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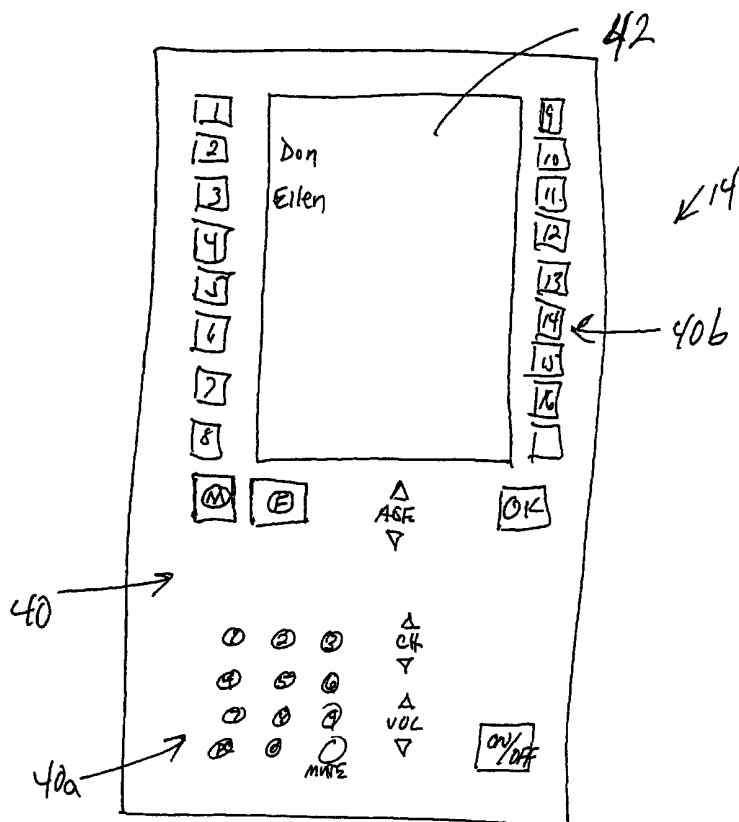
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(54) Title: VIEWER IDENTIFICATION APPARATUS FOR USE IN A BROADCAST AUDIENCE MEASUREMENT



(57) Abstract: A broadcast audience measurement system provides a display of the currently recorded audience status on a remote control device located at or near a viewing location from which a broadcast audience member views television programming. Displaying the audience status on a small, viewer-proximate, display, instead of on a separate display next to the television set, allows a broadcast audience research company to use smaller, less obtrusive equipment, thus increasing the likelihood that viewers associated with the statistically selected viewing premises will cooperate with the audience measurement and making their status as members of a research panel less obvious to visitors.

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VIEWER IDENTIFICATION APPARATUS FOR USE  
IN A BROADCAST AUDIENCE MEASUREMENT

Technical Field of the Invention

5           The present invention relates to the measurement of broadcast audiences, and more particularly to the measurement of television broadcast audiences.

Background of the Invention

10           It is customary in the field of broadcast audience research to employ a measurement apparatus with each broadcast receiver within each of a plurality of statistically selected locations in order to determine tuning data. This tuning data, for example, may be the identity of the channel to which the broadcast receiver is tuned whenever the broadcast receiver is on.

15           It is further customary to provide a manual input device that can be used by those viewers who are actually viewing the program corresponding to the tuned broadcast signal in order to indicate their identities to the measurement apparatus. This manual input is frequently provided in the form of a Peoplemeter which not  
20           only allows each viewer to manually enter a viewer identification but also provides a visual status indicator

for showing which of the viewers have indicated that they are currently in the viewing audience. For example, this visual status indicator may comprise a plurality of selectively illuminated light emitting diodes disposed on a box placed adjacent to a television display and within the field of view of the viewers.

The manual input device alternatively may be a battery-powered remote control that includes a keypad and an infra-red pulse transmitter which permit a viewer to manually enter the viewer's identity and to transmit that identity by way of infra-red pulses to the measurement apparatus or other data collector. The measurement apparatus or other data collector also provides a visual status indication as discussed above. Such a remote control is disclosed by Kiewit in U.S. Patent No. 4,876,736. Still other alternative devices which collect manually entered viewer identification data and which use the television display to indicate the currently recorded audience status are known.

The tuning data from the measurement apparatus and the viewer identities from the manual input device

are commonly time stamped with the times of each tuning event and/or of each change in audience composition. The time stamped tuning and viewer records are then stored in a store and forward unit within the statistically  
5 selected location for subsequent forwarding to a data collection central office, such as on a daily or other basis.

Known manual input devices which reside on or near monitored broadcast receivers may adversely impact  
10 the willingness of viewers to be members of a statistically selected viewing panel for audience measurement purposes because such input devices are large and intrusive and because such input devices make the membership of the viewers in the panel obvious to  
15 visitors.

Also, known manual input devices provide for visual confirmation by displaying entered data on the screen of a television or a set top box. Because this data in the case of visitors includes demographic data  
20 (such as age), visitors may be reluctant to use the manual input device which would require sharing entered

the data that they enter with other persons in the viewing area.

The present invention solves one or more of the above noted problems.

5        Summary of the Invention

          In accordance with one aspect of the present invention, a system comprises an input device and an apparatus. The input device has a transmitter and a display, is remote from a broadcast receiving appliance,  
10        and is operable by a person to input an identification. The transmitter is arranged to transmit the identification. The apparatus is located adjacent the broadcast receiving appliance and has a receiver arranged to receive the identification. The display is arranged  
15        to display the identification in response to a message from the apparatus indicating that the apparatus received the identification. The apparatus has a transmitter arranged to transmit the message in response to receiving the identification.

In accordance with another aspect of the present invention, a remote control device for use in connection with a broadcast receiving and tuning appliance comprises a manual data entry device, a transmitter, a display, a memory, and a microprocessor. The manual data entry device is operable by a user of the broadcast receiving and tuning appliance to generate a tuning output and a person's identification output. The transmitter is arranged to transmit the tuning output to the broadcast receiving and tuning appliance. The memory stores a set of prompting rules which, when executed, are arranged to prompt the user of the broadcast receiving and tuning appliance. The microprocessor, which is controlled by a program stored in the memory, controls the display to display a representation of the person's identification output and executes the prompting rules.

In accordance with yet another aspect of the present invention, an audience measurement system, which collects tuning and persons data at a viewing location remote from a monitored television having an ON state and an OFF state, comprises an input device and a measurement

apparatus. The input device is located at the viewing location and includes a manual data input device, an input device transmitter, an input device receiver, and a display. The measurement apparatus is adjacent to the monitored television and includes a microprocessor, a sensor, a measurement apparatus receiver, and a measurement apparatus transmitter. The manual data input device is operable by a person to input an identification. The input device transmitter is arranged to transmit the identification. The input device receiver is arranged to receive a message. The display is arranged to display a representation of the identification in response to the input device receiver receiving the message. The microprocessor is controlled by a program stored in a memory. The sensor is arranged to determine when the monitored television is in the ON state. The measurement apparatus receiver is arranged to receive the identification from the input device. The measurement apparatus transmitter is arranged to transmit an acknowledgment of receipt of the identification in

response to execution of the program by the microprocessor.

In accordance with still another aspect of the present invention, an audience measurement system, which collects data at a viewing location associated with a tuner located within a statistically selected premises, comprises a network, a central office coupled to the network, a remote control tuning device, and a communication device. The remote control tuning device includes a memory, a microprocessor controlled by a program stored in the memory, a manual input device, a transmitter, and a set of prompting rules. The manual input device is selectively operable by a user of the tuner at a location remote from the tuner and is arranged to output a tuning command and a persons datum to the microprocessor. The microprocessor is arranged to store the tuning command, the persons datum, and a time stamp in the memory. The transmitter is controlled by the microprocessor and is arranged to transmit the tuning command to the tuner. The set of prompting rules is stored in the memory and is used by the program to determine when to prompt the user to enter the persons



datum. The communication device is coupled to the network and is arranged to communicate the tuning event, the persons datum, and the time stamp to the central office

5                   In accordance with a further aspect of the present invention, a method is provided to collect the identity of a person using a monitored broadcast receiver in a statistically selected premises. The monitored broadcast receiver has a transceiver adjacent thereto, and the monitored broadcast receiver is controlled by a  
10                   signal from a remote control having a manual tuning input device and a manual persons datum input device. The method comprises the following steps: a) transmitting a persons datum from the remote control in response to the person using the manual persons datum input device; b)  
15                   receiving the persons datum at the transceiver; c) storing the persons datum in a memory operatively associated with the transceiver; d) transmitting an acknowledgment message from the transceiver; e)  
20                   receiving the acknowledgment message at the remote

control; and, f) displaying, on a display portion of the remote control, a representation of the persons datum.

