electronic device), the electronic device automatically dials the designated database at predetermined (either by the user or by the database in configuration) times, downloads "mail", terminates the telephone connection and turns on the mail-waiting light on the front of the electronic device. Through the use of the auto-poll function, the electronic device can be kept automatically updated with timely, fresh information from the services selected by the user or by the database. The mail message, can for example, indicate when a particular service has been activated and is available to the user, or confirm shipment of goods purchased through use of the electronic device.

Fig. 4 is a flow chart illustrating general operation of the electronic device 20 of Fig. 2. The electronic device 20 begins, after initialization, at step 150 and displays a menu of items available to the user.

When the electronic device is first turned on, it automatically calls its database host to receive operating instructions (such as which services to access and when). To view information screens on the electronic device, the user turns his television on, selects channel 3 or 4, and the electronic device main screens are displayed on the television screen.

The device, at step 152, next polls the IR detector 132 to determine if the user selected a displayed menu item by operating the remote keypad 52. Absent a selection from the remote keypad control 52, the program continues with steps 154 through 162, and returns to step 150. If the user selected a menu item corresponding to an available service of a remote facility, the program flow branches to steps 164 through 170. If the menu selection signals indicate the user desires a printout of the screen, the program flow branches to steps 172 through 176.

Steps 154 through 162 describe performance of the electronic device 20 for receiving and displaying inbound data calls. At step 154, the electronic device 20 checks the modem 110 for an incoming data call. If there is no incoming data

call, the program returns to step 150 to display the user menu. If a call is present, the program executes steps 156 through 162. Step 156 answers the modem, step 158 establishes a connection with a remote facility calling the electronic device 20, step 160 downloads (receives) the data from the calling facility, and step 162 displays any information from the download. After displaying the information, the program returns to step 150. The incoming data may modify operation of the electronic device 20 by reconfiguring the system. The incoming data call may provide the user with an additional menu item if the facilities expand, or if the user requests additional options.

Steps 164 through 170 access and acquire desired information responsive to the selected menu item. The program retrieves stored information relating to accessing the desired facility from the memory 102. This information can include modem settings, node addresses, passwords, etc. Step 166 initiates and dials the modem 110, and step 168 establishes a connection with the host computer 30 providing the desired service. After connection, the electronic device 20 initiates a download of the desired information at step 170. After downloading the information, the electronic device branches to step 162 to display the information for the selected service. After displaying necessary information desired by the selected service, the program returns to step 150.

Steps 172 through 176 produce a printout of the current television image. Step 172 captures data for printing, either in text or graphics form. Step 174 initializes the printer 56 and step 176 sends the captured print data to the printer 56 for printing. The program returns to step 150 after step 176.

Fig. 5 is a top level software flow diagram illustrating a typical operation for a preferred embodiment of the present invention as implemented in the source code included in the appendix. The source code appendix includes five software modules to implement the functions of the

electronic device 20. These modules include ED.C, EDDATA.C, ED.H, ED.ASM, and DRAWSUBS.C.

The ED.C module is the main program which calls the necessary subroutines and functions to implement a particular combination of services for a user of the electronic device 20. The configuration program may be self-contained within the electronic device 20, or loaded remotely from a configuration facility, for example. The ED.C includes the C-code main definition. ED.C includes some functions not found in the other modules that are specific to text manipulation, such as for example, scrolling.

ED.H is a C-program header file which includes the global definitions, tables and equates used in other modules.

EDDATA.C are strictly menu data in ASCII format. Each menu screen includes a name, such as "MAIN MENU" for example. The ED.C program retrieves particular screens by reference to the appropriate name.

ED.ASM includes primitives for low-level operation of particular features or common tasks. For example, these primitives decode one key press from the IR receiver, send one byte to the modem, receive one byte from the modem, control the mail status light toggling, write one pixel on a screen, etc. Other features control graphics screens, the pointing device, card reader, and speakerphone for example. These may be described as generic, universal routines to perform the selected functions.

DRAWSUBS.C are higher level primitives, written in a C-language, for performing a next higher level of functional control. For example, the primitives in DRAWSUBS.C include code to use the primitives of the ED.ASM module to draw boxes or lines, or to set a mode between graphics and text, for example.

Details of Fig. 5 are found in the appropriate one of Figs. 6A through 6C. Fig. 6A includes a set of steps for initialization and active monitoring for input from a user. Step 200 includes a power on/reset initialization and self-test functions. After step 200, the device displays its main menu

at step 202. Step 204 is a main polling loop, waiting for different activities. These activities include detecting no activity (step 206), a manual reset (208), a ringing phone (step 220), a credit card swipe (step 260 in Fig. 6B) or an IR key activation (step 262 in Fig. 6B).

Detection of no activity at step 206 branches the program back to step 202. A manual reset at step 208 returns the program to step 200 for reset initialization and self-test.

A ringing phone at step 220 results in the electronic device answering the phone (step 222) and a subsequent determination of a call type at step 224. The call may be either a voice call (step 226), an incoming fax (step 228), a mail message waiting call (step 230), or a configuration call (step 232).

The voice call type results in allowing the user to normally use the telephone to conduct a voice conversation (step 234) and return to display the main menu (step 202). An incoming fax results in the electronic device logging into an appropriate facility (step 236) and receiving printing the fax document (step 238) from the facility. Subsequently, the program flow returns to display of the main menu step 202.

A message waiting causes the electronic device to log into a mail facility (step 240), receive the message (step 242), and turn on the message light (step 244). Thereafter, the system returns to step 202 to display the main menu.

The call type may be a configuration call, which causes the device to log into a configuration facility (step 246), and receive configuration information at step 248. The configuration information may be menu configuration (step 250), program configuration (252) or security configuration (step 254). After receiving the configuration information, the program returns to reset, step 200.

Fig. 6A connects to Fig. 6B at the indicated markings of A, B and C. Fig. 6B illustrates two other activities, credit card swiping in the card reader (step 260) and IR key activation (step 262). Credit card swiping results in the device reading the card information (step 264), dialing the

phone (step 266), sending the card information (step 268) and obtaining any necessary authorization (step 270). The system returns to step 202, Fig. 6A, thereafter.

Activation of an IR key performs a selected function, correlated to a function presently displayed on the television, in a menu format (step 280). Representative functions, for purposes of explanation only, include speakerphone operation (step 282), get voicemail (step 284), send a fax (step 286) or do stock quotes (step 288). Other functions, including those previously described, may be implemented in similar fashion.

Step 282 is followed by dialing the phone (302) and conducting a voice conversation (step 304) by using the microphone of the device and the television speaker. The program flow returns to step 202.

After step 282, the device dials the phone (step 296), logs into a voicemail facility (298) and activates DTMF signalling to retrieve voicemail (step 300), if necessary. The program returns to step 202 after obtaining voice messages, which may be presented on the television speaker.

To send a fax, after step 286, the devices presents a drawing screen, recording cursor movements recorded through use of the pointing device (step 290), dials the phone and sends a password (step 292), and sends the image data to a fax facility (step 294). The image is typically transmitted in PCX format.

Fig. 6C connects to Fig. 6B at points D, E, and F. If a decoded IR key activation routes the program to step 288, the device displays a sub-menu of stock quote options at step 306). These options include current prices (step 310), volume analysis (step 312), foreign trading (step 314) or other service (step 316) or an option to return to a previous menu (step 318), which in this case is step 202 displaying the main menu.

Steps 310, 312, 314 and 316 advance to step 320 which dials the phone and sends the password to the appropriate stock facility. Step 322 retrieves the appropriate data, depending upon the particular desired option, and returns to step 202 for display of the main menu.

The configuration of the preferred embodiment of the present invention does not limit itself solely to accessing and receiving requested information. The present invention is able to access remote facilities and initiate desired activities on behalf of the user using the electronic device. The present invention includes an ability to store profile information relating to the user, such as cable service provider, etc. and initiate calls, at the users behalf, to authorize the cable service provider to provide "pay-per-view" service or interactive television, for example. By using the credit card reader, or credit card information stored in the memory 102, the electronic device may quickly provide access and authorization for particular events the user desires. In this fashion, the electronic device 20 provides a simple interface to the electronic networks available to conventional computer users, without the expense and complexity of learning to operate a personal computer and associated hardware and software. The electronic device has the ability to capture displayed television images and convert them to PCX format, a widely used graphic standard. The PCX format is useful in many forms, including facsimile transmission.

In conclusion, the present invention provides a simple, efficient solution to a problem of accessing, using and paying for the many electronic facilities presently available. Complex and time-consuming acquisition and configuration, as well as training in use of the computer components becomes unnecessary with the present device. While the above is a complete description of the preferred embodiments of the invention, various alternatives, modifications, and equivalents may be used. Therefore, the above description should not be taken as limiting the scope of the invention which is defined by the appended claims.

WHAT IS CLAIMED IS:

1. An electronic device, for use with a telecommunications network and independent computer systems providing facilities to a user, wherein one facility is a configuration facility comprising:

a television;

a digital communications device for transmission and receipt of digital signals;

a remote keypad for transmitting menu selection signals; and

a controller, coupled to said television and to said digital communications device, for:

displaying a menu on said television, said menu including first and second items, each said item identifying a facility;

responding to said menu selection signals to select a particular one item from said first and second items;

operating said digital communications device to access the telecommunications network and connect to a chosen one of the independent computer systems providing said service corresponding to said particular one item selected from said menu displayed on said television;

initiating said service from said independent computer system; and

displaying information on said television responsive to said service provided by said connected independent computer system.

2. The electronic device of claim 1 further comprising:

means, coupled to said controller, for initiating a self-configuration data call to a configuration facility; and

means, coupled to said controller, for self-configuring the electronic device, including identification of particular menu items available to a user.

3. An electronic device, for use with a television, and a communication network coupled to a remote database, comprising:

means for interfacing to the television;

means for interfacing to the communications network;

a keypad remote control; and

controller means, coupled to the television interfacing means and to the telephone network interfacing means and responsive to signals from said keypad remote control, for:

displaying, on the television, a menu having a plurality of options;

selecting a particular one of said plurality of options by use of said keypad remote control;

initiating a data call over the telephone network to the remote database storing information relating to said particular one option;

accessing said remote database to retrieve said particular one option related information; and

displaying said retrieved particular one option related information on the television.

4. The electronic device of claim 3, further comprising means coupled to said controller means, for automatically initiating a particular data call.

5. The electronic device of claim 3 further comprising:

a stylus-type tracking device; and

means, coupled to said controller means, for interfacing to said stylus-type tracking device.

6. The electronic device of claim 3 wherein said stylus-type tracking device interfacing means includes means for recording a path of a cursor, controlled by said stylus-type tracking device, as a display image for said television.

7. The electronic device of claim 3 further comprising a card reader, coupled to said controller means.

8. The electronic device of claim 3 wherein said television interfacing means includes means for receiving an audio signal over the communication network and audiblizing said audio signal by a television speaker.

9. The electronic device of claim 8 further comprising a microphone, coupled to said controller means, for providing speakerphone capabilities by use of the television and said microphone.

10. The electronic device of claim 9 wherein said speaker phone capabilities are initiated responsive to selection signals from said keypad remote control.

11. The electronic device of claim 3 further comprising a video recorder, coupled to said controller, for recording images.

12. The electronic device of claim 3 further comprising means for interacting with live television programming in real-time.

13. The electronic device of claim 5 wherein said plurality of options includes a mail option, which when selected by said keypad remote control, retrieves a mail message.

14. A method for interfacing a television to an electronic facility, comprising the steps of:

self-configuring an electronic device coupled to the television and to a communications medium upon a power-up to produce a menu of a plurality of user selectable facilities;

displaying said menu on the television;

responding to a menu selection signal from a remote keypad control to identify a particular one of said plurality of user selectable facilities;

initiating a data call by the electronic device to a host computer system servicing said particular facility;

connecting the electronic device to said host computer system;

downloading data associated with said particular facility to the electronic device; and

displaying said downloaded data associated with said particular facility.

15. A speakerphone for a television, comprising:

a remote keypad including a plurality of keys and a transmitter for issuing data relating to keypress events;

a telephone signal receiver for receiving an incoming telephone call;

a microphone;

an audio converter circuit, coupled to the television, for converting incoming telephone audio signals into television audio signals;

a remote receiver for receiving said data relating to keypress events and converting them into control signals; and

a speakerphone controller,,coupled to said telephone receiver, said audio converter circuit and said remote receiver, for controlling telephone operation responsive to said control signals, with a speaker of the television producing audio signals of an incoming telephone call and said microphone providing input for the speakerphone.

16. The speakerphone of claim 15 wherein said speakerphone controller includes a dialing mechanism, responsive to said control signals, for placing a phone call.

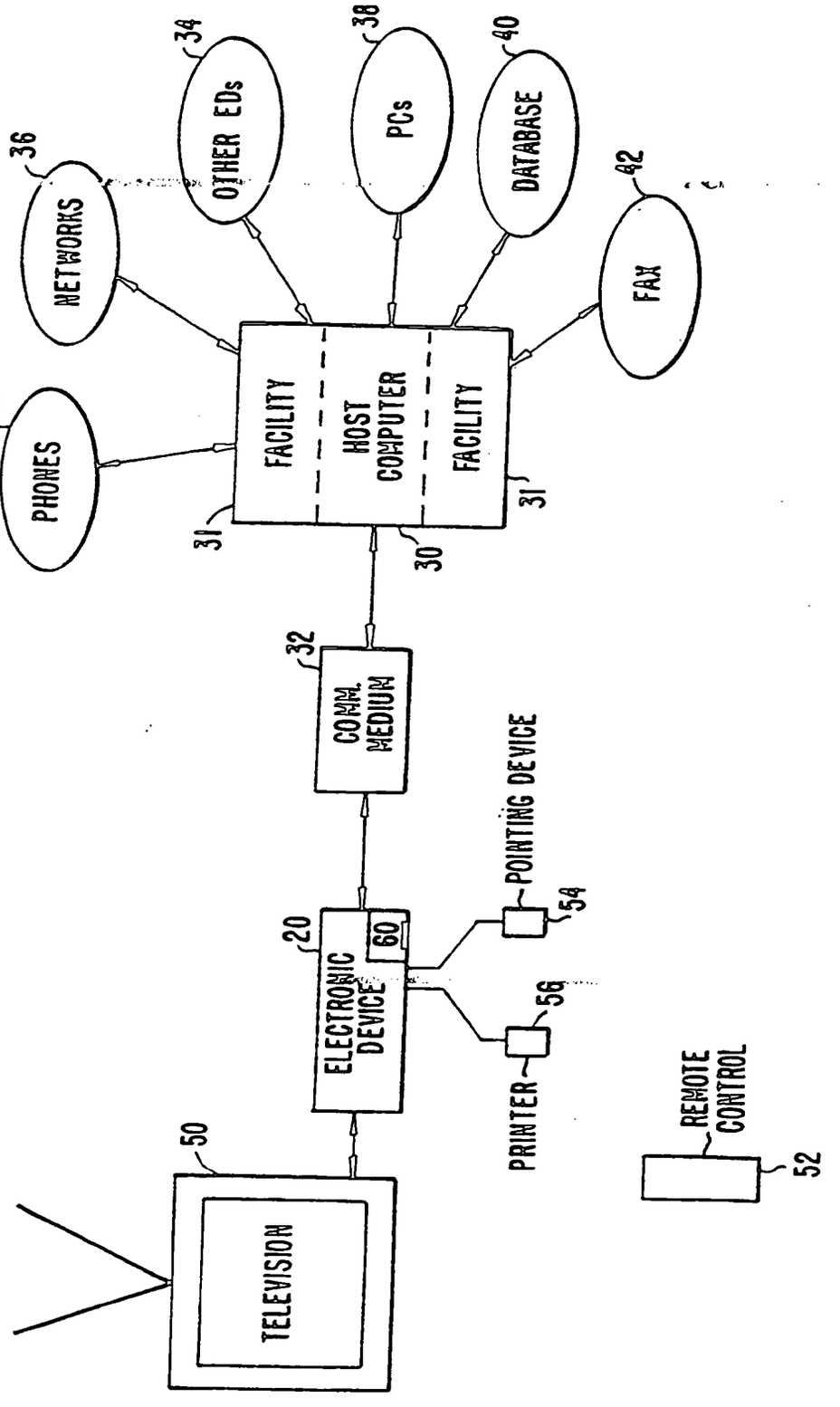

FIG. 1.

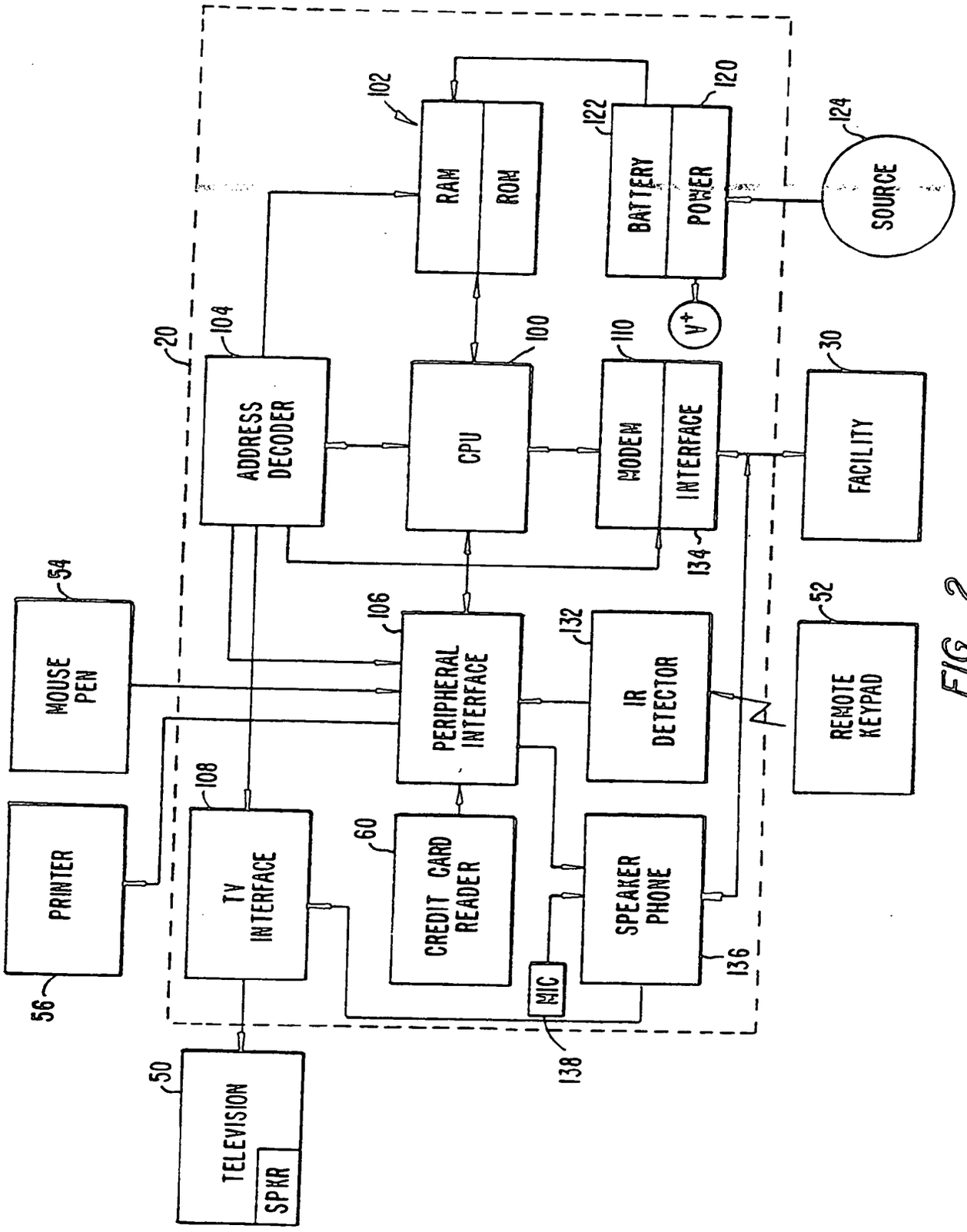

FIG. 2.

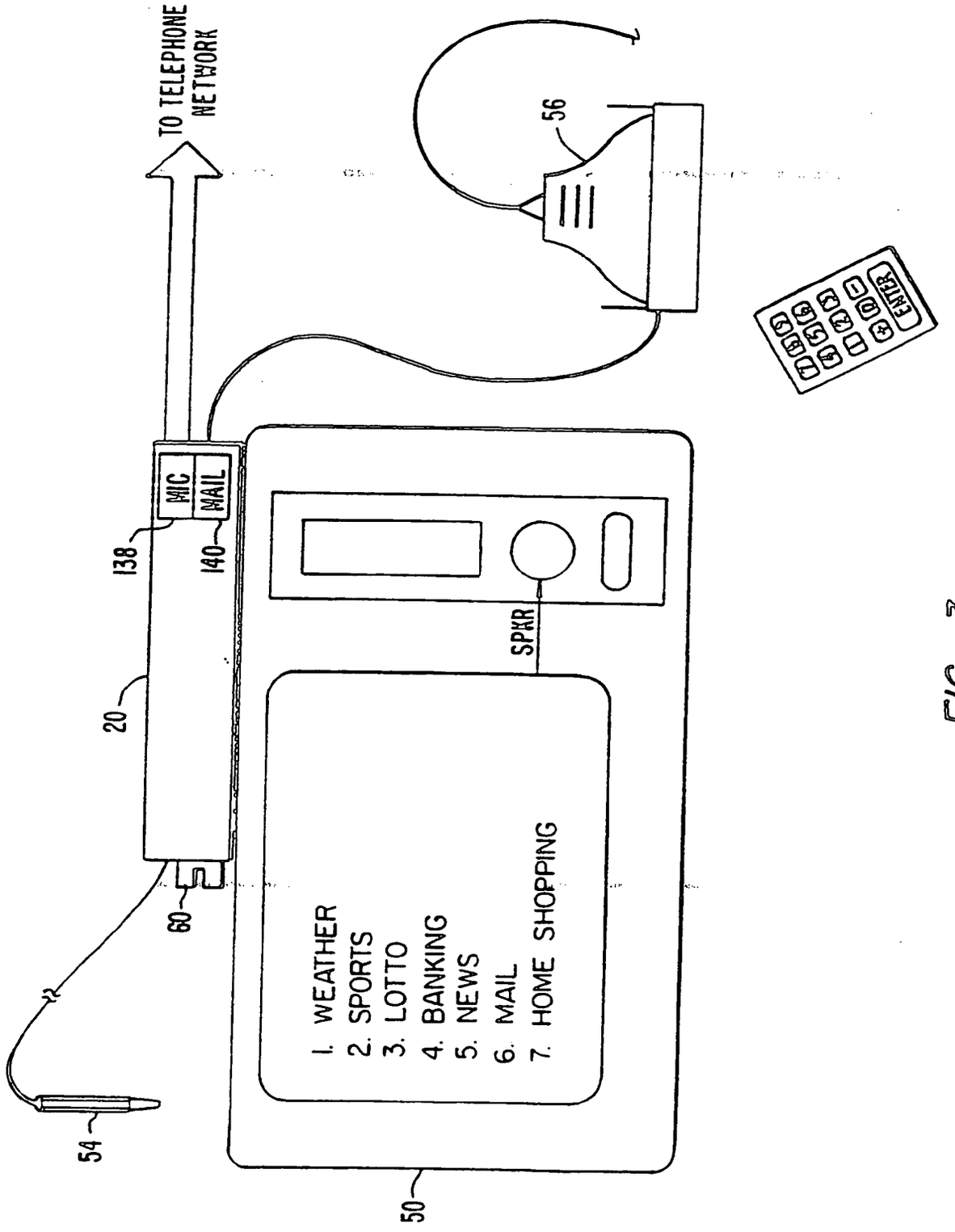

FIG. 3.

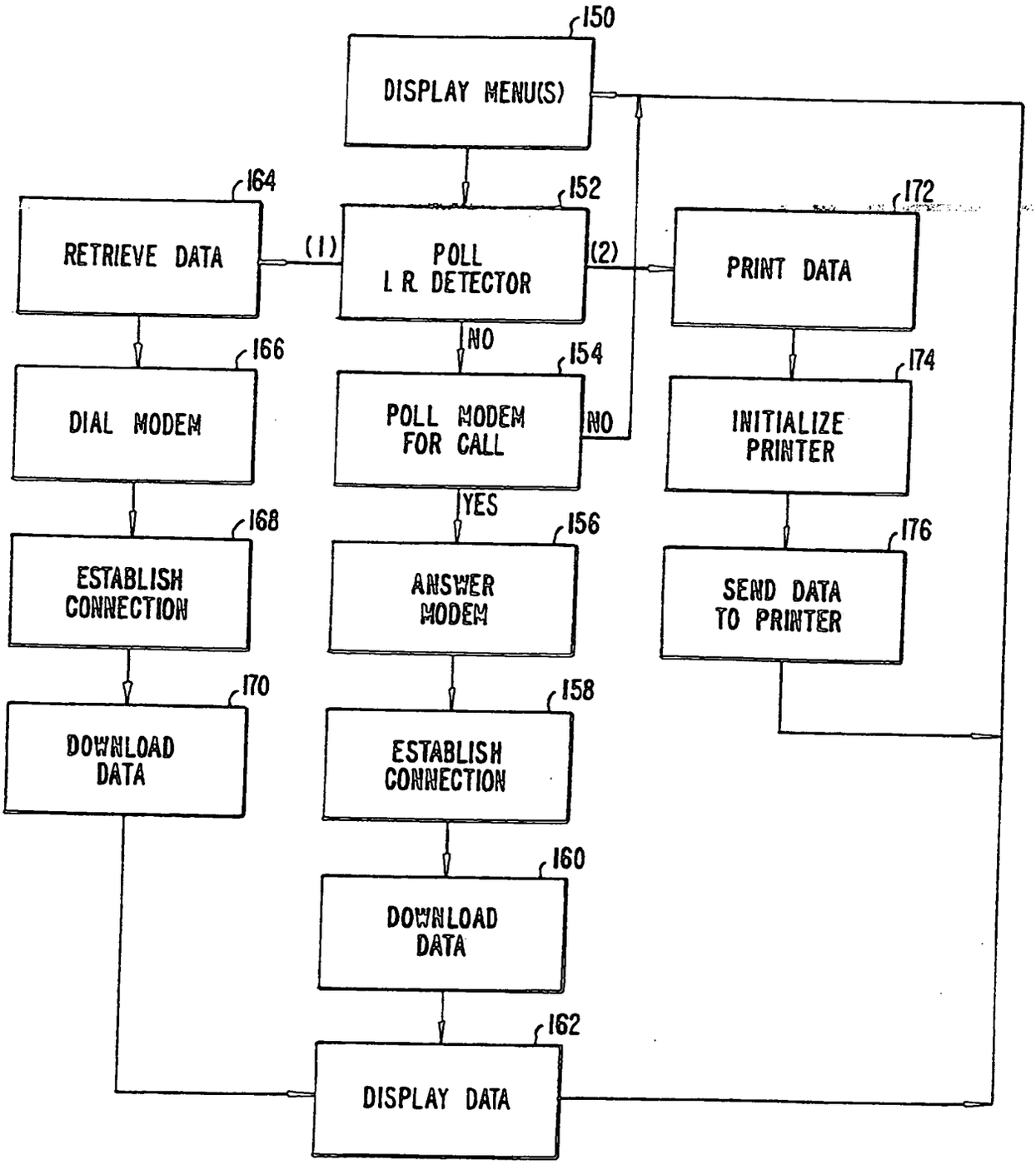

FIG. 4.

FIG. 6C.	FIG. 6B.	FIG. 6A.

FIG. 5.

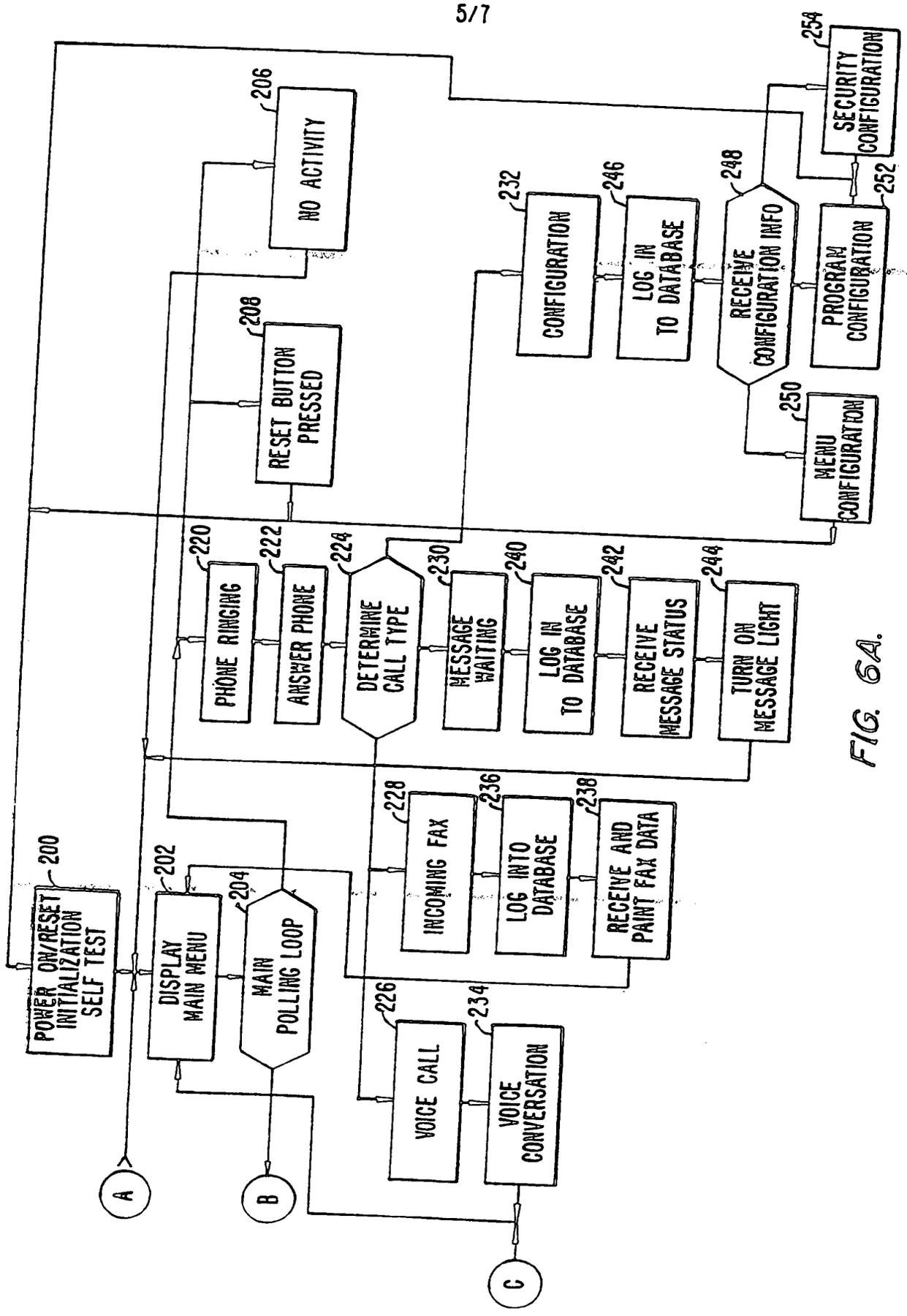

FIG. 6A.

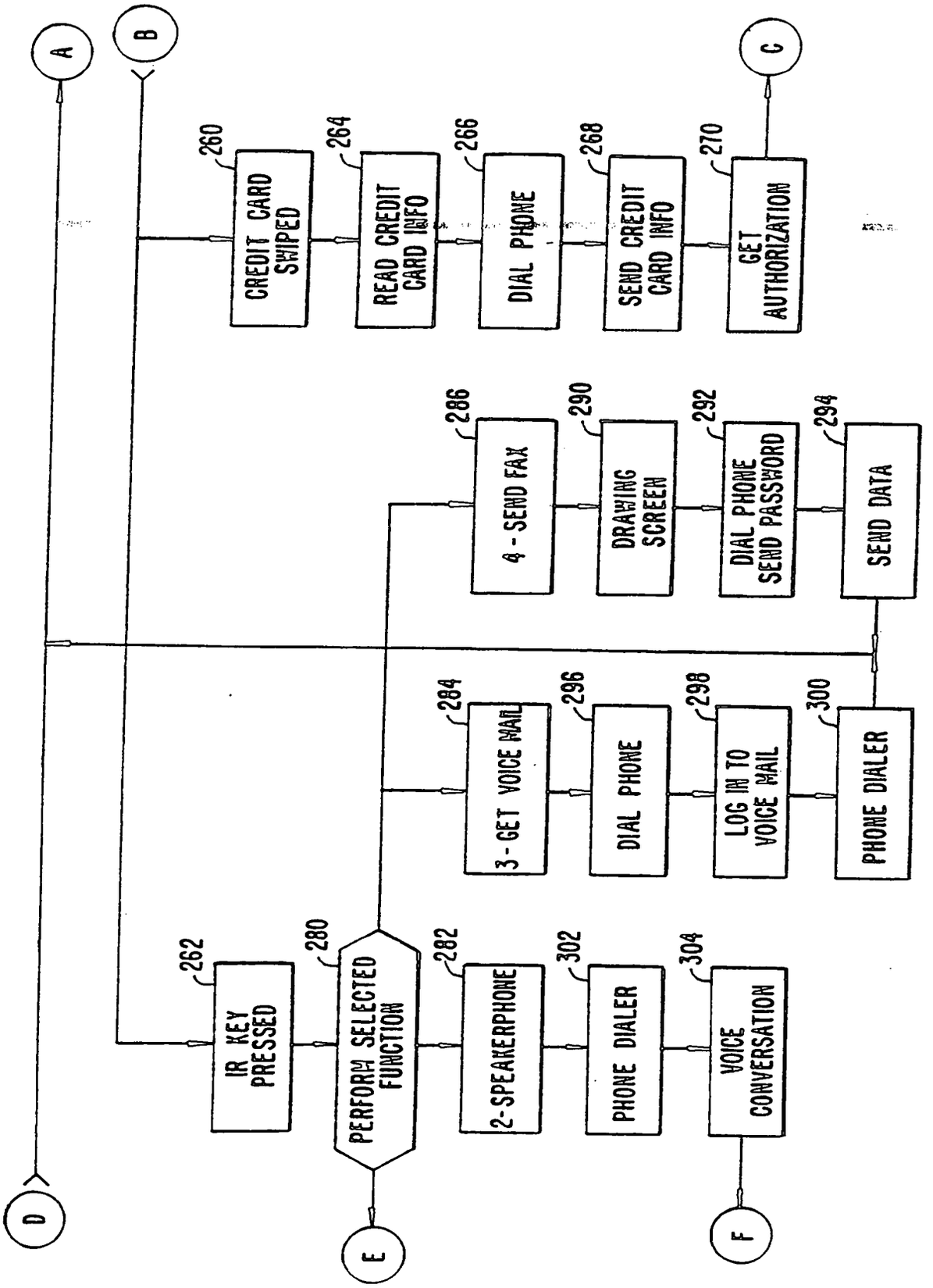
A
B
C
D
E
F
260
CREDIT CARD SWIPED
264
READ CREDIT CARD INFO
266
DIAL PHONE
268
SEND CREDIT CARD INFO
270
GET AUTHORIZATION
286
4 - SEND FAX
290
DRAWING SCREEN
292
DIAL PHONE SEND PASSWORD
294
SEND DATA
284
3 - GET VOICE MAIL
296
DIAL PHONE
298
LOG IN TO VOICE MAIL
300
PHONE DIALER
262
IR KEY PRESSED
280
PERFORM SELECTED FUNCTION
282
2 - SPEAKERPHONE
302
PHONE DIALER
304
VOICE CONVERSATION

FIG. 6B.

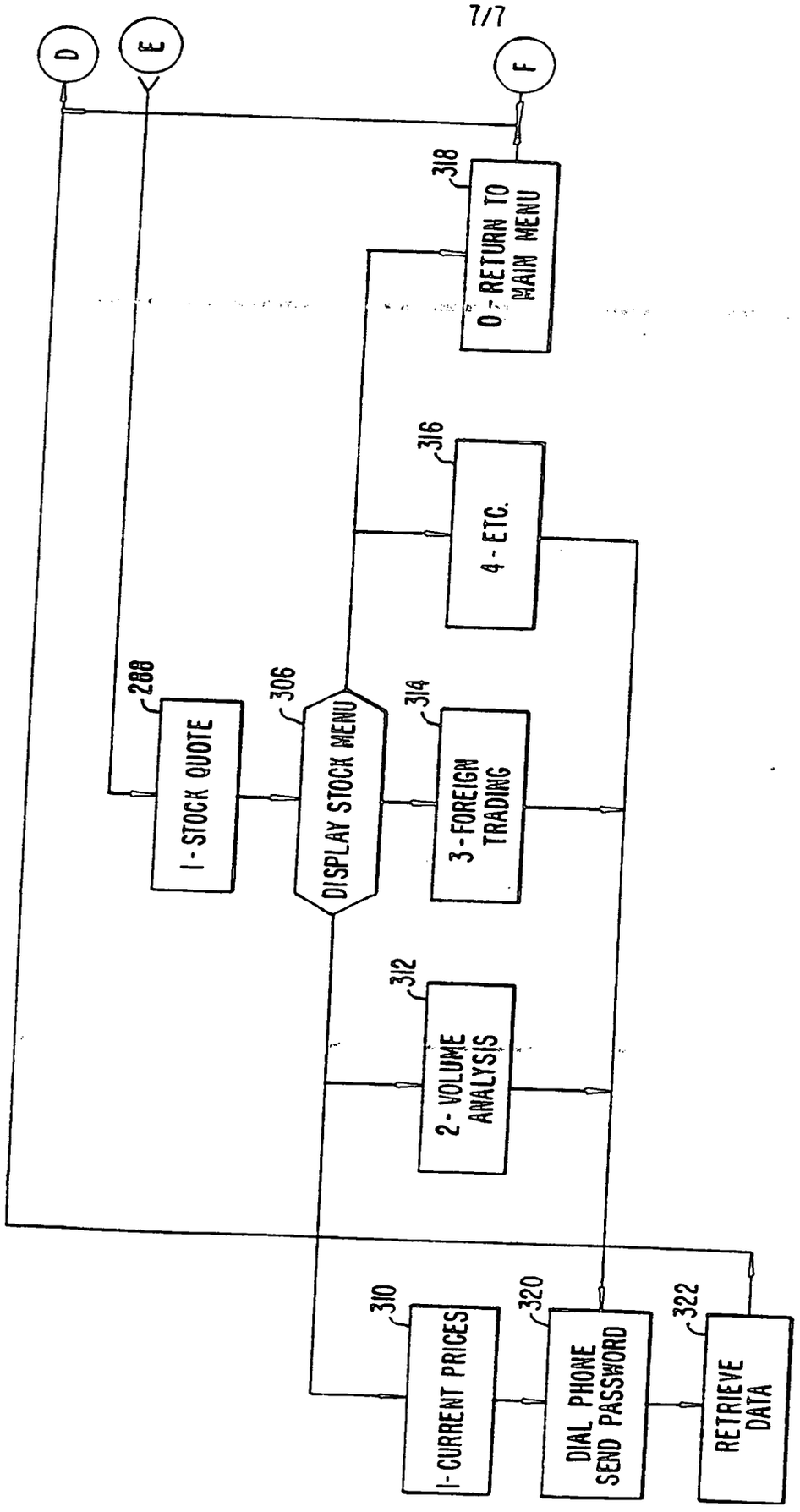

FIG. 6C.

INTERNATIONAL SEARCH REPORT

PCT/US92/03316

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :H04N 7/12

US CL :358/135

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)

U.S. : 379/105,96-98,93,90,110,53,54;178/18,19;358/84,86,141-147

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 practicable, search terms used)

none

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US,A, 4,456,925 (Skerlos et al) 26 June 1984, lee abstract, ass Figures.	15,16 8-10
X Y	US,A, 4,987,486 (Johnson et al) 22 January 1991, see abstract.	1-4,14 5,6-13
Y	US,A, 4,329,684 (Monteath et al.) 11 May 1982 See abstract.	5,6
Y	US,A, 4,695,880 (Johnson et al) 22 September 1987, see abstract.	13
Y	US,A, 4,916,737 (Chomet et al) 10 April 1990, see abstract, Figure 2.	7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Form PCT/ISA/210 (second sheet)(July 1992)*

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 5/225, A63F 9/24 — A1

(11) International Publication Number: WO 97/02699

(43) International Publication Date: 23 January 1997 (23.01.97)

(21) International Application Number: PCT/US96/11122

(22) International Filing Date: 28 June 1996 (28.06.96)

(30) Priority Data:
08/498,009 30 June 1995 (30.06.95) US
08/585,145 10 January 1996 (10.01.96) US

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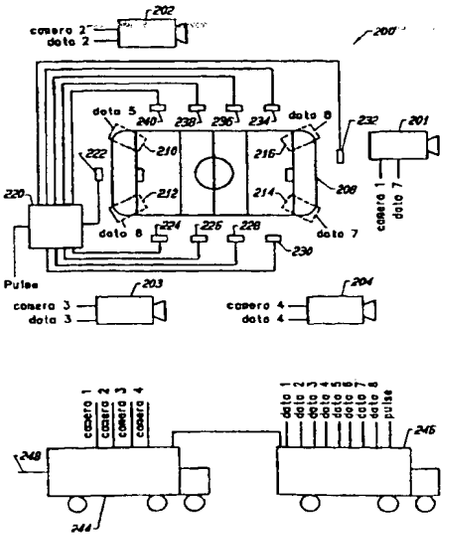
(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
With amended claims.

(54) Title: A SYSTEM FOR ENHANCING THE TELEVISION PRESENTATION OF AN OBJECT AT A SPORTING EVENT

(57) Abstract

A system (200) for enhancing the television presentation of an object at a sporting event includes a sensor (210, 212, 214, 216), which determines the location of the object. Based on the location of the object and the field of view of a broadcast camera (201, 202, 203, 204), a processor (302) determines the position of the object in the video frame of the broadcast camera. Once knowing where the object is positioned within the video frame, the television signal can be edited or augmented to enhance the presentation of the object.



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!SDOCID <WO 9702699A1_I_>

A SYSTEM FOR ENHANCING THE TELEVISION PRESENTATION OF AN OBJECT AT A SPORTING EVENT

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention is directed to a system for enhancing the television presentation of an object at a sporting event.

Description of the Related Art

The television presentation of sporting events needs to be improved. Because of the size and speed of some objects and the distance of the television camera from the playing field, some objects at a sporting event are hard to see on a television screen. One example of an object at a sporting event is the game object, which is defined as the article or thing which is the focus of the game, for example, a hockey puck, baseball, football, soccer ball, shotput, basketball, tennis ball, etc. To compensate for objects that are hard to see on television, broadcasters will use zoom lenses. However, the limited field of view of a zoomed camera prevents the object from being viewed in relation to the playing field and prevents the viewer from seeing other objects that are part of the sporting event. Additionally, even with zoom lenses some objects remain difficult to see on television.

For example, television viewing of a hockey game is hampered by poor visibility and distortion of the hockey puck. The puck is small, and is passed, shot and deflected at high speeds. A standard hockey puck is three inches in diameter and one inch high. A television viewer sees only a limited portion of the ice and the scene being viewed changes rapidly as the camera moves to follow the action. In order to be able to view all areas of the hockey rink, cameras must be located far from the playing surface. Thus, on

a standard television screen a hockey puck tends to appear as a small dot or a smear, and sometimes the puck is not perceptible by a viewer. As a result, it is difficult to follow the puck from player to player, and it is especially difficult to follow the puck as it is shot toward the goal. For most viewers, recognizing that a goal has been scored probably comes after the fact when a signal light is turned on or the announcer informs the viewer that a goal has been scored. Because viewers cannot follow the puck, they do not sustain interest in the game. Although hockey is a popular sport, telecasts of hockey games would have wider appeal and be more fully enjoyed if the movement of the puck could be more closely followed.

In golf and baseball it is hard to see the ball when the ball is hit in the air for a long distance (e.g. a home run in baseball or a tee shot in golf). To compensate, cameras will zoom in on the baseball or golf ball which allows the viewers to see the ball against the sky. Such a view of the ball does not give the viewer a true perspective of the ball's path. That is, the viewer cannot determine how far the ball was hit or where the ball is in the relation to the playing field. At times a viewer of a baseball game cannot distinguish between a home run and a routine fly ball. One way to show a baseball or a golf ball in relation to the playing field is to zoom out and show the entire baseball field or golf course. However, such a zoom-out will make the ball difficult or impossible to see. Other sporting events present similar visibility problems.

Furthermore, television viewers do not have access to the same information that is available to spectators at the event (e.g. game programs, messages on the scoreboard, etc.). Thus, broadcasters may be able to sustain greater viewer interested by presenting the viewers with additional desired information and provide for the use of that information in an exciting way.

Thus, there is a need for enhancing the television presentation of objects at sporting events. However, any solution to the problem should not significantly effect the players or fans who attend the sporting event.

SUMMARY OF THE INVENTION

The present invention is directed to overcome the disadvantages of the prior art. Thus, the present invention provides for a system for enhancing the television presentation of an object at a sporting event. The system, roughly described, determines an object's location, captures a video image which includes a field of view encompassing the location of the object, determines the position of the object in the field of view of the broadcast camera capturing the video image and enhances the television presentation of the object.

One embodiment includes one or more sensors and at least one processor. The sensors are used to detect the object. Many different types of sensors can be used; therefore, the invention is not limited to any particular sensor. One exemplar sensor is an infrared sensor which detects infrared signals from an object. One infrared sensor can be used to determine the object's position in a video image from the broadcast camera. Two or more infrared sensors can be used to determine the three dimensional location of the object. The processor communicates with the sensors and is programmed to determine the object's position in the video image from the broadcast camera. If the sensor or the broadcast camera can be moved, the system includes one or more field of view sensors which provide the processor with information about the broadcast camera's (and the sensor's) field of view. A field of view sensor can include one or more of the following: a pan sensor, tilt sensor, zoom sensor, beacon or anything else used to determine the field of view of a camera or sensor. If the processor knows the three dimensional location of

the object, the processor can determine the position of the object in a video frame of any broadcast camera whose field of view is known.

Various means can be used to enhance the television presentation. For example, the system can add a graphic to the video image at the position of the object in the video frame, a graphic near the position of the object in the video frame, a graphic in a location logically related to the position of the object in the video frame, statistical information or announcements related to the object's location, audio data or non-video data. In one alternative, the processor manipulates the video image. In another alternative, the processor creates a second video image and combines the video image created by the processor and the video image from the broadcast camera. Other suitable methods of manipulating television data are also within the spirit of the present invention.

These and other objects and advantages of the invention will appear more clearly from the following description in which the preferred embodiment of the invention has been set forth in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts a perspective view of a hockey puck according to the present invention.

Figure 2 depicts a cut-away plan view of the hockey puck of Figure 1.

Figure 3 depicts a cross-sectional view of the hockey puck of Figure 1.

Figure 4 shows a first embodiment electronics package for the infrared transmitter of a hockey puck.

Figure 5 depicts one exemplar shock sensor.

Figure 6 shows a second embodiment electronics package for the hockey puck of Figure 1.

Figure 7 is a block diagram of a system used for enhancing the television presentation of the hockey puck of Figure 1.

Figure 8 is a block diagram of a camera location for the system of Figure 7.

Figure 9 is a block diagram of the front end processor electronics of Figure 8.

Figure 10 is a flow chart describing some of the operations in the camera location and related hardware.

Figure 11 is a graphical representation of data from the infrared sensors.

Figure 12 is a block diagram of the pulse detection and strobe detection system.

Figure 13 is a block diagram of a pulse detector.

Figure 14 is a block diagram of the synchronizer box of Figure 12.

Figure 15 is a partial block diagram of the graphics center and production center.

Figure 16 is a flow chart describing some of the operation of the graphics center and production center.

Figures 17A and B are flow charts describing two exemplar methods for determining the puck's three dimensional location.

Figure 18 is a flow chart describing the determination of the puck's position in a video frame and one alternative for enhancing the television presentation of the hockey puck.

Figure 19 shows the hockey puck in a video frame at four moments in time.

Figure 20 is a flow chart of the operation of the graphics center and production center when data is missing.

Figure 21 is a block diagram of a remote system for interacting with a broadcast of a sporting event.

Figure 22 is an elevational cut-away view of a second embodiment hockey puck with an active radar transponder.

Figure 23 is a cross-sectional view of the hockey puck of Figure 22.

Figure 24 is a block diagram of the electronics of the in the hockey puck of Figure 22.

Figures 25-27 describe a waveform used in conjunction with the hockey puck of Figure 22.

Figure 28 is a block diagram of an exemplar radar base unit which can be used in conjunction with the hockey puck of Figure 22.

Figure 29 depicts an exemplar waveform for a RF transmitting object.

Figure 30 depicts a football used in a radar system.

Figure 31 is a cross-sectional view of a golf ball used in a radar system.

Figure 32 is a cut-away view of a tennis ball used in a radar system.

DETAILED DESCRIPTION

The present invention can be used with most video cameras known in the art. For example purposes only, the description below references a conventional broadcast television camera known in the art ("broadcast camera"). A broadcast camera captures video images in frames ("video frames"). In the United States, data is transmitted and presented on a standard television at a rate of thirty frames (60 fields) per second.

I. Infrared System

A. Infrared Transmitting Puck

Conventional hockey pucks are black, cylindrically shaped, 1" thick with a 3" inch diameter, 5 ½ - 6 ounces and made of vulcanized rubber. The preferred embodiment of the hockey puck according to the present invention is shown in Figure 1 and designated generally by the reference numeral 10.

Hockey puck 10 is made in accord with conventional specifications and further includes an electromagnetic transmitter. In one embodiment, the electromagnetic transmitter includes infrared emitting diodes. Preferably (although not required), the tip of the diode is sliced off so that the diode can be flush up against the surface of the puck and the angular width of the infrared (IR) beam will be increased. As will be discussed below, alternatives to infrared emitters includes RF transmitters, radar repeaters and other devices which emit electromagnetic waves outside the visible light spectrum.

Electromagnetic waves include light, radio, X-rays, gamma rays, microwave, infrared, ultraviolet and others, all involving the propagation of electric and magnetic fields through space. The difference between the various types of electromagnetic waves are in their frequency or wavelength. The human eye is sensitive to electromagnetic radiation of wavelengths from approximately 400 to 700 nm, the range called light, visible light or the visible spectrum. Thus, the phrase "electromagnetic signal not visible to a human eye" means an electromagnetic signal outside of the visible spectrum. It is important that the signal transmitted by the hockey puck is not visible to the human eye so that the visual appearance of the puck will not be altered.

Puck 10 is comprised of a rubber body member 11 having a flat top surface 12, a flat bottom surface 14 (shown in Figure 3) and a side surface or outer circumference 16. At the top surface are shown four infrared emitting diodes 20, 22, 24 and 26, which are fitted in bores in the puck. The bottom surface also has four infrared emitting diodes. Because of the point of view, Figure 1 only shows four infrared emitting diodes 28, 30, 32 and 34 along outer circumference 16. The preferred hockey puck includes twelve infrared emitting diodes along outer circumference 16, spaced apart at 30° intervals. By the phrase "along an outer circumference" it is meant that the diodes are generally spaced at or near the outer circumference. For example, the diodes can be recessed (e.g. 1/16") from the circumference and still be "along the

outer circumference." If the diodes are recessed from the circumference, then there may be an indent in the surface of the puck in front of the diode. As an option, the indent could be filled with an infrared transparent epoxy or other filling material which would not change the elasticity or color of the puck. Alternatively, a lens could be placed in front of the diode.

Figure 2 shows a cutaway plan view of puck 10. All twelve diodes (28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50) along outer circumference 16 can be seen. Each diode is housed in a bore approximately the size of the diode. Inside of the puck is a recess 60 which receives printed circuit board 62. Mounted on printed circuit board 62 are electronics and a battery 64. Wires 28w, 30w, 32w, 34w, 36w, 38w, 40w, 42w, 44w, 46w, 48w and 50w run from printed circuit board 62 to the diodes. Battery 64 can be more than one battery vertically stacked in the center of printed circuit board 62. The battery is a lithium battery which handles cold temperatures well and has high current capability. It is important that the electronics operate sufficiently under cold temperatures because hockey pucks are traditionally frozen prior to use during a hockey game. High current capability is also important so that the infrared emitting diodes can be driven with the high current to maximize the intensity of the infrared signal. Battery 64, printed circuit board 62 and the infrared emitting diodes are held in place using a flexible epoxy, for example, DP190 by 3M. Additionally, any gaps in recess 60 not occupied by the electronics could be filled with epoxy to help secure the electronics and to maintain the pucks hardness and elasticity.

Figure 3 is a side cut-away view of hockey puck 10 showing the bottom surface 14, diodes 52 and 54 on the bottom surface and the wires (20w, 22w, 52w and 54w). As discussed above, there are four diodes along the flat lower surface of the preferred embodiment hockey puck 10. It is clear from Figures 2 and 3 that the components of the electromagnetic transmitter are completely disposed inside rubber body member 11. Being "completely

disposed inside the rubber body member" means that the electromagnetic transmitter does not protrude outside the puck's perimeter, this includes abutting or being flush with the perimeter of rubber body member 11.

Figure 4 is a schematic diagram of one alternative electronics package for hockey puck 10. The infrared emitting diodes 20-58 are shown as five strings of diodes (S1 - S5). Each string includes four diodes connected in series. The five strings are connected to each other in parallel. Thus, if one diode fails, all of the diodes on the particular string will turn off; however, the other four strings of diodes will remain functional. In accord with this arrangement, the diodes from the various strings are interleaved throughout the puck. That is, the diodes of one string are not located next to each other. Rather, the diodes are mixed. Looking at Figure 2, each diode is located next to a diode from another string. For example, diode 30 (which is on string S1) is between diode 28 (which is on string S5) and diode 32 (which is on string S2). This arrangement prevents the situation where one diode breaks and the entire side of the puck stops transmitting.

Timing and control circuit 100, which includes an edge trigger and a timer, produces an output interval of a width determined by resistor 108 and capacitor 110. Timing and control circuit 100 is a Motorola MC 4538 which is a dual precision re-triggerable/re-setable monostable multi-vibrator which may be triggered from either edge of an input pulse and produce an accurate output interval over a wide range of widths. In the circuit of Figure 4, battery 63 is made up of two 3 volt batteries in series.

The Q output of timing and control 100 is connected to the gate of FET 102. The source of FET 102 is connected to ground and the drain of FET 102 is connected to the base of transistor 106 across resistor 104. The emitter of transistor 106 is connected to battery 63 and to the RC PIN of timing and control 100 across resistor 108. The RC input of control 100 is connected to capacitor 110 which is connected to the C input of timing and

control circuit 100 and to ground. The A pin of timing and control circuit 100 is grounded, and the B pin is connected to a shock sensor and to resistor 112. The clear pin of timing and control circuit 100 and resistor 112 are both connected to battery 63.

Shock sensor 114 is used to turn on the circuit when it senses a shock. Figure 5 is an example of a shock sensor. Shock sensor 114 includes a wire 122 suspended inside a brass or copper tube 120. Wire 122 is attached to cap 128 with epoxy or other insulating material 129 which acts to suspend the wire inside tube 120 in a cantilevered fashion and insulates the wire. Tube 120 is mounted on board 62 and connected to the B pin of timing and control circuit 100. When shock sensor 114 is shocked (e.g. puck is jolted or hit) wire 122 bends and touches tube 120 which, for a brief moment, completes the circuit. Timing and control circuit 100 includes an edge detector which senses an edge (the circuit being closed) and turns on the puck.

Figure 6 is a schematic of a preferred electronics package for puck 10. Diode bank 150 is the same five strings of infrared emitting diodes depicted in Figure 4. Although the electronics package uses twenty diodes, it is possible that the puck can be constructed and will function with more or fewer than twenty diodes. One diode by itself will produce a signal that can be detected; however, it is advantageous to have more than one diode so that the angle of the puck and location of the puck in regard to other objects will not significantly affect reception of the signal transmitted from the puck. Additional diodes also maximizes the output of the transmitters. The preferred embodiment diode is a GaAlAs infrared emitter SFH485-2, manufactured by Siemens. The SFH485-2 is an infrared emitting diode and emits radiation in the near infrared range (880 nm peak). Other infrared emitting diodes that can be used including an infrared laser diode or any other source which transmits an infrared signal. The infrared emitting diodes are used in the disclosed embodiment to emit an electromagnetic wave with a

wavelength at or near 880 nm. Unlike the circuit of Figure 4, the circuit of Figure 6 does not continuously transmit infrared energy. Rather, the diodes are pulsed. The advantage of pulsing the diodes is to extend battery life, to increase the infrared signal (e.g. run at one amp instead of one hundred milli-amps during the pulse), to improve the signal to clutter ratio by matching the sensor shuttering to the diodes pulse and to allow for subtraction which is discussed below.

Battery 64 is made up of four 3 volt lithium batteries stacked near the center of PC board 62. Figure 6 shows timing and control circuits 154 and 172 which are the same multi-vibrator as timing and control circuit 100 in Figure 4. Timing and control circuit 154 is used to detect a pulse from the shock sensor 114, turn on the pulsing of the diodes and automatically turn off the pulsing of the diodes after a predetermined period of time before all available power has dissipated. That is, the pulsing of the diodes turns off after a preset period of time rather than waiting for the battery to dissipate. Preferably, the diodes are turned off after 45 seconds. This prolongs the life of the battery, allows testing and prevents pucks not in use from transmitting. Connected to the RC input of timing and control circuit 154 is resistor 158 and capacitor 160, both used for timing purposes. The $\bar{Q}$ output of timing and control circuit 154 is connected, across resistor 16, to the base of transistor 166. The A input of timing and control circuit 154 is connected to ground. The B input is connected to shock sensor 114 and to the bottom of resistor 162. The clear pin of timing and control circuit 154 is connected to the top of the resistor 162, battery 64, the top of resistor 158, capacitor 156 and the emitter of transistor 166. Capacitor 156 is also connected to ground.

The clear pin to timer control circuit 172 is connected to the emitter of transistor 166 and the top of resistor 168. The RC input of a timer control 162 is connected to the bottom of resistor of 168 and to capacitor 170. The

C input of timing and control 172 is connected to capacitor 170, the A input, and ground. The Q output of timing and control circuit 172 is connected to FET 174. The B input of timing and control circuit 172 is connected to the Q9 output of Divide by 10 circuit 180 (divides frequency by ten). The clock input to Divide by 10 circuit 180 is connected to the Q12 output of Divide by 16 circuit 182 (divides frequency by 16). The enable and reset pins of Divide by 10 circuit 180 are grounded. The reset pin of Divide by 16 circuit 182 is connected to capacitor 190, capacitor 186 and ground. The $\overline{COUT}$ pin of Divide by 16 circuit 182 is connected to the bottom of resistor 188, capacitor 186 and to resonator 184. Resonator 184 is a CSB1228J ceramic resonator by Murata. Resonator 184 can be mounted on printed circuit board 62 or suspended, inside the puck, within an epoxy or other material to prevent damage to the resonator from shock. The CIN pin of Divide by 16 circuit 182 is connected to resonator 184, the top of the resistor of 188 and to capacitor 190.

FET 174 is connected to infrared emitting diodes 50, 52, 54, 56 and 58. The circuit will produce five amps of current to pass through diode bank 150. Because the diodes are divided into five strings which are connected in parallel, each string receives approximately one amp. Because each string includes four diodes connected in series, each diode will receive approximately one amp of current. The collector of transistor 166 is connected to the top of resistor 176, capacitor 178, diode 20, diode 22, diode 24, diode 26 and diode 28. Capacitor 178 and the bottom of resistor 176 are connected to ground.

The circuit of Figure 6 provides for pulses of nominally 140 μsec at a nominal rate of 29.97 Hz. Those skilled in the art can modify the circuit to change the duration or frequency of the pulses. The pulses begin when the shock sensor is shocked. The pulses end 45 seconds after the last shock. If

the shock sensor receives a shock while the puck is pulsing, the 45 second clock is reset. A shock sensor is only one of many alternatives to insure that the puck is on during play. It is anticipated that the shock to the puck when the referee drops the puck for a face off, a players hits the puck with a stick or the puck hits the boards will provide the shock necessary to trigger the circuit. While in play the puck should be hit by a player's stick or the boards at least once every 45 seconds. During the course of a game pucks are hit out of play. That is, a shot by a player goes over the boards and into the seating area. At that point it is desirable that the puck turn off. Thus, the timer is used to turn the puck off 45 seconds after the last shock. This prevents the arena from being filled with pucks continuously on.

There are at least four approaches to manufacturing a puck in accordance with the present invention. First, the electronics can be supported in an injection mold and vulcanized rubber can be injected around it. Second, the device can be in a pre-loaded package that is molded into a puck. Third, pucks can be molded into two halves with a recess in each half so that the electronics can be fitted in the combined recess when the two halves are assembled together. Fourth, existing conventional pucks could be machined into separate pieces and reassembled with the electronics package (retrofitting). In one embodiment of the fourth approach, half of two pucks would be sliced away. A recess would be carved into the remaining two halves as well as bores for each of the diodes. There is also a need to carve a very thin passage to house the leads from the electronics to the diodes. The inventors envision various other manufacturing options that are compatible with the present invention.

B. System Overview

Puck 10 is used with a system that includes one or more sensors which can be used to detect the location of the puck in three dimensional

space and/or the position of the puck in a video frame. An infrared sensor can determine the angle or direction of the puck from the sensor using techniques known in the art. Two or more infrared sensors can be used to determine the three dimensional location of the puck. The three dimensional location of the puck can be used, in conjunction with the broadcast camera's location and orientation to locate the puck in the video frame and enhance the television presentation of the puck.

Figure 7 depicts system 200, which is one embodiment of a system that can be used to enhance the television presentation of puck 10 with the electronics package depicted in Figure 6. System 200 includes four camera locations 201, 202, 203 and 204. It is possible for system 200 to function with only one camera location; however, to provide a viewer with multiple angles of view it is desired to have up to four or more camera locations. The various camera locations can be located anywhere in the arena suitable for capturing video images of puck 10 in hockey rink 208. Each camera location includes a broadcast camera and communicates with graphics center 246. As shown, signal data 1 transmits data between camera location 201 and graphics center 246, signal data 2 transmits data between camera location 202 and graphics center 246, signal data 3 transmits data between camera location 203 and graphics center 246 and signal data four transmits data between camera location 204 and graphics center 246. In one embodiment, graphics center 246 includes computers and video equipment housed in a truck.

The camera locations also communicate with a television production center 244. The signal camera 1 indicates communication between camera location 201 and production center 244, camera 2 indicates communication between camera location 202 and production center 244, camera 3 indicates communication between camera location 203 and production center 244, and signal camera 4 indicates communication between camera location 204 and production center 244. In one embodiment, the television production center

is a truck including various video and audio equipment. Both the graphics center 246 and the video production center 244 can exist in various forms and can be located in various locations that can maintain the communications with the camera locations and sensors as described below.

System 200 includes one or more infrared sensors. To ease setup, wiring and maintenance, as well as increase the chance that the puck will be in the field of view of an infrared sensor, one or more infrared sensors are located at the camera location. However, locating infrared sensors at the camera locations is optional. The sensors at the camera location communicate with graphics center 246 via data 1, data 2, data 3 and data 4. System 200 also includes additional sensor locations, 210, 212, 214 and 216, which are not located at the camera locations. The signal data 5 indicates communication between infrared sensor location 210 and graphics center 246. The signal data 6 indicates communication between infrared sensor location 212 and graphics center 246. The signal data 7 indicates communication between infrared sensor location 214 and graphics center 246. The signal data 8 indicates communication between infrared sensor location 216 and graphics center 246.

System 200 also includes collector box 220 which is connected to pulse detectors 222, 224, 226, 228, 230, 232, 234, 236, 238 and 240. The pulse detectors detect when puck 10 is pulsing on and transmit signals to the infrared sensors in order to open the shutter of the infrared sensors in synchronization with the puck's pulses. A system that uses a puck which continuously transmits an infrared signal would not need pulse detectors. The pulse detectors shown in Figure 7 are located at the top of the glass which surrounds the ice. Additional pulse detectors (optional) are mounted from the ceiling or other suitable locations in the arena. The components shown in Figure 7 will be discussed in more detail below.

C. Camera Location

Figure 8 shows one embodiment of the camera location. Broadcast camera 280 captures a video frame which is sent to a production center 244 as shown by the signal camera 1. Broadcast camera 280 has a zoom lens including a 2X expander. Connected to broadcast camera 280 is a 2X expander/zoom/focus sensor 282 (collectively a "zoom sensor") which senses the zoom of the camera, the focal length of the camera, and whether the 2X expander is being used. The analog output of sensor 282 is sent to an analog to digital converter 284, which converts the analog signal to a digital signal and transmits the digital signal to processor 302. Broadcast camera 280 is mounted on tripod 287 which enables broadcast camera 280 to tilt and pan. Attached to tripod 287 are pan sensor 288 and tilt sensor 290, both of which are connected to pan-tilt electronics 292.

Remote processor unit 286 is a rack mounted system including analog to digital converter 284, pan-tilt electronics 292, processor 302 and front end processor electronics 300. Processor 302 is an Intel 486 microprocessor with supporting electronics; however, various other processors can be substituted. Processor 302 includes memory and disks to store data and the software described below. In addition to being connected to the other boards in front end processor 286, processor 302 is in communication with graphics center 246, as indicated by signal 306. In one embodiment, pan sensor 288 and tilt sensor 290 are optical encoders that output a signal, measured as a number of clicks, indicating the rotation of a shaft. Forty thousand clicks represent a full 360 degree rotation. Thus, a computer can divide the number of measured clicks by forty thousand and multiply by 360 to determine the pan or tilt angle. The pan and tile sensors use standard technology known in the art and can be replaced by other suitable pan and tilt sensors known by those skilled in the relevant art. Pan-tilt electronics 292 receives the output of pan sensor 288 and tilt sensor 290, converts the outputs to a digital signal,

representing pan and tilt, and transmits the digital signal to processor 302. The pan, tilt and zoom sensors are used to determine the field of view of the broadcast camera and, in some cases, the field of view of an infrared sensor. Thus, one or more of the pan, tilt or zoom sensors can also be labelled as a field of view sensor. For example, if the camera cannot zoom or tilt, the field of view sensor would only include a pan sensor. One alternative field of view sensor includes placing marks in various locations on the hockey rink such that each mark looks different and at least one mark will always be visible to the camera while the camera is pointed at the hockey rink. A computer using optical recognition technology can find the mark in the video frame and, based on the mark's size and position in the video frame, determine the field of view and/or pan, tilt and zoom of the camera. Another alterative includes placing infrared emitters or beacons along the rink (e.g. on the glass). If each beacon has a unique appearance, then a computer can determine the infrared sensor's field of view based on the size of the received signal's size and location in the infrared sensor's frame of data. If an infrared sensor is mounted on a broadcast camera, determining the pan and tilt of one also determines the pan and tilt for the other (plus a known offset). Another alternative includes using pan and tilt sensors to get a rough estimate of field of view and using beacons to fine tune the field of view determination.

The camera location also includes two infrared sensors, master sensor 296 and slave sensor 298, both of which are connected to front end processor electronics 300 and sensor interface box 320. Although the system will function with only one sensor at each location, two sensors are used in master and slave configuration in order to perform substraction which will be discussed below. Master sensor 296 and slave sensor 298 are mounted near one another (e.g. next to each other) so that their optical axes are near each other. It is possible to mount the two sensors away from each other and correct for the misalignment of optical axis. Furthermore, both sensors are

mounted on broadcast camera 280 so that they are pointed in the same direction as broadcast camera 280. This is done because it is contemplated that a camera operator will be tilting and panning broadcast camera 280 to follow the puck, and mounting the sensors on broadcast camera 280 will increase the chance that the sensors will be pointed at the puck. Pan sensor 288 and tilt sensor 290 will indicate where the master and slave sensors are pointing. However, it is not necessary to mount the sensors on the broadcast camera. The internal clocks of the master sensor 296 and slave sensor 298 are synchronized as indicated by signal 305.

The preferred infrared sensor is a progressive scan, full frame shutter camera, for example, the TM-9701 by Pulnix. The Pulnix sensor is a high resolution 768(H) by 484(V) black and white full frame shutter camera with asynchronous reset capability. The camera has an eight bit digital signal output and progressively scans 525 lines of video data. A narrow band infrared filter, which passes electromagnetic waves of approximately 880 nm +/-45 nm, is affixed in front of the lens of the Pulnix sensor. The purpose of the filter is to block electromagnetic signals that are outside the spectrum of the signal from the puck; thus, significantly reducing background clutter.

Each sensor captures a video frame which comprises a set of pixels. Each pixel is assigned a coordinate corresponding to an X axis and a Y axis. The sensor data includes an eight bit brightness value for each pixel. The eight bit brightness values are scanned out pixel by pixel to front end processor electronics 300 from master sensor 296 via the signal Mdata and from slave sensor 298 via the signal Sdata.

Sensor interface box 320 sends the shutter command and horizontal drive to the infrared sensors. Signal 446 from the pulse detection system (described below) is decoded by sync decoder 322 to extract horizontal drive signal 321 which is communicated to master sensor 296. Horizontal drive signal 321 is used to phase lock the master sensor's internal clock to the puck. Signal 321 is also

sent to pulse generator circuit 324 to produce a shutter control signal (Mshutter) at least 120 μsec wide. which is transmitted to master sensor 296. The output of pulse generator 324 is also sent to delay circuit 326 to provide a signal delayed by approximately 60 μsec for pulse generator 328. The output of pulse generator 328 (S shutter), an approximately 120 μsec wide pulse used to control the shutter, is sent to slave sensor 298. Both shutter control signals (Mshutter and Sshutter) are also sent to computer 286 for diagnostic purposes.

Many arenas do not allow photographers to use flashes on their cameras in order to prevent impairing the players' vision from random flashes. In lieu of individual camera flashes, many arenas install a set of strobe flashes at or near the ceiling of the arenas and provide for communication between each photographer's camera and the set of strobe flashes. When the photographer takes a picture, the strobe flashes emit a flash of light, which may include an electromagnetic wave in the infrared spectrum. In one embodiment, the system avoids incorrect data due to a sensor detecting a flash by ignoring data sensed during a flash. One means for preventing the incorrect data is to use filters. A second embodiment connects a signal from the strobe flash to the sensors or a computer which causes the system to ignore data sensed during a flash. A third embodiment includes using flash detectors. The flash detectors can be located anywhere in the arena suitable for sensing a strobe flash. For manufacturing convenience, one alternative includes a flash detector 329 as part of the sensor interface box 320. When flash detector 329 senses a flash a signal FD is sent to front end processor electronics 300. In some environments, a flash detection system may not be necessary.

In addition to mounting sensors on broadcast cameras in the camera locations, additional sensors 210-216 are mounted throughout the arena to improve sensor coverage. Each sensor location, 210, 212, 214 and 216, includes two sensors in master and slave configuration. Sensors 210-216 are

preferably mounted above the rink such with the field of view of the sensors overlapping such that each location on the ice is within the field of view of two sensors. Sensors locations 210, 212, 214 and 216 do not include broadcast cameras and pan/tilt/zoom detectors. Since the sensor at sensor locations 210-216 cannot pan, tilt or zoom, control system 606 (Figure 15) stores the location, pan and tilt of the sensors. Each sensor location also includes a processor 302 and front end processor electronics 300.

Figure 9 shows a block diagram of front end processor electronics 300. Sensor interface 330 receives data (Mdata) from master sensor 296, including the eight bit data for each pixel. Sensor interface 330 has four output signals: LDV, FDV, PC1 and DATA1. LDV (line data valid) is transmitted to XY counters 332 and indicates that a new line of valid data is being scanned out of master sensor 296. FDV (frame data valid), which is transmitted to XY counters 332 and pixel gate counter 338, indicates that valid data for the next frame is being transmitted. PC1 (pixel clock 1) is a 14.318 MHz clock from master sensor 296 and is sent to XY counters 332, pixel gate control 338 and background processor 334. XY counters 332 counts X and Y coordinates sequentially in order to keep track of the pixel of whose data is being scanned in at the current time. When LDV is asserted, the X counter is reset. When FDV is asserted, the Y counter is reset.

As XY counters 332 sequentially count the coordinates of the pixels, frame limits 336 determines whether the coordinate of the particular pixel being scanned in is within the valid frame limits. The valid frame limits includes pixels in a rectangular box within the frame of the scanner 296 which is determined by the values of X_{min}, X_{max} Y_{min}, and Y_{max}, all four of which are supplied from registers in processor 302 via computer interface 339. The registers in processor 302 are set by software in computer 606. (See Figure 15.) These values can be set based on the sensor location and orientation. For example, if half of the field of view of the sensor 296 is above the hockey

rink or below the hockey rink, there is no need to consider data that is not within the hockey rink and avoids sensing spurious sources. When frame limit 336 determines that the pixel is within the valid frame limits, the signal INFRAME is asserted and transmitted to pixel gate control 338.

Sensor interface 340 receives data (Sdata) from slave sensor 298 and communicates the eight bit pixel data and PC2 (pixel clock two) to adjustable delay 342. There is no need to send a version of the signal LDV and FDV for slave sensor 298 because master 296 and slave 298 are synchronized by signal 305 (Figure 8). Adjustable delay 342 is an adjustable shift register for aligning the optical data from the master and slave sensors. The amount of delay is determined by the variable OFFSET which is a twelve bit signal sent from processor 302 via computer interface 339. OFFSET is set in processor 300 via a user interface residing on computer 606 or a local user interface. (See Figure 15.) The data from the two sensors are optically aligned because the two sensors will be mounted on top of each other or next to each other, therefore, having different optical axes. One alternative is to use one optical axis for both sensors, for example, using a prism to transmit one image to two sensors, which in turn are optically aligned. The delayed data (PC2 and DATA2) is transmitted to background processor 334.

Background processor 334 is an Arithmetic Logic Unit with a set of registers. Alternatively, background processor 334 could be a microprocessor. Background processor 334 aligns the data based on the pixel clocks and subtracts the two sets of data (DATA1 and DATA2). There are two types of subtraction that can be used; temporal subtraction and spectral subtraction, although either or both methods can be used, the preferred background processor 334 only performs temporal subtraction. The technique of temporal subtraction utilizes two sensors with similar field of views, opening their shutter at different times. The master sensor's shutter is open and captures data during an infrared pulse from puck 10. The slave sensor's

shutter is open and captures data between pulses from puck 10. Therefore, master 296 and slave 298 sense substantially similar images except master sees the field of view with the puck on and slave sees almost the same field of view without the puck. If the two sets of data are subtracted, the difference should be the signal from the puck. Background processor 334 performs that subtraction. In the particular embodiment disclosed, master sensor 296 opens its shutter for 127 μsec. After master sensor 296 closes its shutter, both master and slave keep their shutters closed for 63μsec. Subsequently, slave 298 opens its shutter for 127 μsec. followed by both shutters being closed for the remainder of the frame's 1/30 of one second. This process repeats itself approximately every 1/30 of a second based on the strobing of the puck which will be described below.

Spectral subtraction utilizes two sensors that have substantially similar field of views, but detect different spectrums. One spectrum includes the puck's pulse and the second spectrum does not. For example, master 296 would use the filter discussed above which passes wavelengths of 880 +/-45 nm. However, slave 298 would use a filter that allows a bandwidth near but not including the bandwidth of master 296. The shutters of both the master 296 and slave 298 would open and close at the same time, creating two sets of data. Theoretically, the two sets of data would differ in that one would include the puck and one would not. Subtracting the two sets of data causes most data to cancel out, except for the puck's signal.

The output of background processor 334 is eight bit DATAS which is sent to pixel gate control 338 and FIFO 334. Pixel gate control 338 is used to determine whether data is valid and to store that data in FIFO 334. Pixel gate control 338 uses three criteria to determine whether the data is valid. The first criteria is to determine whether the data is within the valid frame limits. The second criteria is to determine whether the data has met a certain brightness THRESHOLD. Certain pixels are so dim that they cannot be valid

data. A variable THRESHOLD is used as a brightness threshold. All data with a brightness below the THRESHOLD value are thrown out. Pixel gate control 338 receives THRESHOLD from register processor 302 via computer interface 338. THRESHOLD is set from a graphical interface in computer 606 (or a local interface) based on the environment surrounding the sensors and will usually be determined by trial and error or measurement at each sensor location.

The third criteria to determine whether the data is valid is to find out whether the data was captured during a flash. When a flash is detected sync/sensor control 346 receives a signal FD indicating a flash and forwards this signal to pixel gate control 338. If pixel gate control 338 determines that the coordinates of the pixel are within the frame limit, DATAS is above the THRESHOLD and there is no flash during the frame, pixel gate control will assert $\bar{W}$ (write enable) to FIFO 334 to cause FIFO 334 to store the pixel coordinates (X,Y) from XY counters 332, a data code and eight bit DATAS. The data code indicates whether FIFO 334 is storing valid data, a strobe flash indicator (SF), an end of frame indicator (EOF) or a start of frame indicator (SOF). If the data is not within the frame limits, or not above the THRESHOLD, pixel gate control 338 will not assert $\bar{W}$. If there is a flash during a frame, pixel gate control 338 will assert $\bar{W}$, and store SF in the data code field.

Background processor 334 also sends output signals DATA0D (16 bits), PC1D (2 bits), FDVD (2 bits), and LDVD (2 bits) to optional data monitors. DATA0D is DATAS sent as differential data. PC1D is pixel clock 1 sent as differential data. FDVD is frame data valid sent as differential data. LVDV is line data valid sent as differential data.

Computer interface 334 also transmits a reset signal to FIFO 344 to reset the FIFO when the system is being started up. Processor 302, via computer interface 348, sends a read control signal 350 to FIFO 344 in order to request data from FIFO 344. The output of FIFO 344 is a 32 bit data signal 352 which is sent to computer interface 348 which aligns the data and presents the data to processor 302.

Figure 10 describes the operations in the camera location and related hardware. The first step depicted is registration and initialization 380. This step, which will be discussed in more detail below, includes initializing and calibrating the hardware. Once normal operation begins during a television presentation, broadcast camera 280 begins selectively broadcasting the hockey game (step 382) and, concurrently, steps 384-406 are performed. By selective broadcasting it is meant that the broadcast camera captures video images and sends those images to production center 244. A manager in production center 248 may or may not use those particular video images.

In step 384, puck 10 is turned on (e.g. starts pulsing). While puck 10 is transmitting pulses, one or more pulse detectors (discussed below) detect the puck's pulses and a shutter command is sent to the infrared sensors (step 386). Although step 386 is drawn above step 388, step 386 is continuous and occurs before, after and/or during step 388. During normal operation, two sets of operations occur: steps 388-392 and steps 394-404. In step 388 analog to digital converter 284 and pan-tilt electronics 292 sample the pan, tilt and zoom values. In step 390, these values are sent to processor 302 which transmits the values to graphics center 246. In step 392, processor 302 receives the X and Y boundaries (X_{min}, X_{max}, Y_{min}, Y_{max}) from graphics center 246 and transmits those values to frame limits 336 via computer interface 338. Alternatively, the X and Y boundaries can be determined by processor 302. In step 394, master sensor 296 opens its shutter for 127 μsec and captures (or creates) data representing a position of puck 10 in the field of view of master

sensor 296. In step 396, slave sensor 298 opens its shutter for 127 μsec. and captures (or creates) data. In step 398, data is serially scanned in for each pixel for both sensors. Step 398 could be divided into two separate steps. In step 402, false detections (including noise) are removed, which includes subtraction, brightness threshold, frame limits, flash detection, region of play filters and exclusion zones. Region of play filters and exclusion zones are discussed below. The system also utilizes pulsing, infrared filters on the sensors and infrared reduction through filtering or polarization of spurious sources for assisting the detection of the puck's signal from noise and clutter. The infrared reduction is accomplished by placing filters that remove infrared signals in front of all or some of other electromagnetic emitting sources in the arena (e.g. scoreboard). Although the system uses the above listed methods to enhance performance, a system can be designed to function without any of the listed methods or with a subset of the listed methods. After false detections are removed, valid data is stored in FIFO 344. In step 404, clusters are determined, and in step 406 cluster information is transmitted to graphics center 246.

The data that passes the tests of step 402 tends to be represented as clusters of pixels. Thus, the system can save time transferring sensor information from the camera location to the graphics processing center 246 by sending information which characterizes the clusters instead of individual pixel values. Characterizing these clusters is the tasks performed in step 404. The advantage of clustering is that it saves bandwidth and distributes computer power. A cluster is defined as a group of valid pixels that border each other. Figure 11 shows a portion of a frame of data. For example purposes only, the THRESHOLD value set for this particular frame of data is eight. Thus, only pixels that have the brightness of eight or greater are stored in FIFO 344. Each square in Figure 11 represents a pixel and the number in that square represents the brightness of the pixel. The pixels with no numbers have a

brightness less than eight. The portion of the frame depicted includes two clusters 430 and 432. The first row of clusters 430 includes three pixels having brightness of eight. The second row of clusters 430 includes four pixels having brightness of nine. The first row of clusters 432 includes two pixels, the first pixel having a brightness of eight and the second pixel having a brightness of nine.

For each cluster, a data structure is set up analogous to a structure in the C programming language. The field of the structure would include MINX, MAXX, MINY, MAXY, TOTAL ENERGY and MAX ENERGY. MINX is the minimum X value of any of the pixels in the cluster. MAXX is the maximum X value of any of the pixels in the cluster. MINY is the minimum Y value of any of the pixels in the cluster. MAXY is the maximum Y value of any of the pixels in the cluster. Note that the X and Y values are the coordinates of pixels in the frame. For example, point 436 has the coordinates 96, 198 and point 434 has the coordinates 100, 200. TOTAL ENERGY is the sum of the brightness of all of the pixels in the cluster, and MAX energy is the brightness of the brightest pixel in the cluster. Thus, for cluster 432 MINX equals 96, MAXX equals 100, MINY equals 198, MAXY equals 200, TOTAL ENERGY equals 73, and MAX energy equals 9.

D. Sync and Flash Detectors

Figure 12 shows a pulse detection system, which is one type of a synchronization system that can be used to synchronize the sensors with the object being tracked. Lower collector box 220 sends power to pulse detectors (222-240) and flash detectors (440-442) and receives a signal from pulse detectors 222-240 indicating a puck pulse. Alternatively, pulse detectors 222-240 can be self-powered. In addition to the pulse detectors arranged around the rink, the system can optionally include pulse detectors 443 above the rink (e.g. hanging from ceiling) or another location. Upper collector box

445 sends power to pulse detectors 443 and receives a signal from pulse detectors 443 indicating a pulse. Upper collector box 445 effectively wire-ORs the signals from pulse detectors 443 and sends the result to lower collector box 220. Collector box 220 effectively wire-ORs the output signals from the pulse detectors 220-240 and upper collector box 245 and sends the result, via signal 220, to synchronizer box 440 which resides in graphics center 246. The system can include additional pulse detectors connected to additional upper collector boxes. Each upper collector box would have an output which is connected as an input to another collector box to be wire-OR'ed with the pulse detectors of the other collector box.

Lower collector box 220 receives a signal from each of the flash detectors 442 and effectively wire-ORs the signals. If any of the flash detectors 442 sense a flash, collector box 220 will ignore any pulses detected during the same time period as the flash. Thus, flash detectors 442 are a second (and optional) flash detect system in addition to the flash detectors at the camera locations.

Synchronizer box 444 receives the puck pulse signal on line 220. Based on the signal from the pulse detectors, synchronizer box 444 determines the period of the puck. Synchronizer box 444 sends to each infrared sensor location and camera location a signal 446 which is used to synchronize the shutter of the infrared sensors.

Figure 13 shows a block diagram of a pulse detector. The heart of the pulse detector is a photodetector 450 which includes a photo diode and op-amp. In front of the photodetector is an infrared filter 452. Photodetector 450 is also connected to DC subtraction circuit 454. Figure 13 shows two connections between photodetector 450 and DC subtraction circuit 454 to indicate that DC subtraction circuit 454 provides feedback to the op-amp in photodetector 450. The output of DC subtraction circuit 454 is sent to filter 456 which reduces steady DC signals and low frequency AC signals such as

120 Hz power line modulation. The output of filter 456 is sent to leading edge threshold detector 458, which detects the rising edge of the infrared pulse from puck 10. Connected to leading edge threshold detector 458 is trailing edge gate 460 which outputs a pulse when leading edge threshold detector 458 detects a leading edge. The output of trailing edge gate 460 is transmitted to comparator 462. Filter 456 also transmits its outputs to trailing edge threshold detector 454 which detects the falling edge of a pulse from puck 10. The output of trailing edge threshold detector 454 is transmitted to comparator 462. Comparator 462 determines whether a trailing edge was detected within the pulse created by trailing edge gate 460. If so, comparator 462 outputs an indication that a puck pulse has just occurred. Flash detectors 440-442 are similar to the pulse detectors except that the narrow band infrared filter 452 is replaced with a filter that allows detection of signals in a wide spectrum that includes signals emitted by puck 10.

Figure 14 is a block diagram of synchronizer box 444. Reference oscillator and buffer 500 includes an oscillator operating at 14.31818 MHz (70 nsec clock resolution) and a buffer. This circuit provides timing for circuits 502, 504, 506, 508, 510, 512, and 520. Circuit 502 is an adjustable counter that nominally provides a delay of 4095 clock pulses (286 μsec). Circuits 504 and 510 are fixed counters that provide delays of 4092 clock pulses each (285.8 μsec). Circuit 506 is an adjustable delay counter that nominally provides a delay of 7675 clock pulses (536 μsec). Circuits 502, 504, and 506 are started by the pulse detect signal 220. The difference in time delay between counter 506 and counter 502 is used to control the infrared sensor shutter timing in response to the pulse detect signal 220 so that the shutter opens just before a pulse from puck 10 occurs.

The delayed pulse from counter 506 starts counter timer 508. The output of counter timer 508 starts counter 510. The outputs of counters 504 and 510 are pulses with a width of 4092 clock pulses (285.8 μsec) each. In normal operation,

the delays provided by the adjustable counter 506 and counter 508 are equal to the period of pulse 220 (approximately 30 Hz). The period of counter 508 counts an adjustable delay based on a user setable switch and an up/down counter/adder circuit inside counter timer 508 controlled by the output of counters 504 and 510. The count of the up/down counter is determined by the relative overlap positions of the output pulses from counters 504 and 510. If the output pulse from counter 504 leads the output pulse from counter 510, the up/down counter will count down. If the output pulse from counter 504 lags the output pulse from counter 510, the up/down counter will count up. If the pulses from counters 504 and 510 overlap, the up/down counter will not count up or down. Under this condition, the circuit is locked to input pulse stream 220 and the sum of the counter settings for counter 506 and 508 represent the number of clock pulses from circuit 500 occurring in the period of pulses 220. The circuit will track the period of pulse stream 220 as the period varies over time or from puck to puck. Circuit 514 contains diagnostic LEDs to indicate the presence of pulse signals 220 and a "locked" condition on counter 508.

The counter settings from counter 506 FD_{0-15} and counter 508 TD_{0-15} are added together in oscillator adder circuit 518. The counter settings are also read into a computer (not shown) through a parallel port where they are added and averaged. Jumper 519 is used to select either the sum from circuit 518 or the computer averaged sum output. Since these sums represent the period for pulse signal 220, they are used to control the period of oscillator counter 512. This circuit will run continuously in the absence of pulses 220 and provides a "coasting" feature to control the shutter of the infrared sensors with or without the presence of the pulses from puck 10. The oscillator phase is reset by the output of counter 502 passing through reset gate 516. The gate is opened by the "burst" signal from counter 508. This signal is present during valid pulse tracking intervals and represents the overlap of the pulses from counters 504 and 510.

