its operation from video acquisition, to image compression, to tactical communications protocol, to user interface.

A digital signal processor, or DSP, is a special type of microprocessor that has been highly optimized for numerical computations (namely digital signal processing) which involve long sequences of multiplication and addition operations. Digital filters, spectrum analyzers, and data compression algorithms fall squarely in this category. While the DSP is not often used as a generalized host processor (such as an 80486, Pentium, or 68000), it can certainly be used as a host CPU. Because of the particular hardware optimizations that were implemented for digital signal processing, a DSP tends to have smaller address spaces (under 1 megabyte) and less support for string-oriented operations (for handling character strings). However, several DSP variants can quite easily be used as an embedded controller and signal processor - obviating the need for two separate processors. This often simplifies the hardware design and interprocessor communications mechanisms.

The MicroRIT was conceptualized specifically with a DSP as the system controller in mind to reduce the size and power requirements of the unit. In addition, to controlling the overall system function, the DSP is responsible for controlling the digitization of video, the compression of this captured video, and the communications protocol and link-layer interface. These functions would occur serially. That is, it would not be possible to be capturing video while sending a compressed image at the same time. This one-at-a-time restriction is due to two problems. The first is the limited amount of multi-tasking support in the DSP architecture. Few DSP operating systems are available that support preemptive multi-tasking. The second is the limited address space of the DSP. Many DSP's have a fairly limited address space - often under 64K words! This will require that both the codespace and the dataspace be page-swapped. Page-swapping essentially means that only one software function can be active at a time - which implies the serial nature of the major functions.

2.0 Capturing Video

A conventional frame grabber contains a great deal of circuitry necessary for demodulating the video signal, identifying and triggering off the vertical sync signal, stripping the sync signals from the image data, digitizing the demodulated data, and storing it in a dual-ported RAM. This is required because the host processor has neither access to the raw video signal, nor the processing power to execute these functions in a real-time fashion. The DSP used in the MicroRIT approach, will however, be controlling the video digitization while itself does the vertical sync identification. External analog-to-digital converters (ADC) will still be used to digitize the video signal, rather than using any onboard ADC capabilities of the DSP chip, because most DSP ADC's are not fast enough to digitize at video rates (at least those DSP's that can meet our low-power requirements). Another subtle point about this approach is that video need only be digitized on user demand. This implies that the video ADC circuitry only has to be energized for 1-2 frame times to acquire the image. Video ADC's can consume several watts if left free running. The non-requirement for video output allows this digitization-on-demand approach that should significantly help reduce size, weight, and heat dissipation, as well as extend battery life.

2.1 Video Demodulation

A color video signal, in particular a composite color video signal, carries the luminance and color (chrominance) information in different frequency bands. Usually, an analog filter is used to separate these signals into two analog channels that can then be digitized separately. In order to save power and space in the MicroRIT, we will perform this demodulation in software running on the DSP after a frame's worth of video data has been captured. Even an S-Video signal carries two color channels on the chrominance signal (which is physically separated from the luminance channel). The same type of *software* demodulation will be done on the S-Video chrominance channel for S-Video. The video demodulation is performed after a frame acquisition, not during. This is significant because it restricts the MicroRIT to performing system functions in a serial fashion. That is, one high level function after another is performed by the central processor (the DSP). There is no multitasking of system functionality in the MicroRIT. This is due in part to the lack of multitasking DSP operating systems as well as the somewhat limited addressing capability of today's DSP's (under 1 megabyte of codespace). Thus, after the user specifies that an image is to be acquired, the video digitization circuitry powers up, acquires a frame of video data, and passes control to the video demodulation software which then separates luminance from the color signal by a digital filter.

2.2 Image Compression

After the image has been digitized, separated, and demodulated by the system DSP, it will be compressed with either the JPEG or PhotoTelesis wavelet image compressor. This choice is user selectable (via the set of buttons and alphanumeric display). The wavelet compressor is well suited to the S-Video type of input since it was designed to work on L/Cr/Cb video data. Like all other PhotoTelesis implementations of the wavelet codec, the user will be able to select several choice of compression ratio and/or "quality". PhotoTelesis is constantly improving its image compression technology. These improvements affect compression/decompression time and image quality. They also affect compression features such as, quality specification (Q-Factor), multiresolution compression, and industry standardization. The contractor will strive to incorporate image compression improvements into the MicroRIT product, subject to the program schedule.

2.3 Image Storage

There will be enough battery-backed SRAM within the MicroRIT to hold 40 wavelet compressed color images. These can be held on-board until downloaded to a host computer via an RS-232 port. Originally, it was conceived to use a PCMCIA SRAM card for this image storage. However, the physical size of the mechanical PCMCIA slot and the extra interface circuitry was not justified. If the images are stored within the MicroRIT, the user will have to bring back something, be it the MicroRIT or a PCMCIA card, in order to offload the images to some sort of Base Station unit. Thus, the SRAM memory was chosen over PCMCIA.

2.4 Communications

The MicroRIT will be able to connect to all standard COMSEC equipment including STU-III's, SINCGAR's, SABER and RACAL (MHSR) radios, KY-57, KY-58, and Sunburst. The DSP processor will run the PTAC and PTAC-2 (required for file pull capability) protocols in order to be backward compatible with existing PhotoTelesis equipment. The DSP will also directly control all COMSEC control lines (PTT, BDMC, etc.) as well. The DSP and some glue logic will essentially replace the original EIS card of the PhotoTelesis ACT product line.

Note that this version of the MicroRIT will not include the NITFS TACO-2 protocol. There is an assumption that the MicroRIT will be communicating with other PhotoTelesis equipment (i.e., Base Stations) which do have the TACO-2 capability.

Note that the automatic voice/data cutover modes for the KY-57 and KY-58 will not be implemented. Manual data switching will be used.

2.5 User Interface

The user will be able to interface to the MicroRIT two ways: 1) the set of onboard pushbuttons, 2) an RS-232 cable linking the MicroRIT to a host computer. There will be five (5) buttons on the MicroRIT to control normal operation of the system. There will also be an alphanumeric display for status and menu information. The functions on the MicroRIT will include power (on/off), capture, send, and menu. The menu will allow the specification of compression type, compression ratio, protocol, call sign information, send/hold modes, etc.

The RS-232 interface to the MicroRIT will be used for 3 functions: 1) Update system software (stored in FlashRAM on the MicroRIT), 2) download configuration information to the MicroRIT (call sign lists, compression defaults, etc.), and 3) download compressed/stored images from the MicroRIT to a workstation (such as an MIT-301). This will be a very simple RS-232 interface with a subminiature connector on the MicroRIT to the standard 9-pin COM connector on a PC.

2.6 Hardware

2.6.1 Packaging. The MicroRIT is designed to utilize standard snap on cellular telephone batteries. Several battery sizes and capacities are available from telephone retail outlets. The MicroRIT's overall size approximates that of a hand-held cellular flip-phone. High capacity battery life is estimated at 1 hour of full operation, with standby time approaching 30 hours.

The initial design and packaging will be implemented with an aluminum machined case. The finish will be black anodized for cosmetic finish. High volume applications could be done with a plastic injected molded case, but these costs are not included in the funding proposals submitted. A conceptual drawing is shown in Figure 1. The display and interface panel will allow system status and operational menus to be displayed to the operator. There is a recessed subminature-D connector on the bottom edge of the unit that provides all input/output connections. If this unit is used in embedded system applications, external power can also be provided through this same connector. The connector is recessed to prevent damage to the connector by accidental dropping or stricking other objects. The connector is installed on the bottom edge to provide best comfort to the operator when the cable is installed.