In accordance with yet a further aspect of the present invention, a method is provided to collect the identity of a person using a tuner located in a statistically selected premises. The tuner is controlled by a signal from a remote control having a manual input device, a display, and a microprocessor operating under the control of a stored program. The method comprises the following steps: a) receiving a manual input provided by the person; b) displaying, on the display, a representation of the input if the input is an identity datum; c) storing the input with a corresponding time stamp; and, d) communicating the input and corresponding time stamp to a central office.

In accordance with a still further aspect of the present invention, a remote control for remotely controlling a tuner comprises a display, a manual input device, and a controller. The controller is coupled to the display and the manual input device, and the controller is arranged to accept an input from the manual

input device indicating an identification of a member of  
an audience of the tuner and to control the display to  
display the identification.

#### Brief Description of the Drawings

5                   These and other features and advantages of the  
present invention will become more apparent from a  
detailed consideration of the invention when taken in  
conjunction with the drawings in which:

10                   Figure 1 is a schematic diagram of an audience  
measurement system in accordance with the present  
invention;

15                   Figure 2 is an elevational view of a portable  
remote control device which is in accordance with the  
present invention and which may be used with the audience  
measurement system of Figure 1;

                  Figure 3 is a schematic block diagram of the  
circuitry of the portable remote control device of Figure  
2;

20                   Figure 4 is a software state diagram showing  
the operation of a first embodiment of the portable

remote control device of Figure 2 and of a measurement apparatus of the audience measurement system shown in Figure 1;

Figure 5 is a software state diagram showing the operation of a second embodiment the portable remote control device of Figure 2; and,

Figure 6 is a schematic block diagram of the measurement apparatus of the audience measurement system shown in Figure 1.

#### Detailed Description of the Invention

As shown in Figure 1, an audience measurement system 10 is provided at a statistically selected location 12 in which known viewers are members of a broadcast audience. The audience measurement system 10 includes a portable remote control device 14 which controls a television receiver 16. For example, the portable remote control device 14 can be used from a remote viewing position 18 in order to change the channel, volume level, and so on of the television receiver 16. The audience measurement system 10 is

arranged to log data on audience membership (hereinafter  
"persons data" or "persons status data"). The audience  
measurement system 10 may be arranged to also log tuning  
data regarding the programs and/or channels to which the  
5 television receiver 16 is tuned. Periodically, the  
logged data is transmitted to a data collection central  
office 20 over a network 22. The network 22 may be a  
public switched telephone network, as is conventional  
practice in the audience measurement art.

10 In a first embodiment of the present invention,  
the portable remote control device 14 is slaved to a  
measurement apparatus 24 which is installed adjacent to  
the television receiver 16. The measurement apparatus 24  
both records tuning and persons data and controls the  
15 portable remote control device 14 in order to display  
viewer status (present/not present). In a second  
embodiment of the present invention, the portable remote  
control device 14 not only functions as a portable remote  
control device for the television receiver 16, but is  
20 also arranged to act as an electronic diary by storing  
tuning and persons data. As will be discussed at greater

length hereinafter, the tuning and persons data accumulated according to either embodiment can be communicated to the data collection central office 20 by a variety of techniques known to those skilled in the art.

The audience measurement system 10 includes a data storage and forwarding unit 26 which collects the tuning and persons data from the measurement apparatus 24 and which stores the tuning and persons data until a scheduled forwarding time when the tuning and persons data are forwarded to the data collection central office 20. The data storage and forwarding unit 26 may also store and forward tuning and persons data collected from a measurement apparatus associated with each of the other television receivers (not shown) located in the statistically selected location 12.

When the portable remote control device 14 is slaved to the measurement apparatus 24 according to the first embodiment of the present invention, the portable remote control device 14 may be configured as a half duplex or full duplex transceiver of encoded infra-red

pulse streams so that it can communicate with a transceiver 32 of the measurement apparatus 24 in a bidirectional communication arrangement. According to the second embodiment, the portable remote control device 14 may be configured as a simplex transmitter which transmits an encoded stream of near infra-red pulses 30 unidirectionally to a photosensor receiver coupled to the tuner of the television receiver 16.

The measurement apparatus 24 can comprise logic and a memory so that the current tuning and persons status can be determined by the measurement apparatus 24 based upon inputs from the portable remote control device 14 and then communicated to the data storage and forwarding unit 26. Alternatively or additionally, the measurement apparatus 24 may receive a signal replica from a signal detector 34. For example, this signal detector 34 may be in the form of a video signal source detector such as that disclosed by Chan, in issued U.S. Patent Application Serial No. 08/654,309. This video signal source detector may be positioned as taught in the Chan application to acquire a replica of a video signal

from an input to a CRT of the television receiver 16.  
Alternatively or additionally, the signal detector 34 may  
be in the form of a microphone which acquires a replica  
of an audio output from a speaker of the television  
5 receiver 16. Accordingly, the signal detector 34 is  
arranged to non-intrusively acquire from the television  
receiver 16 a replica of the video and/or audio signal  
processed by the television receiver 16.

The signal replica acquired by the signal  
10 detector 34 can then be processed by the measurement  
apparatus 24 according to a variety of tuning measurement  
methodologies. For example, (i) an ancillary video  
and/or audio code identifying the tuned television  
program or channel can be read from the signal replica,  
15 if present, (ii) video and/or audio feature signatures  
characteristic of the tuned television program can be  
extracted from the signal replica and compared to  
reference signatures in order to identify the program or  
channel, or (iii) the signal replica can be correlated  
20 with a contemporary reference signal obtained by a



reference scanning tuner controlled by the measurement apparatus 24 in order to identify the program or channel.

As a further alternative, the signal detector 34 may be arranged to detect the local oscillator frequency of the television receiver 16. This local oscillator frequency indicates the channel to which the television receiver 16 is tuned, as is known in the audience measurement art.

Moreover, whether or not the signal detector 34 is employed, the measurement apparatus 24 may receive an ON/OFF input from an ON/OFF sensor 36. The ON/OFF sensor 36, for example, may be an inductive sensor which, as is well known, determines that the television receiver 16 is on by detecting the horizontal retrace frequency of the CRT of the television receiver 16. However, such an inductive sensor is practical, for the most part, only if the television receiver 16 uses a CRT display. Accordingly, the ON/OFF sensor 36 may have a photodetector probe 38 positioned in relation to the screen display of the television receiver 16 so that changing light levels or the amount of light emanating

from the screen display can be used to indicate when the television receiver 16 is on or off. The ON/OFF sensor 36 of this latter type can be used to determine the status of any video display.

5                   The portable remote control device 14 may have a user interface as shown in Figure 2. This user interface includes a keypad 40 and a display 42 which allow viewers to remotely control the television receiver 16 and to input data regarding the viewers' identities.

10                  The keypad 40 includes buttons 40a to allow a viewer to enter channel numbers, to change channels up and down, to increase and decrease volume, to mute the television receiver 16, and to turn the television receiver 16 on and off. The buttons 40a may include other buttons as  
15                  well. For example, an appliance select button or buttons such as TV/VCR (not shown) may also be provided. The keypad 40 also includes buttons 40b which permit viewers to identify themselves when they are in the viewing audience.

20                  The display 42, for example, may be a panel capable of displaying eight lines of characters divided

into two columns with up to twenty characters per line.