The output pulse from oscillator 512 starts shutter delay counter 520. The output of this counter is sent to phase-locked loop 542. The delay count for

shutter delay counter 520 is selected by jumper 522 from the control values for counter 508 (TD_{0-15}) or from a computer average of the TD_{0-15} data. The output of counter 520 controls camera shuttering and occurs at a nominal rate of 30 Hz. This signal is used to control phase-locked loop 542 running at nominally 15,750 Hz. Divider 544 divides the output of phase-locked loop 542 by five hundred and twenty five to provide a 30 Hz reference signal that is compared to the output pulse from counter 520, thus controlling the frequency of phase-locked loop 542. Pulse generator 546 receives the output of phase-locked loop circuit 542 and generates approximately 10 μsec wide pulses. Pulse generator 548 generates a pulse approximately 30 μsec wide from the nominally 30 Hz rate out of divider 544. The outputs of circuits 546 and 548 are combined in "OR" circuit 560 and buffered by circuits 562 to provide a "composite sync" signal to the infrared sensors. The composite sync signal contains both a horizontal drive signal (the output of pulse generator 546) and a camera shutter control (the output of pulse generator 548). This composite sync signal is sent to the infrared sensors and decoded by sensor interface box 320.

One alternative to using pulse detectors is to include a receiver (e.g. RF receiver) in the puck. A control transmitter (e.g. similar to that described below) can send a signal to the puck commanding the puck to pulse. The central transmitter would also send a synchronization signal to cause the infrared sensors to open their shutters.

E. Graphics Truck

Figure 15 shows a partial block diagram of graphics center 246 and production center 244. Graphics center 246 includes a video processor 604 which receives data 602 from processor 302 at each of the camera locations and infrared sensor locations. Video processor 604 performs the calculations to determine the location of the puck in the arena as well as the position of the puck in the video frame of a broadcast camera. The preferred video processor

604 is an Indigo Two Impact from Silicon Graphics. Video processor 604 receives cluster data for all of the infrared sensors and pan/tilt/zoom data for all of the broadcast cameras and saves that data in memory 612 along with timing information. The timing information is stored so that if the data is used at a later time, the processor can determine at what time the data was detected. Memory 612, in conjunction with disk drives, also stores software used to program processor 604.

Graphics center 246 also includes a control station 606 which is a second computer used as an operator interface. Control station 606 enables the operator of graphics center 246 to change variables (e.g. THRESHOLD), start the system and perform control functions. Graphics center 246 also includes a spare computer 608 which can be used in case either control station 606 or video processor 604 malfunction. Graphics center 600 can function with one compute. All three computers, 604, 606 and 608, communicate with each other over a local area network 610, which is a 10 Base-T implementation of ethernet. Each computer is connected to a Starbase T-9, 10 Base-T hub with twisted pair wiring.

After video processor 604 determines the location of puck 10, video processor 604 determines the position of the puck in the video frame of the broadcast camera. Video processor 604 then creates data which is sent to a video modification unit 616.

Many cameras are used to televise a sporting event. The video signals from all of the cameras are sent to video control 618 which is used to select one broadcast camera for transmission to viewers. One embodiment of video control 618 includes a plurality of monitors, one monitor for each video signal, and a selection circuit. A director (or manager) would monitor the different video signals and choose which signal to broadcast. The choice will be communicated to the selection circuit which selects one camera signal to broadcast. The choice is also communicated to video processor 604. The

selected video signal is sent to delay 622. The output of delay 622 is transmitted to video modification unit 616. The purpose of delay 622 is to delay the broadcast video signal a fixed number of frames to allow time for video processor 604 to receive data and determine the position of the puck in the video frame. In the embodiment of Figures 7-19, the video frame needs to be delayed five frames. Additional delay can be added to allow for interpolation of missed data, as discussed below. Additionally, the hardware and the software can be modified to increase the speed of the video processing which would decrease the delay. Although the video is delayed a small number of frames, the television signal is still defined as live. The delay introduced by the system is a small delay (under one second) which does not accumulate. That is, successive frames are continuously enhanced with the same small delay. For example, a ten frame delay is equivalent to one third of a second, which is not considered a significant delay for television.

Video modification unit 616 modifies the video signal from delay 622 with the data/signal from video processor 604. The type of modification can vary depending on the desired graphic. One exemplar implementation utilizes a linear keyer as video modification unit 616. When using a keyer the signal from video processor 604 to the keyer includes two signals YUV and an external key (alpha). The YUV signal is called foreground and the signal from delay 622 is called background. Based on the level of the external key, the keyer determines how much of the foreground and background to mix to determine the output signal, from 100% foreground and 0% background to 0% foreground and 100% background, on a pixel by pixel basis.

As an option, the system can also include a data inserter 628 for inserting nonvideo data into a television signal. Nonvideo data is information other than the traditional data used by a television to draw the normal scan lines on a television display. An example of nonvideo data is data transmitted during the vertical blanking interval, which can be closed caption data,

statistics regarding puck 10 (e.g. the puck's location, speed, acceleration etc.), interactive queries or internet addresses. In Figure 15, inserter 628 receives a television signal from video modification unit 616 and nonvideo data from video processor 604, via signal 630. Inserter 630 inserts the nonvideo data into the vertical blanking interval of the television signal and sends the resulting signal to amplifier 626. Inserter 630 is a standard data inserter known in the art. One example of a suitable data inserter can be found in PCT International Patent Application Number PCT/US94/13484, which was published on June 8, 1995 with International Publication Number WO 95/15654, which is incorporated herein by reference.

Figure 16 describes some of the operations in graphics center 246 and processing center 248. In step 640, the pan, tilt and zoom data is received by video processor 604 from the various processors (e.g. 302). In step 642, cluster data is received from the processors (e.g. 302). In step 644, video processor 604 stores the pan/tilt/zoom information for all broadcast cameras and the cluster data in memory 612. In step 648, video processor 604 determines the three dimensional location of puck 10. In step 650, the system removes false detections. As discussed above, there are various means for removing false detections, some of which can be performed both by a processor at the graphics center. preferably, region of the play filters and exclusion zones are accomplished at the graphics center, although the inventors do contemplate performing variations of these methods at sensor locations.

Exclusion zones are known areas of false data. For example, there may be a camera with a light near the arena, or any other light near the playing surface (e.g. light indicating a penalty, timeout, etc.). It is possible for these lights to emit an infrared signal. Since the existence and locations of these sources are known, they can be removed from the data considered by the video processor in determining the three-dimensional location. One

method for ignoring an exclusion zone is after determining the three-dimensional location of the puck, if that location is in an exclusion zone, then ignore that determination. For example, in some instances, the system determines one or more possible locations of the puck. If any of these locations are in the exclusion zone, that location is removed from consideration. Alternatively, the video processor can ignore all lines of position that pass (or substantially pass) through an exclusion zone. Another alternative includes the electronics at the sensor ignoring any cluster that would give rise to a line of position into an exclusion zone. Another alternative includes manually entering all exclusion zones for each sensor that is fixed (e.g. no pan or tilt) before the sporting event begins. This can be done at graphics center or the central location. If a sensor can pan or tilt, the processor at the sensor can be given the three-dimensional location. Exclusion zones can also be defined in two dimensions for a camera or sensor. The exclusion zone can be manually entered at one of the processors or an operator in the production center can identify the exclusion zone using an input device (e.g. mouse) in connection with a monitor (video or sensor data).

Field of play filters are software methods for ignoring data that indicate a location outside the field of play. For example, prior to the sporting event, the system can be programmed with the three-dimensional coordinates of the hockey rink, for example, the X and Y coordinates of the hockey rink and a Z axis height limit (e.g. twenty feet). Any data indicating a location of the puck outside of these limits will be ignored.

In step 652, video processor 604 determines the puck's position in the video frame of the selected broadcast camera. In step 654, the television presentation of the selected broadcast camera is enhanced. In one embodiment, the enhancement includes video processor 604 creating a frame of data with a graphic at the position of the puck in the video frame of the broadcast camera. The frame of data created by video processor 604 is sent

to video modification unit 616 which combines the frame of data sent from video processor 604 with the frame of data from the selected broadcast camera. In step 656, the enhanced video frame is transmitted for broadcast or stored for later use.

The graphic could be a larger puck, a flashing puck, an icon, a trail of fire, an opaque cloud on top of the puck, any combination thereof, or any other graphic which highlights the video presentation of the puck. The graphic could also be logically near the position of the puck, for example, a trail of fire behind the puck, a trajectory of the puck's path, a target at the end of the pucks trajectory, an arrow pointing to the puck, etc. The enhancement could also include audio data, for example, a sound related to the speed or acceleration of the puck, or a sound indicating that the puck is at the certain location. Other examples of enhancements includes nonvideo data; statistics displayed on the television related to the puck's position, location, speed, acceleration, etc. The step of enhancing includes combining data (e.g. a keyer), editing data and creating data.

Figure 17A is a flow chart explaining the determination of the puck's three dimensional location (step 648 in Figure 16). There are many suitable ways for determining the three dimensional location of the puck using the available data described above. One alternative involves determining lines of position. Once lines of position are known, there are many suitable methods to determine three dimensional location. Figures 17A and 17B explain two exemplar methods.

In step 680 of Figure 17A , video processor 604 determines a line of position (LOP) for each cluster of each sensor. Thus, if there are twenty clusters transmitted to video processor 604, twenty LOPs are determined. The LOP is first calculated in "camera space", the coordinate system where the infrared sensor is at the origin looking along the negative Y axis, with the X

axis on the right and the Z axis up. The LOP is then transformed into the three dimensional coordinate system of the arena.

In order to calculate the LOP in camera space, the sensor focal length and aspect ratio are measured in advance on an optical bench. This measurement indicates that a target a meter away if moved one pixel to the side moves h meters in space, and if moved one scan line up or down, moves v meters in space. From these ratios, given that the cluster is x pixels and y scan lines from the center of the sensor field of view, a vector is constructed:

$$V = (x * h, y * v, 1.0)$$

A line of position is represented as a point and a vector:

$$LOP = P,V$$

A point in three dimensional space is represented by a 4 element row vector: (x, y, z, 1.0). The 1.0 (sometimes called w) allows for translation. In camera space, point P is (0,0,0,1.0) since the sensor is at the origin. The LOP is a parametric representation of a line, since any point on the line can be represented as:

$$p = P + k * V, \quad k \text{ is a scalar.}$$

An LOP is transformed into the three dimensional coordinate system of the arena by a 4x4 matrix. The three element vector is multiplied by the inverse transform of the upper left 3x3 matrix of the 4x4 matrix. The four element point is multiplied by the 4x4 matrix.

For an infrared sensor rigidly mounted separate from a broadcast camera, the vector component of the LOP is transformed by the matrix (J):

$$J = TYPR,$$

where,

$$T = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -x & -y & -z & 1 \end{bmatrix}$$

$$Y = \begin{bmatrix} \cos yaw & -\sin yaw & 0 & 0 \\ \sin yaw & \cos yaw & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$P = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos pitch & -\sin pitch & 0 \\ 0 & \sin pitch & \cos pitch & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$R = \begin{bmatrix} \cos roll & 0 & \sin roll & 0 \\ 0 & 1 & 0 & 0 \\ -\sin roll & 0 & \cos roll & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Since the infrared sensor is in a fixed position, the yaw, pitch and roll can be measured during the registration process.

For infrared sensors mounted on a broadcast camera the transformation matrix (M) is:

$$M = XABCDO$$

$$X = TYPR$$

The matrix (X) models the fixed position and orientation of the broadcast camera. The matrices (ABCD) model the movement of the broadcast camera (e.g. pan, tilt, etc.). The matrix (O) has the same form as

the matrix (X) and models the positional and rotational offset of the infrared sensor from the top surface of the camera head.

$$A = \begin{bmatrix} \cos pan & -\sin pan & 0 & 0 \\ \sin pan & \cos pan & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -forward & 0 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & -tiltrise & 1 \end{bmatrix}$$

$$D = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\ tilt & -\sin\ tilt & 0 \\ 0 & \sin\ tilt & \cos\ tilt & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$F = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -povdist & 0 & 1 \end{bmatrix}$$

$$E = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & -axisheight & 1 \end{bmatrix}$$

Pan and tilt angles are measured with the pan and tilt sensors 288 and 290. The forward offset distance (forward) is the distance that the tilt axis is positioned forward of the pan axis. The forward offset distance and optical axis height (axisheight) can be measured directly from the camera head with a ruler. The tilt rise, which is the distance from the nominal position that the camera plate rises, can also be measured with a ruler and a lookup table built as a function of tilt angle. The POV (povdist) (or First Principal Point, or Front Nodal Point) is the position of the camera's virtual point of view measured as a distance forward of the tilt axis when the camera is in the horizontal position. The POV can be measured on an optical bench and a lookup table built as a function of zoom position, focus, and 2X setting. The POV is measured by placing two targets in the field of view of the lens, off-center, one farther away than the other, so they appear in line through the viewfinder. Where a line extended through those targets intersects the optical axis of the camera is the position of the virtual POV. The effective horizontal and vertical focal length of the lens (f_h and f_v) are the half-width and -height of the camera's field of view at some distance divided into that distance. This is measured on the optical bench and a lookup table built as a function of zoom position, focus, and lens doubler. The aspect ratio is f_h/f_v and is constant, so usually f_v is modeled for given settings and f_h is equal to aspect multiplied by f_v.

After a line of position is determined for every cluster, video processor 604 groups all possible pairs of LOPs (step 682). For each pair of LOPs, video processor 604 finds the closest point of contact of the two LOPs (step 684). If the LOPs do not intersect the closest point of contact will be two points, one on each LOP. The line connecting the two points is perpendicular to both LOPs. To simplify the calculations, one embodiment contemplates using the midpoint of the line perpendicular to both LOPs as the closest point

of intersection. However, both points can be used in the steps described below.

At the end of step 684, video processor 604 now has a set of points of closest contact. In step 686, video processor 604 finds a center of all of the points of closest contact. The center is the average of the coordinates of the points of closest contact. In step 688, video processor figuratively draws a sphere around the center point. The radius of the sphere is predefined. The radius should be big enough to allow the system to function, but small enough so that improper data is thrown out. In one embodiment, the radius is set as one meter. Each time the system is set up, a user may need to use trial and error to determine the proper radius. In step 690, video processor 604 determines whether all the points fit within the sphere. If not, video processor 604, in step 692, removes the furthest point and loops back to step 686. If all the points do fit within the sphere, then the average or center of the sphere is a candidate for the three-dimensional location of puck 10. One alternative is to reduce the radius for each iteration, keep iterating until the minimum radius is reached (e.g. .1 meter) and if there are a predefined number of points remaining (e.g. $\geq$ 2) then a valid three dimensional location candidate had been found. Another alternative includes reducing the radius for each iteration, removing all points outside the sphere for each iteration, continue iterating until the minimum radius is reached (e.g. .1 meter) and if there are a predefined number of points remaining (e.g. $\geq$ 2) then valid three dimensional location candidate has been found. The points of closest contact may form more than one separate groups of points, in which case the method of Figure 17A can be repeated for each group of points and more than one location candidate will be determined. The incorrect candidates should be removed when removing false detections in step 650 of Figure 16.

Another method for determining a three dimensional location based on lines of position is based on the probabilities of finding the puck at certain

locations along or near the lines of position. Figure 17B describes one exemplar method for using lines of position and probabilities to determine three-dimensional location. In step 696, lines of position are determined for each cluster of each sensor. In step 698, the system determines cones for each line of position. That is, each line of position can be thought of as a set of cones, one inside the other. Each cone represents a space with an assigned probability for the puck within that space. The set of cones is projected onto the playing surface. In step 700, a set of cubes are figuratively created. A first layer of cubes lie on the playing surface. A second layer of cubes are located above the first layer, and so on. Each cone is projected such that it passes through one or more cubes. For each line of position, each cube is assigned a probability equal to the probability of the cone passing through the cube. If more than one cone for a particular line of position passes through a cube, the cube is assigned the probability of the highest probability cone passing through it. If a cube lies within cones from more than one line of position, a cube will be assigned more than one probability. Each of the probabilities assigned to each cube are added and the sum is stored for each cube (step 702). If a cube was assigned only one probability, then that one probability is the stored sum. The cube with the highest probability sum is assumed to be the cube where the puck is (step 704). In one embodiment, the cubes are small enough so that the resolution of the cube is sufficient to find the puck in one iteration. In one alternative, the playing surface is divided into a small set of large cubes and step 704 determines which of the large cubes the puck lies in. Since the resolution of the cubes is not fine enough for the puck determination to be accurate, the process is repeated (in step 706) by looking back to step 700, dividing the one cube which contains the puck into smaller cubes, the probability is added up for the smaller cube and the system determines which of the smaller cubes contains the puck. If the resolution of the small cube is sufficient, the method ends; otherwise, the method performs

another iteration. The inventors contemplate numerous other equivalent implementations that make use of the probability of the puck's location that are within the spirit of the present invention.

Figure 18 is a flow diagram describing one exemplar embodiment of how video processor 604 determines the position of the puck in the video frame of the selected broadcast camera and creates data which is sent to video modification unit 616. In step 710, video processor 604 transforms the three dimensional location of the puck to a two dimensional position in the video frame of the selected broadcast camera. A broadcast camera is represented mathematically by a 4x4 matrix which includes details of position and orientation. The three dimensional point is transformed into a two dimensional normalized frame location by multiplying the point by the camera matrix (K). The camera matrix (K) in its simplest form is a combination of rotation, translation, and perspective elements, all of which are represented by 4x4 matrices. In reality, the motion of the camera point of view (POV) is much more complicated with offsets caused by the mounting of the camera on the tripod and the motion of the optical POV along the camera's optical axis due to lens characteristics. All these effects can be modeled as more complex linkages (additional matrices) between the fixed camera base and the resulting POV of the camera as the camera is moved through its range of controls. These techniques are well-known in the art.

In the disclosed embodiment, the broadcast camera is modeled as a 4x4 matrix which includes two parts -- a fixed transformation (X) which represents the position of the camera in the arena and its orientation, and a variable transformation (V) which varies with changes in pan angle, tilt angle and the zoom:

$$K = XV$$

The fixed transformation matrix (X) models x, y, z position as well as fixed yaw, pitch and roll representing the camera's mount orientation:

$$X = TYPR$$

The variable transformation matrix (V) models not just the pan and tilt rotations, but also the complicated way the POV of the camera moves as it pans, tilts, and zooms. For a camera used with a Vinton Vector 70 camera head and a Canon J55 Super lense, the variable transformation is modeled in seven parts (matrices):

$$V = ABCDEFG$$

$$G = \begin{bmatrix} f_h & 0 & 0 & 0 \\ 0 & f_v & 0 & 0 \\ 0 & 0 & -(f+n)/(f-n) & -1 \\ 0 & 0 & -2fn/(f-n) & 0 \end{bmatrix}$$

The variables n and f are the distances to the mathematical near and far clipping planes; which only important in assigning a useful range for z-buffered graphics drawing; therefore, nominal values are used of n=1 meter and f=100 meters.

The form of all seven matrices are defined above. Matrix (A) models the camera's pan on its fixed base. Matrix (B) models the tilt axis as a fixed distance forward of the pan axis. Matrix (C) models the tilt axis as a variable distance above the plane of the top of the tripod -- the camera is raised as it tilts away from horizontal to counteract the tendency for it to flop forward or backward. The rise is a function of tilt. Matrix (D) models the camera's tilt

angle. Matrix (E) models the optical axis of the lens as some fixed distance above the tilt axis. Matrix (F) models the lens moving forward and backward along the optical axis of the lens as a function of zoom. Matrix (G) models the effective focal length of the lens as a function of zoom, focus, and lens doubler (2X) settings.

In step 712 of Figure 18, the graphic (if any) is scaled for the field of view of the broadcast camera. The field of view of the broadcast camera, based on location, pan, tilt and zoom, determines how big the puck should be in the video frame. In step 714 video processor draws a black window and then places a graphic at or near the location of the puck. In step 716, the window is sent to video modification unit 616.

The present invention system is capable of performing look ahead processing. That is, due to frame delays, one embodiment of the present system can look at video frames and accompanying data for frames captured after the current frame being processed. This information can be used to enhance the processing at the current frame. One example of look ahead processing is interpolation.

During operation, video processor 604 may not receive data for a particular video frame of the broadcast camera. In such a situation, if only one or a small number of frames of data are lost, it is possible that video processor 604 can interpolate the location or position of the puck so that the enhancement of the television presentation of puck 10 will be continuous. For example, Figure 19 shows a symbolic video frame which includes four images of puck 10 superimposed on the same frame. F_0 signifies the location of the puck during frame 0. F_1 signifies the location of the puck during frame 1. F_2 represents the location of the puck during frame 2, and F_3 represents the location of the puck during frame 3. However, during frame 2, video processor 604 did not receive any data and, thus, interpolates the position of puck 10 during frame 2. Therefore, the puck is dotted for F_2.

Figure 20 describes the process of interpolating the location of the puck. In step 730, the pan/tilt/zoom data is received. In step 732, video processor 604 attempts to receive cluster data, similar to step 642 in Figure 16. Since no useful cluster data is transmitted, video processor 604 waits for the next video frame of data. Step 734 includes steps 640-650 (or 640-652) of Figure 16. After the location of the puck is determined for the next video frame, video processor 604 considers the location of the puck before and after the lost video frame in order to interpolate where the puck should have been during the lost video frame. As discussed above, before a broadcast frame of data is sent to video modification unit 616 it is delayed five frames. In order to interpolate for one frame of lost data, video processor 604 needs to wait for an extra frame of data. This extra delay is added to the five frame delay discussed above. Thus, the total delay is six frames. If video processor 604 interpolates for five frames of data, then it needs five extra frames of data for a total delay of ten frames, and so on. Thus, under the current system, if video processor 604 can interpolate for N frames of lost data then the broadcast camera video frames must be delayed (e.g. at delay 622) five plus N frames.

One embodiment of the present invention contemplates video processor 604 adding nonvideo data to the television signal. Figure 21 depicts additional hardware at the viewer's home which allows for additional enhancement for the television presentation based on the nonvideo data. Television signal 748 is received by television 750 via cable, a conventional antenna or any other suitable means. The signal can also be sent to a decoder 752 or computer 754. Computer 754 is in communication with decoder 752 and television 750. Decoder 752 uses technology known in the art to remove data from the vertical blanking interval of a television signal. In one alternative, the function of decoder 752 is performed by computer 754. Television 750 can also include a VCR or other videotape machine. Computer 754 includes a

monitor 756 which displays windows (e.g. 758, 760, 762). When television signal 748 is received in the viewer's home, decoder 752 strips out the nonvideo data from the vertical blanking interval. Decoder 752 sends the data to computer 754 which can display the data in window 762. Video processor 604 can also be pre-programmed such that when certain events occur (e.g. relative to the location of the puck), video processor 604 inserts one or more addresses of web pages on the internet into the vertical blanking interval of the television signal. As decoder 752 strips out these addresses from the vertical blanking interval, computer 754 can display these addresses on window 762 and allow the user to click on the address with a mouse or use some other user input means which will cause software in the computer 754 (e.g. Mosaic or Netscape) to load the addressed web page.

In another alternative, a television signal is received at the viewer's home and is transmitted directly to computer 754. Computer 754 will then display a window 750 which would show the televised sporting event. In yet another alternative, a viewer can be provided with remote control capabilities. Video processor 604 can determine the position of the puck in the broadcast video frame but not enhance the broadcast video. The puck's position is inserted into the vertical blanking interval of the broadcast signal and sent to the viewer's home. Decoder 752 strips out the location of the puck from the vertical blanking interval and sends the location to computer 754. Computer 754 also receives the video signal and displays the sporting event in window 760. Computer 754 includes software to add a graphic overlay at the position of the puck in window 760. Window 758 could be used as a user interface to allow the viewer to turn on or off the enhancement of the puck or to choose what enhancements should be made. In a further alternative, instead of displaying the enhanced video in window 760, computer 754 can send the enhanced video to television 750. The software used to program computer

754, and all of the software described above, can reside in memory, on a disk or any other computer readable medium.

F. Registration

The registration process includes initializing the system. As discussed above, at least one embodiment of the system determines the three dimensional location of the puck. Since location is relative, the system needs a reference point. Thus, the first step is to establish a coordinate system, which is accomplished by using X,Y,Z axes with the origin or center point (0,0,0) being at the center of the hockey rink. Three or more registration points (e.g. nine) are marked on the rink in addition to the center location. The distance from the center point can be measured for each registration point so that the coordinates of the registration points are known. The broadcast cameras and the sensors can be registered by solving for the unknown variables in the above described matrices.

Registering the broadcast camera involves the determination of the matrix (X). A broadcast camera is pointed at each registration mark in turn, centering the registration mark in the field of view using the center reference mark in the viewfinder. The pan and tilt angles are read and the variable part of the camera transform is calculated for each mark using an arbitrary constant zoom value. (Zoom is not a factor in these comparisons as each registration mark is centered in the field of view. Some constant value is used so errors of different registration marks can be directly compared.) An initial educated guess at the fixed transformation parameters (e.g. x, y, z, yaw, pitch, roll) is made and the fixed component matrix is calculated. For each registration point, the fixed matrix (X) is concatenated (multiplied) with the variable matrix (V) for each registration point to obtain the composite camera matrix. Then, the three dimensional location of the registration point is transformed by the composite camera matrix to a two dimensional position in

the broadcast camera's video frame. An error is determined representing the distance from the calculated two dimensional position to the center of the video frame. The fixed transformation parameters are varied and the process is repeated until the error is minimized, at which point the camera is registered and the resulting fixed matrix (X) is used for subsequent calculations.

To register a stationary infrared sensor that is not mounted on a broadcast camera, infrared emitters are placed at the registration points. An initial educated guess is made at the parameter values for the transformation matrix (J) and the three dimensional locations of the registration marks are determined using matrix (J). An error is determined between the calculated locations (via the matrix) and measured locations of the registration marks. The parameters are varied and the process is repeated until the error is minimized, at which time the sensor is registered and the resulting matrix is used for subsequent calculations.

Registering a camera-mounted infrared sensor is the process of determining the matrix (O). First the broadcast camera on which the infrared sensor is mounted is registered (the X matrix is determined). Infrared sources are placed at the registration marks and the broadcast camera is oriented to give the sensor a view of the infrared sources. The pan and tilt angles are read and the ABCD matrices are calculated. Matrix (G) is calculated using the measured focal length of the sensor. Matrix (O) is the only undetermined part of the equation. A first educated guess is made at the matrix (O) parameters and the composite transformation matrix is calculated. The three dimensional locations of the registration marks are calculated using the transformation matrix and an error is determined between calculated location and the measured location of the registration marks. The parameters are varied and the process is repeated until the error is minimized, at which time the sensor is registered and the determined matrix (O) is used for subsequent

calculations. Alternatively, the x, y, z offsets of the infrared sensor relative to the camera plate can be measured directly rather than solving for them. Measuring directly is generally more accurate.

As an alternative, the location and orientation of the broadcast cameras and sensors can be measured relative to the center location. A tape measure can be used to determine the position of the cameras and sensors, or the cameras and sensors can be surveyed.

G. Single Sensor System

The above described system determines the three dimensional location of the puck in order to enhance the video and/or audio for any broadcast camera whose pan/tilt/zoom and location are known. The inventors also contemplate a system that does not determine the three-dimensional location of the puck. Such a system could include one infrared sensors (or master-slave configuration) attached to or fixed near the broadcast camera. The video processor receives clusters from one infrared sensor and creates a line of position for one clusters. Various criteria can be used to determine the one cluster, for example, the brightest cluster. Since there are no clusters from other infrared sensors, a three dimensional location of the puck cannot be determined. Video processor 604 transforms the line of position from camera space to the three dimensional coordinate system of the arena. A point is selected along the line of position at a fixed distance from the camera, and that point is assumed to be the three dimensional location of the puck. Although the point is not the actual location, it will be in line with the actual location. If the system misses a frame of data, the video processor can interpolate in a manner similar to that described above. However, rather than

H. Replay

As shown in Figure 15, the system includes replay decks 620 that can store video, with timing information, for short term use (instant replay) or long term use. Memory 612 stores the pan/tilt/zoom data for the broadcast cameras, data representing the location and/or position of the puck, and timing information. Alternatively, memory 612 can store the cluster information and the necessary parameters of the transformation matrices. Thus, the system stores all of the information necessary to enhance video subsequent to the live event. For example, between periods of a hockey game an announcer may wish to describe a particular play. The video for the play can be recalled from deck 620 and by matching the timing information, the corresponding data can be read from memory 612 and the system can perform all or part of the methods of Figures 16-20.

I. Alternative Use of Infrared Technology

The infrared technology disclosed above can be used in conjunction with the television presentation of sporting events other than hockey. For example, the infrared transmitter can be located within any suitable object at a sporting event as long as the transmitter does not interfere with the proper use of that object.

II. Radar With Active Transponder

An alternative to using infrared technology is radar. A radar based detection system relies on energy scattered or reflected back to the radar from an object of interest. In the hockey application, the energy scattered from a conventional puck can be lost in all the undesired back scattered energy (clutter) from the players, the rink, the building, etc. In order to make the puck stand out among the clutter, the radar signal is amplified with an

electronic repeater. The puck's emission is made stronger and given a unique signature which makes it more easily detected.

Using radar with an active repeater to track a hockey puck has several desirable qualities. First, in addition to having inherently high ranging accuracy of a few inches or better, RF in the low microwave band efficiently passes through dielectric materials, such as hockey sticks and partially defracts around optically opaque objects such as ice skates, blades and human bodies. Thus, the puck is visible to the radar a substantial percentage of the time. Second, the repeater electronics are entirely confined within the rubber of the puck. Third, puck modulation can be channelized so that errant pucks lost in the crowd cannot be turned on and interfere with the active game puck. Additionally, an active repeater is preferred over a passive reflecting hockey puck because it provides a much higher signal to noise ratio, provides false Doppler data (a motionless puck can be detected) and can be used to track more than one object.

A. Puck with Active Transponder

Figure 22 shows hockey puck 900 to be used with a radar system. Completely embedded within rubber section 902 of puck 900 is radar repeater 904, which uses a gated repeater architecture. Repeater 904 receives, amplifies, modulates and retransmits the instant radar signal. Figure 23 is a side cut-away view of puck 900 showing repeater 904 with batteries 906 and antenna 908. In the preferred embodiment of a hockey puck with an active transponder, batteries 906 includes two 1/3 N lithium ion primary cells.

Figure 24 is a block diagram of radar repeater 904. A signal is received by dipole antenna 908 (which is completely embedded in puck 900) and then passes through a switch and amplifier network. First, the received signal passes through switch 910 to switch 912 and then to amplifiers 914 and 916. After the amplifiers, the received signal passes through switch 918

followed by switch 920. After leaving the switch and amplifier network, the received signal fills up a 13 ns delay line 922, which, preferably, is a coaxial cable. Connected to delay line 922 is a complex impedance modulator 924 which modulates the radar signal by varying the reflection coefficient at the end of the cable at a rate of 427,323 Hz. Preferably, modulator 924 is a PIN diode which is turned off and on (modulated open and closed) causing the phase of the received RF signal to be alternately shifted between 0° and 180°. Modulator 924 receives a modulation signal of 427,323 Hz from repeater and timing and control circuit 926. Control circuit 926 also controls switches 910, 912, 918 and 920. Connected to control circuit 926 is crystal 928 for creating a clock signal oscillating at 26.494 MHz.

The modulation performed by repeater 904 is biphase shift key modulation (BPSK), which creates two signals which have frequencies that vary from the incident signal by the modulation rate. The first signal has the same basic shape and amplitude as the incident signal, but with a frequency equal to the sum of the frequency of the incident signal and the modulation rate. In the preferred radar puck, the modulation rate is 427,323 Hz. The second signal has the same basic shape and amplitude as the incident signal, but with a frequency equal to the difference between the frequency of the incident signal and the modulation rate.

In the receive portion of the cycle, the switches are as drawn in Figure 24. When delay line 922 is full, the repeater switches to transmit mode where control 926 reverses switches 910, 912, 918 and 920, and the signal flows out of the delay line, through switch 920 to switch 912, through amplifier 914 followed by amplifier 916, through switch 918 to switch 910 and finally to antenna 908. Repeater 904 switches between receive and transmit at a rate of 26.494 MHz. One reason for the 13 ns delay in line 922 is to allow time to change the four switches.

The circuit of Figure 24 has a shock activated switch and timer 930 which includes an RC decay timer which turns off the repeater after 45 seconds and a shock sensor which is used to turn on the circuit. Repeater 904 could have many (e.g. twenty) permanently programmed unique modulation channels. Thus, different pucks can modulate at different rates using control circuitry in timing and control circuit 926. Alternatively, an RF signal could be sent to the puck to indicate which modulation rate to use. Thus, the base radar unit could determine the signature of each puck. Either way, a puck could be readily identifiable and differentiated from other pucks and other sources of RF transmission.

In theory, a radar base unit sends out a signal which is received by the repeater inside the puck. The repeater amplifies, modulates and retransmits the signal back to the radar base unit. The radar base unit uses a difference in frequency to determine how far the puck is from the unit. The location of the puck in three dimensional space can be determined by using three radar base units simultaneously because the location of the puck can be determined from knowing how far it is from three known points. Alternatively, a radar base unit can use other data related to time of travel of the signal to determine distance.

One method for using puck 900 is for the radar base unit to send out a frequency swept signal called a chirp which may, for example, be a sine wave with a constant amplitude and a frequency which is incrementally stepped over a given period of time. Preferably, a low power S-band radar is used to send signals to the puck in the microwave range. When the radar base unit receives the signal which has been sent by the puck, the radar base unit determines the difference between the frequency of the signal received from the puck and the frequency of the signal currently being sent as part of the chirp. The difference in frequencies can be used by techniques known in the art to determine the distance of the puck from the radar base unit.

Repeater 904 has the added feature that it modulates the radar signal, as described above, to create two signals which have frequencies that vary from the incident signal by the modulation rate. The modulated signal from the puck, when received by the radar base unit, would have the same frequency as a signal from an object much further than where the puck actually is. That is, a radar base unit would determine that the puck was at a phantom site five to ten times further than the actual location of the puck (e.g. that the puck was outside the arena). Since other objects actually at the phantom site would not be able to reflect a strong signal back to the radar base unit, the puck would stand out as the object giving the strongest return near the phantom location. A radar base unit could filter out signals received from objects not at the phantom location (e.g. most objects in the arena), allowing the puck to be located with minimal interference from any unwanted clutter.

Figures 25, 26 and 27 describe an exemplar radar waveform that can be used with puck 900. The chirp, shown in Figure 25, includes 1024 steps from 2.25 GHz to 2.65 GHz with a ten millisecond period. As described above, the radar base unit alternates between transmit and receive mode during the chirp. Figure 26 shows the gating cycle between transmit and receive for the radar base unit which indicates that the radar base unit switches between transmit and receive modes at eight times the frequency stepping rate (819,200 Hz). As shown by Figure 27, 1024 12-bit in-phase and quadrature sample pairs are taken for each 10 msec chirp.

B. Radar System

Many systems can be designed to utilize the advantages of puck 900. One exemplar radar base unit, shown in Fig 28, uses a homodyne conversion architecture with a gated Frequency Modulated Continuous Wave (FMCW) format. Waveform gating allows the use of a single antenna while the FMCW

format allows maximal RF efficiency with minimal information bandwidth. The radar operates with a peak power of one watt, a center frequency of 2.45 GHz, and a FMCW bandwidth of 400 MHz.

The radar base unit of Figure 28 includes two signal paths: a transmit path 948 and a receive path 954. Gates 980 and 982 are used to open and close the transmission and reception paths which alternate, as discussed above with respect to Figure 26. The transmit path will be discussed first. Under the control of radar timing and control circuit 990, a phase continuous phase locked loop chirp generator 984 creates the output waveform and counts in increments of frequency in 1024 steps from 2.25 GHz to 2.65 GHz. The waveform is sent to splitter 986 where substantially identical signals are sent to demodulator 956 (which is part of the receive path) and to amplifier 988 which amplifies the signal to one watt. After amplifier 988, the signal is applied to the +16 dBic helical radar antenna 950 through circulator 952.

A signal is received by antenna 950 and is passed through circulator 952 into a low noise preamplifier 958. The signal is then passed through filter 960 to remove unwanted energies, for example, cellular phone and satellite signals. The filtered signal is transmitted to demodulator 956, which creates in-phase (I) and quadrature (Q) outputs, both of which are filtered (958 and 960) to remove unwanted noise. The two signals are then sent to multipliers 962 and 964 which perform base band translation, at a clock rate of 428,323 Hz. The two signals are then transmitted to amplifiers 956 and 968, and sent through filters 970 and 972. The filtered signals are converted to digital signals in A/D converters 974 and 976, and stored in FIFO 978 before being transmitted to a computer (not shown) via line 992 for processing.

The computer triggers the radar base unit to transmit one chirp via communication with control 990 over line 992. After the chirp, the I/Q samples are read from the radar base unit and processed to extract the puck signal and then calculate its distance using techniques known in the art. In

actual operation this process would happen at the video field rate of 60 Hz. Although the described radar repeater and radar base unit use a specific modulation scheme, the exact modulation scheme used is not critical to the inventive concept and many other suitable modulation schemes may be substituted.

The above described radar base unit is able to determine the distance from the base unit to the puck. Thus, a sphere can be drawn with the center of the sphere being the base unit and the radius of the sphere being the distance from the base unit to the puck. The puck's three-dimensional location can be determined using three base units. If spheres are drawn for each base unit, the three spheres will intersect at two points. One of these points is in the field of play and represents the three-dimensional position of the puck. The second point is an unrealistic location and is discarded. Once the puck's location is determined, a system can enhance the presentation of the puck in a manner similar to that described in Figures 15-21.

The active radar system discussed above can be used with other objects in sporting events. For example, the radar repeater can be placed inside helmets, in various balls, in race cars, bicycles, etc.

C. Alternatives

One alternative utilizes a puck or other objects which includes an RF transmitter rather than a radar repeater; for example, a chirping puck. The chirping puck would send out a signal which includes periodic chirps. Figure 29 is an example waveform with the Y axis representing frequency and the X axis representing time. A majority of time, the chirping puck is transmitting a signal with a frequency of F_0. Every period, the puck transmits a chirp which includes a signal whose frequency first increases from F_0 to a maximum frequency and then decreases back to F_0. The signal sent by the puck is received by a radar receiver which can determine relative distance.

That is, two radar receivers can determine that one of the radar receivers is M meters closer to the puck than the other radar receiver. Four radar receivers are needed to determine the puck's three-dimensional location. The technology to utilize the chirping puck and accompanying radar receivers can be derived from the above discussed radar technology and from other technology known in the art. One alternative includes having multiple objects having RF transmitters, each transmitter sending a unique signal. Thus, a system can track more than one object and differentiate between the objects being tracked. Thus, when enhancing the television presentation each object separately being tracked can be enhanced distinctly.

Another alternative includes an object with an RF transmitter and a receiver. A base unit sends a signal to the object indicating when the object should transmit. The base unit can be turned on one specific object at a unique frequency so that objects not in use will not transmit any signals and the base unit can determine which object the signal is coming from. Thus, objects can be enhanced distinctly.

III. Radar with a Passive Reflecting Target

Another embodiment the present invention includes using the graphics enhancement system of the present invention with a radar base unit and a passive reflecting target. Similar to the radar with active transponder, three or more radar base units are needed to determine the three dimensional location of the object. A radar base unit sends a radar signal to the object which reflect the signal back to the base unit. The object being tracked does not include an active transponder (e.g. an unmodified baseball). Rather, the unmodified object itself passively reflects the radar signal or the object is modified to include a reflective element. One example of modifying an object includes adding a metal object or sputtering a film of metal throughout a surface. Another option includes adding a retro-reflector in the object. A

retro-reflector returns energy directly back to the transmitter. One example of a retro-reflector is a trihedral, which is also known as a corner reflector. To use passive radar technology with the present invention, those skilled in the art could modify the system of Figure 28 or use other systems known in the art. For example, United States Patent Number 5,150,895 discloses a method of and a system for determining the position of a ball relative to a playing field using a signal reflecting off of a passive radar reflecting element.

Figure 30 shows an outline of football 1030. Inside football 1030 is a corner reflector which includes three walls 1031, 1032 and 1033. All three walls are perpendicular to each other. The corner reflector is made from metalized mylar or another suitable metal. Metalized mylar is particularly useful because it is lightweight and an excellent radar reflector.

Figure 31 shows golf ball 1020 with core 1026. Surrounding core 1026 is one or more wrapped rubber strands 1024. Encasing the rubber strands is shell 1022. Sputtered to the inside surface of shell 1022 are aluminum filings 1028 which are used as radar signal reflecting elements. Alternatives to the aluminum filings could be aluminum paint or any other good radar repeater. Additionally, the radar signal reflecting element can be dispersed within the wrapped rubber strand rather than attached to the inside of shell 1022. Golf ball 1020 could also be used with a Doppler radar system.

Figure 32 shows a tennis ball which includes radar signal reflecting elements. Tennis ball 1000 includes an outer ball body 1002 which is partially cut away to show radar signal reflecting elements 1004. In one embodiment the radar reflective elements are metallic or metalized plastic foils that are attached to the inside surface of outer ball body 1002. Alternatively, tennis ball 1000 can be constructed to include a plurality of metallic particles embedded in outer ball body 1002. The radar system can be used to track other objects including soccer balls, helmets, bicycles, cars, etc.

IV. Optical Recognition

Another embodiment contemplates using a sensor employing optical recognition or pattern recognition. Such a system is based around video frames from cameras and relies on properly positioning the cameras. For example, in baseball a camera should be located behind the catcher, down the base paths, overlooking the infield and overlooking the outfield. In golf, cameras should be near the tee, in sight of the fairway and in proximity to the hole. The system operates best when the cameras are positioned such that the object to be tracked is always in the field of view of at least one or two cameras. Finding objects using optical or pattern recognition is known in the art. Examples of systems known in the art include United States Patent Number 4,924,507, Real-Time Optical Multiple Object Recognition and Tracking System and Method; United States Patent Number 4,950,050, Optical Target Recognition System; United States Patent Number 5,060,282, Optical Pattern Recognition Architecture Implementing the Mean-Square Error Correlation Algorithm; U.S. Patent Number 5,241,616, Optical Pattern Recognition System Utilizing Resonator Array; U.S. Patent Number 5,274,716, Optical Pattern Recognition Apparatus; and Digital Image Processing and Computer Vision, Robert J. Schalkoff, John Wiley & Sons, Inc. (1989), all of which are incorporated by reference. An optical recognition system that determines the three dimensional location of an object can be used by a graphics center and production center in a manner similar to that described above to enhance a television presentation of the object.

V. Additional Graphical Enhancements

Additional enhancements particular to a system for enhancing a baseball game include graphically exaggerating a curve in the trajectory of a curve ball, providing statistics about a pitch, simulating the batter's point of

view, graphically comparing a curve ball to a fast ball and other enhancements related to the location and movement of the ball.

The current invention can also be used to enhance live broadcast video based on past events. For example, ski races allow one racer to ski at a time. During television broadcast of ski competitions, television broadcasters divide the race course into four or five check points. When the racer crosses a particular check point, the broadcaster compares the current skier's time to the time of a previous skier. Using the current invention, the location of a first skier can be tracked (with timing information) along with the pan, tilt, zoom and location of various broadcast cameras. A video processor stores the data in memory. When a second skier races, the video processor uses the stored information about the first racer and the location, pan, tilt, and zoom of the broadcast camera covering the second skier to create a graphic of the first skier. The graphic of the first skier would be overlaid or edited into the video frame with the second skier at the location where the first skier was at the particular relative time of the broadcast. Thus, during the race viewers would be able to see the second skier race against the first skier (phantom skier or phantom object). Similar enhancements can be made with different race events or other types of sporting competitions.

Another enhancement that can be accomplished using the disclosed system is future path display. Video processor 604 can determine the object's trajectory using techniques well known in the art and predict the path of the object. The predicted path can be displayed in the video frame. In one embodiment, a target can appear at the end of the predicted path, for example, a baseball glove. In one alternative, a system performing look ahead processing can delay the video data a given number of frames, thereby, allowing video processor 604 to verify the predicted path for the next given number of frames.

The present invention can be used with many different sporting events. The foregoing detailed description of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and obviously many modifications and variations are possible in light of the above teaching. The described embodiments of the system for enhancing the television presentation of an object at a sporting event were chosen in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. For example, the inventors contemplate that the present invention can be used with many different suitable sensors and graphics processing systems. It is intended that the scope of the invention be defined by the claims appended hereto.

CLAIMS

What is claimed is:

1. A method for enhancing a television presentation of an object during a sporting event, comprising the steps of:

determining a first location of said object at a first time;

capturing a first video image which includes said object, said object being at a particular position in said first video image;

determining said particular position of the object in said first video image; and

enhancing said first video image at said particular position.

2. A method according to claim 1, wherein:

said step of determining a first location finds a three dimensional location of the object.

3. A method according to claim 1, wherein:

the object is a game object used at a sporting event.

4. A method according to claim 3, wherein:

said game object is a hockey puck.

5. A method according to claim 3, wherein:

said game object is a football.

6. A method according to claim 1, further including the step of:

sensing flashes.

7. A method according to claim 1, further including the step of:

sensing pulses from said object.

8. A method according to claim 1, wherein:

said step of determining a first location includes:

sensing the object, including creating data representing a position of the object; and

removing false detections from said data.

9. A method according to claim 1, wherein:

said step of enhancing includes providing a viewer with remote control capabilities.

10. A method according to claim 1, further including the step of:

interpolating said object's location if said object's location cannot be determined directly.

11. A method according to claim 1, wherein.

said step of enhancing is finished within one second or less of said step of capturing.

12. A method according to claim 1, wherein.

said step of enhancing is finished within one third of a second of said step of capturing.

13. A method according to claim 1, wherein:

said step of determining a first location includes:

determining lines of position;

determining a probability for spaces along and near said lines of position; and

finding said first location based on probability.

14. A system for enhancing the television presentation of an object in a sporting event, said system to be used in conjunction with a camera, said system comprising:

a first sensor; and

a processor in communication with said first sensor, said processor programmed to determine said object's position in a video frame of said camera.

15. A system according to claim 14, further including:

a video modification unit, receiving data from said processor and said camera.

16. A system according to claim 14, further including:

a synchronization system adpated to synchronize said sensor to said object.

17. A system according to claim 14, wherein:

said first sensor includes a radar unit.

18. A system according to claim 14, wherein:

said first sensor includes an optical sensor.

19. A system according to claim 14, further including:

a flash detector.

20. A system for enhancing the television presentation of an object at a sporting event, comprising:

a broadcast camera;

a pan sensor connected to said broadcast camera;

a tilt sensor connected to said broadcast camera;

a zoom sensor connected to said broadcast camera;

a first infrared sensor unit including a first master sensor and a first slave sensor;

a second infrared sensor unit including a second master sensor and a second slave sensor;

a first processor in communication with said first infrared sensor;

a second processor in communication with said second infrared sensor;

a third processor in communication with said first, processor, said second processor, said pan sensor, said tile sensor and said zoom sensor;

a flash detector in communication with said first processor; and

one or more pulse detectors in communication with said first and second infrared sensors.

AMENDED CLAIMS

[received by the International Bureau on 25 November 1996 (25.11.96); original claims 1-20 replaced by amended claims 1-45 (8 pages)]

1. A method for enhancing a television presentation of an object during a sporting event, comprising the steps of:

determining a location of said object at a first time;

capturing a first video image which includes said object, said object being at a particular position in said first video image;

determining said particular position of the object in said first video image; and

enhancing said first video image based on said particular position.

2. A method according to claim 1, wherein:

said step of determining a location finds a three dimensional location of the object.

3. A method according to claim 1, wherein:

the object is a game object used at a sporting event.

4. A method according to claim 1, wherein:

said step of determining a location uses infrared technology.

5. A method according to claim 1, wherein:

said step of determining a location uses radar technology.

6. A method according to claim 1, further including the step of:

sensing flashes.

7. A method according to claim 1, further including the step of:
sensing pulses from said object.

8. A method according to claim 1, wherein:
said step of determining a location includes:
sensing said object, including creating data representing said location of said object; and
removing false detections from said data.

9. A method according to claim 8, wherein:
said step of removing false detections includes removing data outside of a defined set of boundaries.

10. A method according to claim 8, wherein:
said step of removing false detections includes subtraction.

11. A method according to claim 8, wherein:
said step of removing false detections includes filtering data.

12. A method according to claim 8, wherein:
said step of removing false detections includes using a region of play filter.

13. A method according to claim 8, wherein:
said step of removing false detections includes removing data representing exclusion zones.

14. A method according to claim 8, wherein:

said step of removing false detections includes removing data if a flash occurred.

15. A method according to claim 8, wherein:
said step of removing false detections includes removing data below a predefined threshold.

16. A method according to claim 1, further including the step of:
determining a broadcast camera's pan, tilt and zoom, said broadcast camera being used to capture said first video image.

17. A method according to claim 1, wherein:
said step of enhancing said first video image includes:
creating a second video image; and
combining said second video image with said first video image.

18. A method according to claim 1, wherein:
said step of enhancing includes adding a graphic to said first video image logically near said particular position.

19. A method according to claim 1, wherein:
said step of enhancing includes adding a trajectory to said first video image.

20. A method according to claim 1, wherein:
said step of enhancing includes creating a video frame and combining video frame with said first video image.

21. A method according to claim 1, wherein:

said object is a game object, said game object includes an electromagnetic transmitter adapted to transmit an electromagnetic signal not visible to a human eye.

22. A method according to claim 1, further including the step of:

interpolating said object's location if said object's location cannot be determined directly.

23. A method according to claim 1, wherein:

said step of determining a location includes:

determining lines of position;

grouping pairs of said lines of position;

determining one or more points of closest contact for at least a subset of said pairs of lines of position; and

determining a center of said points of closest contact.

24. A method according to claim 1, wherein:

said step of determining a location includes:

determining lines of position;

determining probabilities for spaces near said lines of position; and

finding said location based on said probabilities.

25. A method according to claim 1, further including the step of:

inserting data into a television signal, said data relating to said object.

26. A system for enhancing the television presentation of an object

in a sporting event, said system to be used in conjunction with a camera, said system comprising:

a first sensor; and

one or more processors in communication with said first sensor, said processor programmed to determine said object's position in a video frame of said camera.

27. A system according to claim 26, wherein:

said processor is programmed to determine said object's three dimensional location.

28. A system according to claim 26, further including:

a flash detector in communication with said one or more processors.

29. A system according to claim 26, further including:

one or more field of view sensors coupled to said camera, said one or more processors determines a three dimensional location of said object and uses data from said field of view sensor to determine said object's position in a video frame from said camera.

30. A system according to claim 29, further including:

a video modification unit, said video modification receives data from said one or more processors and said camera.

31. A system according to claim 29, further including:

said field of view sensors includes pan and tilt sensors.

32. A system according to claim 29, wherein:

said field of view sensors further includes a zoom sensor.

33. A system according to claim 29, wherein:

said first sensor includes a master infrared detector and a slave infrared detector; and

said one or more processors subtract slave infrared detector data from master infrared detector data.

34. A system according to claim 29, further including a flash sensor.

35. A system for enhancing the television presentation of an object at a sporting event, said system to be used in conjunction with a camera, comprising:

a field of view sensor coupled to said camera;

a first infrared pulse detector;

a first infrared sensor unit receiving data from said first infrared pulse detector and from said object; and

one or more processors receiving data from said field of view sensor and said first infrared sensor unit.

36. A system according to claim 35, further including:

a flash detector, in communication with said one or more processors.

37. A system according to claim 35, wherein:

said first infrared sensor unit includes a master infrared sensor and a slave infrared sensor.

38. A system according to claim 35, further including:

a second infrared sensor unit.

39. A system according to claim 35, wherein:
said first infrared pulse detector includes:
a photodetector;
an infrared filter in front of said photodetector;
a leading edge threshold detector in communication with said photodetector; and
a trailing edge threshold detector in communication with said photodetector.

40. A system according to claim 35, further including:
a collector box; and
a plurality of infrared pulse detectors connected to said collector box.

41. A system according to claim 35, wherein:
said one or more processors includes a first front end processor and a video processor, said first front end processor in communication with said first infrared sensor unit and said field of view electronics, said video processor in communication with said first front end processor; and
said system further including:
a memory in communication with said video processor,
a video modification unit in communication with said video processor,
a video control unit in communication with said video camera, and
a delay unit in communication with said video control unit and said video modification unit.

42. A system according to claim 41, further including:
a second infrared sensor unit; and
a second front end processor, in communication with said second infrared processor unit and said video processor.

43. A system according to claim 35, wherein:
said field of view sensor includes a pan sensor, a tilt sensor and a zoom sensor.

44. A system according to claim 35, wherein:
said one or more processors include:
means for performing brightness threshold analysis;
means for performing subtraction; and
means for boundary determinations.

45. A system according to claim 35, wherein:
said one or more processors include:
means for performing field of play filters; and
means for using exclusion zones.

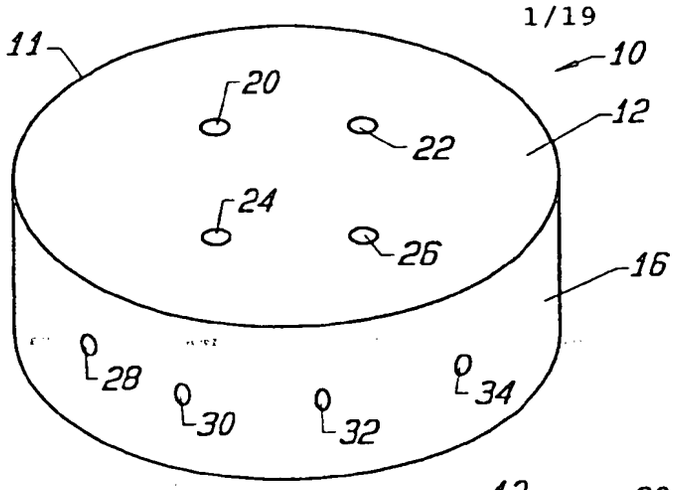


FIG. 1

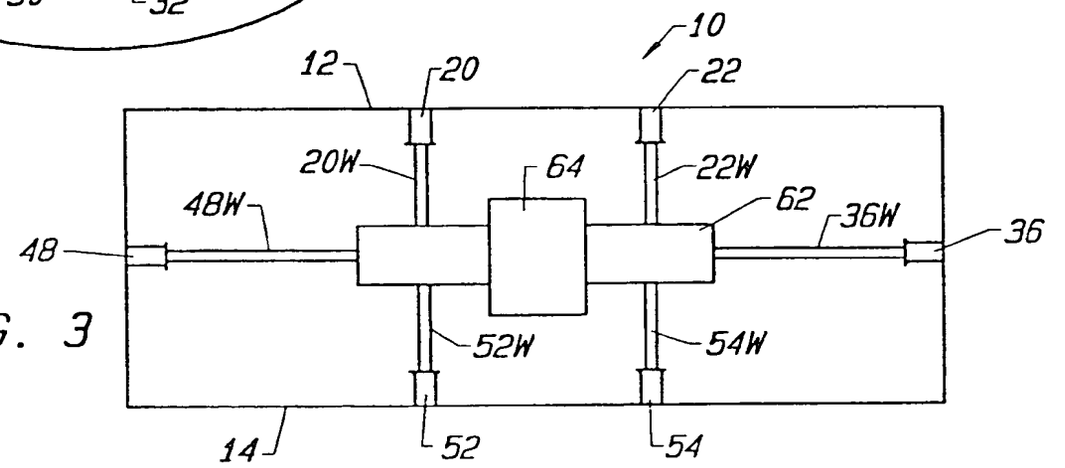


FIG. 3

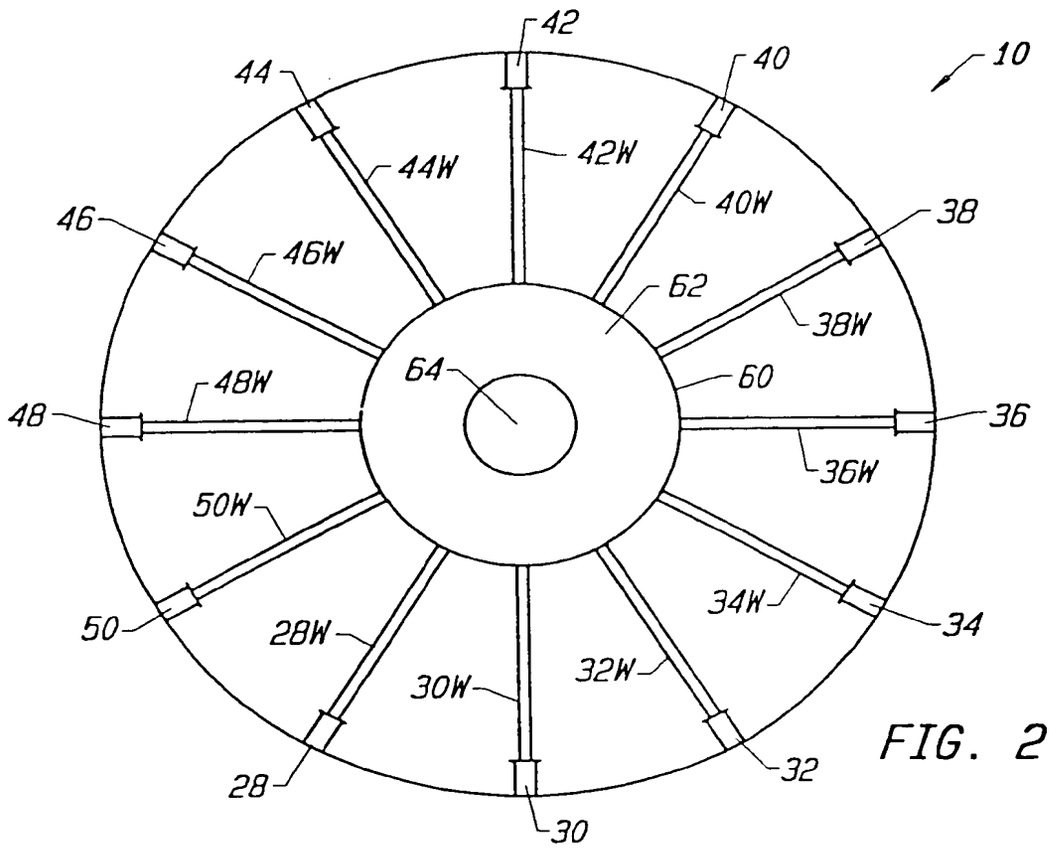


FIG. 2

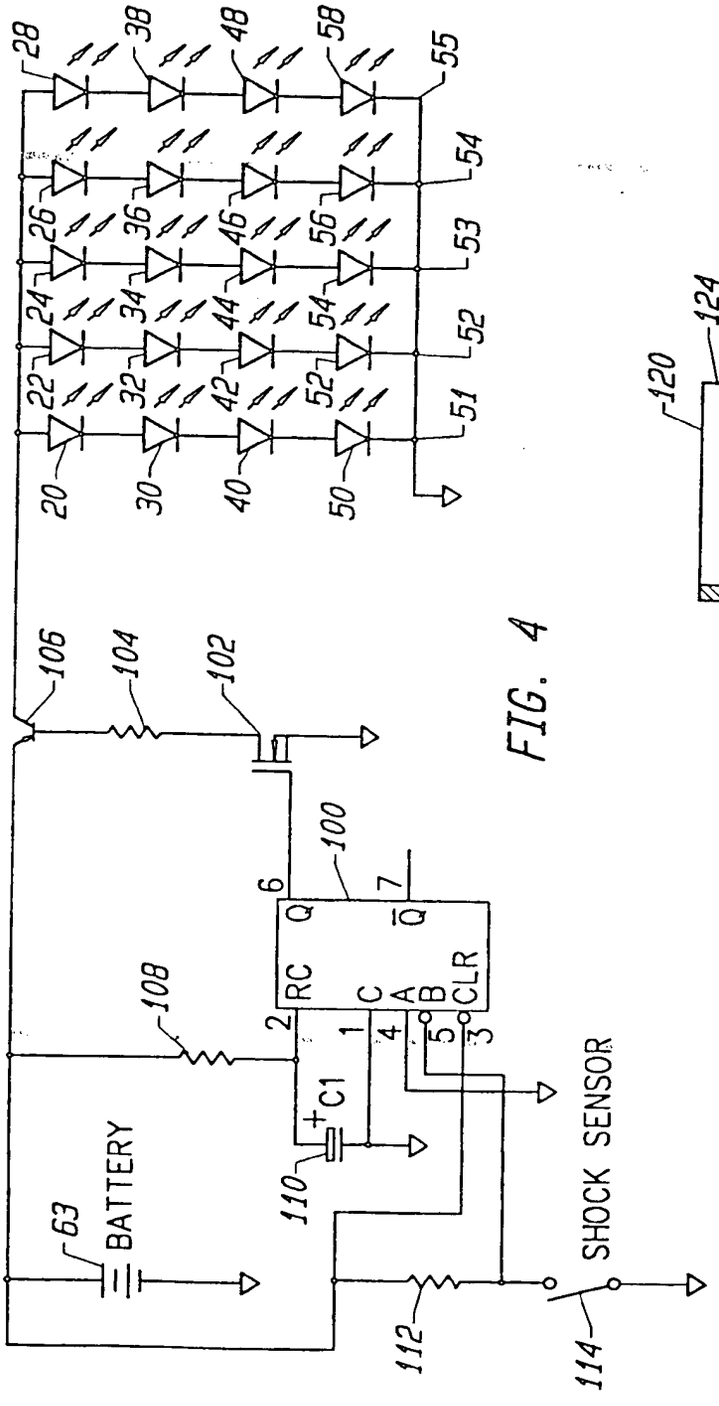


FIG. 4

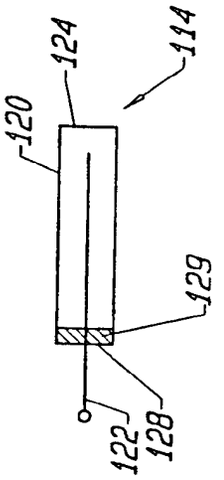


FIG. 5

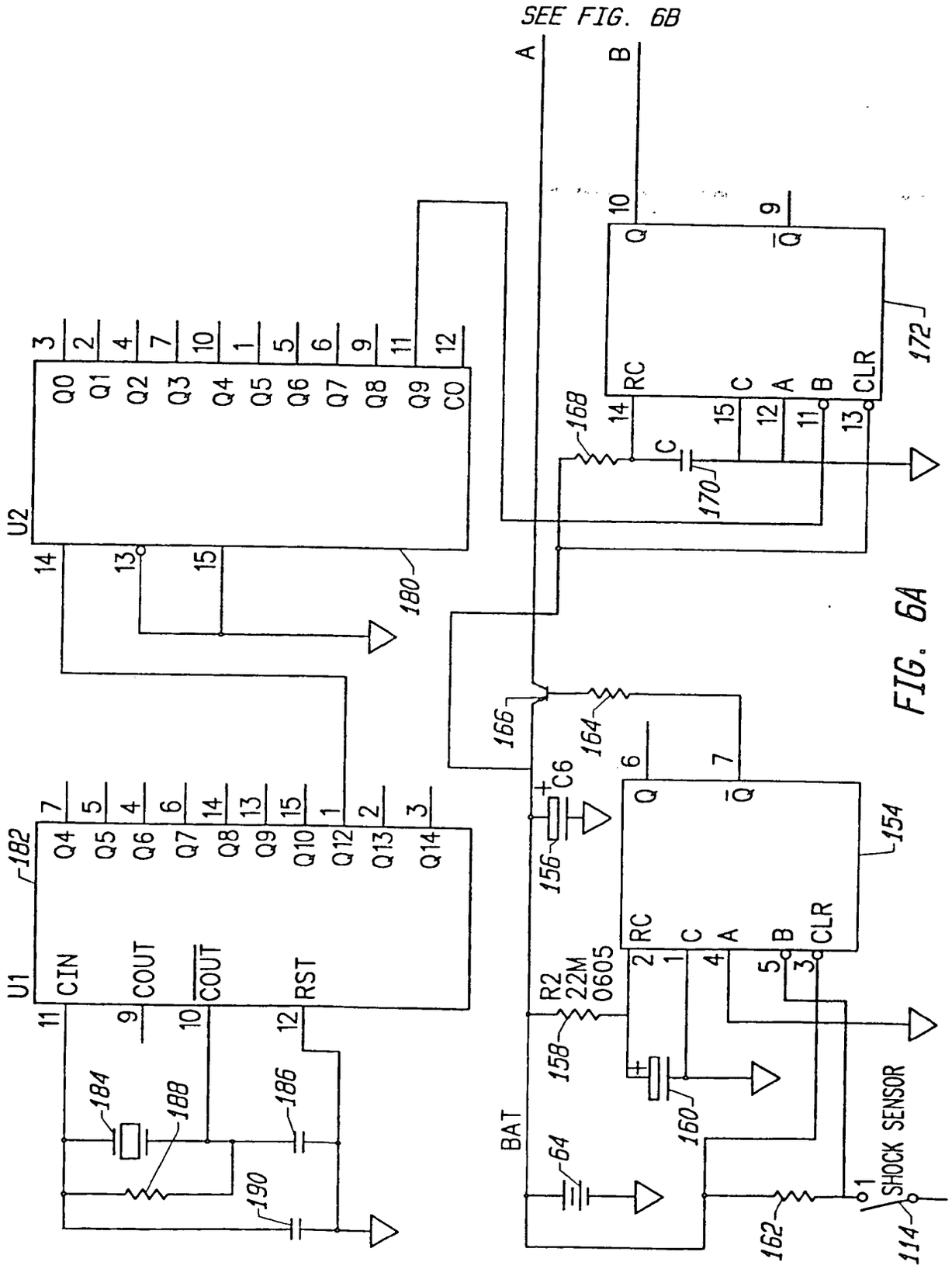


FIG. 6A

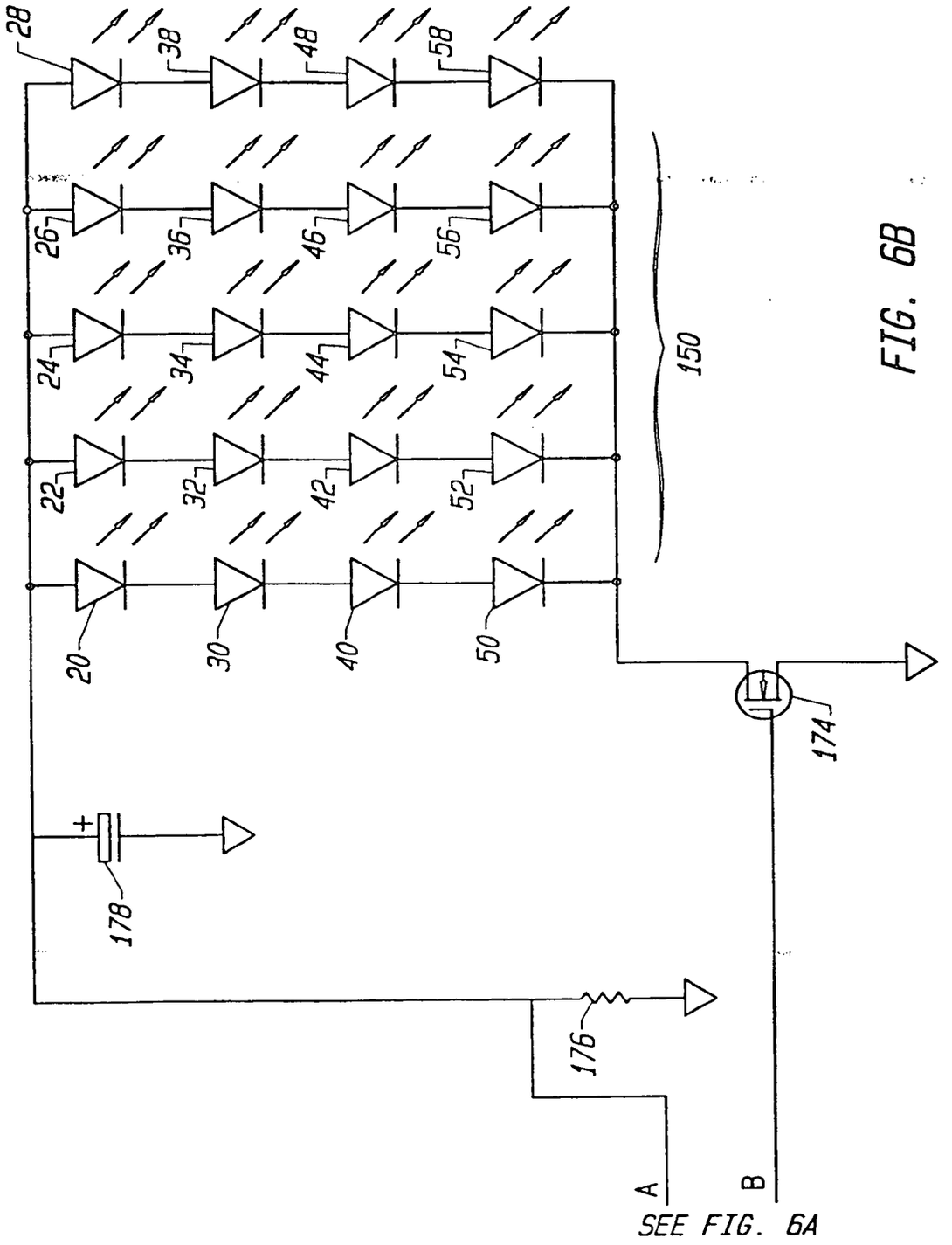
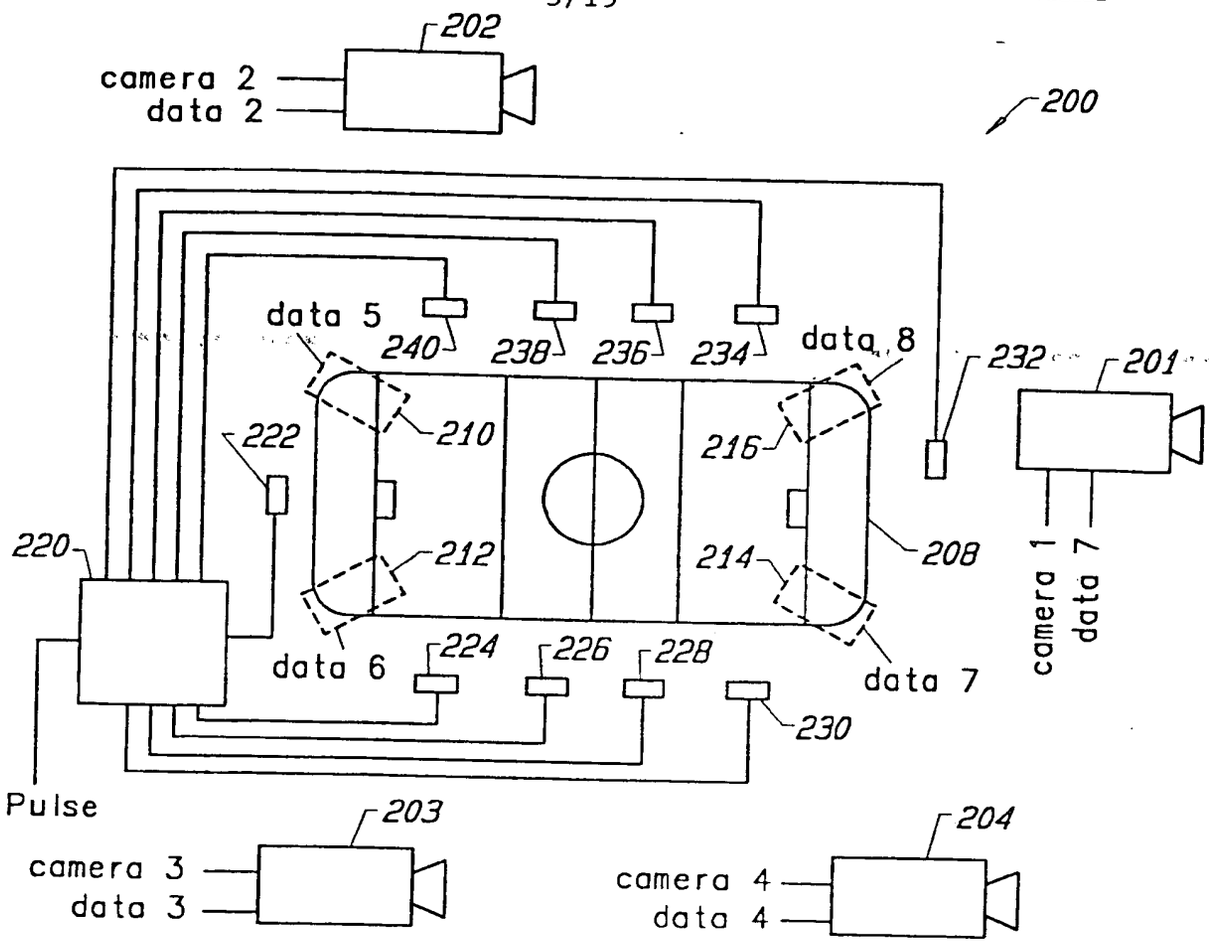

28
38
48
58
26
36
46
56
24
34
44
54
22
32
42
52
20
30
40
50
150
174
178
176
A
B
SEE FIG. 6A

FIG. 6B


202
camera 2
data 2
200
data 5
240
238
236
234
data 8
232
201
222
210
216
220
212
214
208
camera 1
data 7
data 6
224
226
228
data 7
230
Pulse
203
camera 3
data 3
204
camera 4
data 4

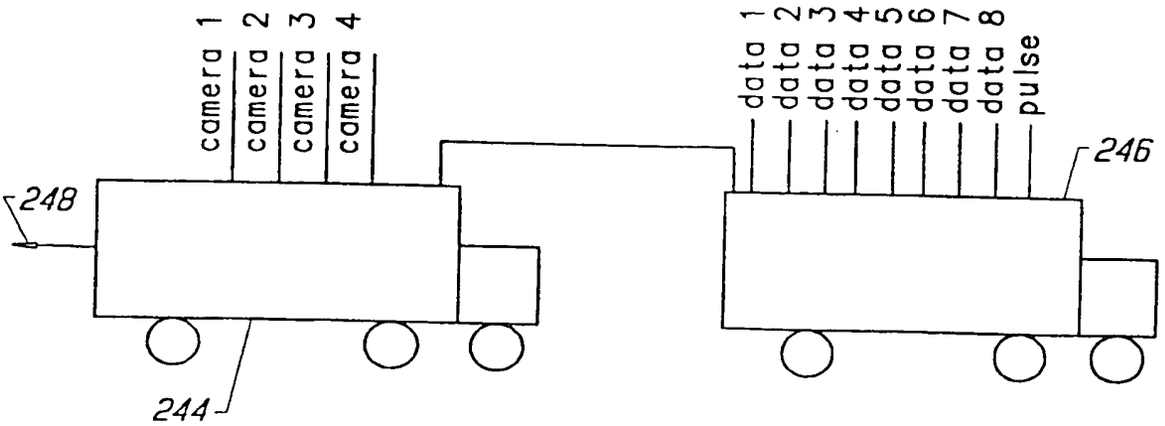

camera 1
camera 2
camera 3
camera 4
data 1
data 2
data 3
data 4
data 5
data 6
data 7
data 8
pulse
248
246
244

FIG. 7

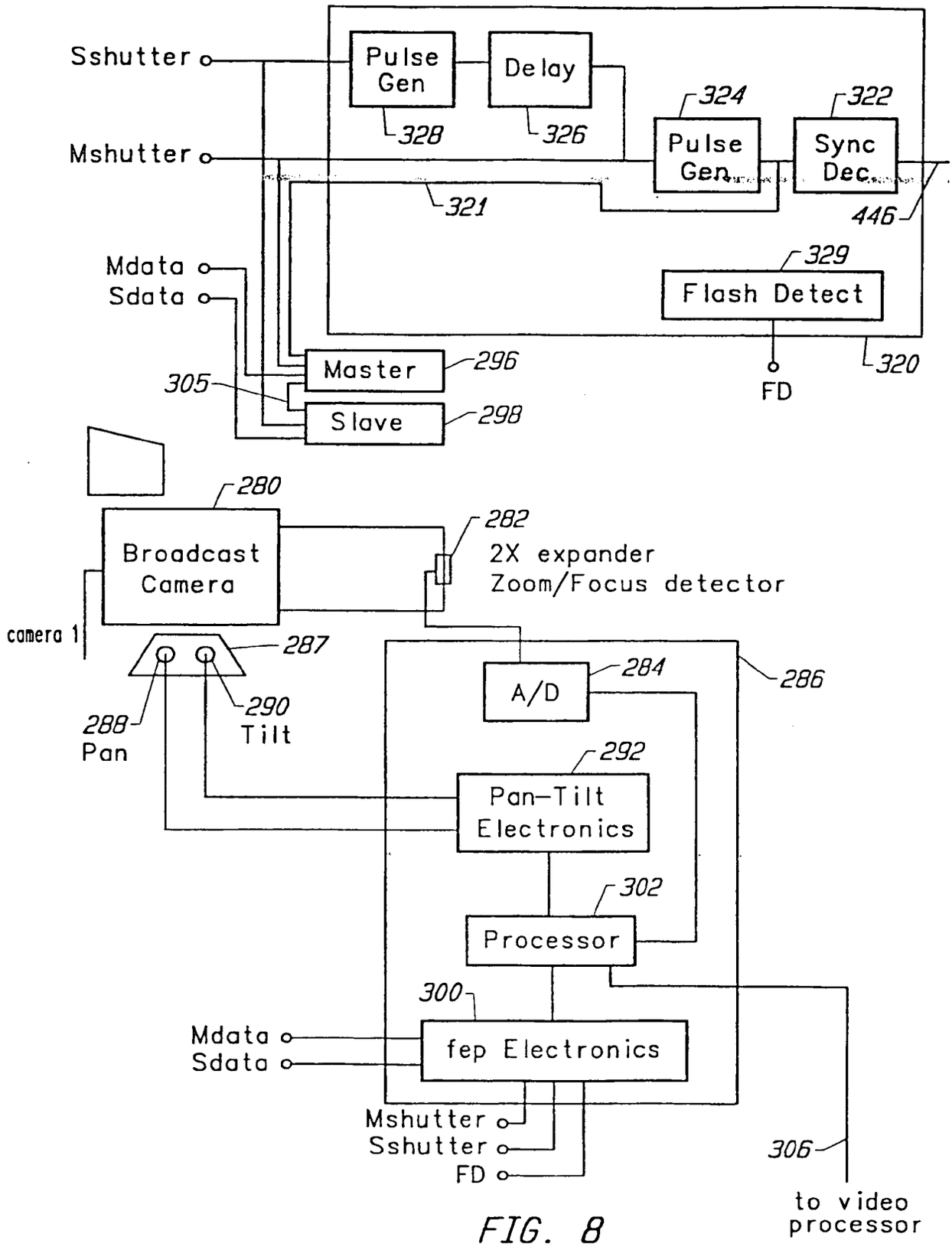


FIG. 8

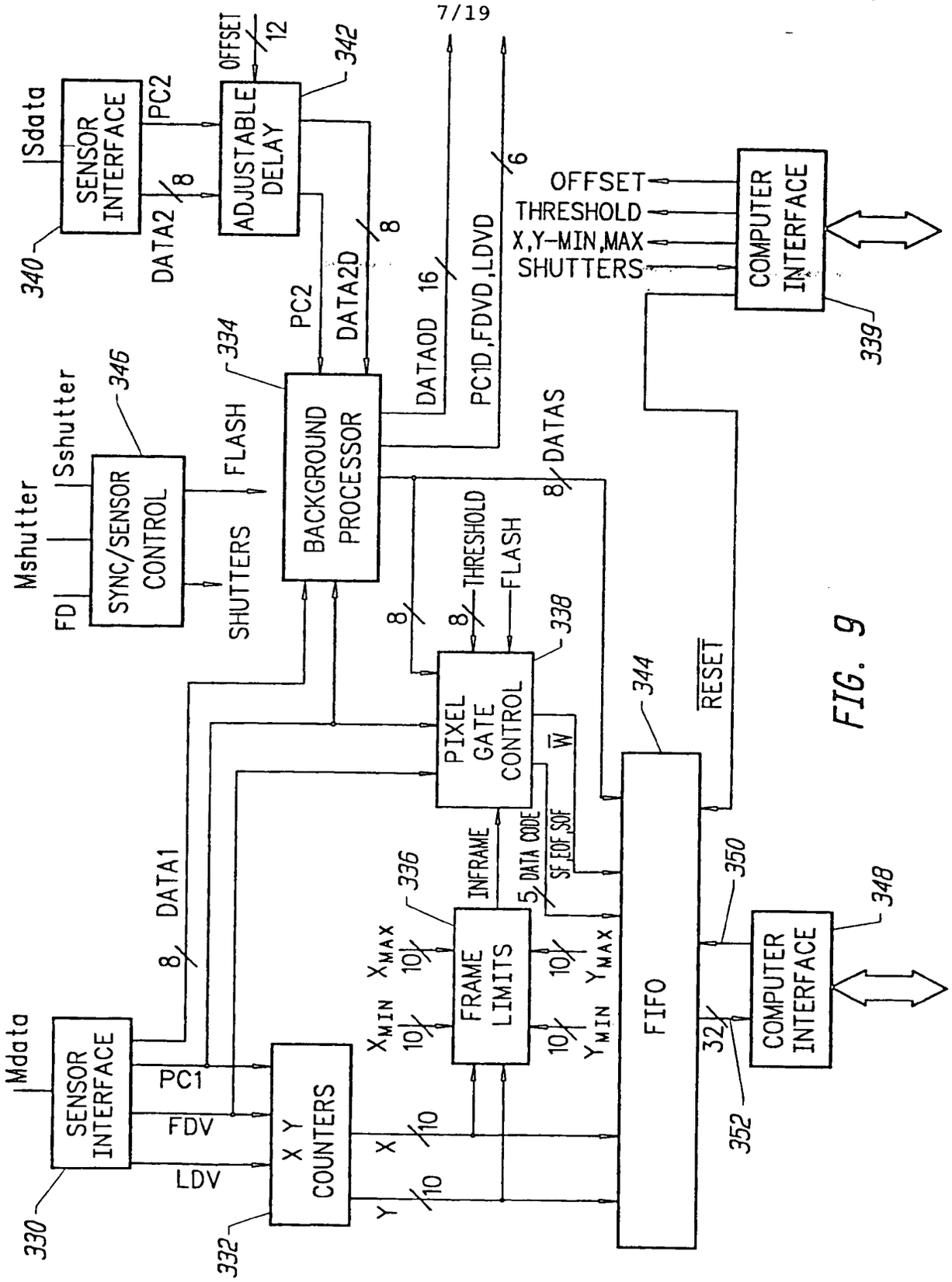

Sdata
SENSOR INTERFACE
340
PC2
8
DATA2
OFFSET
12
ADJUSTABLE DELAY
342
8
DATA2D
PC2
334
BACKGROUND PROCESSOR
DATAOD 16
PC1D,FDVD,LDVD
6
OFFSET
THRESHOLD
X,Y-MIN,MAX
SHUTTERS
COMPUTER INTERFACE
339
Mshutter
Sshutter
346
FD
SYNC/SENSOR CONTROL
SHUTTERS
FLASH
DATAS
8
8
THRESHOLD
FLASH
338
PIXEL GATE CONTROL
W
344
RESET
DATA1
8
INFRAME
5
DATA CODE
SF,EOF,SOF
336
X_{MAX}
10
X_{MIN}
10
FRAME LIMITS
10
Y_{MAX}
10
Y_{MIN}
FIFO
350
348
COMPUTER INTERFACE
32
352
Mdata
SENSOR INTERFACE
PC1
FDV
LDV
330
X
10
Y
10
X Y COUNTERS
332

FIG. 9

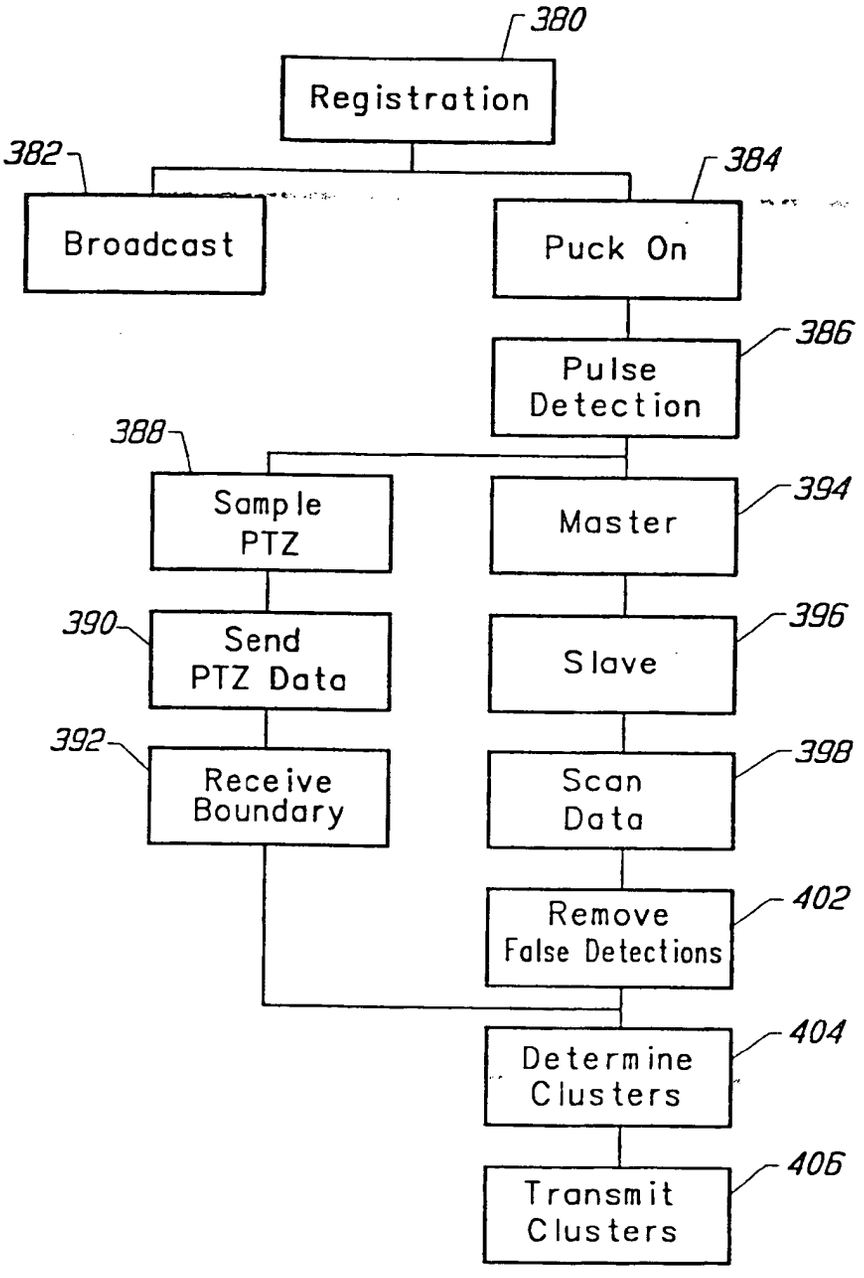

380
Registration
382
Broadcast
384
Puck On
386
Pulse Detection
388
Sample PTZ
394
Master
390
Send PTZ Data
396
Slave
392
Receive Boundary
398
Scan Data
402
Remove False Detections
404
Determine Clusters
406
Transmit Clusters