This MicroRIT package design will also include the ability to embed this device in higher capability equipment. Examples include radios, portable video equipment, or other equipment including cameras and radio transmission capabilities. This concept is similar to equipment with font cartridges, game cartridges, etc. The operator interface and display panel will not be included on these embedded applications. Power will be supplied through the external I/O connector.

2.6.2 Hardware Implementation. The MicroRIT architecture is based on the Texas Instruments TMS320 series of Digital Signal Processors. This DSP is the core of the design, with additional components providing the input/output interfaces to the operator, external power source, radios/Cryptos, and external computer links. There is one D-subminiature connector that provides these I/O functions. There are 5 control buttons, along with an alpha-numeric LED display for operator control and feedback status. The Overall block diagram is shown in Figure 2.

2.6.3 Memory. The memory implemented in the MicroRIT consists of low-power Static Rams (S-Rams). These memories are page partitioned to provide both program storage, raw video data workspace, as well as compressed video image storage. The design goal is to provide the capability to store a minimum of 40 images of 32K each in compressed image size. The architecture provides one memory page per image when storing compressed images.

2.6.4 I/O Ports. There are 2 input/output Serial ports incorporated into the design. One is designated for communication over radios, Crypto's, and STU type telephone devices. The other is intended for interfacing to other standard RS-232 computer devices such as Global Positioning Systems, some camera devices, and personal computer links for downloading image data or downloading operating program software. If the system needs to be reprogrammed for different mission requirements, the planned mechanism is to download from any serial computer device, the operating parameters and program software. If the user elects to save images, rather than send them immediately, these saved images could also be downloaded from the internal S-RAM memory via this serial port.

2.6.5 Power Sources. The MicroRIT is powered from either an attached cellular phone compatible battery, or via external power input through the I/O connector. For extended operating times, the external power mode is used. The input DC voltage range is 5.5-8.0 volt.

SECTION 3

COST

COST

The project represents a significant development effort with a medium level of risk. The contractor is keenly aware of the budget constraints and has taken steps to reduce the government's cost. The proposed cost has been reduced by the contractor's program investment of $576K and utilization of the contractor's Image Compression and Communication Software, which was previously developed with IR&D funds.

The development effort is allocated into hardware engineering and software engineering as follows:

Hardware	$661,093.80
Software	$984,492.21
Total Development Effort	$1,645,586.01
Less:Contractor's Investment	($645,586.01)
Cost to government	$1,000,000.00

Upon completion of the project the government will receive 2 prototypes. The production cost per unit is targeted to be $3,000.00-$4,000.00 in lot sizes of 100. Cost reductions are possible by tooling the cage for plastic injection molding based upon higher volumes.

3.0 Schedule

The contractor anticipates the project will require 12 months from inception to prototype delivery. After prototype delivery, unit production could begin immediately. Attached are program schedules for Hardware and Software.

3.1 GFE

The contractor will require two SABRE II radios for testing during the program.

3.2 Personnel

The contractor will assign two Engineering managers and one program manager to this project. Their resumes are attached:

SOFTWARE
Dr. Bruce Mather..................Manager of Software Engineering

ELECTRONICS HARDWARE
Roger Vest............................Manager of Hardware Engineering

PROGRAM MANAGEMENT
Bill Kidd..............................Program Manager

3.3 Attachments:

1. Micro-RIT Technical Specifications
2. Block Diagram
3. Drawing
4. Program Schedule
5. Detail Costs

SECTION 4

PRODUCT SPECIFICATIONS

MicoRIT Functional & Physical Specifications

Video Input: Color/Monochrome
Composite/S-Video
640 x 480 x 16-bit color (8-bit grayscale)
768 x 512

Image Storage: Onboard flash (or battery-backed SRAM) for 40 + compressed color images (@32K)

Video Output: None

Audio: Digitized voice annotation will be provided

Comms: PTAC (KY-57, Sunburst/STU-III, Sincgars, Saber)

RS-232 Interface: External GPS receiver, S/W update, offload images, system configuration (call sign download, etc.)

User Controls: Five (5) buttons - (1) On/Off and (4) controls:
On/Off switch, Call Sign Select, Grab Image, Send Image, Settings (scrolls menus)

Display: 5x7 dot alpha-numeric low power green LED's (like cellular phones)
One (1) flashing "battery low" LED

* User Controls & Display are optional for embedded applications (i.e., RIT can be built without them)

Power: 2-4 watts @ full operation (idle mode when not doing imaging portion)

Battery: Internal battery and/or external power
30 hours idle, 1 hour operational
Disposables or Rechargeable (like cellular phone)

Weight: 1 pound (plastic) 1.5 pounds (metal)

Size: 1" x 4" x 3" (Hand-Held Cellular Size)

Temperature: -20° to 50° C

System does only one function at a time:

Grab image	one frame at a time
Color demodulation	
Image Compression	< 5 seconds (to grab, demodulate, and compress)
Store image (40+)	< 1 second per image
Send Image	12Kbit line - 15 seconds goal for image xmit; up to 64Kbit comm link

Modem functions - built in FEC

Remote Control (configure) capability:
- New call signs
- Set compression ratio
- Snap picture
- Retrieve image