The buttons 40b are provided along the sides of the display 42. When a new viewer begins viewing of the television receiver 16, that new viewer (or any other viewer) simply presses a corresponding one of the buttons 40b in order to enter the new viewer's identification into the audience measurement system 10. The new viewer's name appears on the display 42 as feedback acknowledging that the new viewer has pressed an identification button and that the audience measurement system 10 has received the identification. The names of all other viewers currently in the audience of the television receiver 16 are also displayed. When a viewer ends a viewing session, the viewer again presses the corresponding one of the buttons 40b which removes the viewer's name from the display 42.

Alternatively, the names of all viewers at the statistically selected location 12 may be continuously displayed whenever the television receiver 16 is in use whether or not the viewers are in the audience in order to continually remind the viewers which buttons 40b are

associated with which viewers. In this case, a tone and/or other audible signal, or another visible indicator such as a mark displayed in the display 42 next to a viewer's identification, may be provided as feedback  
5 acknowledging that a viewer has pressed an identification button 40b to record that the viewer has either entered or left the viewing area.

The user interface may also include an alpha keypad (not shown) so that the viewers' names and  
10 appropriate demographic information may be associated with corresponding ones of the buttons 40b and may be stored in a memory of the portable remote control device 14, in a memory of the measurement apparatus 24, and/or in a memory of the data storage and forwarding unit 26.  
15 Accordingly, when a viewer presses an identification button, the time and date of the press, the appropriate identification, and the appropriate demographic information may be stored with the corresponding tuning data for future transmission to the data collection  
20 central office 20. On the other hand, the viewers' identification and demographic information could be

stored at the data collection central office 20 so that the portable remote control device 14, the measurement apparatus 24, and/or the data storage and forwarding unit 26 need only store the corresponding tuning data and the time and date that each identification button is pressed for future transmission to the data collection central office 20. In this latter case, the data collection central office 20 makes the association between presses of the buttons 40b and the corresponding identifications and demographic information stored at the data collection central office 20.

Instead of providing the user interface of the portable remote control device 14 with an alpha keypad as described above, the portable remote control device 14 may have a port for receiving a connection to a data entry device carrier by an installer. In this case, during installation of the audience measurement system 10, the installer plugs the data entry device into the corresponding port of the portable remote control device 14 and enters the appropriate identification and/or appropriate demographic information into the memory of

the portable remote control device 14 so that each viewer is linked to one of the identification buttons 40b.

In controlling the television receiver 16, the portable remote control device 14 preferably operates in the manner of a conventional universal remote control capable of controlling two or more tuner appliances, such as a television receiver, a VCR, and/or a cable converter. Such a universal remote control conventionally uses several different code sets so that it can operate in multiple viewer-selected modes. One or more of these modes can be used to transmit a tuning or other command (e.g., a fast forward command sent to a VCR) to the currently active tuner (e.g., the tuner of television receiver 16 or of a set-top cable converter or of a VCR) controlling the video display of the television receiver 16. In addition, in the first embodiment of the present invention as mentioned above, one of the modes of the portable remote control device 14 is also used to transmit a persons datum to the measurement apparatus 24.

Optionally, the keypad 40 of the portable remote control device 14 may also include buttons which

may be pressed to enter the gender and age of the viewers and an OK button which may function as an enter button.

The gender and age buttons are particularly useful in providing information about guests who are also in the viewing audience. Age may be entered through the use of up and down buttons as shown in Figure 2. Alternatively, age may be entered through the use of the buttons 40a.

An electronic processor 50 housed within the portable remote control device 14 is shown in Figure 3 and includes a microprocessor 52 suitably connected to the keypad 40, the display 42, a ROM 54, a RAM 56, and a transceiver 58. The microprocessor 52 operates under control of a program stored in the ROM 54. The input of the viewer from the keypad 40 is interpreted and is reformatted by the microprocessor 52 as an output that is sent to the RAM 56, to the display 42, or to the transceiver 58, depending on the program that the microprocessor 52 is running. When the portable remote control device 14 is operated according to the first embodiment of the invention, the RAM 56 is used primarily for short term data buffering. However, when the

portable remote control device 14 is operated according to the second embodiment of the invention (as an electronic diary), the RAM 56 may be required to store several days' worth of data. Hence, the RAM 56 must be significantly larger in the second embodiment than in the first embodiment.

Additionally, when the portable remote control device 14 is used according to the second embodiment as an electronic diary, the electronic processor 50 is provided with an interface 60 for use in uploading data stored in the RAM 56 to the data collection central office 20 as described below. In this embodiment, the portable remote control device 14 is preferably configured with a half duplex or full duplex transceiver, and the RAM 56 is of sufficient size to store as many changes in tuning or audience composition as are expected to occur during a viewing measurement period, which is commonly a day or a week. The data stored in the RAM 56 can be communicated to the data collection central office 20, for example, by plugging the portable remote control device 14 into a docking station 62 (Figure 1) which may



be similar to those used to communicate data between two computers or between a computer and a network server, and which is connected to the data storage and forwarding unit 26. Accordingly, the data stored in the RAM 56 can be uploaded to the data storage and forwarding unit 26 by use of the interface 60 and the docking station 62, and the data stored in the data storage and forwarding unit 26 can be subsequently uploaded to the data collection central office 20 over the network 22.

Alternatively, the data stored in the RAM 56 can be physically transported (such as by mail) to the central office, or the data stored in the RAM 56 can be transmitted by way of the transceiver 58 to the transceiver 32, then to the data storage and forwarding unit 26, and finally to the data collection central office 20 over the network 22.

When the portable remote control device 14 is operated according to the first embodiment, a program represented by the state diagram of Figure 4 may be executed by the microprocessor 52 and by the measurement apparatus 24. In a state 70 of the portable remote

control device 14, each press of a key on the keypad 40 results in a corresponding signal being transmitted by the transceiver 58 to the measurement apparatus 24. In a state 72, the measurement apparatus 24 decodes the signals it receives from the portable remote control device 14. Also in the state 72, the measurement apparatus 24 compares each newly received message with earlier data in order to determine if a change in audience composition or in tuning has occurred.

If a change in audience composition has occurred, the measurement apparatus 24 transmits an acknowledgment message back to the portable remote control device 14 and enters a state 74. In response to the acknowledgment message, the portable remote control device 14 transitions to a state 76. In the state 74, the measurement apparatus 24 causes the persons data to be stored in the RAM 56 along with a time stamp and the current tuning status of the appliance (such as the television receiver 16, a VCR, or a cable converter) being controlled. In the state 76, the portable remote control device 14 causes the name or other identification

indication of the new viewer to be displayed on the display 42. If the acknowledgment message from the measurement apparatus 24 is not received by the portable remote control device 14 within an appropriate amount of time, the portable remote control device 14 returns to the state 70 where it prompts the viewer by a suitable display on the display 42 to re-enter the current audience status. Alternatively, this prompting message may instead be an audible prompt (such as a beep or a series of beeps) or other type of visual prompt (such as a flashing light emitting diode).

If a change in tuning has occurred, the measurement apparatus 24 enters the state 74. In the state 74, the measurement apparatus 24 causes the tuning data to be stored in its RAM along with a time stamp and the current persons data.

If the measurement apparatus 24 receives a message from the portable remote control device 14 indicating a change in audience composition, but determines from the earlier data that, in fact, no change in audience composition has occurred, the measurement

apparatus 24 transmits a suitable error message back to the portable remote control device 14 for display on the display 42.

When the portable remote control device 14 is operated according to the second embodiment, a program represented by the state diagram of Figure 5 may be executed by the microprocessor 52. In a state 80, each keypad input is analyzed in order to determine if the input is a change in audience status or a tuning command.

If there has been a change in audience status, the current audience status is displayed by the display 42, and the current audience status is also stored along with a time stamp and the current tuning status in the RAM 56. Each tuning command is transmitted to the tuner of the appliance under control (such as the tuner of the television receiver 16, a VCR, or a cable converter) and is stored in the RAM 56.

Also, a set of prompting rules 82 is appropriately invoked in order to determine if and when the viewer is to be prompted to input current audience status data. Too frequent prompting (e.g., after each

one of a series of channel changes that occur in short interval) can lead to reduced cooperation. Conversely, never reminding the viewer to enter audience status data can encourage the viewer to ignore entering such data.