FIG. 10

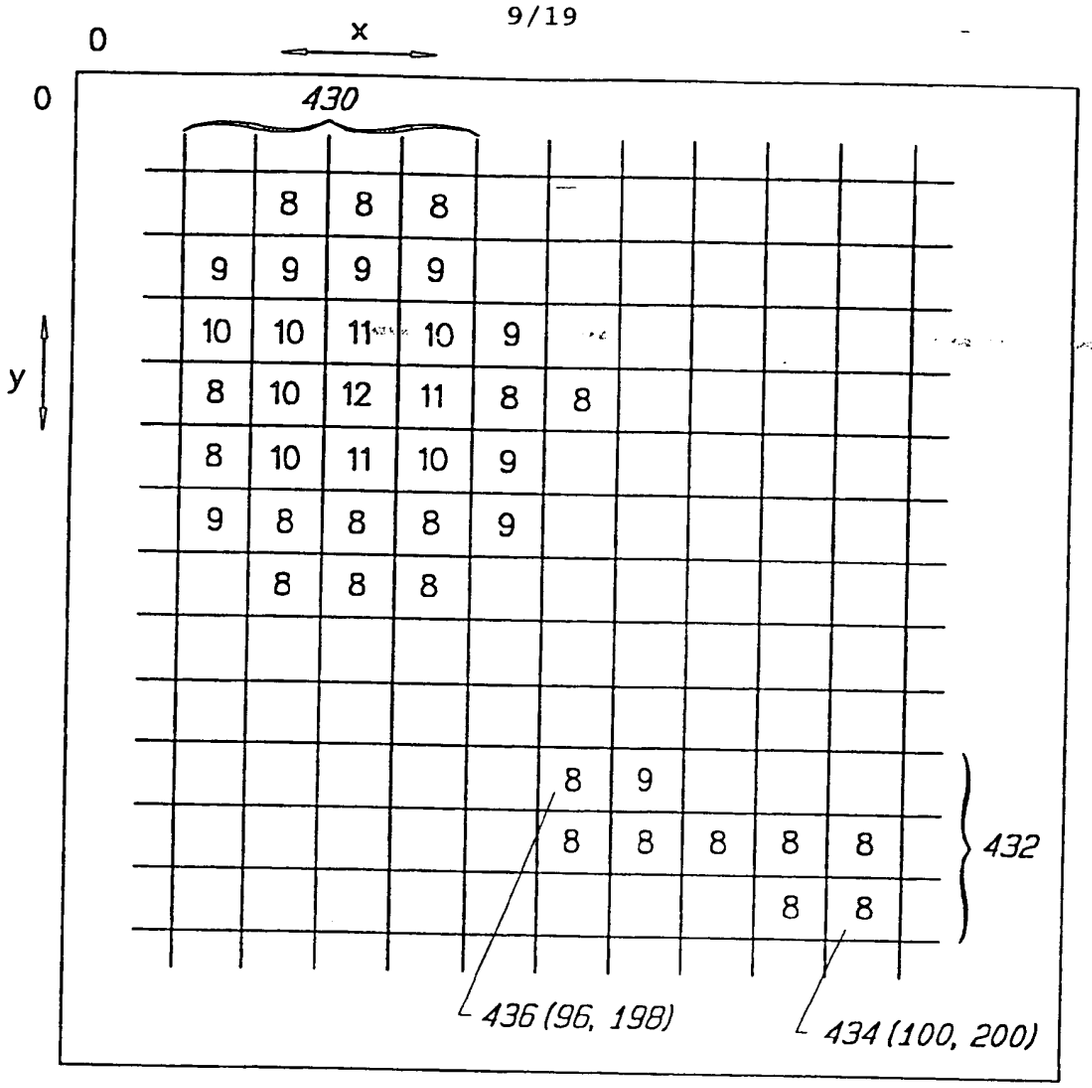

0
x
0
430
y
8 8 8
9 9 9 9
10 10 11 10 9
8 10 12 11 8 8
8 10 11 10 9
9 8 8 8 9
8 8 8
8 9
8 8 8 8 8
8 8
432
436 (96, 198)
434 (100, 200)

FIG. 11

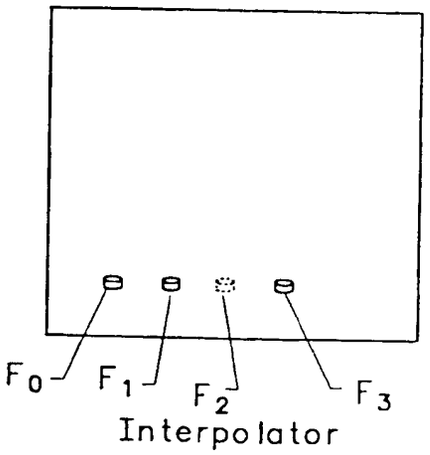

F0
F1
F2
F3
Interpolator

FIG. 19

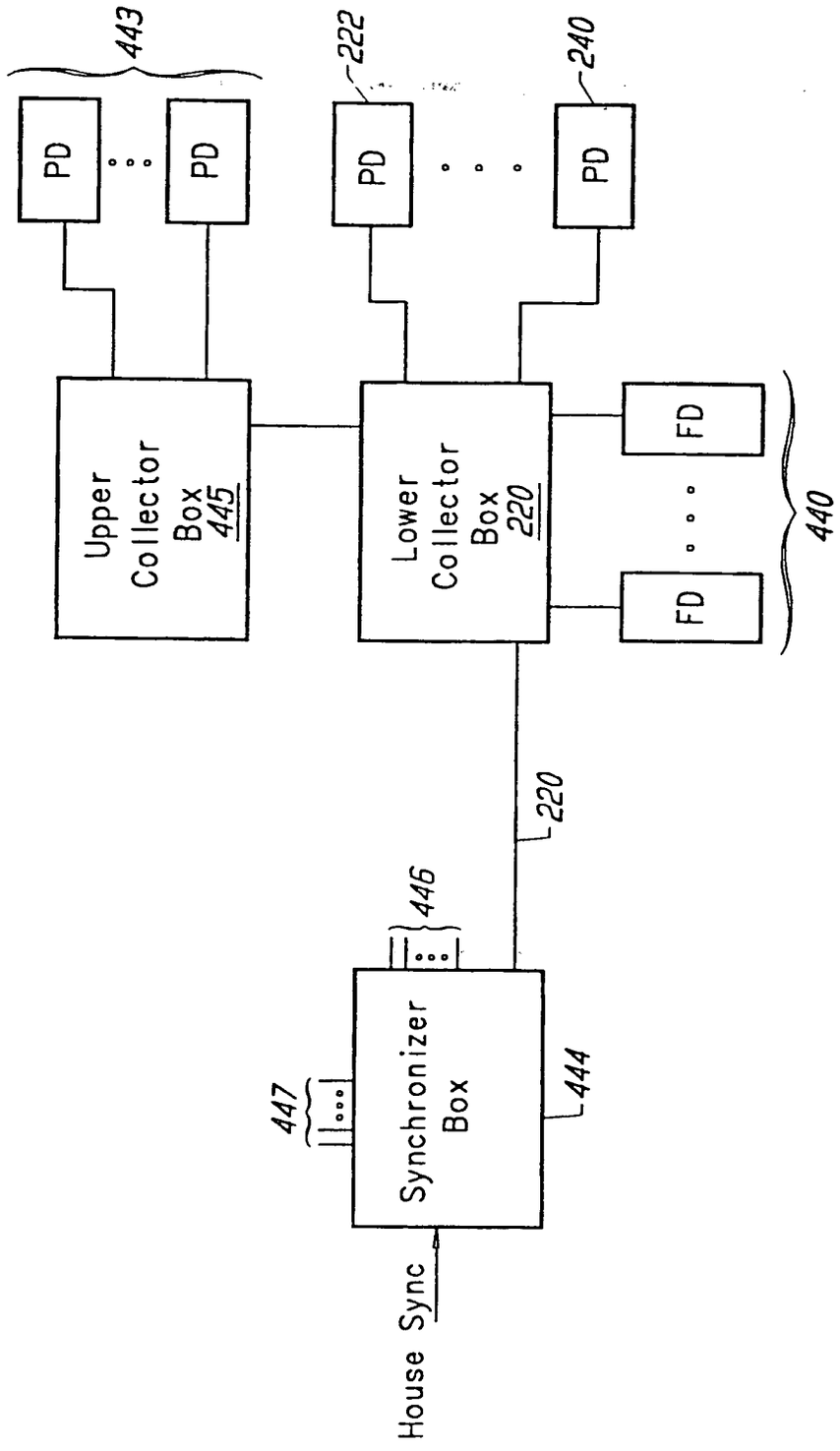

443
222
240
PD
PD
PD
PD
Upper Collector Box 445
Lower Collector Box 220
FD
FD
440
220
446
447
Synchronizer Box
444
House Sync

FIG. 12

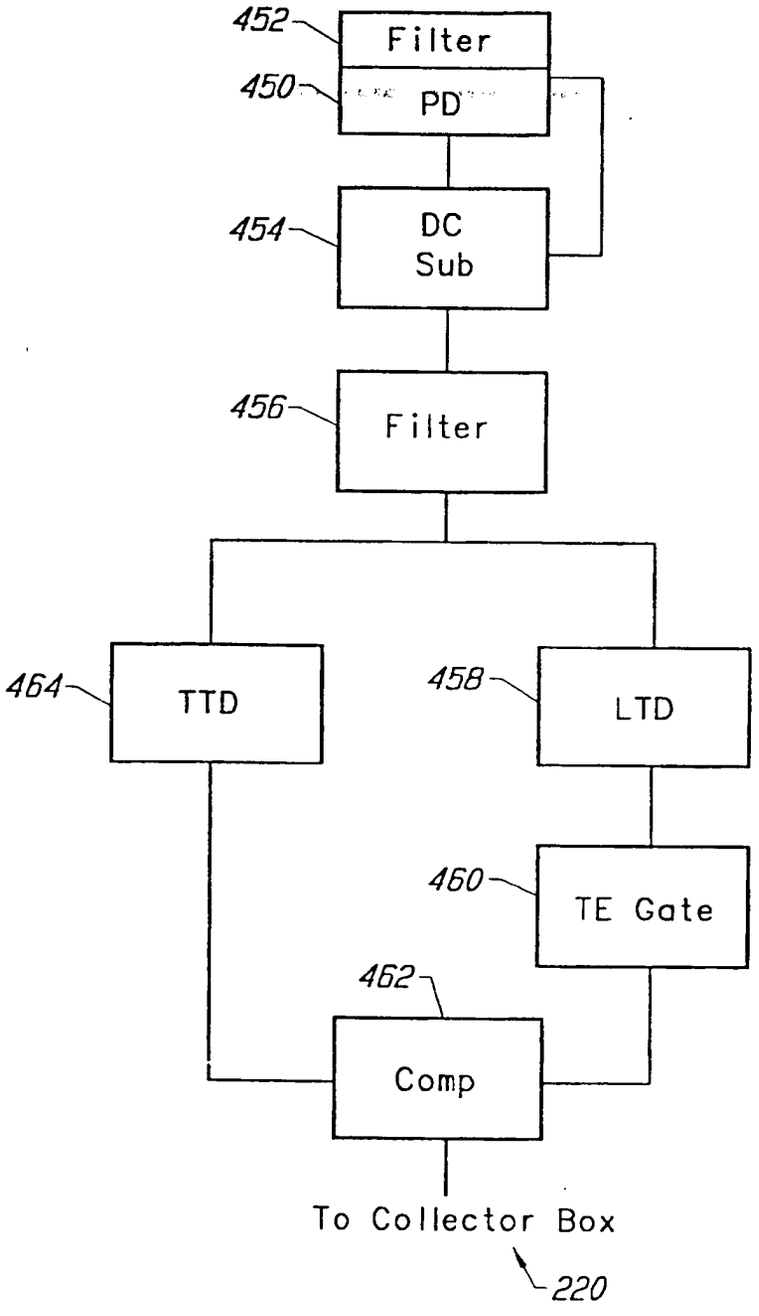
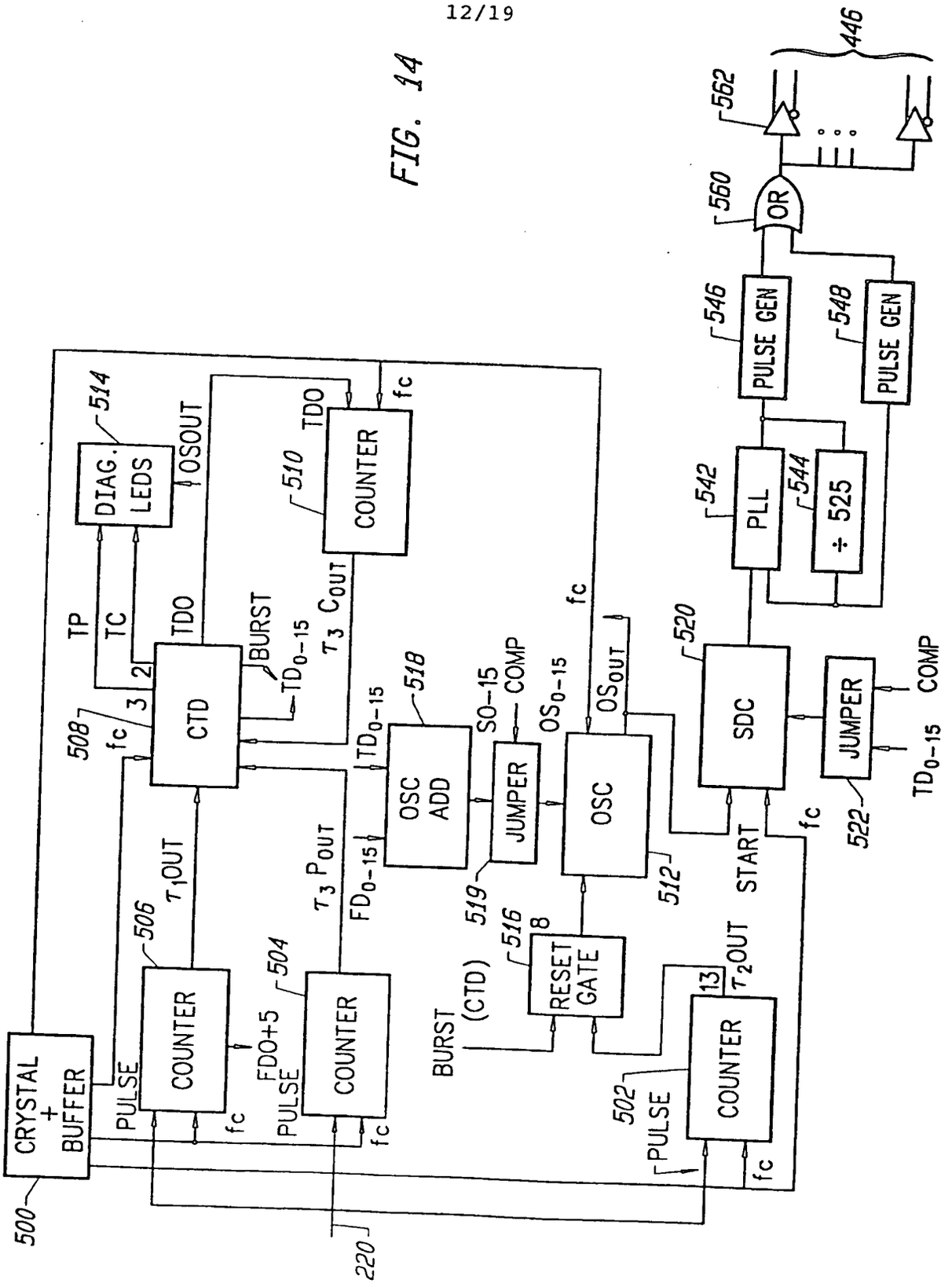

452
Filter
450
PD
454
DC
Sub
456
Filter
464
TTD
458
LTD
460
TE Gate
462
Comp
To Collector Box
220

FIG. 13

FIG. 14



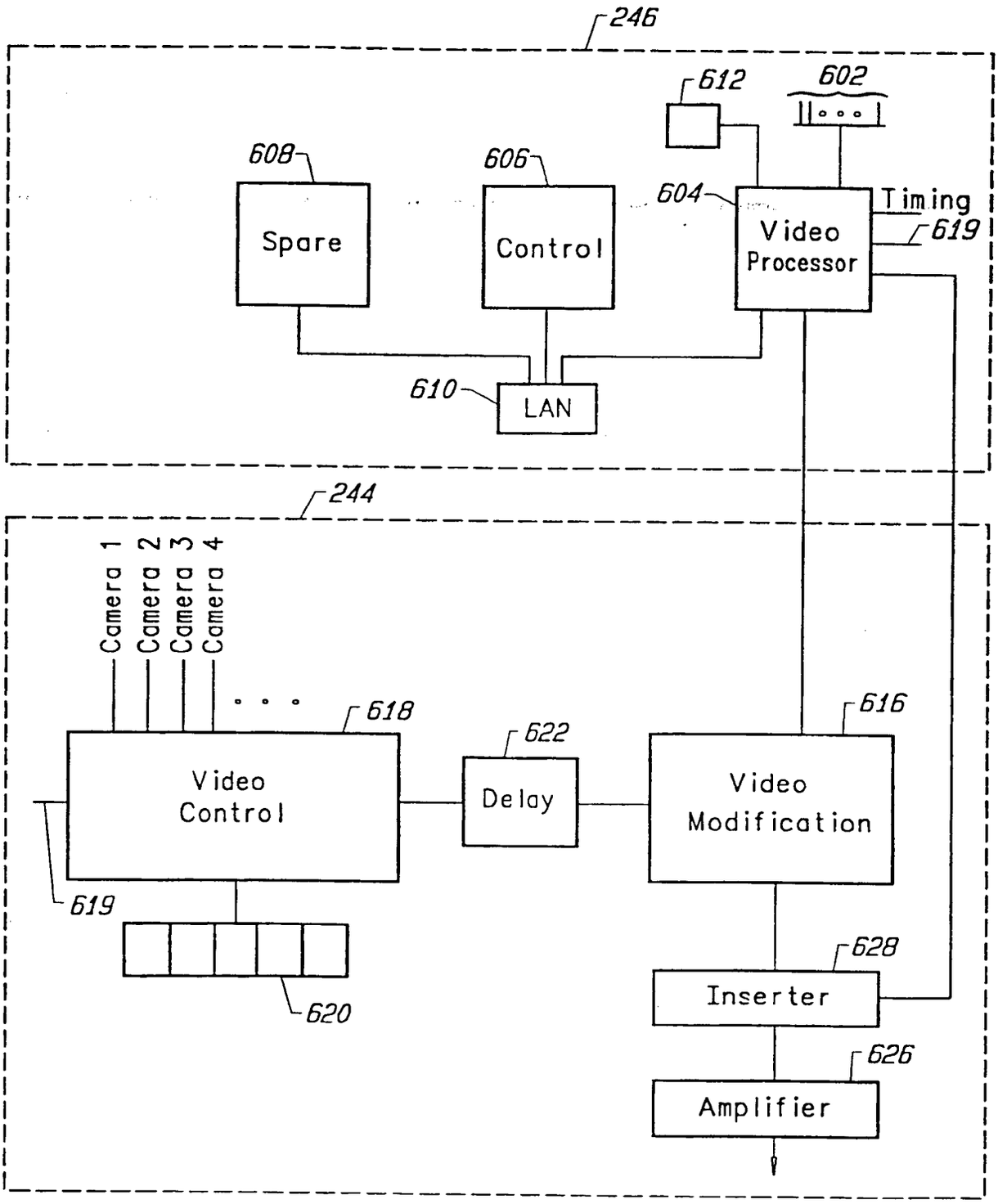

246
612
602
608
606
604
Timing
619
Spare
Control
Video Processor
610
LAN
244
Camera 1
Camera 2
Camera 3
Camera 4
618
616
622
Video Control
Delay
Video Modification
619
628
620
Inserter
626
Amplifier

FIG. 15

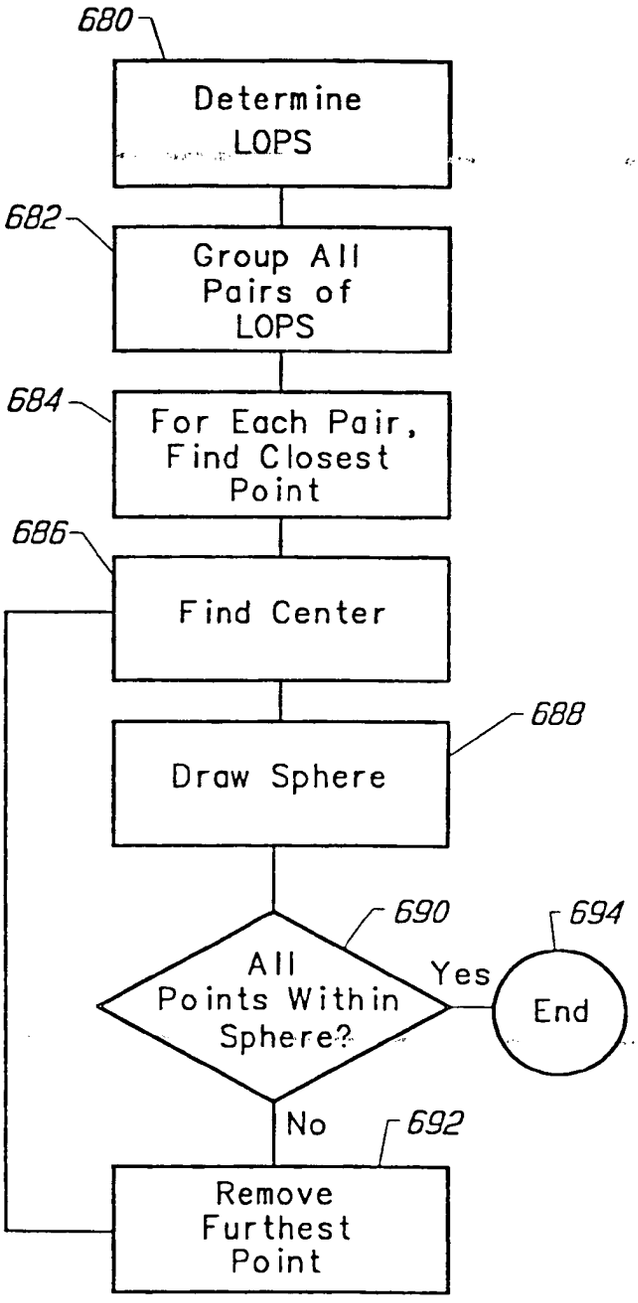


FIG. 17A

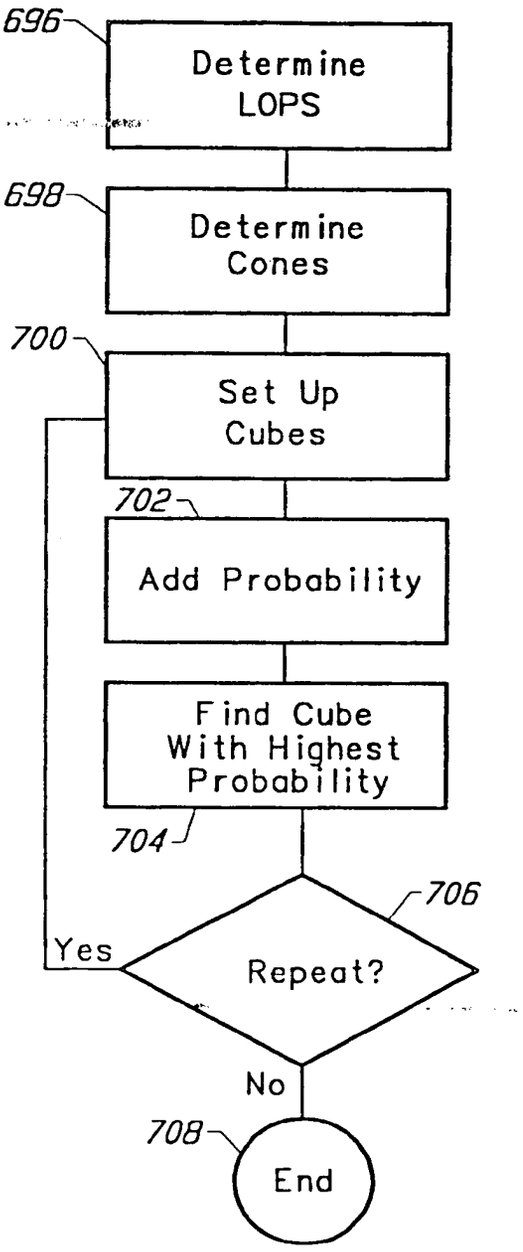


FIG. 17B

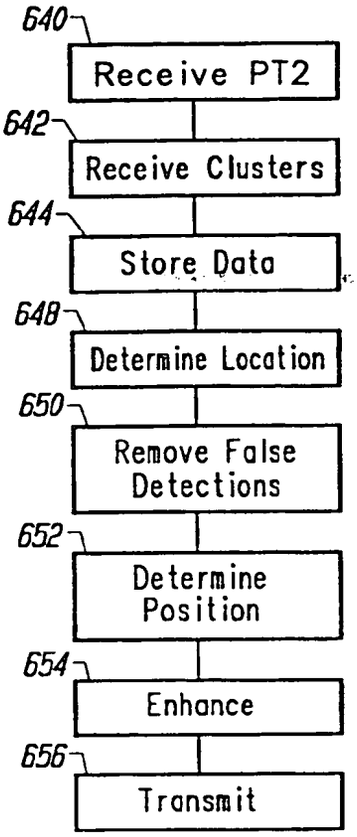


FIG. 16

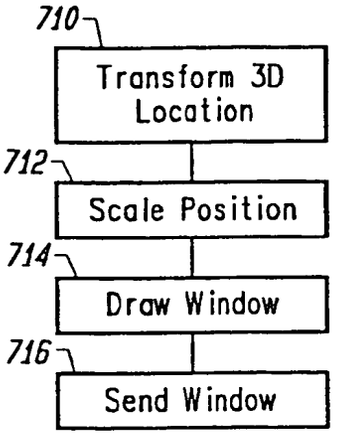


FIG. 18

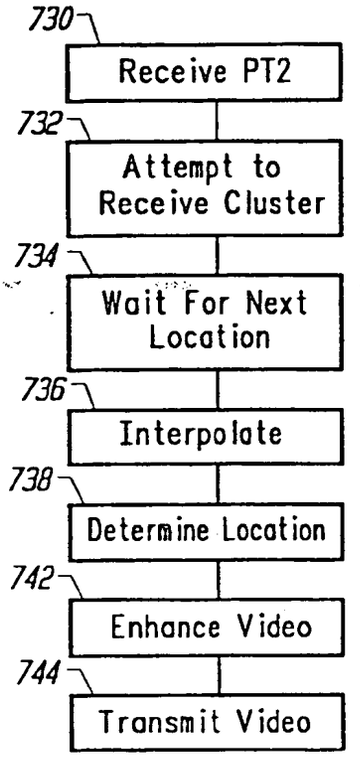


FIG. 20

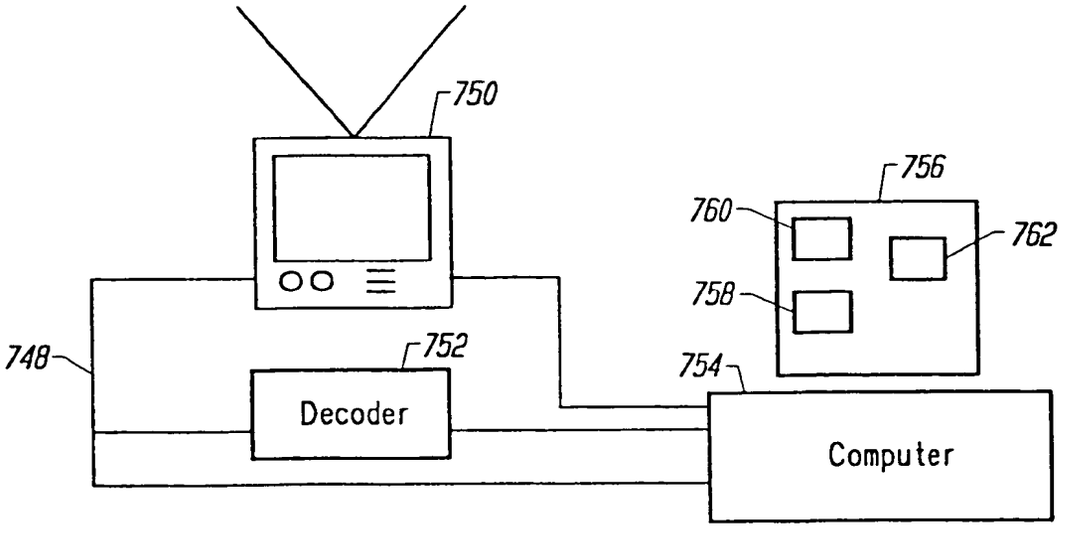


FIG. 21

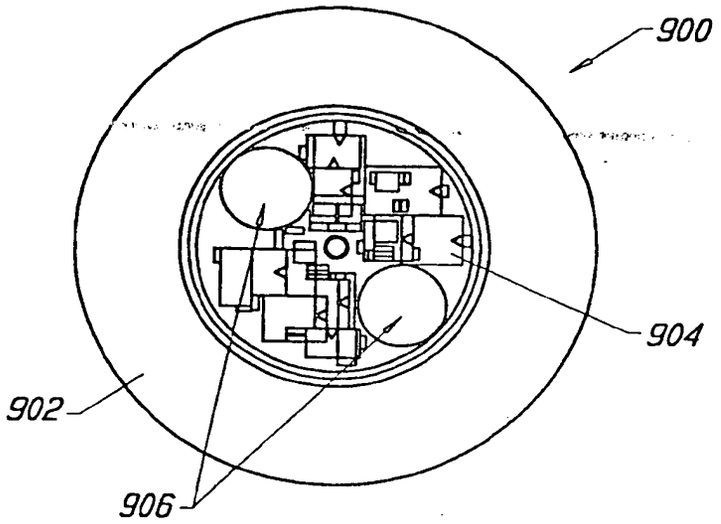


FIG. 22

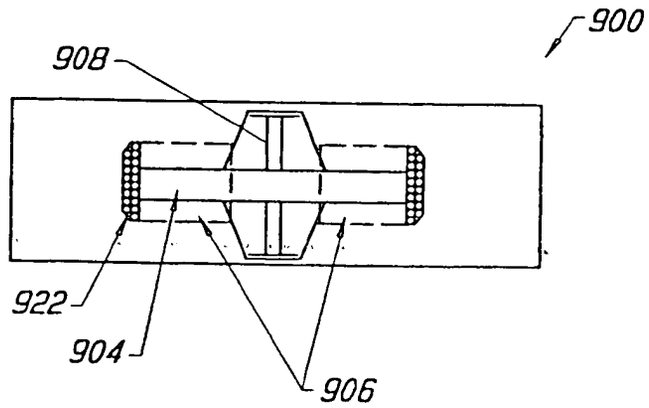


FIG. 23

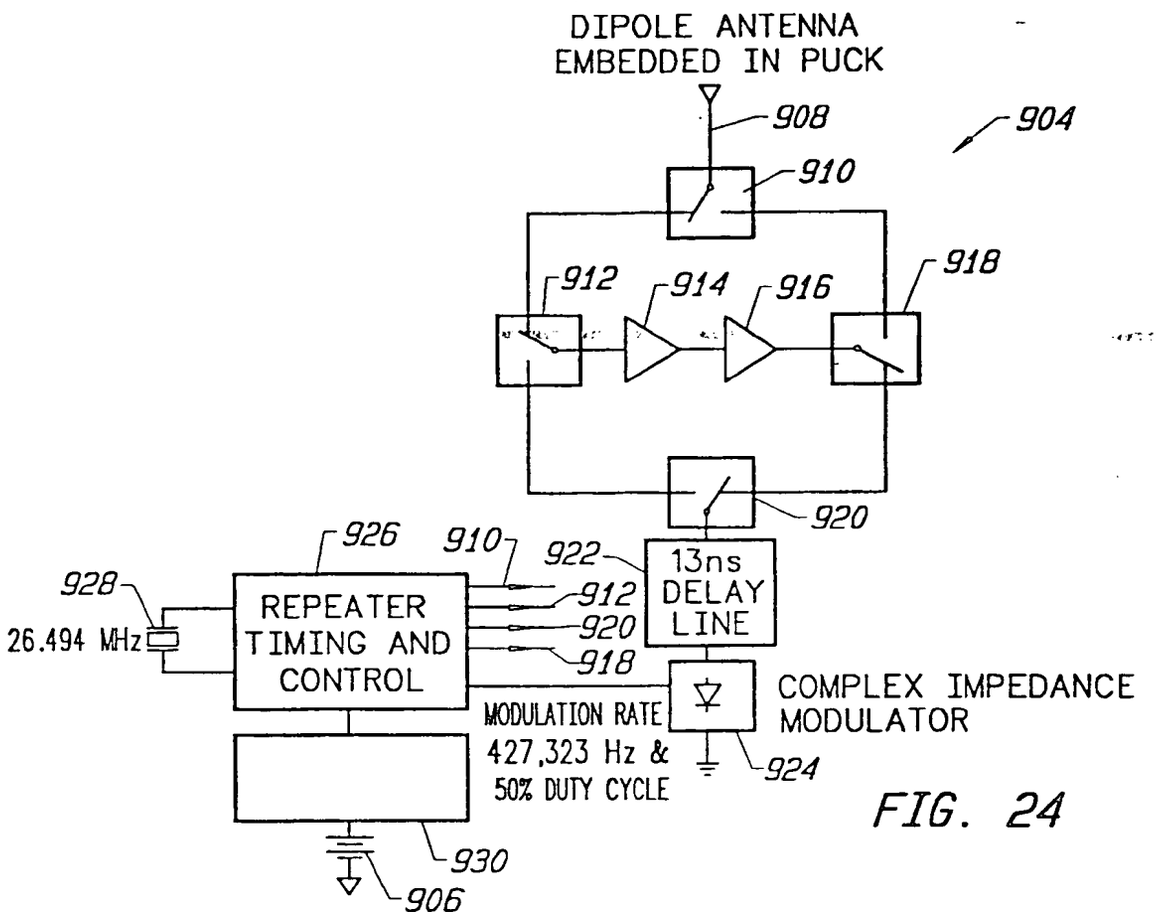


FIG. 24

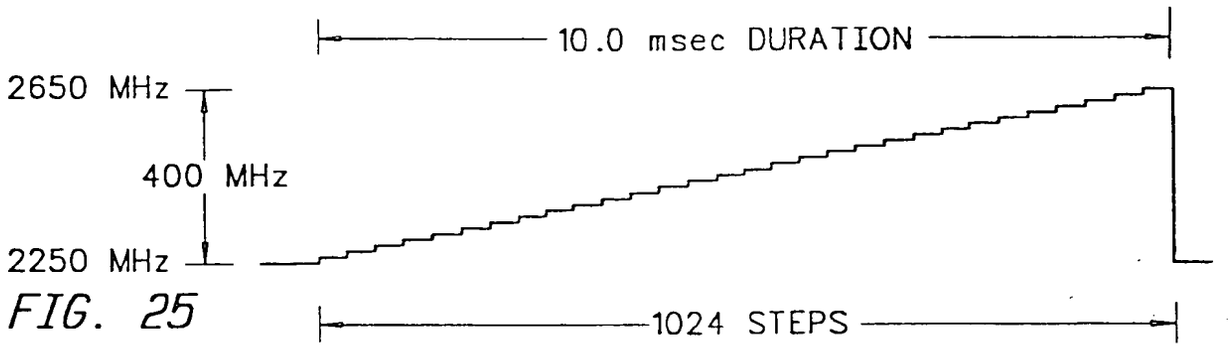


FIG. 25

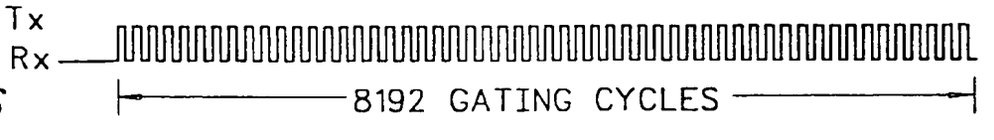


FIG. 26

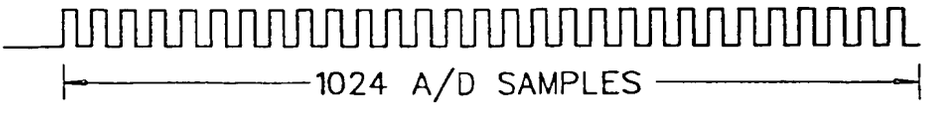


FIG. 27

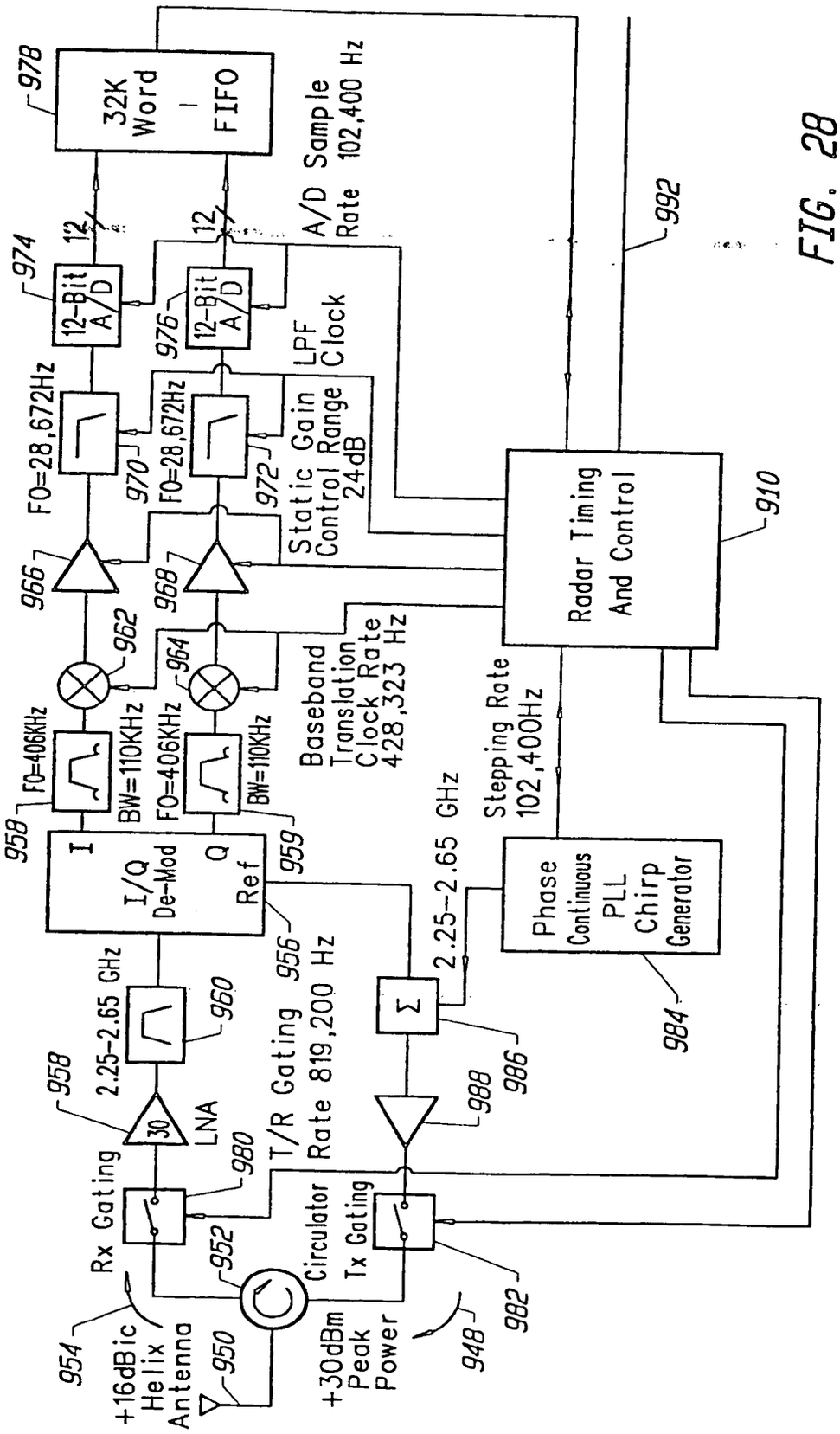
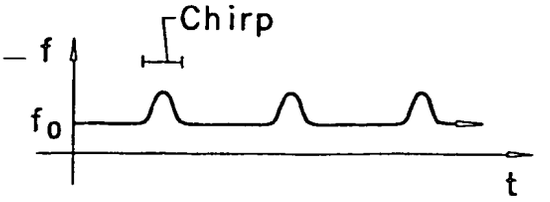

978
32K Word FIFO
A/D Sample Rate 102,400 Hz
992
974
12-Bit A/D
12
976
12-Bit A/D
12
LPF Clock
FO=28,672Hz
970
FO=28,672Hz
972
Static Gain Control Range 24dB
966
968
910
Radar Timing And Control
962
964
Baseband Translation Clock Rate 428,323 Hz
FO=406KHz
BW=110KHz
FO=406KHz
BW=110KHz
958
I
I/Q De-Mod
Q
Ref
959
Stepping Rate 102,400Hz
2.25-2.65 GHz
Phase Continuous PLL Chirp Generator
984
956
T/R Gating Rate 819,200 Hz
2.25-2.65 GHz
960
958
30
LNA
980
Rx Gating
952
Circulator
Tx Gating
988
986
982
954
+16dBic Helix Antenna
950
+30dBm Peak Power
948

FIG. 28

FIG. 29



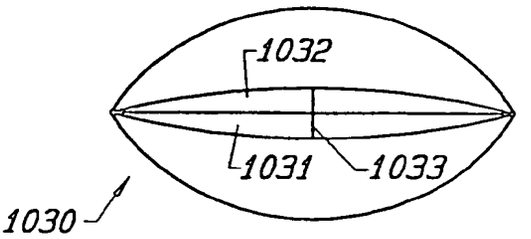
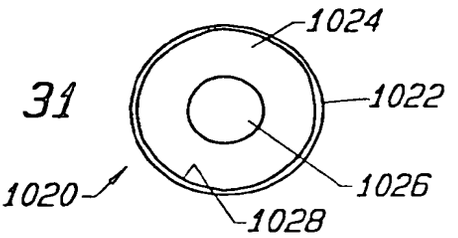


FIG. 30

FIG. 31



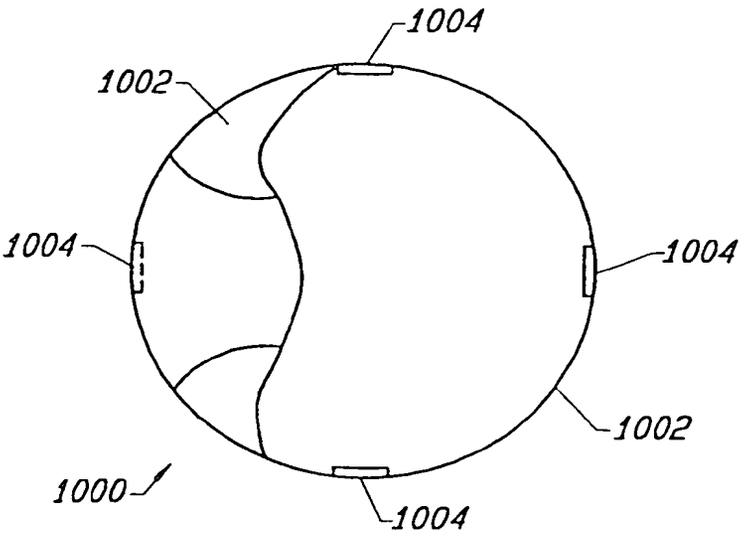


FIG. 32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/11122

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 5/225; A63F 9/24
US CL :463/40; 348/207

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)

U.S. : 463/40; 348/207, 169, 239

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 5,264,933 (ROSSER ET AL.) 23 November 1993, see entire document.	1,3,14
X,P	US, A, 5,498,000 (CUNEO) 12 March 1996, see entire document.	1, 3, 10, 14, 15, 18

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 10 SEPTEMBER 1996	Date of mailing of the international search report 30 SEP 1996
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer Diane Smith for RALEIGH W. CHIU Telephone No. (703) 308-0858

Form PCT/ISA/210 (second sheet)(July 1992)☆

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 757 485 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.02.1997 Bulletin 1997/06

(51) Int Cl.[6]: **H04N 7/088**

(21) Application number: **96305496.0**

(22) Date of filing: **26.07.1996**

(84) Designated Contracting States:
DE FR GB SE

(30) Priority: **31.07.1995 JP 194687/95**
31.07.1995 JP 194688/95
31.07.1995 JP 194700/95
31.07.1995 JP 195121/95
31.07.1995 JP 195259/95
31.07.1995 JP 195303/95

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(54) Interactive television system

(57) A broadcasting station (1) transmits script for presenting plural types of additional information relating to main broadcast in a vertical blanking interval included in a video signal. A television receiver (3) generates an additional information selecting screen for selecting arbitrary additional information from plural types of additional information by executing the script according to a request signal received from a television remote controller (308), and displays in part of a display screen. Reflecting a selection instruction signal received from the television remote controller (308) on the additional information selection screen, the script is executed according to the selection instruction, and selected additional information is generated and displayed on a display screen in a display format conforming to the content of the information.

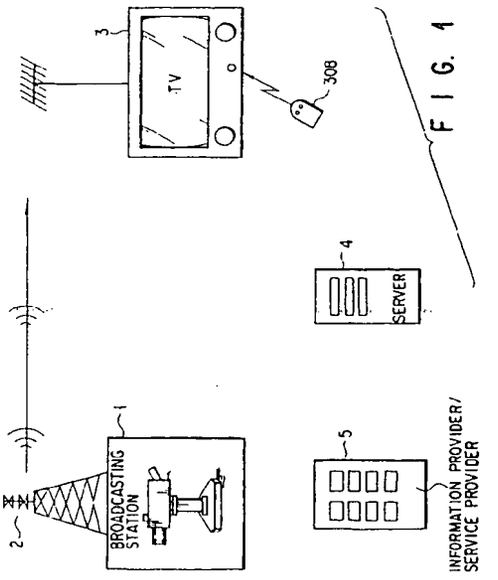

FIG. 1

EP 0 757 485 A2

Printed by Jouve, 75001 PARIS (FR)

Description

The present invention relates to an interactive television system comprising a transmission device of television waves for teletext multiplex broadcasting, a household receiver having a teletext multiplex receiving function, and a circuit device connected to the receiver, and more particularly to an interactive television system for transmitting desired data in a vertical blanking interval. The invention also relates to an interactive television system of complementary information display type, virtual channel type, viewer participation type, response feedback type, broadcast relative online type, and broadcast independent online type.

Recently, along with the trend of high function and high precision of general household television using ground waves, the technology for utilizing the general household television is noticed as part of multimedia. At the present, teletext multiplex broadcast is available, and, for example, cooking recipe guide and translation synchronized with the voice by character row display are presented as the information service relating to the program, or news, weather forecast, stock market report and others are presented as the information service not relating to the program.

This kind of television, at the present, offers one-way information transmission from the broadcasting station to the general household television, and the purpose of use is limited to a small range of application.

It is hence a first object of the invention to present an interactive television system comprising a transmission device of television waves for teletext multiplex broadcasting, a household receiver having a teletext multiplex receiving function, and a circuit device connected to the receiver, in which the consumer cost is kept to a minimum by effectively utilizing the existing infrastructure, and versatile and specific information linking with the program is timely presented, and an interactive function between a television (household receiver) and a viewer is realized.

It is a second object of the invention to present an interactive television system for realizing an information exchange system for general household having the function of selection of information by the user, that is, the interactive function, which is one of the features of multimedia information, easily by effectively utilizing the existing infrastructure without demanding large consumer cost.

According to a first aspect of the invention, a television system comprises receiving means for receiving a video signal including control data, means for identifying the control data from the video signal received by the receiving means and for storing the identified control data, means for inputting an instruction from an operator, a display, first display means for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information on the display, according to the stored control data, in response to the instruction input by the input means, and second display means for displaying a screen corresponding to additional information selected by the operator of the plural pieces of additional information on the display, according to the stored control data, in response to the instruction input by the input means.

This interactive television system makes effective use of the existing infrastructure for selection of information by the user, that is, the interactive function, which is one of the features of multimedia information. It hence presents an interactive television system of complementary information display type that is easily realized without demanding large extra cost to the broadcasting station and users.

Herein, as the existing infrastructure, the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line are utilized effectively. In an economically advantageous system, still more, the interactive television system of complementary information display type capable of presenting specific information timely by linking with the program is realized.

According to a second aspect of the invention, a television system comprises a receiver, and line processing device, the receiver comprising: first receiving means for receiving a video signal including transfer destination information and control data, means for identifying the control data and the transfer destination information from the video signal received by the first receiving means and for storing the identified control data, means for inputting an instruction from an operator, a display, a memory for storing identification information, display means for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by the input means, and output means for outputting transfer data corresponding to additional information selected by the operator of the plural pieces of additional information, together with the identification information stored in the memory, according to the transfer destination information, in response to the instruction input by the input means, and the line processing device comprising: second receiving means for receiving the transfer data and the identification information output from the output means, and processing means for executing processing which corresponds to the additional information selected by the operator, according to the transfer data and identification information received by the second receiving means.

According to a third aspect of the invention, a television system comprises a plurality of receivers, and a line processing device connected to the plurality of receivers, each one of the plurality of receivers comprising: first receiving means for receiving a video signal including transfer destination information and control da-

ta, means for identifying the control data and the transfer destination information from the video signal received by the first receiving means and for storing the control data and the transfer destination information, means for inputting an instruction from an operator, a display, a memory for storing identification information, display means for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by the input means, and output means for outputting transfer data corresponding to the additional information selected by the operator, together with the identification information stored in the memory to the line processing device, according to the transfer destination information, in response to the instruction input by the input means, and the line processing device comprising: second receiving means for receiving the transfer data and the identification information outputted from the output means, and processing means for executing predetermined processing in every one of the plural pieces of additional information, according to the transfer data and the identification information received by the second receiving means.

According to a fourth aspect of the invention, a television system comprises a receiver, and line control device, the receiver comprising: first receiving means for receiving a video signal including transfer destination information and control data, means for identifying the control data and the transfer destination information from the video signal received by the first receiving means and for storing the control data and the transfer destination information, means for inputting an instruction from an operator, a display, a memory for storing identification information, display means for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by the input means, and first output means for outputting transfer data corresponding to additional information selected by the operator of the plural pieces of additional information, together with the identification information stored in the memory, according to the transfer destination information, in response to the instruction input by the input means, and the line control device comprising: second receiving means for receiving the transfer data and the identification information output from the first output means, a database dealing with at least one of the receiver and the operator, and second output means for outputting response data corresponding to the additional information selected by the operator of the plural pieces of additional information, according to the transfer data and the identification information received by the second receiving means, and the database.

According to a fifth aspect of the invention, a television system comprises a receiver, and a server, the receiver comprising: first receiving means for receiving a video signal including telephone number information and control data, means for identifying the control data and the telephone number information from the video signal received in the first receiving means and storing the control data and the telephone number information, means for inputting an instruction from an operator, a display, a memory for storing identification information, first display means for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by the input means, output means for outputting transfer data corresponding to additional information selected by the operator of the plural pieces of additional information, together with the identification information stored in the memory onto a telephone line, according to the telephone number information, in response to the instruction input by the input means, and second display means for receiving the response data output on the telephone line, and displaying the information corresponding to the received response data on the display; and the server comprising: second receiving means for receiving the transfer data and the identification information output from the output means through the telephone line, a database dealing with at least one of the receiver and the operator, and means for retrieving the database according to the identification information received by the second receiving means, and outputting response data corresponding to the transfer data onto the telephone line.

According to a sixth aspect of the invention, a television system comprises a receiver, and a server, the receiver comprising: input means for inputting an instruction from an operator, a display, a first memory for storing identification information, a second memory for storing telephone number information of a the server, output means for outputting transfer data corresponding to the instruction input by the input means, together with the identification information stored in the first memory, onto a telephone line, according to the telephone number information, in response to the instruction input by the input means, and display means for receiving response data output onto the telephone line, and displaying information corresponding to the received response data on the display, and the server comprising: receiving means for receiving the transfer data and the identification information output from the output means through the telephone line, a database dealing with at least one of the receiver and the operator, and means for retrieving the database according to the identification information received in the second receiving means, and outputting response data corresponding to the transfer data onto the telephone line.

The interactive television system according to the second to sixth aspects easily realizes an information exchange system for general household having the function of selection of information by the user, that is, the interactive function, which is one of the features of

multimedia information, by effectively utilizing the existing infrastructure without demanding large consumer cost. Herein, as the existing infrastructure, the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line are utilized effectively, and in an economically advantageous system configuration, the interactive television system of virtual channel type, viewer participation type, response feedback type, and online service type for general household is realized.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram showing a constitution of an interactive television system of complementary information display type according to a first embodiment of the invention;
FIG. 2 is a flowchart of operation interlocked with the on-screen program in the first embodiment;
FIG. 3 is a block diagram showing the constitution of parts shown in FIG. 1 in the first embodiment;
FIG. 4 is a block diagram showing an internal structure of a multimedia teletext broadcast receiving circuit 33 shown in FIG. 3;
FIG. 5 is a diagram showing a button constitution example of television remote control in the first embodiment;
FIGS. 6A and 6B are diagrams showing transmission timing of control data (script and screen control information) in the first embodiment;
FIG. 7 is a diagram showing an example of screen display in the first embodiment;
FIG. 8 is a diagram showing an example of screen display in the first embodiment;
FIG. 9 is a diagram showing an example of screen display in the first embodiment;
FIG. 10 is a diagram showing an example of screen display in the first embodiment;
FIG. 11 is a diagram showing an example of screen display in the first embodiment;
FIG. 12 is a diagram showing an example of screen display in the first embodiment;
FIG. 13 is a diagram showing an example of screen display in the first embodiment;
FIG. 14 is a diagram showing an example of screen display in the first embodiment;
FIG. 15 is a diagram showing an example of screen display in the first embodiment;
FIG. 16 is a diagram showing an example of screen display in the first embodiment;
FIG. 17 is a diagram showing an example of screen display in the first embodiment;
FIG. 18 is a diagram showing an example of screen display in the first embodiment;
FIG. 19 is a diagram showing an example of screen display in the first embodiment;
FIG. 20 is a diagram showing an example of screen display in the first embodiment;
FIG. 21 is a diagram showing an example of screen display in the first embodiment;
FIG. 22 is a diagram showing an example of screen display in the first embodiment;
FIG. 23 is a block diagram showing a constitution of an interactive television system of virtual channel type according to a second embodiment of the invention;
FIG. 24 is a flowchart showing operation not interlocked with the on-screen program in the second embodiment;
FIG. 25 is a block diagram showing a constitution of an interactive television system of viewer participation type according to a third embodiment of the invention;
FIG. 26 is a flowchart showing operation interlocked with the on-screen program in the third embodiment;
FIG. 27 is a block diagram showing the constitution of parts shown in FIG. 29 in the third embodiment;
FIG. 28 is a block diagram showing a constitution of an interactive television system of response feedback type according to a fourth embodiment of the invention;
FIG. 29 is a flowchart showing operation interlocked with the on-screen program in the fourth embodiment;
FIG. 30 is a block diagram showing a constitution of an interactive television system of online service type according to a fifth embodiment of the invention;
FIG. 31 is a flowchart showing operation interlocked or not interlocked with the on-screen program in the fifth embodiment;
FIG. 32 is a block diagram showing an internal structure of a multimedia teletext broadcast receiving circuit 33 in the fifth embodiment;
FIG. 33 is a diagram showing an example of screen display in the second embodiment;
FIG. 34 is a diagram showing an example of screen display in the second embodiment;
FIG. 35 is a diagram showing an example of screen display in the second embodiment;
FIG. 36 is a diagram showing an example of screen display in the second embodiment;
FIG. 37 is a diagram showing an example of screen display in the fourth embodiment;
FIG. 38 is a diagram showing an example of screen display in the fourth embodiment;
FIG. 39 is a block diagram showing a constitution of an interactive television system of online service type according to a sixth embodiment of the invention; and
FIG. 40 is a flowchart showing operation independent of broadcast in the sixth embodiment.

Referring now to the drawings, first to sixth embodiments of the invention are described in detail below.

First, a first embodiment of the invention is described by reference to FIGS. 1 to 22.

FIG. 1 is a diagram showing a system configuration for explaining the outline of the first embodiment.

The invention is an interactive television system of complementary information display type realizing an interaction function between a television and a viewer. From a transmission antenna 2 of a broadcasting station 1, control data including scrip and screen control information for presenting subsidiary image information relating to main broadcast is transmitted in a vertical blanking interval (VBI) of main broadcasting program.

Herein, the entire bit stream for display of additional information transmitted in the teletext multiplex transmission period in VBI is called merely "script" except for partial control information, and therefore the script include the header, form, resource, and program (script main body). The same definition of the term script is applied to other embodiments described later.

A household interactive television receiver (TV) 3 receives the television wave transmitted from the broadcasting station 1, and accepts program presentation of desired channel by button operation of a remote controller (television remote controller) 308.

At this time, the interactive television receiver (TV) 3, when receiving the broadcasting program by teletext (coded transmission type teletext), receives and buffers the teletext signal in the teletext receiving circuit.

When a teletext program is selected by button operation of the television remote controller 308, the teletext program according to the selection instruction is decoded by teletext decoder, and is displayed in a specified display format.

In this invention, by the reception script by the received teletext signal, the existing teletext program is further developed, and it is intended to present various specific additional information widely linking with the on-screen program timely, on the basis of the reception script for display of additional information, according to the instruction of the viewer.

For example, referring to a sports program as additional information that can be displayed by the reception script, as the additional information for a gold live program, the rank, individual score, course layout and others relating to the live program (on-screen program) are prepared, and as the viewer manipulates the television remote controller 308 to request to display selected screen of additional information, the desired additional information can be selected on the additional information selection screen according to the request, so that the selected rank, individual score, or course layout relating to the on-screen program is presented to the viewer.

FIG. 2 is a diagram showing outline of processing procedure of the portion relating to the invention, in this interactive television system of complementary information display type.

In FIG. 2, step S1 shows transmission process of television wave for teletext (coded transmission type teletext), and herein sowing the process of transmission of script (herein, the script is meant to include the header, form and resource, as well as the script main body (program) describing the process procedure) for presenting plural types of additional information relating to the main broadcast in the vertical blanking interval (VBI) included in the video signal of the main broadcast.

Step S2 shows the process of receiving the television wave in the interactive television receiver (TV) 3, and storing (buffering) the reception script.

Step S3 shows the process of sending out a display output request signal of additional information by manipulating the television remote controller 308.

Step S4 shows the process of executing the script according to the display output request of additional information from the viewer, creating additional information selection screen for selecting desired additional information from plural types of additional information, and displaying in part of the display screen.

Step S5 shows the process of manipulation of the television remote controller 308 by the viewer for sending out the additional information selection instruction signal.

Step S6 shows the process of displaying the screen of the selected and instructed additional information according to the additional information selection instruction from the viewer.

By this interactive function using the television as the medium, for example, linking with various on-screen programs such as live sports and news, versatile and specific additional information can be presented timely. For example, in a live golf program, as the additional information for a gold live program, the rank, individual score, course layout and others relating to the live program (on-screen program) are prepared, and as the viewer manipulates the television remote controller 308 to request to display selected screen of additional information, the desired additional information can be selected on the additional information selection screen according to the request, so that the selected rank, individual score, or course layout relating to the on-screen program is presented to the viewer.

Alternatively, as additional information, for example, in a children's educational program, simple selectors may be provided, the script showing the screen of right answer to a quiz by selection of viewer is prepared and transmitted from the transmission antenna 2 of the broadcasting station 1, and in the children's educational program, according to the selection manipulation of selectors by the television remote controller operation by the viewer, the answer is judged according to the received right answer information, and the result of judgment may be displayed on the screen.

FIG. 3 is a block diagram showing the constitution of parts in the interactive television system of comple-

mentary information display type in the embodiment of the invention, and same parts as in FIG. 1 are identified with same reference numerals and their explanations are omitted.

Reference numerals 11 to 21 show constituent elements in the broadcasting station 1. A television camera 11 is installed in the studio for producing a program. A video tape recorder 12 records the picture and sound for program production in a video tape, and reproduces. A control room 13 is used for various adjustments for program production. A CG rendering 14 is for computer graphic processing for program production.

An interactive teletext manufacturing apparatus 15 creates script data for presenting plural types of additional information relating to main broadcast in the VBI included in the video signal of main broadcast (on-screen program). This script includes an individual program ID for every bidirectional program (type of additional information).

A teletext manufacturing apparatus 16 creates transmission data for existing teletext, for example, weather forecast and stock market quotation.

An interface 17 is an application server for transferring the script created in the interactive teletext manufacturing apparatus 15 to the transmission apparatus of the television wave, and reference numeral 18 is for connection control with an external line. A sending control apparatus 19 is responsible for control of teletext (VBI data transmission) including the script relating to the invention. A multiplexing apparatus 20 superposes teletext (VBI data) on the main broadcast (on-screen program). A transmitter 21 sends out the multiplexed television wave (television wave for teletext) from the transmission antenna 2.

Reference numerals 31 to 34 show constituent elements of the interactive television receiver (TV) 3. A teletext receiver 31 receives teletext transmitted from the transmission antenna 2. A display unit (cathode-ray tube: CRT) 32 selectively displays the ordinary teletext obtained in a multimedia teletext receiver 33 or interactive teletext of the invention, in addition to the main broadcast (on-screen program) obtained in the teletext receiver 31.

The multimedia teletext receiver 33 discriminates and takes in the teletext data (VBI data) from the received broadcast wave, and classifies into the data of ordinary teletext, and data of interactive teletext (herein data of plural types of additional information relating to the main broadcast), and generates display data of ordinary teletext and display data of plural types of additional information relating to the main broadcast. Herein, however, the display control function of ordinary teletext is omitted, and only the display control function of plural types of additional information relating to the main broadcast (interactive teletext decoder) is described. In the interactive teletext decoder of the multimedia teletext receiver 33, the reception script is interpreted and executed, and display information is supplied into the video processing circuit of the teletext receiver 31, and the information to be sent out to the line is supplied into a modem 34, and the detail is described later by referring to FIG. 4.

The modem 34 is used for connecting the multimedia teletext receiver 33 to the public telephone line, and hence, through the modem 34, the data handled in the multimedia teletext receiver 33 can be transmitted by dialing automatically to the line connection destination (for example, server) given from the interactive teletext decoder of the receiver 33 (built in the reception script). That is, by specific key input operation of the television remote controller 308, the information registered in the registration setting unit [PS] of ROM device control and individual identification information mentioned later may be automatically dialed, through the modem 34, to the line connection destination (for example, server 4) given from the interactive teletext decoder (built in the reception script) as the transmission source.

Reference numerals 41 to 46 show constituent elements of the server 4. A communication control processor (CCP) facility 41 (41-1, 41-2, 41-3, ..., 41-m) possesses the multimedia teletext receiver 33. Dealing with the interactive television receivers (TV) 3 at multiple homes, data is transmitted and received with the multimedia teletext receiver 33 in each TV 3.

Plural response server facilities 42 (42-1, ..., 42-n) are provided under the control of a center server facility 43 mentioned later, and transmission and reception information is distributed and processed with multiple TV receivers 3. The response server facility 42 is connected to local database (L-DB) 42A accumulating the individual information of specific area for subscriber control.

The center server facility 43 accumulates and processes the disperse processing results of the response server facilities. The center sever facility 43 is connected to the master database (M-DB) 43A accumulating the individual information in the whole area for subscriber control.

A broadcast server facility 44 receives process instructions to response from the interactive TV 3 preliminarily from the broadcasting station 1, or sends back the response result of the interactive TV 3 to the broadcasting station 1 in a format requested by the broadcasting station. 1.

An IP/SP (information provider/service provider) server facility 45 receives process instructions to the response from the interactive TV 3 preliminarily from network service 5, or sends back the response result of the interactive TV 3 to the network service 5 in a format requested by the network service 5.

An operation management facility 45 manages the operation of the server system comprising the above facilities.

FIG. 4 is a functional block diagram showing an internal structure of the multimedia teletext receiver 33.

In FIG. 4, a CPU (central processing unit) 301 is responsible for control of the multimedia teletext receiv-

er 33. In this embodiment, the CPU 301 processes the script for presenting plural types of additional information relating to the main broadcast, and as this CPU 301 executes the process of the script process module [SCR] in the ROM 302 mentioned later, an interactive teletext decoder is realized. Herein, the reception script distinguished from the video signal is buffered (stored) in the RAM 305, and is interpreted and executed, and display data (RGB signal) is generated.

A control memory (read-only memory: ROM) 302 stores the basic control program executed by the CPU 301 and fixed information, and it is accessed by the CPU 301 to be read. Herein, the script process module [SCR] for executing script process, teletext process module [CBP] for executing teletext, and others are stored, and there are also registration setting unit [PS] of machine control and individual identification information in which machine individual ID designated in each receiver and individual ID are registered, kanji and character control unit [CHA] in which kanji and characters are stored and controlled, and icon control unit [ICON], among others.

A data separation processing circuit (waveform equalizing data separating circuit) 303 discriminates teletext data and interactive teletext data (that is, script for display of additional information) from the video signal received in the teletext receiver 31. The discriminated reception teletext data and reception script are stored in a RAM 305 under the control of the CPU 301.

A display memory (VRAM: video random access memory) 304 is a memory for storing display data, in which, for example, display data processed by a picture process program [PICM] is stored.

The memory (RAM) 305 is used as work memory of the CPU 301, and herein the data communication control program [DCOM], picture process program [PICM], user interface program [USIF], script buffer [SCB], and teletext data buffer are provided.

A station selection microprocessor (MP) 307 receives a signal from the television remote controller 308, separates into television manipulation command, and selection control command for display of additional information, sends out the television manipulation command such as channel designation to the television receiver, and stores the selection control command for display of additional information temporarily in the buffer register for remote control reception, and sends to the CPU 301 in bit parallel.

The television remote controller 308 remote controls the interactive television receiver 3. Herein, as shown in FIG. 5, there are mode selection key (i key) for changing the interactive mode between valid and invalid, direction command keys (up key, down key, left key, right key) for selecting a desired selector from plural selectors provided on the additional information selection screen, and determination (firm) key.

The mode selection key (i key) is a toggle switch for changing over the interactive mode valid and invalid alternately, and when the interactive mode is valid, as shown in FIG. 7, an "i" mark appears in the upper left corner of the display (CRT) 32.

The station selection MP 307 is usable only when the interactive mode is valid (that is, when the "i" mark is shown), and some of the keys (for example, numeric keys) are reflected only in the displayed additional information.

Incidentally, valid/invalid setting of the interactive mode is selected by force also at a certain timing according to the command built in the script in a specified additional information display, aside from manipulation of the television remote controller 308.

FIGS. 6A and 6B are transmission timing diagrams of control data including the script and screen control information, and herein, in addition to the horizontal scanning period (existing teletext signal) in the VBI for transmitting ordinary teletext data, the control data is transmitted by utilizing the horizontal scanning period in the VBI indicated by 6A and 6B. FIG. 6A shows even fields, and FIG. 6B shows odd fields.

FIGS. 7 to 22 show examples of screen transition state in the first embodiment. Specifically, FIGS. 7 to 15 show screen changes of a live golf game as an example of sports program. FIGS. 16 to 22 show screen changes in a quiz program. In the quiz program, the processing device for executing the script, that is, the CPU 301 judges the reply entered from the television remote controller 301 on the basis of the right answer information built in the script (for example, yes/no, selector number, quiz answer by symbol input), and displays the information of the result of judgment on the display screen at the display timing conforming to the screen control information received together with the script.

Examples of operation in this embodiment of the invention are described below.

From the transmission antenna 2 of the broadcasting station 1, the television wave for teletext (coded transmission type teletext) including control data in VBI (script and image control information) is transmitted in the transmission format shown in FIGS. 6A and 6B (step S1 in FIG. 2).

Herein, the script for presenting plural types of additional information relating to the main broadcast in the vertical blanking interval (VBI) included in the video signal of the main broadcast (including the script main body (program) describing the processing procedure, header, form, and resource) is transmitted. For example, in this explanation, a live golf game is transmitted together with plural types of additional information.

The interactive television receiver (TV) 3 receives the television wave (broadcast wave) of the live golf game, and the reception script included in the broadcast is stored (buffered). That is, the multimedia teletext receiver 33 provided in the interactive television receiver (TV) 3 discriminates and takes in the VBI data from the received broadcast wave, and separates into the data of ordinary teletext program and data of interactive teletext program (herein, the data of plural types of addition-

al information relating to main broadcast), and generates display data of ordinary teletext program and display data of plural types of additional information relating to the main broadcast, and stores (buffers) them in the RAM 305 (step S2 in FIG. 2).

Herein, when the viewer manipulates the mode selection key (i key) of the television remote controller 308 and makes the interactive mode valid, the "i" mark appears in the upper left corner of the display unit (CRT) 32, telling that the interactive mode is valid (step S3 in FIG. 2).

Furthermore, along with the manipulation of the mode selection key (i key), by the execution of the script process by the interactive teletext decoder realized by execution of the process of script process module [SCR] in the ROM 302 by the CPU 301, for example, an additional information selection screen as shown in FIG. 8 is displayed (step S4 in FIG. 2).

On this additional information selection screen, as the viewer manipulates the direction command key (herein up key or down key) of the television remote controller 308, the selected and designated selector is emphasized in display (for example, displayed in a special color frame), and the specified selector is clarified (in FIG.8, the "rank" is emphasized by the specific color frame). At this time, when the decision (firm) key of the television remote controller 308 is manipulated, the script process is executed again, and the selected and designated additional information screen is displayed. For example, when the decision (firm) key is pressed while the rank is emphasized in special color frame, the additional information screen of rank is displayed as shown in FIG. 9 (steps S5 and S6 in FIG. 2).

Or, when the decision (firm) key is manipulated when the course is emphasized in special color frame on the additional information selection screen shown in FIG. 8, the additional information screen of course guide is displayed as shown in FIGS. 10 and 11, and further when a direction command key (down key) is manipulated, as shown in FIG. 12, the additional information screen of course layout is displayed. When the decision (firm) key is manipulated while the score is emphasized in special color frame on the additional information selection screen shown in FIG. 8, as shown in FIGS. 13 and 14, the additional information screen of score is displayed. Moreover, when an arbitrary player is selected on the screen display shown in FIG. 14 (in the first embodiment, the fourth player from the left, the rank enclosed by double square), further specific information is displayed as shown in FIG. 15.

Similarly, in a quiz program, the additional information of the quiz program is displayed in the screen transition as shown in FIGS. 16 to 22. Herein, the right answer information is preliminarily built in the reception script, and according to the selection operation of selector by manipulation of the television remote controller 308 by viewer, it is judged if the reply is correct or not by the CPU 301 on the basis of the received right answer information, and the result of judgment is displayed on the screen.

By such interactive function using the television as the medium, versatile and specific additional information can be presented timely, by linking with the on-screen program such as live sports game, news and quiz.

If desired to save additional information, while displaying the additional information screen desired to be saved, by pressing the memory key of the television remote controller 308, the data of the desired additional information screen is stored in the save region of the display memory (VRAM) 304, and it can be freely displayed again by a specific key operation (for example, simultaneous pressing of i key and memory key).

Moreover, the image data stored in the save region of the display memory (VRAM) 304 can be transferred into an external device, such as magnetic disk drive or printer, through an external device connection port (not shown).

By specific key input manipulation of the television remote controller 308, the information registered in the registration setting unit [PS] of machine control and individual identification information of the ROM 302 can be transmitted through the modem 34 by automatically dialing to the line connection destination (for example, server 4) given from the interactive teletext decoder (built in the reception script).

Thus, the first embodiment presents an interactive television system of complementary information display type that is easily realized without demanding large extra cost to the broadcasting station and users, by making effective use of the existing infrastructure for selection of information by the user, that is, the interactive function, which is one of the features of multimedia information.

That is, as the existing infrastructure, the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line are utilized effectively, and in an economically advantageous system, still more, the interactive television system of complementary information display type capable of presenting specific information timely by linking with the program is presented.

A second embodiment of the invention is described below.

FIG. 23 is a diagram showing a system configuration for explaining the outline of the second embodiment.

The second embodiment is an interactive television system of virtual channel type enabling to exchange information independently of the main broadcast, in which from the transmission antenna 2 of the broadcasting station 1, script (and screen control information) for presenting an independent subsidiary image information not relating with the main broadcast is transmitted in the

vertical blanking interval (VBI) of the main broadcasting program. In FIG. 23, same reference numerals are given to same constituent elements as in FIG. 1, and detailed description of the constituent elements is omitted. The definition of the script is same as in the first embodiment.

As the feature of the second embodiment, the broadcasting station 1 incorporates a transmitter for transmitting the script for presenting plural types of additional information independent of the main broadcast in the vertical blanking interval included in the video signal, and the television receiver 3 comprises a script execution processing unit, and a sending unit for sending out the transfer data conforming to the additional information to the receiver, or to the transfer destination conforming to the transfer destination information built in the script together with the individual identification information to the individual viewer, and hence the information of virtual channel independent of the main broadcast can be presented to the viewer.

At this time, the additional information that can be displayed by the reception script includes, for example, presentation of program selection menu of teletext, merchandise transaction including catalog request and purchase of merchandise, and various subscription procedures.

FIG. 24 is a diagram showing an example of processing procedure in the interactive television system of virtual channel type mentioned above.

In FIG. 24, step S11 shows transmission process of television wave for teletext (coded transmission type teletext) in the broadcasting station 1, and herein showing the process of transmission of script (herein, the script is meant to include the header, form and resource, as well as the script main body (program) describing the process procedure) for presenting plural types of additional information not relating to the main broadcast in the vertical blanking interval (VBI) included in the video signal of the main broadcast.

Step S12 shows the process of receiving the television wave in the interactive television receiver (TV) 3, and storing (buffering) the reception script.

Step S13 shows the process of sending out a display output request signal of additional information by manipulating the television remote controller 308.

Step S14 shows the process of executing the script according to the display output request of additional information from the viewer, creating additional information selection screen for selecting desired additional information from plural types of additional information, and displaying in part of the display screen.

Step S15 shows the process of manipulation of the television remote controller 308 by the viewer for sending out the additional information selection instruction signal.

Step S16 shows the process of displaying the detailed screen of the selected and instructed additional information according to the additional information selection instruction from the viewer.

Step S17 shows the process of displaying the screen for confirming the additional information finally selected and instructed, confirming it, and transmitting the information to the server 4.

Step S18 shows the process of sending the information of the interactive television receiver (TV) 3 to the server 4.

By this interactive function using the television as the medium, for example, various information can be exchanged, for example, presentation of program selection menu of teletext, merchandise transaction including catalog request and purchase of merchandise, and various subscription procedures.

The constitution of the parts in the interactive television system of virtual channel type in the second embodiment is same as in the first embodiment, and detailed description is omitted (see FIG. 3).

The internal structure of the multimedia teletext receiver 33 in the second embodiment is also same as in the first embodiment, and detailed description is omitted (see FIGS. 4 and 5).

The transmission timing of control data (script and screen control information) in the second embodiment is also same as in the first embodiment, and detailed description is omitted (see FIGS. 6A and 6B).

Herein, an example of operation of the second embodiment is described.

From the transmission antenna 2 of the broadcasting station 1, in the transmission format as shown in FIGS. 6A and 6B, the script and the television wave for teletext (coded transmission type teletext) incorporating transfer destination information (for example, telephone number) in the script are transmitted in the VBI (step S11 in FIG. 24).

Herein, in the vertical blanking interval (VBI) included in the video signal of main broadcast, the script for presenting plural types of additional information independent of the main broadcast (including the script main body (program) describing the processing procedure, header, form, and resource), and the telephone number incorporated in the script are transmitted.

The interactive television receiver (TV) 3 receives the television wave (broadcast wave) carrying shopping information by the virtual channel, and stores (buffers) the reception script included in the broadcast wave. That is, the multimedia teletext receiver 33 provided in the interactive television receiver (TV) 3 discriminates and takes in the VBI data from the received broadcast wave, and separates into the data of ordinary teletext program and data of interactive teletext program (herein, the data of plural types of additional information independent of main broadcast), and generates display data of ordinary teletext program and display data of plural types of additional information independent of the main broadcast, and stores (buffers) them in the RAM 305 (step S12 in FIG. 24).

Herein, when the viewer manipulates the mode selection key (i key) of the television remote controller 308

and makes the interactive mode valid, the "i" mark appears in the upper left corner of the display unit (CRT) 32, telling that the interactive mode is valid (step S13 in FIG. 24).

Furthermore, along with the manipulation of the mode selection key (i key), by the execution of the script process by the interactive teletext decoder realized by execution of the process of script process module [SCR] in the ROM 302 by the CPU 301, for example, an additional information selection screen is displayed (step S14 in FIG. 24).

On this additional information selection screen, as the viewer manipulates the direction command key (herein left key or right key) of the television remote controller 308, the selected and designated selector is emphasized in display (for example, displayed by flickering), and the specified selector is clarified. At this time, when the decision (firm) key is manipulated while the selector for shopping is emphasized (by flickering), the screen for introduction and selection of plural types of additional information is displayed (steps S15, S16 in FIG. 24).

Furthermore, on this screen for introduction and selection of plural types of additional information, when a certain additional information is selected and specified, a screen appears to display the detail of selected additional information, and when "revise" is selected on this screen, it returns to the aforementioned screen.

On the screen for confirmation of detail of selected additional information, when "confirm" (order) is selected, the selection information is automatically transmitted to the server 4 through the modem 34 and telephone line (steps S17, S18 in FIG. 24). As a result, the server 4 confirms that the viewer has ordered the desired additional information through the interactive TV receiver 3, and the corresponding processing is executed.

The plural types of additional information includes shopping information, for example, ranges widely including jewelry, food, clothes, real estate, and others, and in the interactive system offering transaction services in plural types, it is also possible to transmit automatically by using different telephone numbers by the trade and trader. In this case, plural telephone numbers set individually by trade and trader are incorporated in the transmission script, and when the transaction is formed at the interactive TV receiver side 3, the telephone number corresponding to the trade and trader corresponding to the transaction is sent out to the modem 34, so that transaction service using plural telephone lines can be realized.

By specific key input manipulation of the television remote controller 308, the information registered in the registration setting unit [PS] of machine control and individual identification information of the ROM 302 can be transmitted through the modem 34 by automatically dialing to the line connection destination (for example, server 4) given from the multimedia teletext receiver 33 (built in the reception script).

Thus, the second embodiment constructs an interactive television system of virtual channel type for general household in an economically advantageous system configuration, by effectively utilizing the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line as the existing infrastructure.

A third embodiment of the invention is described below.

FIG. 25 is a diagram showing a system configuration for explaining the outline of the third embodiment.

The third embodiment is an interactive television system of a type of broadcasting programs participated by viewer of televisions, for enabling to exchange information about main broadcast, in which from the transmission antenna 2 of the broadcasting station 1, script (and screen control information) for presenting a subsidiary image information for participation of viewers relating with the main broadcast is transmitted in the vertical blanking interval (VBI) of the main broadcasting program. In FIG. 25, same reference numerals are given to same constituent elements as in FIG. 1, and detailed description of the constituent elements is omitted. The definition of the script is same as in the first embodiment.

In the third embodiment, by the reception script by the received teletext signal, the existing teletext program is further developed, and information can be exchanged by presenting various types of additional information, such as quiz program participated by viewers of the televisions relating to the on-screen program, interviews and others, on the basis of the reception script for displaying additional information.

That is, in the third embodiment, it is intended to connect the interactive TV receiver 3 to telephone reception service 4 having accumulate processing function automatically through a telephone line, so that the content of the main broadcast (on-screen program) such as quiz and interview can be automatically transmitted by simple manipulation such as television remote controller, allowing many viewers to participate in the program.

FIG. 26 is a diagram showing an example of processing procedure in the interactive television system of the above type of broadcasting programs participated by viewers of the televisions.

In FIG. 26, step S21 shows transmission process of television wave for teletext (coded transmission type teletext) in the broadcasting station 1, and herein showing the process of transmission of script (herein, the script is meant to include the header, form and resource, as well as the script main body (program) describing the process procedure) for viewer response procedure of, for example, quiz or interview, relating to the main broadcast in the vertical blanking interval (VBI) included in the video signal of the main broadcast.

Step S22 shows the process of receiving the tele-

vision wave in the interactive television receiver (TV) 3, and storing (buffering) the reception script.

Step S23 shows the process of sending out a request signal for allowing the viewers to participate in the program such as quiz or interview, by manipulating the television remote controller 308 by the viewer.

Step S24 shows the process of executing the script according to the participation request from the viewer, creating a request input screen according to the additional information, and displaying in part of the display screen.

Step S25 shows the process of manipulation of the television remote controller 308 by the viewer for inputting the response information.

Step S26 shows the process of displaying the confirmation screen according to the response content from the viewer.

Step S27 shows the process of transmitting the response content of the viewer to the telephone reception service 4.

Step S28 shows the process of accumulating the response contents from the viewers.

Step S29 shows the process of sending back the accumulation result to the broadcasting station 1.

By this interactive function using the television as the medium, for example, response contents to the main broadcast (on-screen program) such as quiz and interview can be automatically transmitted by simple manipulation of the television remote controller, so that the viewer can participate in the main broadcasting program easily.

FIG. 27 is a block diagram showing the constitution of the parts in the interactive television system of a type of broadcasting programs participated by viewers of the televisions according to this embodiment, and same parts as in FIG. 25 are identified with same reference numerals, and their explanation is omitted.

Herein, the modem 34 is used for connecting the multimedia teletext receiver 33 to the public telephone line, and through this modem 34, the data handled in the multimedia teletext receiver 33 can be transmitted by automatically dialing to the line connection destination given by the interactive teletext decoder of the receiver 33 (built in the reception script), for example, to the telephone reception service 4 having the accumulate processing function. That is, by specific key input operation of the television remote controller 308, the information registered in the registration setting unit [PS] of machine control and individual identification information of the ROM mentioned below can be transmitted through the modem 34 by automatically dialing to the line connection destination or the telephone reception service 4 given from the interactive teletext decoder (built in the reception script).

The internal structure of the multimedia teletext receiver 33 in this third embodiment is also similar to that in the first embodiment, and detailed description is omitted (see FIGS. 4 and 5).

The transmission timing of the control data in the third embodiment (script and screen control information) is also same as in the first embodiment, and detailed description is omitted (see FIGS. 6A and 6B).

An example of operation of the third embodiment is described below.

From the transmission antenna 2 of the broadcasting station 1, in the transmission format as shown in FIGS. 6A and 6B, the script and the television wave for teletext (coded transmission type teletext) incorporating transfer destination information (for example, telephone number) in the script are transmitted in the VBI (step S21 in FIG. 26).

Herein, in the vertical blanking interval (VBI) included in the video signal of main broadcast, the script for presenting plural types of additional information independent of the main broadcast (including the script main body (program) describing the processing procedure, header, form, and resource), and the telephone number incorporated in the script are transmitted.

In this example, a quiz program participated by viewers is transmitted.

The interactive television receiver (TV) 3 receives the television wave (broadcast wave) carrying the quiz program participated by viewers of the televisions, and stores (buffers) the reception script included in the broadcast wave. That is, the multimedia teletext receiver 33 provided in the interactive television receiver (TV) 3 discriminates and takes in the VBI data from the received broadcast wave, and separates into the data of ordinary teletext program and data of interactive teletext program (herein, the data of plural types of additional information independent of main broadcast), and generates display data of ordinary teletext program and display data of plural types of additional information independent of the main broadcast, and stores (buffers) them in the RAM 305 (step S22 in FIG. 26).

Herein, when the viewer manipulates the mode selection key (i key) of the television remote controller 308 and makes the interactive mode valid, the "i" mark appears in the upper left corner of the display unit (CRT) 32, telling that the interactive mode is valid (step S23 in FIG. 26).

Furthermore, along with the manipulation of the mode selection key (i key), by the execution of the script process by the interactive teletext decoder realized by execution of the process of script process module [SCR] in the ROM 302 by the CPU 301, for example, a response input screen having plural selectors by participation of viewers in the quiz of the on-screen program is displayed (step S24 in FIG. 26).

On this response input screen, as the viewer manipulates the direction command key of the television remote controller 308, the selected and designated selector is emphasized in display (for example, displayed by flickering), and the specified selector is clarified (steps S25, S26 in FIG. 26).

Furthermore, on this response input screen, when

the "decision" key is manipulated, the response content of the viewer is transmitted to the telephone reception service 4 (step S27 in FIG. 26).

The process of transmitting to the telephone reception service 4 is transmitted by automatic dialing using the telephone number contained in the script, and at this time there are means for transmitting the response information automatically by using a common telephone number and means for transmitting automatically by varying the telephone number for every content of response (selector). In the means for transmitting automatically by varying the telephone number for every content of response (selector), an individual telephone number is assigned for every response of each selector and preliminarily contained in the script, and when the CPU 301 of the interactive TV receiver 3 transmits to the telephone reception service 4, the telephone reception service 4 is called by the individual telephone number for the response content (selector).

The telephone reception service 4 receives the response information from multiple interactive TV receivers 3 in the telephone line by the common telephone number or in the telephone line by the individual telephone number in every response content (selector), and transmits the accumulated information to the broadcasting station 1 (or network service 5) (steps S28, S29 in FIG. 26).

In this way, by the interactive function through the medium of television, the response content to, for example, the main broadcast (on-screen program) such as quiz or interview, can be transmitted automatically by simple operation of the television remote controller, and the viewer can easily participate in the main broadcasting program.

Thus, the third embodiment constructs an interactive television system of a type of broadcasting programs participated by viewers of the televisions for general household in an economically advantageous system configuration, by effectively utilizing the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line as the existing infrastructure.

A fourth embodiment of the invention is described below.

FIG. 28 is a diagram showing a system configuration for explaining the outline of the fourth embodiment.

The fourth embodiment is an interactive television system of response feedback type enabling to exchange information about main broadcast, in which from the transmission antenna 2 of the broadcasting station 1, script (and screen control information) for presenting a subsidiary image information of response feedback type relating with the main broadcast is transmitted in the vertical blanking interval (VBI) of the main broadcasting program. In FIG. 28, same reference numerals are given to same constituent elements as in FIG. 1, and detailed description of the constituent elements is omitted.

In the fourth embodiment, by the reception script by the received teletext signal, the existing teletext program is further developed, and various additional information such as the quiz program of response feedback type about the on-screen program, interview, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide and others can be presented by the instruction of the viewer, on the basis of the reception script for displaying additional information, and each information exchange is done arbitrarily and selectively only by the manipulation of the television remote controller.

That is, in the fourth embodiment, it is intended to connect the interactive TV receiver 3 to the server 4 having accumulate processing function automatically through a telephone line, so that the content of response to the main broadcast (on-screen program) such as quiz and interview can be automatically transmitted by simple manipulation such as television remote controller, allowing many viewers to participate in the program easily.

Moreover, by providing the server 4 with, for example, the merchandise transaction processing function of executing the reception process of the specified merchandise or specified commodity ordered by the viewer, and acquiring the address information of the ordering viewer by retrieval of subscriber database by identification information, varied transaction procedures such as catalog request, merchandise purchase, mailing, and ticket reservation can be done easily by simple manipulation of the television remote controller.

FIG. 29 is a diagram showing an example of processing procedure in the interactive television system of the above response feedback type.

In FIG. 29, step S31 shows transmission process of television wave for teletext (coded transmission type teletext) in the broadcasting station 1, and herein showing the process of transmission of script (herein, the script is meant to include the header, form and resource, as well as the script main body (program) describing the process procedure) for viewer response procedure of, for example, quiz or interview, relating to the main broadcast in the vertical blanking interval (VBI) included in the video signal of the main broadcast.

Step S32 shows the process of receiving the television wave in the interactive television receiver (TV) 3, and storing (buffering) the reception script.

Step S33 shows the process of sending out a request signal for participating in the program such as quiz or interview by response feedback type, by manipulating the television remote controller 308 by the viewer.