SECTION 5

DRAWING AND BLOCK DIAGRAM

Figure 1 - Micro ™ Drawing

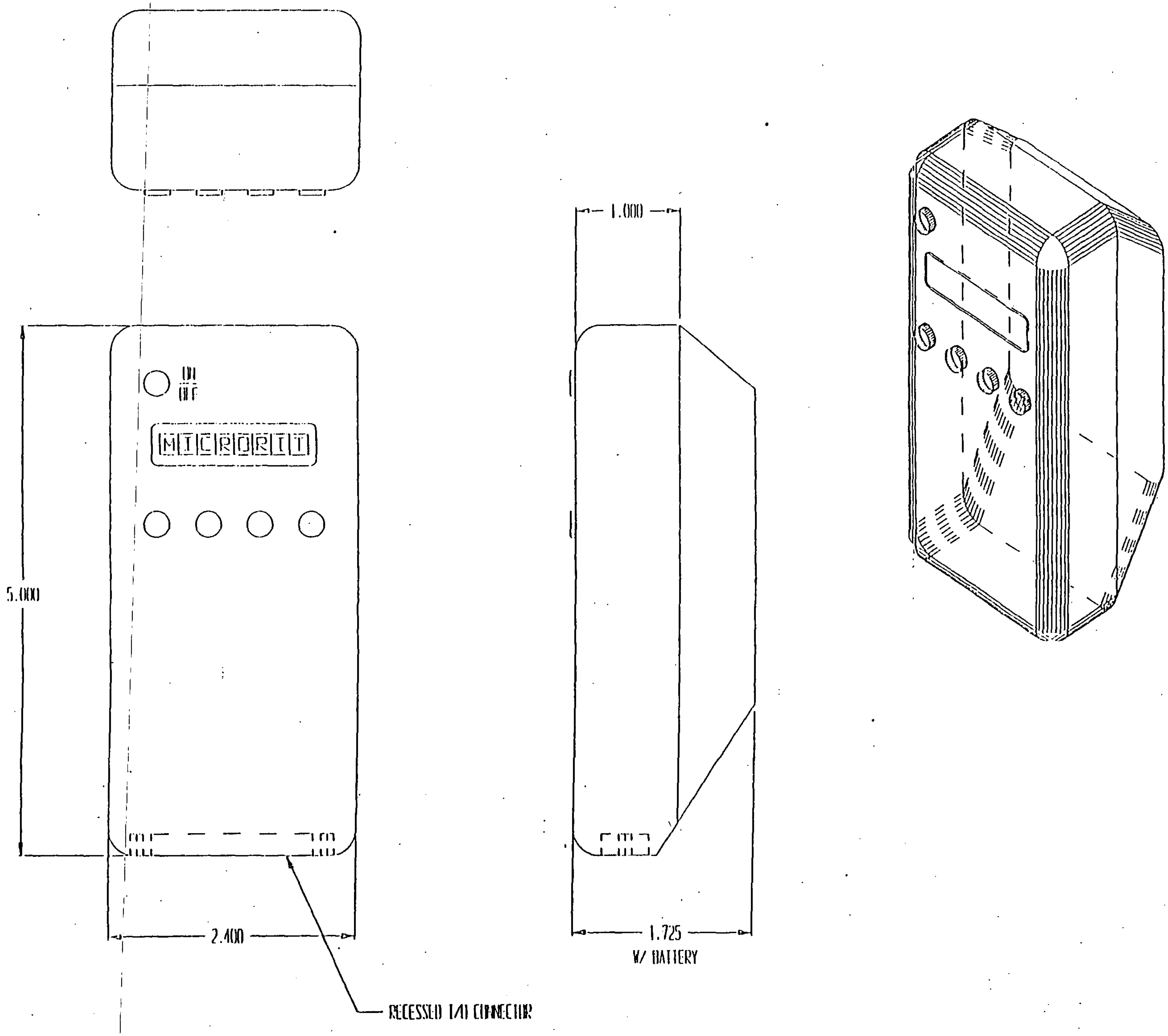
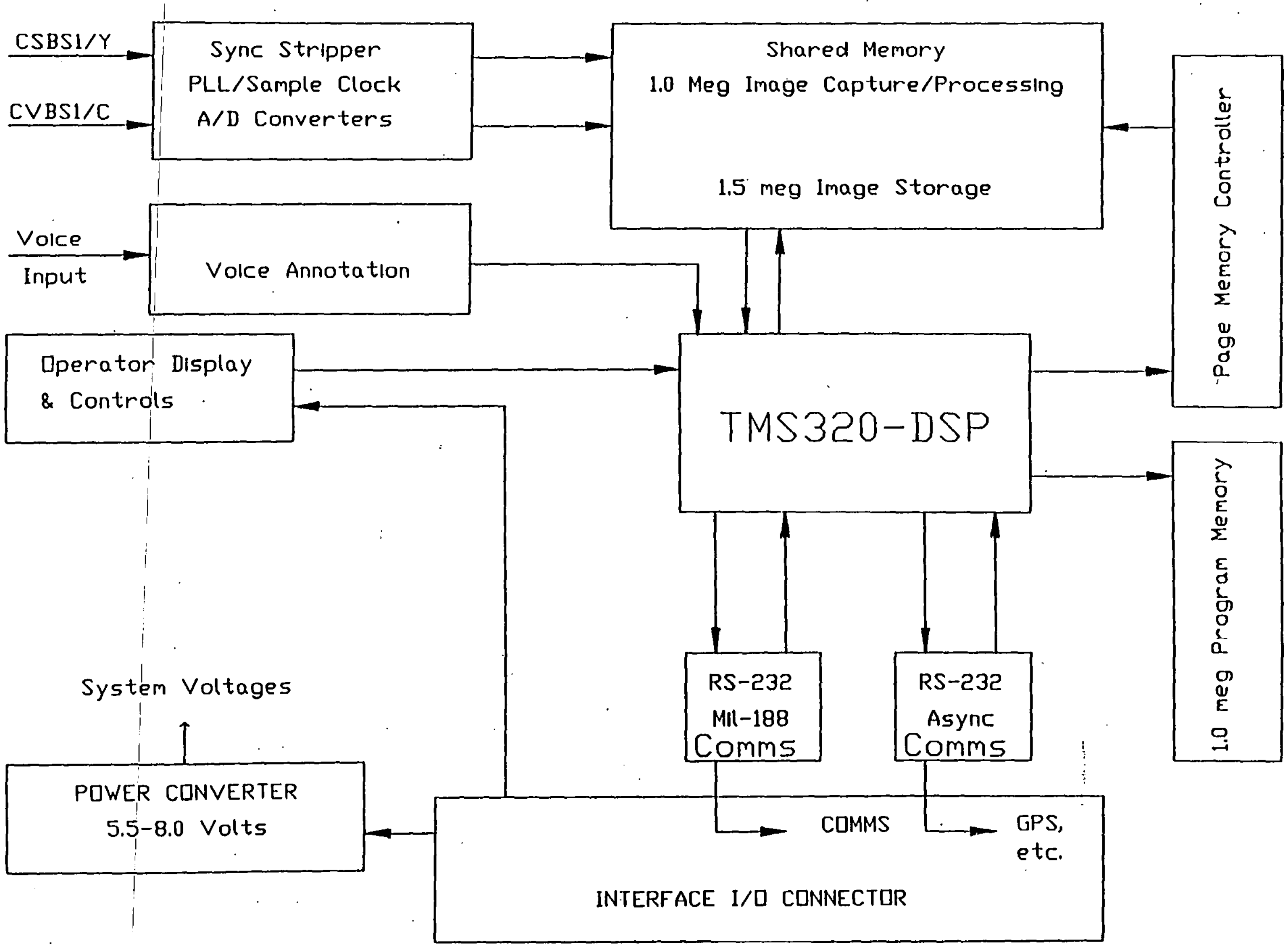


Figure 2 - MicroRIT™ Block Diagram



MICRO-RIT ™ BLOCK DIAGRAM

SECTION 6

SCHEDULE

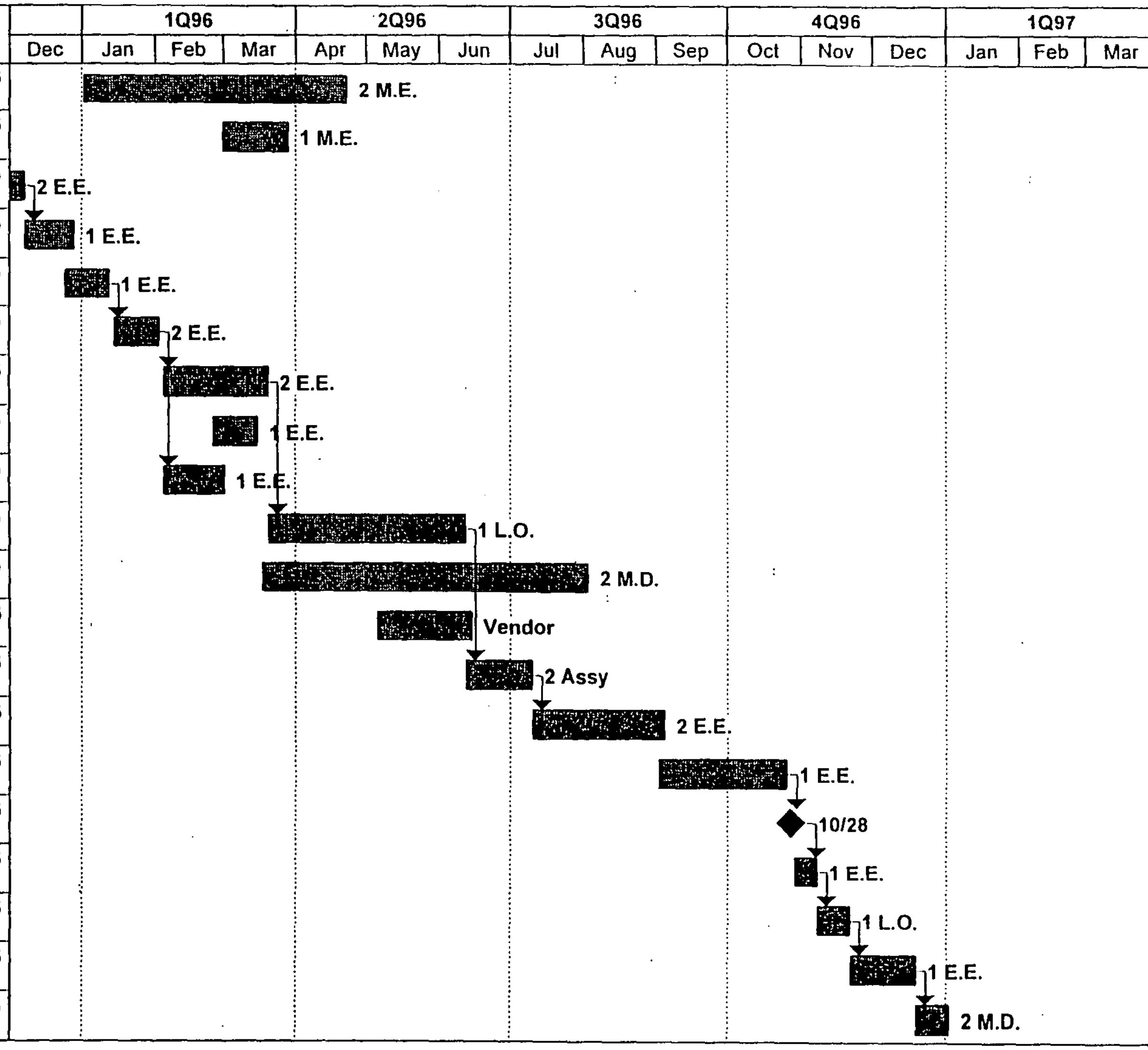
ID	Tas
1	Pro
2	Wri
3	Eva
4	Eva
5	Eva
6	DSP
7	O/S
8	Orde
9	Write
10	**Syst**
11	
12	
13	
14	
15	
16	
17	
18	**Video**
19	V
20	V
21	V
22	F
23	F
24	I
25	**Comm**
26	A
27	S
28	P
29	P
30	**Audio**
31	A
32	A
33	A
34	A
35	**User I**
36	LE
37	Po
38	M
39	**Remot**
40	Re
41	Do
42	Hardwa
43	System
44	User M
45	System
46	Write A
47	Custom
48	**Montly**
61	**Custon**
68	Delivery