5 Hence, the prompting rules 82 are based on parameters, such as the elapsed time since a channel change or the elapsed time since audience status data were last entered, that seek to optimize cooperation and accuracy.

According to an exemplary set of prompting  
10 rules, a prompt lasting for a first period of time (such as forty-five seconds) may be given whenever the television receiver 16 is turned on, after a time lapse (such as forty-seven minutes) from the last press of a key on the portable remote control device 14, and/or  
15 whenever key entries are incomplete. Also, a prompt lasting for a second period of time (such as seventy-five seconds) may be given after a time lapse (such as forty-two minutes) from the last press of a key on the portable remote control device 14 if one or more persons are  
20 logged in, and/or periodically (such as once every ten minutes) after the last press of a key on the portable

remote control device 14 if no persons are logged in.

The prompts described above may be differentiated such as by color depending upon the event which triggers the prompt.

5                   Other events may also be used to trigger prompts. Such other events include, for example, a channel change when no viewer is logged in, the passage of a predetermined number of days when a particular household member has not logged in, the passage of a  
10                   predetermined number of days when a short term visitor has not logged in, no log ins when the television receiver 16 is turned on, no log ins of particular household members (such as children) when the television receiver 16 is tuned to particular programs (such as  
15                   children's programming, and the like.

                  An electronic processor 90 of the measurement apparatus 24 is shown in Figure 6 and includes a microprocessor 92 suitably connected to the transceiver 32, the signal detector 34, a ROM 94, a RAM 96, and an  
20                   interface 98. The transceiver 32, controlled by the microprocessor 92 executing a program stored in the ROM

94, is used to receive tuning status and persons status data from the portable remote control device 14. The tuning status data, along with the current audience status data and a time stamp, are saved in the RAM 96.

5      Optionally or alternatively, the measurement apparatus 24 may also respond to the signal detector 34, as discussed above, in order to identify the displayed program from codes, signatures, or correlations, or to determine the tuned channel such as by detecting the local oscillator  
10      frequency of the television receiver 16. This

information can be stored in the RAM 96. The measurement apparatus 24 additionally may be arranged to determine the ON/OFF status of the television receiver 16 from the ON/OFF sensor 36 in order to prompt the viewer to

15      indicate audience status by use of the portable remote control device 14 in accordance with a set of prompting rules. As discussed above, the measurement apparatus 24 transmits the tuning and audience status data to the data storage and forwarding unit 26 by means of the interface  
20      98.

The portable remote control device 14 is preferably constrained to display audience status data that is the same as the audience status data currently stored in the measurement apparatus 24. This constraint implies that the measurement apparatus 24 and the portable remote control device 14 communicate by way of a duplex or half-duplex link, rather than by using a simplex scheme which is common in television remote controls. Any of several known communication protocols may be used to assure that the displayed audience status data and the stored audience status data match. For example, the measurement apparatus 24 could transmit a fixed acknowledgment message to the portable remote control device 14 each time a new persons status datum is received, and the portable remote control device 14 would then display the current persons status only if it receives the acknowledgment message within a predetermined interval after transmitting the persons status datum. Otherwise, the portable remote control device 14 would prompt re-transmission of the persons status datum. Alternatively, the persons status data



transmitted by the portable remote control device 14 could be re-transmitted by the measurement apparatus 24 back to the portable remote control device 14 as the acknowledgment message.

5                   Thus, the present invention as described above provides a display of the current audience status on a portable remote control device which may be disposed at or near a viewing location from which a broadcast audience member views television programming. Displaying  
10                   the audience status on a small, viewer-proximate, display, instead of displaying that information on a separate display adjacent a television receiver, allows a broadcast audience research company to use smaller, less obtrusive equipment. Moreover, viewing of the display 42  
15                   is limited for the most part to the field of view of the person entering data into the measurement system and, thus, does not attract the attention of visitors to the statistically selected location 12.

                  Certain modifications of the present invention  
20                   have been discussed above. Other modifications will occur to those practicing in the art of the present

invention. For example, the measurement apparatus 24 has been described above as essentially a smart terminal. However, the measurement apparatus 24 may instead be configured as a dumb terminal of a local host computer which is disposed elsewhere in the statistically selected location 12 and which collects the tuning and persons data.

Also, it is noted that the portable remote control device 14 may function in several different modes as described above. However, each of these modes may use a separate corresponding remote control each having substantially the same external appearance and user interface as the portable remote control device 14 shown in Figure 2.

Furthermore, the present invention as described above relies on the use of certain infrared transceivers. However, it will be appreciated that other signaling modes, such as ultrasonic or spread-spectrum radio, could instead be employed.

In addition, the present invention as described above relies on the use of transceivers. Instead, a

separate receiver and transmitter could be used in place of each transceiver.

Moreover, when the portable remote control device 14 is used in accordance with the second embodiment, it may be assumed that all tuning is done with the portable remote control device 14. In this case, the portable remote control device 14 would store all tuning and persons status inputs from the keypad 40 in the RAM 56 for subsequent communication to the data collection central office 20, such that the signal detector 34 and even the measurement apparatus 24 need not be used or provided. Indeed, the data storage and forwarding unit 26 can also be eliminated if the portable remote control device 14 is arranged to transmit tuning and audience status data directly to the data collection central office 20. To facilitate such data transmission, the portable remote control device 14 can be provided with the interface 60 or a cellular telephone or other communication apparatus.

However, it must be recognized that tuning can be effected instead by use of controls on the appliance

itself or by use of a remote control that was provided as original equipment with the appliance. Therefore, the signal detector 34 is preferably included in the audience measurement system 10. Alternatively, the measurement apparatus 24 could be programmed to occasionally repeat the tuning command most recently received from the portable remote control device 14 in order to force the viewer to thereby re-tune the appliance by use of the portable remote control device 14 to the channel selected by a means other than the portable remote control device 14.

Also, as describe above, the portable remote control device 14 according to the first embodiment of the invention transmits tuning commands which are received by both the controlled tuner and by the measurement apparatus 24. The controlled tuner responds by effecting the tuning indicated by the tuning command, and the measurement apparatus 24 responds by recording the tuning event. Instead, in accordance with the teachings of U.S. Patent No. 4,876,736, the portable remote control device 14 may be arranged to transmit

tuning commands using codes recognized by the measurement apparatus 24 but not by the controlled tuner. Thus, the measurement apparatus 24 records the tuning event, converts the code into a form recognized by the controlled tuner, and passes the converted tuning command on to the controlled tuner.

Furthermore, iconic symbols, which may in the form of buttons, may be used to indicate the significance of the various buttons of the portable remote control device 14 to the users, particularly children and illiterate users.

In addition, the display 42 is shown in Figure as a screen arranged to display characters of a viewer's identification. Instead, the display may be a light emitting device such as an LED which is assigned to the member of the audience and which emits light to indicate the presence of the member in the audience. Alternatively, the display may be first and second light devices where the first light emitting device emits light to indicate the presence of the viewer in the audience,

and where the second light emitting device emits light to indicate the absence of the viewer from the audience.

Moreover, there is a potential problem if multiple portable remote control devices 14 for multiple corresponding televisions are used in the same household. If portable remote control devices are accidentally (or intentionally) exchanged by household members, and these portable remote control devices archive the viewing (and even tuning) information for later downloading, then the tuning may be mis-attributed to the wrong television. A solution to this problem would be to associate a unique ID code to each television location that authorizes the portable remote control device to work only at that location.

Also, a different portable remote control device 14 could be assigned to each person in the household (with additional portable remote control devices provided to visitors). Each person would then carry that person's portable remote control device within the household. In this case, it is preferable if the portable remote control device 14 were a universal

television controller intended to operate multiple tuners such as every television in the household.