Step S34 shows the process of executing the script according to the participation request from the viewer, creating a response input screen according to the additional information, and displaying in part of the display screen.

Step S35 shows the process of manipulation of the

television remote controller 308 by the viewer for inputting the response information.

Step S36 shows the process of displaying the confirmation screen according to the response content from the viewer.

Step S37 shows the process of transmitting the response content of the viewer to the server 4.

Step S38 shows the process of sending the response content from the viewer by dialing automatically to the telephone number information of the line connection destination extracted from the reception script.

Step S39 shows the process of transmitting the response content from the viewer to the server 4. Herein, the identification information (ID number) preliminarily assigned to the receiver 3 and the response content are sent to the server 4.

Steps S40 and S42 show the loop of feedback for sending back the data processed in the server 4 to the broadcasting station 1 by processing in the network service (information provider/service provider) 5, and the loop of data exchange of setting condition, processing condition, parameter condition, etc. between the broadcasting station 1 and server 4 and network service (information provider/service provider) 5, and step S41 shows the loop of feedback of the data processed in the server 4 directly to the broadcasting station 1.

By this interactive information exchange function using the television as the medium, for example, response contents to the main broadcast (on-screen program) such as quiz and interview can be automatically transmitted by simple manipulation of the television remote controller, so that the viewer can participate in the main broadcasting program easily.

Moreover, by providing the server 4 with, for example, the merchandise transaction processing function of executing the reception process of specified merchandise or specified commodity ordered by the viewer, and acquiring the address information of the ordering viewer by retrieval of subscriber database according to the identification information, varied transaction procedures such as catalog request, merchandise purpose, mailing, and ticket reservation can be executed easily by simple manipulation of the television remote controller.

The constitution of the parts in the interactive television system of response feedback type of the fourth embodiment is same as in the first embodiment, and detailed explanation is omitted (see FIG. 3).

The internal structure of the multimedia teletext receiver 33 in the fourth embodiment is also similar to that in the first embodiment, and detailed description is omitted (see FIGS. 4 and 5).

The transmission timing of the control data in the fourth embodiment (script and screen control information) is also same as in the first embodiment, and detailed description is omitted (see FIGS. 6A and 6B).

An example of operation of the fourth embodiment is described below.

From the transmission antenna 2 of the broadcasting station 1, in the transmission format as shown in FIGS. 6A and 6B, the script and the television wave for teletext (coded transmission type teletext) incorporating transfer destination information (for example, telephone number) in the script are transmitted in the VBI (step S31 in FIG. 29).

Herein, in the vertical blanking interval (VBI) included in the video signal of main broadcast, the script for presenting plural types of additional information relating to the main broadcast (including the script main body (program) describing the processing procedure, header, form, and resource), and the telephone number of transfer destination of the additional information program incorporated in the script are transmitted.

In this example, a merchandise introduction and guide program enabling to purchase commodities and request catalog by response feedback is transmitted.

The interactive television receiver (TV) 3 receives the television wave (broadcast wave) carrying the merchandise introduction and guide program by response feedback type, and stores (buffers) the reception script included in the broadcast wave. That is, the multimedia teletext receiver 33 provided in the interactive television receiver (TV) 3 discriminates and takes in the VBI data from the received broadcast wave, and separates into the data of ordinary teletext program and data of interactive teletext program (herein, the data of plural types of additional information independent of main broadcast), and generates display data of ordinary teletext program and display data of plural types of additional information independent of the main broadcast, and stores (buffers) them in the RAM 305 (step S32 in FIG. 29).

Herein, when the viewer manipulates the mode selection key (i key) of the television remote controller 308 and makes the interactive mode valid, the "i" mark appears in the upper left corner of the display unit (CRT) 32, telling that the interactive mode is valid (step S33 in FIG. 29).

Furthermore, along with the manipulation of the mode selection key (i key), by the execution of the script process by the interactive teletext decoder realized by execution of the process of script process module [SCR] in the ROM 302 by the CPU 301, for example, a response input screen having plural selectors by response feedback to the on-screen program is displayed (step S34 in FIG. 29).

On this response input screen, as the viewer manipulates the direction command key of the television remote controller 308, the selected and designated selector is emphasized in display (for example, displayed by flickering), and the specified selector is clarified (steps S35, S36 in FIG. 29).

Furthermore, on this response input screen, when the "decision" key is manipulated, the response content of the viewer is transmitted to the server 4 (step S37 in FIG. 29).

The process of transmitting to the server 4 is trans-

mitted by automatic dialing using the telephone number contained in the script, and at this time there are means for transmitting the response information automatically by using a common telephone number and means for transmitting automatically by varying the telephone number for every content of response (selector). In the means for transmitting automatically by varying the telephone number for every content of response (selector), an individual telephone number is assigned for every response of each selector and preliminarily contained in the script, and when the CPU 301 of the interactive TV receiver 3 transmits to the server 4, the server 4 is called by the individual telephone number for the response content (selector).

The server 4 receives the response information from multiple interactive TV receivers 3 in the telephone line by the common telephone number or in the telephone line by the individual telephone number in every response content (selector) (steps S38, S39 in FIG. 29).

Further, the server 4 processes the received information by, for example, accumulating, modifying, or updating local database (L-DB) 42A, master database (M-DB) 43A, etc., preliminarily as specified, and transmits the data to the broadcasting station 1 or network service (information provider/service provider) 5 (steps S40, S41 in FIG. 29).

In this way, by the interactive function through the medium of television, the response content to, for example, the main broadcast (on-screen program) such as quiz or interview, can be transmitted automatically by simple operation of the television remote controller, and the viewer can easily participate in the main broadcasting program.

Moreover, by providing the server 4 with, for example, the merchandise transaction processing function of executing the reception process of specified merchandise or specified commodity ordered by the viewer, and acquiring the address information of the ordering viewer by retrieval of subscriber database according to the identification information, varied transaction procedures such as catalog request, merchandise purpose, mailing, and ticket reservation can be executed easily by simple manipulation of the television remote controller.

In FIG. 28, the server 4 and information provider/service provider 5 are different, but it may be also constituted, for example, to include both the information provider/service provider 5 and server 4.

Thus, the fourth embodiment constructs an interactive television system of response feedback type of high utility and excellent controllability for general household in an economically advantageous system configuration, by effectively utilizing the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line as the existing infrastructure.

Especially, in the receiver 3, the identification number assigned for the receiver or subscriber is stored, and this identification number is sent to the server 4 together with the response from the viewer (operator). Therefore, in the server 4, the sender of the response data can be identified, and the service can be presented to every viewer according to the identification number.

A fifth embodiment of the invention is described below.

FIG. 30 is a diagram showing a system configuration for explaining the outline of the fifth embodiment.

The fifth embodiment is an interactive television system of so-called broadcast related online type enabling to exchange information about main broadcast, and also to exchange information by utilizing teletext not relating to the main broadcast, in which from the transmission antenna 2 of the broadcasting station 1, script (and screen control information) for presenting a subsidiary image information of broadcast related online is transmitted in the vertical blanking interval (VBI) of the main broadcasting program (on-screen program). In FIG. 30, same reference numerals are given to same constituent elements as in FIG. 1, and detailed description of the constituent elements is omitted. The definition of the script is same as in the first embodiment.

In the fifth embodiment, by the reception script by the received teletext signal, the existing teletext program is further developed, and various additional information for broadcast related online information exchange (for example, educational program, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program, and other information exchange) can be presented by the instruction of the viewer, and each information exchange is done arbitrarily and selectively only by the manipulation of the television remote controller.

That is, in this invention, it is intended to connect the interactive TV receiver 3 to the server 4 through a telephone line automatically, so that various information relating to the main broadcast or independent of the main broadcast can be exchanged by connecting the line automatically to the server 4 by simple manipulation of the television remote controller.

By constructing the information exchange mechanism by using the household television receiver as the medium, for example, various information exchange procedures about catalog request, merchandise purchase, mailing, ticket reservation, and educational system with scoring function can be done easily by simple manipulation of the television remote controller.

For example, by providing the server 4 with the subscriber database, the transaction processing function can be realized by executing the reception process of the merchandise designated by the viewer, and acquiring the address information of the viewer by retrieval of the subscriber database according to the identification information, so that varied transaction procedures of catalog request, merchandise purchase, mailing, ticket reservation and others can be done easily by simple manipulation of the television remote controller.

Also by providing the server 4 with the mail exchange and storing mechanism, mails can be exchanged between interactive TV receivers 3.

Moreover, by utilizing the mail exchange function by the interactive TV receiver 3 and server 4, not requiring dial operation or sound (voice) response at all, helper system or emergency report system for general household can be easily constructed.

FIG. 31 is a diagram showing an example of processing procedure in the interactive television system of the above broadcast related online type.

In FIG. 31, step S51 shows transmission process of television wave for teletext (coded transmission type teletext) in the broadcasting station 1, and herein showing the process of transmission of script for displaying an off-screen program in the vertical blanking interval (VBI) included in the video signal of the main broadcast.

Step S52 shows the process of receiving the television wave in the interactive television receiver (TV) 3, and storing (buffering) the reception script.

Step S53 shows the process of requesting information exchange by additional information, by manipulating the television remote controller 308 by the viewer.

Step S54 shows the process of executing the script according to the request from the viewer, creating a menu screen for selection of information exchange according to additional information, and displaying in part of the display screen.

Step S55 shows the process of manipulation of the television remote controller 308 by the viewer for selecting the information exchange service to receive information presentation from the menu screen (for example, educational program, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program presentation) by, for example, designation operation of a selector.

Step S56 shows the process of line connection of the request of information exchange service according to the selection data from the viewer to the server 4.

Step S57 shows the process of transmitting the selection data from the viewer by automatically dialing to the server 4 according to the telephone number information of the line connection destination extracted from the reception script.

Step S58 shows the process of presenting (transmitting) the data of information exchange service according to the request from the viewer to the demanding interactive TV receiver 3.

Steps S59 and S60 show the process of utilizing the information exchange service received from the server 4.

Steps S61 and S62 show the process of transmitting the viewer's message to the server 4 during or after use of the information exchange service.

Step S63 shows the process of transmitting the data processed in the response server 4 to the network service (information provider/service provider) 5.

By this interactive information exchange function using the television as the medium, the viewer can receive, by simple button operation of the television remote controller 308, desired information exchange service (for example, educational program, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program presentation).

Specifically, by providing the server 4 with, for example, a transaction processing function of executing the reception process of commodity designated by the viewer, and acquiring the address information of the ordering viewer by retrieval of subscriber database (local database (L-DB) 42A and master database (M-DB) 43A) according to the identification information, varied transaction procedures such as catalog request, merchandise purpose, mailing, and ticket reservation can be executed easily by simple manipulation of the television remote controller.

Also by providing the server 4 with the mail exchange and storing mechanism, mails can be exchanged between interactive TV receivers 3.

Moreover, by utilizing the mail exchange function by the interactive TV receiver 3 and server 4, not requiring dial operation or sound (voice) response at all, helper system or emergency report system for general household can be easily constructed.

The constitution of the parts in the interactive television system of broadcast related online type of the fifth embodiment is same as in the first embodiment, and detailed explanation is omitted.

FIG. 32 is a functional block diagram showing an internal structure of multimedia teletext receiver 33 in the fifth embodiment. The constitution of the multimedia teletext receiver 33 shown in FIG. 32 is basically same as that of the first embodiment shown in FIG. 4, and therefore same reference numerals as in FIG. 4 are provided, and detailed description is omitted. The constituent elements relating to the operation of the fifth embodiment are described specifically below.

The memory 302, same as in the first embodiment, is a control memory having a partial reloadable region which is read and accessed by the CPU 301, and stores the basic control program executed by the CPU 301 and fixed information. Herein, the script process module [SCR] for executing script process, teletext process module [CBP] for executing teletext, and others are stored, and there are also registration setting unit [PS] of machine control and individual identification information in which machine individual ID designated in each receiver and individual ID are registered, kanji and character control unit [CHA] in which kanji and characters are stored and controlled, and icon control unit [ICON], among others.

By setting the registration setting unit [PS] of machine control and individual identification information in the reloadable region, in addition to the identification information of machine ID and individual ID, as additional information of individual ID, the family membership, address, name, postal code, birthday, private telephone

number, facsimile number, registered mail box number, transfer destination telephone number (or plural numbers), credit card number, driver's permit number, insurance number, citizen code, and various additional information can be provided by controlling the termination. This registration setting unit [PS] of machine control and individual identification information is provided as a backup of the communication control block [CCB] in the RAM 305 mentioned later, and when the communication control block [CCB] in the RAM 305 is updated, the CPU 301 also updates the content in the corresponding registration setting unit [PS] of machine control and individual identification information according to the updating.

The RAM 305 is used in the work memory or the like of the CPU 301, and herein data communication control program [DCOM], picture processing program [PICM], user interface program [USIF], script buffer [SCB], and teletext data buffer are provided among others.

In the nonvolatile memory region supported by battery in the RAM 305, the communication control block [CCB] is provided, and in this communication control block [CCB], individual information stored in the ROM (or set by the viewer through the television remote controller 308), including the telephone number information (TEL-A), transfer destination telephone numbers (TEL-B1, TEL-B2), machine ID (M-ID), and individual ID (P-ID), is set. Moreover, as the additional information of the individual ID (P-ID), family membership (α1), address, name, postal code, birthday (α2), facsimile number (α3), registered mail box number (α4), credit card number (α5), insurance number (α6), citizen code (α7), and others can be set.

The communication control block [CCB] can be set or changed only after each information satisfies the specified condition such as input of compound password. The content of the communication control block [CCB] is stored as backup in the registration setting unit [PS] of machine control and individual identification information.

The CPU 301 reads and accesses this communication control block [CCB] in every line connection, and cuts out the information necessary for every transfer from the [CCB] data block, and sends the acquired information to the server 4 at the transfer destination, together with the response data to the transfer destination entered by manipulation of the television remote controller by the viewer.

The transmission timing of the control data in the fifth embodiment (script and screen control information) is also same as in the first embodiment, and detailed description is omitted (see FIGS. 6A and 6B).

FIGS. 33 to 38 show screen transition examples in the fifth embodiment, illustrating an example of shopping by broadcast related online type.

An example of operation of the fifth embodiment is described below.

From the transmission antenna 2 of the broadcasting station 1, in the transmission format as shown in FIGS. 6A and 6B, the script and the television wave for teletext (coded transmission type teletext) incorporating transfer destination information (for example, telephone number) in the script are transmitted in the VBI (step S51 in FIG. 31).

Herein, in the vertical blanking interval (VBI) included in the video signal of main broadcast, the script (including the script main body (program) describing the processing procedure, header, form, and resource) for presenting plural types of additional information corresponding to plural types of information exchange service, and the telephone number of transfer destination of the additional information program incorporated in the script are transmitted.

In this example, the shopping information is transmitted together with the transaction partner telephone number.

The interactive television receiver (TV) 3 receives the television wave (broadcast wave) carrying the broadcast related online program, and stores (buffers) the reception script included in the broadcast wave. That is, the multimedia teletext receiver 33 provided in the interactive television receiver (TV) 3 discriminates and takes in the VBI data from the received broadcast wave, and separates into the data of ordinary teletext program and data of interactive teletext program (herein, the data of plural types of additional information relating to main broadcast), and generates display data of ordinary teletext program and display data of plural types of additional information relating to the main broadcast, and stores (buffers) them in the RAM 305 (step S52 in FIG. 31).

Herein, when the viewer manipulates the mode selection key (i key) of the television remote controller 308 and makes the interactive mode valid, the "i" mark appears in the upper left corner of the display unit (CRT) 32 as shown in FIG. 33, telling that the interactive mode is valid (step S53 in FIG. 31).

Furthermore, along with the manipulation of the mode selection key (i key), by the execution of the script process by the interactive teletext decoder realized by execution of the process of script process module [SCR] in the ROM 302 by the CPU 301, for example, a selection menu screen (shopping selection screen) for information exchange having plural selectors by broadcast related online to the on-screen program is displayed as shown in FIG. 34 (step S54 in FIG. 31).

On this selection menu screen (shopping selection screen) for information exchange, as the viewer manipulates the direction command key (herein left key or right key) of the television remote controller 308, the selected and designated selector is emphasized in display (for example, displayed by flickering), and the specified selector is clarified. At this time, when the decision (firm) key is manipulated while the selector for shopping is emphasized (by flickering), the screen for introduction and selection of shopping information is displayed as shown in FIG. 35 (steps S55, S56 in FIG. 31).

Furthermore, on this screen for introduction and selection of shopping information shown in FIG. 35, when a certain merchandise is selected and specified, a screen as shown in FIG. 36 appears to display the detail of transaction and detail of merchandise, and when "revise" is selected on this screen, it returns to the screen of FIG. 35.

On the screen for confirmation of detail of transaction and detail of merchandise shown in FIG. 36, when "confirm" (order) is selected, the transaction information is automatically transmitted to the server 4 through the modem 34 and telephone line (steps S57 in FIG. 31). As a result, the server 4 confirms that the viewer has ordered the desired merchandise through the interactive TV receiver 3, and the corresponding processing is executed. At this time, the screen showing the transaction process is displayed as shown in FIG. 37.

The process of transmitting to the server 4 is transmitted by automatic dialing using the telephone number contained in the script, and at this time there are means for transmitting the response information automatically by using a common telephone number and means for transmitting automatically by varying the telephone number for every content of response (selector). In the means for transmitting automatically by varying the telephone number for every content of response (selector), an individual telephone number is assigned for every response of each selector and preliminarily contained in the script, and when the CPU 301 of the interactive TV receiver 3 transmits to the server 4, the CPU 301 originates a call to the server 4 by using the individual telephone number for the response content (selector).

The server 4 receives the response information from multiple interactive TV receivers 3 in the telephone line by the common telephone number or in the telephone line by the individual telephone number in every response content (selector).

Further, the server 4 recognizes the request of the viewer received from the interactive TV receiver 3, and presents (transmits) the information for information exchange service according to the request to the interactive TV receiver 3 (step S58 in FIG. 31).

To be more specific, when the server 4 receives transaction information from the interactive TV receiver 3, the local database (L-DB) 42A is retrieved according to the machine ID or individual ID contained in the information, and confirmation process and registration process according to the transaction content are executed, and when the transaction is established, the information noticing this is sent back to the interactive TV receiver 3 that has made the transaction.

The interactive TV receiver 3, when receiving the transaction establishment information from the server 4 through the modem 34, displays the screen as shown in FIG. 38 according to the information content.

The viewer utilizes the information exchange service presented from the server 4 through the medium of the interactive TV receiver 3 (steps S59, S60 in FIG. 31).

To terminate the use of this information exchange service, the viewer being presented with the information manipulates, for example, the "menu button" which instructs end of communication of the television remote controller 308, and the information exchange service is terminated, and the selection menu screen for information exchange having plural selectors appears again.

This embodiment relates to an example of single shopping information, but the shopping, for example, ranges widely including jewelry, food, clothes, real estate, and others, and in the interactive system offering transaction services in plural types, it is also possible to transmit automatically by using different telephone numbers by the trade and trader. In this case, plural telephone numbers set individually by trade and trader are incorporated in the transmission script, and when the transaction is confirmed at the interactive TV receiver side 3, the telephone number corresponding to the trade and trader corresponding to the transaction is sent out to the modem 34, so that transaction service using plural telephone lines can be realized.

By the interactive information exchange function by using the general household television receiver as the medium and utilizing the public telephone line, in the system configuration easy to construct and distribute, extremely saving the user's cost, the viewer can receive desired information exchange service (for example, educational program, catalog request, merchandise purchase, mailing, ticket reservation, and local program presentation) by simple button operation of the television remote controller 308.

Specifically, by providing the server 4 with the transaction processing function for executing the reception process of the merchandise designated by the viewer, and acquiring the address information of the viewer by retrieval of the subscriber database (local database (L-DB) 42A, master database (M-DB) 43A) according to the identification information, varied transaction procedures of catalog request, merchandise purchase, mailing, ticket reservation and others can be done easily by simple manipulation of the television remote controller.

Or, by providing the server 4 with the transaction processing function for executing the reception process of the merchandise designated by the viewer, and acquiring the address (address, name, postal code, etc.) information of the demanding viewer by retrieval of the subscriber database according to the identification information, varied transaction procedures of catalog request, merchandise purchase, mailing, ticket reservation and others can be done easily by simple manipulation of the television remote controller.

Also by providing the server 4 with the mail exchange and storing mechanism, mails can be exchanged between interactive TV receivers 3.

Moreover, by utilizing the mail exchange function by the interactive TV receiver 3, not requiring dial operation or sound (voice) response at all, helper system or emergency report system for general household can be eas-

ily constructed.

Thus, the fifth embodiment constructs an interactive television system of broadcast related online type of high utility and excellent controllability for general household in an economically advantageous system configuration, by effectively utilizing the broadness in coverage and rapidity in reporting which are basic features of television broadcast, coding transmission system in vertical blanking interval (VBI) of television broadcast, and public telephone line, spread widely as the existing infrastructure.

Especially, if the information to be supplied to the viewer, that is, the interactive TV receiver 3 is an enormous quantity, the system can be built up so as to supply the information as the basis for judgment by the viewer from the broadcasting station 1 same as in the preceding embodiment and supply the divided information by the server 4. As a result, shortage of screen display data or delay of response due to increase of quantity of information can be prevented. When supplying divided information, the identification information used in the fourth embodiment may be utilized, so that adequate information can be presented efficiently.

A sixth embodiment of the invention is described below.

FIG. 39 is a diagram showing a system configuration for explaining the outline of the sixth embodiment.

The sixth embodiment is an interactive television system of so-called broadcast non-related online type enabling to exchange information not relating to the main broadcast, by using the interactive TV receiver.

From the transmission antenna 2 of the broadcasting station 1, script (and screen control information) for presenting a subsidiary image information of broadcast non-related online is transmitted in the vertical blanking interval (VBI) of the main broadcasting program (on-screen program). In FIG. 39, same reference numerals are given to same constituent elements as in FIG. 1, and detailed description of the constituent elements is omitted. The definition of the script is same as in the first embodiment.

In the invention, completely unrelated to the broadcast, by effectively utilizing the existing infrastructure, bidirectional information exchange is enabled, and the function of the interactive TV receiver 3 is extended.

That is, in the invention, by a third information transmitting function, completely independent of the main broadcast and existing teletext generated, displayed and outputted by the reception script, it is intended to extend the function of the interactive TV receiver 3, and the system is built up by connecting multiple interactive TV receivers 3 through public telephone lines. By such configuration of connecting multiple interactive TV receivers 3 to the server 4 through telephone lines, bidirectional information exchange function of receivers is further advanced, and according to the viewer's instruction, online information exchange not relating to the broadcast (for example, educational program, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program and other information exchange, and various information services) can be presented, and each information exchange can be done easily and selectively only by manipulation of the television remote controller.

That is, in this invention, it is intended to connect the interactive TV receiver 3 to the server 4 through a telephone line automatically, so that various information relating to the main broadcast or independent of the main broadcast can be exchanged by connecting the line automatically to the server 4 by simple manipulation of the television remote controller.

By constructing the information exchange mechanism by using the household television receiver as the medium, for example, various information exchange procedures about catalog request, merchandise purchase, mailing, ticket reservation, and educational system with scoring function can be done easily by simple manipulation of the television remote controller.

For example, by providing the server 4 with the subscriber database, the transaction processing function can be realized, relating to the main broadcast, or independently of the main broadcast, or not relating to the main broadcast at all, by executing the reception process of the merchandise designated by the viewer, and acquiring the address information of the viewer by retrieval of the subscriber database according to the identification information, so that varied transaction procedures of catalog request, merchandise purchase, mailing, ticket reservation and others can be done easily by simple manipulation of the television remote controller.

Or, by providing the server 4 with the subscriber database, disclosure function of information guide presented to the subscriber (disclosure of presented information guide menu), and information presenting function, it realizes, completely indifferent to broadcast, the transaction process function for executing the reception process of the merchandise specified by the viewer and acquiring the address information of the viewer by retrieval of the subscriber database according to the identification information, so that varied transaction procedures for catalog request, merchandise purchase, mailing, and ticket reservation can be done by simple manipulation of the television remote controller.

Also by providing the server 4 with the mail exchange and storing mechanism, mails can be exchanged between interactive TV receivers 3, completely indifferent to broadcast.

Moreover, by utilizing the mail exchange function by the interactive TV receiver 3 and server 4, not requiring dial operation or sound response at all (that is, not necessary to turn dial or talk), helper system or emergency report system for general household can be easily constructed.

FIG. 40 is a diagram showing an example of processing procedure in the interactive television system of the above broadcast non-related online type.

In FIG. 40, step S71 shows transmission process of requesting online information presentation not relating to the broadcast, by button operation of the television remote controller 308 by the viewer.

Step S72 shows the process of receiving the online information presentation request by button operation of the television remote controller 308 from the viewer, and transmitting the request to the server 4.

Step S73 shows the process of transmitting presented information guide menu from the server 4 to disclose the presented information guide to the viewer. Alternatively, a basic home menu may be stored in the ROM of the receiver 3 preliminarily, and it may be displayed in the CRT 32. In this case, the menu screen can be displayed promptly and adequately.

Step S74 shows the process of button operation of the television remote controller 308 by the viewer for selecting the information exchange service to receive information presentation from the presented information guide menu (for example, educational program presentation, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program presentation, mail exchange, home helper booking, use of registered main box (emergency report, etc.), hospital and other facility booking, and other information exchange service) by, for example, designation operation of a selector.

Step S75 shows the process of line connection of the request of information exchange service according to the selection data from the viewer to the server 4. Herein, by automatically dialing to the server 4 according to the telephone number information of the line connection destination stored in the communication control block [CCB] in the RAM mentioned later, the request of information exchange service according to the selection data from the viewer is transmitted.

Step S76 shows the process of presenting (transmitting) the data of information exchange service according to the request from the viewer to the demanding interactive TV receiver 3.

By this interactive information exchange function using the television as the medium, the viewer can receive, by simple button operation of the television remote controller 308, desired information exchange service (for example, educational program presentation, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program presentation, mail exchange, home helper booking, use of registered main box (emergency report, etc.), hospital and other facility booking, and other information exchange service).

Specifically, by providing the server 4 with, for example, a transaction processing function of executing the reception process of commodity designated by the viewer, and acquiring the address information of the ordering viewer by retrieval of subscriber database (local database (L-DB) 42A and master database (M-DB) 43A) according to the identification information, varied transaction procedures such as catalog request, merchandise purpose, mailing, and ticket reservation can be executed easily by simple manipulation of the television remote controller.

Also by providing the server 4 with the mail exchange and storing mechanism, mails can be exchanged between interactive TV receivers 3.

Moreover, by utilizing the mail exchange function by the interactive TV receiver 3 and server 4, not requiring dial operation or sound (voice) response at all, helper system or emergency report system for general household can be easily constructed.

The constitution of the parts in the interactive television system having online bidirectional function not relating to the broadcast is same as in the fifth embodiment, that is, the first embodiment, and detailed description is omitted (see FIG. 3).

The internal structure of the multimedia teletext receiver 33 and transmission timing of the control data in the sixth embodiment (script and screen control information) are also same as in the fifth embodiment, that is, the first embodiment, and detailed description is omitted (see FIGS. 4, 5, 6A and 6B).

An example of operation of the sixth embodiment is described below. The bidirectional information exchange service using the broadcast wave is explained in the fifth embodiment, and detailed description is omitted.

The information exchange service not relating to broadcast wave is described below.

First, the viewer operates button of the television remote controller 308 to request online information presentation not relating to broadcast (step S71 in FIG. 40).

The interactive TV receiver 3, when receiving the request of online information presentation by button operation of the television remote controller 308 from the viewer, transmits the request to the sever 4, by automatically dialing to the server 4 according to the telephone number information of the line connection destination stored in the communication control block [CCB] in the RAM 305 (step S72 in FIG. 40).

The server 4, when receiving the request of online information presentation by manipulation of the television remote controller 308 by the viewer, retrieves the local database (L-DB) 42A (or master database (M-DB) 43A) according to identification information to disclose the presented information guide to the viewer, and acquires the telephone number of the demanding viewer, and transmits the presented information guide menu to the demanding viewer (step S73 in FIG. 40).

At this time, if the private telephone number of the viewer is included in the information received from the interactive TV receiver 3, the process of acquisition of demanding viewer telephone number from the database is skipped, and the line is connected automatically by using the received telephone number.

The interactive TV receiver 3 displays the presented information guide menu on the display screen of the

display unit (CRT) 32 according to the data received from the server 4.

On the presented information guide menu screen, the viewer operates the button of the television remote controller 308, and selects the desired information exchange service from the presented information guide menu (for example, educational program presentation, catalog request guide, merchandise purchase guide, mailing guide, ticket reservation guide, local program presentation, mail exchange, home helper booking, use of registered main box (emergency report, etc.), hospital and other facility booking, and other information exchange service) by, for example, designation operation of a selector (step S74 in FIG. 40).

At this time, on the presented information guide menu screen, as the viewer manipulates the direction command key of the television remote controller 308, the selected and designated selector is emphasized in display (for example, displayed by flickering), and the specified selector is clarified.

Furthermore, on this screen, when the "decision" key is manipulated, the selection content (request of information exchange service) of the viewer is transmitted to the server 4 (step S75 in FIG. 40).

The server 4, when receiving the request of information exchange service from the viewer, calls the information exchange service information according to the request from the local database (L-DB) 42A or master database (M-DB) 43A, and saves in the transfer data store buffer not shown, and transmits the information exchange service data according to the request to the demanding interactive TV receiver 3, thereby starting presentation of information exchange service (step S76 in FIG. 40).

At this time, depending on the content of the information exchange service (for example, presentation of pay TV program), the fee processing is started. That is, when presentation of information exchange service is started, in the subscriber database in the local database (L-DB) 42A or master database (M-DB) 43A, the feed control region of the database is updated and controlled, to the subscriber presented with the information exchange service, by transfer information quantity, simple time calculation, or package unit calculation.

In this way, the viewer of the interactive TV receiver 3 can receive information exchange service presented from the server 4 according to the request, through the medium of the TV receiver.

To terminate the use of this information exchange service, the viewer being presented with the information manipulates, for example, the "menu button" which instructs end of communication of the television remote controller 308, and the information exchange service is terminated, and the selection menu screen for information exchange having plural selectors appears again.

By the interactive information exchange function by using the general household television receiver as the medium and utilizing the public telephone line, in the system configuration easy to construct and distribute, extremely saving the user's cost, the viewer can receive desired information exchange service (for example, educational program, catalog request, merchandise purchase, mailing, ticket reservation, and local program presentation) by simple button operation of the television remote controller 308.

Specifically, by providing the server 4 with the transaction processing function for executing the reception process of the merchandise designated by the viewer, and acquiring the address information of the viewer by retrieval of the subscriber database (local database (L-DB) 42A, master database (M-DB) 43A) according to the identification information, varied transaction procedures of catalog request, merchandise purchase, mailing, ticket reservation and others can be done easily by simple manipulation of the television remote controller.

Or, by providing the server 4 with the transaction processing function for executing the reception process of the merchandise designated by the viewer, and acquiring the address (address, name, postal code, etc.) information of the demanding viewer by retrieval of the subscriber database according to the identification information, varied transaction procedures of catalog request, merchandise purchase, mailing, ticket reservation and others can be done easily by simple manipulation of the television remote controller.

Also by providing the server 4 with the mail exchange and storing mechanism, mails can be exchanged between interactive TV receivers 3.

Moreover, by utilizing the mail exchange function by the interactive TV receiver 3, not requiring dial operation or sound (voice) response at all, helper system or emergency report system for general household can be easily constructed.

Thus, the sixth embodiment constructs an online interactive television system, not relating to the broadcast, of high utility and excellent controllability for general household in an economically advantageous system configuration, by effectively utilizing the broadness in coverage and rapidity in reporting which are basic features of television broadcast, public telephone lines, etc., spread widely as the existing infrastructure.

In the described first to sixth embodiments, the control data, the transfer destination information and the telephone number information are included in a vertical blanking interval of the broadcasting wave. However, the video signal (the broadcasting wave) may includes the control data, the transfer destination information and the telephone number information in another position rather than the vertical blanking interval.

Claims

1. A television system characterized by comprising:

receiving means (31) for receiving a video sig-

nal including control data;
means (303, 305) for identifying the control data from the video signal received by said receiving means and for storing the identified control data;
means (307, 308) for inputting an instruction from an operator;
a display (32);
first display means (301) for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information on said display, according to the stored control data, in response to the instruction input by said input means; and
second display means (301) for displaying a screen corresponding to additional information selected by the operator of the plural pieces of additional information on said display, according to the stored control data, in response to the instruction input by said input means.

2. A television system according to claim 1, characterized in that the video signal includes the control data in a vertical blanking interval.

3. A television system according to claim 1, characterized in that the control data includes script for providing plural types of additional information relating to a broadcasting program provided by the video signal.

4. A television system according to claim 2, characterized in that the control data includes script for providing plural types of additional information relating to a broadcasting program provided by the video signal.

5. A television system according to claim 1, characterized in that said input means includes:

a remote controller (308) having at least one operation button to be manipulated by the operator, and means for outputting a signal corresponding to manipulation of the operation button as the instruction, and
a remote control receiver (307) for receiving the signal output by the remote controller.

6. A television system according to claim 3, characterized in that said television system comprises a read-only memory (302) for storing a script interpreter executing an interactive procedure, and character font information, and

said first and second display means execute the stored control data by using the script interpreter in order to access the character font information, and displays a screen according to the accessed character font information on said display.

7. A television system according to claim 4, characterized in that said television system comprises a read-only memory (302) for storing a script interpreter executing an interactive procedure, and character font information, and

said first and second display means execute the stored control data by using the script interpreter in order to access the character font information, and displays a screen according to the accessed character font information on said display.

8. A television system according to claim 1, characterized by further comprising:

a memory;
means (304) for storing information of the screen displayed on said display into said memory, in response to the instruction input by said input means; and
means (301) for redisplaying the screen displayed on said display according to the information stored in said memory, in response to the instruction input by said input means.

9. A television system according to claim 1, characterized by further comprising:

determining means (301) for determining whether right or wrong with respect to the instruction input by said input means according to the stored control data; and
means (301) for displaying a result of determining by said determining means on said display.

10. A television system according to claim 9, characterized in that the control data includes video control data showing predetermined timing of broadcasting program provided by the video signal, and

said determining means displays the result of determining by said determining means on said display according to the video control data.

11. A television system characterized by comprising:

a receiver (3); and
a line processing device (4),
said receiver comprising:

first receiving means (31) for receiving a video signal including transfer destination information and control data,
means (303, 305) for identifying the control data and the transfer destination information from the video signal received by said first receiving means and for storing the identified control data,

means (307, 308) for inputting an instruction from an operator,
a display (32),
a memory (302) for storing identification information,
display means (301) for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by said input means, and
output means (34, 301) for outputting transfer data corresponding to additional information selected by the operator of said plural pieces of additional information, together with the identification information stored in said memory, according to the transfer destination information, in response to the instruction input by said input means, and

the line processing device comprising:

second receiving means (41) for receiving the transfer data and the identification information output from said output means, and
processing means (43) for executing processing which corresponds to the additional information selected by the operator, according to the transfer data and identification information received by said second receiving means.

12. A television system according to claim 11, characterized in that the video signal includes the transfer destination information and the control data in a vertical blanking interval.

13. A television system according to claim 11, characterized in that the control data includes script for providing the plural pieces of additional information independent of broadcasting program provided by the video signal.

14. A television system according to claim 12, characterized in that the control data includes script for providing the plural pieces of additional information independent of broadcasting program provided by the video signal.

15. A television system according to claim 11, characterized in that the transfer destination information includes a plurality of line numbers assigned to the plural pieces of additional information respectively.

16. A television system according to claim 12, characterized in that the transfer destination information includes a plurality of line numbers assigned to the plural pieces of additional information respectively.

17. A television system according to claim 11, characterized in that said input means possesses:

a remote controller (308) having at least one operation button to be manipulated by the operator, and means for outputting a signal corresponding to manipulation of this operation button as the instruction, and
a remote control receiver (307) for receiving the signal output by the remote controller.

18. A television system characterized by comprising:

a plurality of receivers (3); and
a line processing device (4) connected to said plurality of receivers,
each one of said plurality of receivers comprising:

first receiving means (31) for receiving a video signal including transfer destination information and control data,
means (303, 305) for identifying the control data and the transfer destination information from the video signal received by said first receiving means and for storing the control data and the transfer destination information,
means (307, 308) for inputting an instruction from an operator,
a display (32),
a memory (302) for storing identification information,
display means (301) for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by said input means, and
output means (301) for outputting transfer data corresponding to the additional information selected by the operator, together with the identification information stored in said memory to said line processing device, according to the transfer destination information, in response to the instruction input by said input means, and

said line processing device comprising:

second receiving means for receiving the transfer data and the identification information outputted from said output means, and

processing means for executing predetermined processing in every one of the plural pieces of additional information, according to the transfer data and the identification information received by said second receiving means.

19. A television system according to claim 18, characterized in that the video signal includes the transfer destination information and the control data in a vertical blanking interval.

20. A television system according to claim 18, characterized in that the control data includes script for providing the plural pieces of additional information relating to broadcasting program provided by the video signal.

21. A television system according to claim 19, characterized in that the control data includes script for providing the plural pieces of additional information relating to broadcasting program provided by the video signal.

22. A television system according to claim 18, characterized in that the transfer destination information includes a plurality of line numbers assigned to the plural pieces of additional information respectively.

23. A television system according to claim 19, characterized in that the transfer destination information includes a plurality of line numbers assigned to the plural pieces of additional information respectively.

24. A television system according to claim 18, characterized in that said input means possesses:

a remote controller (308) having at least one operation button to be manipulated by the operator, and means for outputting a signal corresponding to manipulation of the operation button as the instruction, and
a remote control receiver (307) for receiving the signal output by the remote controller

25. A television system according to claim 18, characterized in that the predetermined processing by said processing means is counting of the received transfer data in every one of said plural pieces of additional information.

26. A television system characterized by comprising:

a receiver (3); and
a line control device (4),
said receiver comprising:

first receiving means (31) for receiving a video signal including transfer destination information and control data,
means (303, 305) for identifying the control data and the transfer destination information from the video signal received by said first receiving means and for storing the control data and the transfer destination information,
means (307, 308) for inputting an instruction from an operator,
a display (32),
a memory (302) for storing identification information,
display means (301) for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by said input means, and
first output means (301) for outputting transfer data corresponding to additional information selected by the operator of the plural pieces of additional information, together with the identification information stored in said memory, according to the transfer destination information, in response to the instruction input by said input means, and

said line control device comprising:

second receiving means (41) for receiving the transfer data and the identification information output from said first output means,
a database (43A) dealing with at least one of said receiver and the operator, and
second output means (41, 42, 43) for outputting response data corresponding to the additional information selected by the operator of the plural pieces of additional information, according to the transfer data and the identification information received by said second receiving means, and said database.

27. A television system according to claim 26, characterized in that the video signal includes the transfer destination information and the control data in a vertical blanking interval.

28. A television system according to claim 26, characterized in that said first receiving means of said receiver receives the response data, and displays the response data in said display.

29. A television system according to claim 27, characterized in that said first receiving means of said receiver receives the response data, and displays the response data in said display.

30. A television system according to claim 26, characterized in that the control data includes script for providing the plural pieces of additional information relating to broadcasting program provided by the video signal.

31. A television system according to claim 27, characterized in that the control data includes script for providing the plural pieces of additional information relating to broadcasting program provided by the video signal.

32. A television system according to claim 26, characterized in that the transfer destination information includes a plurality of line numbers assigned to the plural types of additional information respectively.

33. A television system according to claim 27, characterized in that the transfer destination information includes a plurality of line numbers assigned to the plural types of additional information respectively.

34. A television system according to claim 26, characterized in that said input means includes

a remote controller (308) having at least one operation button to be manipulated by the operator, and means for outputting a signal corresponding to manipulation of the operation button as the instruction, and
a remote control receiver (307) for receiving the signal output by the remote controller.

35. A television system characterized by comprising:

a receiver (3); and
a server (4),
said receiver comprising:

first receiving means (31) for receiving a video signal including telephone number information and control data,
means (303, 305) for identifying the control data and the telephone number information from the video signal received in said first receiving means and storing the control data and the telephone number information,
means (307, 308) for inputting an instruction from an operator,
a display (32),
a memory (302) for storing identification information,
first display means (301) for displaying an additional information selection screen for selecting arbitrary additional information from plural pieces of additional information according to the stored control data, in response to the instruction input by said input means,
output means (301) for outputting transfer data corresponding to additional information selected by the operator of the plural pieces of additional information, together with the identification information stored in said memory onto a telephone line, according to the telephone number information, in response to the instruction input by said input means, and
second display means (301) for receiving the response data output on the telephone line, and displaying the information corresponding to the received response data on said display; and

said server comprising:

second receiving means (41) for receiving the transfer data and the identification information output from said output means through the telephone line,
a database (42A, 43A) dealing with at least one of said receiver and the operator, and
means (43) for retrieving said database according to the identification information received by said second receiving means, and outputting response data corresponding to the transfer data onto the telephone line.

36. A television system according to claim 35, characterized in that the video signal includes the telephone number information and the control data in a vertical blanking interval.

37. A television system according to claim 35, characterized in that the control data includes script for providing the plural pieces of additional information independent of broadcasting program provided by the video signal.

38. A television system according to claim 35, characterized in that the control data includes script for providing plural pieces of additional information relating to broadcasting program provided by the video signal.

39. A television system according to claim 36, characterized in that the control data includes script for providing plural pieces of additional information relating to broadcasting program provided by the video signal.

40. A television system according to claim 35, characterized in that the identification information includes a telephone number assigned to said receiver.

41. A television system according to claim 36, characterized in that the identification information includes a telephone number assigned to said receiver.

42. A television system according to claim 35, characterized in that said input means includes

a remote controller (308) having at least one operation button to be manipulated by the operator, and means for outputting a signal corresponding to manipulation of the operation button as the instruction, and
a remote control receiver (307) for receiving the signal output by the remote controller.

43. A television system characterized by comprising:

a receiver (3); and
a server (4),
said receiver comprising:

input means (307, 308) for inputting an instruction from an operator,
a display (32),
a first memory (302) for storing identification information,
a second memory (305) for storing telephone number information of a said server,
output means (34, 301) for outputting transfer data corresponding to the instruction input by said input means, together with the identification information stored in said first memory, onto a telephone line, according to the telephone number information, in response to the instruction input by the input means, and
display means (301) for receiving response data output onto the telephone line, and displaying information corresponding to the received response data on said display, and

said server comprising:

receiving means (41) for receiving the transfer data and the identification information output from said output means through the telephone line,
a database (42A, 43A) dealing with at least one of said receiver and the operator, and
means (43) for retrieving said database according to the identification information received in said second receiving means, and outputting response data corresponding to the transfer data onto the telephone line.

44. A television system according to claim 43, characterized in that said receiver includes a third memory for storing control data, and

said display means displays the information according to the control data.

45. A television system according to claim 43, characterized in that the control data includes script for the plural pieces of additional information independent of broadcasting program provided by said server.

46. A television system according to claim 43, characterized in that the identification signal includes a telephone number assigned to said receiver.

47. A television system according to claim 43, characterized in that said input means includes

a remote controller (308) having at least one operation button to be manipulated by the operator, and means for outputting a signal corresponding to manipulation of the operation button as the instruction, and
a remote control receiver (307) for receiving the signal output by the remote controller.