29

Project: microrit
Date: Thu 11/2/9

MicroRit Hardware Development

ID	Task Name	Duration	Start
1	Package Design	16w	Tue 1/2/96
2	Control Panel & I/O Interface	4w	Fri 3/1/96
3	DSP Evaluation/Selection	1w	Fri 12/1/95
4	Block Diagram	3w	Fri 12/8/95
5	Engineering Specs	3w	Mon 12/25/95
6	Component Selection	3w	Mon 1/15/96
7	Schematic Design/Capture	6.5w	Mon 2/5/96
8	Power Heat Analysis	3w	Mon 2/26/96
9	Interconnect & Cabling Design	4w	Mon 2/5/96
10	PWB Artwork Layouts (3 ea)	12w	Wed 3/20/96
11	Documentation	20w	Mon 3/18/96
12	Prototype Build (FAB)	6w	Mon 5/6/96
13	Prototype Build (Assy)	4w	Wed 6/12/96
14	Prototype Checkout	8w	Wed 7/10/96
15	System Integration H/W-S/W	8w	Mon 9/2/96
16	Prototype Delivery (2 ea)	1d	Mon 10/28/96
17	Schematic Updates (Pass 2)	1.5w	Tue 10/29/96
18	Artwork Updates (Pass 2)	2w	Thu 11/7/96
19	Assy/Checkout (Pass 2)	4w	Thu 11/21/96
20	Pass 2 Updates/Release	2w	Thu 12/19/96



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SECTION 7

COST DETAIL

MICI. RIT
PHOTOTELESIS

Micro-Rit

Hardware	Hours	Rates	Labor $	Materials	Overhead	Total Cost
Mechanical design						
Packaging	1040	$26.62	$27,684.80		$69,212.00	$96,896.80
Control Panel & I/O Interface	160	$27.47	$4,395.20		$10,988.00	$15,383.20
Electrical design						
DSP Evaluation /Selection	80	$30.52	$2,441.60		$6,104.00	$8,545.60
Block Diagram	120	$30.52	$3,662.40		$9,156.00	$12,818.40
Engineering Specifications/ Updates	240	$30.52	$7,324.80		$18,312.00	$25,636.80
Component Selection	180	$30.52	$5,493.60		$13,734.00	$19,227.60
Power/Heat Analysis	120	$42.19	$5,062.80		$12,657.00	$17,719.80
Interconnect/Cabling Design	160	$26.62	$4,259.20		$10,648.00	$14,907.20
Schematic Design/Capture	520	$30.56	$15,891.20		$39,728.00	$55,619.20
Schematic update Pass2 (3 each)	80	$30.56	$2,444.80		$6,112.00	$8,556.80
PWB artwork desgin/layout (3 each)	480	$22.92	$11,001.60		$27,504.00	$38,505.60
PWB layout Pass 2 (2 each)	120	$22.92	$2,750.40		$6,876.00	$9,626.40
Documentation	800	$19.53	$15,624.00		$39,060.00	$54,684.00
Prototype						
Assembly /Checkout labor	960	$21.93	$21,052.80		$52,632.00	$73,684.80
Materials & Fab				$30,000.00		$30,000.00
H/W Project Management	480	$42.19	$20,251.20		$50,628.00	$70,879.20
Project review	320	$42.19	$13,500.80		$33,752.00	$47,252.80
Development Equipment						
DSP Development station	320	$27.47	$8,790.40	$15,000.00	$21,976.00	$45,766.40
DSP Evaluation Kit	160	$27.47	$4,395.20		$10,988.00	$15,383.20
Total Hardware	6340		$176,026.80	$45,000.00	$440,067.00	$661,093.80

CONFIDENTIAL DATA

MICRO-RIT
PHOTOTELESIS

Software	Hours	Rates	Labor $	Materials	Overhead	Total Cost
Specification Document	80	$32.81	$2,624.80		$6,562.00	$9,186.80
Evaluate and select DSP	80	$32.81	$2,624.80		$6,562.00	$9,186.80
Evaluate and Select Operating system	170	$31.51	$5,356.70		$13,391.75	$18,748.45
Evaluate and Select Complier	170	$31.51	$5,356.70		$13,391.75	$18,748.45
Other Development O/S complier				$15,000.00	$0.00	$15,000.00
Software Specification	170	$32.81	$5,577.70		$13,944.25	$19,521.95
System Management Functions						
Memory Management Routines						
Code Space Manager	320	$30.21	$9,667.20		$24,168.00	$33,835.20
Data Space Manager	320	$32.81	$10,499.20		$26,248.00	$36,747.20
Reflash Interface	160	$25.00	$4,000.00		$10,000.00	$14,000.00
Interrupt Handling	160	$32.81	$5,249.60		$13,124.00	$18,373.60
Power Management	320	$25.00	$8,000.00		$20,000.00	$28,000.00
Video System						
Video Frame Grabber S/W	420	$28.91	$12,140.10		$30,350.25	$42,490.35
Video Demodulation S/W S-Video	160	$32.81	$5,249.60		$13,124.00	$18,373.60
Video Demodulation S/W Composite	160	$32.81	$5,249.60		$13,124.00	$18,373.60
Port Wavelet compressor	240	$32.81	$7,874.40		$19,686.00	$27,560.40
Port JPEG compressor	240	$25.00	$6,000.00		$15,000.00	$21,000.00
Image Storage Handler	80	$30.21	$2,416.80		$6,042.00	$8,458.80
Communications System						
Asynch Port Interface	60	$25.00	$1,500.00		$3,750.00	$5,250.00
Synch Port Interface	120	$25.00	$3,000.00		$7,500.00	$10,500.00
Port PTAC	1650	$28.91	$47,693.25		$119,233.13	$166,926.38
Port PTAC-2	240	$25.00	$6,000.00		$15,000.00	$21,000.00
Audio System	545	$32.64	$17,791.00		$44,477.50	$62,268.50
User Interface	160	$30.21	$4,833.60		$12,084.00	$16,917.60
LED Display Driver	60	$25.00	$1,500.00		$3,750.00	$5,250.00
Push Button Interface	60	$25.00	$1,500.00		$3,750.00	$5,250.00
Menuing Interface	120	$25.00	$3,000.00		$7,500.00	$10,500.00
Remote Control/Host Mode						
Remote Control Interface	480	$30.21	$14,500.80		$36,252.00	$50,752.80
Docking Station Interface	320	$30.21	$9,667.20		$24,168.00	$33,835.20