Furthermore, the portable remote control device 14 can be provided with multiple levels of prompts. For example, at the lowest level, the screen back-light could be flashed for 10 seconds and provides a suitable display such as "Update the audience or confirm with OK". If the audience responds appropriately, the portable remote control device 14 resumes normal operation. If the audience does not respond appropriately, the portable remote control device 14 waits for a first predetermined amount of time (e.g. 20 seconds), then the portable remote control device 14 again flashes the screen back-light for 10 seconds and provides the display requesting the audience to update or confirm as before. This prompt may be repeated for up to C1 cycles. After C1 cycles have passed without appropriate audience response, the portable remote control device 14 flashes the screen back-light for 20 seconds at a higher flash rate and displays "Update the audience or confirm with OK". If the audience responds appropriately, the portable remote

control device 14 resumes normal operation. If the audience does not respond appropriately, the portable remote control device 14 waits mode for a second predetermined amount of time (e.g. 30 seconds), then prompts, waits, and so on for up to C2 cycles. If the audience does not respond appropriately within the C2 cycles, the portable remote control device 14 flashes the screen back-light at a still higher flash rate for 20 seconds and displays "Update the audience or confirm with OK." If audience responds appropriately, the portable remote control device 14 resumes normal operation. If audience does not respond appropriately, the portable remote control device 14 waits for a third predetermined amount of time (e.g. 60 seconds), then the portable remote control device 14 prompts, waits, and so on for up to C3 cycles. After C3 cycles have passed without appropriate audience response, the portable remote control device 14 enters a rest phase with the normal screen display "Update the audience or confirm with OK" remains.



In addition, it is desirable for viewers to update audience composition without prompting as changes in audience composition occur. Prompting serves mainly as a fail-safe, when sufficient time has elapsed without any unprompted change or confirmation of viewing status. Therefore, the portable remote control device 14 may be provided with a timer that is reset by any data or status confirmation entry and that initiates two distinct prompts - a "soft" self-terminating prompt that serves as an anticipatory cue prior to a "hard" prompt that continues until a response is registered. The hard prompt serves both as a mild negative reinforcement for the audience having failed to operate the portable remote control device 14 proactively, and as a fail-safe to obtain confirmation or audience change information in the absence of proactive data entry. The soft prompt serves to train audience members to anticipate and ultimately prevent the appearance of prompts - and thus to report audience change information closer to the time it actually occurs.

As an additional contingency, the interval between prompts could be lengthened or shortened in order to reinforce timely entry of audience changes. This adjustment to the length of the prompting interval could be based on the data entry performance of viewers. For example, if a viewer typically waits until a prompt appears before reporting an earlier audience change, then the data record will show an improbably high proportion of reported audience changes coinciding with the appearance of the prompt. If this pattern of performance is observed, the prompting software may shorten the interval between prompts. Shortening the interval between prompts will reduce any possible lags between the occurrence and reporting of audience changes, as well as to provide a mild negative reinforcement for respondents who fail to report audience changes as they occur.

Alternatively, it is possible that viewers will report audience changes when they occur and that the intervals between prompts are shorter than the interval during which no audience change actually occurs. The only way that a viewer in this situation may prevent the

prompt from occurring would be to periodically press the OK button just to reset the prompt timer, even though the currently indicated audience status has not changed.

Many viewers in this situation might allow the prompt to

5 come on, at which point they would not change the

audience entry, but merely press the OK button to

indicate that the audience has not changed. Since no

data error has occurred, if this pattern of performance

is observed (repeated confirmations that no audience

10 change has occurred in response to prompts), it may be

that the prompting interval is more frequent than

required for this viewer. In this instance, the

prompting software may lengthen the interval between

prompts to provide a positive reinforcement. Indeed,

15 different prompting intervals could be set for various

viewers on the same people meter, depending on their

previous performance.

Accordingly, the description of the present

invention is to be construed as illustrative only and is

20 for the purpose of teaching those skilled in the art the

best mode of carrying out the invention. The details may

be varied substantially without departing from the spirit of the invention, and the exclusive use of all modifications which are within the scope of the appended claims is reserved.

WHAT IS CLAIMED IS:

1           1. A system comprising an input device and an  
2           apparatus, wherein the input device has a transmitter and  
3           a display, wherein the input device is remote from a  
4           broadcast receiving appliance and is operable by a person  
5           to input an identification, wherein the transmitter is  
6           arranged to transmit the identification, wherein the  
7           apparatus is located adjacent the broadcast receiving  
8           appliance and has a receiver arranged to receive the  
9           identification, wherein the display is arranged to  
10          display the identification in response to a message from  
11          the apparatus indicating that the apparatus received the  
12          identification, and wherein the apparatus has a  
13          transmitter arranged to transmit the message in response  
14          to receiving the identification.

1           2. The system of claim 1 wherein the apparatus  
2           includes a memory, and wherein the apparatus stores the  
3           identification in the memory.

1                   3. The system of claim 1 wherein the apparatus  
2 includes a memory, and wherein the apparatus stores a  
3 tuning event in the memory.

1                   4. The system of claim 1 wherein the apparatus  
2 includes a memory, and wherein the apparatus stores the  
3 identification and a tuning event in the memory.

1                   5. A remote control device for use in  
2 connection with a broadcast receiving and tuning  
3 appliance, the remote control device comprising:

4                   a manual data entry device operable by a user  
5 of the broadcast receiving and tuning appliance to  
6 generate a tuning output and a person's identification  
7 output;

8                   a transmitter arranged to transmit the tuning  
9 output to the broadcast receiving and tuning appliance;

10                  a display;

11                  a memory storing a set of prompting rules,  
12 wherein the prompting rules, when executed, are arranged

13 to prompt the user of the broadcast receiving and tuning  
14 appliance; and,  
15 a microprocessor controlled by a program stored  
16 in the memory, wherein the microprocessor controls the  
17 display to display a representation of the person's  
18 identification output and executes the prompting rules.

1 6. The remote control device of claim 5  
2 wherein the prompting rules in the set of prompting rules  
3 includes:

4 a first prompt lasting for a first period of  
5 time which is given whenever the broadcast receiving and  
6 tuning appliance is turned on, after a time lapse from  
7 the last manual data entry, and/or whenever manual data  
8 entry is incomplete;

9 a second prompt lasting for a second period of  
10 time which is given after a time lapse from the last  
11 manual data entry if one or more persons are logged in,  
12 and/or periodically after the last manual data entry if  
13 no persons are logged in.

1                   7. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given whenever the broadcast  
4           receiving and tuning appliance is turned on.

1                   8. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given after a time lapse from  
4           the last manual data entry.

1                   9. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given whenever manual data  
4           entry is incomplete.

1                   10. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given after a time lapse from  
4           the last manual data entry if one or more persons are  
5           logged in.



1                   11. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given periodically after the  
4           last manual data entry if no persons are logged in.

1                   12. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given upon a channel change  
4           when no viewer is logged in.

1                   13. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given upon the passage of a  
4           predetermined number of days when a particular household  
5           member has not logged in.

1                   14. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes a prompt which is given upon the passage of a  
4           predetermined number of days when a short term visitor  
5           has not logged in.

1                   15. The remote control device of claim 5  
2                   wherein the prompting rules in the set of prompting rules  
3                   includes a prompt which is given upon no log ins during a  
4                   time that the broadcast receiving and tuning appliance is  
5                   turned on.

1                   16. The remote control device of claim 5  
2                   wherein the prompting rules in the set of prompting rules  
3                   includes a prompt which is given upon no log ins of  
4                   particular household members when the broadcast receiving  
5                   and tuning appliance is tuned to particular program  
6                   types.

1                   17. The remote control device of claim 5  
2                   wherein the prompting rules in the set of prompting rules  
3                   includes a self-terminating soft prompt which is given  
4                   upon expiration of timer that is reset by any data or  
5                   status confirmation entry and a hard prompt that  
6                   continues until a response is registered.

1           18. The remote control device of claim 5  
2           wherein the prompting rules in the set of prompting rules  
3           includes prompts which flash at different rates.