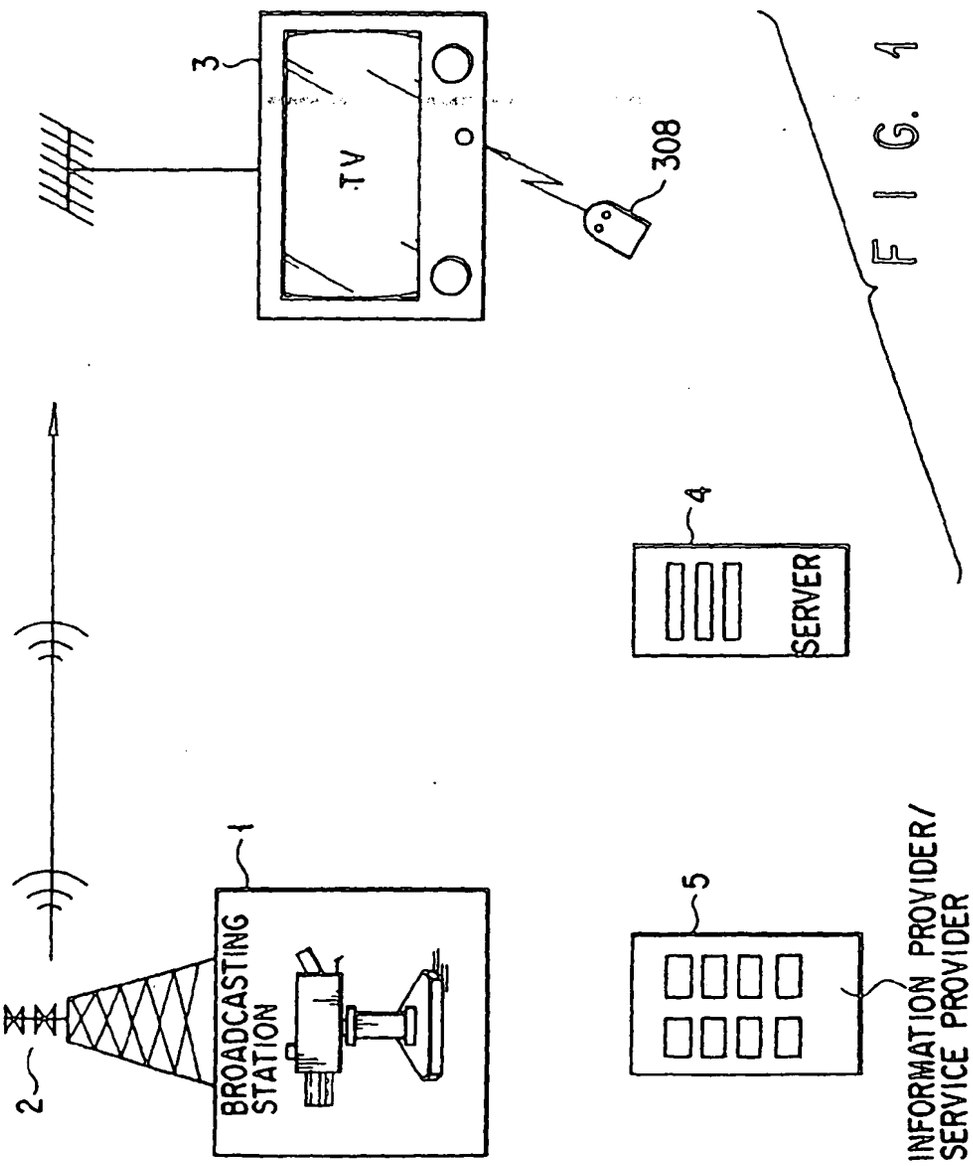

FIG. 1

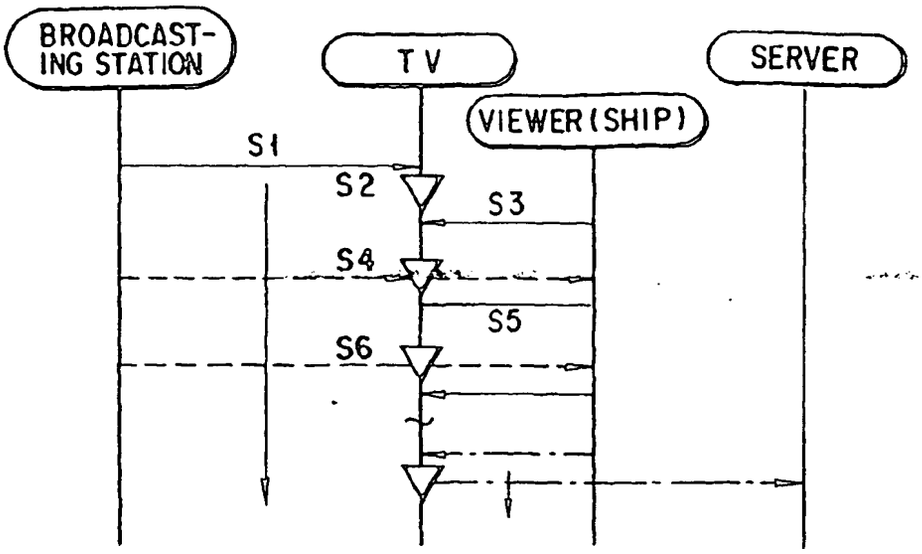

FIG. 2

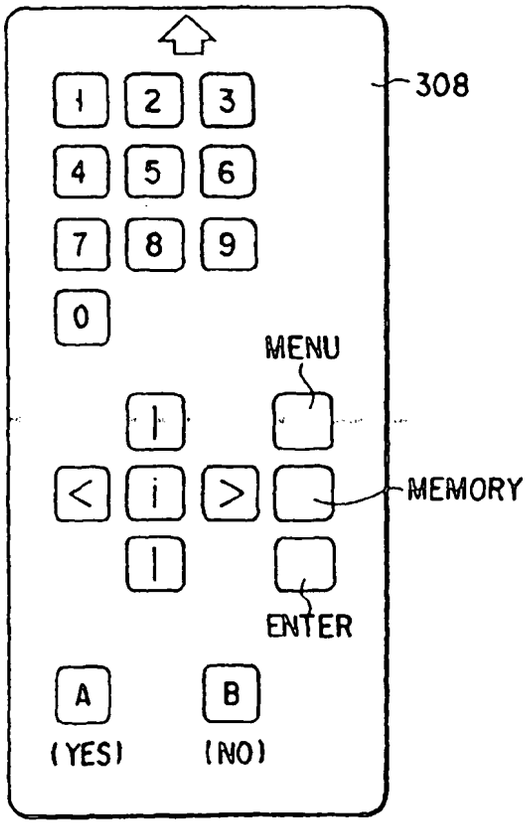

FIG. 5

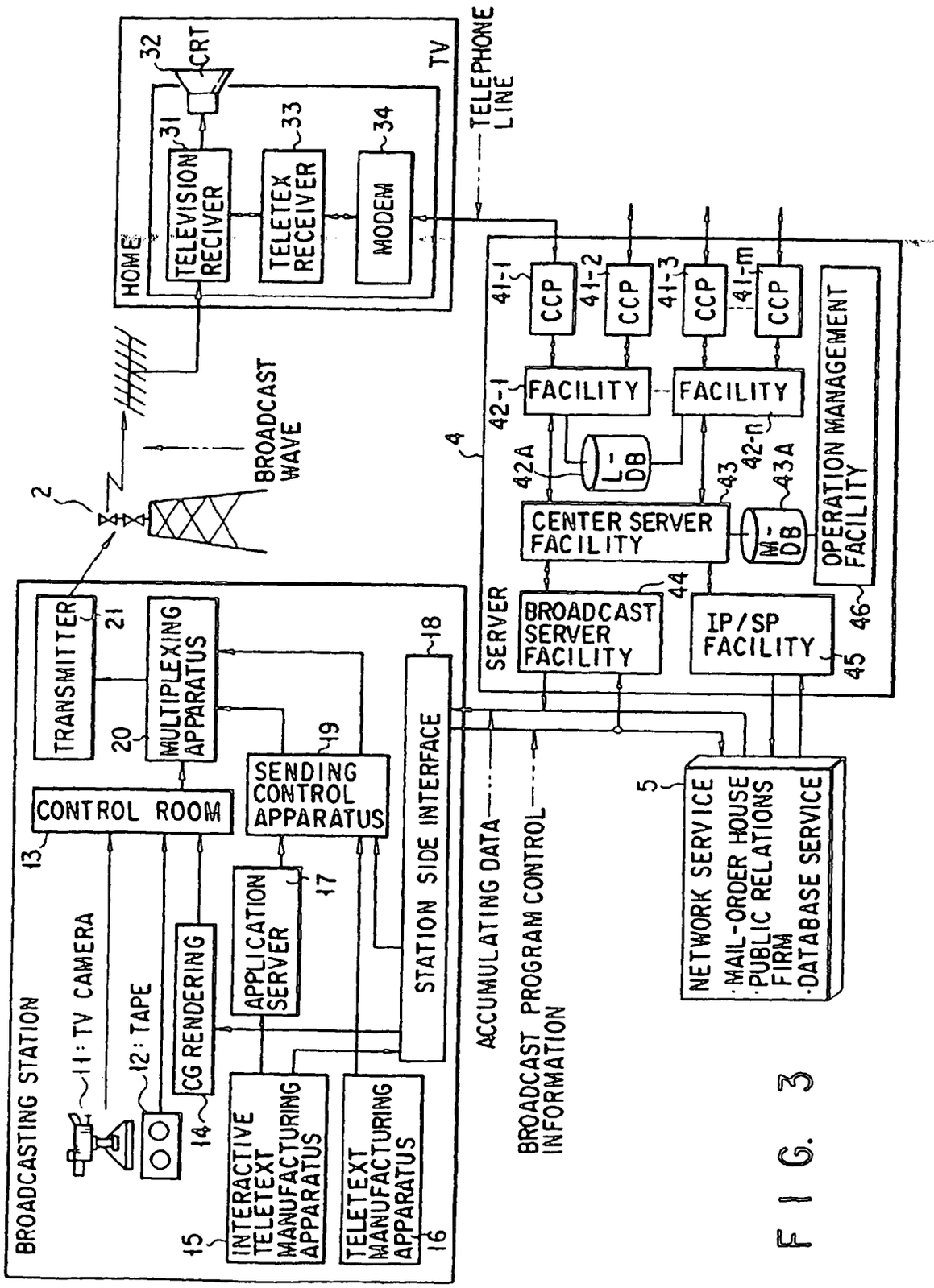

FIG. 3

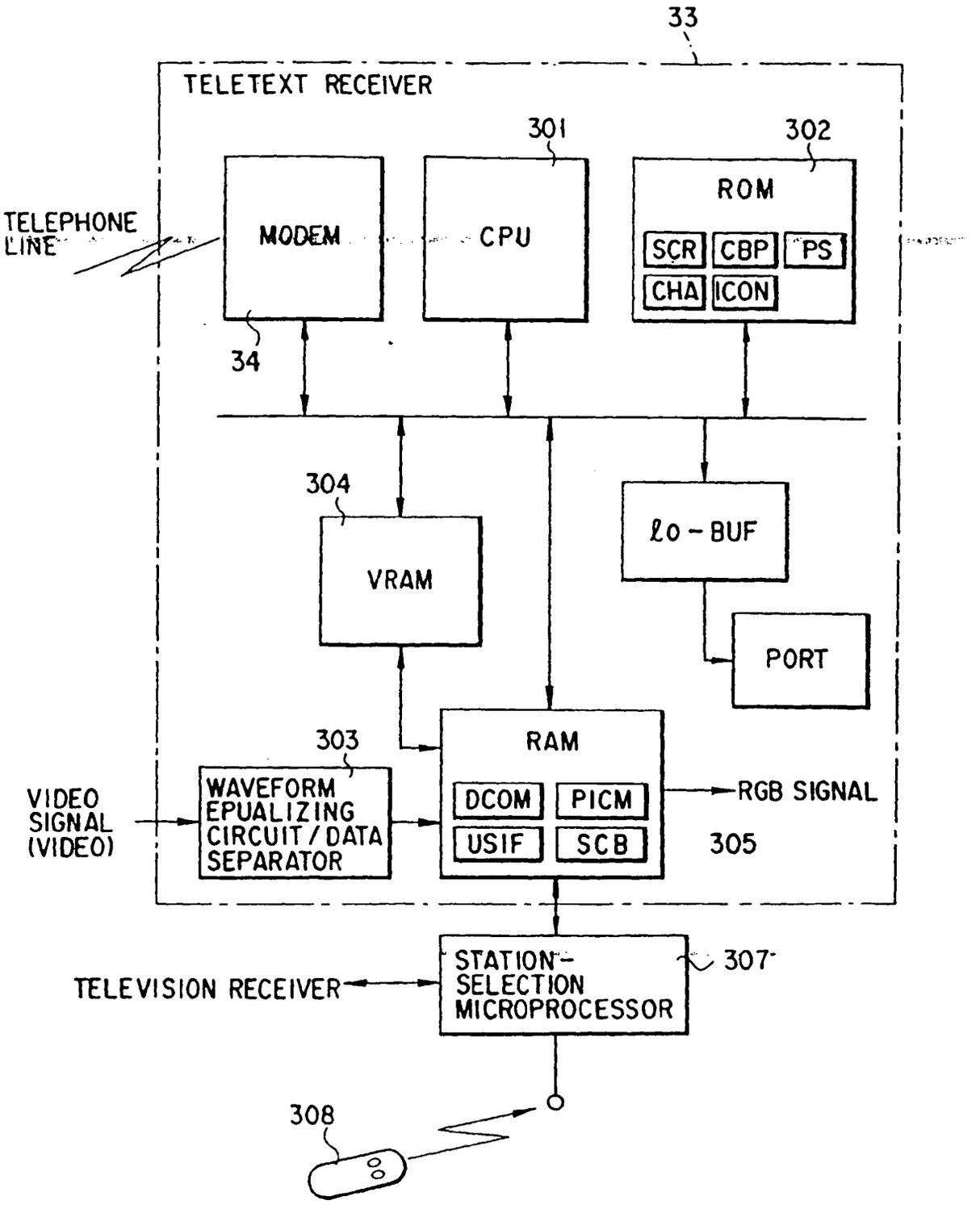

FIG. 4

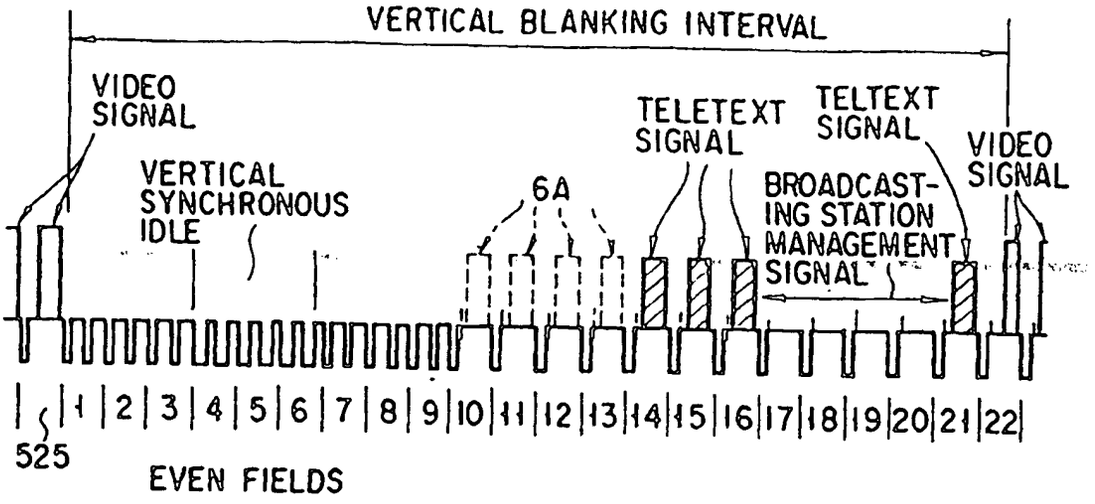

FIG. 6A

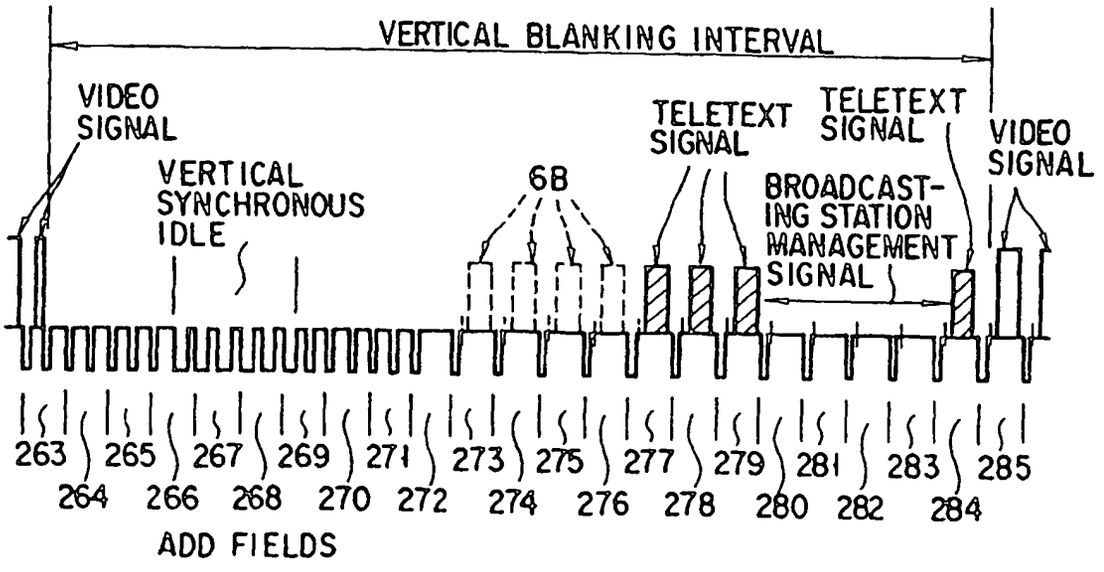

FIG. 6B

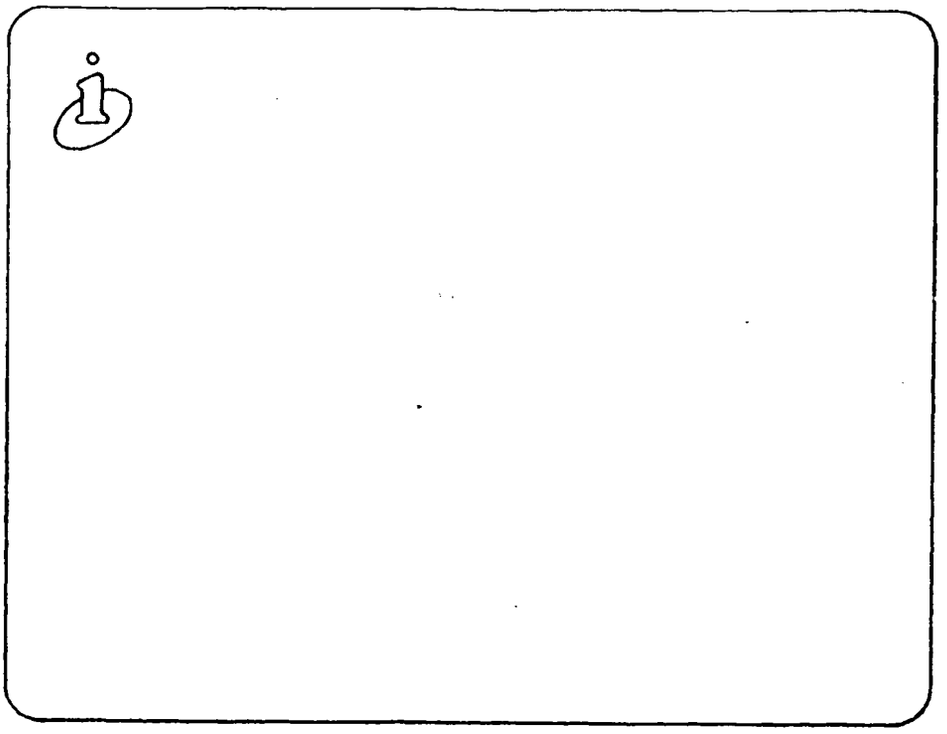

FIG. 7

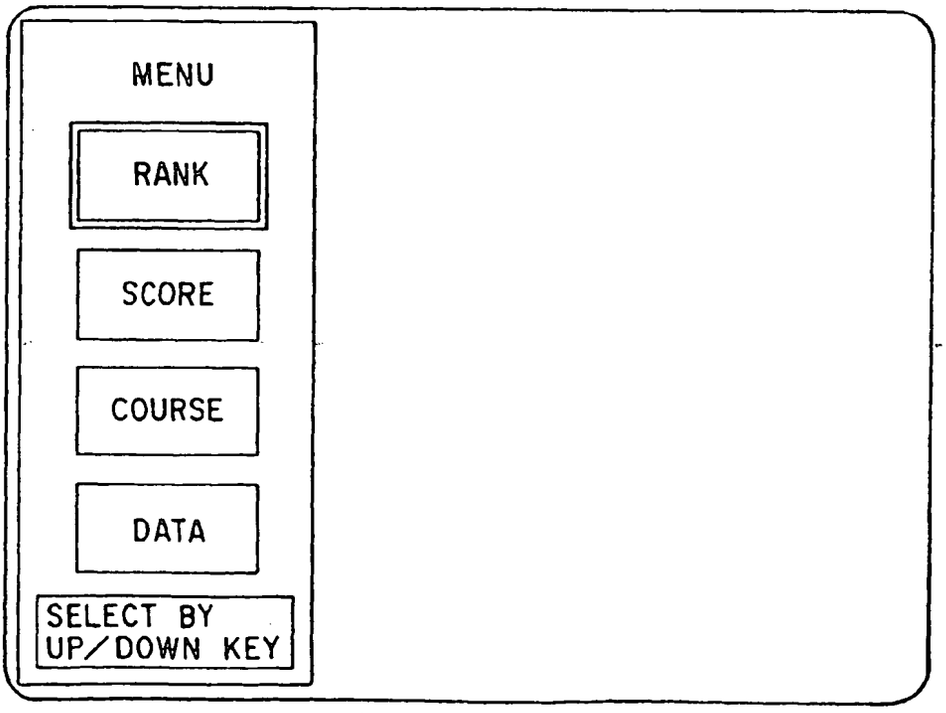

FIG. 8

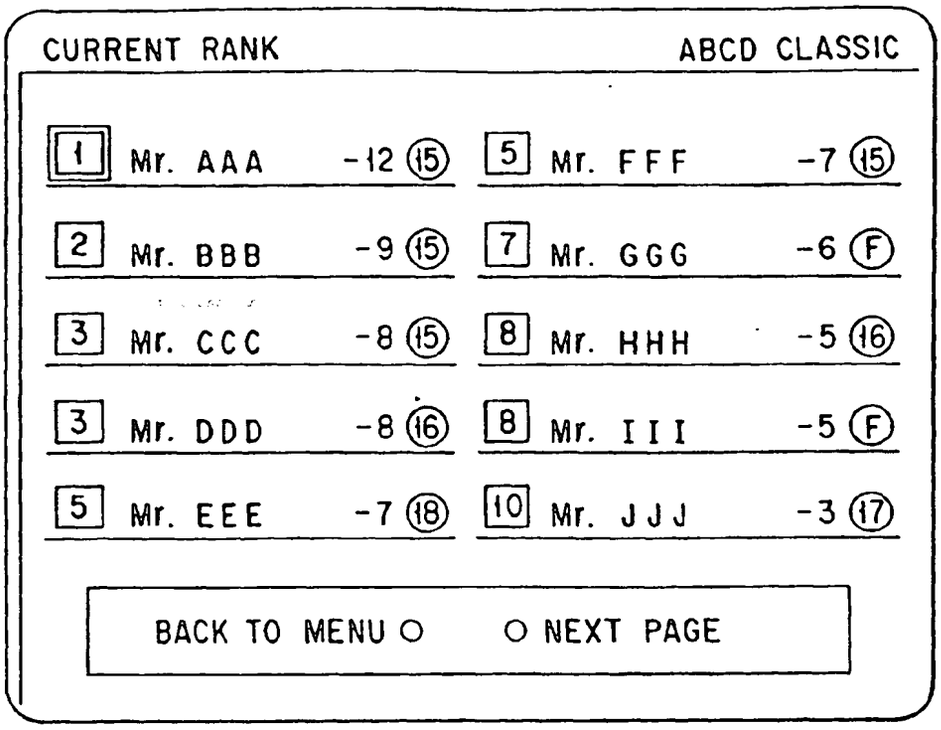

FIG. 9

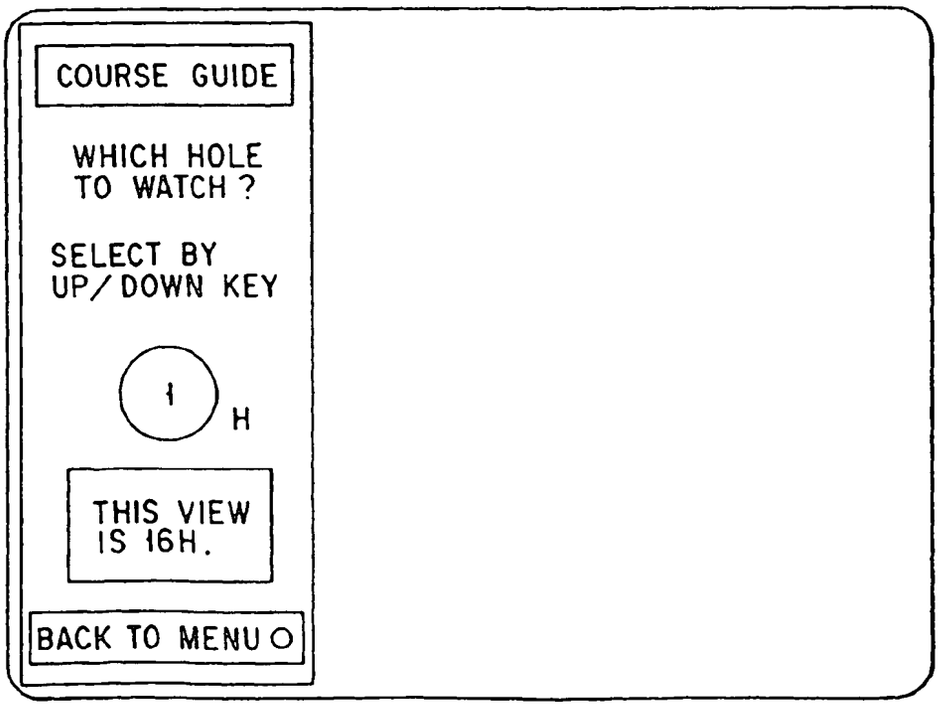

FIG. 10

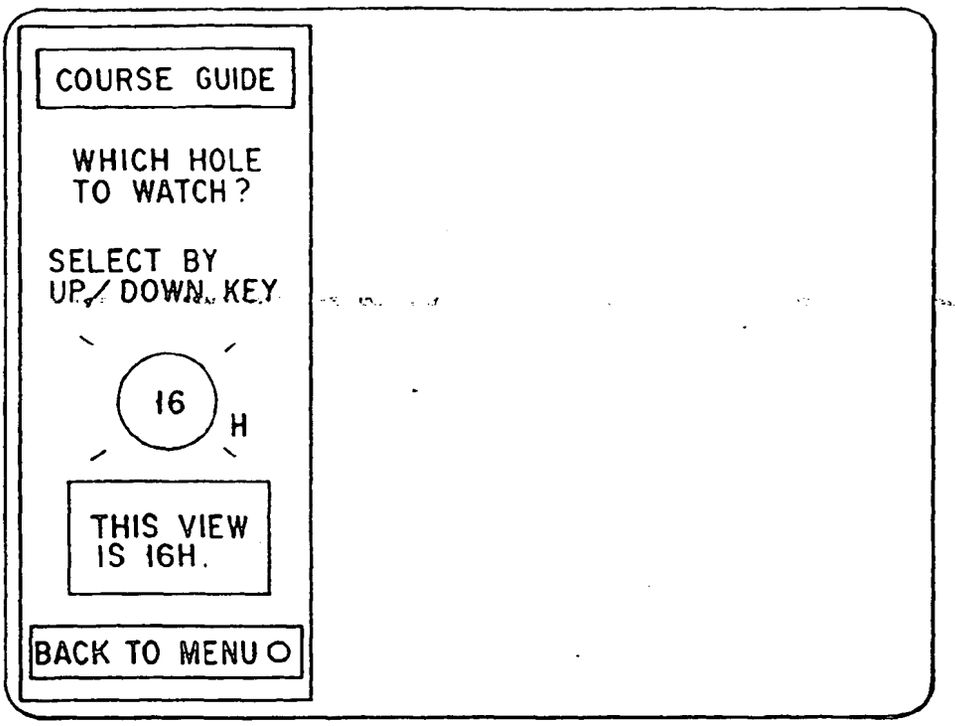

FIG. 11

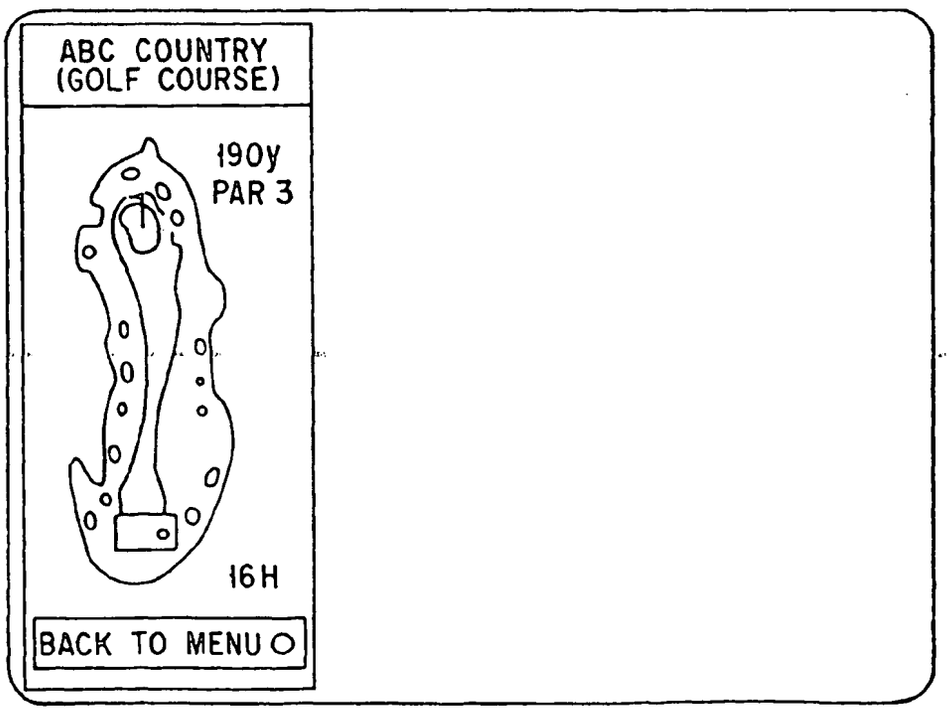

FIG. 12

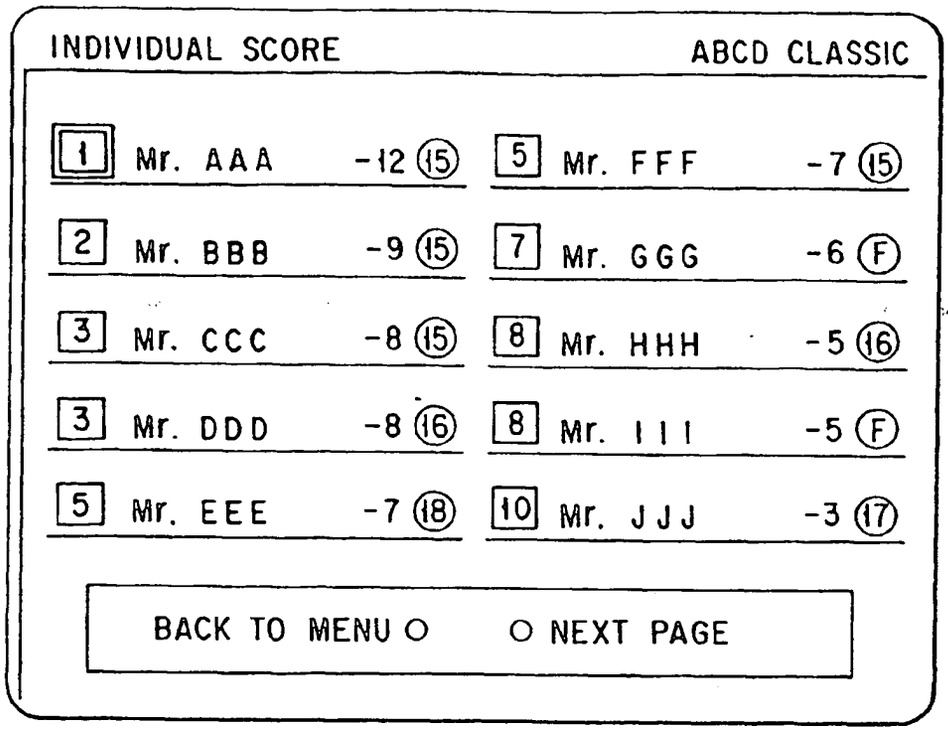

FIG. 13

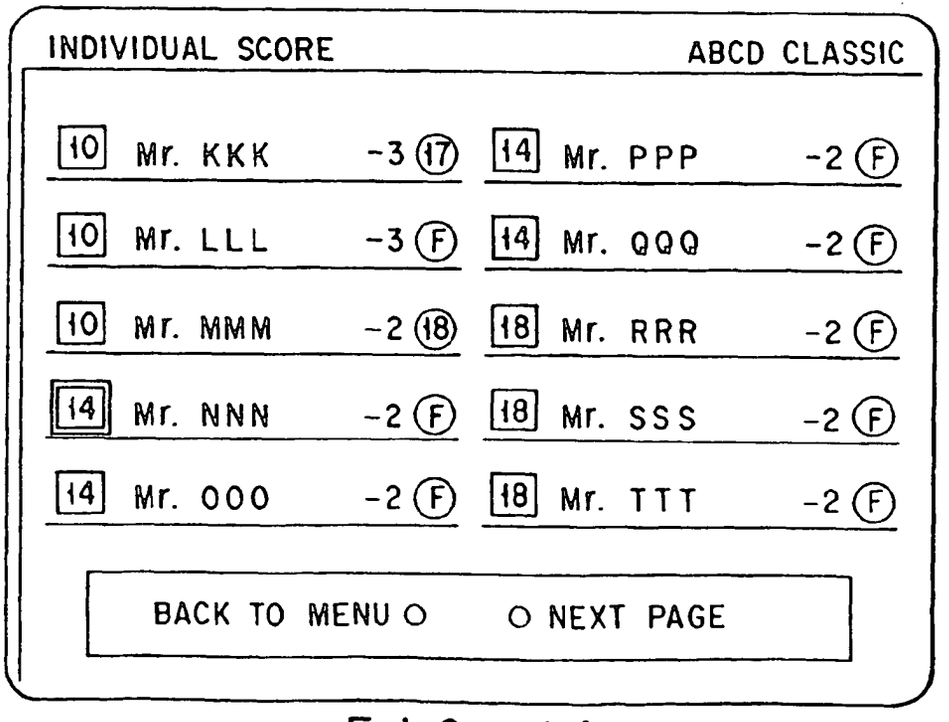

FIG. 14

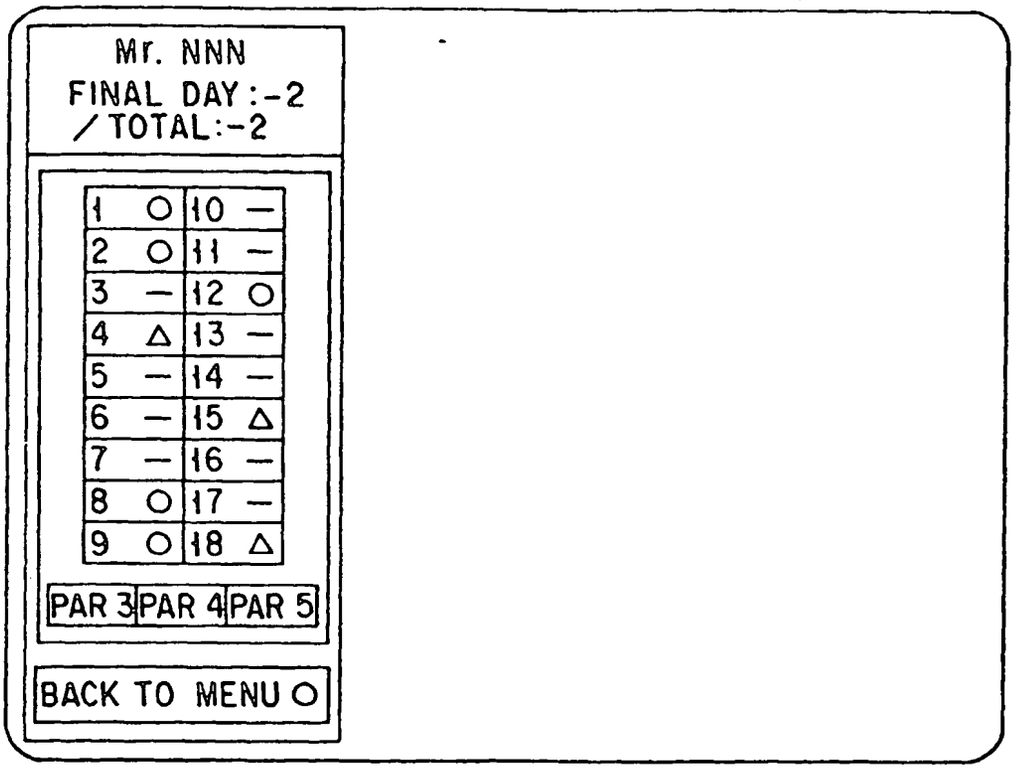

FIG. 15

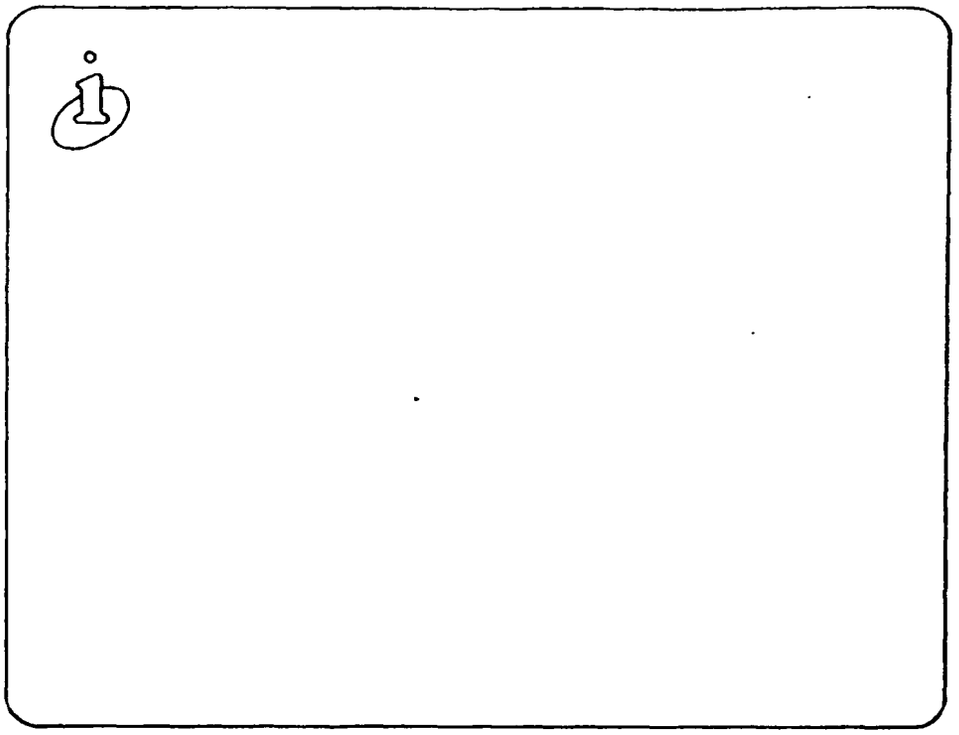

FIG. 16

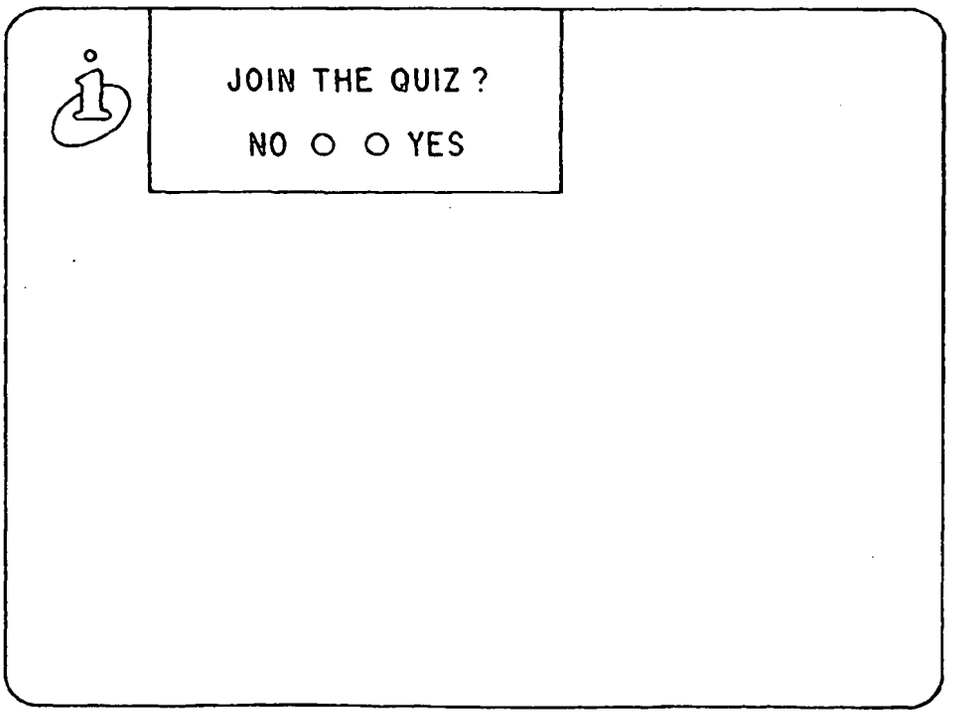

FIG. 17

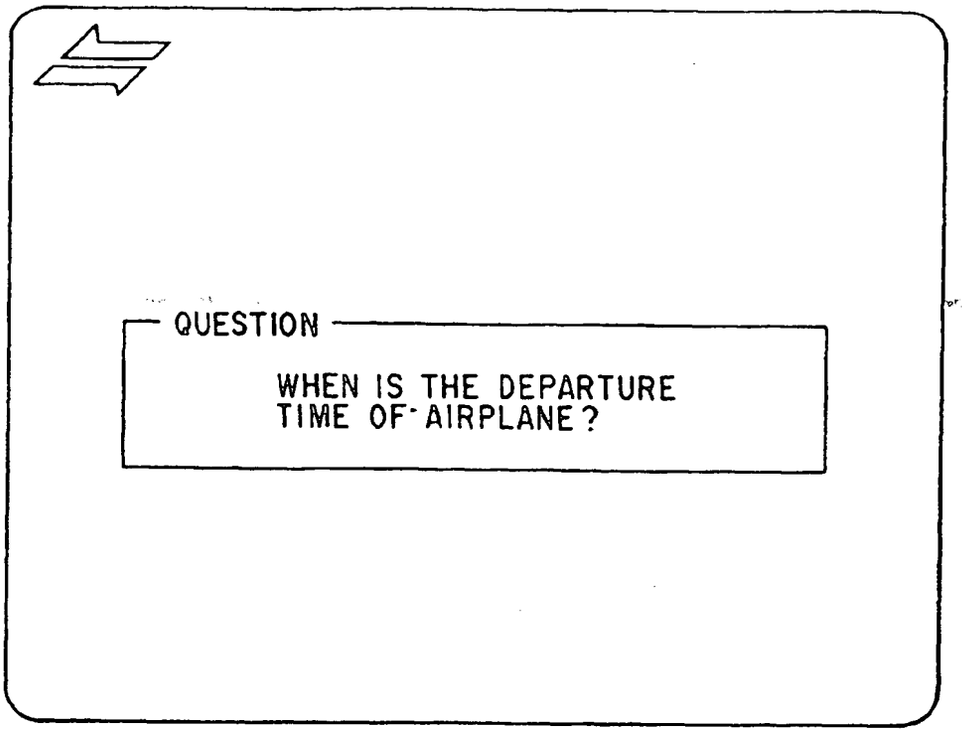

FIG. 18

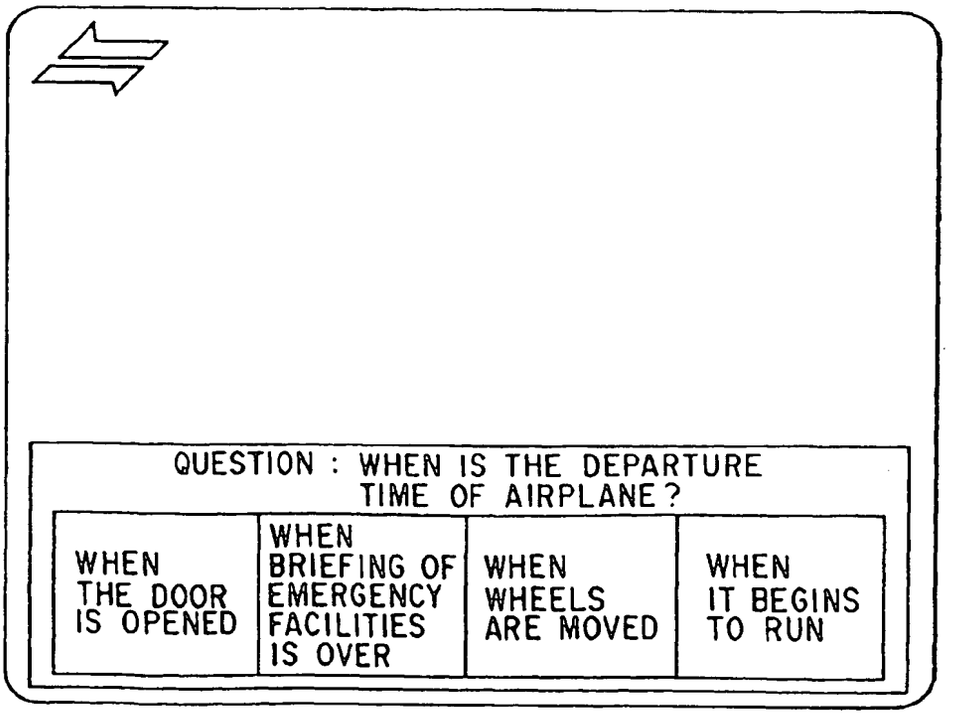

FIG. 19

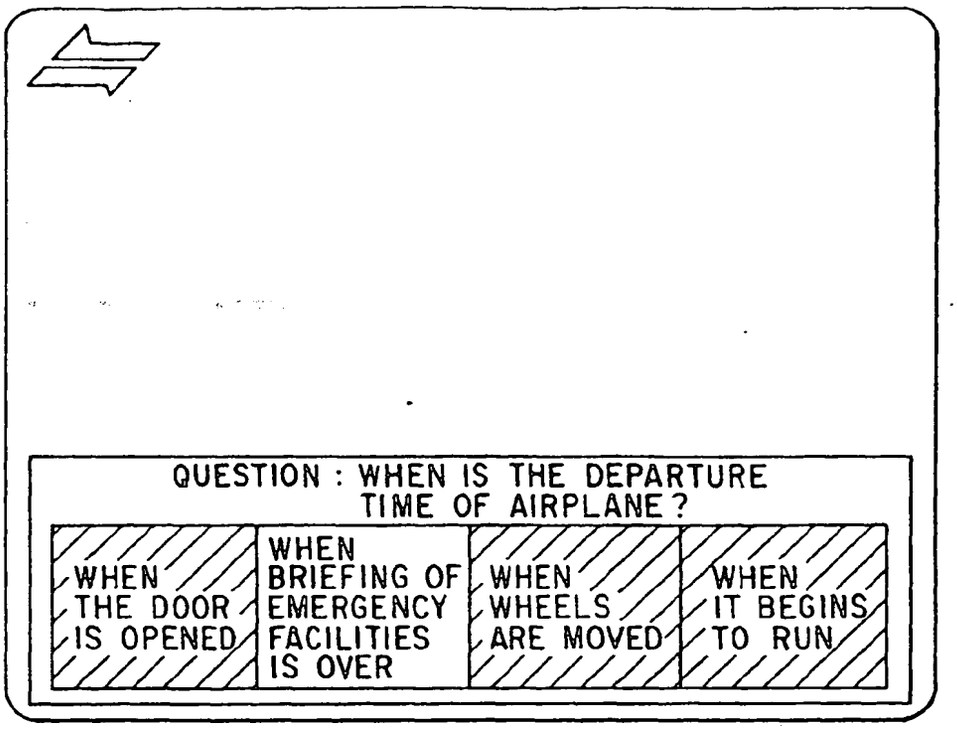

FIG. 20

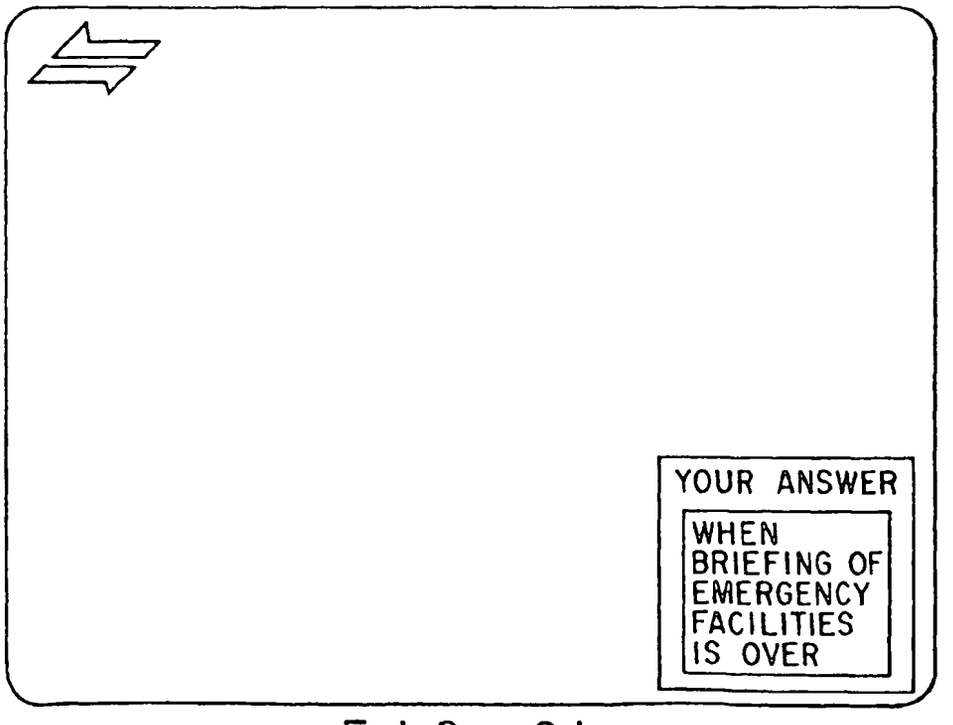

FIG. 21

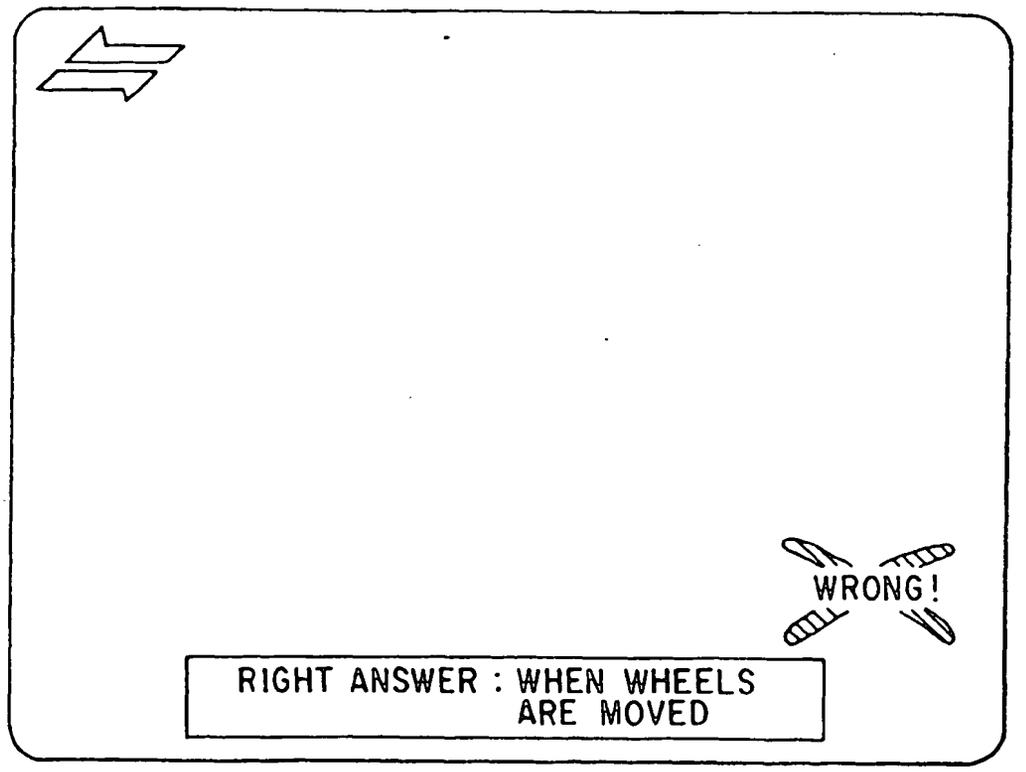

FIG. 22

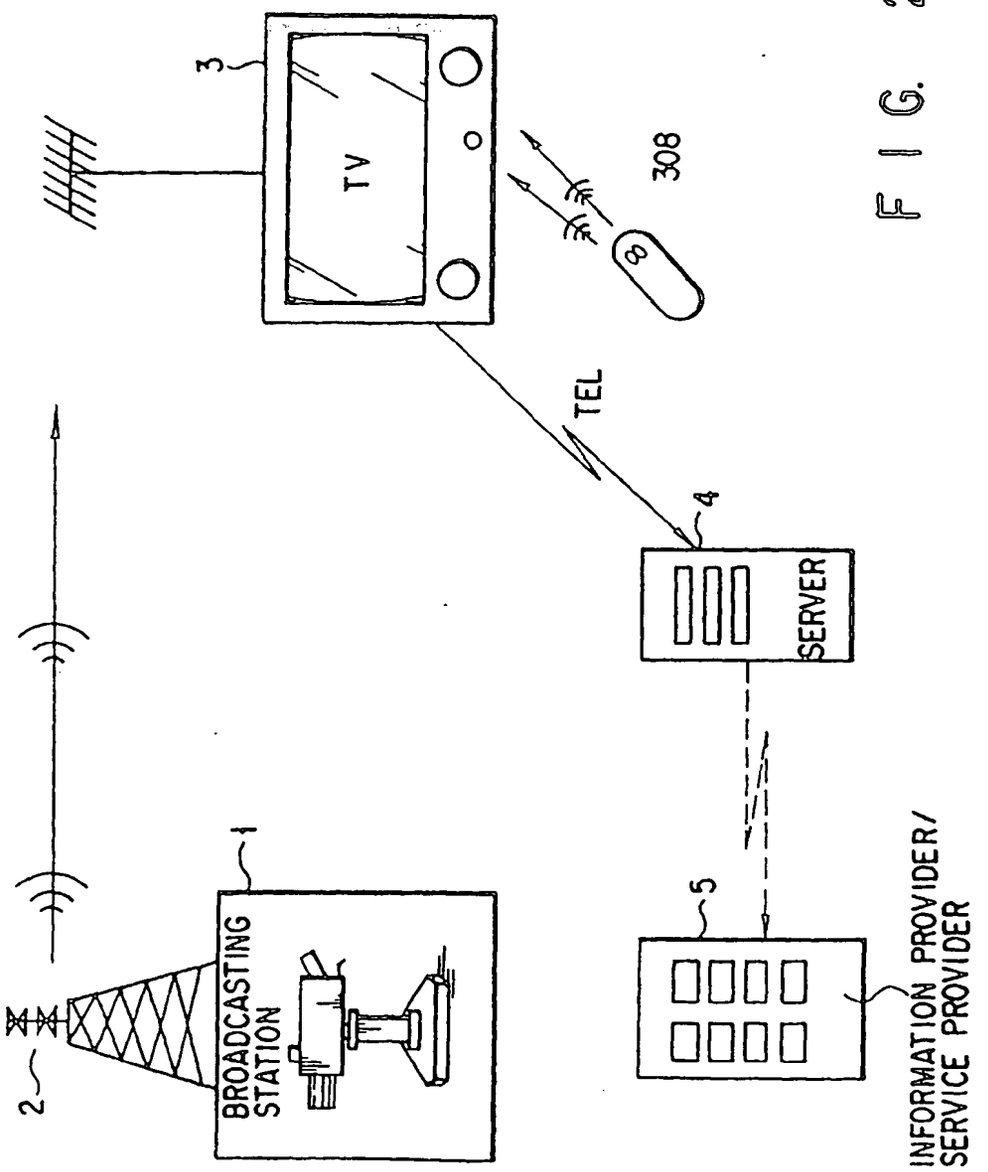

FIG. 23

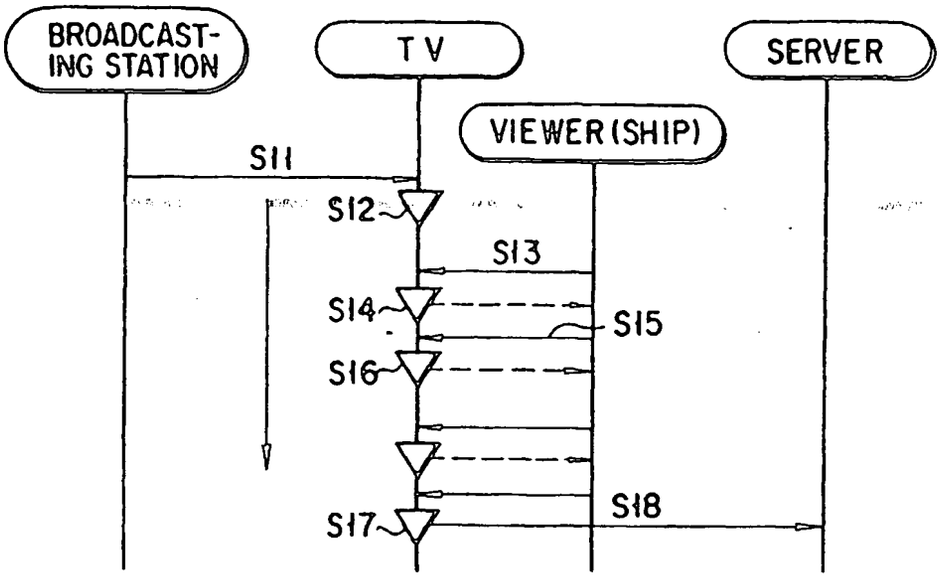

FIG. 24

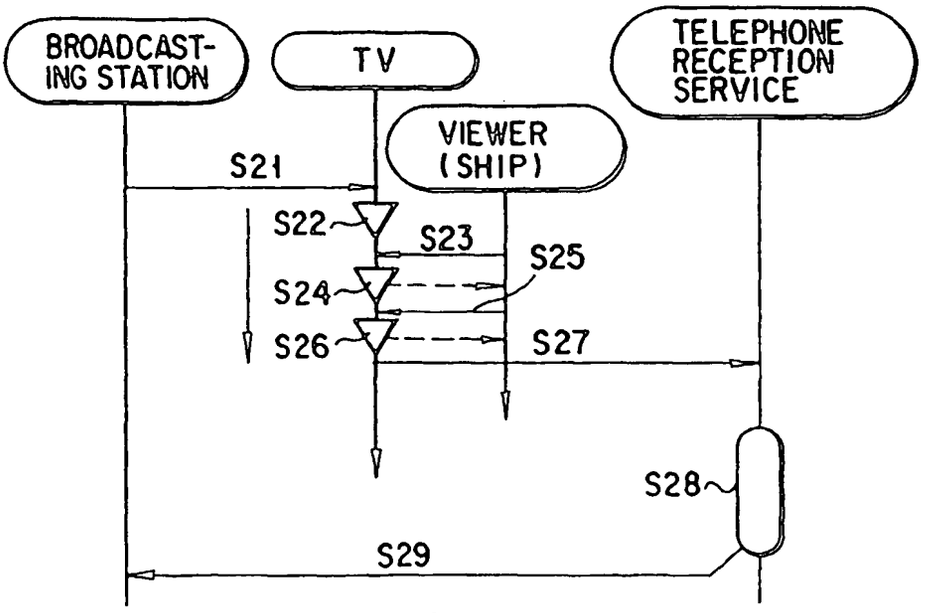

FIG. 26

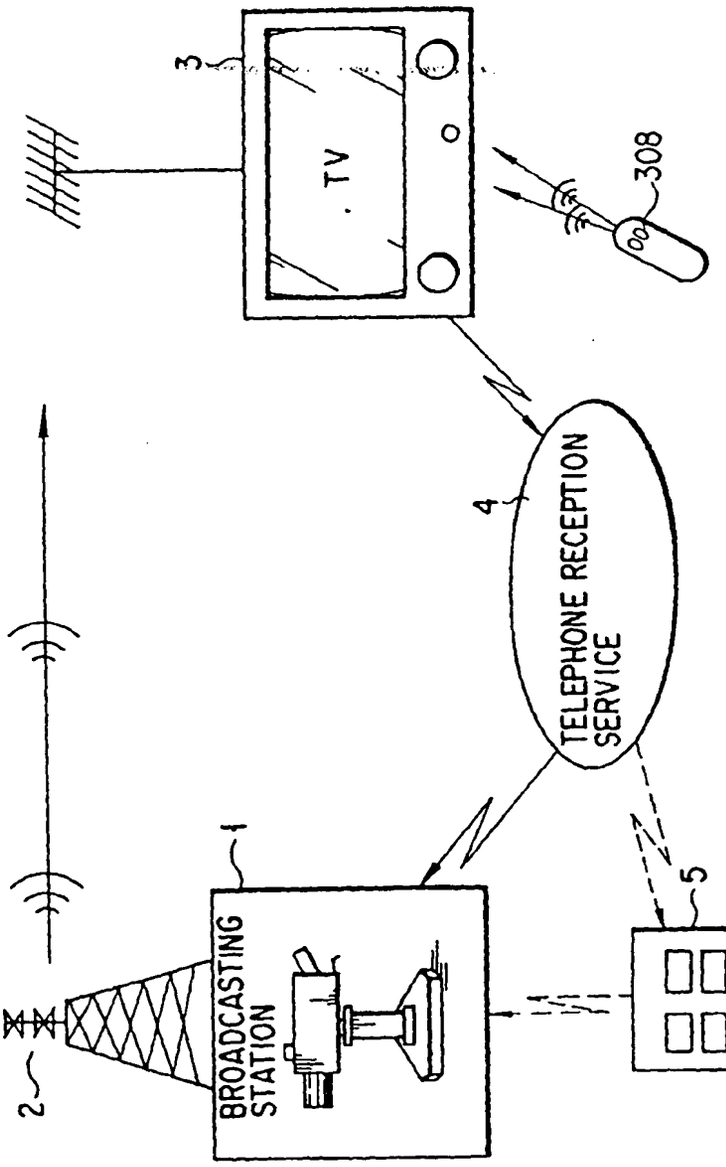

FIG. 25

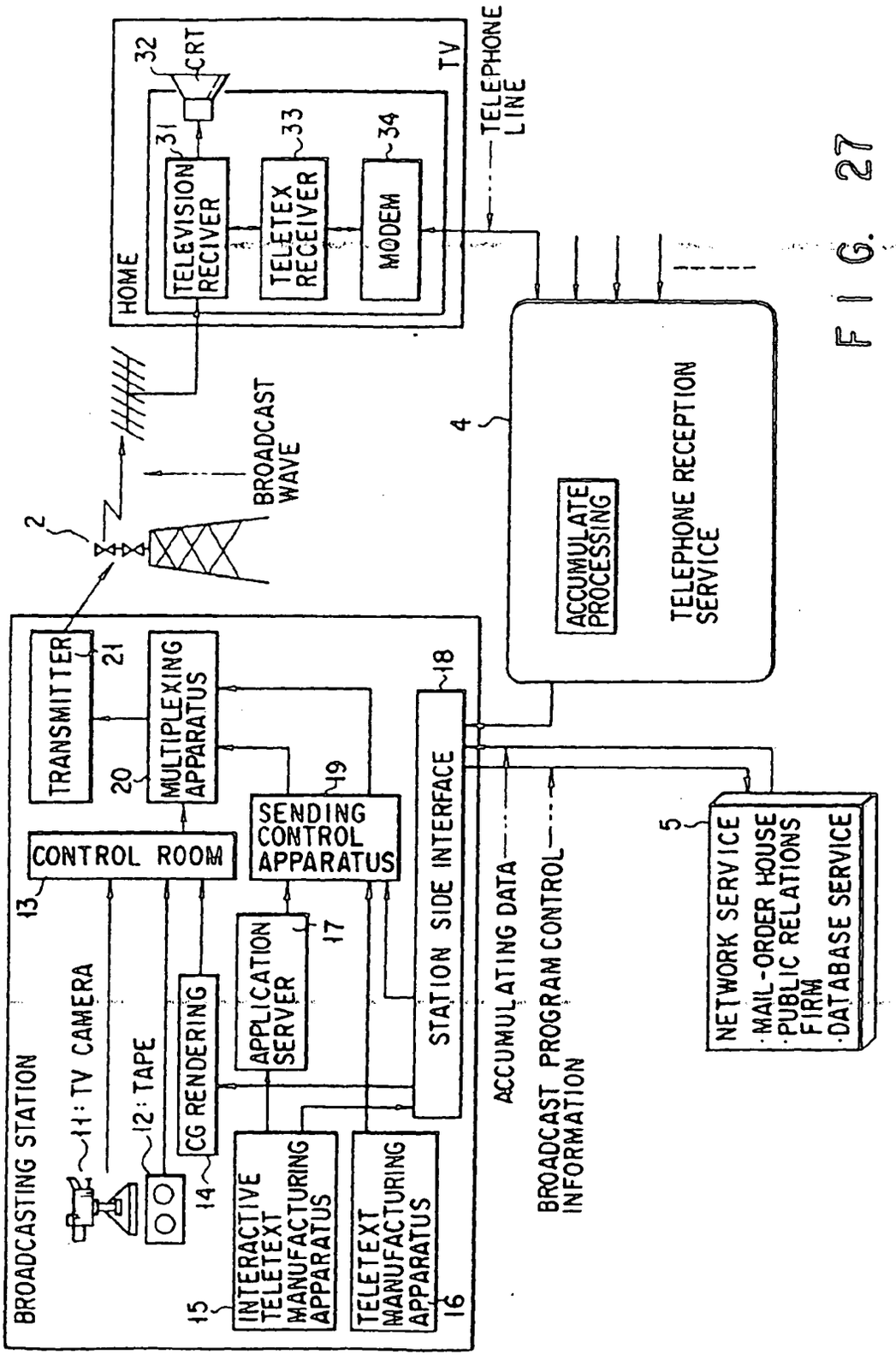

FIG. 27

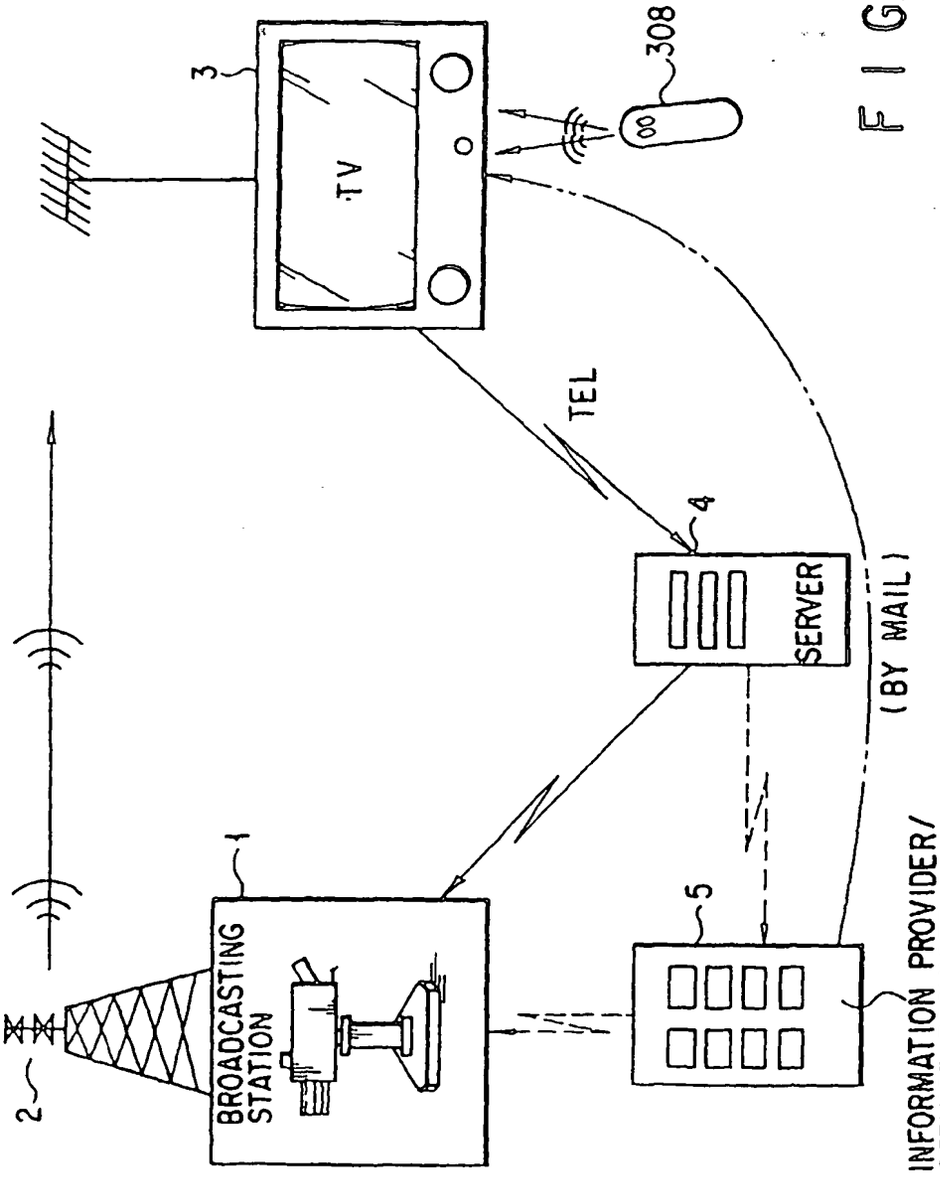

FIG. 28

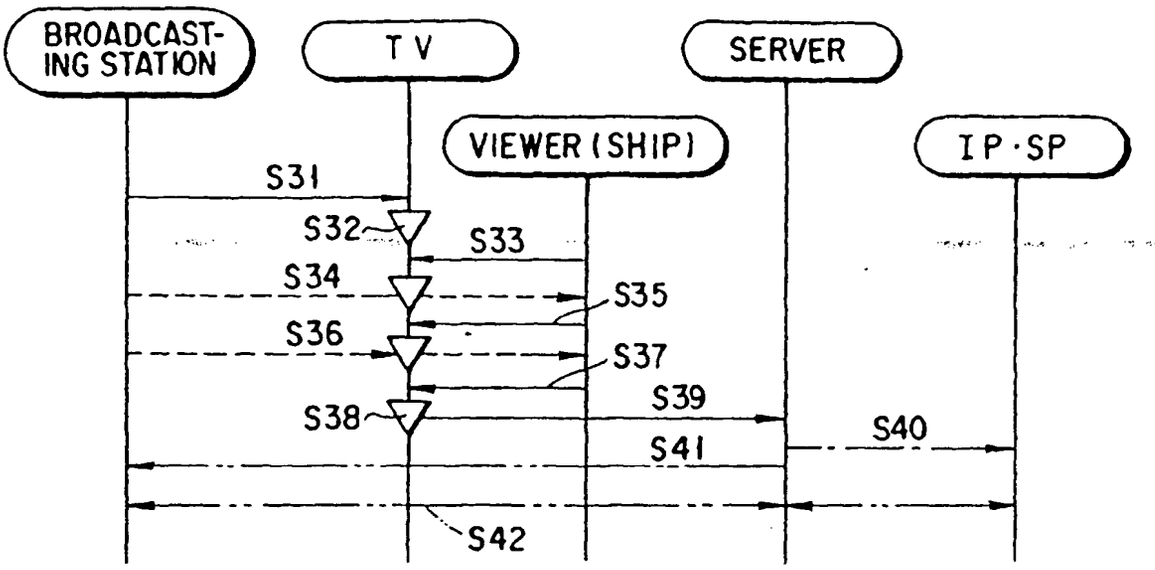

FIG. 29

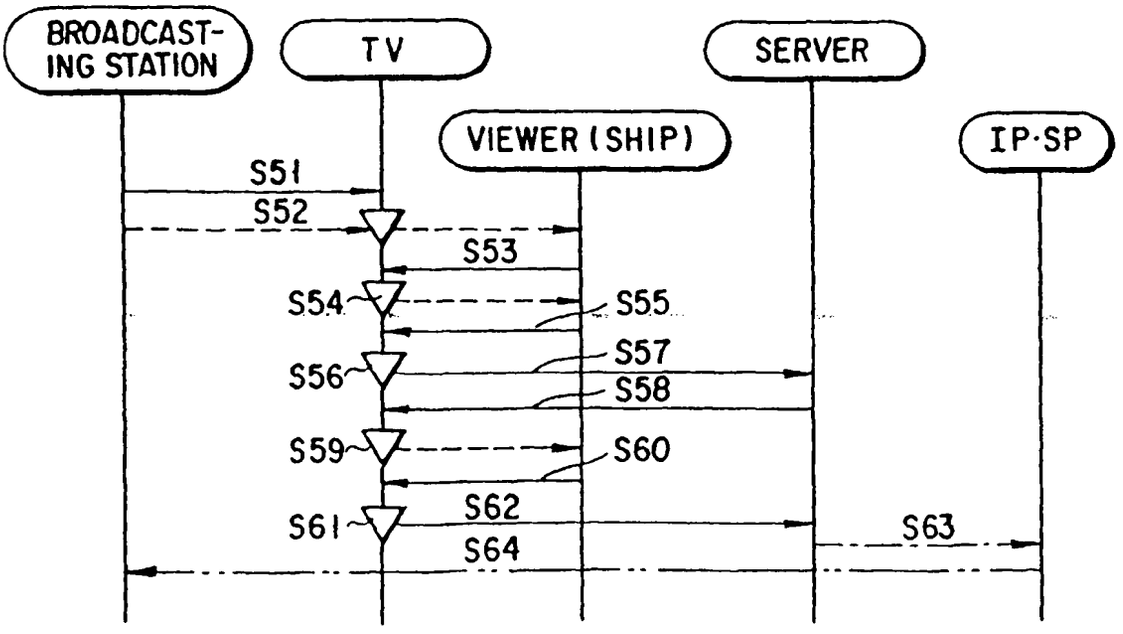

FIG. 31

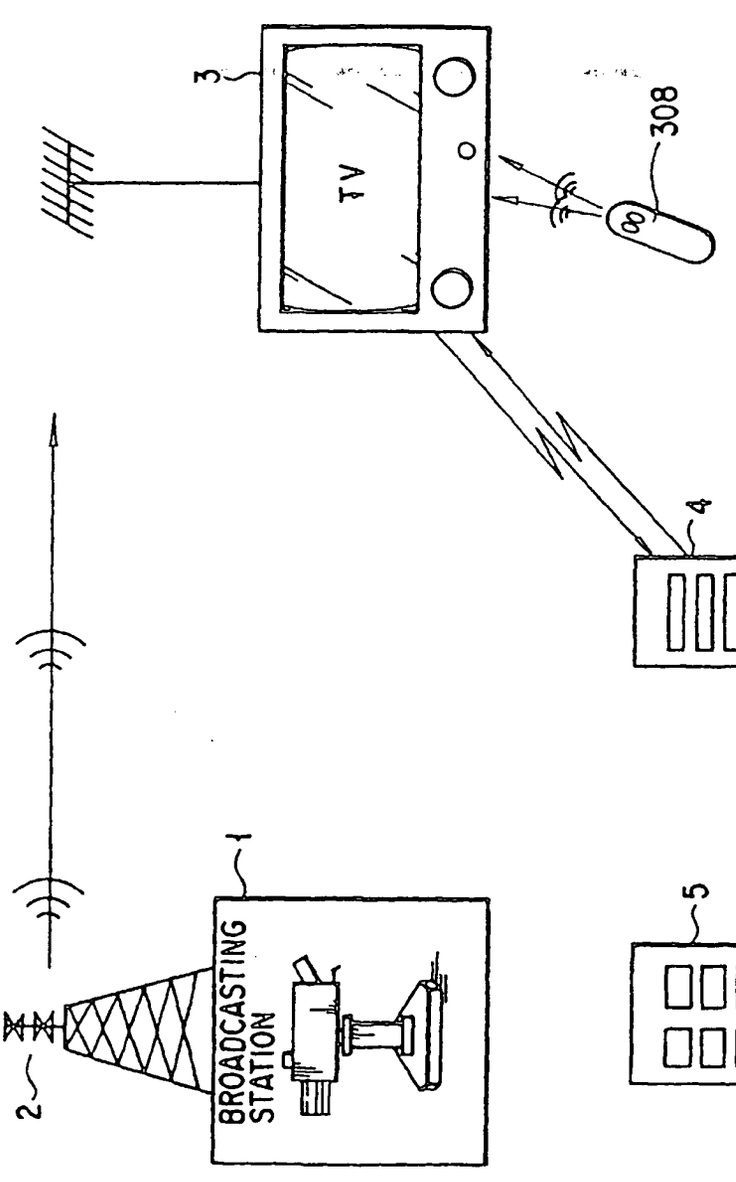

FIG. 30

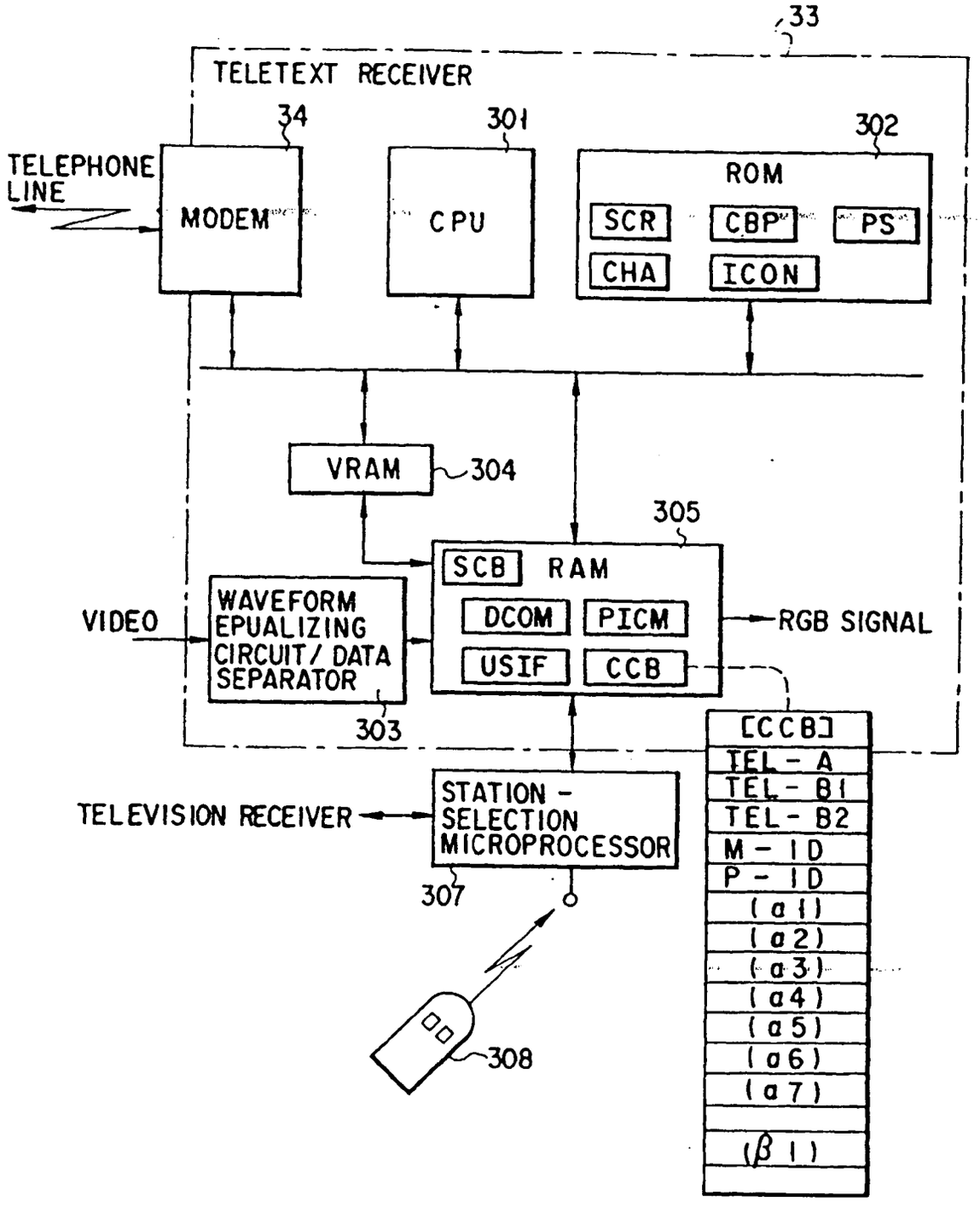

FIG. 32

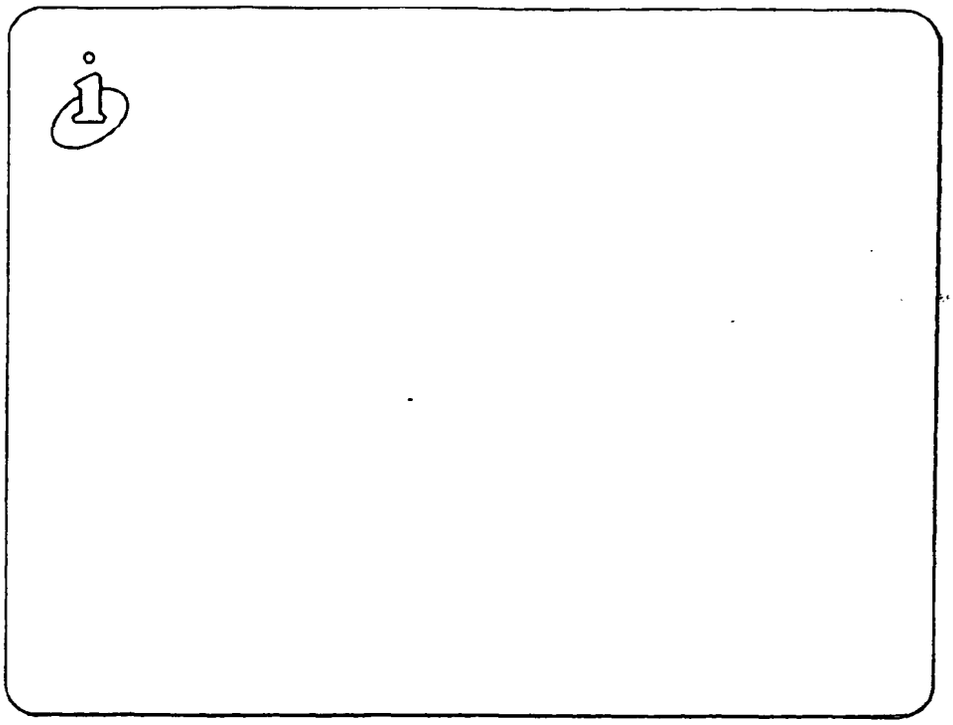

FIG. 33

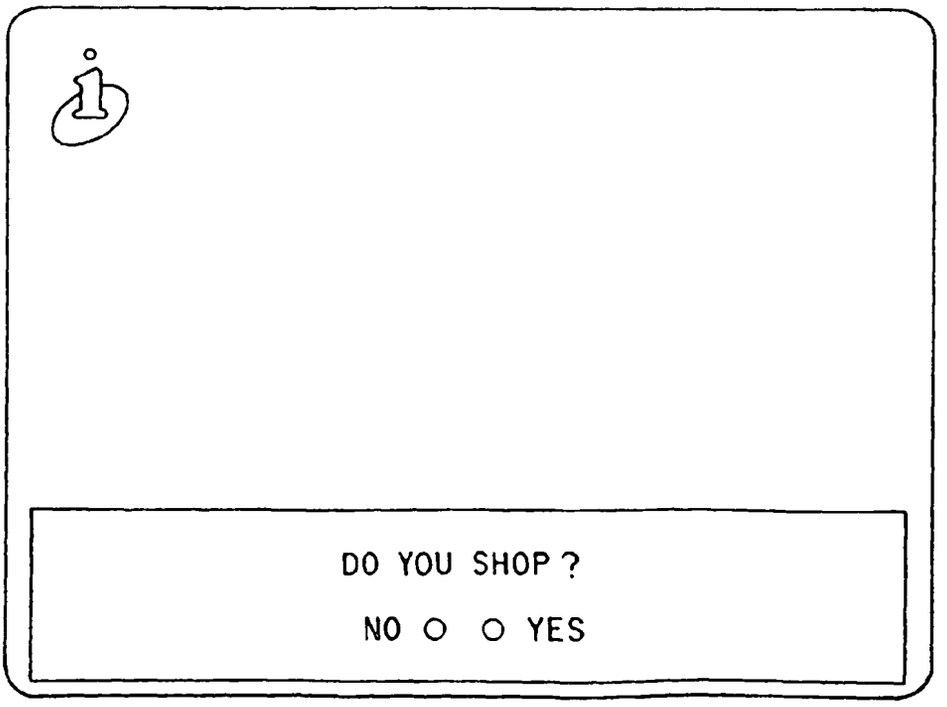

FIG. 34

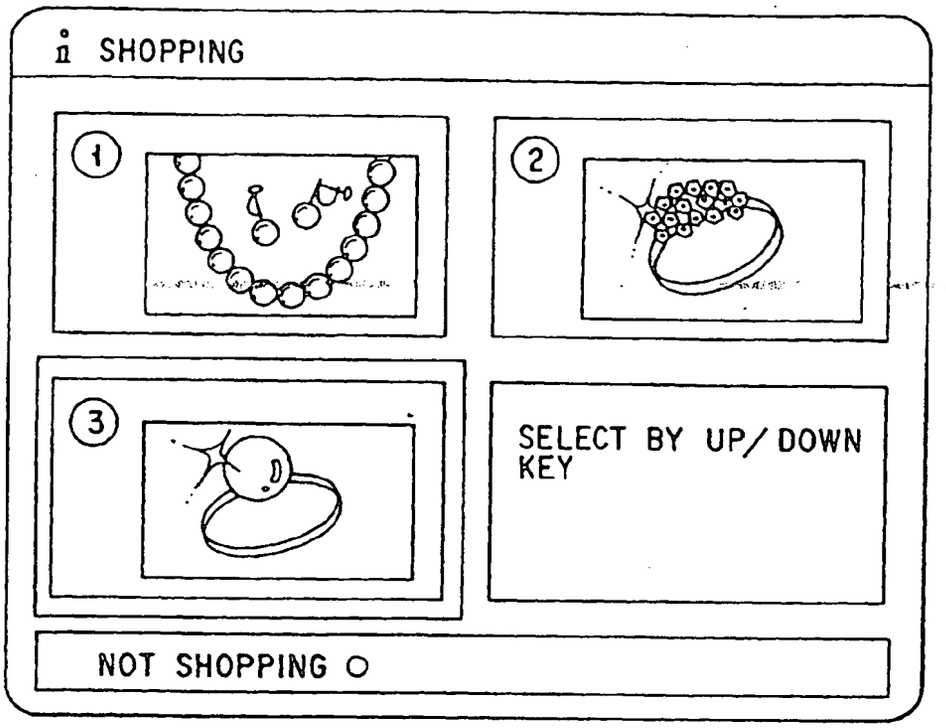

FIG. 35

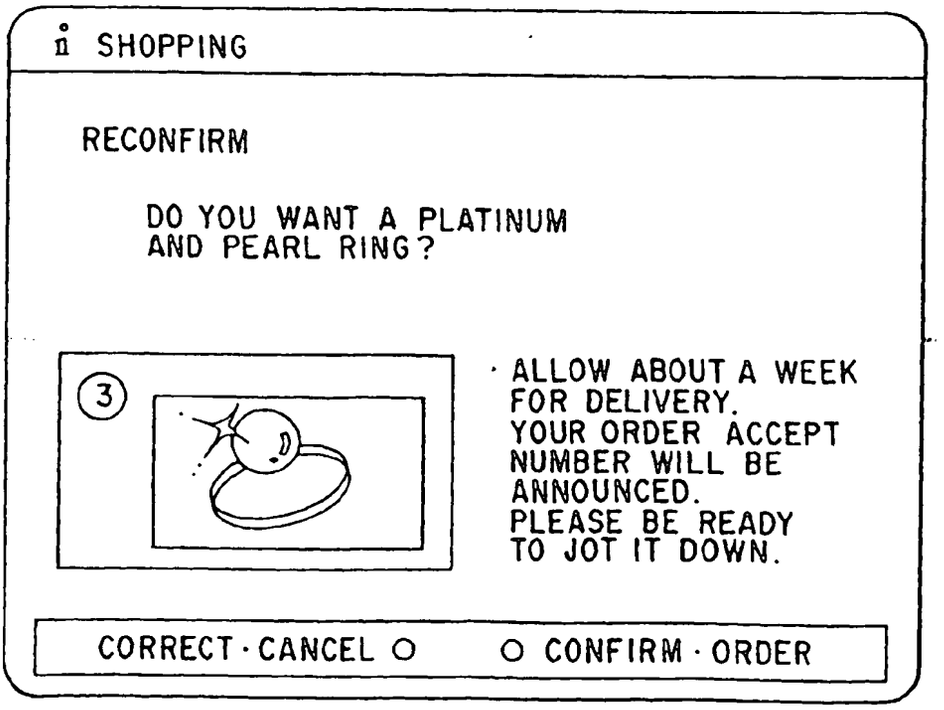

FIG. 36

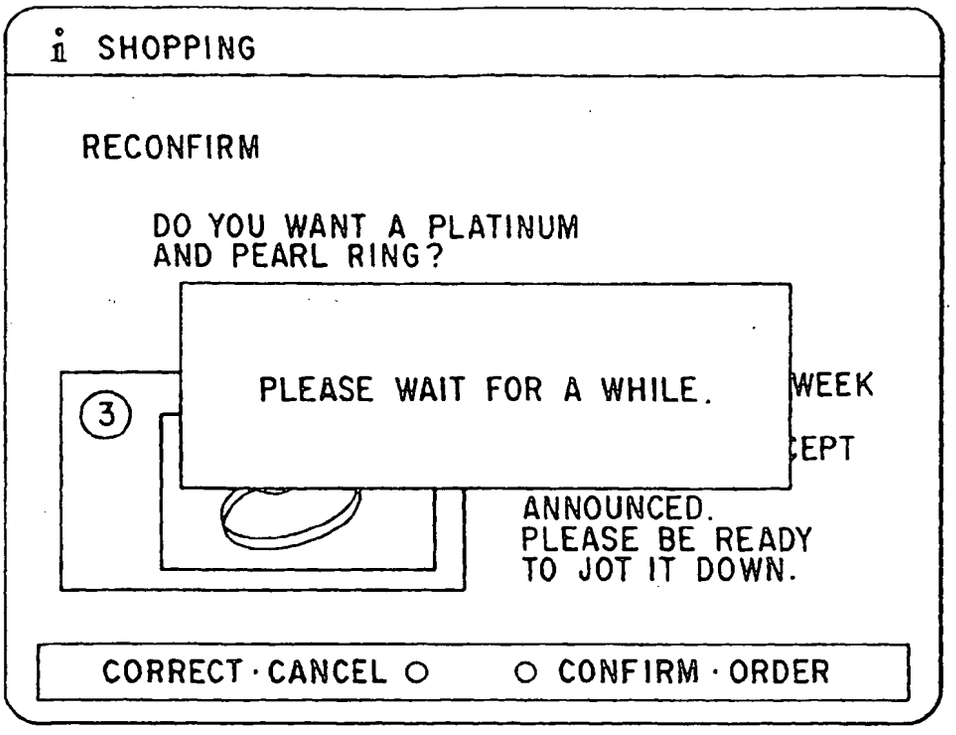

FIG. 37

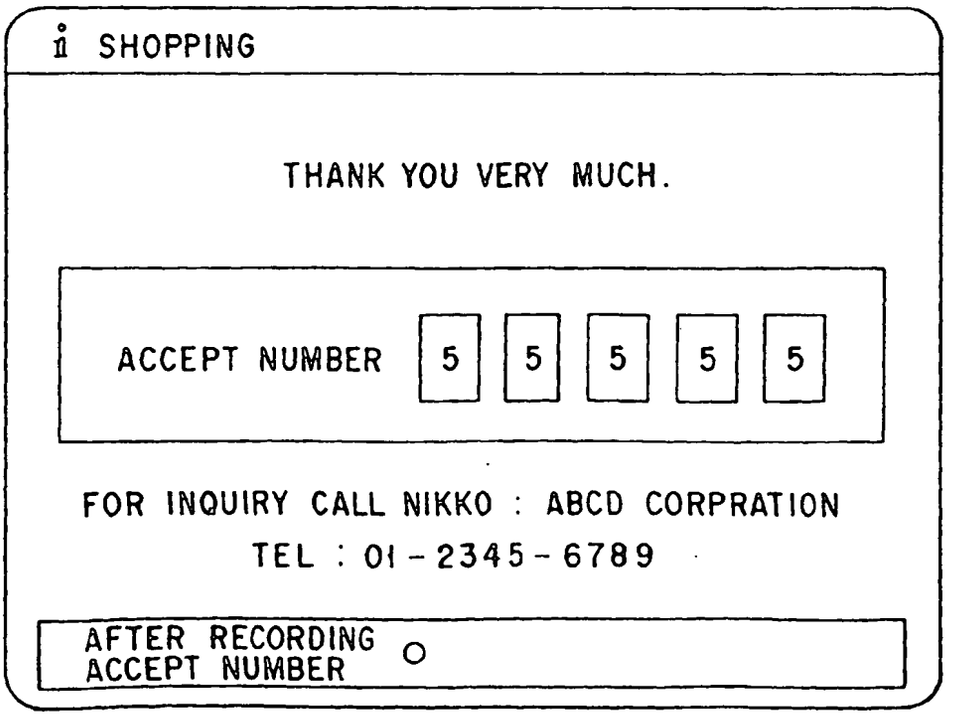

FIG. 38

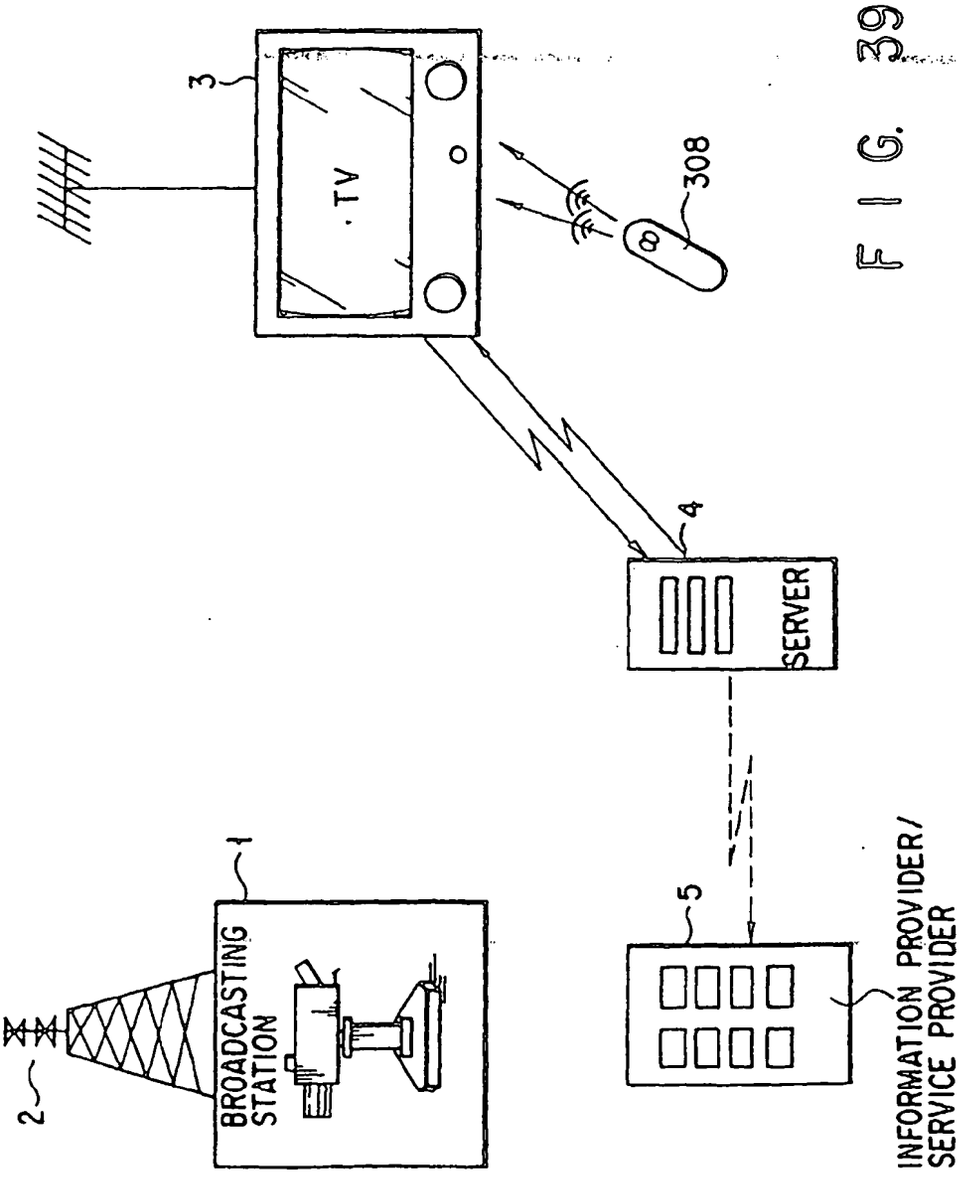

FIG. 39

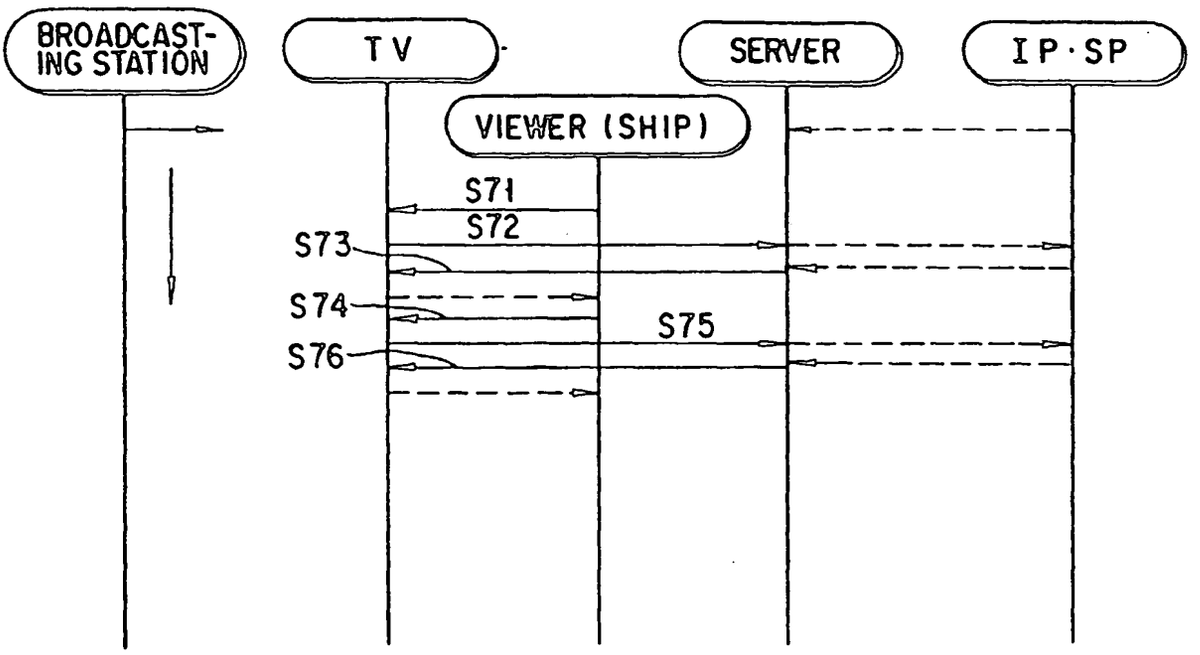

FIG. 40

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 757 485 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
31.03.1999 Bulletin 1999/13

(51) Int Cl.6: **H04N 7/088**

(43) Date of publication A2:
05.02.1997 Bulletin 1997/06

(21) Application number: **96305496.0**

(22) Date of filing: **26.07.1996**

(84) Designated Contracting States:
DE FR GB SE

(30) Priority: **31.07.1995 JP 194687/95**
31.07.1995 JP 194688/95
31.07.1995 JP 194700/95
31.07.1995 JP 195121/95
31.07.1995 JP 195259/95
31.07.1995 JP 195303/95

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(54) Interactive television system

(57) A broadcasting station (1) transmits script for presenting plural types of additional information relating to main broadcast in a vertical blanking interval included in a video signal. A television receiver (3) generates an additional information selecting screen for selecting arbitrary additional information from plural types of additional information by executing the script according to a request signal received from a television remote controller (308), and displays in part of a display screen. Reflecting a selection instruction signal received from the television remote controller (308) on the additional information selection screen, the script is executed according to the selection instruction, and selected additional information is generated and displayed on a display screen in a display format conforming to the content of the information.

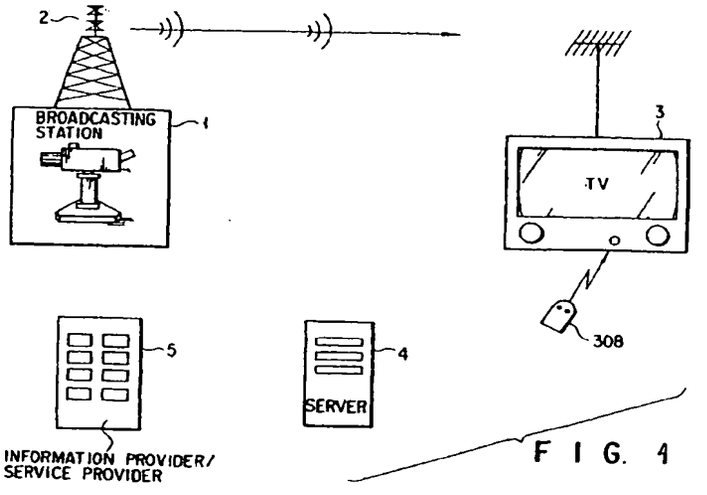

FIG. 4

EP 0 757 485 A3

Printed by Jouve, 75001 PARIS (FR)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 30 5496

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropnate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	WO 95 01058 A (APPLE COMPUTER) 5 January 1995	1-7	H04N7/088
A	* page 40, line 1 - page 41, last line; figures 7-9 * * page 44, line 4 - last line * * page 71, line 1 - page 73, last line * * page 33, line 8 - line 16 * * page 30, line 20 - page 31, line 3 *	8-10	
X	WO 94 13107 A (DISCOVERY COMMUNICAT INC) 9 June 1994	1-7,9,10	
A	* page 52, line 30 - page 54, line 27; figure 12A * * page 75, line 7 - page 76, line 27 *	11,18, 26,35,43	
X	EP 0 583 196 A (FUJITSU LTD) 16 February 1994	11-14, 17-21, 24, 26-31, 34,43-47	
A	* column 8, line 19 - column 9, line 15 *	15,16, 22,23, 25,32, 33,35	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04N
P,A	WO 95 31068 A (ITALTEL SPA) 16 November 1995 * page 5, line 20 - page 8, line 26; figures 2,3 *	1,11,18, 26,35,43	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 February 1999	Beaudoin, O

CATEGORY OF CITED DOCUMENTS

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O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 30 5496

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.6)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 February 1999	Beaudoin, O

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 96 30 5496

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(12) UK Patent Application (19) GB (11) 2 132 856 A

(21) Application No 8328863
(22) Date of filing 28 Oct 1983
(30) Priority data
(31) 57/191290
57/210758
(32) ~~29 Oct~~ 1982
1 Dec 1982
(33) Japan (JP)
(43) Application published
11 Jul 1984
(51) INT CL³
G11B 27/00
H04N 7/08
(52) Domestic classification
H4P T
H4T 4R BRB
U1S 2211 H4P H4T
(56) Documents cited
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GB A 2050770
GB 1029815
GB 0903478
(58) Field of search
H4P

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(54) Signal conversion method and video tape recorder employing the same method

(57) In order to record a teletext signal using a domestic video tape recorder, the received teletext signal *a*, *b* is converted to a further signal *c*, *d* having a lower data transmission rate than that of the received teletext signal. The further signal is added to the video signal in the vertical blanking interval thereof and a clock signal corresponding to the lower rate is added to each horizontal line interval in which the further signal is added when the further signal is recorded. Preferably, a framing code corresponding to the lower rate is also added. A video tape recorder for carrying out this procedure includes a random access memory whose reading and writing operations are controlled to provide the rate reduction.

FIG. 4

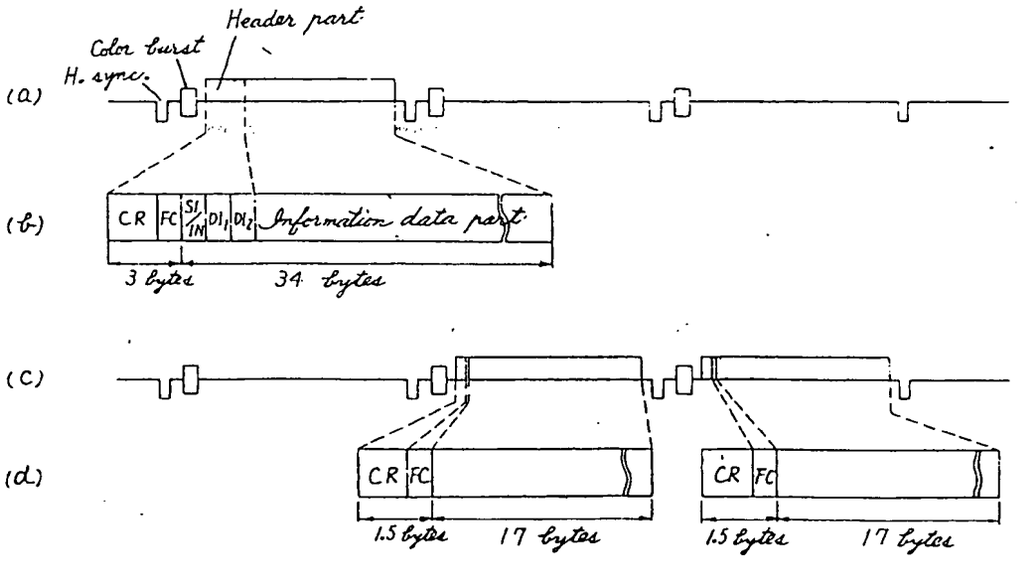

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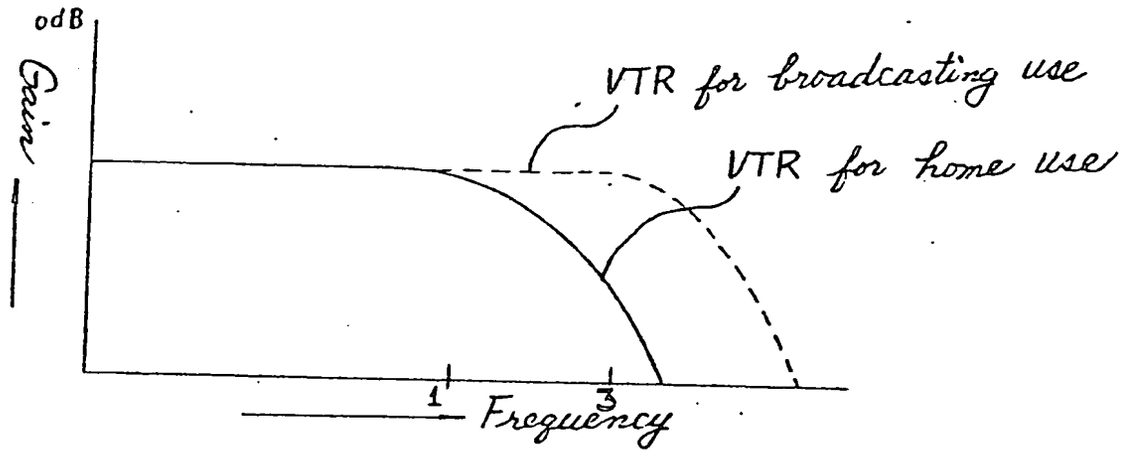
FIG. 1



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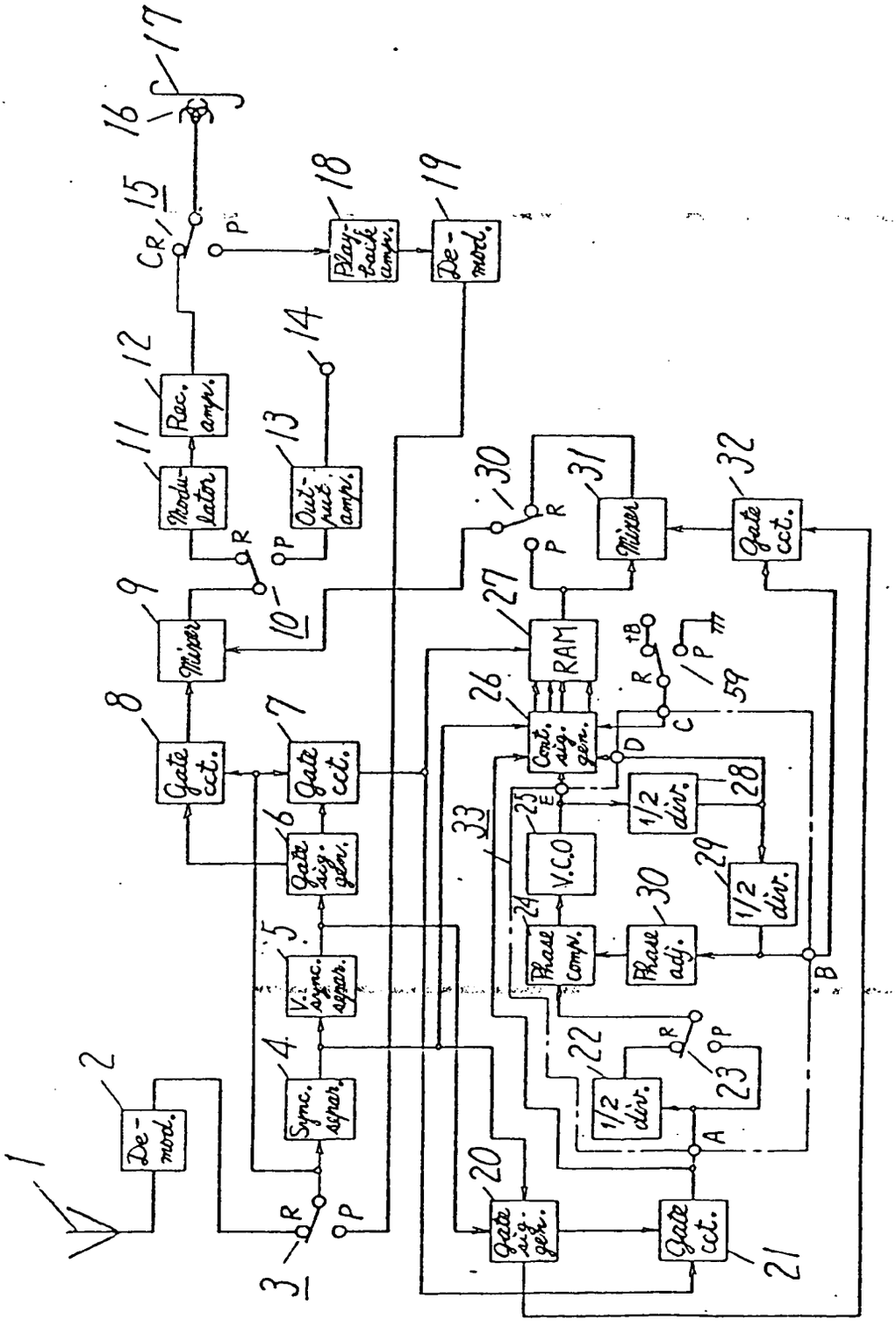

FIG. 2

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FIG. 3

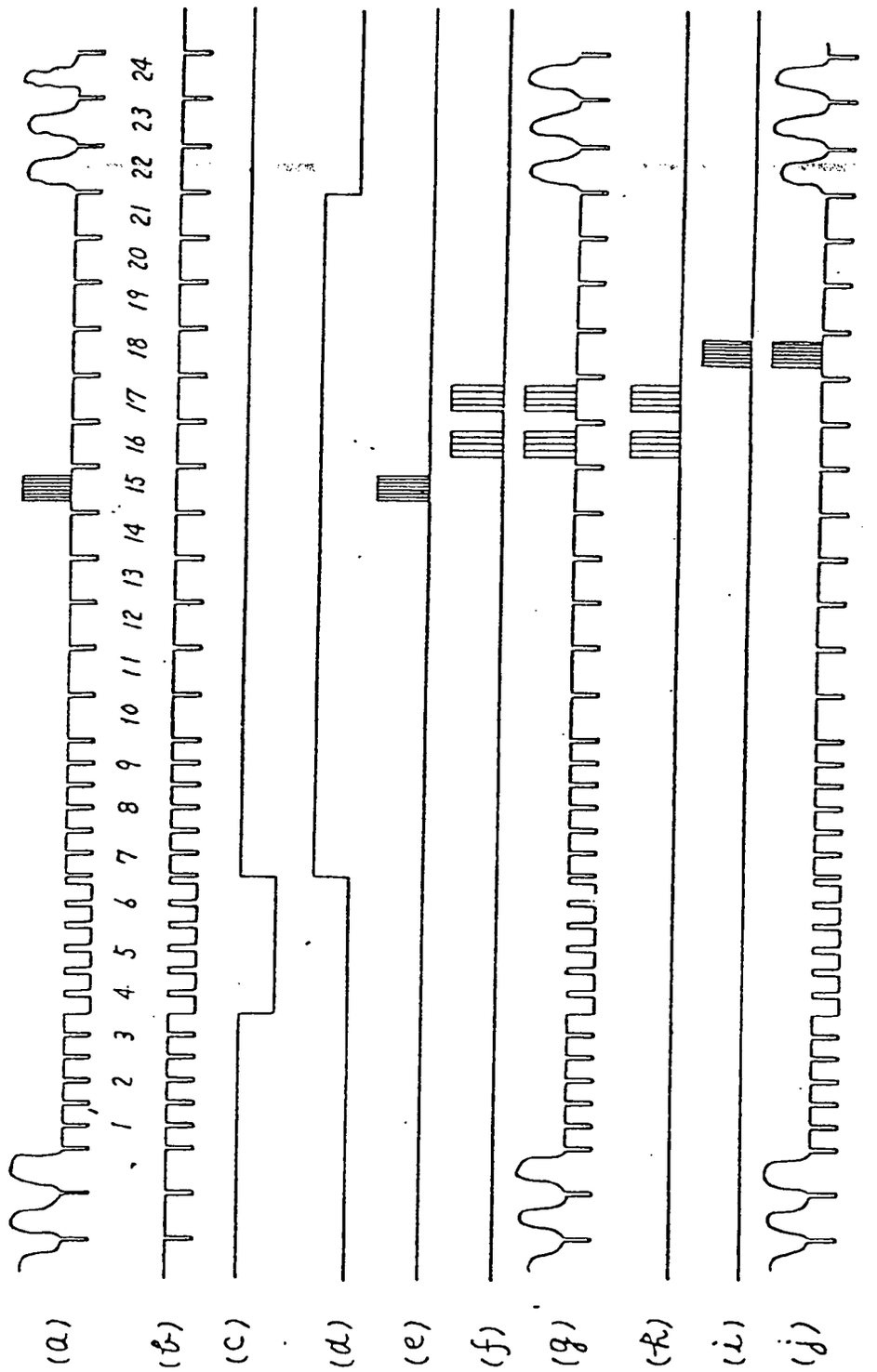

FIG. 4

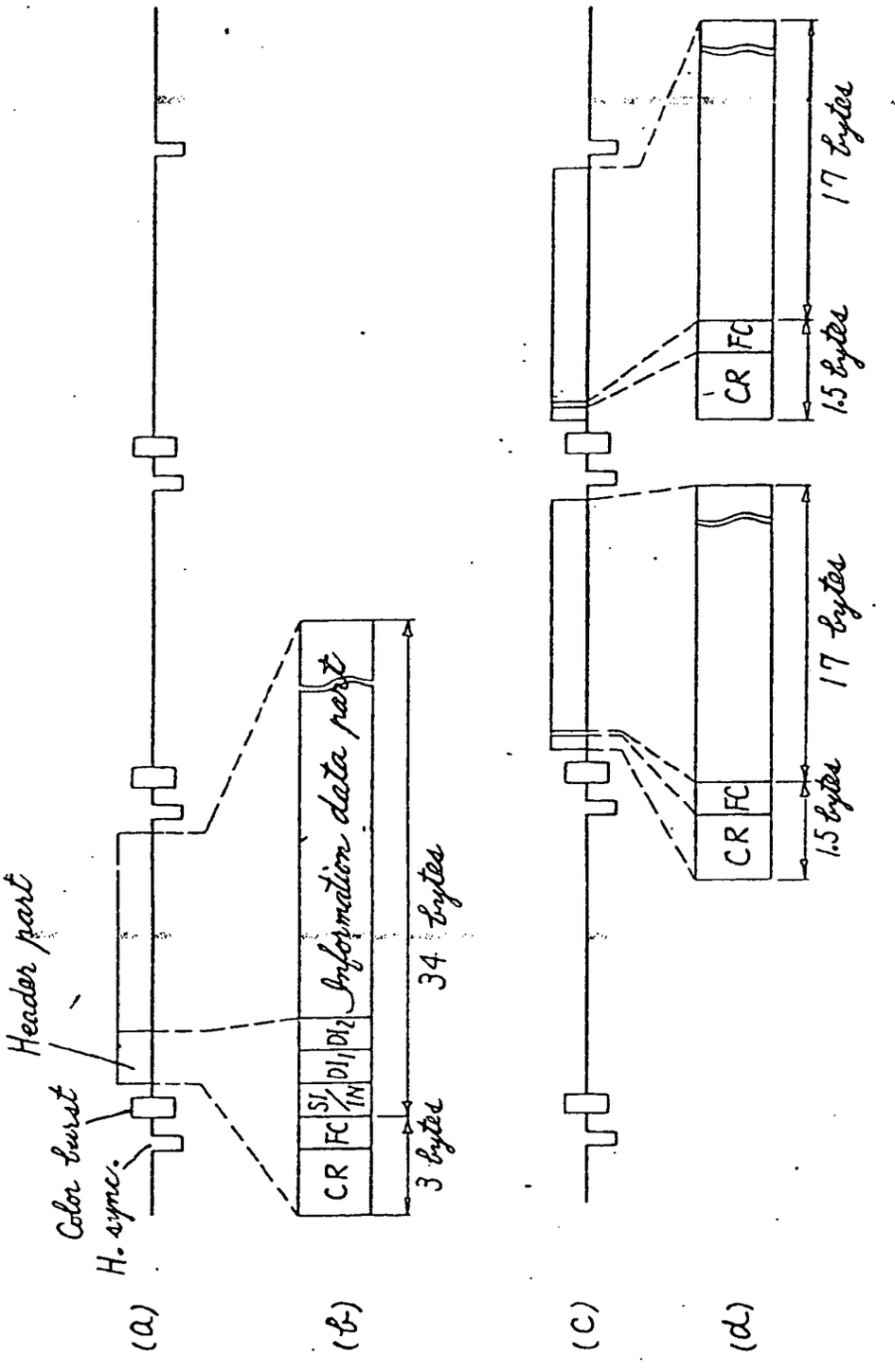

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FIG. 5

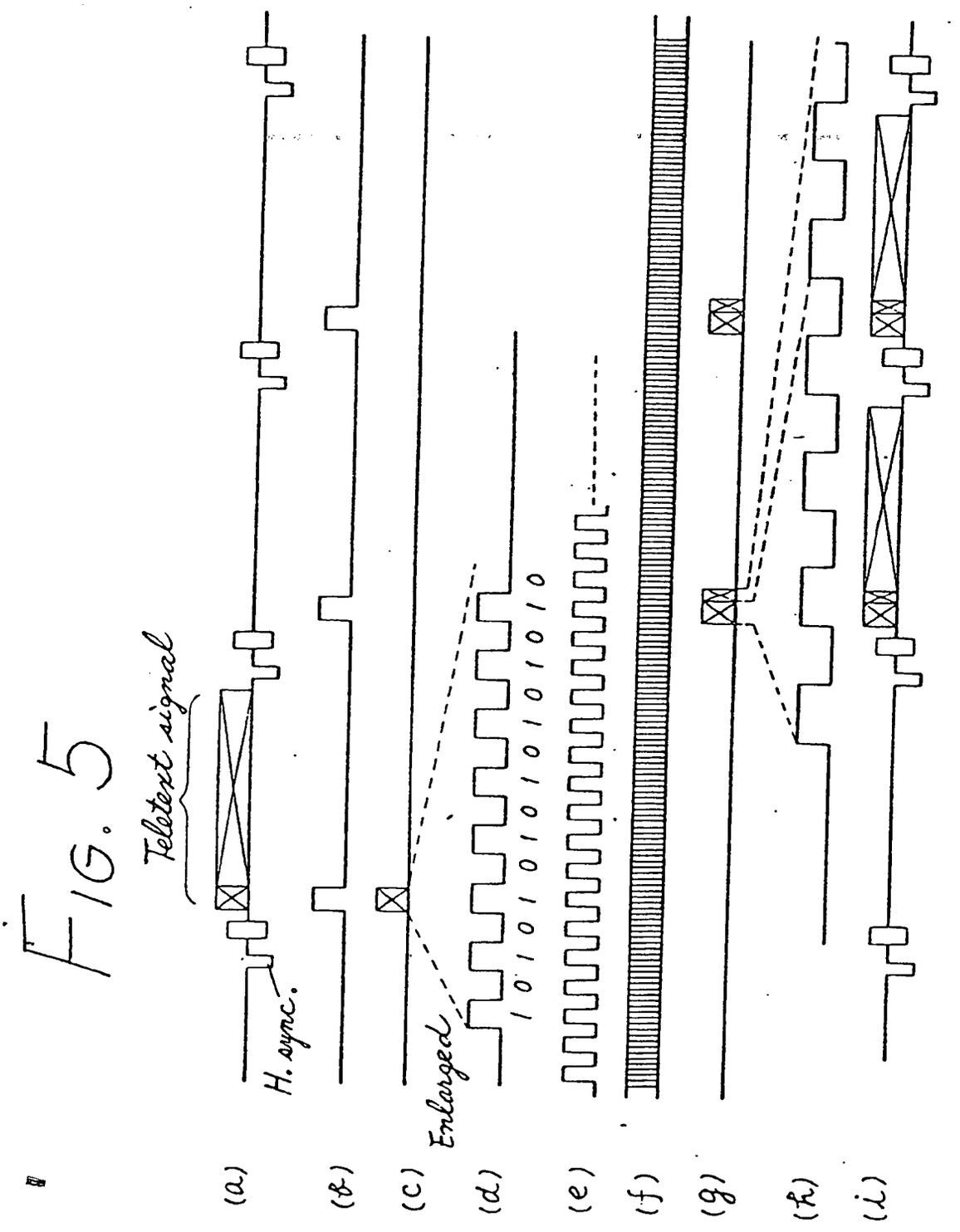

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FIG. 6

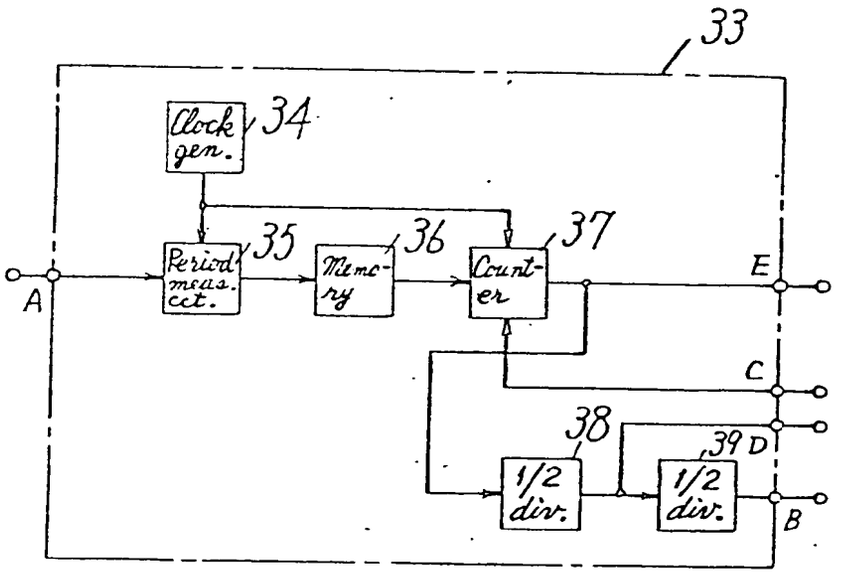

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FIG. 7

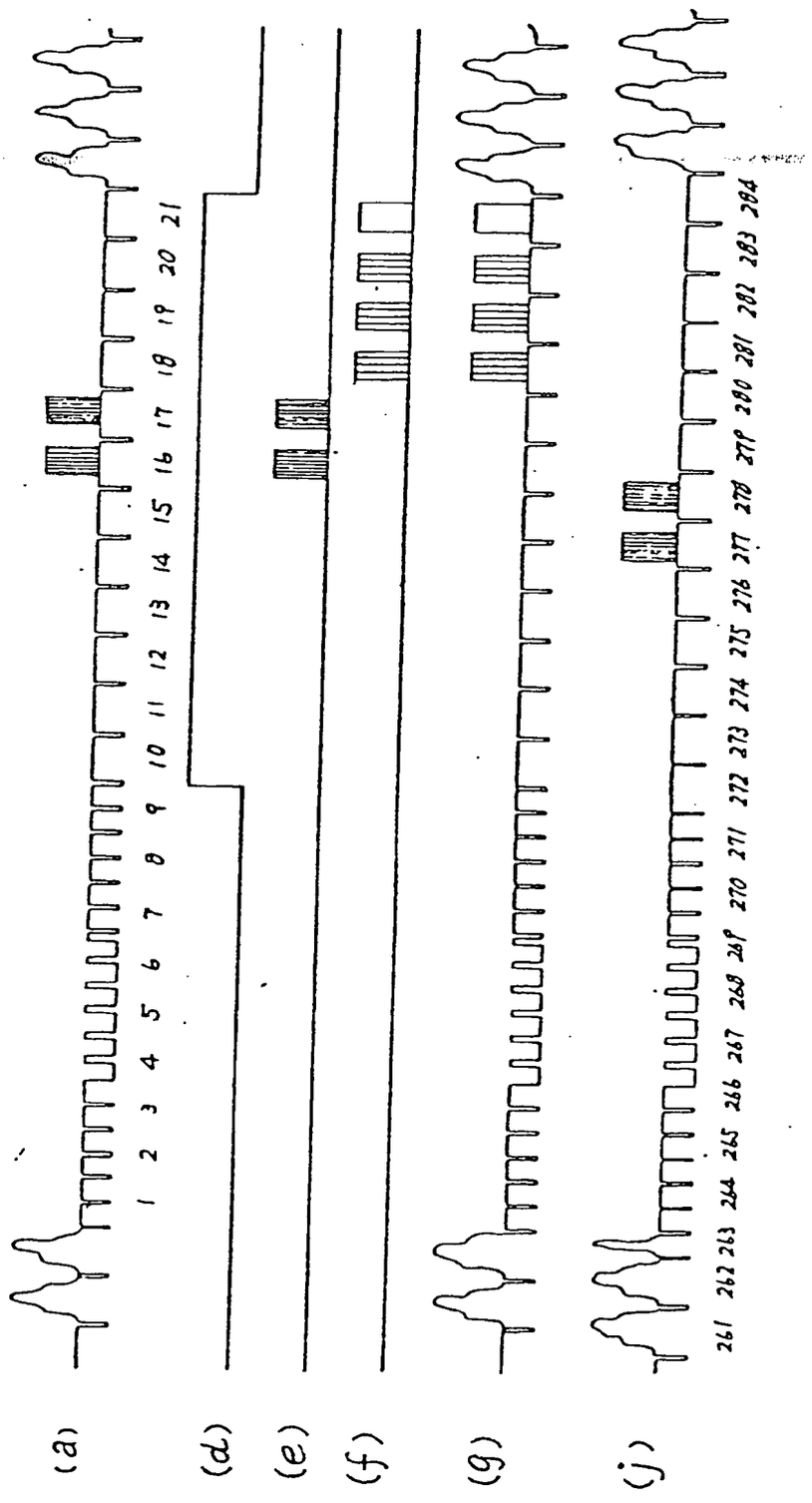

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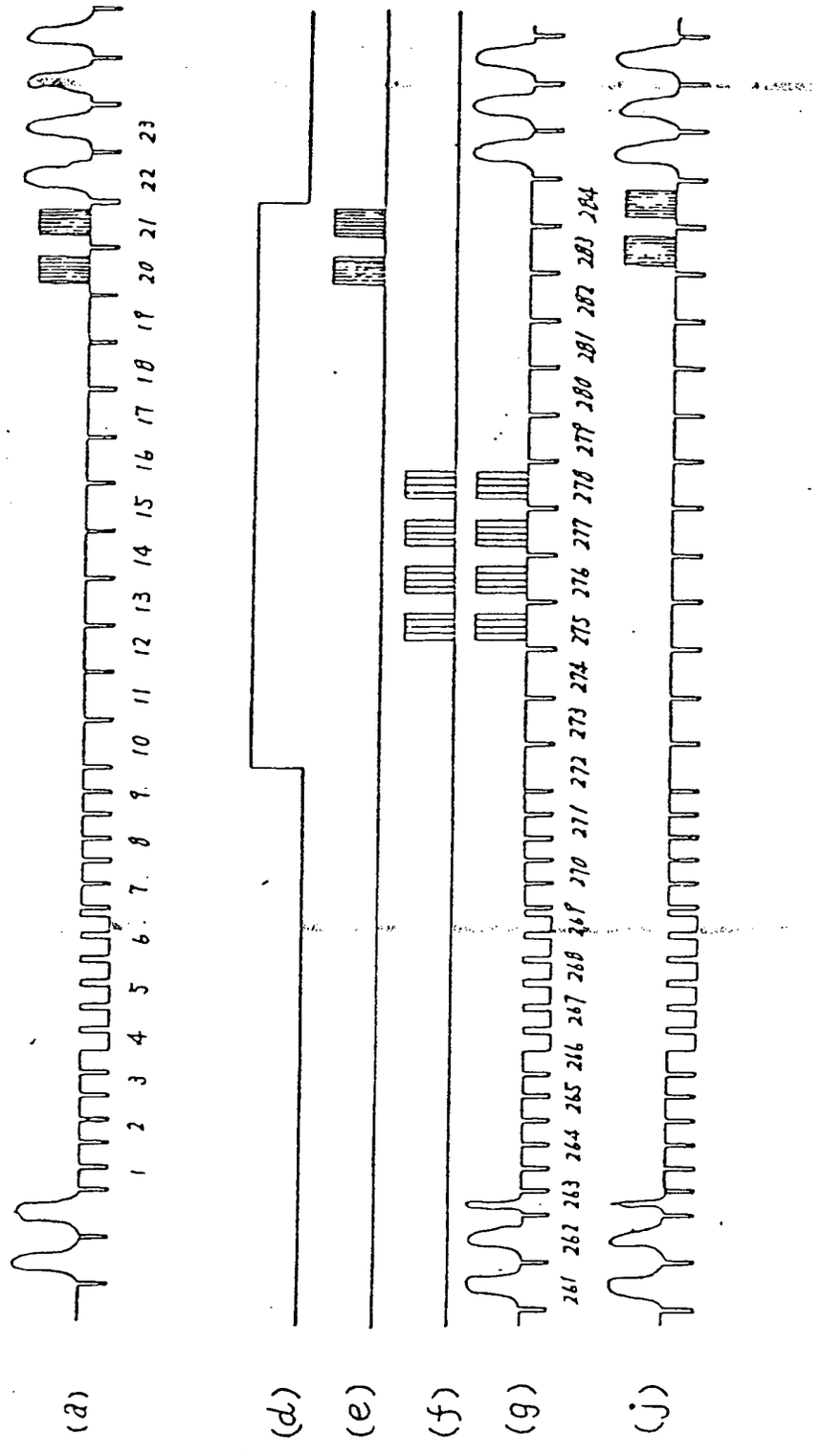
FIG. 8



SPECIFICATION

Signal conversion method and video tape recorder employing the same method

The present invention relates to a signal conversion method for preventing teletext signals from being deteriorated when they are recorded and reproduced in video tape recorders for domestic use, and a video tape recorder employing such a signal conversion method.