CONFIDENTIAL DATA

MICRO-RIT
PHOTOTELESIS

Software	Hours	Rates	Labor $	Materials	Overhead	Total Cost
System Integration	1200	$28.26	$33,906.00		$84,765.00	$118,671.00
User Manuals	280	$21.10	$5,906.60		$14,766.50	$20,673.10
System Checkout & rework	475	$25.72	$12,217.30		$30,543.24	$42,760.54
Write acceptance test plan	120	$38.91	$4,668.60		$11,671.50	$16,340.10
Customer Acceptance test Plan	14	$45.84	$641.76		$1,604.40	$2,246.16
Management	277.2	$38.91	$10,784.47		$26,961.17	$37,745.63
Total Software	9431.2		$276,997.77	$15,000.00	$692,494.43	$984,492.21
Combined	15771.2		$453,024.57	$60,000.00	$1,132,561.43	$1,645,586.01

CONFIDENTIAL DATA

SECTION 8

PERSONNEL RESUMES

BRUCE C. MATHER

Manager of Software Engineering
PhotoTelesis...a business of Texas Instruments Incorporated

Dr. Mather joined PhotoTelesis Corporation in December 1993, as Director of Software Engineering. Prior to joining PhotoTelesis, he was a Senior Research Engineer at Southwest Research Institute where he was employed for seven years. He also serves as an Adjunct Professor at St. Mary's University where he teaches a course in Digital Speech Processing.

Among Dr. Mather's technical areas of expertise are robotic systems, image processing, machine perception, neural networks, virtual reality, multimedia database systems and digital signal processing. He is a member of the Institute of Electrical and Electronic Engineers (IEEE), the Society of Manufacturing Engineers (SME), and the International Neural Network Society (INNS).

Dr. Mather attended the University of Illinois in Champaign, Urbana, where he earned his BSEE degree in 1980, his MSEE in 1983, and his PhD in Electrical Engineering in 1986. He graduated with highest honors and received the Eta Kappa Nu Senior Honor Award for academic excellence. His PhD dissertation involved advanced, multidimentional digital signal processing (DSP) of synthetic aperture radar (SAR) data.

At Southwest Research Institute, while working in their Advanced Robotics Department, he designed and developed interprocess and intercomputer communication and synchronization in the C programming language under the Unix operating system.

In 1991, Bruce joined the Advanced Training Concepts Section at SWRI and was instrumental in the development of the Visual Information System multimedia database product which runs under Windows 3.1. He also worked on an IR&D project involving a Virtual Environment system for multidimensional data visualization. His other areas of interest include speech recognition, position sensing, and holographic sound.

ROGER D. VEST

Manager of Hardware Engineering
PhotoTelesis...a business of Texas Instruments Incorporated

Mr. Vest joined PhotoTelesis Corporation in January of 1994 as Director of Hardware Engineering. Previously, he was Manager of Engineering for CompuAdd Express Corporation in Austin, Texas. In that position, he reported to the President and was responsible for all phases of product development and product sourcing. During his time there, three portable computer (notebook) products were introduced.

Prior to CompuAdd Express, Mr. Vest was employed by Texas Instruments, also in Austin, for over fifteen years. When he resigned to accept the CompuAdd Express position, he was a Senior Member of the Technical Staff. During his last year with TI, Mr. Vest managed a PWB design/layout center for their Custom Manufacturing Group. This effort included initial layout, prototype PWB fabrication, PWB assembly, and prototype checkout of customer products for several high volume computer suppliers. He has an extensive background in surface-mount technology, including footprint design, PWB layout guidelines and automatic test compatibility. He has published several articles on surface-mount technology design rules and footprint requirements.

Mr. Vest graduated from Texas Tech University in Lubbock, Texas, with a Bachelor of Science degree in Electrical Engineering. He was on the Dean's list at the time of his graduation.

WILLIAM A. KIDD

Program Manager
PhotoTelesis...a business of Texas Instruments Incorporated

Mr. Kidd joined Texas Instruments in June 1988. While assigned to the Airborne department of the Defense Systems and Electronics Group, Mr. Kidd was a member of the Light Helicopter program where he was the Program Control manager and cost account manager for several hundred data item submittals. Follow-on assignments included management support to numerous projects. Most recently Mr. Kidd was transferred to PhotoTelesis, a business of Texas Instruments, where he was assigned the program management responsibility for the U.S. Army's Light Weight Video Reconnaissance System (LVRS).

Mr. Kidd developed an excellent understanding of DoD acquisition while on active duty with the U.S. Air Force from 1967-1988. During his military career he gained more than 20 years direct experience in DoD Systems Acquisition Management. At the time of his retirement, Mr. Kidd was the Commander of Air Force Systems Command's, Systems Acquisition School. Previous Air Force program management assignments included the Pave Tack Pod program, the Pave Tack Forward Looking Infrared (FLIR) subsystem, and the Pave Tiger Mini-Drone program. Other relevant Air Force assignments include schedule planning and control for launch, on-orbit support, and recovery of satellite payloads, and Air Force Plant Representative Officer at a defense contractor's facility, responsible for on-site engineering management of DEM/VAL and production programs.

Mr. Kidd has an MS degree in Engineering Management from Arizona State University, Tempe, AZ. His undergraduate BS degree in Mechanical Engineering, was received from Grove City College, Grove City, PA.

Electronic Patent Application Fee Transmittal

Application Number:	11617509
Filing Date:	28-Dec-2006
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Filer:	Jeffrey Darryl Hunt
Attorney Docket Number:	06-0719

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	944 1251	1	130	130

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
	Total in USD ($)			**130**

Electronic Acknowledgement Receipt

EFS ID:	5143936
Application Number:	11617509
International Application Number:	
Confirmation Number:	4247
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Customer Number:	67589
Filer:	Jeffrey Darryl Hunt
Filer Authorized By:	
Attorney Docket Number:	06-0719
Receipt Date:	13-APR-2009
Filing Date:	28-DEC-2006
Time Stamp:	16:34:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	2681
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Amendment After Final	ResptoFinalOA04132009.pdf	63018 7bab390ec5cca0c947c8f33da760efed7027d123	no	15
Warnings:					
Information:					
2	Rule 130, 131 or 132 Affidavits	AffidavitMonroe10336470.pdf	5233293 4ecd2b8888475ae768ac42d7e4f4f413aa5be9c7	no	115
Warnings:					
Information:					
3	Fee Worksheet (PTO-06)	fee-info.pdf	30043 8beca9f2aaf7a575b4d1afde0cd9c621d80bbb22	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	5326354	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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	Filing Date	
11/617,509	12/28/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
			TOTAL			TOTAL	

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

APPLICATION AS AMENDED – PART II

AMENDMENT 04/13/2009	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 34	Minus	** 42	= 0	X $ =		OR	X $52=	0
Independent (37 CFR 1.16(h))	* 7	Minus	***3	= 4	X $ =		OR	X $220=	880
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**880**

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	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.