1           19. An audience measurement system for  
2           collecting tuning and persons data at a viewing location  
3           remote from a monitored television having an ON state and  
4           an OFF state, the apparatus comprising:

5           an input device at the viewing location, the  
6           input device including

7           a manual data input device operable by a  
8           person to input an identification,

9           an input device transmitter arranged to  
10          transmit the identification,

11          an input device receiver arranged to  
12          receive a message, and

13          a display arranged to display a  
14          representation of the identification  
15          in response to the input device  
16          receiver receiving the message; and,

17                   a measurement apparatus adjacent to the  
18       monitored television, the measurement apparatus including  
19                   a microprocessor controlled by a program  
20                   stored in a memory,  
21                   a sensor arranged to determine when the  
22                   monitored television is in the ON  
23                   state,  
24                   a measurement apparatus receiver arranged  
25                   to receive the identification from  
26                   the input device, and  
27                   a measurement apparatus transmitter  
28                   arranged to transmit an  
29                   acknowledgment of receipt of the  
30                   identification in response to  
31                   execution of the program by the  
32                   microprocessor.

1                   20. An audience measurement system for  
2       collecting data at a viewing location associated with a  
3       tuner located within a statistically selected premises,  
4       the system comprising:

5           a network;  
6           a central office coupled to the network;  
7           a remote control tuning device including  
8                 a memory,  
9                 a microprocessor controlled by a program  
10                     stored in the memory;  
11           a manual input device selectively operable  
12                 by a user of the tuner at a location  
13                 remote from the tuner, the manual  
14                 input device being arranged to output  
15                 a tuning command and a persons datum  
16                 to the microprocessor, wherein the  
17                 microprocessor is arranged to store  
18                 the tuning command, the persons  
19                 datum, and a time stamp in the  
20                 memory,  
21           a transmitter controlled by the  
22                 microprocessor and arranged to  
23                 transmit the tuning command to the  
24                 tuner, and

25                   a set of prompting rules stored in the  
26                   memory and used by the program to  
27                   determine when to prompt the user to  
28                   enter the persons datum; and,  
29                   a communication device coupled to the network  
30                   and arranged to communicate the tuning event, the persons  
31                   datum, and the time stamp to the central office.

1                   21. A method of collecting the identity of a  
2                   person using a monitored broadcast receiver in a  
3                   statistically selected premises, the monitored broadcast  
4                   receiver having a transceiver adjacent thereto, the  
5                   monitored broadcast receiver controlled by a signal from  
6                   a remote control having a manual tuning input device and  
7                   a manual persons datum input device, the method  
8                   comprising the following steps:  
9                   a) transmitting a persons datum from the remote  
10                  control in response to the person using the manual  
11                  persons datum input device;  
12                  b) receiving the persons datum at the  
13                  transceiver;

14                   c) storing the persons datum in a memory

15                   operatively associated with the transceiver;

16                   d) transmitting an acknowledgment message from  
17                   the transceiver;

18                   e) receiving the acknowledgment message at the  
19                   remote control; and,

20                   f) displaying, on a display portion of the  
21                   remote control, a representation of the persons datum.

1                   22. A method of collecting the identity of a  
2                   person using a tuner located in a statistically selected  
3                   premises, the tuner controlled by a signal from a remote  
4                   control having a manual input device, a display, and a  
5                   microprocessor operating under the control of a stored  
6                   program, the method comprising the following steps:

7                   a) receiving a manual input provided by the  
8                   person;

9                   b) displaying, on the display, a representation  
10                   of the input if the input is an identity datum;

11                   c) storing the input with a corresponding time  
12                   stamp;

13                   d) communicating the input and corresponding  
14           time stamp to a central office.

1                   23. The method of claim 22 wherein the input  
2           is a tuning command.

1                   24. The method of claim 22 wherein the input  
2           is an identity datum.

1                   25. The method of claim 22 wherein the input  
2           is a tuning command and an identity datum.

1                   26. A remote control for remotely controlling  
2           a tuner, the remote control comprising:  
3                   a display;  
4                   a manual input device; and,  
5                   a controller coupled to the display and the  
6           manual input device, wherein the controller is arranged  
7           to accept an input from the manual input device  
8           indicating an identification of a member of an audience  
9           of the tuner and to control the display to display the  
10          identification.



1                   27. The remote control of claim 26 wherein the  
2 controller includes a memory, and wherein the controller  
3 is arranged to store the identification in the memory.

1                   28. The remote control of claim 27 further  
2 comprising a transmitter, wherein the transmitter is  
3 arranged to transmit a tuning event initiated by way of  
4 the manual input device, and wherein the controller is  
5 arranged to store the tuning event with the  
6 identification in the memory.

1                   29. The remote control of claim 28 wherein the  
2 controller is arranged to store a time stamp with the  
3 tuning event and the identification in the memory.

1                   30. The remote control of claim 26 further  
2 comprising a transmitter, wherein the transmitter is  
3 arranged to transmit a tuning event initiated by way of  
4 the manual input device, and wherein the controller is  
5 arranged to store the tuning event in the memory.

1                   31. The remote control of claim 30 wherein the  
2 controller is arranged to store a time stamp with the  
3 tuning event in the memory.

1                   32. The remote control of claim 26 further  
2 comprising a transmitter, and wherein the transmitter is  
3 arranged to transmit the identification in response to  
4 operation of the manual input device.

1                   33. The remote control of claim 26 further  
2 comprising a receiver, wherein the controller is arranged  
3 to control the display to display the identification only  
4 if the receiver receives an acknowledgment message.

1                   34. The remote control of claim 33 further  
2 comprising a transmitter, wherein the transmitter is  
3 arranged to transmit the identification in response to  
4 operation of the manual input device.

1                   35. The remote control of claim 26 wherein the  
2 display is a screen arranged to display characters of the  
3 identification.

1                   36. The remote control of claim 26 wherein the  
2 display is a light emitting device assigned to the member  
3 of the audience, and wherein the light emitting device  
4 emits light to indicate the presence of the member in the  
5 audience.

1                   37. The remote control of claim 36 wherein the  
2 light emitting device is a first light emitting device,  
3 wherein the display includes a second light emitting  
4 device assigned to the member of the audience, and  
5 wherein the light second emitting device emits light to  
6 indicate the absence of the member from the audience.