Video tape recorders (hereinafter referred to as a "VTR") for domestic use have poorer signal-to-noise ratios and frequency characteristics during recording and reproducing processes than those of VTRs used in broadcasting stations. For example, a domestic VTR has a frequency band curve as shown in Figure 1 of the accompanying drawings which is substantially flat up to as high as 1 MHz, but the gain drops above 1 MHz and drops more than 20 dB at 3MHz whereas the VTR for broadcasting use has a frequency band curve which is still substantially flat.

For teletext broadcasting in Japan, 5.73 MHz (= 364 fH, fH : horizontal synchronising frequency) has been assigned as a transmission clock frequency, and the maximum transmission frequency required for character signals is 2.86 MHz. When such signals are recorded and reproduced in a domestic VTR, reproduced output signals or teletext signals have a considerably low level and are largely distorted with a poor signal-to-noise ratio. Therefore, it is substantially impossible for such domestic VTRs to record and reproduce teletext signals due to attenuated signal levels at such a frequency.

It is an object of the present invention to prevent signals such as teletext signals from being deteriorated when they are recorded and reproduced in VTRs.

According to a signal conversion method of the present invention, a teletext signal is extracted from a composite image signal of a base band on reception of broadcast signal, and is converted into a teletext signal having a lower transmission rate than a normal transmission rate. The teletext signal is then divided into signals which are added to some horizontal lines in a vertical blanking interval of the video signal. When the signals are added, a clock signal which corresponds to the teletext signal of the slower rate is added to the signal in each horizontal line. When the teletext signal is to be reproduced, the signal is converted back into the teletext signal at the normal rate to emply signals added to a reproduced video signal as a video signal output.

A video tape recorder according to the present invention comprises a gate circuit for extracting a teletext signal from a vertical blanking interval a composite video signal obtained by demodulating a received broadcast signal, a random-access memory, and a control signal generator for generating a control signal for controlling reading and writing operations of the random-access memory. The control signal is generated from a clock signal contained in the teletext signal and a synchronising signal of the video signal. In a recording mode, the control signal is written into the memory at a normal transmission rate and read out of the memory at a rate lower than the normal transmission rate, and an obtained teletext signal is recorded on a recording medium while being added in the vertical blanking interval of the original video signal. In a playback mode, the teletext signal of the lower rate added in the vertical blacking interval of the video signal reproduced from the recording medium is extracted by the gate circuit, and a control signal is generated by the control signal generator based on a synchronising signal in the reproduced signal and a clock signal in the teletext signal of the lower rate. The reproduced teletext signal is written into the memory circuit and read out thereof at the normal transmission rate. The teletext signal thus obtained is delivered as an output while being added in the vertical blanking interval of the reproduced video signal.

The above and other features and advantages of the present invention will become more apparent from the following description when taken in conjunction with the accompanying drawings in which preferred embodiments of the present invention are shown by way of illustrative example.

Figure 1 is a diagram showing difference frequency characteristics of video signals recorded and reproduced by a VTR for domestic use and a sophisticated VTR for broadcasting or industrial use;

Figure 2 is a block diagram of a VTR capable of recording and reproducing teletext signals according to the present invention;

Figures 3, 4 and *5* are diagrams showing signal waveforms illustrative of conversion of character signals;

Figure 6 is a block diagram of an arrangement, different from that shown in Figure 2, for generating a clock signal; and

Figures 7 and *8* are diagrams showing the waveforms of converted character signals generated when recording and reproducing a plurality of teletext signals.

Description of the preferred embodiments

As shown in Figure 2, a carrier television signal received by an antenna 1 is demodulated by a demodulator 2 into a composite video signal shown at *a* in Figure 3. The demodulated video signal is supplied to a synchronising separator 4 and gate circuits 7, 8 through a switch 3 for selecting recording and playback modes, the switch 3 having a recording contact R and a playback contact P. The synchronising separator 4 serves to extract a synchronising signal of a video signal shown at *b* in Figure 3 from the supplied composite video signal. The signals shown at *a, b* in Figure 3 are in the vicinity of the vertical blanking interval of an odd-numbered field, and a teletext signal is added anywhere between 10th H and 21st H in the vertical blanking interval (an even-numbered field, between 273rd H and 284th H: H being one horizontal synchronising signal interval). A teletext signal is shown as being added to the 15th H.

The synchronising signal produced by the synchronising separator 4 is applied to a vertical synchronising separator 5, a gate signal generator

20, and a control signal generator 26.

The vertical synchronising separator 5 serves to extract a vertical synchronising signal from the synchronising signal and produces an output as shown at *c* in Figure 3. The output signal from the vertical synchronising separator 5 is applied to gate signal generator 6, 20.

The gate signal generator 6 produces a gate signal for producing the teletext signal from the composite video signal. The gate signal generator 6 comprises a monostable multivibrator, for example, for generating a gate signal as illustrated at *d* in Figure 3 by using the vertical synchronizing signal as a trigger signal. The gate signal is supplied to the gate signal 7. The gate signal generator 6 also issues a gate signal having a polarity opposite to that of the gate signal d in Figure 3 to the gate circuit 8. Since the gate circuit 7 is supplied with the composite video signal containing the teletext signal from the demodulator 2, the gate 7 picks up the teletext signal only as shown at e in Figure 3 in response to the gate signal applied from the gate signal generator 6. The gate circuit 7 includes a clipping circuit for removing the synchronizing signal when the teletext signal is extracted from the video signal.

Since the gate circuit 8 is fed with the gate signal of the opposite polarity, it produces the video signal only with the teletext signal removed therefrom. The teletext signal issued from the gate circuit 7 is stored temporarily in a random-access memory (hereinafter referred to as a "RAM") 27 which is supplied with a control signal such as an addressing signal from a control signal generator 26.

The control signal generator 26 will now be described in detail. As shown at *a, b* in Figure 4, the teletext signal is composed of a header part and an information data part. The header part has a clock run-in (CR) signal, a framing code (FC), a service identification and interrupt control (SI/IN) signal, and a data identification (DI) code. A clock serving as a reference for reading data must be generated from the clock run-in signal.

The control signal for the RAM 27 is generated on the basis of the clock run-in signal.

The clock run-in signal is extracted by a gate circuit 21 from the teletext signal issued from the gate circuit 7. A gate signal is issued from the gate signal generator 20 to the gate circuit 21. Since the gate signal generator 20 is supplied with the synchronizing signal from the synchronizing separator 4 and the vertical synchronizing signal from the vertical synchronizing separator 5, the gate signal generator 20 produces the gate signal as shown at b in Figure 5 based on the supplied signals. Figure 5a shows on an enlarged scale a signal portion of the signal illustrated in Figure 2a which contains the teletext signal. The gate circuit 21 is thus responsive to the gate signal for generating the clock run-in signal as shown at *c, d* in Figure 5. As shown at d in Figure 5, the clock run-in signal is composed of eight pulses. The clock signal has a frequency twice that of the clock run-in signal. Therefore, the clock run-in signal is equivalent to a data signal representative of "1010101010101010", and the clock signal for reading such a data signal must be in the form as shown at e in Figure 5. Therefore, the clock run-in signal shown at d in Figure 5 forms the basis for generating the clock signal illustrated at e in Figure 5.

An arrangement for producing such clock signal will be described. The clock run-in signal generated from the gate circuit 21 is applied to divide-by-2 frequency divider 22 which generates a signal having a period twice that of the signal shown at d in Figure 5. The signal generated by the frequency divider 22 is fed via a contact R of a switch 23 to a phase comparator 24 supplied with a signal produced by reducing the frequency of an output from a voltage-controlled oscillator 25 to 1/4. More specifically, the output from the voltage-controlled oscillator 25 is delivered through two divide-by-2 frequency dividers 28, 29 so that the frequency will be reduced to 1/4. The frequency-divided output is brought into phase with the clock run-in signal by a phase adjuster 30, so that the clock signal will be generated by the voltage-controlled oscillator 25, because, provided the clock signal has a frequency fc, the frequency of the clock run-in signal is 1/2 fc, and the signal from the divided-by-2 frequency divider 22 has a frequency 1/4 fc.

Though the signal entering the phase comparator 24 is composed of four pulses, the phase can be maintained at constant for an interval of several Hs by holding an error signal produced thereby. While in the illustrated embodiment a PLL (Phase-Locked Loop) circuit 33 is employed, a circuit arrangement shown in Figure 6 may equally be utilized.

Input and output signals applied to and produced from circuits enclosed by the dot-and-dash lines in Figures 2 and 6 are remain the same. The signals applied to and issued from the terminals denoted by the identical letters are identical. The circuit arrangement shown in Figure 6 will be described. The clock run-in signal is applied through the terminal A to a period measuring circuit 35, which is supplied from a clock generator 34 with a clock signal having a frequency several hundreds higher than that of the clock run-in signal for keeping any error in period measurement down to 1 % or below. The measuring accuracy may be increased by measuring all of the 16 pulses of the clock run-in signal. The count of periods is then stored in a memory 36, and the stored count is set in a counter 37. The counter 37 counts clock pulses from the clock generator 34, issues a pulse each time the count reaches a set value. Therefore, the counter 37 can produce a clock signal in synchronism with the clock run-in signal. A signal equal to the clock run-in signal can be produced by dividing the frequency of the clock signal from the counter 37 with a divide-by-2 frequency divider 38, and a clock signal for recording (described later) can be generated by further dividing the frequency of the signal from the divide-by-2 frequency divider 38 with another divide-by-2 frequency divider 39.

The clock signal generated by the voltage-controlled oscillator 25 (Figure 2) or the counter 37 (Figure 6) is applied to the control signal generator 26, which is supplied with the clock run-in signal from the gate circuit 21, the synchronizing signal from the synchronizing separator 4, and a selected

DC voltage from a switch 59 for selecting recording and playback modes. According to the illustrated embodiment, a DC voltage + B is applied to the control signal generator 26 from the switch 59 only in the recording mode. This is just for the sake of convenience, and the DC voltage + B may not be applied in the recording mode. The control signal generator 26 is also supplied with a signal obtained by frequency-dividing the clock signal with the divide-by-2 frequency divider 28. In response to the supplied signals, the control signal generator 26 generates a control signal for storing the teletext signal shown at e in Figure 3 into the RAM 27 by utiizing the clock signal from the voltage-controlled oscillator 25 and the clock run-in signal serving as a head signal for the signal storing operation. The teletext signal stored in the RAM 27 is read out of the RAM 27 as a clock signal of low rate as shown at f in Figure 3, which is then added and recorded in the vertical blanking interval as illustrated at g in Figure 3. In the embodiment, the signal that has been on one line is expended into signals on two lines which are added as shown at g in Figure 3. The signal is read out of the RAM 27 at a rate half the speed at which the signal has been stored into the RAM 27.

As illustrated in Figures 4 at *a* and *b*, the teletext signal is also composed of data of 37 bytes. There are various methods available for expanding the data on a time basis for two blocks. Figure 4 shows one example of such expansion method. The clock run-in (CR) signal and the framing code (FC) do not constitute data, and the remaining signal part of 34 bytes is the necessary information data. By dividing this information data into halves, each data half contains 17 bytes. To the head of each 17-byte data, there are added a clock run-in (CR) signal and a framing code (FR) signal which are newly produced and of 1.5 bytes as shown in Figure 4 at *c*, *d*. Thus, a teletext signal is generated which has the same time interval as that of the original teletext signal, with the frequency being half that of the latter. Therefore, the clock signal for reading the data out of the RAM 27 at a half rate can be produced from the output from the divide-by-2 frequency divider 28 and the synchronizing signal.

To the clock run-in signal and the framing code signal as shown at *c*, *d* in Figure 4 are added the signal obtained by reducing the frequency of the clock signal to 1/4 with the divide-by-2 frequency divider 29. The framing code is of four bits though it is composed of eight bits of 11100101 in the original teletext signal. Since the framing code is a code utilized within the VTR only, it may be the same as the clock signal or the original framing code may be divided into halves with a first line being 1110 and a second line 0101. The clock run-in signal and the framing code signal are added to the frequency-divided signal from the divide-by-2 frequency divider 29 by a gate circuit 32, and then is mixed with a signal from the RAM 27 by a mixer 31. A gate signal for the gate circuit 32 is produced by the gate signal generator 20 and is longer by the framing code signal than the gate signal shown at b in Figure 5. Figure 5 shows at f a successive clock signal (output from the divide-by-2 frequency divider 29) which has been frequency-divided into 1/4, and Figure 5 shows at *g* clock run-in signals and framing pulses employed in the VTR in the recording mode. Figure 5 shows a clock run-in signal and a framing pulse on an enlarged scale. An output from the mixer 31 is then delivered through a contact R of a stich 30 to a mixer 9. Since the mixer 9 is supplied with the video signal with no teletext signal from the gate circuit 8, the mixer 9 issues a signal shown at *g* in Figure 3 (the signal g shown on an enlarged scale in Figure 5 at *i*). The signal from the mixer 9 is delivered through a contact R of a switch 10 to a modulator 11 in which the signal is frequency-modulated. The frequency-modulated signal is then amplified by a recording amplifier 12, which issues an amplified signal through a contact R of a switch 15 to a magnetic head 16 for being recorded on a magnetic tape 17. In reality, the VTR incorporates a rotary head for recording the signal on the magnetic tape 17. Since the present invention has no particular bearing on the rotary head, the mechanical parts in the VTR will not be described.

A playback mode for playing back the magnetic tape 17 on which the video signal including the teletext signal will now be described.

The video signal as reproduced by the magnetic head 16 is delivered through the switch 15, amplified by a playback amplifier 18, and applied to a demodulator 19. The demodulator 19 serves to demodulate the frequency-modulated signal and issues a signal which is the same as the recorded video signal (as shown at *g* in Figure 3). The demodulated signal is applied through the contact P of the switch 3 to the synchronizing separator 4 and the gate circuits 7, 8, which process the signal in the same manner as that in the recording mode.

The signal contains a teletext signal having a low bit rate, which cannot be played back as a normal teletext signal on a television receiver having a teletext-signal-reception capability.

In order for such a signal to be properly received by the television receiver, the signal must be converted into a teletext signal having a normal bit rate. A method of such such signal conversion will be described hereinbelow.

Unlike the recording mode, the control signal generator 26 produces a writing control signal based on the frequency-divided signal from the divide-by-2 frequency divider 28. The signal stored in the RAM 27 is read out of the RAM 27 at the same rate as that of the original teletext signal as shown at *j* in Figure 3. The teletext signal as read out of the RAM 27 is delivered through a contact P of the switch 30 to the mixer 9. Since the mixer 9 is fed with the video signal with no teletext signal from the gate circuit 8, the mixer 9 produces an output signal as shown at j in Figure 3. The signal from the mixer 9 is then delivered through the contact P of the switch 10 and an output amplifier 13 to an output terminal 14. A television receiver with a teletext-signal-reception capability is connected to the output terminal 14 for displaying an image based on the reproduced teletext signal.

The control signal generator 26 will be described in greater detail. The signal for selecting the record-

ing mode R and the playback mode P is applied to the control signal generator 26 for effecting the signal storage into the RAM 26, the signal storage for the signal reading, and the directing of the signal reading rate. More specifically, in the recording mode, the signal is stored on single line at a normal character signal transmission rate, and thereafter read out over two lines at a rate half the normal character signal transmission speed. In the playback mode, the reproduced character signal is stored over two lines at a rate half the normal character signal transmission speed, and read out at the normal character signal transmission speed.

The framing code may be of a format peculiar to the VTR in the recording mode as described above. In the playback mode, however, the RAM 27 or other processing circuit is attached to produce the foregoing framing code, 11100101. Alternatively, 1110 and 0101 may be recorded respectively on two lines, and they may be added together to produce a framing code.

While in the foregoing embodiment the clock run-in signal and the framing code signal comprise 1.5 bytes as desired.

Figure 7 shows teletext signals added in 16th H and 17th H, and Figure 8 illustrates teletext signals added in 20th H and 21th H. The signals *a* through *j* shown in Figures 7 and 8 correspond respectively to those in Figure 3. When a plurality of teletext signals are added, the mixer 9 produces a signal shown at *j* in Figures 7 and 8 in the playback mode. These teletext signals in the reproduced video signals are positioned differently from those prior to being recorded. This is because the RAM needs storage and reading times. Such positional or phase differences however do not affect the decoding of teletext signals in the television receiver.

It is not determined in which lines (H) teletext signals will finally be incorporated. Two examples will be described. The example shown in Figure 7 indicates that teletext signals are incorporated in 16th H and 17th H. By reducing the transmission speed by half in the recording mode by the method as shown in Figure 3, teletext signals are incorporated in 18th, 19th, 20th, and 21st H, located at the end of a vertical blanking interval provided for by the standards. The character signals thus converted produce a video signal as shown at *g* in Figure 7 which will be recorded. The reproduced video signals remain the same as that shown at g in Figure 7. If the reproduced character signals were converted into those having the original bit rate in the same manner as described above with reference to Figure 3, the teletext signals would be positioned in 22nd and 23rd H in alignment with the video signal. To avoid this, the character multiplexing signals are brought into a next field. Figure 7 shows at *j* the telextext signals in 277th and 278th H in an even-numbered field. Though the signals are delayed about 1 field from the original position, the delay will not be detected when the signals are decoded and displayed.

Figure 8 shows at a that character signals are incorporated in 20th and 21st H. In this instance, no signal of low rate cannot be brought subsequently to the 21st H in the recording mode, and hence the signals are delayed into a next field as shown at *f, g* in Figure 8. Since these signals are reproduced in the same position, the original teletext signals are added in 283rd and 284th H in an even-numbered field. The 1-field delay caused at this time also poses no problem. Naturally, the character signals which have originally been in an even-numbered field are delayed into a next succeeding odd-numbered field.

The three examples including the example of Figure 3 have been described. Signals can be recorded at a much lower rate in instances wherein there are more programs and a lower rate is required. Various combinations can therefore be possible, but the principles remain the same as described above, and such modifications are within the scope of the present invention.

As described above, the signal frequency recorded is half that of the original signal. Since the video frequency currently proposed in the teletext broadcating system is 2.86 MHz, as described above, its half frequency is 1.43 MHz, which can sufficiently be recorded and reproduced on home VTRs without suffering from signal deterioration.

A signal conversion method of the present invention is capable of preventing teletext signals from being deteriorated when they are to be recorded or reproduced on a small-size VTR for home use. The teletext signals can be recorded and reproduced with high fidelity by employing a simple memory circuit. By adding a special clock in the VTR, stable character signals can be transmitted in the VTR. Any influence due to variations in the speed of the magnetic tape and the rotation of a motor in the VTR can also be eliminated. Thus, the present invention has many industrial advantages.

CLAIMS

1. A method of signal conversion comprising the steps of converting a received normal teletext signal A into a teletext signal B having a lower rate than a normal transmission speed, adding said teletext signal B in a vertical blanking interval of a video signal, and adding a clock signal corresponding to said lower rate to each horizontal line in which said signal B is added when the signal B is to be recorded on a recording medium.

2. A method according to claim 1, wherein a framing code corresponding to the lower rate is added to each horizontal line.

3. A video tape recorder comprising means for converting a teletext signal contained in a composite video signal into a signal having a lower rate than a normal transmission rate, means for adding the converted signal in a vertical blanking interval of the video signal and recording the signal on a recording medium, means for converting the teletext signal of the lower rate contained in the video signal as reproduced from said recording medium into a signal having the normal transmission rate, and means for adding the last-mentioned converted signal in a vertical blanking interval of the reproduced video signal to produce a video signal output.

4. A video tape recorder comprising a gate circuit

for extracting a teletext signal added in a vertical blanking interval from a composite video signal of a base band obtained by demodulating a received broadcast radio wave, a random-access memory, and a control signal generator for generating a control signal for controlling reading and writing operation of the random-access memory, the arrangement being such that the control signal is generated by said control signal generator from a clock signal contained in the teletext signal and a synchronizing signal of the video signal, that, in a recording mode, the control signal is written into said memoery at a normal transmission rate and read out of the memory at a rate lower than the normal transmission rate, and an obtained teletext signal is recorded on a recording medium while being added in the vertical blanking interval of the original video signal, and that, in a playback mode, the teletext signal of the lower rate added in the vertical blacking interval of the video signal reproduced from the recording medium is extracted by said gate circuit, and a control signal is generated by said control signal generator based on a synchronizing signal in the reproduced signal and a clock signal in the teletext signal of the lower rate, and the reproduced teletext signal is written into the memory and read out thereof at the normal transmission rate, the teletext signal thus obtained being delivered as an output while being added in the vertical blanking interval of the reproduced video signal.

Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon, Surrey, 1984.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

PCT

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INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 6 :
H04N 7/173

A1

(11) Internationale Veröffentlichungsnummer: WO 97/22207

(43) Internationales Veröffentlichungsdatum: 19. Juni 1997 (19.06.97)

(21) Internationales Aktenzeichen: PCT/EP96/05261

(22) Internationales Anmeldedatum: 28. November 1996 (28.11.96)

(30) Prioritätsdaten:
195 45 882.6 8. December 1995 (08.12.95) DE

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(81) Bestimmungsstaaten: JP, KR, US, europäisches Patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: SYSTEM FOR REPRODUCING VISUAL INFORMATION

(54) Bezeichnung: SYSTEM ZUM WIEDERGEBEN VON VISUELLEN INFORMATIONEN

(57) Abstract

To position advertising content in a telecommunication system, for example known throughout the world as the *Internet*, with a high level of acceptance by system users, it is proposed to transmit within a television signal which can be reproduced by a television receiver an address (HTTP) for a server program of the digital communication network. Optical signals are transmitted to the user on the screen of the television receiver in any form (in the form of a marking or plain writing). The address (HTTP) is evaluated at the command of the user to the effect that the content of the server program and other visual information which can be retrieved using the server program, in particular advertising-related information, can be reproduced on the screen of the television receiver.

(57) Zusammenfassung

Um Werbeinhalte in einem Telekommunikationssystem, wie es beispielsweise unter der Bezeichnung Internet weltweit verbreitet ist, mit hoher Akzeptanz von Seiten der Systembenutzer zu plazieren, wird vorgeschlagen, innerhalb eines Fernsehsignals, welches mittels eines Fernsehempfängers wiedergebbar ist, eine Adresse (HTTP) für ein Serverprogramm des digitalen Telekommunikationsnetzes zu übertragen. Diese Übertragung wird dem Benutzer auf dem Bildschirm des Fernsehempfängers in beliebiger Form (als Markierung oder in Klarschrift) optisch signalisiert. Die Adresse (HTTP) wird auf Befehl des Benutzers dahingehend ausgewertet, daß die Inhalte des Serverprogramms und weitere, mittels des Serverprogramms abrufbare visuelle Informationen, insbesondere werbungsbezogene Informationen, auf dem Bildschirm des Fernsehempfängers wiedergebbar sind.

LEDIGLICH ZUR INFORMATION

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System zum Wiedergeben von visuellen Informationen

BESCHREIBUNG

Die Erfindung bezieht sich auf ein System zum Wiedergeben von visuellen Informationen, die in einem digitalen Telekommunikationsnetz, beispielsweise dem "Internet" übertragen werden.

In digitalen Telekommunikationsnetzen werden unter sogenannten HTTP-Adressen Serverprogramme übertragenen, mit deren Hilfe visuelle Informationen von Datendiensten in Form von Schrift, Grafiken und/oder Bildern abrufbar sind. Die Wiedergabe der angewählten Serverprogramme und der damit abgerufenen visuellen Informationen erfolgt auf dem Bildschirm des Monitors eines PC-Arbeitsplatzes, d.h., in einem Umfeld, in dem die Akzeptanz von Werbeinhalten gering ist. Elektronische Werbung erfolgt daher überwiegend in Verbindung mit Fernsehunterhaltung.

Es ist ferner bekannt, in Fernseh-Werbesendungen Produkte vorzustellen und am Ende der Werbesendung getrennt für jedes Land die Preise und die Telefonnummern anzugeben, unter welchen die zuvor beworbenen Produkte bestellt werden können. Dieses sogenannte "Teleshopping" hat jedoch den Nachteil, daß vom Fernsehteilnehmer die betreffenden Telefonnummern mitgeschrieben werden müssen. Zudem leidet der unmittelbare Bezug zwischen der fernsehmäßigen Präsentation des Produktes und der Anzeige von Preis und Telefonnummer. Um den Bestellvorgang zeitgleich mit der Präsentation des Produktes durchzuführen und zu vereinfachen, ist es aus der DE 44 27 046 A1 bereits bekannt, Zusatzinformationen innerhalb des Fernsehprogrammsignals in zeitlicher Korrelation zu dessen Programminhalt zu übertragen. Auf einen ersten Befehl des Benutzers wird eine in

der zuletzt empfangenen Zusatzinformation enthaltene Klarschrift und gegebenenfalls Grafikinformation für eine bestimmte Zeitdauer auf dem Fernsehbildschirm wiedergegeben. Während dieser Wiedergabe wird auf einen zweiten Befehl des Benutzers aus der zuletzt empfangenen Zusatzinformation eine Telefonnummer als Bestellinformation entnommen und über ein Modem eine Telefonverbindung zu einer automatischen Bestellannahme hergestellt.

Die Aufgabe der Erfindung besteht demgegenüber darin, Werbeinhalte in einem Telekommunikationssystem der eingangs erwähnten Art mit hoher Akzeptanz von Seiten der Systembenutzer zu plazieren.

Diese Aufgabe wird erfindungsgemäß durch die kennzeichnenden Merkmale des Patentanspruchs 1 gelöst.

Eine vorteilhafte Ausgestaltungen des erfindungsgemäßen Systems ergibt sich aus dem Unteranspruch.

Die Erfindung geht von der Überlegung aus, die Akzeptanz von Werbeinhalten bei Benutzern von digitalen Telekommunikationsnetzen dadurch zu erhöhen, daß dem Benutzer beim Betrachten von Fernsehunterhaltung mit eingeblendeter Werbung signalisiert wird, daß er auf Knopfdruck die HTTP-Adresse eines Serverprogramms in einem digitalen Telekommunikationsnetz, z.B. Internet, anwählen kann. Wesentlich ist, daß die Inhalte des Serverprogramms auf dem Bildschirm des Fernsehempfängers wiedergegeben werden, so daß der Benutzer mit Hilfe des Serverprogramms nähere Informationen über die Werbeinhalte einer noch laufenden

Fernsehwerbung aus dem digitalen Telekommunikationsnetz abrufen und sofort auf auf dem Bildschirm des Fernsehempfängers wiedergeben kann. Für die technische Umsetzung ist es lediglich erforderlich, die HTTP-Adresse als Zusatzsignal in dem Fernsehsignal in zeitlicher Korrelierung zu den Werbeinhalten zu übertragen und diese Zusatzsignalübertragung dem Benutzer auf dem Bildschirm in beliebiger Form zu signalisieren, beispielsweise durch Einblenden einer bestimmten Markierung. Auf Befehl des Benutzers (Knopfdruck) wird die HTTP-Adresse aus dem Fernsehsignal ausgelesen und an ein mit dem Fernsehempfänger gekoppeltes Modem weitergeleitet, welches eine Kommunikationsverbindung zu dem digitalen Telekommunikationsnetz unter der ausgelesenen Adresse herstellt. Für die Wiedergabe der digitalen Informationssignale des Telekommunikationsnetzes auf dem Bildschirm des Fernsehgerätes ist neben einer Digital/Anlog-Wandlung der Signale im Falle eines analogen Fernsehempfängers bzw. einer Digital/Digital-Wandlung im Falle eines digitalen Fernsehempfängers in jedem Falle eine Synchronisation mit dem Takt des Fernsehsignals erforderlich.

SYSTEM ZUM WIEDERGEBEN VON VISUELLEN INFORMATIONEN

PATENTANSPRÜCHE

1. System zum Wiedergeben von visuellen Informationen in Form von Schrift, Grafiken und/oder Bildern, die in einem digitalen Telekommunikationsnetz übertragen werden, dadurch gekennzeichnet, daß innerhalb eines Fernsehsignals, welches mittels eines Fernsehempfängers wiedergebbar ist, eine Adresse (HTTP) für ein Serverprogramm des digitalen Telekommunikationsnetzes übertragen wird, welche dem Benutzers auf dem Bildschirm des Fernsehempfängers in beliebiger Form (als Markierung oder in Klarschrift) optisch signalisiert wird, und daß die Adresse (HTTP) auf Befehl des Benutzers dahingehend ausgewertet wird, daß die Inhalte des Serverprogramms und weitere, mittels des Serverprogramms abrufbare visuelle Informationen (beispielsweise werbungsbezogene Informationen) auf dem Bildschirm des Fernsehempfängers wiedergebbar sind.

2. System nach Anspruch 1, dadurch gekennzeichnet, daß die aus dem digitalen Telekommunikationsnetz empfangenen Datensignale vor der Wiedergabe auf dem Bildschirm des Fernsehempfängers auf den Takt des Fernsehsignals synchronisiert werden.

INTERNATIONAL SEARCH REPORT

Inte ›nal Application No
PCT/EP 96/05261

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/173

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 H04N

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.
A	US 5 410 326 A (GOLDSTEIN) 25 April 1995 see the whole document ---	1,2
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A	COMMUNICATIONS OF THE ASSOCIATION FOR COMPUTING MACHINERY, vol. 36, no. 12, December 1993, NEW YORK US, pages 19-23, XP000414935 LARRY PRESS: "the internet and interactive television" see the whole document --- -/--	1

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

[X] Patent family members are listed in annex.

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1

Date of the actual completion of the international search	Date of mailing of the international search report
6 March 1997	27. 03. 97
Name and mailing address of the ISA 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	Authorized officer Yvonnet, J

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INTERNATIONAL SEARCH REPORT

Inte nal Application No
PCT/EP 96/05261

C.(Continuation) 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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INTERNATIONAL SEARCH REPORT

information on patent family members

Inter nal Application No
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INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen
PCT/EP 96/05261

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
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Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
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Datum des Abschlusses der internationalen Recherche	Absendedatum des internationalen Recherchenberichts
6.März 1997	27. 03. 97
Name und Postanschrift der Internationale Recherchenbehörde Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Bevollmächtigter Bediensteter Yvonnet, J

Formblatt PCT/ISA/210 (Blatt 2) (Juli 1992)

INTERNATIONALER RECHERCHENBERICHT

Inter ales Aktenzeichen
PCT/EP 96/05261

C.(Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
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Formblatt PCT/ISA/210 (Fortsetzung von Blatt 2) (Juli 1992)

INTERNATIONALER RECHERCHENBERICHT

Angaben zu Veröffentlichungen, die zur selben Patentfamilie gehören

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PCT/EP 96/05261

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PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04N 7/10, 7/14, H04H 1/00, 1/02

A1

(11) International Publication Number: WO 00/36836

(43) International Publication Date: 22 June 2000 (22.06.00)

(21) International Application Number: PCT/US99/29595

(22) International Filing Date: 14 December 1999 (14.12.99)

(30) Priority Data:
09/216,668 16 December 1998 (16.12.98) US

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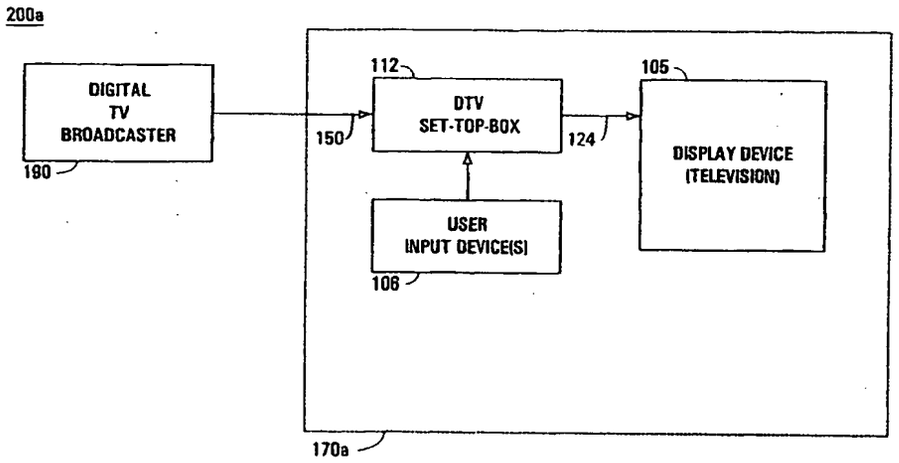
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A METHOD AND A SYSTEM RELATING TO DIGITAL TELEVISION AND BROADCASTING



(57) Abstract

A client–side intelligent device (112) having background caching of web pages within a digital television (DTV) system (170a) having an intelligent device (112) interfacing with a user/viewer input device (106) and controlling the display of information on a display device (105). The intelligent device (112) in one embodiment, is a set–top–box but could be any intelligent electronic device or computer system. The set–top–box is configured to receive a DTV signal that includes audio/visual information as well as data signals in a datacast format. The datacast format includes web pages, e.g., in the HTML (hypertext markup language) format of the world wide web. An intelligent filter is used that modifies itself based on user behavior and user preferences in terms of the web pages that a viewer routinely visits. The intelligent filter is then used to identify certain web pages of the pages that are being broadcast and these identified web pages are stored in a cache memory for later use by the viewer.

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A METHOD AND A SYSTEM RELATING TO DIGITAL TELEVISION AND BROADCASTING

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to the field of digital television (DTV) systems and digital broadcasting. More specifically, the present invention relates to the fields of digital broadcasting and web browsing. In this description, among other items, there is described an intelligent device having background caching of web pages within a digital television system and the method of same.

RELATED ART

Heretofore, television systems have mainly been used to receive and display broadcast television signals (e.g., audio/visual programs) for television viewers. In Europe, a data transmission format called "Teletext" has been used which enables compatible television sets to receive a special video signal having encoded therein pages of text based information that can be displayed to a viewer. The viewer can select to thereby view certain text-based pages from a keyboard console or remote device, which can include a cursor directing device. The text-based pages are broadcast from the television broadcaster and some high end television sets can store all the text-based pages in a memory device. Although helpful for obtaining mainstream information, e.g., stock prices and reports, sports information, general news, weather reports, etc., the Teletext system is very limited in the number of pages it can support, e.g., about 100 pages, is very limited in that only text is used and provides no intelligent information filtering mechanisms with respect to the text-based pages. It would be desirable to provide a system that can support enhanced information viewing and navigation within a television system.

In the United States, the digital satellite system (DSS) television broadcast standard offers an on-screen programming guide that decodes text-based programming information from the television broadcast signal. The DSS on-screen programming information describes the schedule of television programs and acts like an electronic television guide. Also included are some text-based extended information that describe the subject matter of a particular television show, program or movie. Much like the Teletext system, the DSS on-screen programming information is only text-based, it uses a television set, is limited in the number of pages it can support and provides no intelligent information filtering mechanisms. It would be desirable to provide a system that can support enhanced information viewing and navigation within a television system.

Recently, digital television broadcast standards and digital television sets have been introduced and used. The use of cable systems and digital audio/visual systems into the home has introduced the set-top-box device. The set-top-box device acts as an intelligent controller for accessing and decoding cable programs from digital cable, e.g., terrestrial cable or from a digital satellite system. In the recently proposed home audio/visual network systems, e.g., the HAVi and AV/C standards, the set-top-box also acts as an intelligent controller to control the activities and communications of other electronic devices that can be coupled to the network, like a digital television, a video cassette recorder (VCR), a compact disk (CD) unit, a tuner, a personal computer system, etc. These electronic platforms allow an enhanced ability to access and display information in digital form that was not before possible in the realm of television media. It would be desirable to provide a system that can take advantage of this

enhanced ability to access and display digital information within a television system.

The internet protocol of the world wide web allows multiple computer systems to communicate and display information in a way not before possible. The internet protocol allows hypertext documents, e.g., documents in a hypertext markup language (HTML) format, to be communicated from a server to a client computer system for viewing and interaction therewith. In typical usage, a user interacts with a web browser of a host computer system that connects to the internet via a modem or via some other form of direct high speed digital connection. Once connected to the internet, the user can access information in the form of hypertext documents (web pages) that are stored on server computer systems located on the world wide web, which exists literally all over the globe. It would be desirable to provide a system that can take advantage of the enhanced ability to access and display digital information within a television system for displaying and accessing HTML documents.

SUMMARY OF THE INVENTION

Accordingly, the present invention takes advantage of the enhanced ability of a digital television system to access and display information to enhance a television viewer's entertainment and information gathering experience. The present invention provides a digital television (DTV) system capable of efficiently accessing and displaying viewer-selected web pages and other HTML documents to a viewer. The web pages and other HTML documents are sent over a digital broadcast to the DTV system of the present invention. These and other advantages of the present invention not specifically mentioned above will become clear within discussions of the present invention presented herein.

A client-side intelligent device having background caching of web pages within a digital television (DTV) system and method of same are described herein. The present invention includes a digital television system having an intelligent device for interfacing with a user/viewer and controlling the display of information on a display screen. The intelligent device, in one embodiment, is a set-top-box, but could be any intelligent electronic device or computer system. The set-top-box is configured to receive a digital TV broadcast signal (e.g., land based cable or digital satellite system) that may include audio/visual information as well as data signals in a datacast format. The datacast format includes web pages, e.g., in the HTML (hypertext markup language) format. The present invention allows a viewer to have his/her DTV set-top-box or HDTV (high definition TV) monitor and locally cache hypertext documents (and multi-media components), that are transmitted by digital broadcasters, to thereby enhance the internet connectivity performance. A forward caching process is used.

The DTV broadcasters support multiple channels of information on which digital content providers can supply a domain of web pages that are transmitted in round robin fashion on a periodic basis. The present invention is able to display viewer-selected hypertext documents on the DTV system from this domain. An intelligent filter is used to cache hypertext documents. The intelligent filter modifies itself based on user behavior, e.g., user history, and user preferences in terms of the web pages that a viewer routinely visits. The intelligent filter is used to identify certain web pages (or other HTML-based documents and multi-media components) of the data that are being broadcast and these identified web pages are stored in a cache memory for later use by the viewer. Hypertext documents are forward cached in that they are stored in the cache memory before they are displayed to the user. A second tuner can be used to poll multiple channels when updating the cached contents. Cached web pages avoid broadcast latencies (due to periodic updating) and thereby are displayed faster to the viewer. The use of cached web pages therefore enhances internet connectivity performance.

More specifically, embodiments of the present invention include a method of displaying information in a digital television system, the method comprising the steps of: a) maintaining an intelligent filter that records hypertext documents based on the frequency that hypertext documents were previously accessed by a viewer of the digital television system; b) monitoring datacast information decoded from a received digital television broadcast signal to identify newly received hypertext documents, the step b) comprising the steps of: b1) sequentially scanning a first tuner of the digital television system over channels of the digital television broadcast signal for a predetermined time period for each scanned channel; and b2) at each scanned channel, identifying

newly received hypertext documents. The method further comprising the steps of: c) storing into a cache memory any of the newly received hypertext documents that are recorded in the intelligent filter; d) receiving, from a viewer, an identifier of a selected hypertext document; and e) provided the selected hypertext document is located within the cache memory, accessing the selected hypertext document from the cache memory and displaying the selected hypertext document on a display screen of the digital television system.

Embodiments include the above and further comprising the step of f) using a second tuner of the digital television system to display contents of a selected channel to the viewer on the display screen wherein the datacast information comprises a domain of hypertext documents that are periodically broadcast. Embodiments include the above and wherein the step a) comprises the steps of: a1) receiving and recording identifiers of hypertext documents accessed by the viewer; a2) recording a count associated with each identifier received by the step a1), the count indicating the number of times each recorded hypertext document was accessed by the viewer; and a3) ranking the identifiers of the intelligent filter based on their associated counts. Embodiments further include a digital television system implemented in accordance with the above.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A illustrates a digital television system in accordance with one embodiment of the present invention.

Figure 1B illustrates a digital television system in accordance with a second embodiment of the present invention that includes a digital modem connection to the world wide web.

Figure 2 is a logical block diagram of an intelligent client device in accordance with one embodiment of the present invention.

Figure 3 is a hardware and software data flow diagram of the logical components of the intelligent client device of the present invention.

Figure 4 illustrates the background and foreground processes implemented within the intelligent client device of the present invention.

Figure 5 is a flow diagram illustrating steps of the foreground process of the intelligent client device of the present invention for accessing and displaying selected web pages and other hypertext documents.

Figure 6 is a flow diagram illustrating steps of the foreground process of the intelligent client device of the present invention for updating the intelligent filter based on viewer preferences and behavior, e.g., viewer history.

Figure 7A illustrates steps in the background process of one embodiment of the present invention for storing web pages and other hypertext documents in the cache memory of the intelligent client device.

Figure 7B illustrates steps in the background process of a two-tuner embodiment of the present invention for storing web pages and other hypertext documents in the cache memory of the intelligent client device.

DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description of the present invention, an intelligent device within a digital television system for performing background caching of web pages, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be recognized by one skilled in the art that the present invention may be practiced without these specific details or with equivalents thereof. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not to unnecessarily obscure aspects of the present invention.

NOTATION AND NOMENCLATURE

Some portions of the detailed descriptions which follow are presented in terms of procedures, logic blocks, processing, and other symbolic representations of operations on data bits within an intelligent electronic media device. These descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. A procedure, logic block, process, etc., is herein, and generally, conceived to be a self-consistent sequence of steps or instructions leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these physical manipulations take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a consumer electronic media device. For reasons of convenience, and with reference to common usage, these signals are referred to as bits, values,

elements, symbols, characters, terms, numbers, or the like with reference to the present invention.

It should be borne in mind, however, that all of these terms are to be interpreted as referencing physical manipulations and quantities and are merely convenient labels and are to be interpreted further in view of terms commonly used in the art. Unless specifically stated otherwise as apparent from the following discussions, it is understood that throughout discussions of the present invention, discussions utilizing terms such as "processing" or "computing" or "generating" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a consumer electronic media device, or similar electronic computing device (e.g., dedicated or embedded computer system), that manipulates and transforms data. The data is represented as physical (electronic) quantities within the consumer electronic media device's registers and memories and is transformed into other data similarly represented as physical quantities within the consumer electronic media device memories or registers or other such information storage, transmission, or display screens.

DIGITAL TV SYSTEM

Figure 1A illustrates one embodiment of the client-side digital television ("DTV") system 170a of the present invention. DTV system 170a is coupled to receive a multi-channel digital television signal 150 from a digital TV broadcaster 190. Digital system 200a includes the broadcaster 190 and the client-side DTV system 170a. Within system 200a, the digital TV broadcast

signal 150 can be delivered to DTV system 170a using a terrestrial line (e.g., cable TV) or can be delivered via a wireless transmission mechanism (e.g., digital satellite system, etc.). In accordance with the present invention, a number of different and well known digital broadcast TV signal formats can be used to deliver the digital TV broadcast signal 150 to DTV system 170a. In one format, each channel of signal 150 has a bandwidth of approximately 19.2 Megabits per second (2.5 Megabytes per second) in which audio/visual and datacast information can reside. In one implementation, the American Television Standard Committee (ATSC) digital TV format is used. Several well known ATSC signal formats support datacast information transmission. In other embodiments, the Digital TV Applications Software Environment (DASE) signal format can be used.

The client-side DTV system 170a, of one embodiment, includes an intelligent client device ("intelligent device") 112 which is coupled to receive information from a user/viewer input device 106. The intelligent device 112, in one implementation, is a set-top-box and is also coupled (via bus 124) to a display device (e.g., a television) 105 for generating images and rendering sound. Optionally, separate speakers (not shown) can be used to generate the sound. The user/viewer input device 106 can be a number of different well known user input mechanisms including, for instance, a remote control, a physical keyboard, a mouse or other cursor directing device, a joystick, etc., and/or any combination of the above. The components of the intelligent device 112 are described in more detail with respect to Figure 2.

DTV system 170a of Figure 1A allows a viewer to see (e.g., browse) hypertext documents that are broadcast within encoded datacast information of the digital TV broadcast signal 150. The encoded datacast information can reside within a channel that also includes audio/visual programming or can reside within a channel dedicated to the transmission of digital datacast information. DTV system 170a of the present invention implements a mechanism for caching frequently visited hypertext documents (e.g., web pages) in a cache memory to enhance the internet connectivity experience of the viewer. Specifically, hypertext documents are cached in advance of being seen by the viewer. However, these documents are cached based on prior viewing behavior of the viewer. Digital TV broadcasting allows networks to broadcast datacast information (e.g., hypertext documents, HTML-based media and documents, web pages, etc.) over the digital TV signal. In accordance with the present invention, this digital information includes HTML-based documents related to (or not necessarily related to) the programming of the broadcaster. The present invention provides a viewer with a browser in the intelligent device 112 (e.g., set-top-box) or HDTV monitor. The system of the present invention is capable of storing (in cache memory) the latest versions of the hypertext documents visited by the viewer thereby allowing the viewer to access this information in a timely fashion.

The datacast information within the digital TV broadcast signal 150 is broadcast periodically. Within the system 170a of Figure 1A, the digital TV broadcast signal 150 is therefore monitored by the intelligent device 112 for

these hypertext documents. Based on the contents of an intelligent filter, those hypertext documents matching the filter are stored in a cache memory within the intelligent device 112. If a viewer should select a stored hypertext document (e.g., a cache hit) to view, then that selected hypertext document is obtained from the cache memory and displayed on display device 105. If the selected hypertext document is not stored in the cache memory (e.g., a cache miss occurs), then the intelligent device 112 access the selected hypertext document by monitoring the digital TV broadcast signal 150 until the hypertext document is next seen within the periodic broadcast.

Figure 1B illustrates an alternative embodiment of the present invention that includes a digital modem 108 as a second source for receiving hypertext documents. The digital mode 108 is capable of receiving hypertext documents from the internet. Client-side DTV system 170b includes the intelligent device 112 coupled to the digital modem 108 and to the user/viewer input device 106. The display device 105 is also coupled to the intelligent device 112. The digital modem 108 is coupled to the world wide web 180 that contains the internet protocol. Like the system 170a, system 170b of Figure 1A is coupled to receive a digital TV broadcast signal 150 from a digital TV broadcaster 190. The broadcaster 190, the world wide web 180 and the client-side DTV system 170b together constitute system 200b.

System 170b operates in an analogous fashion as system 170a with one exception. Upon a cache miss, system 170b can use the digital modem 108 to obtain the selected web page or hypertext document rather than waiting for its

next occurrence over the periodic broadcast of datacast information of the digital TV broadcast signal 150.

BROADCAST OF DATACAST INFORMATION WITHIN THE DIGITAL TV BROADCAST SIGNAL

With respect to system 170a and system 170b, the network broadcasters 190 broadcast a domain of hypertext documents in a periodic fashion, as discussed above. The number of documents within this domain is limited only by available channel bandwidth and expected latency. The document broadcast order is arbitrary, and typically established by the content provider. For instance, a 19.2 Megabit/second channel totally dedicated to the transmission of datacast information could broadcast about 200 hypertext documents per second. If a particular content provider wanted to establish a maximum latency of 20 seconds for any hypertext document, then about 200x20 or 4,000 hypertext documents would be the maximum number of documents within the domain for that channel. The broadcast order of the hypertext documents would be arbitrary and could be such that frequently visited documents get broadcast more often (e.g., with more frequency) than other lesser requested documents. In this case, different hypertext documents would have different maximum latencies.

However, many digital TV broadcast channels can share bandwidth between their audio/video information/programming and the datacast information. For instance, if a 19.2 Megabit/second channel contains audio, video and datacast information, it is likely that the datacast portion of the

channel would contain far fewer than 200 documents/second because the bulk of the available channel width would be consumed by the audio/visual programming. This constraint would limit the document domain size for such a channel.

HARDWARE AND SOFTWARE COMPONENTS OF INTELLIGENT DEVICE (COMPUTER SYSTEM)

Figure 2 illustrates the components of the intelligent device 112 in more detail. Any consumer electronic device can be provided with the appropriate computer system hardware to act as the intelligent device and thereby provide a platform for the processes of the present invention. For instance, a set-top-box device can be used. Another example of an intelligent device 112 is a digital television or computer system having the required hardware resources as described below. It is appreciated that certain aspects of the present invention, described below, are discussed in terms of steps executed on the intelligent device 112 (e.g., processes 400, 450, 480, 500a and 500b). Although a variety of different computer systems can be used as the intelligent device 112, an exemplary system is shown in Figure 2.

Intelligent device 112 of Figure 2 includes an internal address/data bus 100 for communicating digital information, one or more central processors 101 coupled with the bus 100 for processing information and instructions, a volatile memory 102 (e.g., random access memory RAM) coupled with the bus 100 for storing information and instructions for the central processor 101 and a non-volatile memory 103 (e.g., read only memory ROM) coupled with the bus 100 for

storing static information and instructions for the processor 101. A cache memory 102a resides within memory 102. As discussed more fully below, hypertext documents matching an intelligent filter are stored into the cache memory 102a for later use by the viewer. Intelligent device 112 can also optionally include a data storage device (not shown) such as a magnetic or optical disk and disk drive coupled with the bus 100 for storing information and instructions. The intelligent filter discussed above is a memory resident data structure and therefore may reside within memory 102.

Intelligent device 112 also includes a video decoder 120 coupled to bus 100 and coupled to supply a digital video signal 124 (e.g., to digital display device 105). A number of well known video decoders can be used for video decoder 120. Intelligent device 112 also includes an audio decoder 122 (e.g., a sound card) that is coupled to bus 100 and generates a digital audio signal over bus 126 (which can be coupled to external speakers). The video decoder 120 processes video information from bus 100 and the audio decoder 122 processes digital audio information from bus 100. Any of a number of well known audio decoders can be used for audio decoder 122 of the present invention. In one embodiment of the present invention, a two dimensional rendering engine 118 is also coupled to the bus 100 and coupled to the video decoder. The two dimensional rendering engine 118 processes graphics information and supplies the output as an overlay to the video decoder. In this way, graphics information can efficiently be overlaid with the other video information (including hypertext documents).

Digital TV broadcast information is received and processed by the intelligent device 112 from tuner 130 which is coupled to receive the digital TV broadcast signal 150. Optionally, a second tuner 132 can also be used to receive digital TV broadcast information. In one embodiment of the present invention, the second tuner 132 is not used. The first tuner 130 is coupled to a modulator 140 via bus 160 and the modulator 140 is coupled to bus 100. The modulator 140 performs analog to digital conversion of the signals of bus 160 and also acts as a bus interface for bus 100. The modulator 140 and the tuner 130 are well known. In an alternative embodiment, the second tuner 132 is coupled to a modulator 142 via bus 162 and the modulator 142 is coupled to bus 100. The modulator 142 performs analog to digital conversion of the signals of bus 162 and also acts as a bus interface for bus 100.

As discussed further below, the first tuner 130 is used for processing digital information used in foreground processing tasks. For instance, the first tuner 130 is controlled by the viewer and its contents are displayed in real-time on the television screen 105 for the viewer to enjoy. However, the second tuner 132 is used to perform background processing to maintain the contents of the cache 102a. In the embodiment that does not utilize the second tuner 132, the first tuner 130 is used to perform both the foreground and background tasks.

Under processor control from processor 101, digital audio/video information received from tuner 130 are directed over bus 100 to video decoder 120 and to audio decoder 122 for rendering on the display 105 and speakers

via bus 124 and bus 126. It is appreciated that bus 124 and bus 126 can be merged into one single larger digital bus carrying both video and audio data signals. Under processor control from processor 101, digital audio/video information received from optional tuner 132 are directed over bus 100 and are initially processed by an intelligent processor as shown in Figure 3. Hypertext documents from tuner 132 can be stored in cache memory 102a and if selected, are then transmitted on bus 100 to video decoder 120 and to audio decoder 122, as discussed above.

Figure 3 illustrates a data flow diagram of the intelligent controller 112 including hardware and software components. Tuner 130 and tuner 132 receive digital TV information from digital TV broadcast signal 150. Modulator 140 receives analog information from tuner 130 and generates a digital signal which is received by a demultiplexer 250. Modulator 142 receives analog information from tuner 132 and generates a digital signal which is received by a demultiplexer 250. Demultiplexer 250 can be hardware or software implemented and sorts out the audio, video and datacast portions of the digital signals received from the modulators 140 and 142. Digital video information is forwarded from demultiplexer 250 over data path 220a to a video processor 260. Video processor 260 can be software implemented, or alternatively, can be implemented in hardware, or can be a combination of both. Video processor 260 includes a video decoder 120 capable of decoding encoded video signals in well known formats such as MPEG (Motion Picture Expert Group) and MPEG II.

As discussed above, video processor 260 interfaces with a two dimensional rendering engine 290 which can be a hardware unit (as shown in Figure 2) or can be implemented as a software process as shown in Figure 3. Rendering engine 290 interfaces with both the video processor 260 and with a data processor 270 to overlay graphics information. Rendering engine 290 also directly interfaces with the cache memory 102a. The digital video signals are output over bus 124. Demultiplexer 250 also forwards digital audio signals over data path 220c to the audio processor 280 which generates audio signals over bus 126.

Demultiplexer 250 of Figure 3 also forwards digital datacast information over data path 220b to the data processor 270 which processes hypertext documents. Data processor 270 contains a browser. Any of a number of well known browsers, e.g., as commercially available from Netscape or Microsoft, can be used by data processor 270. Hypertext documents are rendered by data processor 270 and shipped to the rendering engine 290 for display over bus 124. An intelligent filter 300 is coupled to the data processor 270. Data processor 270 also directly interfaces with the cache memory 102a. In accordance with the present invention, intelligent filter 300 is a software unit and receives an identifier of each hypertext document received by data processor 270. In one embodiment, the identifier is the web address of a web page. The intelligent filter 300 has recorded therein a listing of identifiers corresponding to frequently visited web pages. This information is compiled based on past viewer behavior.

The intelligent filter 300 stores into cache memory 102a each hypertext document that is received by data processor 270 and that also matches an identifier stored in the intelligent filter 300. Hypertext documents not within the intelligent filter 300 are not stored in the cache memory 102a. The size of the cache memory 102a depends on the number of hypertext documents that are desired for storage and typically becomes an implementation choice depending on available memory resources. A 10 Megabyte cache memory 102a can store about 1,000 web pages.

CACHING PROCESSES OF THE PRESENT INVENTION

Figure 4 illustrates the major processes of the present invention to implement a digital TV web caching system. Process 400 is the foreground process and responds to a user/viewer selecting a particular web page or other hypertext document for display. At step 450, the intelligent device 112 accesses and displays a selected web page. At step 480, the intelligent filter 300 is then updated based on the user/viewer selections. In this way, the intelligent filter 300 is updated based on the behavior and viewing patterns/history of the user. Process 400 then repeats.

In the background, process 500 updates the cache memory 102a based on information received over the digital TV broadcast signal and based on the contents of the intelligent filter 300. Process 500 is cyclic. It is appreciated that the intelligent device 112 caches web pages based on the intelligent filter 300 and that this caching activity occurs in the background. It is appreciated that the

present invention performs "forward" caching in that web pages and other hypertext documents are cached before they are viewed using the browser. It is further appreciated that both process 400 and process 500 are implemented as instructions stored within computer readable memory units of intelligent device 112 and executed on processor 101.

Figure 5 is a flow diagram illustrating the steps within foreground process 450. At step 452, the intelligent device 112 receives a user/viewer originated request for a particular desired hypertext document (e.g., a particular web page). This request typically is received in the form of a web page address typed in (or otherwise selected) by a viewer using the user input device 106. At step 454, the present invention checks the contents of the cache memory 102a to determine if this hypertext document is currently stored in the cache memory 102a. At step 456, a check is made if a cache hit occurs (e.g., the selected hypertext document is stored in the cache memory 102b) or if a cache miss occurs (e.g., the selected hypertext document is not stored in the cache memory 102b).

If a cache hit occurs at step 456, then process 450 flows to step 464 where the intelligent device 112 obtains the selected hypertext document from cache memory 102a. At step 466, the intelligent device 112 then displays the selected hypertext document on the digital display screen 105. Upon a cache hit, no latency is perceived by the user from step 452 to step 466. Process 450 then returns.

If a cache miss occurs at step 456, then process 450 flows to step 458. At step 458, if the DTV system of the present invention contains a digital modem, it can optionally be used to obtain the selected hypertext document from the internet. Within the preferred embodiment, the DTV system of the present invention, at step 458, uses the digital TV broadcast signal 150 to obtain the selected hypertext document. At this step, the DTV system monitors the digital TV broadcast signal 150 until its periodic broadcast transmits the selected hypertext document. At step 458, a latency can be detected by the viewer between the request and the display of the selected hypertext document. The duration of the latency depends on the maximum latency for hypertext documents as determined by the content provider of the currently tuned channel. The latency is also determined by the timing of step 458 within the periodic broadcast of hypertext documents. At step 460 and step 462, the selected hypertext document is located and it is stored within a memory unit of the intelligent device 112. At step 466, the selected hypertext document is then displayed on the digital screen. Process 450 then returns.

The provision of the cache memory 102a therefore increases the user's internet connectivity experience, in accordance with the present invention, by eliminating any perceived latencies for selected web pages that are associated with a cache hit.

Figure 6 is a flow diagram illustrating the steps within foreground process 480 for updating the intelligent filter 300 based on user/viewer behavior. At step

482, if the currently selected hypertext document is not recorded in the intelligent filter 300, then it is recorded with an associated initial count (e.g., 1). At step 482, if the currently selected hypertext document is already recorded in the intelligent filter 300, then its associated count is incremented by one. In either case, an identifier of the selected hypertext document is recorded in the intelligent filter 300. At step 482, if the intelligent filter 300 becomes filled, as new hypertext documents are recorded, those recorded hypertext documents with the lowest count are dropped off. Optionally, at step 482, a timestamp is recorded with each recorded hypertext document indicating the time and date that the user last visited the web page.

At step 484, the present invention then ranks all of its recorded entries by count number with those hypertext documents with the largest count placed higher in the recorded list. At step 486, the present invention then optionally drops off of the recorded list any hypertext document that has not been visited by the viewer for a predetermined time period. This optional function is facilitated by the timestamps discussed above.

Figure 7A and Figure 7B illustrate two different versions of background process 500 for filling the cache memory 102a. Process 500a and process 500b are "background" processes in that they operate constantly whether or not the user/viewer is interacting with the DTV system. Process 500a of Figure 7A corresponds to DTV system 170a (Figure 1A) that has one tuner. Process 500b of Figure 7B is used with DTV system 170b (Figure 1B) that contains two tuners.

Process 500a of Figure 7A commences at step 502 where the first tuner 130 receives a web page or other hypertext document from the currently tuned channel of the digital TV broadcast signal 150. The viewer can alter the currently tuned channel at any time while process 500a is operating. During TV watching periods, the information received by tuner 130 is displayed in real-time on the display screen 105. At step 504, the intelligent device 112 compares the encoded identifier of the received hypertext document (e.g., the web page address) against the identifiers that are recorded in the intelligent filter 300. At step 506, if a match occurs then step 508 is entered, otherwise, step 502 is entered and this process continues for the next received hypertext document of the currently tuned channel.

At step 508, the intelligent device 112 receives and stores the current hypertext document into the cache memory 102a. If a previous older copy of the hypertext document is stored in the cache memory 102a, then at step 508, the present invention replaces the old copy with the new copy. If a previous same copy of the hypertext document is stored in the cache memory 102a, then at step 508, the present invention ignores the current hypertext document. It is appreciated that each hypertext document contains an identifier that can be used to determine if one hypertext document is the same or an older or a newer version of another hypertext document. After step 508 completes, step 502 is entered again to process the next received hypertext document. As described above, process 500a is limited in that only the currently tuned channel (e.g., that is also used by the viewer) is used to update cache memory 102a.

Figure 7B illustrates the steps of process 500b. Process 500b utilizes the second tuner 132 to update the cache memory 102a by continuously polling the available channels in a round robin fashion to update the cache memory 102a. In this way, the particular program selected by the viewer does not limit the scope of information that can be used to update the cache memory 102a. In other words, process 500b allows the cache memory 102a to be updated based on information that is being broadcast over one channel (e.g., using tuner 132) while the viewer is currently watching a program, or viewing other media information, on another channel (e.g., using tuner 130).

At step 510 of Figure 7B, the present invention receives datacast information over the channel that is currently tuned by the second tuner 132. The user/viewer is not allowed to alter the channel being tuned by tuner 132. Only the processor 101 of the intelligent device 112 can alter tuner 132 by program control. At step 510, a hypertext document is received by the intelligent device 112 from the second tuner 132. At step 512, the intelligent device 112 compares the encoded identifier of the received hypertext document (e.g., the web page address) against the identifiers that are recorded in the intelligent filter 300. At step 514, if a match occurs then step 516 is entered, otherwise, step 518 is entered.

At step 516, the intelligent device 112 receives and stores the current hypertext document into the cache memory 102a. If a previous older copy of the hypertext document is stored in the cache memory 102a, then at step 516, the

present invention replaces the old copy with the new copy. If a previous same copy of the hypertext document is stored in the cache memory 102a, then at step 516, the present invention ignores the current hypertext document. It is appreciated that each hypertext document contains an identifier that can be used to determine if one hypertext document is the same or an older or a newer version of another hypertext document. After step 516 completes, step 518 is entered.

At step 518, the intelligent device 112 checks if a predetermined time period has expired. Each available channel is scanned according to process 500b only for a predetermined time period. Once this time period expires, a new channel is used. At step 518, the present invention determines if the time period for the currently tuned channel has expired. If not, then step 510 is entered and the next hypertext document is received from the same tuned channel. In one implementation, the time period is 20 seconds for each channel but could be any reasonable period or could be programmable or could vary from channel to channel.

At step 518, if the time period for the currently tuned channel expires, then at step 520 the second tuner 132 is tuned to the next channel and the time period is reset. Step 510 is then entered to obtain the next hypertext document from the newly tuned channel. Process 500b repeats in this fashion. It is appreciated that the user can tune tuner 130 to any channel at any time during process 500b and this action will not alter the results of process 500b.

Therefore, process 500b is not limited to the particular channel being watched by the user (e.g., via tuner 130).

The preferred embodiment of the present invention, an intelligent device within a digital television system for performing background caching of web pages, is thus described. While the present invention has been described in particular embodiments, it should be appreciated that the present invention should not be construed as limited by such embodiments, but rather construed according to the below claims.

CLAIMS

What is claimed is:

1. In a digital television system, a method of displaying information comprising the steps of:

a) maintaining an intelligent filter that records hypertext documents that were previously accessed by a viewer of said digital television system;

b) monitoring datacast information decoded from a digital television broadcast signal to identify newly received hypertext documents;

c) storing into a cache memory any of said newly received hypertext documents that are recorded in said intelligent filter;

d) receiving, from a viewer, an identifier of a selected hypertext document; and

e) provided said selected hypertext document is located within said cache memory, accessing said selected hypertext document from said cache memory and displaying said selected hypertext document on a display screen of said digital television system.

2. A method as described in Claim 1 wherein said step a) comprises the steps of:

a1) receiving and recording identifiers of hypertext documents accessed by said viewer;

a2) recording a count associated with each identifier received by said step a1), said count indicating the number of times each recorded hypertext document was accessed by said viewer; and

a3) ranking said identifiers of said intelligent filter based on their associated counts.

3. A method as described in Claim 2 wherein said step a) further comprises the step of a4) removing from said intelligent filter any recorded identifier of a hypertext

document that has not been accessed by said viewer for a predetermined time period.

4. A method as described in Claim 1 wherein said step b) comprises the steps of:

b1) tuning a tuner to a selected channel within said digital television broadcast signal and receiving datacast information therefrom for a time period;

b2) identifying newly received hypertext documents from said datacast information of said step b1);

b3) provided said time period expired, updating said selected channel and initializing said time period; and

b4) repeating said steps b1) - b3).

5. The method of claim 1 wherein the digital television system is a client-side digital television system, and wherein in step a) the hypertext documents are based on the frequency that the hypertext documents were previously accessed by said viewer; and in step b) the digital television broadcast signal is a received digital television broadcast signal, step b) further comprising the steps of:

b1) sequentially scanning a first tuner of said digital television system over channels of said digital television broadcast signal for a predetermined time period for each scanned channel; and

b2) at each scanned channel, identifying newly received hypertext documents.

6. The method as described in Claim 5 further comprising the step of f) using a second tuner of said digital television system to display contents of a selected channel to said viewer on said display screen.

7. The method as described in Claim 1 or 5 wherein said datacast information comprises a domain of hypertext documents that are periodically broadcast.

8. The method as described in Claim 6 or 7 further comprising the step of f) provided said selected hypertext document is not located within said cache memory, obtaining said selected hypertext document upon its next occurrence within said datacast information and displaying said selected hypertext document on said display screen of said digital television system.

9. A method as described in Claim 6 or 7 further comprising the step of f) provided said selected hypertext document is not located within said cache memory, obtaining said selected hypertext document from a digital modem coupled to the word wide web and displaying said selected hypertext document on said display screen of said digital television system.

10. A method as described in Claim 6 wherein said step a) comprises the steps of:

a1) receiving and recording identifiers of hypertext documents accessed by said viewer;

a2) recording a count associated with each identifier received by said step a1), said count indicating the number of times each recorded hypertext document was accessed by said viewer;

a3) ranking said identifiers of said intelligent filter based on their associated counts; and

a4) removing from said intelligent filter any recorded identifier of a hypertext document that has not been accessed by said viewer for a predetermined time period.

11. A method as described in Claim 1 or 6 wherein said hypertext documents are web pages and wherein said identifiers and web page addresses.

12. A digital television system comprising:

a display screen;

a tuner coupled to receive a digital television broadcast signal;

an intelligent controller coupled to said display screen and coupled to said tuner, said intelligent controller comprising a processor coupled to a bus and a memory unit containing instructions that when executed implement a method of displaying information comprising the steps of:

a) maintaining an intelligent filter that records hypertext documents that were previously accessed by a viewer of said digital television system;

b) monitoring datacast information decoded from said digital television broadcast signal to identify newly received hypertext documents;

c) storing into a cache memory any of said newly received hypertext documents that are recorded in said intelligent filter;

d) receiving, from a viewer, an identifier of a selected hypertext document; and

e) provided said selected hypertext document is located within said cache memory, accessing said selected hypertext document from said cache memory and displaying said selected hypertext document on said display screen.

13. A digital television system as described in Claim 12 wherein said datacast information comprises a domain of hypertext documents that are periodically broadcast.

14. A digital television system as described in Claim 13 wherein said method further comprises the step of f) provided said selected hypertext document is not located within said cache memory, obtaining said selected hypertext document upon its next occurrence within said datacast information and displaying said selected hypertext document on said display screen.

15. A digital television system as described in Claim 13 wherein said method further comprises the step of f) provided said selected hypertext document is not located within said cache memory, obtaining said selected hypertext document from a digital modem coupled to the word wide web and displaying said selected hypertext document on said display screen.

16. A digital television system as described in Claim 12 wherein said step a) comprises the steps of:

a1) receiving and recording identifiers of hypertext documents accessed by said viewer;

a2) recording a count associated with each identifier received by said step a1), said count indicating the number of times each recorded hypertext document was accessed by said viewer; and

a3) ranking said identifiers of said intelligent filter based on their associated counts.

17. A digital television system as described in Claim 16 wherein said step a) further comprises the step of a4) removing from said intelligent filter any recorded identifier of a hypertext document that has not been accessed by said viewer for a predetermined time period.

18. A digital television system as described in Claim 12 wherein said hypertext documents are web pages and wherein said identifiers and web page addresses.

19. A digital television system as described in Claim 12 wherein said step b) comprises the steps of:

b1) tuning said tuner to a selected channel within said digital television broadcast signal and receiving datacast information therefrom for a time period;

b2) identifying newly received hypertext documents from said datacast information of said step b1);

b3) provided said time period expired, updating said selected channel and initializing said time period; and

b4) repeating said steps b1) - b3).

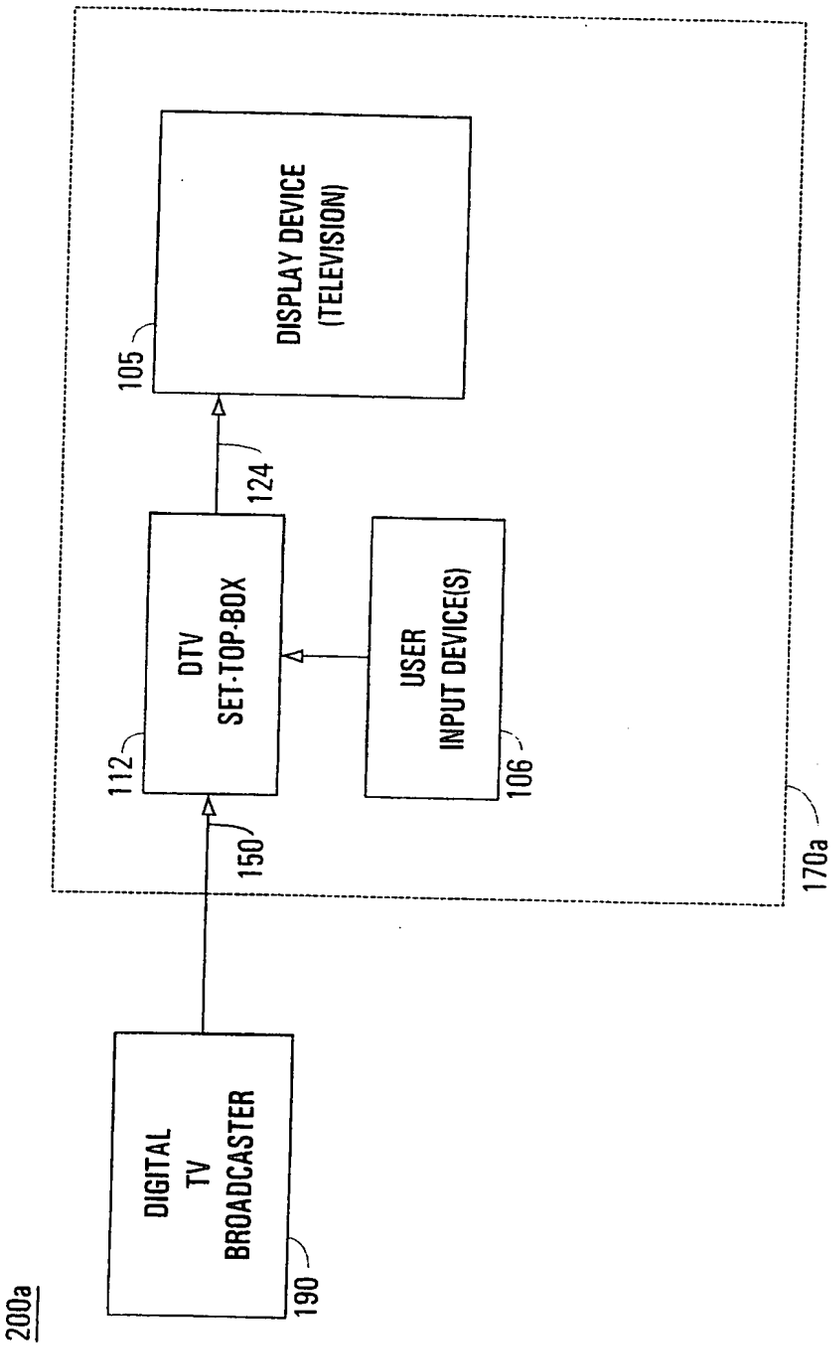
DISPLAY DEVICE
(TELEVISION)
105
124
DTV
SET-TOP-BOX
112
USER
INPUT DEVICE(S)
106
150
170a
DIGITAL
TV
BROADCASTER
190
200a

FIGURE 1A

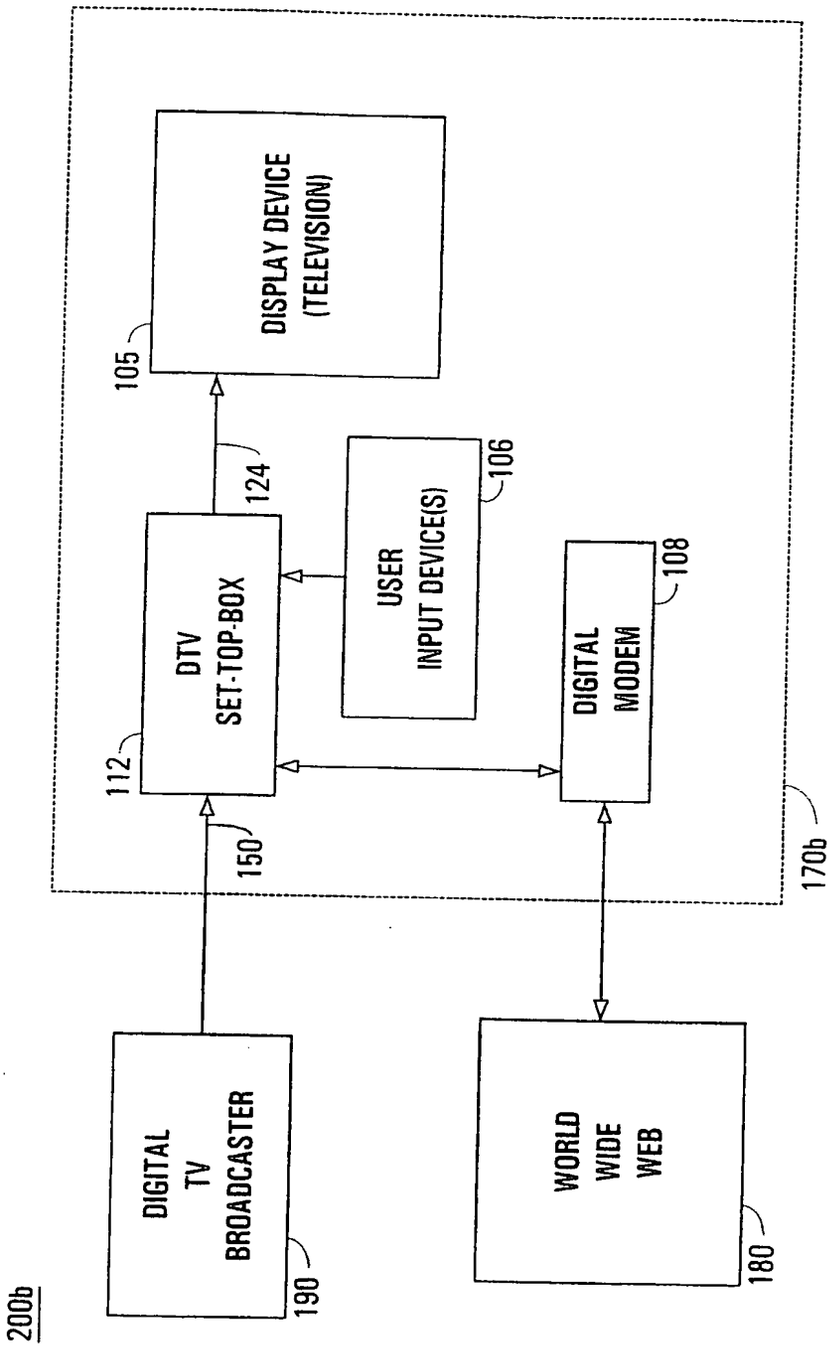
DISPLAY DEVICE (TELEVISION)
105
124
DTV SET-TOP-BOX
112
USER INPUT DEVICE(S)
106
DIGITAL MODEM
108
150
170b
DIGITAL TV BROADCASTER
190
WORLD WIDE WEB
180
200b

FIGURE 1B

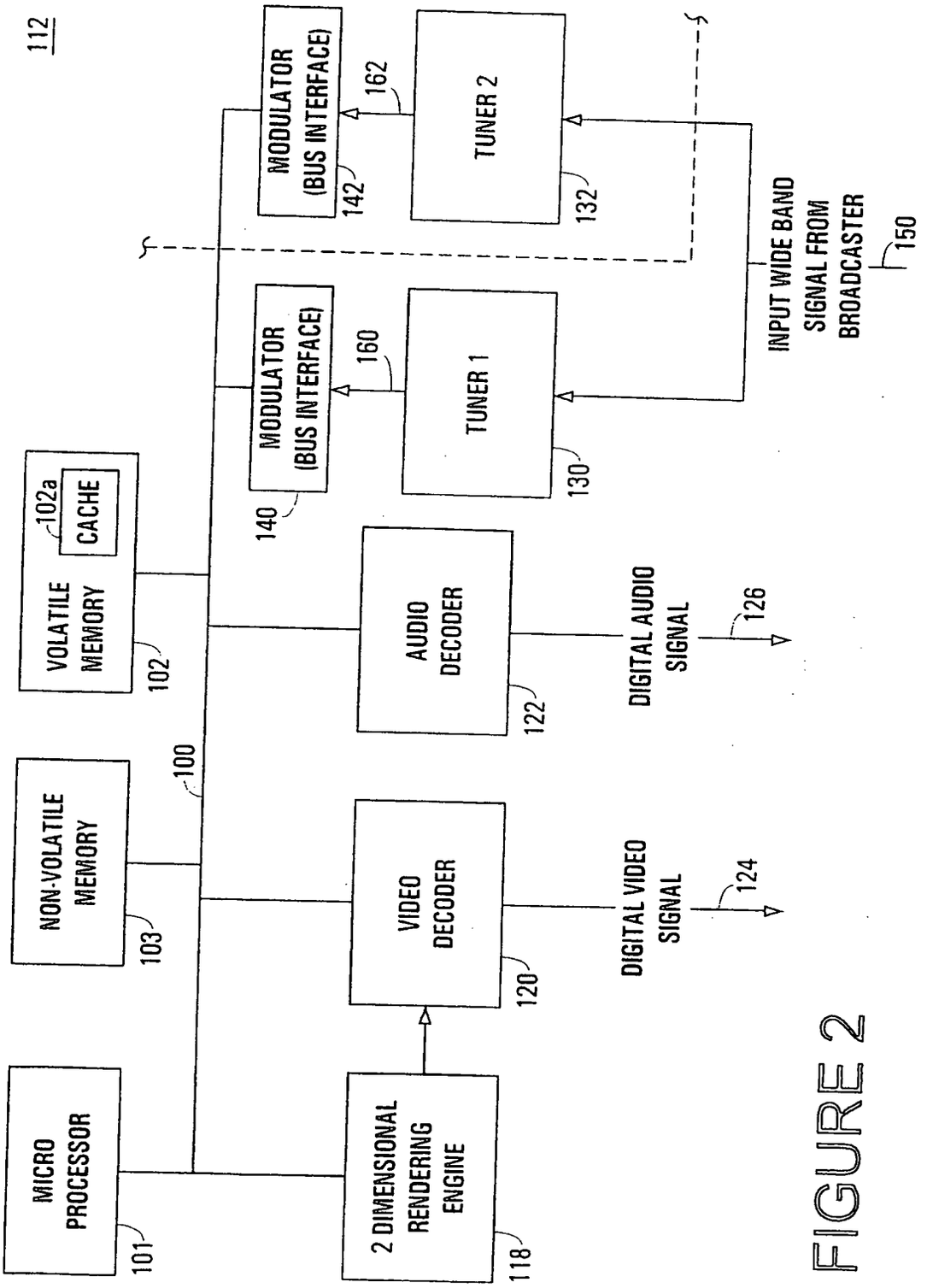
112
MODULATOR (BUS INTERFACE)
162
142
TUNER 2
132
INPUT WIDE BAND SIGNAL FROM BROADCASTER
150
MODULATOR (BUS INTERFACE)
160
140
TUNER 1
130
VOLATILE MEMORY
102a
CACHE
102
AUDIO DECODER
122
DIGITAL AUDIO SIGNAL
126
100
NON-VOLATILE MEMORY
103
VIDEO DECODER
120
DIGITAL VIDEO SIGNAL
124
MICRO PROCESSOR
101
2 DIMENSIONAL RENDERING ENGINE
118

FIGURE 2

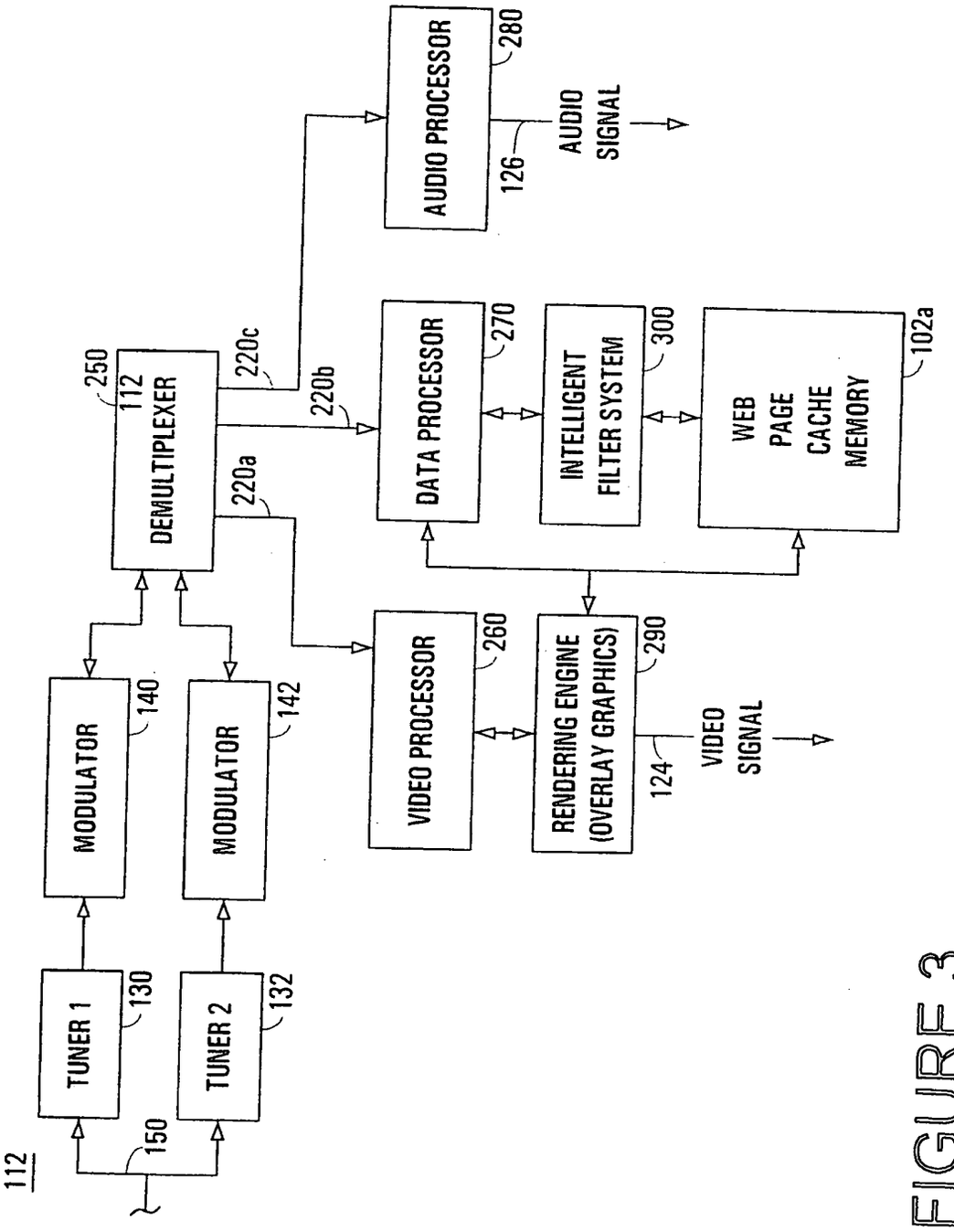
112
150
TUNER 1
130
TUNER 2
132
MODULATOR
140
MODULATOR
142
250
112
DEMULTIPLEXER
220a
220b
220c
AUDIO PROCESSOR
280
126
AUDIO SIGNAL
DATA PROCESSOR
270
INTELLIGENT FILTER SYSTEM
300
WEB PAGE CACHE MEMORY
102a
VIDEO PROCESSOR
260
RENDERING ENGINE (OVERLAY GRAPHICS)
290
124
VIDEO SIGNAL

FIGURE 3

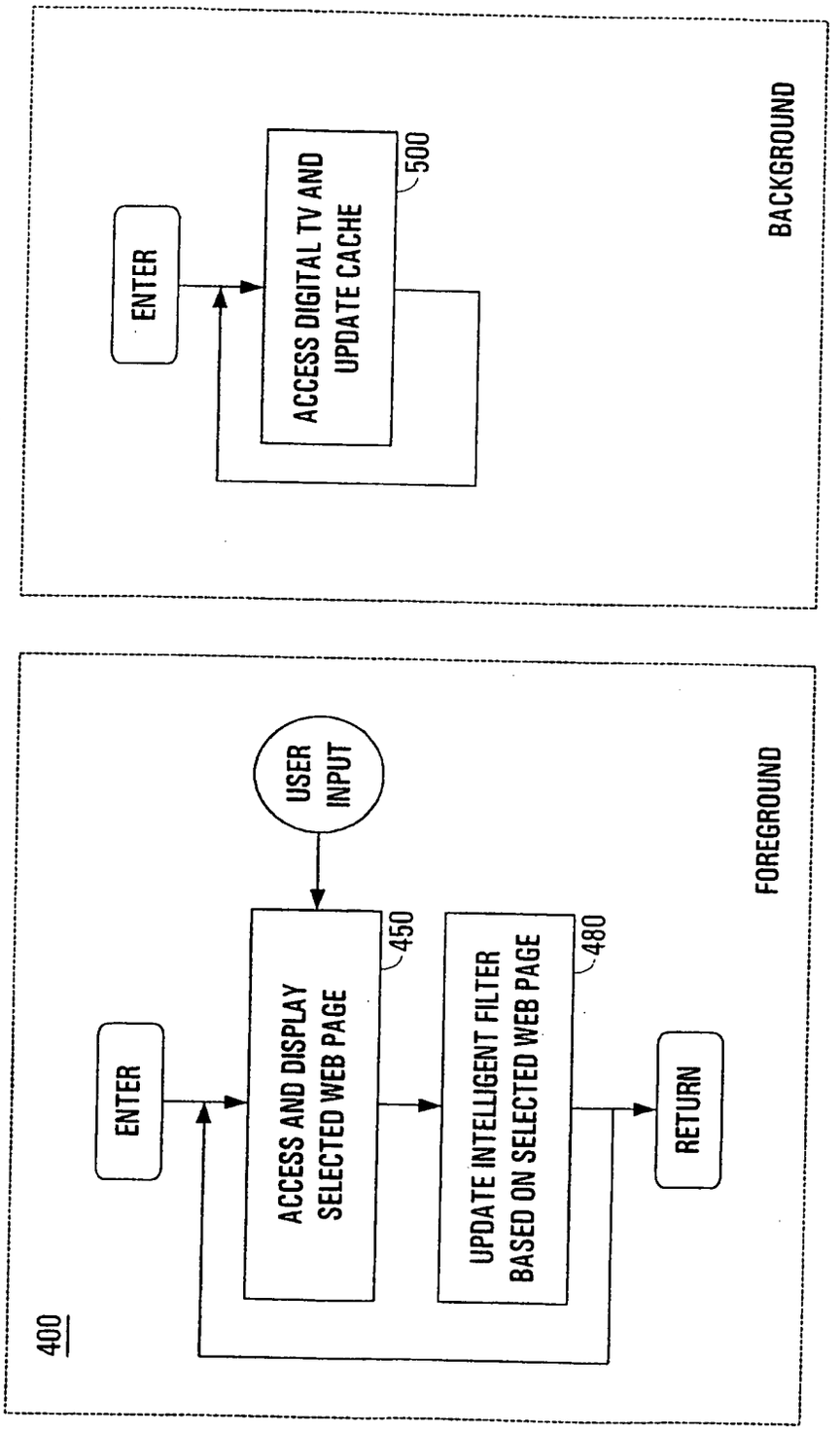
BACKGROUND
ENTER
ACCESS DIGITAL TV AND UPDATE CACHE
500
FOREGROUND
400
ENTER
USER INPUT
ACCESS AND DISPLAY SELECTED WEB PAGE
450
UPDATE INTELLIGENT FILTER BASED ON SELECTED WEB PAGE
480
RETURN