Legal Instrument Examiner:
/DIANE JOHNSON/

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.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/617,509	Filing Date 12/28/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
			TOTAL			TOTAL	

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

APPLICATION AS AMENDED – PART II

AMENDMENT

04/13/2009	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 34	Minus	** 42	= 0	X $ =		OR	X $52=	0
Independent (37 CFR 1.16(h))	* 7	Minus	***7	= 0	X $ =		OR	X $220=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**0**

AMENDMENT

	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	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.

Legal Instrument Examiner:
/SHIRELL m. CARMICHAEL/

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.

PTO/SB/30EFS (04-09)
Approved for use through 05/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11/617,509	Filing Date	2006-12-28	Docket Number (if applicable)	06-0719	Art Unit	2625
First Named Inventor	David A Monroe			Examiner Name	Houshang Safaipour		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on ____________
- ☐ Other ____________

☐ Enclosed

- ☐ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other ____________

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months ____________
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other ____________

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 504128

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
☐ Applicant Signature

PTO/SB/30EFS (04-09)
Approved for use through 05/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Jeffrey D. Hunt/	Date (YYYY-MM-DD)	2009-05-06
Name	Jeffrey D. Hunt	Registration Number	38189

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 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.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	11617509
Filing Date:	28-Dec-2006
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Filer:	Jeffrey Darryl Hunt/Jacob Cowart
Attorney Docket Number:	06-0719

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	953 1251	1	130	130

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**940**

Electronic Acknowledgement Receipt

EFS ID:	5286675
Application Number:	11617509
International Application Number:	
Confirmation Number:	4247
Title of Invention:	Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System
First Named Inventor/Applicant Name:	David A Monroe
Customer Number:	67589
Filer:	Jeffrey Darryl Hunt/Jacob Cowart
Filer Authorized By:	Jeffrey Darryl Hunt
Attorney Docket Number:	06-0719
Receipt Date:	06-MAY-2009
Filing Date:	28-DEC-2006
Time Stamp:	14:59:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$940
RAM confirmation Number	1130
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Request for Continued Examination (RCE)	rce.pdf	37376 5fc6ce31e1433628d931e3388a937356d6fd8b84	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Fee Worksheet (PTO-875)	fee-info.pdf	32154 185605e87ae671474d0d9d9876d88c6fbc9a6633	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	69530		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

67589 7590 08/20/2009

MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701

EXAMINER	
SAFAIPOUR, HOUSHANG	
ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 08/20/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

TITLE OF INVENTION: APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	11/20/2009

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 DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

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, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). 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. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

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.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

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)

67589 7590 08/20/2009

MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701

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.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

TITLE OF INVENTION: APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	11/20/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
SAFAIPOUR, HOUSHANG	2625	358-474000

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 submitted:
- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies ____________

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, 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).

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.

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

67589 7590 08/20/2009

MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701

EXAMINER	
SAFAIPOUR, HOUSHANG	
ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 08/20/2009

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 134 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 134 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 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

Notice of Allowability	**Application No.** 11/617,509	**Applicant(s)** MONROE, DAVID A	
	Examiner HOUSHANG SAFAIPOUR	**Art Unit** 2625	

-- 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 *RCE filed on 5/6/09*.
2. ☒ The allowed claim(s) is/are *43-73*.
3. ☐ 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.

4. ☐ 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.
5. ☐ 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).
6. ☐ 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 Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of issue fee.

Authorization to amend the claims was given in telephone interview with Jeffrey D. Hunt (Registration No. 38,189) on August 12, 2009.

In the claims:

62. (currently amended) The apparatus according to claim ~~62~~ 61 and further comprising: the first housing section being supported for pivotal movement relative to the second housing section about a pivot axis.

74. Canceled

75. Canceled

76. Canceled

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 05/06/2009 has been entered.

Reasons for Allowance

2. Claims 1-42 and 74-76 are canceled.

3. Claims 43-73 are allowed.

4. This is examiner's statement of reasons for allowance.

Regarding claims 43-73, the prior art, either singularly or in combination, does not teach or suggest an apparatus comprising:

a portable housing, the portable housing being wireless:

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format,

an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by tile portable housing, the display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device,

movement by the user of the portable housing commonly moving the display.

The features identified, in combination with other claim limitations, are neither suggested nor discussed by the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOUSHANG SAFAIPOUR whose telephone number is (571)272-7412. The examiner can normally be reached on Mon.-Fri. from 6:00am to 2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Edward Coles can be reached on (571)272-7402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

Notice of References Cited	Application/Control No. 11/617,509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A	
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,035,212	03-2000	Rostoker et al.	455/552.1
*	B	US-6,243,056	06-2001	Jachimowicz et al.	345/82
*	C	US-6,036,086	03-2000	Sizer et al.	235/375
*	D	US-5,550,646	08-1996	Hassan et al.	358/442
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*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.

Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/06/2008	08/15/2009							
	1	-	-							
	2	-	-							
	3	-	-							
	4	-	-							
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Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	**Art Unit** 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/06/2008	08/15/2009							
	37	-	-							
	38	-	-							
	39	-	-							
	40	-	-							
	41	-	-							
	42	-	-							
1	43	✓	=							
2	44	✓	=							
3	45	✓	=							
4	46	✓	=							
5	47	✓	=							
6	48	✓	=							
7	49	✓	=							
8	50	✓	=							
9	51	✓	=							
10	52	✓	=							
11	53	✓	=							
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18	60	✓	=							
19	61	✓	=							
20	62	✓	=							
21	63	✓	=							
22	64	✓	=							
23	65	✓	=							
24	66	✓	=							
25	67	✓	=							
26	68	✓	=							
27	69	✓	=							
28	70	✓	=							
29	71	✓	=							
30	72	✓	=							

Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/06/2008	08/15/2009							
31	73	✓	=							
	74	✓	-							
	75	✓	-							
	76	✓	-							

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11617509	MONROE, DAVID A
Examiner	**Art Unit**
HOUSHANG SAFAIPOUR	2625

ORIGINAL	
CLASS	**SUBCLASS**
358	1.15

INTERNATIONAL CLASSIFICATION										
CLAIMED					**NON-CLAIMED**					
H	0	4	N	1 / 00 (2006.01.01)						
G	0	6	F	3 / 12 (2006.01.01)						

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
358	402	403	407		

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33	7	49	23	65						
	2		18		34	8	50	24	66						
	3		19		35	9	51	25	67						
	4		20		36	10	52	26	68						
	5		21		37	11	53	27	69						
	6		22		38	12	54	28	70						
	7		23		39	13	55	29	71						
	8		24		40	14	56	30	72						
	9		25		41	15	57	31	73						
	10		26		42	16	58		74						
	11		27	1	43	17	59		75						
	12		28	2	44	18	60		76						
	13		29	3	45	19	61								
	14		30	4	46	20	62								
	15		31	5	47	21	63								
	16		32	6	48	22	64								

NONE

(Assistant Examiner) (Date)

Total Claims Allowed: 31

/HOUSHANG SAFAIPOUR/
Primary Examiner.Art Unit 2625 8/15/09

(Primary Examiner) (Date)

O.G. Print Claim(s)	O.G. Print Figure
1	6A & 6B

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11617509	MONROE, DAVID A
	Examiner	**Art Unit**
	HOUSHANG SAFAIPOUR	2625

SEARCHED

Class	Subclass	Date	Examiner
358	1.15, 402, 403, 407, 442, 468, 474	12/5/08	HS

SEARCH NOTES

Search Notes	Date	Examiner
East	12/5/08	HS
Inventor search performed	8/15/09	HS
Interference search performed	8/15/09	HS

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
358	1.15, 402, 403, 407	8/15/09	HS

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 4247

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/617,509	12/28/2006 **RULE**	358	2625	06-0719

APPLICANTS
David A Monroe, San Antonio, TX;

** **CONTINUING DATA** *************************
This application is a CON of 10/336,470 01/03/2003 PAT 7,365,871

** **FOREIGN APPLICATIONS** *************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** **
02/01/2007

Foreign Priority claimed ❑ Yes ☑ No 35 USC 119(a-d) conditions met ❑ Yes ☑ No Verified and Acknowledged /HOUSHANG SAFAIPOUR/ Examiner's Signature	❑ Met after Allowance HS Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TX	73	20	1

ADDRESS

MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701
UNITED STATES

TITLE

Apparatus for Capturing, Converting and Transmitting a Visual Image Signal Via A Digital Transmission System

FILING FEE RECEIVED		
1840	FEES: Authority has been given in Paper No.____________ to charge/credit DEPOSIT ACCOUNT No.____________ for following:	❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue) ❑ Other ________________ ❑ Credit

BIB (Rev. 05/07).