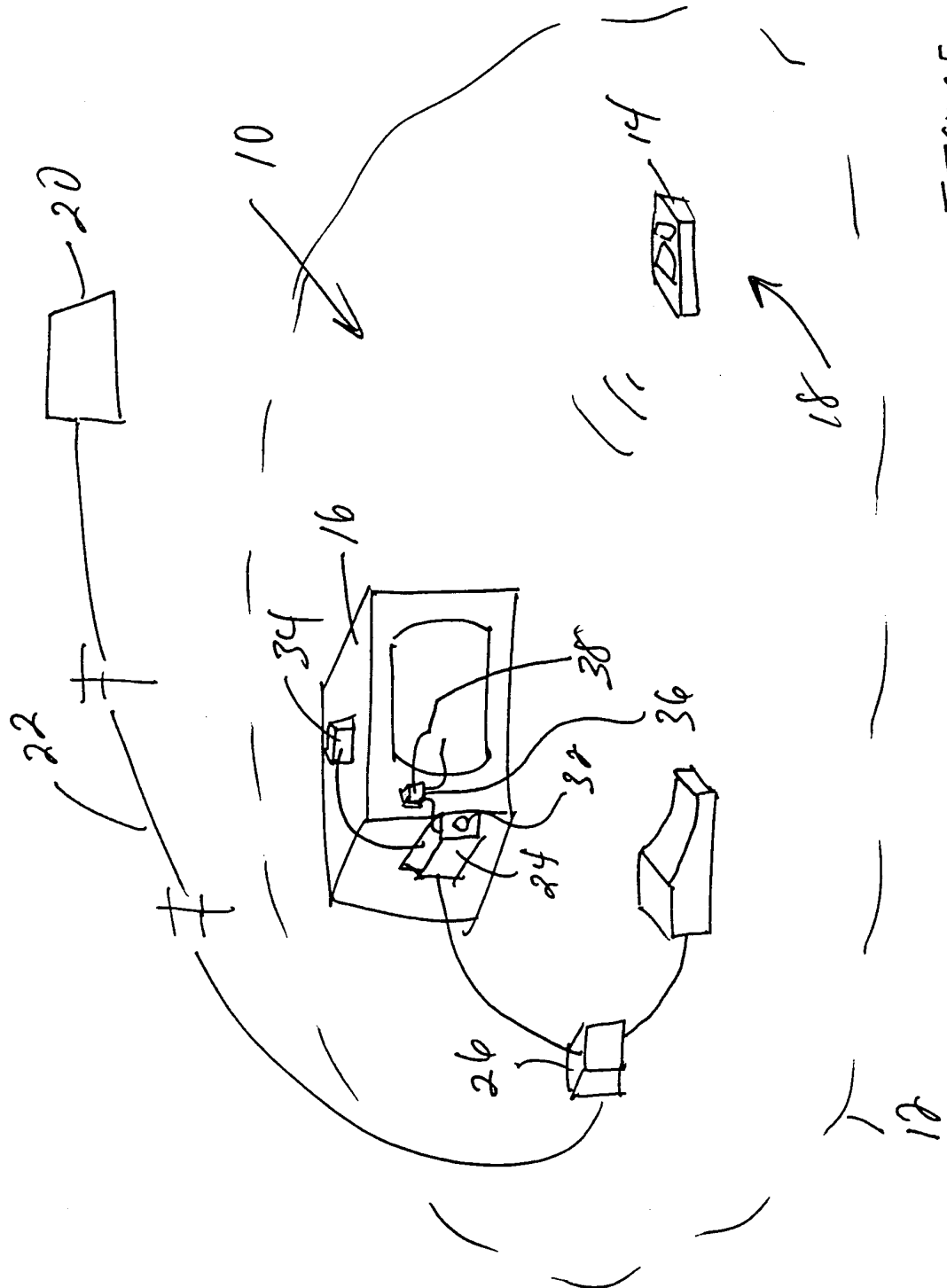


FIGURE 1

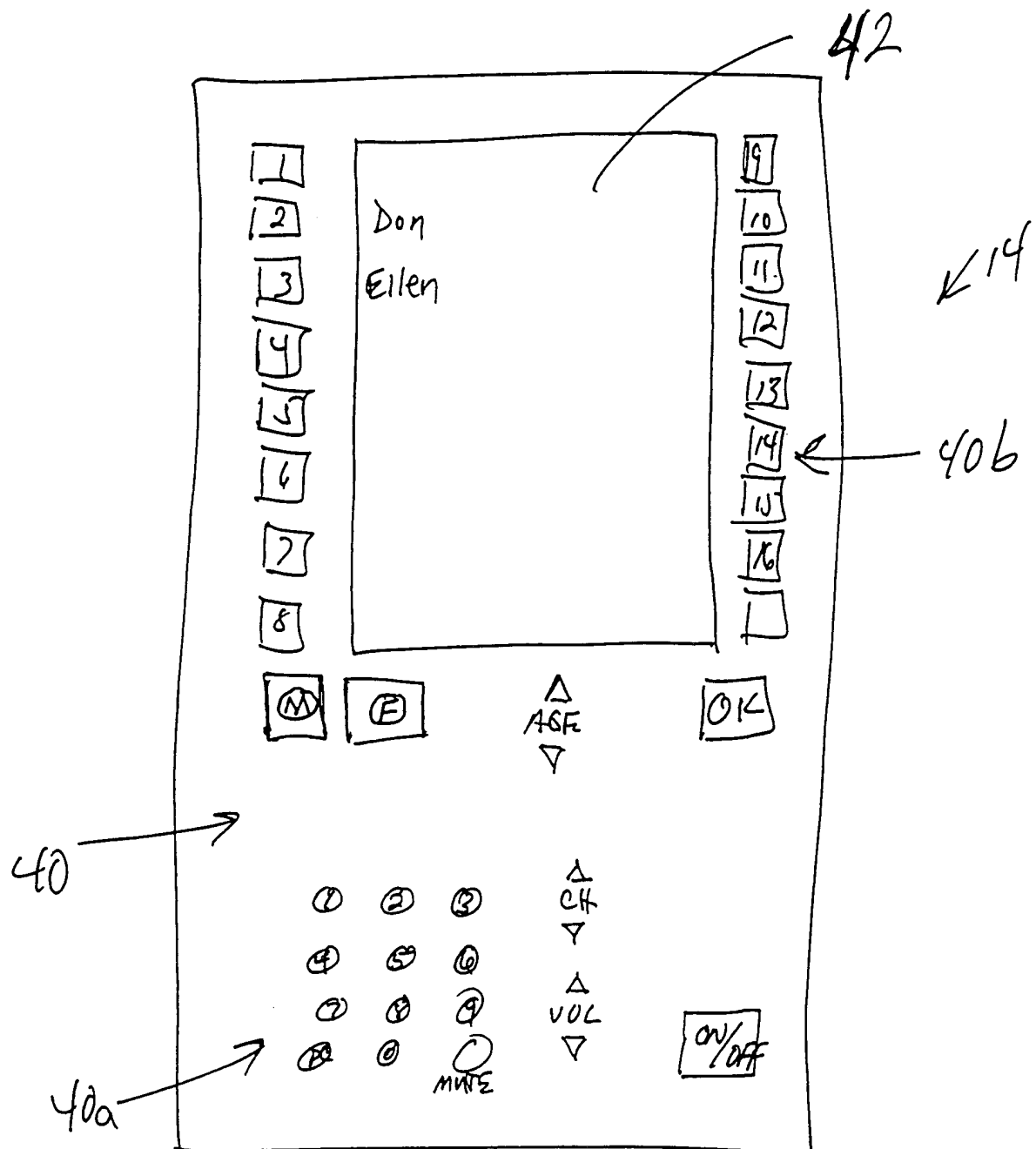


FIGURE 2

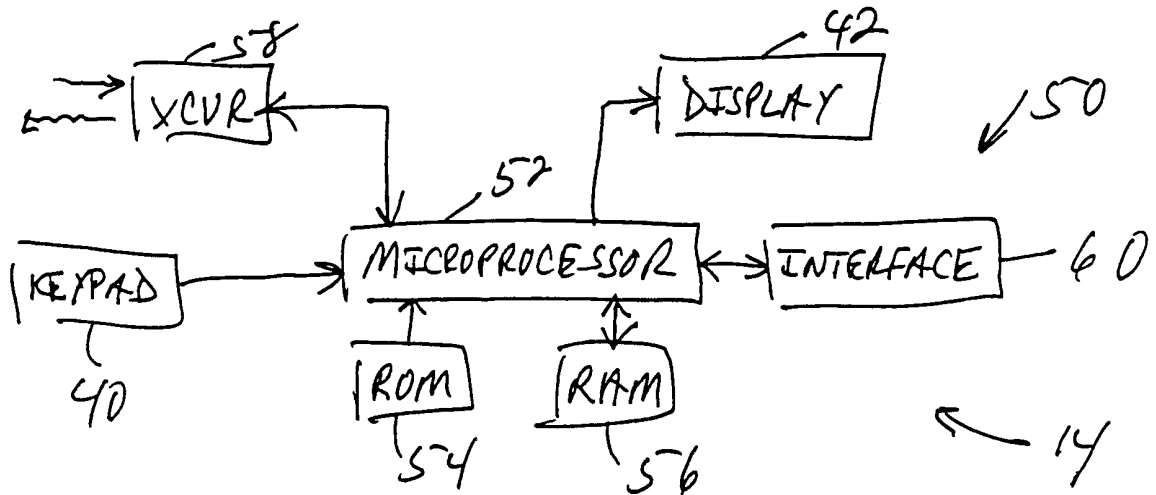


FIGURE 3

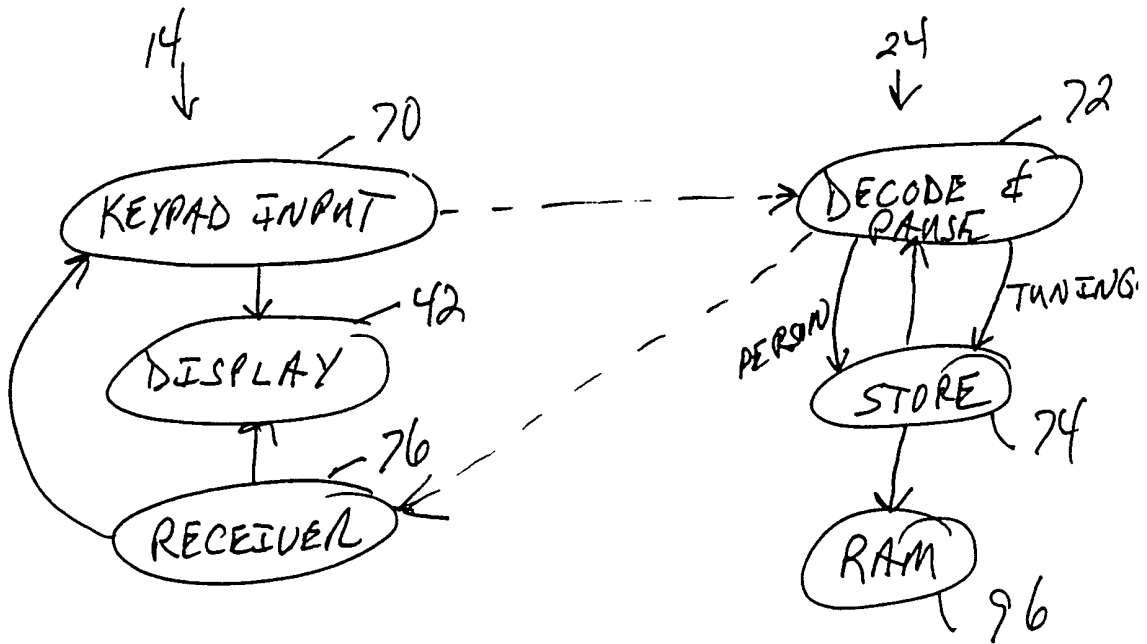
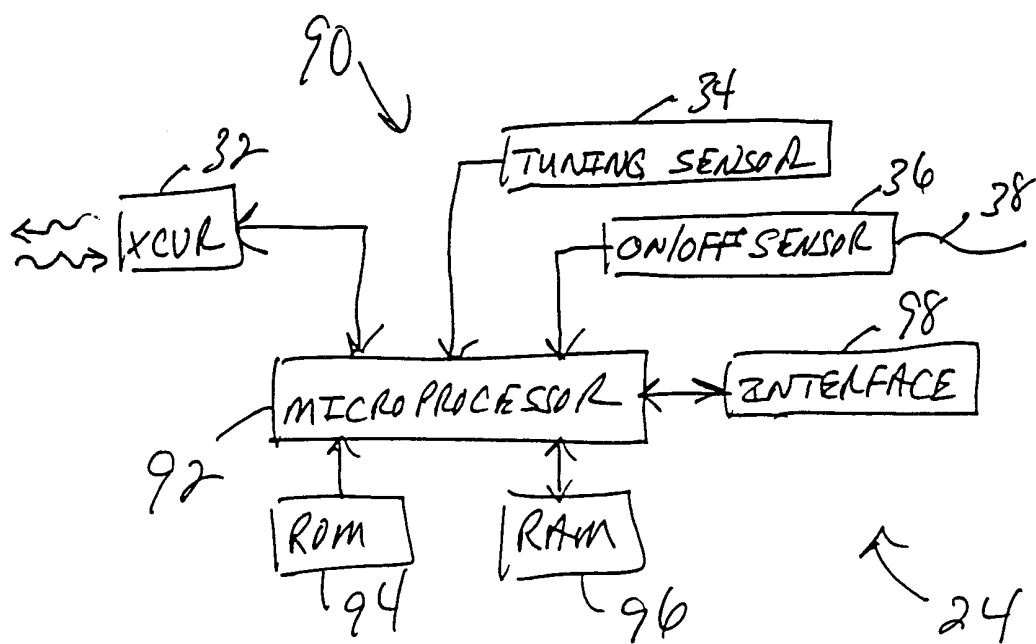
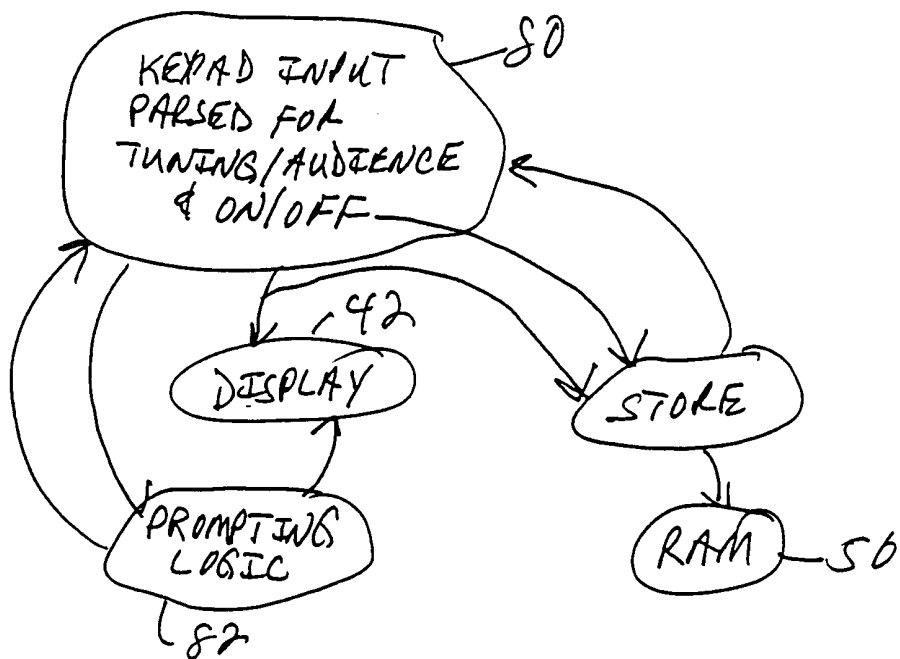


FIGURE 4



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/07572

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04H9/00

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 7 H04H

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)

EPO-Internal, WPI-Data, PAJ, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 297 205 A (AUDEBERT YVES ET AL) 22 March 1994 (1994-03-22)	5
Y	column 6, line 1 -column 8, line 10	1-4, 6-12, 15, 17, 19, 20, 22-32, 35
	column 14, line 27-45; claims 1, 12, 23-27, 31; figures 1-3, 9	
Y	US 5 497 185 A (DUFRESNE MICHEL ET AL) 5 March 1996 (1996-03-05)	1-4, 6-12, 15, 17, 19, 20, 22-32, 35
	the whole document	
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

15 September 2000

Date of mailing of the international search report

21/09/2000

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/07572

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 684 526 A (YOSHINOBU HITOSHI) 4 November 1997 (1997-11-04)	5,20