FIGURE 4

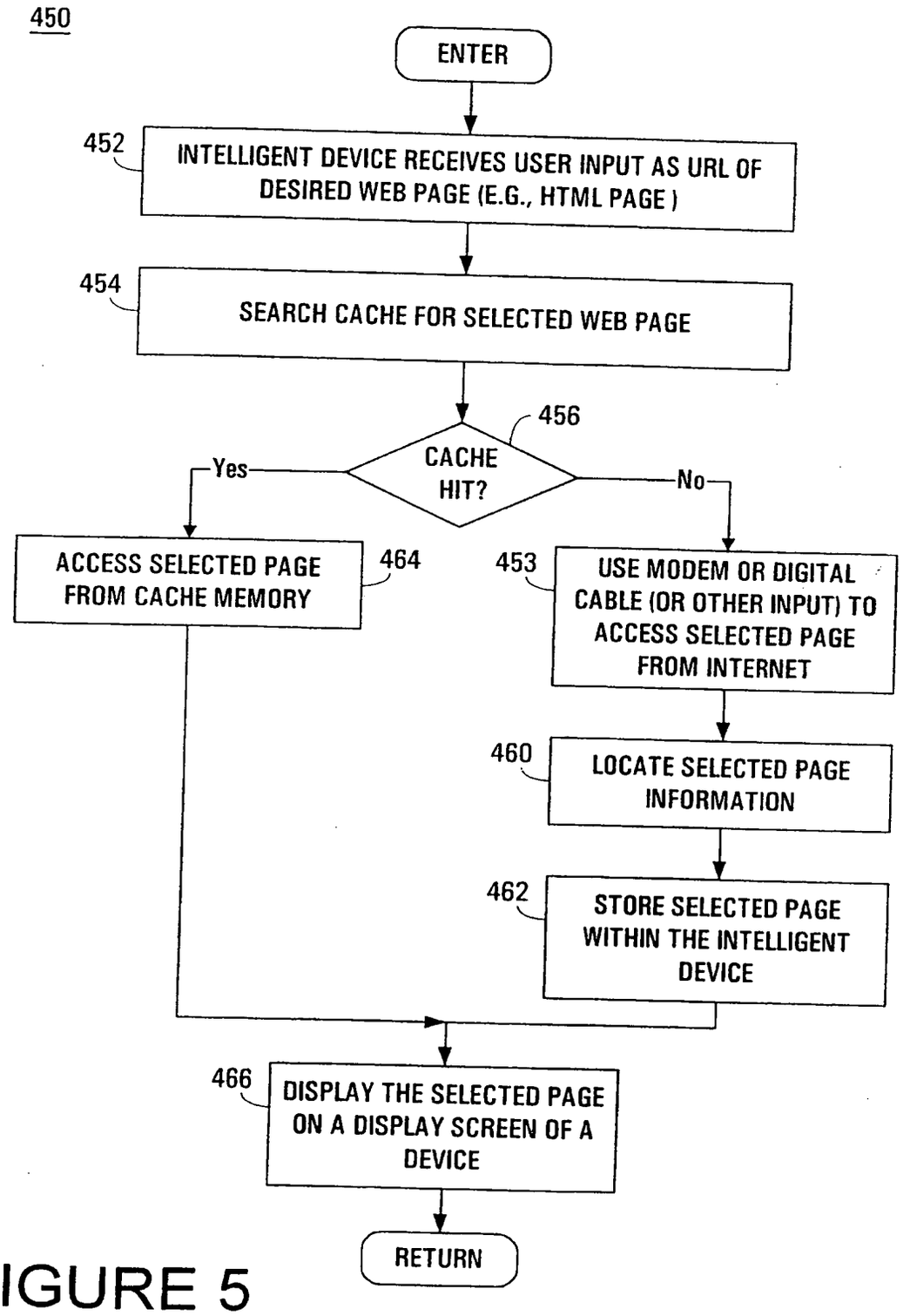
450
ENTER
452
INTELLIGENT DEVICE RECEIVES USER INPUT AS URL OF DESIRED WEB PAGE (E.G., HTML PAGE)
454
SEARCH CACHE FOR SELECTED WEB PAGE
456
CACHE HIT?
Yes
No
ACCESS SELECTED PAGE FROM CACHE MEMORY
464
453
USE MODEM OR DIGITAL CABLE (OR OTHER INPUT) TO ACCESS SELECTED PAGE FROM INTERNET
460
LOCATE SELECTED PAGE INFORMATION
462
STORE SELECTED PAGE WITHIN THE INTELLIGENT DEVICE
466
DISPLAY THE SELECTED PAGE ON A DISPLAY SCREEN OF A DEVICE
RETURN

FIGURE 5

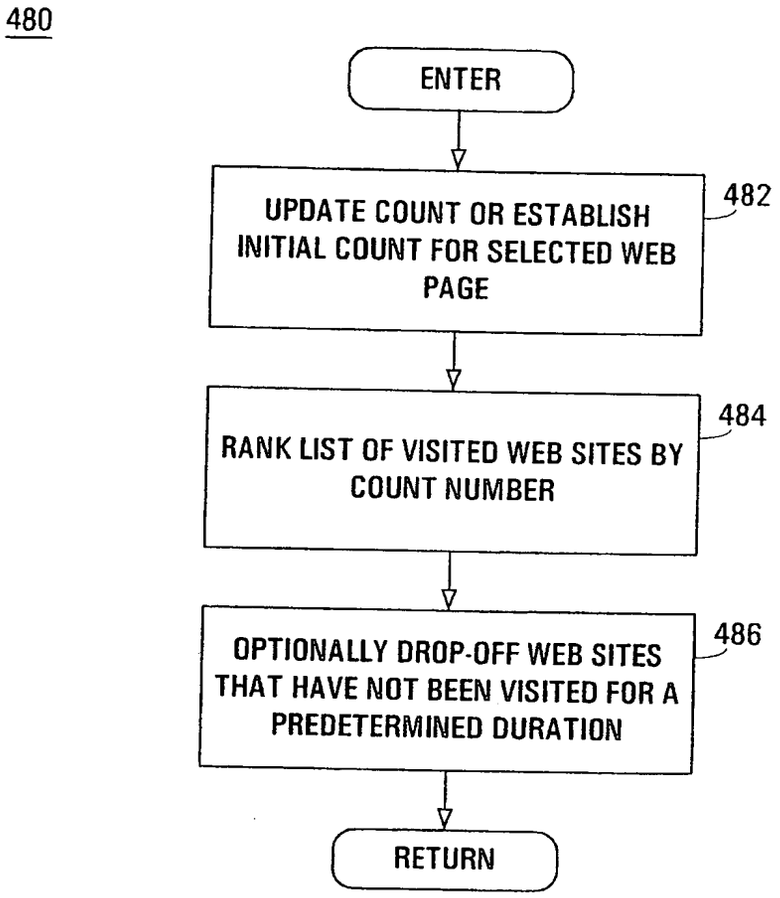
480
ENTER
UPDATE COUNT OR ESTABLISH INITIAL COUNT FOR SELECTED WEB PAGE
482
RANK LIST OF VISITED WEB SITES BY COUNT NUMBER
484
OPTIONALLY DROP-OFF WEB SITES THAT HAVE NOT BEEN VISITED FOR A PREDETERMINED DURATION
486
RETURN

FIGURE 6

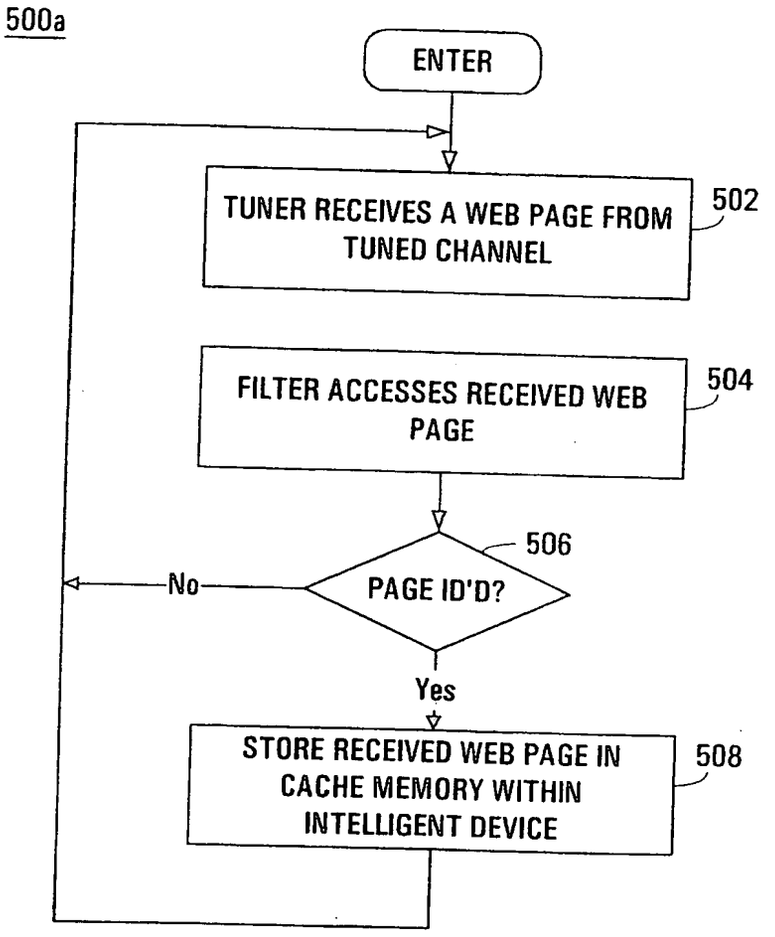
500a
ENTER
TUNER RECEIVES A WEB PAGE FROM TUNED CHANNEL
502
FILTER ACCESSES RECEIVED WEB PAGE
504
506
PAGE ID'D?
No
Yes
STORE RECEIVED WEB PAGE IN CACHE MEMORY WITHIN INTELLIGENT DEVICE
508

FIGURE 7A

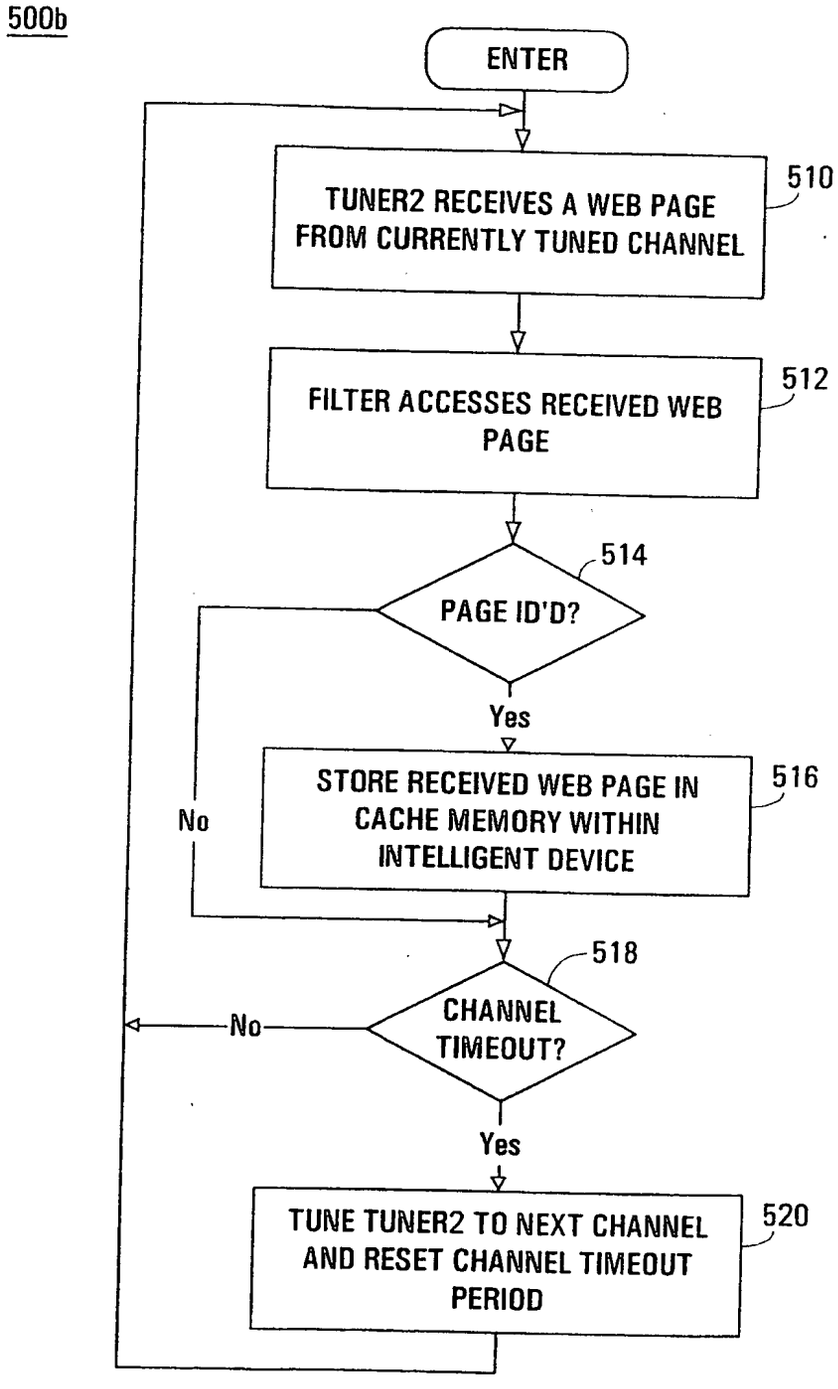
500b
ENTER
TUNER2 RECEIVES A WEB PAGE FROM CURRENTLY TUNED CHANNEL
510
FILTER ACCESSES RECEIVED WEB PAGE
512
PAGE ID'D?
514
Yes
No
STORE RECEIVED WEB PAGE IN CACHE MEMORY WITHIN INTELLIGENT DEVICE
516
CHANNEL TIMEOUT?
518
No
Yes
TUNE TUNER2 TO NEXT CHANNEL AND RESET CHANNEL TIMEOUT PERIOD
520

FIGURE 7B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29595

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) :HO4N 7/10, 7/14; HO4H 1/00, 1/02
US CL :Please See Extra Sheet.
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)
U.S. : 709/217; 345/327; 348/12, 13, 6, 10; 455/3.1, 3.2, 5.1, 6.1, 6.2, 6.3

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
APS - DTV, set-top, user, preferences, habits, web pages, internet, HTML

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 5,929,850 A (BROADWIN et al) 27 July 1999, col. 10, line 8 - col. 12, line 46, col. 6, lines 22-27, col. 13, lines 33-42, col. 15, lines 1-67, fig. 1, fig. 2	1-3, 5-7, 10, 12-18
Y, P	US 5,889,951 A (LOMBARDI et al) 30 March 1999, col. 27, lines 10-36	2, 3, 7, 10, 16, 17
Y	US 5,727,129 A (BARRETT et al) 10 March 1998, col. 5, lines 22-46, col. 9, lines 4-16	12-18

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
04 APRIL 2000	10 MAY 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer VIVEK SRIVASTAVA For Eugene Eogan Telephone No. (703) 305-4038

Form PCT/ISA/210 (second sheet) (July 1998) ★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29595

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,701,161 A (WILLIAMS et al) 23 December 1997, col. 5, line 65 - col. 6, line 19	5, 6, 10
A, P	US 5,895,471 A (KING et al) 20 April 1999, ALL	1-19
A, P	US 5,978,828 A (GREER et al) 02 November 1999, ALL	1-19

Form PCT/ISA/210 (continuation of second sheet) (July 1998) ★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29595

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 8, 9, and 11
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet(1)) (July 1998) ★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29595

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

709/217; 345/327; 348/12, 13, 6, 10; 455/3.1, 3.2, 5.1, 6.1, 6.2, 6.3

#19

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/299,335	11/18/2002	Craig Ullman	4247.51

CONFIRMATION NO. 6304

OC000000012173479

OC000000012173479

25227
MORRISON & FOERSTER LLP
1650 TYSONS BOULEVARD
SUITE 300
MCLEAN, VA 22102

Date Mailed: 03/24/2004

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/12/2003.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

TARA J WITCHER
2600 (703) 308-5535

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#10

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/299,335	11/18/2002	Craig Ullman	4247.51

CONFIRMATION NO. 6304

OC000000012173480

OC000000012173480

25227
MORRISON & FOERSTER LLP
1650 TYSONS BOULEVARD
SUITE 300
MCLEAN, VA 22102

Date Mailed: 03/24/2004

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/12/2003.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

TARA J WITCHER
2600 (703) 308-5535

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2611 / 130 x CD

PTO/SB/21 (02-04)
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	9

Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig ULLMAN
Art Unit	2611
Examiner Name	Christopher C. Grant
Attorney Docket Number	559442600201

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form (1 page)
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [X] Information Disclosure Statement (2 pages)
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [X] CD, Number of CD(s) 1
- [ ] After Allowance communication to Technology Center (TC)
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [X] Other Enclosure(s) (please Identify below):

PTO/SB/08 (6 pages) along with (1) CD of references.

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	MORRISON & FOERSTER LLP Jonathan Boekman 48,640
Signature	
Date	November 24, 2004

va-85639 v1

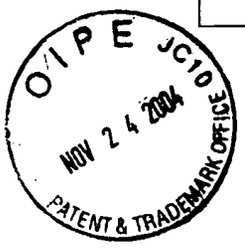
CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand delivered to: Commissioner for Patents, 2011 South Clark Place, Room 1B03, Crystal Plaza 2, Arlington, Virginia, 22202, on the date shown below.

Dated: 11/24/04 Signature: Cherrise Texidor

(Cherrise Texidor)

PATENT
Docket No. 559442600201



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN *et al.*

Serial No.: **10/299,335**

Filing Date: **November 18, 2002**

For: **ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS**

Examiner: **Christopher Grant**

Confirmation No.: **6304**

Group Art Unit: **2611**

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO-1449. Copies of the foreign and non-patent documents are also submitted herewith on a CD due to the substantial number of references. The Examiner is requested to make these documents of record.

This Supplemental Information Disclosure Statement is submitted before mailing of a first Office Action on the merits; accordingly, no fee is required.

va-85608

Applicants would appreciate the Examiner initialing and returning the Form PTO-1449, indicating that the information has been considered and made of record herein.

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 and § 1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

In the event that the transmittal form is separated from this document and the Patent Office determines that an extension and/or other relief (such as payment of a fee under 37 C.F.R. § 1.17 (p)) is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing 559442600201.

Dated: November 24, 2004

Respectfully submitted,

By: _____

Jonathan Bockman
Registration No. 45,640
Morrison & Foerster LLP
1650 Tysons Boulevard
Suite 300
McLean, Virginia 22102
703-760-7700

va-85608

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

U.S. PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Name	Class	Subclass	Filing Date If Appropriate
	1.	2/25/1986	4,572,509	SITRICK			
	2.	6/3/1986	4,592,546	FASCENDA et al.			
	3.	10/31/1989	4,877,408	HARTSFIELD			
	4.	5/19/1992	5,114,155	TILLERY et al.			
	5.	5/4/1993	5,208,659	RHODES			
	6.	9/7/1993	5,243,528	LEFEBVRE			
	7.	1/25/1994	5,282,028	JOHNSON et al.			
	8.	10/25/1994	5,359,510	SABALIAUSKAS			
	9.	10/31/1995	5,462,275	LOWE et al.			
	10.	9/17/1996	5,557,316	HOARTY et al.			
	11.	11/26/1996	5,579,055	HAMILTON et al.			
	12.	12/17/1996	5,586,257	PERLMAN			
	13.	12/24/1996	5,586,937	MENASHE			
	14.	1/14/1997	5,593,349	MIGUEL et al.			
	15.	3/11/1997	5,610,653	ABECASSIS			
	16.	5/6/1997	5,627,978	ALTOM et al.			
	17.	5/27/1997	5,633,810	MANDAL et al.			
	18.	6/10/1997	5,637,844	EIBA			
	19.	9/16/1997	5,667,708	GLASS et al.			
	20.	10/21/1997	5,679,075	FORREST et al.			
	21.	11/25/1997	5,691,986	PEARLSTEIN			
	22.	12/9/1997	5,695,400	FENNELL, JR. et al.			
	23.	12/16/1997	5,697,844	VON KOHORN			
	24.	3/24/1998	5,730,654	BROWN			
	25.	5/5/1998	5,748,731	SHEPHARD			
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	29.	7/14/1998	5,779,549	WALKER et al.			

va-85603

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	30.	8/18/1998	5,796,952	DAVIS et al.			
	31.	9/22/1998	5,813,006	POLNEROW et al.			
	32.	10/20/1998	5,823,879	GOLDBERG et al.			
	33.	12/8/1998	5,846,132	JUNKIN			
	34.	12/8/1998	5,848,373	DELORME et al.			
	35.	1/5/1999	5,855,516	EIBA			
	36.	2/2/1999	5,867,208	MCLAREN			
	37.	3/2/1999	5,878,222	HARRISON			
	38.	3/9/1999	5,880,720	IWAFUNE et al.			
	39.	3/30/1999	5,889,950	KUZMA			
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	41.	4/6/1999	5,890,906	MACRI et al.			
	42.	4/6/1999	5,890,963	YEN			
	43.	4/13/1999	5,894,556	GRIMM et al.			
	44.	8/17/1999	5,940,595	REBER et al.			
	45.	5/25/1999	5,907,680	NIELSEN			
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	47.	6/29/1999	5,918,014	ROBINSON			
	48.	7/20/1999	5,926,179	MATSUDA et al.			
	49.	7/27/1999	5,929,849	KIKINIS			
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	51.	8/24/1999	5,941,774	TAKEMOTO et al.			
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va-85603

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	62.	12/21/1999	6,005,561	HAWKINS et al.			
	63.	12/28/1999	6,009,458	HAWKINS et al.			
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	66.	2/22/2000	6,029,045	PICCO et al.			
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	68.	3/28/2000	6,044,403	GERSZBERG et al.			
	69.	4/4/2000	6,047,235	HIYOKAWA et al.			
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	76.	7/4/2000	6,082,887	FEUER et al.			
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	78.	8/1/2000	6,098,085	BLONDER et al.			
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	81.	8/22/2000	6,108,703	LEIGHTON et al.			
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	93.	2/27/2001	6,193,610	JUNKIN			

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Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	94.	3/6/2001	6,199,014	WALKER et al.			
	95.	3/6/2001	6,199,045	GINIGER et al.			
	96.	3/20/2001	6,204,842	FUJII			
	97.	3/20/2001	6,205,582	HOARTY			
	98.	6/26/2001	6,253,228	FERRIS et al.			
	99.	8/14/2001	6,275,705	DRANE et al.			
	100.	8/21/2001	6,278,942	MCDONOUGH			
	101.	9/11/2001	6,288,753	DeNICOLA et al.			
	102.	9/18/2001	6,292,780	DOEDERLEIN et al.			
	103.	10/2/2001	6,297,748	LAPPENBUSCH et al.			
	104.	11/13/2001	6,317,791	COHN et al.			
	105.	11/13/2001	6,317,780	COHN et al.			
	106.	12/4/2001	6,326,982	WU et al.			
	107.	3/12/2002	6,353,933	LOVE			
	108.	4/2/2002	6,366,914	STERN			
	109.	5/28/2002	6,397,220	DEISINGER et al.			
	110.	6/25/2002	6,412,011	AGRAHARAM et al.			
	111.	8/27/2002	6,442,598	WRIGHT et al.			
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	114.	10/8/2002	6,463,585	HENDRICKS et al.			
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	116.	11/26/2002	6,486,892	STERN			
	117.	1/28/2003	6,513,069	ABATO et al.			
	118.	2/25/2003	6,526,041	SHAFFER et al.			
	119.	6/10/2003	6,577,716	MINTER et al.			
	120.	8/26/2003	6,611,872	McCANNE			
	121.	9/23/2003	6,625,624	CHEN et al.			
	122.	11/4/2003	6,643,691	AUSTIN			
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	124.	4/20/2004	6,725,159	KRASNER			
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va-85603

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	126.	8/15/2002	2002/0112002	ABATO			
	127.	10/24/2002	2002/0156909	HARRINGTON			
	128.	12/12/2002	2002/0188943	FREEMAN et al.			
	129.	4/29/1997	RE 35,498	BARNARD			
	130.	1/7/2003	RE 37,957	GARFIELD			

FOREIGN PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Country	Class	Subclass	Translation YES	Translation NO
	131.	7/6/2000	AU 717399	Australia			X	
	132.	11/5/1997	EP 0 805 598	Europe			X	
	133.	4/22/1998	EP 0 837 609	Europe			X	
	134.	11/25/1998	GB 2 325 537	United Kingdom			X	
	135.	2/3/1999	GB 2 327 837	United Kingdom			X	
	136.	11/22/2000	GB 2 350 213	United Kingdom			X	
	137.	6/22/2000	WO 00/36836	PCT			X	
	138.	7/27/2000	WO 00/43892	PCT			X	
	139.	7/27/2000	WO 00/43899	PCT			X	
	140.	12/21/00	WO 00/77664	PCT			X	
	141.	8/22/2002	WO 02/065252	PCT			X	
	142.	8/22/2002	WO 02/065318	PCT			X	
	143.	3/21/1996	WO 96/08923	PCT			X	
	144.	8/14/1997	WO 97/29591	PCT			X	
	145.	9/12/1997	WO 97/33434	PCT			X	
	146.	10/7/1999	WO 99/50778	PCT			X	

OTHER DOCUMENTS *(including author, title, Date, Pertinent Pages, Etc.)*

Examiner Initials	Ref No.	Title
	147.	Eitz, "Combiners for Videotext Signals" Broadcast Technology Reports, translation of vol. 28, no. 6, November 1984, pages 273-289, XP002182048, Norderstedt, Germany
	148.	"Advanced Television Enhancement Forum Specification (ATVEF)", Comment Draft Version 1.0rl, 2/25/99, XP002142688
	149.	Cline et al., "DirectShow RTP Support for Adaptivity in Networked Multimedia Applications", Multimedia Computing and Systems, 1998, Proceedings, IEEE International Conference June 28-

va-85603

Form PTO-1449 INFORMATION DISCLOSURE CITATION IN AN APPLICATION *(Use several sheets if necessary)*	Docket Number: 559442600201	Application Number: 10/299,335
	Applicant: Craig ULLMAN et al.	
	Filing Date: November 18, 2002	Group Art Unit: 2611
	Mailing Date: November 24, 2004	

		July 1, 1998, pages 13-22
	150.	Mannos, T.J., "Re: Web page prefetching?" located at <URL:http://dejanews.com> retrieved on October 4, 2002, DEJA News (Online), December 1, 1997
	151.	Philippe Le Hegaret, "Document Object Module (DOM)", Architecture Domain, located at www.w3.org/DOM/ retrieved on June 22, 2001, 2 pages
	152.	S. Gillich et al., "ATVEF Integration with DVB Using IP/MPE," December 20, 1999, retrieved from www.atvef.com/library/atvef-dub-bindingR8.html on June 8, 2001, 5 pages
	153.	J. Steinhorn et al., "Embedded Systems Programming-Enhancing TV with ATVEF," retrieved from www.embedded.com/1999/9910/9910ial.htm on March 28, 2000, 10 pages
	154.	"Enhanced Content Specification," ATVEF, 1998, retrieved from www.atvef.com/library/spec1-1a.html. on March 28, 2000, 38 pages

EXAMINER:	DATE CONSIDERED:

EXAMINER: Initial if citation considered, whether or not the citation conforms with MPEP 609. Draw a line through the citation if not in conformance and not considered. Include a copy of this form with next communication to applicant.

2611/130 x CD nom IFW

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig ULLMAN
Art Unit	2611
Examiner Name	Christopher C. Grant
Attorney Docket Number	559442600201
Total Number of Pages in This Submission	9

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form (1 page)
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [X] Information Disclosure Statement (2 pages)
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [X] CD, Number of CD(s) 1
- [ ] After Allowance communication to Technology Center (TC)
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [X] Other Enclosure(s) (please Identify below):

PTO/SB/08 (6 pages) along with (1) CD of references.

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	MORRISON & FOERSTER LLP Jonathan Bockman - 45,640
Signature	[signature]
Date	November 24, 2004

va-85639 v1

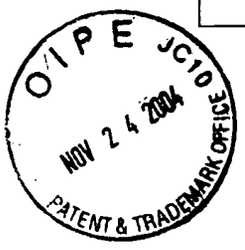
CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand delivered to: Commissioner for Patents, 2011 South Clark Place, Room 1B03, Crystal Plaza 2, Arlington, Virginia, 22202, on the date shown below.

Dated: 11/24/04 Signature: Cherrise Texidor

(Cherrise Texidor)

PATENT
Docket No. 559442600201



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN *et al.*

Serial No.: **10/299,335**

Filing Date: **November 18, 2002**

For: **ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS**

Examiner: **Christopher Grant**

Confirmation No.: **6304**

Group Art Unit: **2611**

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO-1449. Copies of the foreign and non-patent documents are also submitted herewith on a CD due to the substantial number of references. The Examiner is requested to make these documents of record.

This Supplemental Information Disclosure Statement is submitted before mailing of a first Office Action on the merits; accordingly, no fee is required.

va-85608

Applicants would appreciate the Examiner initialing and returning the Form PTO-1449, indicating that the information has been considered and made of record herein.

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 and § 1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

In the event that the transmittal form is separated from this document and the Patent Office determines that an extension and/or other relief (such as payment of a fee under 37 C.F.R. § 1.17 (p)) is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing 559442600201.

Dated: November 24, 2004

Respectfully submitted,

By: _____

Jonathan Bockman
Registration No. 45,640
Morrison & Foerster LLP
1650 Tysons Boulevard
Suite 300
McLean, Virginia 22102
703-760-7700

va-85608

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

U.S. PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Name	Class	Subclass	Filing Date If Appropriate
	1.	2/25/1986	4,572,509	SITRICK			
	2.	6/3/1986	4,592,546	FASCENDA et al.			
	3.	10/31/1989	4,877,408	HARTSFIELD			
	4.	5/19/1992	5,114,155	TILLERY et al.			
	5.	5/4/1993	5,208,659	RHODES			
	6.	9/7/1993	5,243,528	LEFEBVRE			
	7.	1/25/1994	5,282,028	JOHNSON et al.			
	8.	10/25/1994	5,359,510	SABALIAUSKAS			
	9.	10/31/1995	5,462,275	LOWE et al.			
	10.	9/17/1996	5,557,316	HOARTY et al.			
	11.	11/26/1996	5,579,055	HAMILTON et al.			
	12.	12/17/1996	5,586,257	PERLMAN			
	13.	12/24/1996	5,586,937	MENASHE			
	14.	1/14/1997	5,593,349	MIGUEL et al.			
	15.	3/11/1997	5,610,653	ABECASSIS			
	16.	5/6/1997	5,627,978	ALTOM et al.			
	17.	5/27/1997	5,633,810	MANDAL et al.			
	18.	6/10/1997	5,637,844	EIBA			
	19.	9/16/1997	5,667,708	GLASS et al.			
	20.	10/21/1997	5,679,075	FORREST et al.			
	21.	11/25/1997	5,691,986	PEARLSTEIN			
	22.	12/9/1997	5,695,400	FENNELL, JR. et al.			
	23.	12/16/1997	5,697,844	VON KOHORN			
	24.	3/24/1998	5,730,654	BROWN			
	25.	5/5/1998	5,748,731	SHEPHARD			
	26.	5/26/1998	5,757,916	MacDORAN et al.			
	27.	5/26/1998	5,758,079	LUDWIG et al.			
	28.	6/2/1998	5,759,101	VON KOHORN			
	29.	7/14/1998	5,779,549	WALKER et al.			

va-85603

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	30.	8/18/1998	5,796,952	DAVIS et al.			
	31.	9/22/1998	5,813,006	POLNEROW et al.			
	32.	10/20/1998	5,823,879	GOLDBERG et al.			
	33.	12/8/1998	5,846,132	JUNKIN			
	34.	12/8/1998	5,848,373	DELORME et al.			
	35.	1/5/1999	5,855,516	EIBA			
	36.	2/2/1999	5,867,208	MCLAREN			
	37.	3/2/1999	5,878,222	HARRISON			
	38.	3/9/1999	5,880,720	IWAFUNE et al.			
	39.	3/30/1999	5,889,950	KUZMA			
	40.	3/30/1999	5,889,951	LOMBARDI			
	41.	4/6/1999	5,890,906	MACRI et al.			
	42.	4/6/1999	5,890,963	YEN			
	43.	4/13/1999	5,894,556	GRIMM et al.			
	44.	8/17/1999	5,940,595	REBER et al.			
	45.	5/25/1999	5,907,680	NIELSEN			
	46.	6/29/1999	5,917,725	THACHER et al.			
	47.	6/29/1999	5,918,014	ROBINSON			
	48.	7/20/1999	5,926,179	MATSUDA et al.			
	49.	7/27/1999	5,929,849	KIKINIS			
	50.	7/27/1999	5,929,850	BROADWIN et al.			
	51.	8/24/1999	5,941,774	TAKEMOTO et al.			
	52.	9/7/1999	5,947,747	WALKER et al.			
	53.	9/7/1999	5,948,040	DELORME et al.			
	54.	9/14/1999	5,951,636	ZERBER			
	55.	9/21/1999	5,954,798	SHELTON et al.			
	56.	9/21/1999	5,956,038	REKIMOTO			
	57.	10/5/1999	5,961,603	KUNKEL et al.			
	58.	10/26/1999	5,973,685	SCHAFFA et al.			
	59.	11/2/1999	5,978,833	PASHLEY et al.			
	60.	11/16/1999	5,987,454	HOBBS			
	61.	11/16/1999	5,987,523	HIND et al.			

va-85603

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	62.	12/21/1999	6,005,561	HAWKINS et al.			
	63.	12/28/1999	6,009,458	HAWKINS et al.			
	64.	2/8/2000	6,023,729	SAMUEL et al.			
	65.	2/15/2000	6,026,375	HALL et al.			
	66.	2/22/2000	6,029,045	PICCO et al.			
	67.	2/22/2000	6,029,195	HERZ			
	68.	3/28/2000	6,044,403	GERSZBERG et al.			
	69.	4/4/2000	6,047,235	HIYOKAWA et al.			
	70.	4/25/2000	6,055,569	O'BRIEN et al.			
	71.	5/2/2000	6,057,856	MIYASHITA et al.			
	72.	5/9/2000	6,061,738	OSAKU et al.			
	73.	6/13/2000	6,075,527	ICHIHASHI et al.			
	74.	6/27/2000	6,080,063	KHOSLA			
	75.	6/27/2000	6,081,830	SCHINDLER			
	76.	7/4/2000	6,082,887	FEUER et al.			
	77.	7/25/2000	6,094,677	CAPEK et al.			
	78.	8/1/2000	6,098,085	BLONDER et al.			
	79.	8/8/2000	6,101,180	DONAHUE et al.			
	80.	8/15/2000	6,102,797	KAIL			
	81.	8/22/2000	6,108,703	LEIGHTON et al.			
	82.	10/3/2000	6,126,547	ISHIMOTO et al.			
	83.	10/3/2000	6,128,482	NIXON et al.			
	84.	10/10/2000	6,131,120	REID			
	85.	10/24/2000	6,138,144	DESIMONE et al.			
	86.	11/7/2000	6,144,848	WALSH et al.			
	87.	11/7/2000	6,144,991	ENGLAND			
	88.	11/21/2000	6,151,626	TIMS et al.			
	89.	12/19/2000	6,163,803	WATANABE			
	90.	1/30/2001	6,182,072	LEAK et al.			
	91.	1/30/2001	6,182,116	NAMMA et al.			
	92.	2/20/2001	6,192,340	ABECASSIS			
	93.	2/27/2001	6,193,610	JUNKIN			

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	94.	3/6/2001	6,199,014	WALKER et al.			
	95.	3/6/2001	6,199,045	GINIGER et al.			
	96.	3/20/2001	6,204,842	FUJII			
	97.	3/20/2001	6,205,582	HOARTY			
	98.	6/26/2001	6,253,228	FERRIS et al.			
	99.	8/14/2001	6,275,705	DRANE et al.			
	100.	8/21/2001	6,278,942	MCDONOUGH			
	101.	9/11/2001	6,288,753	DeNICOLA et al.			
	102.	9/18/2001	6,292,780	DOEDERLEIN et al.			
	103.	10/2/2001	6,297,748	LAPPENBUSCH et al.			
	104.	11/13/2001	6,317,791	COHN et al.			
	105.	11/13/2001	6,317,780	COHN et al.			
	106.	12/4/2001	6,326,982	WU et al.			
	107.	3/12/2002	6,353,933	LOVE			
	108.	4/2/2002	6,366,914	STERN			
	109.	5/28/2002	6,397,220	DEISINGER et al.			
	110.	6/25/2002	6,412,011	AGRAHARAM et al.			
	111.	8/27/2002	6,442,598	WRIGHT et al.			
	112.	8/27/2002	6,442,687	SAVAGE			
	113.	10/1/2002	6,460,180	PARK et al.			
	114.	10/8/2002	6,463,585	HENDRICKS et al.			
	115.	11/12/2002	6,480,885	OLIVIER			
	116.	11/26/2002	6,486,892	STERN			
	117.	1/28/2003	6,513,069	ABATO et al.			
	118.	2/25/2003	6,526,041	SHAFFER et al.			
	119.	6/10/2003	6,577,716	MINTER et al.			
	120.	8/26/2003	6,611,872	McCANNE			
	121.	9/23/2003	6,625,624	CHEN et al.			
	122.	11/4/2003	6,643,691	AUSTIN			
	123.	12/9/2003	6,661,372	GIRERD et al.			
	124.	4/20/2004	6,725,159	KRASNER			
	125.	5/9/2002	2002/0056129	BLACKKETTER et al.			

va-85603

Form PTO-1449

INFORMATION DISCLOSURE CITATION IN AN APPLICATION

(Use several sheets if necessary)

Docket Number: 559442600201	Application Number: 10/299,335
Applicant: Craig ULLMAN et al.	
Filing Date: November 18, 2002	Group Art Unit: 2611
Mailing Date: November 24, 2004	

	126.	8/15/2002	2002/0112002	ABATO			
	127.	10/24/2002	2002/0156909	HARRINGTON			
	128.	12/12/2002	2002/0188943	FREEMAN et al.			
	129.	4/29/1997	RE 35,498	BARNARD			
	130.	1/7/2003	RE 37,957	GARFIELD			

FOREIGN PATENT DOCUMENTS

Examiner Initials	Ref. No.	Date	Document No.	Country	Class	Subclass	Translation YES	Translation NO
	131.	7/6/2000	AU 717399	Australia			X	
	132.	11/5/1997	EP 0 805 598	Europe			X	
	133.	4/22/1998	EP 0 837 609	Europe			X	
	134.	11/25/1998	GB 2 325 537	United Kingdom			X	
	135.	2/3/1999	GB 2 327 837	United Kingdom			X	
	136.	11/22/2000	GB 2 350 213	United Kingdom			X	
	137.	6/22/2000	WO 00/36836	PCT			X	
	138.	7/27/2000	WO 00/43892	PCT			X	
	139.	7/27/2000	WO 00/43899	PCT			X	
	140.	12/21/00	WO 00/77664	PCT			X	
	141.	8/22/2002	WO 02/065252	PCT			X	
	142.	8/22/2002	WO 02/065318	PCT			X	
	143.	3/21/1996	WO 96/08923	PCT			X	
	144.	8/14/1997	WO 97/29591	PCT			X	
	145.	9/12/1997	WO 97/33434	PCT			X	
	146.	10/7/1999	WO 99/50778	PCT			X	

OTHER DOCUMENTS *(including author, title, Date, Pertinent Pages, Etc.)*

Examiner Initials	Ref No.	Title
	147.	Eitz, "Combiners for Videotext Signals" Broadcast Technology Reports, translation of vol. 28, no. 6, November 1984, pages 273-289, XP002182048, Norderstedt, Germany
	148.	"Advanced Television Enhancement Forum Specification (ATVEF)", Comment Draft Version 1.0rl, 2/25/99, XP002142688
	149.	Cline et al., "DirectShow RTP Support for Adaptivity in Networked Multimedia Applications", Multimedia Computing and Systems, 1998, Proceedings, IEEE International Conference June 28-

va-85603

Form PTO-1449 INFORMATION DISCLOSURE CITATION IN AN APPLICATION *(Use several sheets if necessary)*	Docket Number: 559442600201	Application Number: 10/299,335
	Applicant: Craig ULLMAN et al.	
	Filing Date: November 18, 2002	Group Art Unit: 2611
	Mailing Date: November 24, 2004	

		July 1, 1998, pages 13-22
	150.	Mannos, T.J., "Re: Web page prefetching?" located at <URL:http://dejanews.com> retrieved on October 4, 2002, DEJA News (Online), December 1, 1997
	151.	Philippe Le Hegaret, "Document Object Module (DOM)", Architecture Domain, located at www.w3.org/DOM/ retrieved on June 22, 2001, 2 pages
	152.	S. Gillich et al., "ATVEF Integration with DVB Using IP/MPE," December 20, 1999, retrieved from www.atvef.com/library/atvef-dub-bindingR8.html on June 8, 2001, 5 pages
	153.	J. Steinhorn et al., "Embedded Systems Programming-Enhancing TV with ATVEF," retrieved from www.embedded.com/1999/9910/9910ial.htm on March 28, 2000, 10 pages
	154.	"Enhanced Content Specification," ATVEF, 1998, retrieved from www.atvef.com/library/spec1-1a.html. on March 28, 2000, 38 pages

EXAMINER:	DATE CONSIDERED:

EXAMINER: Initial if citation considered, whether or not the citation conforms with MPEP 609. Draw a line through the citation if not in conformance and not considered. Include a copy of this form with next communication to applicant.

ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C ...). The first artifact folder for an artifact type receives the letter A, the second B, etc..
Examples: 59123456PA, 59123456PB, 59123456ZA, 59123456ZB

10299335 4A

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Doc Code: Artifact Artifact Type Code X

☐ Other, description: _____
Doc Code: Artifact Artifact Type Code: Z

March 8, 2004

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. 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 displays a valid OMB control number

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

		Application Number	10/299,335
		Filing Date	November 18, 2002
		First Named Inventor	Craig ULLMAN
		Art Unit	2611
		Examiner Name	C. C. Grant
Total Number of Pages in This Submission	27	Attorney Docket Number	559442600201

ENCLOSURES (*Check all that apply*)

☐ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance Communication to TC
☐ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☐ Amendment/Reply	☐ Petition	☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☐ Affidavits/declaration(s)	☐ Power of Attorney, Revocation Change of Correspondence Address	☐ Status Letter
☐ Extension of Time Request	☐ Terminal Disclaimer	☒ Other Enclosure(s) (please identify below):
☐ Express Abandonment Request	☐ Request for Refund	Return Receipt Postcard Form PTO SB/08/a/b listing: * (62) US Patent Documents (not enclosed) * (14) Foreign Patent Documents * (2) Non Patent Literature Documents
☒ Information Disclosure Statement	☐ CD, Number of CD(s) _____	
☐ Certified Copy of Priority Document(s)	☐ Landscape Table on CD	
☐ Reply to Missing Parts/ Incomplete Application	Remarks	
☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	MORRISON & FOERSTER LLP		
Signature			
Printed name	Jonathan Bockman		
Date	March 4, 2005	Reg. No.	45,640

va-95579 v1

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand delivered to: Commissioner for Patents, Alexandria, Virginia, 22313, on the date shown below.

Dated: 3/4/05 Signature: Cherrise Texidor
(Cherrise Texidor)

PATENT
Docket No. 559442600201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Craig ULLMAN et al.

Serial No.: 10/299,335

Filing Date: November 18, 2002

For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS

Examiner: Christopher C. Grant

Confirmation No.: 6304

Group Art Unit: 2611

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Dear Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO/SB/08a/b. Copies of the foreign documents and non-patent literature are also submitted herewith. The Examiner is requested to make these documents of record.

This Supplemental Information Disclosure Statement is submitted before mailing of a first Office Action on the merits; accordingly, no fee is required.

Applicants would appreciate the Examiner initialing and returning the Form PTO/SB/08a/b, indicating that the information has been considered and made of record herein.

va-95256

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 and § 1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

In the event that the transmittal form is separated from this document and the Patent Office determines that an extension and/or other relief (such as payment of a fee under 37 C.F.R. § 1.17 (p)) is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing 559442600201.

Dated: March 4, 2005

Respectfully submitted,

By: _____

Jonathan Bockman
Registration No. 45,640
Morrison & Foerster LLP
1650 Tysons Boulevard
Suite 300
McLean, Virginia 22102
Telephone: (703) 760-7769
Facsimile: (703) 760-7777

va-95256

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig ULLMAN
Art Unit	2611
Examiner Name	Christopher Grant
Attorney Docket Number	559442600201

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
	1.	4,931,865	6/5/1990	SCARAMPI	
	2.	5,603,078	2/11/1997	HENDERSON et al.	
	3.	5,724,521	3/3/1998	DEDRICK	
	4.	5,724,567	3/3/1998	ROSE et al.	
	5.	5,748,186	5/5/1998	RAMAN	
	6.	5,771,307	6/23/1998	LU et al.	
	7.	5,771,381	6/23/1998	JONES et al.	
	8.	5,796,393	8/18/1998	MacNAUGHTON et al.	
	9.	5,819,261	10/6/1998	TAKAHASHI et al.	
	10.	5,832,496	11/3/1998	ANAND et al.	
	11.	5,848,396	12/8/1998	GERACE	
	12.	5,848,397	12/8/1998	MARSH et al.	
	13.	5,861,881	1/19/1999	FREEMAN et al.	
	14.	5,870,558	2/9/1999	BRANTON, JR. et al.	
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	16.	5,913,040	6/15/1999	RAKAVY et al.	
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Examiner Signature		Date Considered	

va- 95255

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig ULLMAN
Art Unit	2611
Examiner Name	Christopher Grant
Attorney Docket Number	559442600201

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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]
	63.	GB-2356319-A	5/16/2001		abstract	
	64.	EP-0901284-A	3/10/1999		abstract	
	65.	EP-1111914-A	6/27/2001		abstract	
	66.	WO-00-045599-A	8/3/2000		abstract	
	67.	WO-01-015357-A	3/1/2001		abstract	
	68.	EP-0852443-A	7/8/1998		abstract	
	69.	EP-0424648-A2	5/2/1991		abstract	
	70.	WO-98-23080-A2	5/28/1998		abstract	
	71.	WO-98-29956-A2	7/9/1998		abstract	
	72.	JP-10-222541	8/21/1998		abstract	
	73.	WO-99-44159-A1	9/2/1999		abstract	
	74.	EP-0952539-A2	10/27/1999		abstract	
	75.	WO-99-55066-A1	10/28/1999		abstract	
	76.	EP-1089201-A1	4/4/2001		abstract	

*EXAMINER: Initial if information considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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]
	77.	"RealSystem G2 Production Guide," 1998-2000, pp. 75-79	
	78.	"Overview," located at www.claria.com/companyinfo/ visited on March 1, 2005	

*EXAMINER: Initial if information considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Examiner Signature		Date Considered	

va- 95255

Transmission of web address data in a radio frequency signal

Patent number:	GB2356319
Publication date:	2001-05-16
Inventor:	KAPLAN ROBERT (GB)
Applicant:	KAPLAN ROBERT (GB)
Classification:	
- international:	H04N7/088
- european:	H04H1/00A; H04N7/08; H04N7/24T4
Application number:	GB19990026294 19991105
Priority number(s):	GB19990026294 19991105

Abstract of **GB2356319**

A predetermined web site address is embedded in a transmitted radio frequency signal which is subsequently received, decoded and forwarded to a computer to provide access to the site via the internet. The radio frequency signal may be a broadcast television or radio programme received from a satellite, the internet or cable. The arrangement allows easier access to a web site referred to in a programme. A smart card may be provided to access the site address data.

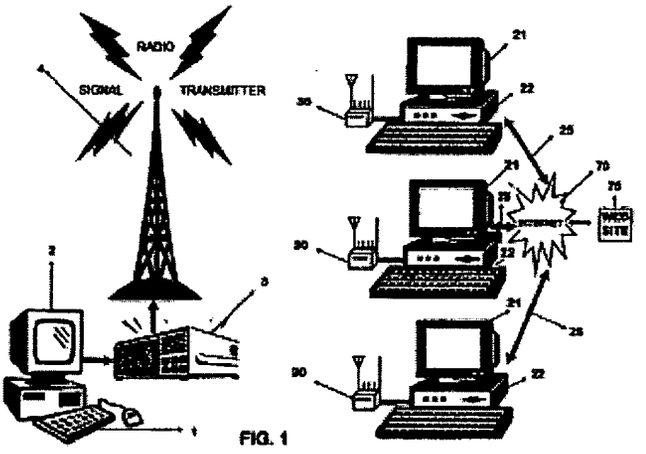


FIG. 1

Internet linkage with broadcast TV

Patent number: EP0901284
Publication date: 1999-03-10
Inventor: HICKS JOHN ALSON III (US)
Applicant: AT & T CORP (US)
Classification:
- international: H04N7/08
- european: H04N7/088
Application number: EP19980116100 19980826
Priority number(s): US19970924236 19970905

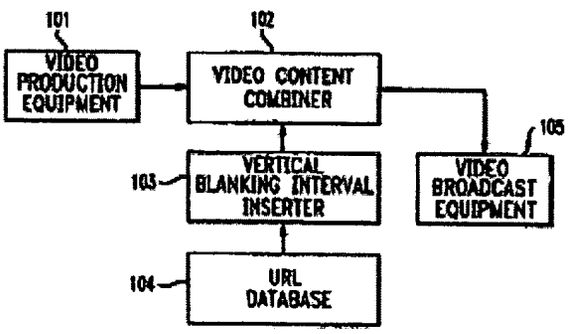
Also published as:
EP0901284 (A3)

Cited documents:
WO9727546
WO9733434
WO9613124
EP0757485

Abstract of **EP0901284**

Signals corresponding to Uniform Resource Locators (URL's) are inserted directly into a broadcast television signal, advantageously in portion of the vertical blanking interval available for closed captioning information. When a television signal with the embedded URL is received in an Internet capable television, the presence of the URL is indicated to the viewer, such as by causing a small, transparent, overlay icon to be displayed on the TV screen. When a viewer thereafter actuates a special button on their wireless (infrared), or wired, remote control, the URL information contained in the television signal is extracted and sent to the portion of the television, or auxiliary device, used to establish an Internet connection. The viewer is then able to gain access to the Internet site having the address specified by the URL, which site will generally contain information associated with the television programming.

FIG. 1



TV receiving and internet browsing apparatus

Patent number: EP1111914
Publication date: 2001-06-27
Inventor: WALTON ANTHONY STEPHEN [GB]
Applicant: ACCESS DEVICES LTD [GB]
Classification:
- international: H04N5/445
- european: H04N5/445M
Application number: EP20000311314 20001218
Priority number(s): EP20000311314 20001218; EP19990310559 19991223

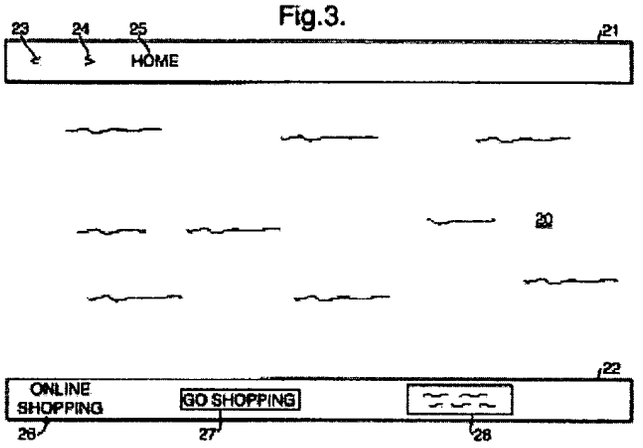
Cited documents:

WO9957707
WO9856188
WO9826584
FR2760165

Abstract of **EP1111914**

TV receiving apparatus comprises a receiver (7) for receiving broadcast TV signals, a TV display (5), and a control system (6) for controlling the display of received TV signals on the TV display 5. The control system (6) includes an Internet browser (11) connectable to an Internet server (1) to supply URLs, selected by a user, to the server, to receive corresponding web pages, and to adapt and display the received web pages in a first region (20) of the TV display. The control system (6) is also adapted to cause information different from the selected web page and received from the server (1) to be displayed in a second region (22) of the TV display independently of the web page(s) displayed in the first region (20).

Fig.3.



PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04N 7/24 — A2

(11) International Publication Number: WO 00/45599

(43) International Publication Date: 3 August 2000 (03.08.00)

(21) International Application Number: PCT/IB00/00135

(22) International Filing Date: 28 January 2000 (28.01.00)

(30) Priority Data:
9902235.2 1 February 1999 (01.02.99) GB

(71) Applicant *(for all designated States except US)*: EMUSE CORPORATION [IE/IE]; 80 Park Avenue, Sandymount, Dublin 4 (IE).

(72) Inventor; and

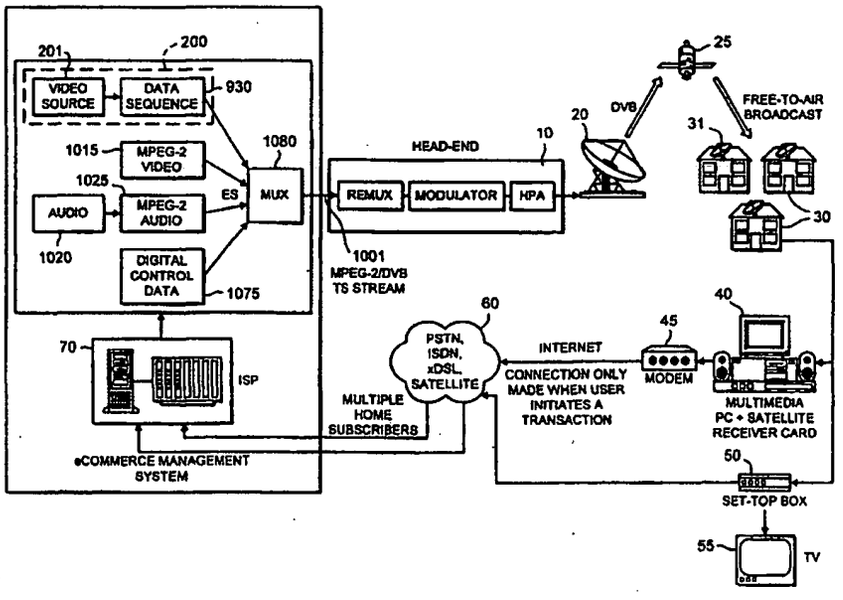
(75) Inventor/Applicant *(for US only)*: RAINSFORD, Patrick, J. [IE/IE]; 80 Park Avenue, Sandymount, Dublin 4 (IE).

(74) Agents: BAILLIE, IAIN, C. et al.; Langner Parry, 52–54 High Holborn, London WC1V 6RR (GB).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: INTERACTIVE SYSTEM



(57) Abstract

An interactive system provides a video programme signal and generates interactive content data to be associated with at least one object within a frame of the video programme. The interactive content data is embedded with the object and the object is tracked through a sequence of frames and the interactive content data is embedded into each one of the frames. The programme frames with the embedded data are multiplexed with video and audio signals and may be broadcast. A receiver identifies an object of interest and the embedded data associated with the object is retrieved. The embedded data may be used for e–commerce.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 March 2001 (01.03.2001)

PCT

(10) International Publication Number
WO 01/15357 A1

(51) International Patent Classification⁷: H04H 1/00, G06F 17/30, H04N 7/08, 5/60

(21) International Application Number: PCT/US00/22037

(22) International Filing Date: 11 August 2000 (11.08.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/382,376 24 August 1999 (24.08.1999) US

(71) Applicant: DIGITALCONVERGENCE.:COM INC. [US/US]; Suite 600, 9101 North Central Expressway, Dallas, TX 75231 (US).

(72) Inventors: PHILYAW, Jeffry, Jovan; 5968 West Northwest Highway, No. 1813, Dallas, TX 75225 (US). MATHEWS, David, Kent; 3438 Livingston Lane, Carrollton, TX 75007 (US).

(74) Agents: HOWISON, Gregory, M. et al.; Howison, Chauza, Handley & Arnott, L.L.P., P.O. Box 741715, Dallas, TX 75374-1715 (US).

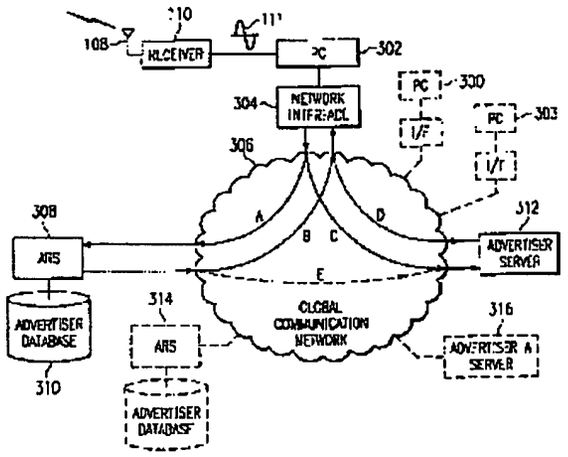
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR CONTROLLING A PC THROUGH AN AUDIO VISUAL BROADCAST, TO STORE INFORMATION IN THE PC FOR SUBSEQUENT ACCESS TO THE INTERNET



(57) Abstract: A method for allowing a consumer to access an advertiser's location over a global communication network. A normal broadcast program is broadcast to a class of consumers having a unique signal embedded therein, which unique signal embedded therein is associated with a particular advertiser and a predetermined location on the network. Additionally, the unique signal has encoded therein a unique code that correlates with the location of this predetermined located on the network. When the unique signal is received at a consumer's location, the unique signal is decoded to extract therefrom the unique code. In response to this decoding, routing information to the predetermined location on the network from a consumer's computer on the network at the consumer's location is determined. This determined routing information is then archived in the consumer's computer.

WO 01/15357 A1

An apparatus for producing interactive television programs

Patent number: EP0852443
Publication date: 1998-07-08
Inventor: THRIFT PHILLIP R (US)
Applicant: TEXAS INSTRUMENTS INC (US)
Classification:
- International: H04N7/173; G06F17/30
- european: H04N5/00M8; H04N7/16E2
Application number: EP19980300019 19980105
Priority number(s): US19970034683P 19970103

Also published as:
JP10271484 (A)
EP0852443 (A3)

Cited documents:
US5585858
XP000631189
XP000641071
XP000581417
XP002090497

Abstract of **EP0852443**

A Java television receiver (10) includes a Java television platform (12) that has a bidirectional Internet connection (14) capable of sending Internet data to the Java television platform (12) and transmitting data from the Java television platform (12) to an Internet provider. Additionally, a memory (13) is included to store a deck of showlet cards (15a) downloaded from the Internet. A tuner/decoder (24) connected to the Java television platform (12) is provided which can receive, tune and decode television signals. An audio/video overlay (32) connected to the Java television platform is provided to combine a showlet card (15b) from the Java television platform (12) and television signals from the tuner/decoder (24). The display of showlet cards (15b) and television signals is coordinated by a synchronization unit (30). Finally, a video output (36) and an audio output (38) sends the combined Internet data and television signals to a television (40).

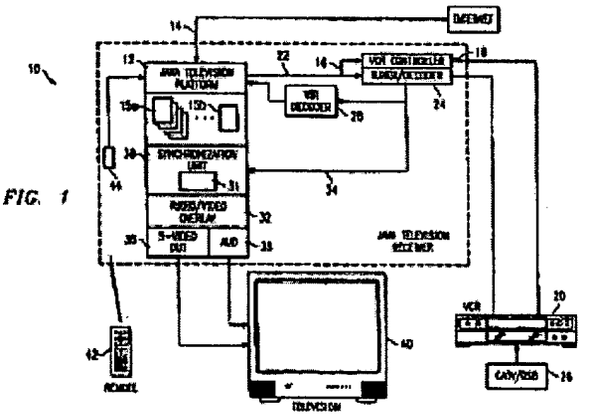


FIG. 1

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 424 648 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90117047.2**

(51) Int. Cl.5: **H04N 7/16**

(22) Date of filing: **05.09.90**

(30) Priority: **23.10.89 US 425117**

(43) Date of publication of application:
02.05.91 Bulletin 91/18

(84) Designated Contracting States:
BE CH DE DK FR GB LI NL SE

(71) Applicant: **GENERAL INSTRUMENT CORPORATION**
767 Fifth Avenue
New York New York 10153(US)

(72) Inventor: **Wachob, David E.**
8379 Glen Road
Elkins Park, Pennsylvania 19117(US)

(74) Representative: **Hoeger, Stellrecht & Partner**
Uhlandstrasse 14 c
W-7000 Stuttgart 1(DE)

(54) Method and apparatus for providing demographically targeted television commercials.

(57) Different commercial messages are broadcast to different demographically targeted audiences in a cable television system or the like. A first television channel contains television programs and periodic commercial messages. A second television channel contains alternate commercial messages. Demographic characteristics of a viewer are identified, and commercial messages are selectively provided from the first or second channel, depending upon the viewer's demographic characteristics. Demographic data can be input by a viewer via a remote control, downloaded to a subscriber's converter from a remote headend, or programmed into the converter at installation. Prioritization of the demographic characteristics of a plurality of television viewers watching a program together enables commercials to be targeted to the viewer having highest priority. Statistical data can be maintained concerning the number and identity of subscribers viewing specific commercials.

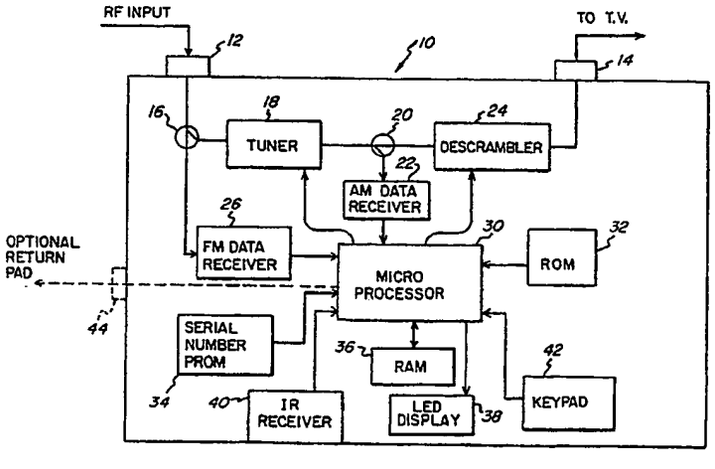


FIG. 1

EP 0 424 648 A2

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : **H04M 11/06**

A2

(11) International Publication Number: **WO 98/23080**

(43) International Publication Date: 28 May 1998 (28.05.98)

(21) International Application Number: PCT/US97/21174

(22) International Filing Date: 14 November 1997 (14.11.97)

(30) Priority Data:

08/751,203	18 November 1996 (18.11.96)	US
08/751,668	18 November 1996 (18.11.96)	US
08/752,271	18 November 1996 (18.11.96)	US
08/758,734	18 November 1996 (18.11.96)	US
08/751,209	18 November 1996 (18.11.96)	US
08/751,661	18 November 1996 (18.11.96)	US
08/752,236	18 November 1996 (18.11.96)	US
08/752,487	18 November 1996 (18.11.96)	US
08/752,269	18 November 1996 (18.11.96)	US
08/751,923	18 November 1996 (18.11.96)	US
08/751,658	18 November 1996 (18.11.96)	US
08/752,552	18 November 1996 (18.11.96)	US
08/751,933	18 November 1996 (18.11.96)	US
08/751,663	18 November 1996 (18.11.96)	US
08/746,899	18 November 1996 (18.11.96)	US
08/751,915	18 November 1996 (18.11.96)	US
08/752,400	18 November 1996 (18.11.96)	US
08/751,922	18 November 1996 (18.11.96)	US
08/751,961	18 November 1996 (18.11.96)	US

(71) Applicant *(for all designated States except US)*: MCI COMMUNICATIONS CORPORATION [US/US]; 1133 19th Street, N.W., Washington, DC 20036 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: ELLIOTT, Isaac, K. [US/US]; 3855 Orchard Drive, Colorado Springs, CO 80920 (US). STEELE, Rick, D. [US/US]; 6314 Dessbury Drive, Colorado Springs, CO 80918 (US). GALVIN, Thomas, J. [US/US]; 1085 Milstead Drive, Hiawatha, IA 52233 (US). LAFRENIERE, Lawrence, L. [US/US]; 3220 Brunswick Drive, Colorado Springs, CO 80920 (US). KRISHNASWAMY, Sridhar [IN/US]; 7312 Beckett Drive, N.E., Cedar Rapids, IA 52402 (US). FORGY, Glen, A. [US/US]; 19 Montrose Avenue, Iowa City, IA 52245 (US). REYNOLDS, Tim, E. [US/US]; 3123 Juniper Drive, Iowa City, IA 52245 (US). SOLBRIG, Erin, M. [US/US]; 3405 Guadalajara Road, S.W., Cedar Rapids, IA 52404 (US). CERF, Vinton [US/US]; 3614 Camelot Drive, Annadale, VA 22003 (US). GROSS, Phil [US/US]; 20331 Cockerill Road, Purceville, VA 22132 (US). DUGAN, Andrew, J. [US/US]; 2025 Tabor Court, Colorado Springs, CO 80919 (US). SIMS, William, A. [US/US]; 4930 Townsend Drive, Colorado Springs, CO 80922 (US). HOLMES, Allen [US/US]; 5375 Chambrey Court, Colorado Springs, CO 80919 (US). SMITH, Robert, S., II [US/US]; 5045 Dorset Lane, Suwanee, GA 30174 (US). KELLY, Patrick, J., III [US/US]; 2710 Briarhurst Drive, Houston, TX 77057 (US). GOTTLIEB, Louis, G. [US/US]; 6639 Foxdale Circle, Colorado Springs, CO 80919 (US). COLLIER, Matthew, T. [US/US]; 12983 Thistlethorn Drive, Herndon, VA 20171 (US). WILLE, Andrew, N. [US/US]; 3380 Oriole Court, N.E., Cedar Rapids, IA 52401 (US). RINDE, Joseph [US/US]; 7706 Fontaine Street, Potomac, MD 20854 (US). LITZENBERGER, Paul, D. [US/US]; 420 West Oak Street, Wylie, TX 75098 (US). TURNER, Don, A. [US/US]; 4204 Magnolia Drive, McKinney, TX 75070 (US). WALTERS, John, J. [US/US]; 2601 Lexington, McKinney, TX 75070 (US). EASTEP, Guido, M. [US/US]; 3005 Saint Germain Drive, McKinney, TX 75070 (US). MARSHALL, David, D. [US/US]; 1008 Serenade Lane, Richardson, TX 75081 (US). PRICE, Ricky, A. [US/US]; 2991 Hillingdon Drive, Richardson, TX 75082 (US). SALEH, Bilal, A. [SY/US]; 1205 E. Camp McDonald Road, Prospect Heights, IL 60070 (US).

(74) Agents: WARREN, Sanford, E., Jr.; Warren & Perez, Suite 710, 8411 Preston Road, Dallas, TX 75225 (US) et al.

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

Without international search report and to be republished upon receipt of that report.

(54) Title: A COMMUNICATION SYSTEM ARCHITECTURE

(57) Abstract

Telephone calls, data and other multimedia information is routed through a hybrid network which includes transfer of information across the internet. A media order entry captures complete user profile information for a user. This profile information is utilized by the system throughout the media experience for routing, billing, monitoring, reporting and other media control functions. Users can manage more aspects of a network than previously possible, and control network activities from a central site.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04B	A2	(11) International Publication Number: **WO 98/29956**
		(43) International Publication Date: 9 July 1998 (09.07.98)

(21) International Application Number: PCT/US97/23365

(22) International Filing Date: 17 December 1997 (17.12.97)

(30) Priority Data:
08/777,543 30 December 1996 (30.12.96) US

(71) Applicant: INTEL CORPORATION [US/US]; 2200 Mission College Boulevard, Santa Clara, CA 95052 (US).

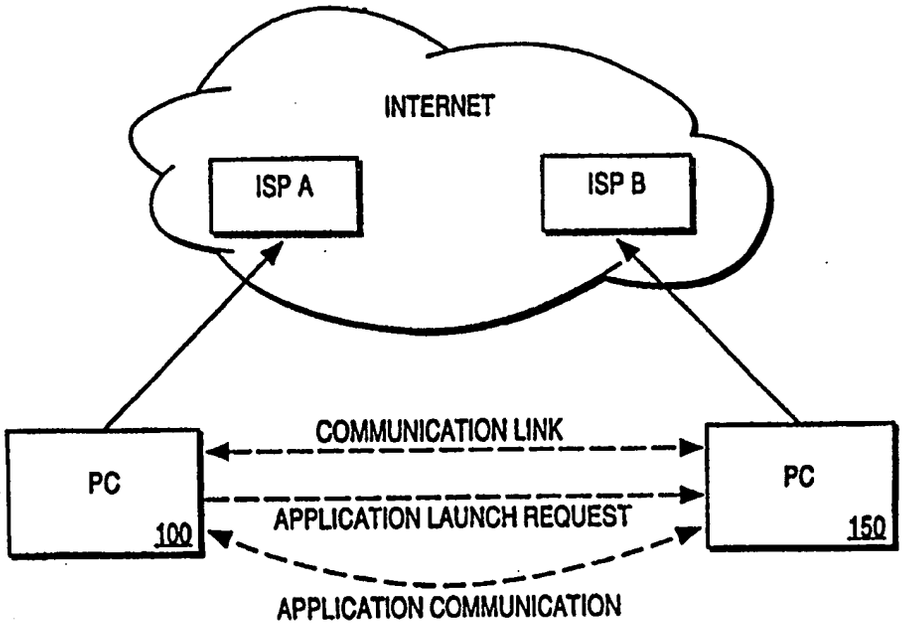
(72) Inventors: EDWARDS, James, W.; 634 N.E. 22nd Avenue, Portland, OR 97232 (US). KOGAN, Dan, D.; 4135 S.W. Crestwood Drive, Portland, OR 97225 (US). ANDERSEN, David, B.; 16540 S.W. Hillsboro Highway, Hillsboro, OR 97123 (US). BOSS, Dale; 14978 N.W. Applegate Lane, Portland, OR 97224 (US). CHOUINARD, David; 13032 S.W. Laurmont Drive, Tigard, OR 97223 (US). HAZZARD, Kevin; 6688 S.W. 158th Avenue, Beaverton, OR 97007 (US). RICHARDSON, John, W.; 2748 N.E. 19th Avenue, Portland, OR 97212 (US).

(74) Agents: TAYLOR, Edwin, H. et al.; Blakely, Sokoloff, Taylor & Zafman LLP, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025 (US).

(81) Designated States: AL, AM, AT, AT (Utility model), AU (Petty patent), AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: METHOD AND APPARATUS FOR SUPPORTING ON-DEMAND CONNECTIVITY FOR NETWORK APPLICATIONS



(57) Abstract

A method and apparatus for supporting on-demand connectivity for network applications is disclosed. Specifically, the present invention discloses a method and apparatus for remotely triggering a connection from a first device to a network. Additionally, a method and apparatus for coordinating application connections is also disclosed. The method comprises the steps of establishing application connections on-demand and managing the application connections.

Patent Abstracts of Japan

PUBLICATION NUMBER : 10222541
PUBLICATION DATE : 21-08-98

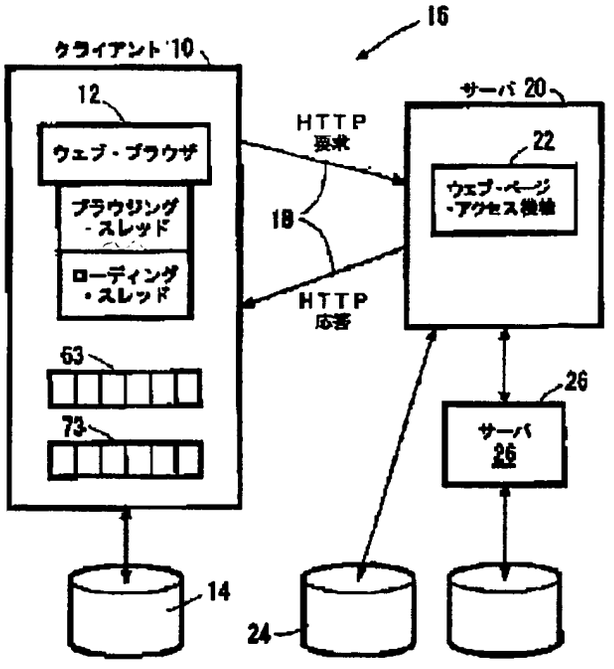
APPLICATION DATE : 13-01-98
APPLICATION NUMBER : 10004436

APPLICANT : INTERNATL BUSINESS MACH CORP <IBM>;

INVENTOR : WILLIAM FRANCIS PHILLIPS;

INT.CL. : G06F 17/30 G06F 13/00

TITLE : PRE-LOAD DEVICE FOR WEB PAGE CORRESPONDING TO LINK DESIGNATED IN HTML AND METHOD THEREFOR



ABSTRACT : PROBLEM TO BE SOLVED: To attain the high speed of access by a user by automatically pre- loading another html, and a related graphics file corresponding to a link marked as the object of the pre-load in a storage device.

SOLUTION: A client 10 is provided with a web browser program 12 and a storage device 14. The client 10 is connected through a communication line 18 with a WWW 16. A server 20 is provided with a web page access mechanism program 22 for performing access to the web page of a disk 24 instead of the client 10, or requesting a web page to a server 26 instead of the client 10. Then, an (html) is read, and the entry of a link marked as the object of primary load is identified. At that time, when another (html) and related graphics corresponding to this link are present in response to the identification of this link, the related graphics are automatically pre-loaded to the storage device of a client web browser.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06F 17/30 — A1

(11) International Publication Number: **WO 99/44159**

(43) International Publication Date: 2 September 1999 (02.09.99)

(21) International Application Number: PCT/US99/04166

(22) International Filing Date: 26 February 1999 (26.02.99)

(30) Priority Data:

60/076,179	27 February 1998 (27.02.98)	US
60/076,404	27 February 1998 (27.02.98)	US
Not furnished	26 February 1999 (26.02.99)	US

(81) Designated States: AU, CA, JP, KR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

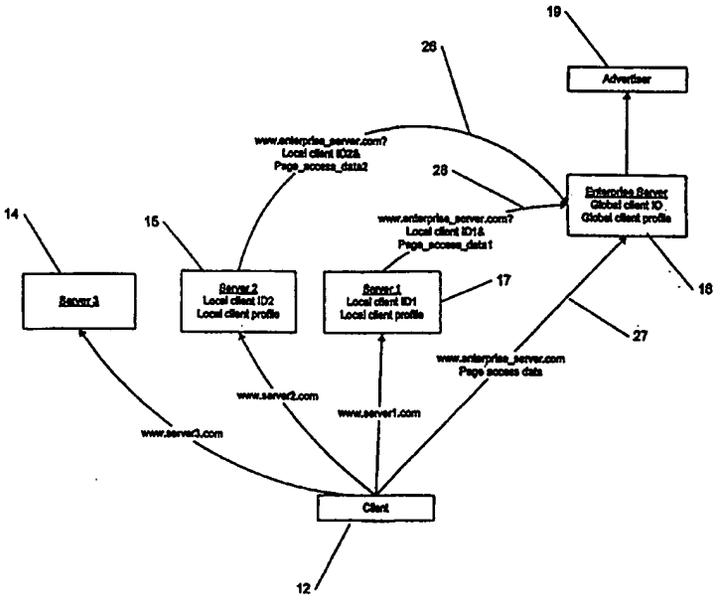
Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(71) Applicant: ENGAGE TECHNOLOGIES [US/US]; 100 Brickstone Square, Andover, MA 01810 (US).

(72) Inventor: JAYE, Daniel; 100 Brickstone Square, Andover, MA 01810 (US).

(74) Agents: KELLY, Edward, J. et al.; Foley, Hoag & Eliot, LLP, One Post Office Square, Boston, MA 02109 (US).

(54) Title: SYSTEM AND METHOD FOR BUILDING USER PROFILES



(57) Abstract

A computer apparatus and a method are described for establishing a global interest profile of a user. At least one local server and an enterprise server communicate with the user via a communication channel. The local server assigns a local ID to the user. The enterprise server assigns to the user a global ID and links the local ID and local user information with the global ID to form a global interest profile of the user. The identity of the users is not shared between servers, thereby maintaining the privacy of the user. Also described is a method for forming and updating user profiles that operates incrementally and in real time.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 952 539 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.10.1999 Bulletin 1999/43

(51) Int Cl.[6]: **G06F 17/60**

(21) Application number: **99302974.3**

(22) Date of filing: **16.04.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **20.04.1998 US 62727**

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(74) Representative: **Berkson, Michael David**
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Intellectual Property Law Group
London Road
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(54) System and method for retrieving customer information at a transaction center

(57) A method and system for gathering and storing customer profile data when the customer accesses a website location. Dynamic content messages from company marketing material are selected in accordance with the profile data and used to provide a customized webpage to the customer. In addition, a customer service representative can provide real-time updates to the customized webpage when the customer contacts a customer service representative to place a product or service order.

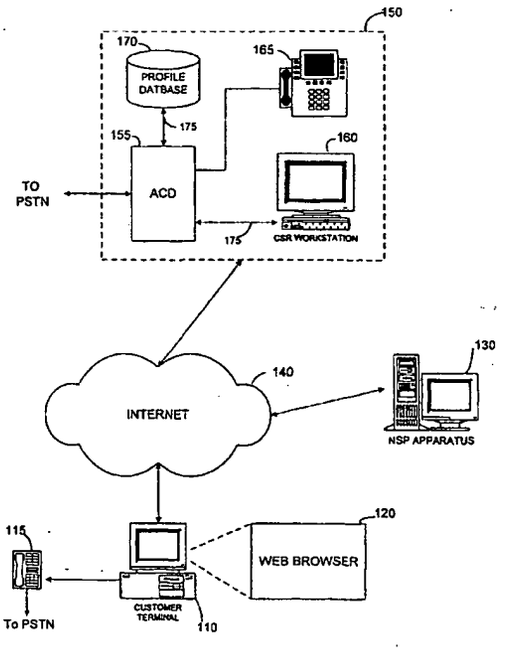

FIG. 1

EP 0 952 539 A2

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PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04M 3/00	A1	(11) International Publication Number: WO 99/55066
		(43) International Publication Date: 28 October 1999 (28.10.99)

(21) International Application Number: PCT/US99/08102

(22) International Filing Date: 14 April 1999 (14.04.99)

(30) Priority Data:
09/062,041 17 April 1998 (17.04.98) US

(71)(72) Applicant and Inventor: ZETMEIR, Karl, D. [US/US]; 11909 Blue Jacket, Overland Park, KS 66213 (US).

(74) Agent: LUEBBERING, Thomas, B.; Hovey, Williams, Timmons & Collins, Suite 400, 2405 Grand Boulevard, Kansas City, MO 64108 (US).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: TELEPHONE CALL MANAGEMENT SOFTWARE AND INTERNET MARKETING METHOD

(57) Abstract

A telephone call management computer program that provides both call management features and long distance savings for telephone consumers and marketing and advertising services for sponsor companies that wish to advertise to the consumer is disclosed. The call management program is initially stored on a host computer (12) and is then downloaded upon request to user computers (22) along with advertisement banners selected by the sponsor companies. When used, the program automatically front–loads a long distance carrier's PIC code in front of all long distance calls made from theuser computers to permit consumers to automatically make long distance phone calls at discounted rates without memorizing numerous PIC codes and without continually shopping for the best long distance rate. The program also provides many enhanced telephone calling options and displays the banners and other advertising directly on the user computers (22) while the consumers use the program.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 089 201 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.04.2001 Bulletin 2001/14

(21) Application number: **00308630.3**

(22) Date of filing: **29.09.2000**

(51) Int Cl.[7]: **G06F 17/30**, H04N 7/16, H04N 7/173, G06F 17/00, H04L 29/06, G06F 17/60

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **29.09.1999 US 409305**

(71) Applicant: **ACTV, INC.**
New York, NY 10020 (US)

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- **Harrington, Jeffrey M.**
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- **Ullman, Craig D.**
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(74) Representative: **Needle, Jacqueline**
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(54) Enhanced video programming system and method utilizing user profile information

(57) A file specifying a "donut" of dynamic, hierarchical, shared user-profile information is maintained. The donut contains a user-profile, or acts as a key to a data repository containing such a user-profile, and the donut specifies user-profile information such as user characteristics, viewing preferences, hobbies, and spending habits. The donut may be stored in a network server or in a user's machine which is connectible to the network. The donut is accessed by browser programs, associated web server programs, and other applications for use in routing content to the user associated with the donut. The donut implements a dynamic store of user profile-data which may be exchanged between the user and the server. This enables, for example, advertising to be tailored to the user based on the users responses to specific questions and/or on the user profile.

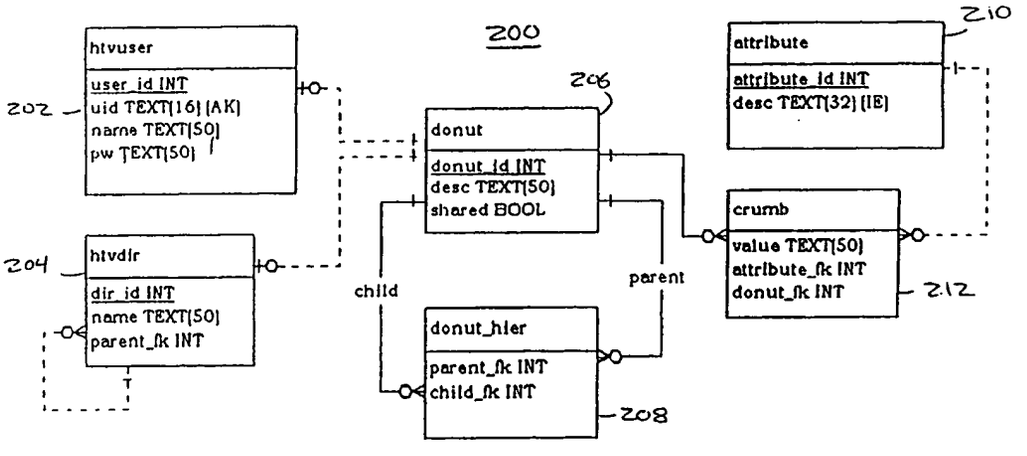

Figure 10

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EP 1 089 201 A1

1FW

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig ULLMAN
Art Unit	2611
Examiner Name	C. C. Grant
Attorney Docket Number	559442600201

Total Number of Pages in This Submission

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form
- [ ] Fee Attached
- [ ] Amendment/Reply
- [ ] After Final
- [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [X] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
- [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
- [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [X] Other Enclosure(s) (please Identify below):

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Form PTO SB/08/a/b listing:
* (18) US Patent Documents (not enclosed)
* (19) Foreign Patent Documents
* (11) Non Patent Literature Documents

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	MORRISON & FOERSTER LLP		
Signature			
Printed name	Jonathan Bockman		
Date	December 23, 2005	Reg. No.	45,640

va-146443 v1

PATENT
Docket No. 559442600201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:	
Craig ULLMAN et al.	Examiner: C. C. Grant
Serial No.: 10/299,335	Group Art Unit: 2611
Filing Date: November 18, 2002	Confirmation No.: 6304
For: ENHANCED VIDEO PROGRAMMING SYSTEM AND METHOD FOR INCORPORATING AND DISPLAYING RETRIEVED INTEGRATED INTERNET INFORMATION SEGMENTS	

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Pursuant to 37 C.F.R. § 1.97 and § 1.98, Applicants submit for consideration in the above-identified application the documents listed on the attached Form PTO/SB/08a/b. Copies of the foreign documents and non-patent literature are also submitted herewith. The Examiner is requested to make these documents of record.

This Supplemental Information Disclosure Statement is submitted before mailing of a first Office Action on the merits; accordingly, no fee is required.

Applicants would appreciate the Examiner initialing and returning the Form PTO/SB/08a/b, indicating that the information has been considered and made of record herein.

va-146073

The information contained in this Supplemental Information Disclosure Statement under 37 C.F.R. § 1.97 and § 1.98 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

In the event that the transmittal form is separated from this document and the Patent Office determines that an extension and/or other relief (such as payment of a fee under 37 C.F.R. § 1.17 (p)) is required, Applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing 559442600201.

Dated: December 23, 2005

Respectfully submitted,

By: _____

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Registration No. 45,640
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McLean, Virginia 22102
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Facsimile: (703) 760-7777

va-146073

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig D. ULLMAN
Art Unit	2611
Examiner Name	C. C. Grant
Attorney Docket Number	559442600201

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
	1.	5,568,390	10-22-1996	Hirota et al.	
	2.	5,600,364	2-4-1997	Hendricks et al.	
	3.	5,619,249	4-8-1997	Billock et al.	
	4.	5,798,785	8-25-1998	Hendricks et al.	
	5.	5,920,856	7-6-1999	Syeda-Mahmood	
	6.	5,946,664	8-31-1999	Ebisawa et al.	
	7.	6,006,265	12-21-1999	Rangan et al.	
	8.	6,173,317	1-9-2001	Chaddha et al.	
	9.	6,195,680	2-27-2001	Goldszmidt et al.	
	10.	6,239,797	5-29-2001	Hills et al.	
	11.	6,240,183	5-29-2001	Marchant	
	12.	2001/0003823	6-14-2001	Mighdoll et al.	
	13.	6,285,407	9-7-2001	Yasuki et al.	
	14.	6,389,458	5-14-2002	Shuster	
	15.	6,456,854	9-24-2002	Chern et al.	
	16.	6,526,335	2-25-2003	Treyz et al.	
	17.	6,625,647	9-23-2003	Barrick et al.	
	18.	6,760,749	7-6-2004	Dunlap et al.	