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11/617,509	Filing Date	2006-12-28	Docket Number (if applicable)	06-0719	Art Unit	2625
First Named Inventor	David A Monroe			Examiner Name	Houshang Safaipour		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on ____________
- ☐ Other ____________

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other ____________

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months ________
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other ____________

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 504128

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Jeffrey D. Hunt/	Date (YYYY-MM-DD)	2009-10-20
Name	Jeffrey D. Hunt	Registration Number	39189

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 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.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:	§	
	§	
DAVID A. MONROE	§	
	§	
Filed: December 28, 2006	§	Art Unit: 2625
	§	
Serial No.: 11/617,509	§	Examiner: H. Safaipour
	§	
For:	§	Docket No.: 06-0719
APPARATUS FOR CAPTURING,	§	
CONVERTING AND	§	
TRANSMITTING A VISUAL	§	
IMAGE SIGNAL VIA A DIGITAL	§	
TRANSMISSION SYSTEM	§	
	§	

<u>REQUEST FOR CONTINUED EXAMINATION</u>

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

Dear Sir:

Applicant gratefully acknowledges the Notice of Allowance mailed August 20, 2009. In response to the Notice of Allowance, Applicant respectfully submits this Request for Continuing Examination (RCE) and the accompanying Information Disclosure Statement (IDS). Applicant respectfully requests consideration of the IDS and issuance of a Notice of Allowance for claims 43-73. Applicant acknowledges that claims 62, 74, 75 and 76 were canceled by the Examiner's Amendment.

The Commissioner is authorized to withdraw or credit any fees, or any underpayment of fees, associated with this application from Moore Landrey LLP Deposit Account No. 50-4128. The undersigned is available by phone at (512) 499-8900 to discuss any issue concerning this application at the convenience of the Examiner.

Respectfully submitted,

/Jeffrey D. Hunt/

Jeffrey D. Hunt, Reg. No. 38,189

Date: October 20, 2009

CUSTOMER # 67589
Moore Landrey, L.L.P.
1609 Shoal Creek Blvd., Ste. 100
Austin, Texas 78701
Telephone: (512) 499-8900
Facsimile: (512) 320-8906

PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11617509
	Filing Date	2006-12-28
	First Named Inventor	David A Monroe
	Art Unit	2625
	Examiner Name	Houshang Safaipour
	Attorney Docket Number	06-0719

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5136628		1992-08-04	Araki et al.	
	2	5164979		1992-11-17	Choi et al.	
	3	5400068		1995-03-21	Ishida et al.	
	4	7372447		2008-05-13	Jacobson et al.	
	5	5042061		1991-08-20	Kaneke et al.	
	6	5485504		1996-01-16	Ohnsorge	
	7	7310072		2007-12-18	Ronzani	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11617509
	Filing Date	2006-12-28
	First Named Inventor	David A Monroe
	Art Unit	2625
	Examiner Name	Houshang Safaipour
	Attorney Docket Number	06-0719

Examiner Initial*	Cite No	Publication Number	Kind Code1	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number3	Country Code2 i	Kind Code4	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T5
	1	JP03089691			1991-04-15	Yamamoto		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	Copy of Office Action issued on October 4, 2007 in Appl. No. 11/617,509 (present application).	☐
	2	Copy of Office Action issued on December 12, 2008 in Appl. No. 11/617,509 (present application).	☐
	3	Copy of Office Action issued on September 27, 2004 in Appl. No. 10/336,470 (the parent of the present application).	☐
	4	Copy of Office Action issued on August 9, 2005 in Appl. No. 10/336,470 (the parent of the present application).	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Application Number	11617509
	Filing Date	2006-12-28
	First Named Inventor	David A Monroe
	Art Unit	2625
	Examiner Name	Houshang Safaipour
	Attorney Docket Number	06-0719

	5	Copy of Office Action issued on December 16, 2005 in Appl. No. 10/336,470 (the parent of the present application).	☐
	6	Copy of Office Action issued on July 27, 2006 in Appl. No. 10/336,470 (the parent of the present application).	☐
	7	Copy of Office Action issued on March 8, 2007 in Appl. No. 10/366,470 (the parent of the present application).	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number	11617509
	Filing Date	2006-12-28
	First Named Inventor	David A Monroe
	Art Unit	2625
	Examiner Name	Houshang Safaipour
	Attorney Docket Number	06-0719

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the 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 the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Jeffrey d Hunt/	Date (YYYY-MM-DD)	2009-10-06
Name/Print	Jeffrey D Hunt	Registration Number	38,189

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT ABSTRACTS OF JAPAN

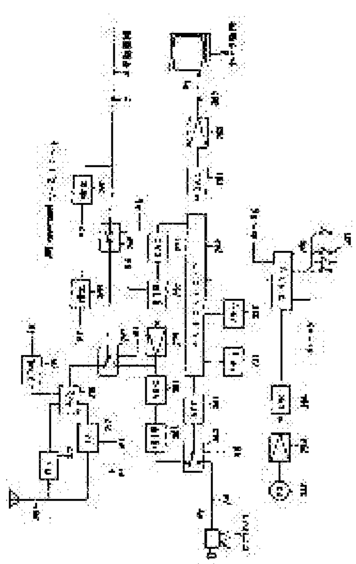
(11)Publication number : **03-089691**
(43)Date of publication of application : **15.04.1991**

(51)Int.Cl. H04N 7/14

(21)Application number : **01-225686**
(22)Date of filing : **31.08.1989**

(71)Applicant : **SONY CORP**
(72)Inventor : **YAMAMOTO TADAHISA**

(54) VIDEO TELEPHONE **SET**



(57)Abstract:
PURPOSE: To improve operability and convenience of use by dividing a video telephone set into a handset and a base unit, adopting the wireless system for the handset and mounting externally a video camera and a display device to the base unit.
CONSTITUTION: A video telephone set is divided into a handset 100 and a base unit 200, and a camera 5 and a television receiver 6 are integrated with the base unit 200. Then it is devised that processings such as an outgoing call, an incoming call, talking, pickup of a picture to be sent to a party opposite, transmission of a picture data and display of picture data from the party opposite are executed from the handset 100. Since an opposite picture is displayed on a television receiver 6 with a large screen size, detailed communication is realized. Moreover, since the camera 5 is mounted externally, various kinds of cameras such as a camera with an automatic iris mechanism can be used and the picture quality is improved.