Y	column 5, line 56 -column 6, line 40  column 7, line 1 -column 9, line 19 column 23, line 13-27; claims 3,5-12,15,18,19; figures 2-5,19 -----	22-32, 35,36
Y	WO 95 35606 A (GREENE STEVEN BRADFORD ;MURPHY PETER EDWARD PAUL (GB)) 28 December 1995 (1995-12-28) the whole document -----	22-32, 35,36
X	US 4 646 145 A (PERCY PENELOPE C ET AL) 24 February 1987 (1987-02-24) column 5, line 30 -column 6, line 63 column 7, line 45-54; figures 1-5 -----	26,32,36

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/07572

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5297205 A	22-03-1994	FR 2653578 A AT 120291 T AU 636410 B AU 6644590 A CA 2071901 A DE 69018007 D DE 69018007 T EP 0425347 A ES 2072999 T WO 9106914 A HK 27597 A JP 2742560 B JP 5501463 T KR 191811 B MX 172252 B	26-04-1991 15-04-1995 29-04-1993 31-05-1991 25-04-1991 27-04-1995 26-10-1995 02-05-1991 01-08-1995 16-05-1991 06-03-1997 22-04-1998 18-03-1993 15-06-1999 09-12-1993
US 5497185 A	05-03-1996	US 5373315 A	13-12-1994
US 5684526 A	04-11-1997	JP 7245594 A	19-09-1995
WO 9535606 A	28-12-1995	AU 686825 B AU 2746495 A EP 0781476 A JP 10502225 T ZA 9505130 A	12-02-1998 15-01-1996 02-07-1997 24-02-1998 31-01-1996
US 4646145 A	24-02-1987	CA 1200895 A	18-02-1986