Electronic Patent Application Fee Transmittal

Application Number:	11617509
Filing Date:	28-Dec-2006
Title of Invention:	APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM
First Named Inventor/Applicant Name:	David A Monroe
Filer:	Jeffrey Darryl Hunt/Jacob Cowart
Attorney Docket Number:	06-0719

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt

EFS ID:	6292084
Application Number:	11617509
International Application Number:	
Confirmation Number:	4247
Title of Invention:	APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM
First Named Inventor/Applicant Name:	David A Monroe
Customer Number:	67589
Filer:	Jeffrey Darryl Hunt/Jacob Cowart
Filer Authorized By:	Jeffrey Darryl Hunt
Attorney Docket Number:	06-0719
Receipt Date:	20-OCT-2009
Filing Date:	28-DEC-2006
Time Stamp:	12:39:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$810
RAM confirmation Number	7598
Deposit Account	504128
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Request for Continued Examination (RCE)	rce1.pdf	797447 fa4a4d71410fe6b8c3625f4741a0a475569131d7	no	3
Warnings:					
Information:					
2	Transmittal Letter	RCETransmittal.pdf	23700 91ef5eb9ec62a67b917b30e17f376f16c5437158	no	2
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	ids.pdf	788050 0e42889095b8ad92f2fc37b07c7784f43cf13f54	no	5
Warnings:					
Information:					
4	NPL Documents	10336470.pdf	3343207 e5e069acef3a713f368b2c5eefa0dbaf74997769	no	82
Warnings:					
Information:					
5	NPL Documents	11617509.pdf	1228228 7eeccee41c7eea4498c0b549af2f5d7c263f1164	no	32
Warnings:					
Information:					
6	Foreign Reference	Yamamoto.pdf	36974 21be08011bc00c0c2fbc27e1edee9ce9dd1ca42d	no	1
Warnings:					
Information:					
7	Fee Worksheet (PTO-875)	fee-info.pdf	30594 d86f46d0d0066cece576b09979630832824d6a3f	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	6248200	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

67589 7590 11/16/2009

MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701

EXAMINER	
SAFAIPOUR, HOUSHANG	
ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 11/16/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

TITLE OF INVENTION: APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	02/16/2010

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 DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

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, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). 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. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

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)

67589 7590 11/16/2009

MOORE LANDREY
1609 SHOAL CREEK BLVD
SUITE 100
AUSTIN, TX 78701

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.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

TITLE OF INVENTION: APPARATUS FOR CAPTURING, CONVERTING AND TRANSMITTING A VISUAL IMAGE SIGNAL VIA A DIGITAL TRANSMISSION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	02/16/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
SAFAIPOUR, HOUSHANG	2625	358-474000

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 submitted:

- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies ______________________

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, 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).

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.

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.

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/617,509	12/28/2006	David A Monroe	06-0719	4247

67589 7590 11/16/2009

MOORE LANDREY
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EXAMINER	
SAFAIPOUR, HOUSHANG	
ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 11/16/2009

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 134 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 134 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 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No. 11/617,509	Applicant(s) MONROE, DAVID A	
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625	

-- 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 *RCE filed on 10/20/2009*.

2. ☒ The allowed claim(s) is/are *43-73*.

3. ☐ 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.

4. ☐ 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.

5. ☐ 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).

6. ☐ 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 Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of issue fee.

Authorization to amend the claims was given in telephone interview with Jeffrey D. Hunt (Registration No. 38,189) on August 12, 2009.

In the claims:

62. (currently amended) The apparatus according to claim ~~62~~ 61 and further comprising: the first housing section being supported for pivotal movement relative to the second housing section about a pivot axis.

74. Canceled

75. Canceled

76. Canceled

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 10/20/2009 has been entered.

Reasons for Allowance

2. Claims 1-42 and 74-76 are canceled.

3. Claims 43-73 are allowed.

4. This is examiner's statement of reasons for allowance.

Regarding claims 43-73, the prior art, either singularly or in combination, does not teach or suggest an apparatus comprising:

a portable housing, the portable housing being wireless:

an image collection device supported by the portable housing, the image collection device being operable to provide visual image data of a field of view;

memory supported by the portable housing, the memory being suitable to receive visual image data in digital format, the memory being suitable to retain the visual image data in digital format, an input device supported by the portable housing, the input device being operable by the user;

operation of the input device by the user enabling the memory to retain the visual image data in digital format, the memory being suitable to provide retained visual image data in digital format;

media supported by the portable housing, the media being suitable to embody at least one compression algorithm;

at least one processing platform supported by the portable housing, the at least one processing platform being operable to execute the at least one compression algorithm, the at least one processing platform being provided the retained visual image data in digital format, execution of the at least one compression algorithm providing compressed visual image data;

a display supported by tile portable housing, the display being operable to display for viewing by a user a perceptible visual image of the field of view, the perceptible visual image being generated from the visual image data in digital format;

a mobile phone supported by the portable housing, the mobile phone being operable to send to a remote recipient a wireless transmission, the wireless transmission conveying the compressed digital image data; and

movement by the user of the portable housing commonly moving the image collection device,

movement by the user of the portable housing commonly moving the display.

The features identified, in combination with other claim limitations, are neither suggested nor discussed by the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOUSHANG SAFAIPOUR whose telephone number is (571)272-7412. The examiner can normally be reached on Mon.-Fri. from 6:00am to 2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Edward Coles can be reached on (571)272-7402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Houshang Safaipour/
Primary Examiner, Art Unit 2625

Notice of References Cited	Application/Control No. 11/617,509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A	
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,035,212	03-2000	Rostoker et al.	455/552.1
*	B	US-6,243,056	06-2001	Jachimowicz et al.	345/82
*	C	US-6,036,086	03-2000	Sizer et al.	235/375
*	D	US-5,550,646	08-1996	Hassan et al.	358/442
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*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.

Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/06/2008	08/15/2009	11/07/2009						
	1	-	-	-						
	2	-	-	-						
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	35	-	-	-						
	36	-	-	-						

Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE									
Final	Original	12/06/2008	08/15/2009	11/07/2009							
	37	-	-	-							
	38	-	-	-							
	39	-	-	-							
	40	-	-	-							
	41	-	-	-							
	42	-	-	-							
1	43	✓	=	=							
2	44	✓	=	=							
3	45	✓	=	=							
4	46	✓	=	=							
5	47	✓	=	=							
6	48	✓	=	=							
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24	66	✓	=	=							
25	67	✓	=	=							
26	68	✓	=	=							
27	69	✓	=	=							
28	70	✓	=	=							
29	71	✓	=	=							
30	72	✓	=	=							

Index of Claims	Application/Control No. 11617509	Applicant(s)/Patent Under Reexamination MONROE, DAVID A
	Examiner HOUSHANG SAFAIPOUR	Art Unit 2625

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/06/2008	08/15/2009	11/07/2009						
31	73	✓	=	=						
	74	✓	-	-						
	75	✓	-	-						
	76	✓	-	-						

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11617509	MONROE, DAVID A
Examiner	**Art Unit**
HOUSHANG SAFAIPOUR	2625

ORIGINAL

CLASS	SUBCLASS
358	1.15

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
358	402	403	407		

INTERNATIONAL CLASSIFICATION

CLAIMED					NON-CLAIMED
H	0	4	N	1 / 00 (2006.01.01)	
G	0	6	F	3 / 12 (2006.01.01)	

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33	7	49	23	65						
	2		18		34	8	50	24	66						
	3		19		35	9	51	25	67						
	4		20		36	10	52	26	68						
	5		21		37	11	53	27	69						
	6		22		38	12	54	28	70						
	7		23		39	13	55	29	71						
	8		24		40	14	56	30	72						
	9		25		41	15	57	31	73						
	10		26		42	16	58		74						
	11		27	1	43	17	59		75						
	12		28	2	44	18	60		76						
	13		29	3	45	19	61								
	14		30	4	46	20	62								
	15		31	5	47	21	63								
	16		32	6	48	22	64								

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 31	
/HOUSHANG SAFAIPOUR/ Primary Examiner.Art Unit 2625 (Primary Examiner)	11/7/2009 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6A & 6B