FOREIGN PATENT DOCUMENTS

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]
	19.	WO-96/04633	2/15/1996			
	20.	WO 96/08923	3/21/1996			
	21.	WO 97/29591	8/14/1997			
	22.	WO 97/33434	9/12/1997			
	23.	EP 0 805 598	11/5/1997			
	24.	EP 0 837 609	4/22/1998			
	25.	GB 2 325 537	11/25/1998			
	26.	WO-99/00163	1/7/1999			
	27.	GB 2 327 837	2/3/1999			
	28.	WO-99/14930	3/25/1999			
	29.	WO 99/50778	10/7/1999			
	30.	WO 00/36836	6/22/2000			
	31.	AU 717399	8/28/1997		corresponds to WO 97/29591	
	32.	WO 00/43892	7/27/2000			
	33.	WO 00/43899	7/27/2000			
	34.	GB 2 350 213	11/22/2000			
	35.	WO 00/77664	12/21/00			

Examiner Signature		Date Considered	

va-146072

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	10/299,335
Filing Date	November 18, 2002
First Named Inventor	Craig D. ULLMAN
Art Unit	2611
Examiner Name	C. C. Grant
Attorney Docket Number	559442600201

	36.	WO 02/065252	8/22/2002				
	37.	WO 02/065318	8/22/2002				

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va- 146072

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INTERNATIONAL APPLICATION PUBLISHE

(51) International Patent Classification 6 : G08G 1/0968, H04H 1/00 | A1

(11) International Publication Number: WO 96/04633

(43) International Publication Date: 15 February 1996 (15.02.96)

(21) International Application Number: PCT/EP95/03012

(22) International Filing Date: 28 July 1995 (28.07.95)

(30) Priority Data:
08/282,893 29 July 1994 (29.07.94) US

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(81) Designated States: AU, BR, CA, CH, CN, JP, KR, MX, RU, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published

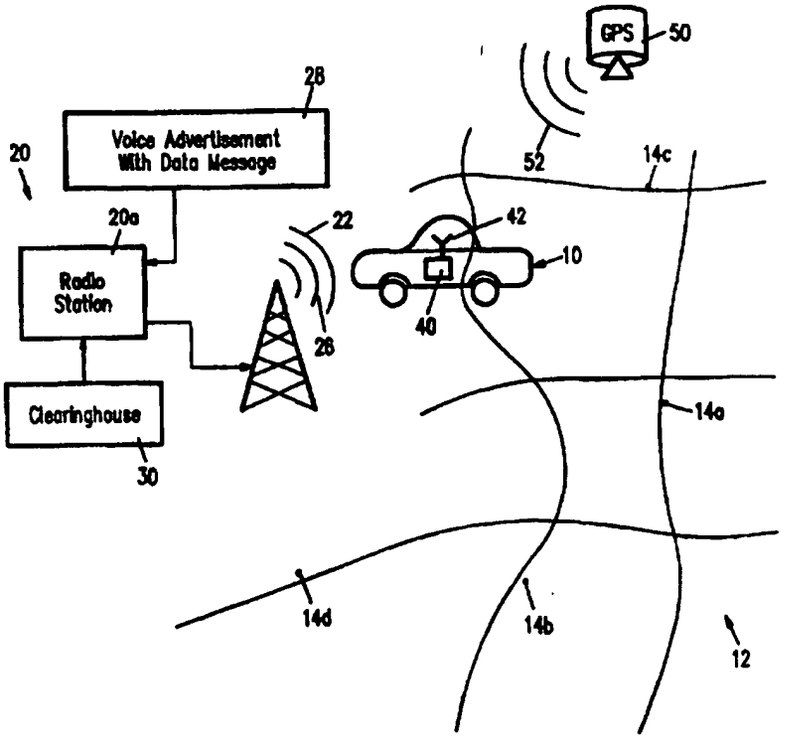
With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: DUAL CHANNEL ADVERTISING REFERENCING VEHICLE LOCATION

(57) Abstract

A vehicle information device collects information concerning specific geographic points of interest. The operator recalls for display such information, including a display showing direction and distance of travel to a designated geographic point of interest relative to a then-current vehicle location. Dual channel advertising is transmitted by voice broadcast and by data broadcast. Upon hearing in the voice broadcast an advertisement of interest, the operator captures the associated data broadcast including, among other detailed text message information, the location of the advertiser. Distance and relative direction of travel from the current vehicle location to the geographic point of interest is thereby presented. Multiple geographic points of interest are stored for selective review whereby the user constructs a database containing locations of particular interest to a particular person.



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DUAL CHANNEL ADVERTISING REFERENCING VEHICLE LOCATION

Background of the Invention

The present invention relates generally to vehicle information systems, and particularly to vehicle information systems providing information relevant to current vehicle location.

A variety of traffic related information is now available for use in aiding vehicle travel, especially in urban road networks. A travel information device likely to be soon more commonly incorporated into vehicles is a vehicle position detecting system, e.g., the well known global positioning system (GPS) providing satellite broadcast to determine location of a receiving GPS device. Vehicles with GPS capability, therefore, have the very useful feature of tracking current vehicle position.

Given access to current vehicle location, i.e., longitude and latitude values, a proposed information system provides vehicle position relative to a map representation of a given region, e.g., a map display of city streets with vehicle position indicated by street location rather than longitude and latitude position. Thus, a digital map database further supports vehicle

position display by reference to more meaningful information, i.e., by reference to a street map. To be of value, however, the digital map database must be current and comprehensive, i.e., have information relevant to wherever a vehicle may be used.

Massive digital map databases are, however, inherently expensive and difficult to include in mass produced products such as is desirable in a GPS-capable consumer product. Digital map databases require license fees, large amounts of memory, frequent and expensive revision, and generally cannot be comprehensive enough to allow use throughout the entire world. It is not economically feasible to provide in an inexpensive consumer product a digital map database covering the entire world, or at least a significant geographic region. If the device is prepared for use throughout the world, an incredibly massive digital map is required giving rise to significant cost and maintenance requirements. If only selected geographic regions are incorporated into the digital map, the device cannot be used outside such geographic regions without post-manufacture modification or manipulation of numerous storage devices, e.g., a library of CD-ROM discs.

It would be desirable, therefore, for a vehicle information device to be usable in any geographic area as manufactured yet still maintain an ability to indicate vehicle position information beyond merely longitude and latitude. In particular,

people need more meaningful information than merely longitude and latitude, yet a massive digital map is difficult to justify in the context of relatively inexpensive consumer products. The need for current vehicle position is most typically a need to know current vehicle position relative to a location of interest. Unfortunately, customizing massive digital databases to provide reference to individual vehicle operator locations of interest is impractical. It would be desirable to avoid a requirement of procuring and maintaining in the travel information device a massive digital database, yet maintain an ability to reference geographic locations. The subject matter of the present invention provides such a vehicle travel information device.

Summary of the Invention

In accordance with the present invention, a travel information device in a vehicle includes a vehicle position detecting device and collects vehicle position information while also collecting data relevant geographic points of interest to provide a display indicating position of a point of interest relative to a current vehicle location.

In the illustrated and preferred form of the present invention, collecting information relevant to geographic points of interest is by radio signal data broadcast in conjunction with radio signal voice broadcast, such as advertising, whereby a user

interrogates a device under the present invention to collect by data broadcast detailed information concerning an advertisement of interest provided by a companion voice broadcast. The data broadcast includes precise location information providing, in conjunction with current vehicle position, a basis for presenting a display graphically showing relative position between the geographic point of interest, such as the location of an advertiser, and the current vehicle location.

According to one aspect of the present invention, storage of information relative to geographic points of interest builds for the user a personal electronic reference for later selectively displaying such information, including ability to selectively display a representation of location relative to a then current vehicle position.

The subject matter of the present invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. However, both the organization and method of operation of the invention, together with further advantages and objects thereof, may be best understood by reference to the following description taken with the accompanying drawings wherein like reference characters refer to like elements.

Brief Description of the Drawings

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

FIG. 1 illustrates a vehicle information system, a given road network, and a vehicle travelling within the road network and carrying a travel information device according to a preferred form of the present invention.

FIG. 2 is a block diagram of the travel information device for the vehicle of FIG. 1.

FIG. 3 illustrates the front panel controls and display of the travel information device of FIG. 2 as viewed by the operator of the vehicle of FIG. 1.

FIG. 4 illustrates by flow chart a first method of collecting data for storage by the travel information device wherein the user hears by voice broadcast information of interest an selects corresponding data broadcast information for storage.

FIG. 5 illustrates by flow chart an alternative method for collecting information from the data broadcast whereby the operator designates collection criteria and the travel information device automatically collects qualifying data broadcast information.

FIG. 6 illustrates by flow chart programming for a radio broadcast system coordinating or associating voice radio broadcast with data radio broadcast.

FIG. 7 illustrates by flow chart programming of the travel information device of FIG. 1 for scanning or reviewing of information stored therein.

Detailed Description of a Preferred Embodiment

In FIG. 1, a vehicle 10 travels within a road network 12. Network 12 includes main arterial roadways as illustrated, but as may be appreciated would be significantly more complex. For the present illustration, it will be understood that vehicle 10 travels throughout road network 12 along any selected travel route. Furthermore, the operator of vehicle 10 travels within road network 12 to and from geographic points of interest 14, individually designated 14a-14d. While only several such geographic points of interest 14 are indicated in FIG. 1, it will be understood that any number of such geographic points of interest 14 may exist within road network 12. Furthermore, geographic points of interest 14 for one individual vary relative to that of another individual. Accordingly, reference herein to geographic points of interest 14 shall be taken to be locations of interest to a particular person.

Also illustrated in FIG. 1, radio broadcast system 20 provides a combined radio signal voice broadcast 22 and radio signal data broadcast 26. While illustrated as a single radio broadcast system 20, it will be understood that voice broadcast 22 and data broadcast 26 could originate from separate radio signal broadcast facilities. Under the preferred form of the present invention, however, voice broadcast 22 and data broadcast 26 originate from a common FM radio source as provided under the "Gaskill" paging system. The present invention may be implemented according to many paging system protocols, but as illustrated herein operates under the time-division multiplexed protocol of the Gaskill paging system, as illustrated in U.S. Patent Nos. 4,713,808 and 4,897,835. The disclosure of U.S. Patent Nos. 4,713,808 and 4, 897,835 are incorporated herein fully by reference thereto.

The Gaskill paging system and associated receiving devices provide an inexpensive, highly battery-efficient and highly miniaturized paging device which, under the illustrated embodiment of the present invention, constitutes a data radio signal receiver 62 (FIG. 2) as a conduit for data broadcast 26 delivery to device 40.

Generally the Gaskill paging system uses FM radio signal transmission facilities to broadcast within a side-band frequency paging signal data packets according to a time-division

multiplexed protocol. Thus, voice broadcast 22 comprises the normal FM radio signal broadcast and data broadcast 26 represents the side-band paging system broadcast.

It will be understood, therefore, that radio broadcast system 20 provides coordinated voice and data by radio signal. In particular, radio broadcast system 20 receives voice advertisement and data message information 28, e.g., an advertising subscription, and integrates the data message portion thereof into other incoming paging system data packets originating from a Gaskill paging system clearinghouse 30. In this manner, radio station 20a coordinates or associates voice and data broadcasts 22 and 26, respectively. As may be appreciated, however, the data message portion of information 28 could be routed through clearinghouse 30, in which case radio station 20a associates a voice broadcast 22 with a data broadcast 26 originating entirely from clearinghouse 30. Such association may be provided by a number of arrangements, but under the illustrated form of the present invention, association of voice broadcast 22 and data broadcast 26 shall be by time relation, e.g., concurrently broadcast, broadcast in close time relationship, or at given time offset.

Vehicle 10 includes a travel information device 40 receiving by way of antenna 42 the voice broadcast 22 and data broadcast

26. Thus, device 40 receives conventional FM voice broadcasts and paging data broadcasts the Gaskill paging system protocol. In this manner, device 40 receives associated voice and data broadcasts whereby an operator of vehicle 10, upon hearing a voice broadcast of interest, captures the associated data broadcast to collect and store within device 40 detailed information, i.e., a data record including longitude and latitude, for a geographic point of interest 14.

FIG. 1 also illustrates a global position system (GPS) satellite 50 providing transmission 52. Details and use of GPS transmission and the collection of such transmission to determine location of a GPS receiver are well known. Use of GPS transmission 52 under the present invention is by incorporation of a global position system receiving device into travel information device 40 collection of a current vehicle position therewith as described more fully hereafter.

Thus, travel information device 40 receives several channels of information. First, voice broadcast 22 provided by radio broadcast system 20 provides to the vehicle operator a stream of voice information potentially including reference to geographic points of interest 14, i.e., advertisers located within road network 12. Second, data broadcast 26, as provided in association with voice broadcast 22, provides further detailed text message information captured selectively by device 40, e.g.,

when commanded by the operator of vehicle 10. This establishes, among other detailed information, a precise location for a geographic point of interest 14. Third, the global position system transmission 52 provides a current vehicle location and, therefore, a basis for presenting location of geographic points of interest 14 relative to current vehicle position.

As described more fully hereafter, device 40 maintains a database containing a collection of data records obtained from data broadcast 26. Each data record corresponds to a geographic point of interest 14, and device 40 displays a vector, i.e., distance and direction, indicator illustrating the relative position of a given geographic point of interest 14 relative to current vehicle location. In this manner, device 40 constructs and maintains information specific to a user of device 40, i.e., maintains information relative to geographic points of interest 14 selected by the operator of vehicle 10, and further provides meaningful position information beyond longitude and latitude for such points of interest 14 without reference to a massive digital map database of the road network 12. Device 40 maintains current information relative to a given geographic region and specific to selected geographic points of interest 14. Under one aspect of the present invention, such geographic points of interest 14 correspond generally to locations of advertisers providing, by way of radio broadcast system 20, both voice information in broadcast 22 and detailed message or text data in broadcast 26.

This allows listeners to later reference such data and locate the corresponding geographic point of interest 14 relative to a then current vehicle position.

FIG. 2 illustrates in block diagram travel information device 40. In FIG. 2, a microprocessor 60 orchestrates generally operation of device 40. Data radio signal receiver 62 couples antenna 42 to microprocessor 60. As contemplated under the preferred form of the present invention, data radio signal receiver 62 comprises essentially a paging system receiver operating under the Gaskill paging system. Thus, the Gaskill system paging device provided as receiver 62 serves as a data terminal collecting data broadcast 26 and providing to microprocessor 60 detailed information associated with, for example, an associated voice advertisement broadcast in voice broadcast 22. A voice radio receiver 64, also coupled to antenna 42, receives the voice broadcast 22 and delivers a voice signal 66 to an amplifier 68 driving a speaker 70. Microprocessor 60 tunes voice radio receiver 64 by way of a tune control 72. Thus, microprocessor 60 selects a radio signal voice broadcast 22 by tune control 72 and, by way of volume control 74 applied to amplifier 68, causes presentation of the corresponding voice broadcast on speaker 70.

A global position system receiver 80 receives the transmission 52 from global position system satellite 50 and

delivers to microprocessor 60 a current vehicle location 82. In this manner, microprocessor 60 requests from global position system radio receiver 80 a current vehicle location and receives in return the current vehicle location 82.

Microprocessor 60 receives other vehicle information. For example, a fuel gauge sensor 90 provides a fuel remaining input 92 to microprocessor 60.

Microprocessor 60 drives a display 100. Display 100 presents, for example, tuning and station selection information relative to the voice radio receiver 60 to provide an FM radio capability wherein the operator of vehicle 10 manipulates input controls 102, i.e., volume, station select, and other controls described more fully hereafter, to listen to a selected voice broadcast 22. Display 100 further presents, as described more fully hereafter, data relevant to stored geographic points of interest 14 and also graphic indication, i.e., a vector indicating distance and direction, of a selected geographic point of interest 14 relative to the current vehicle location.

A compass 104 provides a vehicle orientation input 106 to microprocessor 60. Device 40 uses the current vehicle position, i.e., as provided by vehicle location 82, and also the current vehicle orientation, as provided by input 106, to calculate a graphic indication, i.e., a display vector orientation,

indicating direction of travel for a geographic point of interest 14 relative to the current vehicle position. To portray on display 100 the relative direction, i.e., toward the geographic point of interest, current vehicle orientation is considered. Thus, calculation and display of a vector on display 100 begins with calculation of distance between two points designated by longitude and latitude values, i.e., distance between the current vehicle location and the geographic point of interest 14, and calculation of an angle of orientation for a direction of travel. In other words, display 100 has a fixed relationship relative to vehicle 10 and vehicle orientation input 106 supports an accurate display of a direction of travel as presented by vector icon on display 100. Furthermore, the display presented may be updated as vehicle 10 moves and the distance between vehicle 10 and the geographic point of interest 14 changes and also as vehicle orientation changes.

FIG. 3 illustrates a front view of the travel information device 40 monitoring the combined voice and data broadcasts 22 and 26 and global positioning system broadcast 52. FIG. 3 also illustrates display 100 and input controls 102. Input controls 102 include a tune dial 102a, a volume dial 102b and an AM/FM switch 102c. As may be appreciated, device 40 operates, from a user perspective, in part as a conventional car radio. The user manipulates input controls 102a-102c to listen to a voice broadcast 22 on speakers 70. Additional control

inputs 102 for device 40 include a clock button 102d, a tuner button 102e, a where information button 102f, a stored information button 102g, a filter button 102h, and a here button 102i. Use of input controls 102d-102i will be explained more fully hereafter, but generally provide to the user various display presentations relative to display 100 and modes of operation for device 40.

As illustrated in FIG. 3, display 100 presents a text message display portion 100a showing information such as vendor name, address, and current marketing information, for example, a sale or promotional activity including a date of availability for the promotional activity. Display portion 100a further presents a category of vendor, e.g., sporting goods. As may be appreciated, the data records obtained from data broadcast 26 and stored in device 40 include a variety of fields as indicated generally by the display portion 100a in FIG. 3. In such form, information maintained in device 40 may be manipulated in the manner of a database, e.g., searching, sorting, and other such database record management functions.

Display 100 further provides a vector angle portion 100b and a vector distance-to-travel portion 100c. As described herein above, angle portion 100b indicates the relative orientation of a direction of travel from the current vehicle location to a selected geographic point of interest 14. Distance-to-travel

portion 100c represents the distance separating the current vehicle location and the geographic point of interest. The angular orientation of portion 100b desirable takes into account the current vehicle 10 orientation input 106 as provided by compass 104. Presentation of vector angle portion 100b should, therefore, indicate generally a direction of travel considering the viewer's perspective, i.e., looking at display 100 from within vehicle 10, to indicate appropriately the relative orientation of a direct line-of-sight or direction-of-travel from the current vehicle position to the geographic point of interest 14.

Clock button 102d, when pressed, causes presentation by microprocessor 60 on display 100 the current time of day. Tuner button 102e, when pressed, causes presentation on display 100 by microprocessor 60 information relevant to tuning voice broadcast radio 64, e.g., frequency of station currently tuned, preset features available, and any other information normally displayed in connection with operation of a voice broadcast radio.

Where information button 102f, when pressed, indicates to microprocessor 60 operator desire to collect information from data broadcast 26. For example, voice broadcast 22 and data broadcast 26 are synchronized broadcasts and the operator of device 40 hears an advertisement of interest provided by way of voice broadcast 22 and presses the where information button 102f

for further information. Microprocessor 60 then collects a data record, i.e., text message information relative to the advertisement of interest, by way of data broadcast 26 and data receiver 62. Text message information presented in display portion 100a is obtained, therefore, by the operator activating the where information button 102f during or just after a voice broadcast advertisement of interest.

Device 40 holds multiple data records, i.e., one for each geographic point of interest 14. Stored information button 102g allows scanning through such stored data records and selective display of the previously stored data record for a geographic point of interest 14. In this manner, the user of device 40 constructs a personal electronic reference tracking travel information including data records for particular geographic points of interest 14, i.e., data records selected by and of interest to a particular user. The user thereby builds a personalized and current database of geographic points of interest 14.

Filter button 102h drives device 40 into an automatic data collection mode according to user selected filter criteria. For example, device 40 monitors the stream of data provided in data broadcast 22 and compares location information therein to the current vehicle location to collect all references within a given distance of current vehicle location. Additionally, the user

establishes a category of interest, e.g., auto parts advertisements, grocery store advertisements, sporting goods or restaurant advertisements, to further filter information available in data broadcast 22. In this manner, the user of device 40 creates automatically a customized database by designating geographic points of interest 14 according to user-selected criteria.

The here button 102i provides another method of creating a data record concerning a geographic point of interest 14 within device 40, in this case one corresponding to current vehicle location. The operator presses here button 102i and creates a geographic point of interest 14 data record corresponding to current vehicle location. This allows the user to begin at a given location, operate here button 102i, and have ability to reference that given location later while travelling, e.g., to return to that given location or to have directional indication of that given location from another vehicle location. The data record created by device 40 in response to the here button 102i includes at least the longitude and latitude information corresponding to the vehicle position at the time of button 102i activation. Additional textual information can be entered by the user if desired, e.g., textual information entered by operation of control inputs 102 in response to supporting prompts presented on display 100. For example, the user may wish to name a location in conjunction with activating the here button 102i for meaningful later reference thereto.

FIG. 4 illustrates programming of microprocessor 60 for information collection from data broadcast 26, i.e., in this case in response to activation of where information button 102f. In FIG. 4, it will be assumed that voice broadcast 22 and data broadcast 26 are associated by simultaneous broadcast. As may be appreciated, other association methods may be employed and incorporated into the illustrated embodiment of the present invention. Processing in response to user activation of the where information button 102f begins in block 140 where microprocessor 60 collects the most recently received data record of data broadcast 26. As shown in the present embodiment, voice broadcast 22 and data broadcast 26 are associated by simultaneous presentation and microprocessor 60 need only collect in response to activation of the where information button 102f the current presented or most recently presented data record in data broadcast 26. In anticipation of such task, microprocessor 60 always collects in an input buffer (not shown) each data record presented in data broadcast 26. For each new data record presented, the old, previous data record is replaced in the input buffer. Thus, when the operator activates where information button 102f, the input buffer holds, or will soon hold, a complete data record taken from data broadcast 26 and associated with the current voice broadcast 22 presentation. Thus, processing in block 140 implements a method of association between voice broadcast 22 and data broadcast 26.

Decision block 142 determines whether the current voice broadcast 22 is related to the most recently received data record. For example, not every voice broadcast 22 presentation, e.g., advertisement, will have an associated data record available in data broadcast 26. For example, if the data record most recently received by way of data broadcast 26 is "stale" then it should not be taken as related to the current voice broadcast 22 presentation. In such case, processing branches through block 144 where device 40 presents on display 100 the message "where information not available" and processing terminates. If, however, the data record most recently received is related to the voice broadcast 22 presentation, i.e., not "stale", then processing advances to block 146 where microprocessor 60 obtains the current vehicle location and vehicle orientation. As may be appreciated, determining whether a given data record is "stale" may be implemented by time-stamping data records held in the input buffer. The length of time required to become "stale" in the input buffer is variable and a function of how quickly the operator of vehicle 10 must activate the where information button 102f.

Microprocessor 60 then calculates in block 148 the angle portion 100b and distance-to-travel portion 100c. In other words, microprocessor 60 calculates and angle of orientation for

the arrow icon presented in portion 100b using the current vehicle orientation 106 and the direction of travel toward the subject geographic point of interest 14. Microprocessor 60 then calculates the distance-to-travel value for portion 100c as the separation between the current vehicle position and subject geographic point of interest 14.

As may be appreciated, a timer interrupt may also be set to itteratively execute procedures updating the display portions 100b and 100c as the vehicle changes orientation and location relative to the geographic point of interest 14 associated with the current data record. Furthermore, microprocessor 60 may take into account fuel remaining input 92 in comparison to expected vehicle 10 mileage and consider separation between current vehicle position and the subject geographic point of interest 14. If vehicle 10 holds insufficient fuel to make the trip to the subject geographic point of interest, an appropriate display may be presented to indicate such condition to the vehicle operator.

Continuing to block 150, microprocessor 60 presents in display portion 100a the text message portion of the current data record, e.g., vendor name, address, phone number, and any other special promotional information provided. In decision block 152, the operator has opportunity to keep for permanent storage the current data record, in which case processing branches through block 154 where the current data record is stored for later

reference, i.e., by operation of the stored information button 102g. Otherwise, processing exits directly from decision block 152.

FIG. 5 illustrates by flow chart an alternative method for gathering information from the data broadcast 22, i.e., gathering information automatically according to user-designated criteria in response to filter button 102h. In this manner, the operator need not monitor voice broadcast 22 to collect information of potential interest by way of data broadcast 26.

In FIG. 5, processing begins in block 180 where microprocessor 60 obtains, from the user, appropriate filtering criteria. For example, user interaction is conducted by way of display 100 and alternate functions defined for control inputs 102 to collect from the user a designation of filter criteria. For example, the user may be interested in all data records broadcast and being associated with a location within a given distance of current vehicle location. In this manner, the user collects advertising information for vendors in close and convenient proximity to current vehicle location. Also, data records are classified according to category, and the user designates as qualifying under user criteria certain categories of information. For example, the user may be interested in certain types of products or services advertised and having associated data records in data broadcast 22. In any event,

block 180 represents user designation of criteria applied to data records appearing in data broadcast 22, i.e., which of those data records will be accepted and stored by device 40 for later reference by operation of the stored information button 102g.

Continuing to block 182, microprocessor 60 gets the next data record provided in data broadcast 22 and, in decision block 184, applies the user-designated criteria. If the data record collected in block 182 meets the user-designated criteria provided in block 180, then processing advances to block 186. Otherwise, processing returns to block 182 from decision block 184 to collect the next data record appearing in data broadcast 26. In block 186, microprocessor 60 obtains the current vehicle position and orientation. Continuing to block 188, microprocessor 60 calculates and displays the arrow icon at appropriate angle of orientation and the distance-to-travel value in display portions 100b and 100c, respectively.

Then, in block 190, microprocessor 60 displays the text message data available in the collected data record. An alarm presented in block 190 indicates to the user collection of a data record potentially of interest, i.e., satisfying the user-designated criteria provided in block 180. Decision block 192 allows the user opportunity to discard or keep for permanent storage the data record just collected. Accordingly, if the user declines storage of the just-collected data record then

processing returns immediately to block 182. Otherwise, processing advances through block 194 where the just-collected data record is stored for later reference by operation of the stored information button 102g. Processing then returns from block 194 to block 182 for collection of a next data record.

As may be appreciated, an exit procedure (not shown) interrupts the data record collection loop represented by flow chart in FIG. 5. For example, the user may wish to terminate collection or may wish to modify the designation of data record collection criteria in block 180. Furthermore, processing at decision block 192 need not forego collection of additional data records in data broadcast 26. In other words, additional records may be queued for review by the operator even though microprocessor 60 is awaiting input at decision block 192. Also, should the operator not respond immediately at decision block 192, a time-out feature allows processing to advance without requiring user input, e.g., accepts for storage the data record qualifying under the user designated criteria and allows the user to later delete the record from device 40.

FIG. 6 illustrates by flow chart processing conducted by the radio broadcast system 20 in providing associated voice broadcast 22 and data broadcast 26. In FIG. 6, processing begins in block 200 where radio broadcast system 20 receives an advertising subscription including both voice advertising for presentation in

the voice broadcast 22 and message information for presentation in the data broadcast 26. As noted herein above, association between the voice advertisement and message data is by simultaneous broadcast. Thus, system 20 transmits in block 202 the text message information and location information in data broadcast 26 followed by transmission of the voice presentation in voice broadcast 22. As may be appreciated, processing in blocks 202 and 204 repeats intermittently, i.e., according to how often and when the dual channel advertisement is to be broadcast.

FIG. 7 illustrates programming for microprocessor 60 in response to activation of the stored information button 102g. In FIG. 7, processing begins in block 220 where microprocessor 60 presents opportunity for the user to scan stored data records according to a given criteria, i.e., get a display selection from the user of device 40. For example, the user wishes to display data records according to a certain sequence or to display only records meeting a certain criteria, e.g., restaurant advertisements. Having obtained a display selection from the user, processing advances to block 224 where microprocessor 60 gets a next data record according to the user-designated display selection. Continuing to block 226, microprocessor 60 obtains the current vehicle position and orientation. Then, in block 228, microprocessor 60 calculates and presents display portions 100b and 100c, i.e., displays vector information indicating the distance and relative orientation to a geographic point of

interest 14 corresponding to the data record currently presented. Continuing to block 230, microprocessor 60 displays at display portion 100a the text portion of the data record for review by the user. Decision block 232 provides the user opportunity to terminate scanning of stored information in which case processing exits from decision block 232. If the user continues scanning through the scored data records according to the designated display selection, then processing returns from decision block 232 to block 224 where a next data record in the sequence is selected for review by the user.

Important to note, as the user scans through stored data records and obtains a presentation on display 100, the then-current vehicle orientation and location are referenced to present a then-current relative position in display portions 100b and 100c, i.e., the current relative direction of travel and distance to the geographic point of interest 14 associated with the data record currently displayed by device 40. Also, processing illustrated in FIG. 7 initiates a timer interrupt procedure updating display portions 100b and 100c as the vehicle orientation and location relative to the currently displayed geographic point of interest 14 changes.

The scanning procedure illustrated in FIG. 7 may, as will be appreciated, be augmented to include additional features such as deleting data records, sorting on various fields of the text

message portion, and applying additional category values whereby the user may better manage a collection of information maintained in device 40 and relevant to travel of vehicle 10 to and from geographic points of interest 14.

Thus, an improved vehicle information device and method of operation have been shown and described. Under the present invention, a user builds a customized database containing geographic points of interest, including precise longitude and latitude information and ability to provide distance and orientation of travel toward the geographic point of interest and in relation to the current vehicle location. In this manner, the user obtains useful information by way of radio signal without requiring reference to a massive digital database of the surrounding geographic area. Information obtained by radio signal is always current, i.e., replaced by subsequent broadcast. In this manner, the operator maintains a dynamic and up-to-date database of specific geographic points of interest.

It will be appreciated, that the present invention is not restricted to the particular embodiment or embodiments that have been described and illustrated herein, and that variations may be made therein without departing from the scope of the invention as found in the appended claims and equivalents thereof.

Claims

What is claimed is:

1. A method for providing travel information relative to vehicle location, the method comprising the steps:

transmitting information of potential interest, said information of potential interest including records, each record including at least a location corresponding to a geographic point;

receiving at travel information devices said information of potential interest;

determining at each travel information device a current location therefor; and

selecting at each travel information device ones of said records for display, said display including indication of direction and distance to the corresponding geographic point in relation to said current location for said travel information device.

2. A method according to claim 1 wherein said transmitting step includes, in said information of potential interest, also text message data.

3. A method according to claim 2 wherein said text message data comprises advertising data for a vendor at the corresponding geographic location.

4. A method according to claim 1 wherein said method further comprises the step of carrying said travel information device in a vehicle.

5. A method according to claim 1 wherein said step of transmitting includes transmitting voice information by voice broadcast and text data information by data broadcast, said records being provided in said data broadcast, said voice broadcast and data broadcast being associated whereby presentation of said voice broadcast corresponds to a given portion of said data broadcast.

6. A method according to claim 1 wherein said step of transmitting information comprises the step of transmitting advertising information and said geographic point corresponds to a vendor location associated with said advertising.

7. A method of operating a travel information device carried by a vehicle along a travel route, the method comprising the steps:

receiving data records by radio signal, each data record corresponding to a potential point of interest along a travel route and including at least a geographic location for said potential point of interest;

selecting and storing ones of said data records;

calculating current location for said travel information device; and

displaying position relative to said current location of a geographic location corresponding to a selected data record.

8. A method according to claim 7 wherein said data records correspond to advertising information of a vendor at said geographic location.

9. A method according to claim 7 wherein said method further comprises advertising broadcast by voice signal and associated with at least one of said data records.

10. A method according to claim 7 wherein said displaying position step comprises the step of displaying relative orientation of a direction and magnitude of distance from said current location to said geographic location.

11. A method of providing travel information at a vehicle, the method comprising the steps:

detecting said vehicle position;

collecting information relevant to geographic points of interest, said information including a geographic location for each of said geographic points of interest; and

displaying relative to a current location as established in said detecting step a distance to and a direction toward a selected one of said geographic points of interest.

12. A method according to claim 11 wherein said method further comprises the steps:

maintaining a plurality of data records, each corresponding to information taken from said collecting step and relevant to a geographic point of interest; and

reviewing said plurality of data records while concurrently executing said display step relative to a data record currently under review taking into account a then-current vehicle location.

13. A method according to claim 11 wherein said collecting step comprises the steps:

monitoring by an operator of the travel information device a voice broadcast; and

actuating by an operator said travel information device to capture information in an associated data broadcast.

14. A method according to claim 11 wherein said step of detecting said vehicle position is by satellite transmission.

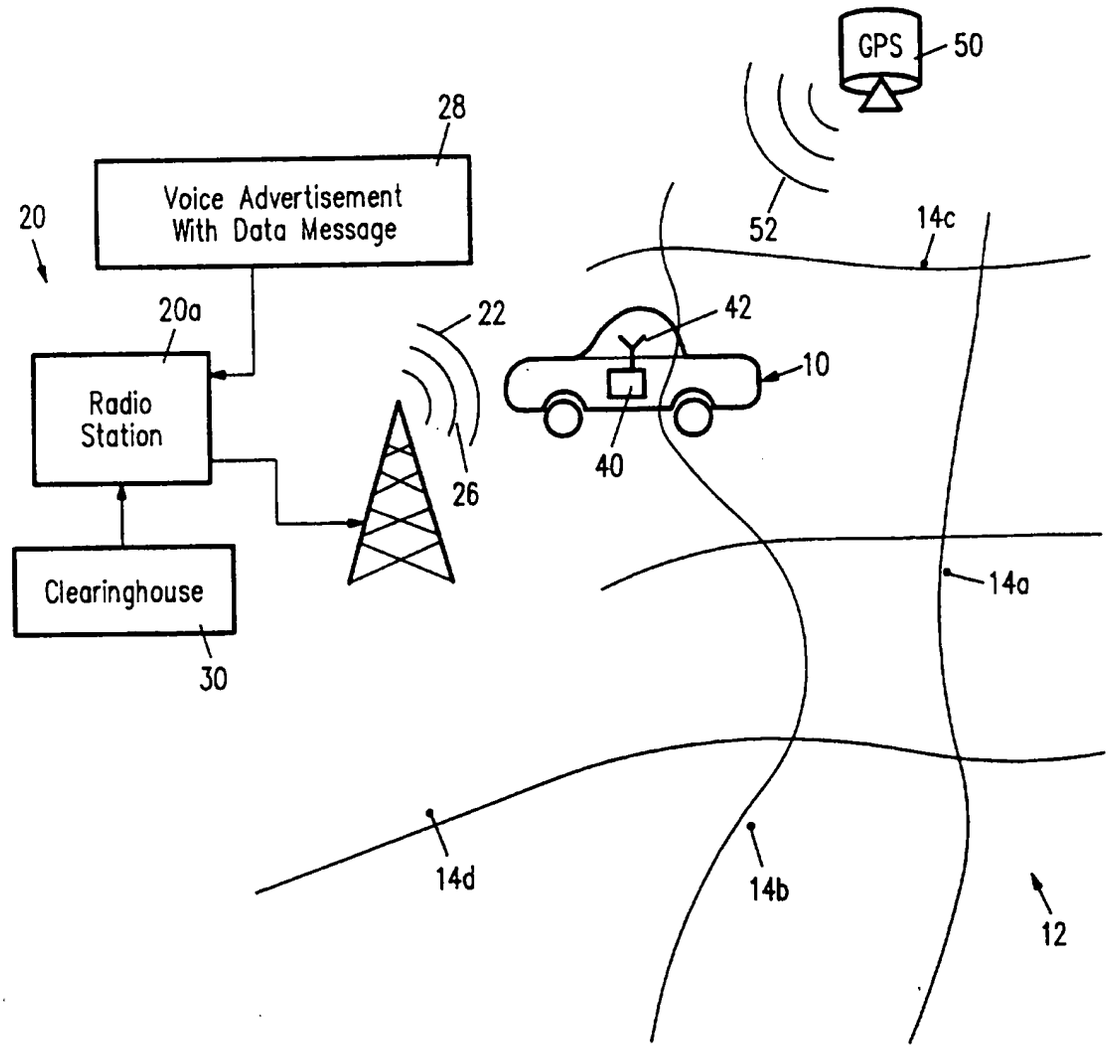
GPS
50
28
Voice Advertisement
With Data Message
20
20a
Radio
Station
Clearinghouse
30
22
26
52
14c
42
10
40
14a
14d
14b
12

FIG. 1

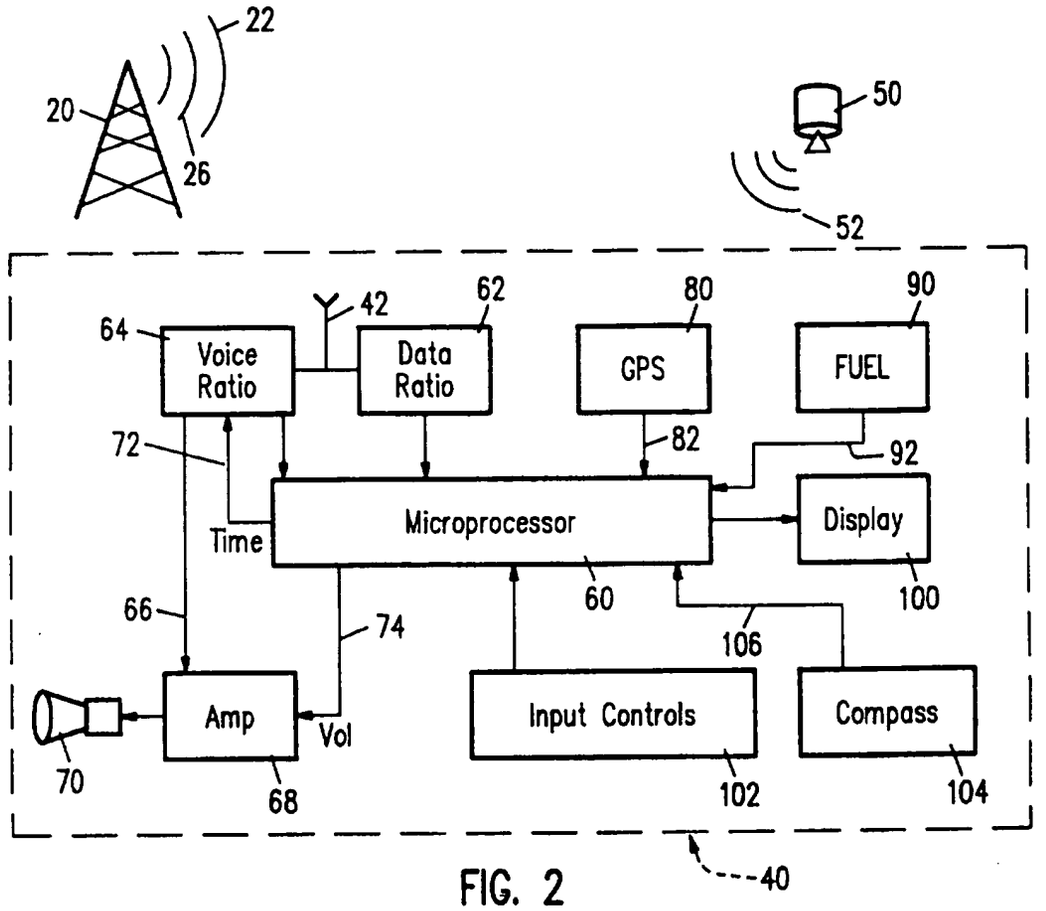
22
20
26
50
52
42
62
80
90
64
Voice Ratio
Data Ratio
GPS
FUEL
72
82
92
Time
Microprocessor
Display
60
100
66
74
106
Amp
Vol
Input Controls
Compass
70
68
102
104
40

FIG. 2

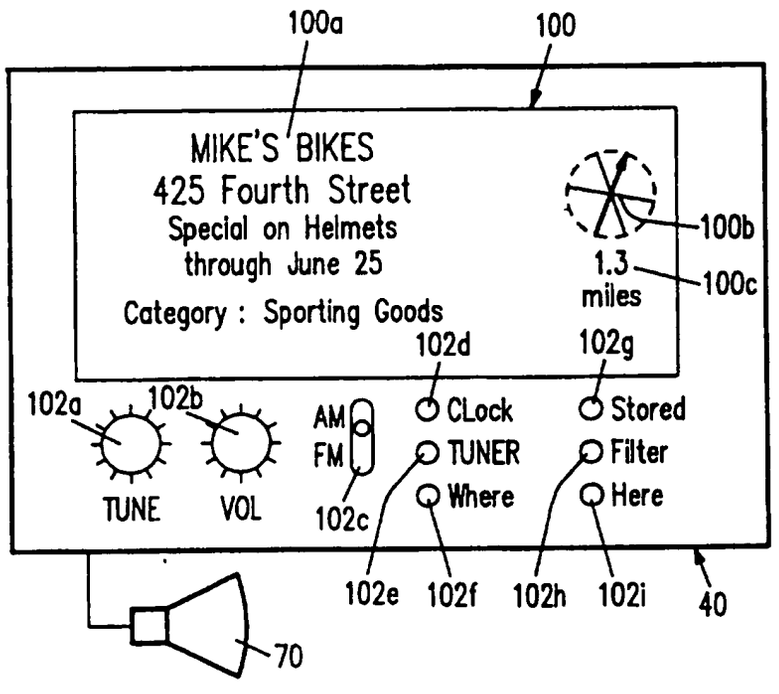
100a
100
MIKE'S BIKES
425 Fourth Street
Special on Helmets
through June 25
Category : Sporting Goods
100b
1.3
miles
100c
102d
102g
102a
102b
AM
FM
CLock
TUNER
Where
Stored
Filter
Here
TUNE
VOL
102c
102e
102f
102h
102i
40
70

FIG. 3

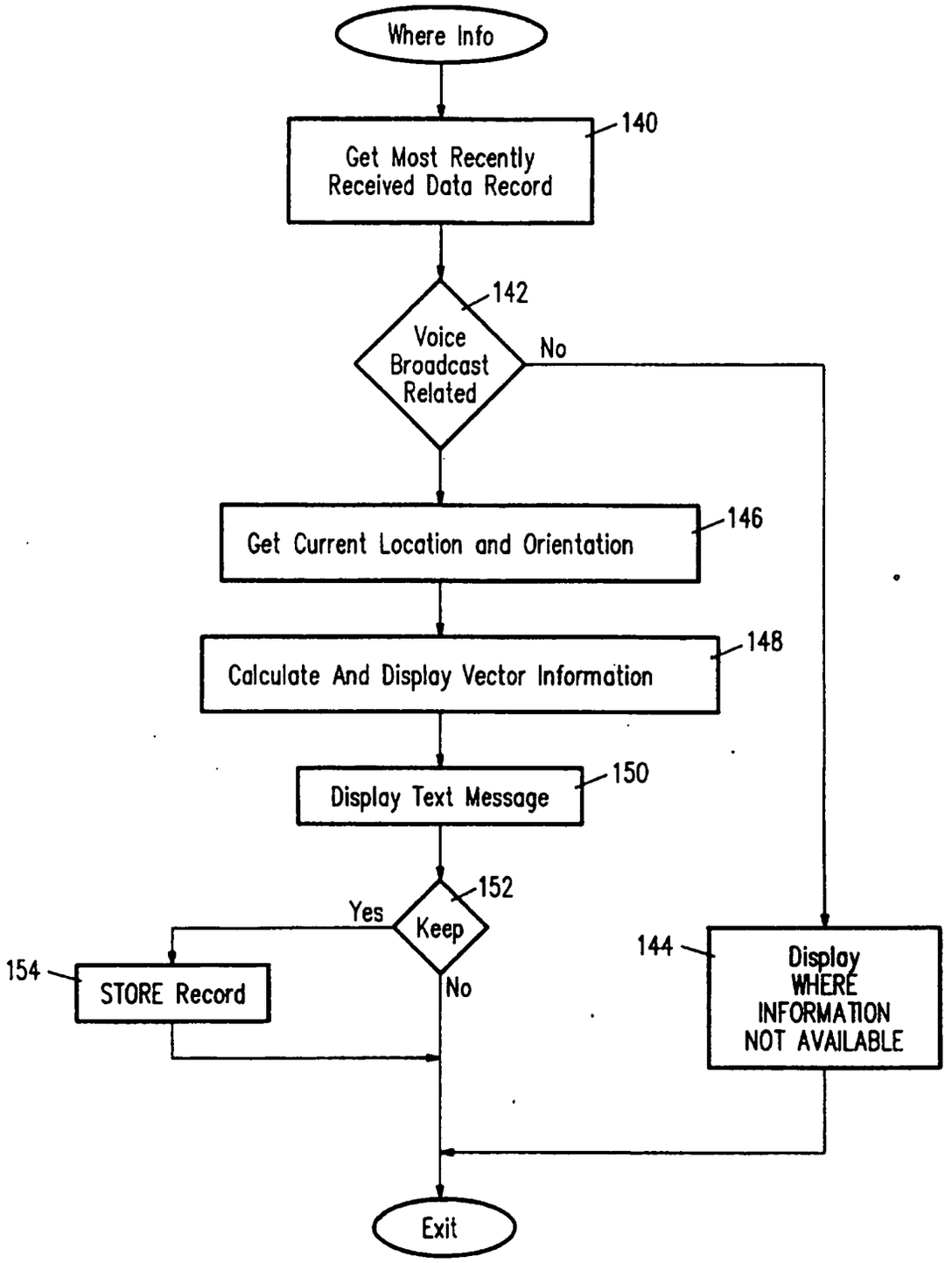
Where Info
Get Most Recently Received Data Record
140
Voice Broadcast Related
142
No
Get Current Location and Orientation
146
Calculate And Display Vector Information
148
Display Text Message
150
Keep
152
Yes
No
STORE Record
154
Display WHERE INFORMATION NOT AVAILABLE
144
Exit

FIG. 4

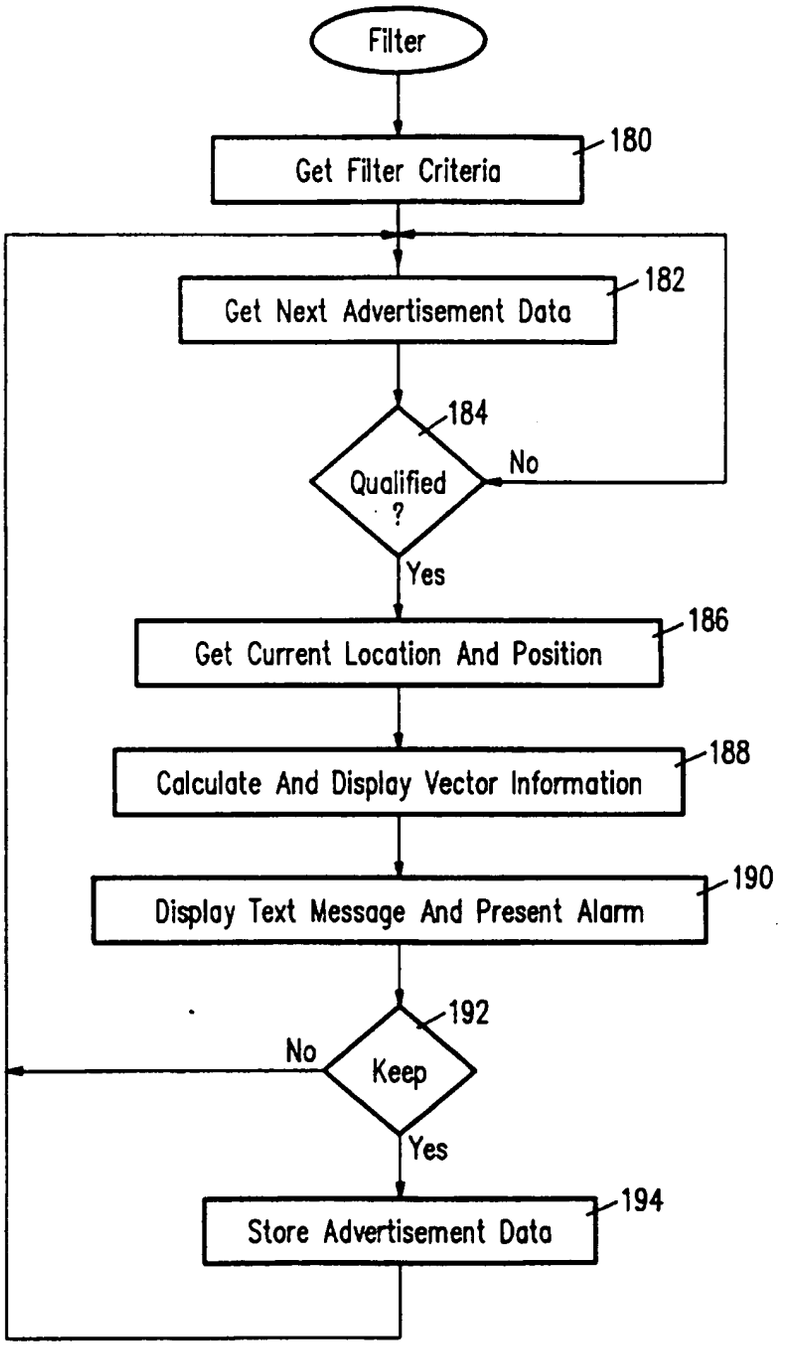
Filter
Get Filter Criteria
180
Get Next Advertisement Data
182
184
Qualified ?
No
Yes
Get Current Location And Position
186
Calculate And Display Vector Information
188
Display Text Message And Present Alarm
190
192
No
Keep
Yes
Store Advertisement Data
194

FIG. 5

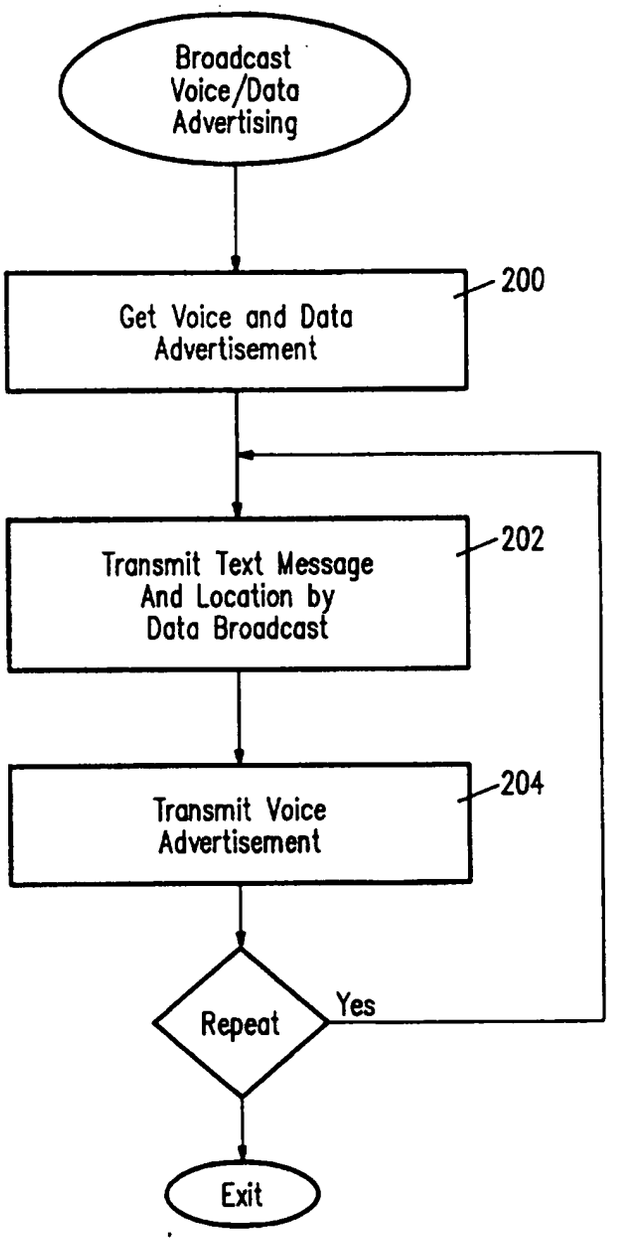
Broadcast Voice/Data Advertising
Get Voice and Data Advertisement
200
Transmit Text Message And Location by Data Broadcast
202
Transmit Voice Advertisement
204
Repeat
Yes
Exit

FIG. 6

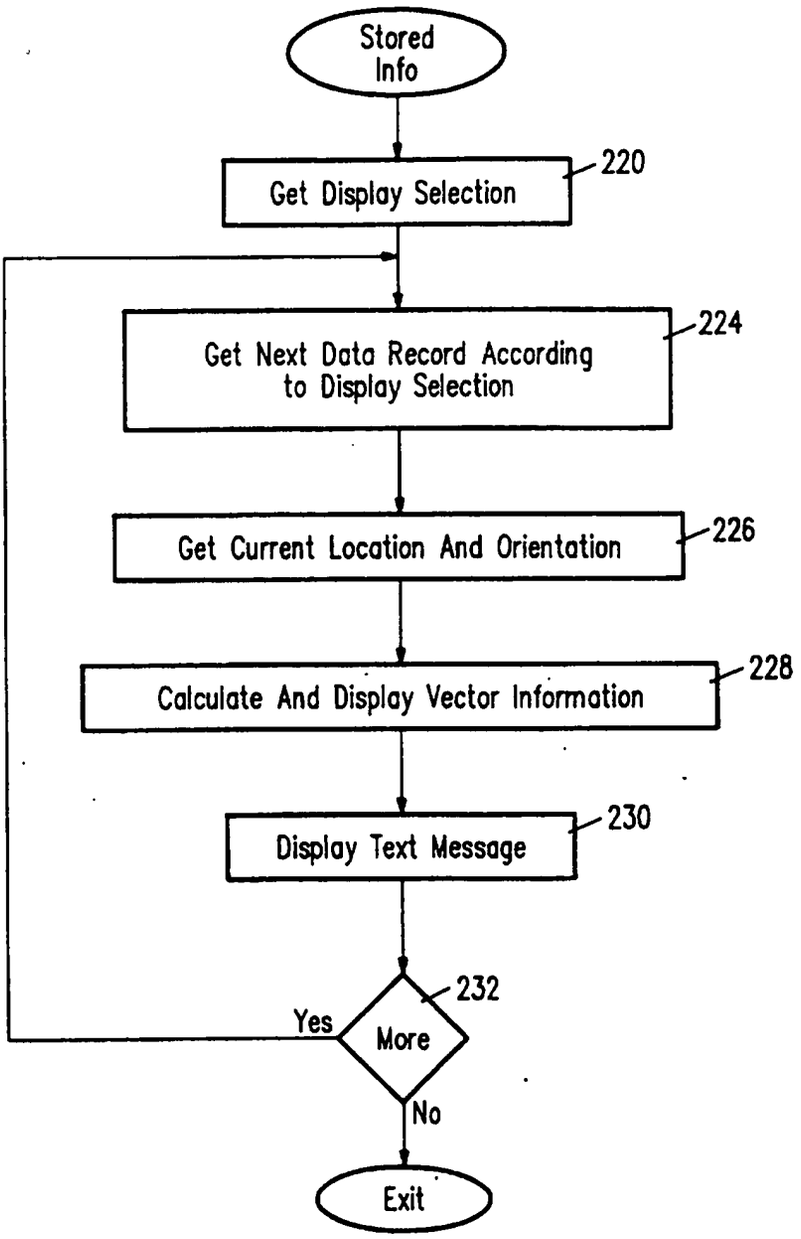
Stored Info
Get Display Selection
220
Get Next Data Record According to Display Selection
224
Get Current Location And Orientation
226
Calculate And Display Vector Information
228
Display Text Message
230
More
232
Yes
No
Exit

FIG. 7

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/EP 95/03012

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G08G1/0968 H04H1/00

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 H04H G09B

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.
A	PATENT ABSTRACTS OF JAPAN vol. 016 no. 403 (E-1254) ,26 August 1992 & JP,A,04 134932 (CLARION CO LTD) 8 May 1992, see abstract	1,4,7,11
A	EP,A,0 286 105 (HITACHI, LTD) 12 October 1988 see the whole document	1-4,6-12
A	US,A,5 063 610 (ALWADISH) 5 November 1991	
A	WO,A,90 13190 (SPINGARN) 1 November 1990	

☐ 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
1 December 1995	18. 12. 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

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. ional Application No
PCT/EP 95/03012

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-286105	12-10-88	JP-B-	6016320	02-03-94
		JP-A-	63251900	19-10-88
		DE-D-	3852415	26-01-95
		DE-T-	3852415	14-06-95
		US-A-	4951212	21-08-90
US-A-5063610	05-11-91	US-A-	5214792	25-05-93
WO-A-9013190	01-11-90	AU-B-	5544690	16-11-90
		US-A-	5146612	08-09-92

Form PCT/ISA/210 (patent family annex) (July 1992)

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INTERNATIONAL APPLICATION PUBLISHED UNDEI

WO 9608923A1

(51) International Patent Classification 6 :		(11) I
H04N 7/08	A1	(43) International Publication Date: 21 March 1996 (21.03.96)

(21) International Application Number: PCT/SE95/01056

(22) International Filing Date: 18 September 1995 (18.09.95)

(30) Priority Data:
9403109-3 16 September 1994 (16.09.94) SE

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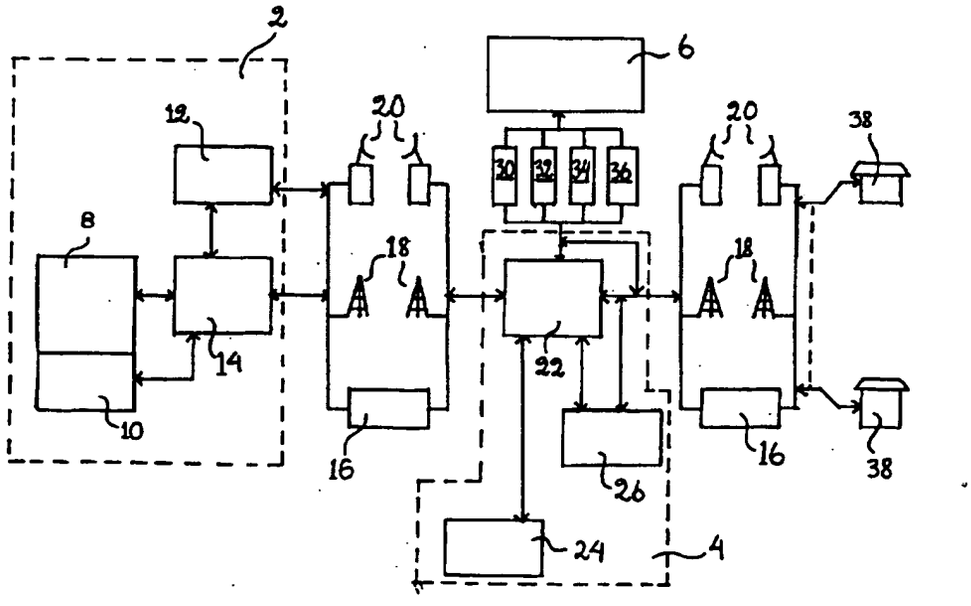
(74) Agents: BERG, Sven, Anders et al.; H. Albihns Patentbyrå AB, P.O. Box 3137, S-103 62 Stockholm (SE).

(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: APPARATUS AND METHOD FOR LOCAL INSERTION OF MATERIAL IN BROADCASTING



(57) Abstract

A method, system and apparatus for insertion of additional material into a TV channel television signal being broadcast from a central source (2) and received by a remote receiver (4) adapted for rebroadcasting said television signals to a number of end user units (38).

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Apparatus and method for local insertion of material in broadcasting

Field of the Invention

The present invention relates to apparatus and methods for local insertion of analogue or digital material, such as audio/video advertisement, in analogue and digital broadcasting.

Background of the Invention

Advertising in television broadcasting has traditionally been an exclusive field for large companies on national or multinational level.The reasons have i.a. been found in high producing costs for commercials and, perhaps above all, in the fact that a very large number of consumers are reached in one broadcast and thus motivating a high price per broadcast commercial. Declining producing costs and an increasing number of rebroadcast systems, such as cable television systems and the like, targeting limited consumer groups that are integrated e.g. geographically or by virtue of interest have given rise to a need for inserting locally broadcast commercials in conveniently arranged slots in wide area broadcast television channels. This would e.g. allow large companies to insert information about local dealers into centrally produced commercials or small companies to afford locally broadcast commercials into a medium which in practice has been previously closed.

Prior Art

Advertising insertion systems have evolved from analogue insertion systems described for example the documents US Patent 4,724,491 to Lambert, US Patent 5,060,068 to Lindstrom and WO 93/10630 of Keene with video tape recorders playing commercials and being switched on in response to cue in signals broadcast in the main television signal. These analogue and partly mechanical systems present problems concerning reliability in the segueing of an advertisement segment into the main television signal or vice versa.

Other problems in this field concern the transmitting of additional television signals to be inserted into a main television signal from a central site to a remote site, and the monitoring and logging of additional signals that actually have been inserted and

broadcast. These and related problems are dealt with in the US Patent to Esch and in the European patent application EP-A1-0 620 689 of Lambert.

A digital insertion system is shown in WO 93/21732 of Fasciano et al. This document describes a system comprising an apparatus for digitizing, compressing and storing audio/video source information, a playing apparatus for decompressing the source information and regenerating an analogue signal and a patching apparatus adapted to insert the regenerated analogue signal into a broadcast channel. Different general configurations and compression schemes are described.

Problems in Prior Art

Problems in prior art concern i.a. reliability in synchronizing and cueing additional signals into a broadcasting or other communication channel, and reliability in remote control of insertion apparatus. In particular it is a problem to achieve a technical implementation that satisfies reliability requirements to a cost which is reasonable to a larger group of advertisment buyers.

Objects of the Invention

It is a overall object to achieve an insertion system which allows a flexible and reliable remote control of insertion equipment and which provides reliable timing, cueing, synchronizing and playing of insertion material. A particular object is to provide such a system in a digital implementation, with a high degree of integration of functional units and at a low cost. Another object is to provide such a system which makes use of existing broadcast system resources without interfering with other broadcast or communicated material and which is transparent to other system users.

These and other objects and advantages are accomplished by means of a system, apparatus and method with the features of independent claims 1, 6,9 and 12, respectively. Further features and embodiments of the inventive concept are indicated in the dependents claims.

Brief Description of the Drawing

The inventive concept will now be described by means of an embodiment of the invention and with reference to the figures of the accompanying drawing.

Fig 1 is a schematic illustration of a broadcast system incorporating the inventive

insertion system and showing a central site and a headend site of a remote rebroadcast system;

Fig 2 is a schematic illustration of an embodiment of a central control apparatus provided in a central site according to Fig 1;

Fig 3 is a schematic illustration of an embodiment of a local insertion control apparatus provided in a remote headend site according to Fig 1;

Fig 4 is a schematic illustration of an embodiment of a cue in apparatus comprised in a local insertion control unit according to Fig 3; and

Fig 5 is a schematic illustration of an embodiment of a signal changeover means comprised in an embodiment of a cue in apparatus according to Fig 4.

Description of Embodiments of the Invention

Fig 1 shows a schematic illustration of a broadcast system comprising means for local insertion of additional material into a main broadcast signal. For example a central TV station (2) for broadcasting one or several TV channels is coupled via e.g. conductive or optical transmitting means 16, aerials 18 for terrestrial wireless transmission or parabolic aerials 20 for transmission via satellite to one or several remote headend stations 4 for rebroadcasting a television signal from the central TV station. The headend station 4 is integrated in a rebroadcast system using e.g conductive/optical 16, terrestrial wireless 18 or satellite transmission 18 means for rebroadcasting the television signal to TV consumers 38. A headend station 4 may also be coupled to a service and/or control station 6 where additional material to be inserted in predefined slots of the main television signal, such as local commercials in the form of audio and/or video segments, text, characters, data or control information, may be produced, encoded or compressed. The additional material may be transmitted to the headend station 4 e.g by means of satellite communications 30, telephone/modem communications 32, ISDN 34 or manual or mechanical conveyance 36.

The central TV station 2 is provided with a central control unit 14 for controlling the insertion of additional material.The central control unit 14 is coupled to broadcast equipment 8 for TV channels, i.e. one or several main television signals, to storage means 10 for storing a central play list containing information about the main television signal, central commercials and predefined slots for central and local insertion of additional material. Central insertion of additional material may be controlled by the

central control unit 14 or any other insertion equipment comprised in or coupled to the broadcast equipment 8.

The central TV station of Fig 1 comprises a per se known broadcast equipment 8 coupled to a central control unit 14, wherein an output broadcast television signal from said broadcast equipment 8 is input into the central control unit 14. Said central control unit 14 is adapted for controlling the insertion of a media segment, which is a section of information represented e.g. in the form of audio, video, software, stills or data signals. An embodiment of the central control unit 14 comprises control software, a cueing generator and possibly a modem for data communications. Different embodiments of the central control unit are operated by means of menu software using a keyboard or a customized control panel, or by means of an existing automatic control system.

The remote headend station of Fig 1 comprises a remote control unit 22 coupled to remote control means 26 and storage means 24 for storing a local playlist, additional material or media segments to be inserted, log files and status information. The mentioned means 22,24,26 are coupled to a not shown television signal receiver and a not shown rebroadcast equipment. The remote control unit 22 may itself be controlled either through the remote control means 26 or through insertion control signals incorporated in the broadcast television signal received by the headend station. By means of the communications means comprised in the described system, a network may be formed between a central site (2), a remote site (4) and compression and/or decompression means located at a separate site.

The method for insertion comprises the steps of:

1. Producing or compiling a media segment;
2. Defining a scheduled slot, i.e. a portion of time in a broadcast which can be allocated for insertion of a media segment or a block, which is a number of consecutive media segments;
3. Transferring a media segment to and storing it in the remote headend station 4;
4. Notifying the central TV station 2;
5. Centrally planning and controlling the insertion of each media segment by means of the central control unit 14;
6. Encoding a cue in signal into a broadcast television signal;
7. Broadcasting/communicating said television signal comprising said cue in signal to remote headend stations 4;

8. Inserting, at a headend station 4, in response to said encoded cue in signal, said stored media segment in said defined slot;

9. Broadcasting said media segment to TV consumers 38;

10. Rebroadcasting said television signal to TV consumers 38;

11. Communicating possible operating errors or logging information from remote headend station 4 to central TV station or monitoring center.

Fig 2 shows an embodiment of a central control unit 14 for scheduling insertion of additional material, said central control unit comprising a central processing unit (CPU) platform 48 being able to execute multitasking control and logging software 50. Data storage means 42, e.g. a magnetic or optical disc, is coupled to the CPU 48 via a storage means interface 44. Monitoring circuits 46 and a signal encoder 40, e.g. a teletext encoder, are mutually coupled as well as coupled to the CPU 48. A conventional studio television signal output 66 is coupled to said signal encoder 40 for encoding insertion control signals into the television signal, which after encoding is fed to an insertion encoded television signal output 68 for conventional broadcasting. Also coupled to the CPU 48 are data communications means 54, e.g. modem or ISDN equipment, which is connectable to external communication means 62, and serial input/output ports 56 being connectable to external serial interfaces 64. For an optional interface between the central control unit 14 and a human operator a keyboard 52, a display means 58 or control switching means 60 are connectable to the CPU 48.

For controlling a number of remote control units 4, one embodiment of the inventive system operates by means of a signalling method using the vertical blanking interval VBI of a television signal. In one preferred embodiment the inventive method involves using only one user selectable line of the VBI and the signals may typically have up to 10 EXP 14 different codings with full error checking. To their form the signals used in this method are Teletext compatible but are transparent to standard Teletext receivers. Such control signals are locked to the television signal, and are thus available any time a television signal itself is available. Controlling commands from the central control unit 14 to a remote control unit 22 may also be transferred through VSAT, ISDN or modem, and in most cases signals being sent in return to the central control unit 14 would be transferred through ISDN or modem. In one embodiment signals used to achieve an insertion comprise firstly, a cue signal transferring information about playlists for different remote control units 22 and secondly, an action signal for

triggering an insertion of a predefined media segment.

In a preferred embodiment of the VBI transferring method the control signals are Hamming coded for data security. The data structure of control signals may be configured with data comprising:

1. Clock run in specification;
2. A framing code;
3. Data channel specification;
4. Designation code;
5. Security access code;
6. Format signal;
7. Action signal;
9. Parameters.

The inventive system comprise functional means for performing the following steps in response to corresponding control or command signals.

For media segment player means:

1. Cueing in a block of additional material;
2. Playing or broadcasting a cued block;
3. Stopping a currently played block;
4. Holding a currently played block;
5. Releasing a currently played block;
6. Cancelling a stored block.

For insertion system units:

1. Resetting selected remote control units 22;
2. Setting time and date;
3. Downloading current log file to central control unit 14;
4. Selecting a defined remote control unit 22 to listen to next command;
5. Setting conditions, e.g. if and when, for remote control units to verify commands and operations with the central control unit 14.

For data transfer units controlling transfers of large amounts of data, e.g. additional material, playlists, program updates:

1. Initiating data transfer;
2. Ending data transfer;
3. Identifying data blocks.

For controlling data file storage means:

1. Identifying or confirming existing file;
2. Deleting files;
3. Copying files;
4. Moving files;
5. Renaming files;
6. Retrieving directory of files.

The remote control units 22 (Fig 1) are configured as multichannel units with the ability of changing input and output channels dynamically. In an example, an input channel refers to a monitoring channel, while an output channel is the channel into which additional material is inserted. The remote control unit 22 has an interface both to internal insertion means and to external equipment comprised in a rebroadcast station. For monitoring and controlling said external equipment, the remote control unit 22 comprises functional means for:

1. Setting an input switch controlling an input channel;
2. Setting an output switch controlling an output channel;
3. Setting an analogue switch;
4. Setting a relay;
5. Setting user bits showing user status;
6. Reading monitor bits showing predefined the status of predefined units.

Command parameters used in connection with said control signals comprise a timestamp and a playlist identity including an indication of one or several of the following items: year, month, day of month, hour, minute, second and block number.

Fig 3 shows an embodiment of a remote control unit 22 comprising an insertion control unit 76 coupled to a signal switching means 74 which also is coupled to an analogue or digital insertion signal recorder and/or player 80 comprising genlock circuits. The insertion player 80 is preferrably provided with means for signal or data compression/decompression, e.g according to an MPEG-2 or a JPEG system. The switching means 74 is adapted to switch to broadcast television output in case of system failure. The mentioned units 76, 74 and 80 are further coupled to and controlled by a central processing unit (CPU) platform 70 being able to execute multitasking control and logging software 72, and the insertion control unit 76 may also be provided with an input/output port 112 for external control and monitoring signals. A remote control unit

22 may be configured to be able to handle several different incoming television signals for different TV channels. In operation, a television signal comprising an video signal 96 and an audio signal 98 is input into the signal switching means 74, a connection 110 is provided for conveying the video signal to the insertion control unit 76, a genlock video signal 104 is conveyed to the genlock circuits of the insertion signal player 80 and an insertion video signal 100 as well as an insertion audio signal 102 being genlocked with the original television signal are transferred to the signal switching means 74. The received broadcast television signals 96 and 98 are rebroadcast through video output 106 and audio output 108, and in response to a cue in signal transmitted together with said television signal 96 or 98, the signal switching means 74 switches over to rebroadcast said inserted audio/video signals 100,102 for a predefined time interval.

Embodiments of the remote control unit 22 further comprise, interconnected or coupled via the CPU 70, a storage means 82, e.g. magnetical or optical, a storage means interface 84, data communications means 78 connectable to external communications 114 such as modem, ISDN or VSAT, monitoring means 88, additional facility means 86, e.g. local Teletext, serial input/output ports 92 and display means, e.g. LCD display 90 or video monitor 94.

Fig 4 shows an embodiment of the insertion control unit 76 provided with a computer interface 120 comprising address decoding circuits, interrupt control circuits and read/write circuits allowing a connected computer processor to communicate with units coupled to said interface 120. An embodiment of the computer interface is implemented by means of generic array logics (GALs) and part of a field programmable gate array (FPGA). The insertion control unit 76 further comprises a video input switch 116 for selecting, from a number 1-N of received input signals/channels 144, a signal from which data should be encoded. The video input switch 116 may is controllable by means of a connected computer 70 (FIG 3) or by means of control data received through any other communications device. The main purpose of the switch is to allow a number of channels to be monitored without duplicating receiver and decoding means in the headend station. In another embodiment different VBI lines may be allocated to different TV channels, so that each TV channel can be sampled at least once a frame. In that case, the channels would normally have to be sync locked together.

A video output 146 is used for genlocking insertion material recorder and player, and other devices of the system. The video output 146 is also input into a pulse generator 118

for generating pulses from the selected video signal. These pulses are then transmitted to and used by other functional units comprised in the system, e.g. synchronizing and blanking means.

A Teletext/data broadcast receiver 124, possibly implemented in an FPGA, is coupled to the computer interface 120, a random access data storage means 122 and an error checking/correction means 126. As has been explained above, initial data transmitted using a line of the VBI is utilized as an independent data channel as specified by the Teletext specification, whereas other functional data, e.g. cueing, playing, logging, crosschecking and playlist information, is transmitted in a Hamming coded data format. The receiver 124 extracts data from the video signal and validates the initial data for correctness. If valid data is detected, the additional information is sent the error checking/correction means 126 for checking and possible correction before validated data is stored in the storage means 122. The receiver 124 controls the storage of received data in the storage means 122.

An audio/video changeover means 132 for switching from rebroadcasting a received television/channel signal 144 to an insertion signal 148 from an insertion material player. The audio/video changeover means 132 is i.a. coupled to the computer interface 120.

The insertion control unit 76 may further be provided with a data comparator 130 coupled to a non volatile storage means 128, which may be preloaded with a block of data from the CPU 70 (FIG 3) for allowing a real time comparison with the decoded data as it is received.

For acheiving integration of insertion system units into existing rebroadcast systems and controlling external devices by means of the CPU 70 (FIG3), embodiments of the insertion control unit 76 may be provided with one or several relays 134 used to turn on and off various devices comprised in the system, control switches 136 and status indicators 138. Said devices 134, 136 and 138 are coupled to the computer interface 120 and to a general purpose interface 142. For various purposes, a serial interface, e.g. RS232, may also be coupled to the computer interface 120.

An embodiment of an audio/video changeover means 132 is shown in Fig 5 comprising a computer interface 152, a number 1 to N five signal routes audio/video switches 154 coupled to said computer interface 152 and an unbalanced to balanced converter 156 coupled to said audio/video switches 154. The audio/video switches 154 allow insertion of additional material signals comprising insertion video signal (IV), first

channel insertion audio signal A (IA A) and second channel insertion audio signal B (IA B) into a number N TV channels. The insertion is controllable by means of a CPU 70 (FIG 3) or directly from integrated teletext control signal or command detection. As mentioned above, insertion audio signals from a insertion material player is input in two channels A and B, which may be stereo or two different languages. In order to maintain normal broadcast quality, balanced or differential audio signals are generated in said changeover means 156 by means of a comprised converter and signals A+,A-,B+,B- are output and transmitted to the audio/video switches 154. Said audio/video switches are each provided with one video switch and four audio switches, which change simultaneously from the input TV channel signals V,A+,A-,B+,B- to the corresponding insertion signals IV, IB and IA signals in response to insertion control signals. Said changeover means 132 is preferrably provided with a real time switching means for separately switching the video signals in order to allow centrally broadcast vertical interval data to pass through unchanged. The default condition is for all switches to pass their respective TV channel signals unchanged.

The insertion control unit 76 may further be provided with a data comparator 130 coupled to a non volatile storage means 128, which may be preloaded with a block of data from the CPU 70 (FIG 3) for allowing a real time comparison with the decoded data as it is received.

Couplings and signal transmitting routes between functional units of the inventive system are apparent from the drawings.

Claims

1. A system for insertion of additional material into a TV channel television signal being broadcast from a central source (2) and received by a remote receiver (4) adapted for rebroadcasting said television signals to a number of end user units (38), **characterized in**

central insertion control means (14) for centrally controlling the insertion of said additional material, said central insertion control means being coupled to broadcast equipment of said central source and being adapted to incorporate a control signal and an information signal into said television signal; and in

remote insertion control means (22) for locally controlling the insertion of said additional material, said remote insertion control means being coupled to rebroadcasting equipment of said remote receiver (4), being adapted to detect control said control signals and information signals in a received television signal and being adapted to rebroadcasting said additional material in response to said control signal for a predefined time interval.

2. A system as recited in claim 1, **characterized in** a first remote control means (12) coupled to said central insertion control means (14) for remotely controlling and communicating with said central insertion control means;

a second remote control means (26) coupled to said local insertion control means (22) for remotely controlling and communicating with said remote control means (22); and in that

communication with said remote control means (12,26) and said insertion control means (14,22) is performable by means of communications means (16,18,20).

3. A system as recited in claim 1 or 2, **characterized in** that said central insertion control means (14) is operating in response to central playing schedule information.

4. A system as recited in any of the preceding claims, **characterized in** that said remote insertion control means (22) is coupled to storage means (24) for storing additional material, play lists, log files and status information.

5. A system as recited in any of the preceding claims, **characterized in** that a central insertion control means (14), a local insertion control unit (22) and possibly a separately located compression and/or decompression means for compressing and/or decompressing information are connectable into a network by means of said communications means (16, 18,20).

6. An apparatus for central insertion control (14) interconnectable with a system for insertion of additional material into a TV channel television signal being broadcast from a central source (2) and received by a remote receiver (4) adapted for rebroadcasting said television signals to a number of end user units (38), **characterized in** a storage means (42) for storing control information as well as additional material information and logging information;

a processing means (48) for controlling and monitoring said insertion and being coupled to said storage means (42);

an encoding means (40) for encoding control signals and information signals into a broadcast television signal, said encoding means being coupled to said processing means (48).

7. An apparatus as recited in claim 6, **characterized in** that said encoding means (40) comprises a teletext encoder.

8.An apparatus as recited in any of claims 6 or 7, **characterized in** data communications means (54) for external communication and serial interface means (56,64) for connection to external devices, said data communications means (54) and said serial interface means (56,64) being coupled to said processing means (48).

9. An apparatus for local insertion control (22) in a system for insertion of additional material into a TV channel television signal being broadcast from a central source (2) and received by a remote receiver (4) adapted for rebroadcasting said television signals to a number of end user units (38), **characterized in** a processing means (70);

a storage means (82) for storing additional material and being coupled to said processing means (70);

a playing means (80) for playing stored additional material and being coupled to said processing means (70) and said storage means (82);

a television signal switching means (74) for switching between rebroadcasting received television signals (96,98) and additional material being played by said playing means (80), said additional material being input into said switching means (70) as television signals (100,102); and

an insertion control means (76) being coupled to said switching means (74) for controlling it, said insertion control means having an input for receiving the video signal portion of a broadcast video signal, from which a control signal is extractable.

10. An apparatus as recited in claim 9, **characterised in** that it comprises genlocking means (81) having an input 104 for receiving a broadcast video signal and being coupled to said playing means (80) for genlocking its output signal to said received video signal.

11. An apparatus as recited in any of claims 9 or 10, **characterized in** that said insertion control means comprise a processor interface (120) being connectable to said processor means (70);

a teletext and/or data broadcast receiver (124) being coupled to said computer interface (120);

an audio/video changeover means (132) for switching from outputting a received television signal to outputting an insertion signal from a insertion material playing means (80), said changeover means being coupled to said computer interface (120).

12. A method for insertion of additional material into a TV channel television signal being broadcast from a central source (2) and received by a remote receiver (4) adapted for rebroadcasting said television signals to a number of end user units (38), **characterized in** the steps of:

producing or compiling a media segment;

defining a scheduled slot, i.e. a portion of time in a broadcast television signal, - which can be allocated for insertion of a segment or a block of segements of additional material;

transferring an additional material segment to and storing it in the remote headend

station (4);

notifying a central TV station (2) that said additional material segment has been stored in said headend station (4);

centrally planning and controlling the insertion of each media segment by means of a central control unit (14);

encoding a cue in signal into a broadcast television signal;

broadcasting/communicating said television signal comprising said cue in signal to remote headend stations (4);

inserting, at a headend station (4), in response to said encoded cue in signal, said stored additional material segment in said defined slot;

broadcasting said media segment to TV consumers (38);

rebroadcasting said television signal to TV consumers (38);

communicating possible operating errors and/or logging information from remote headend station (4) to central TV station or a monitoring center.

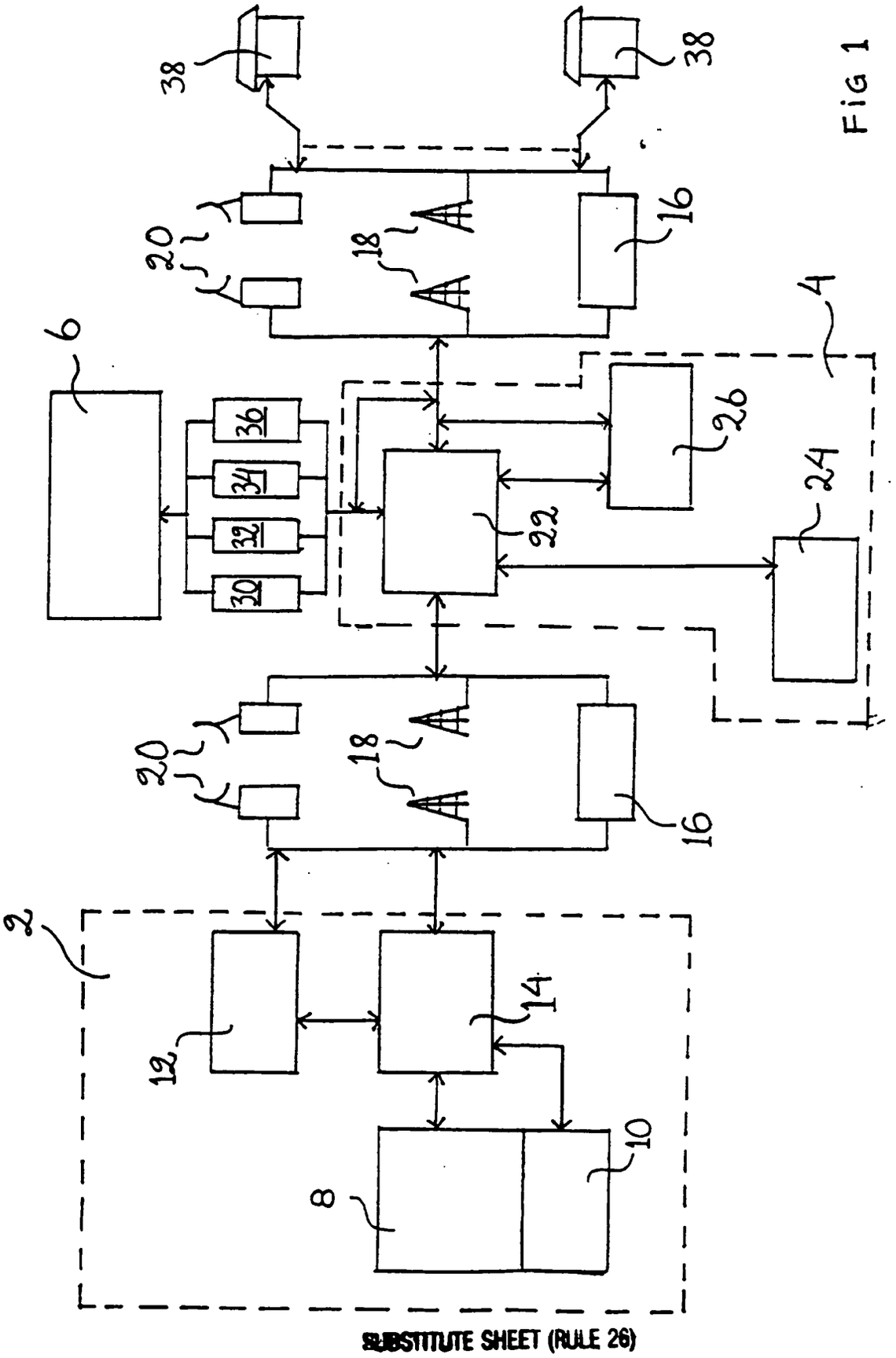

Fig 1

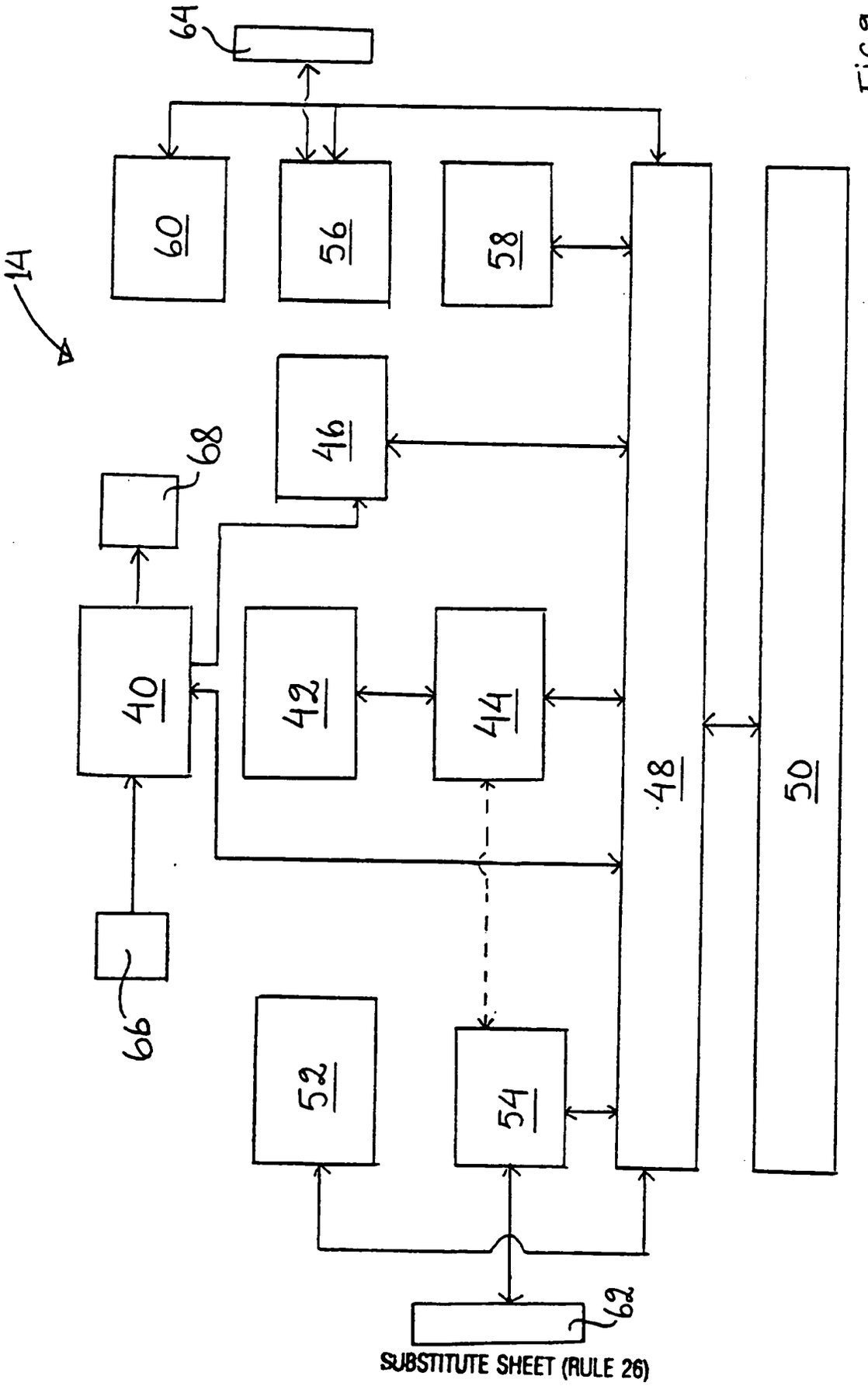

Fig 2

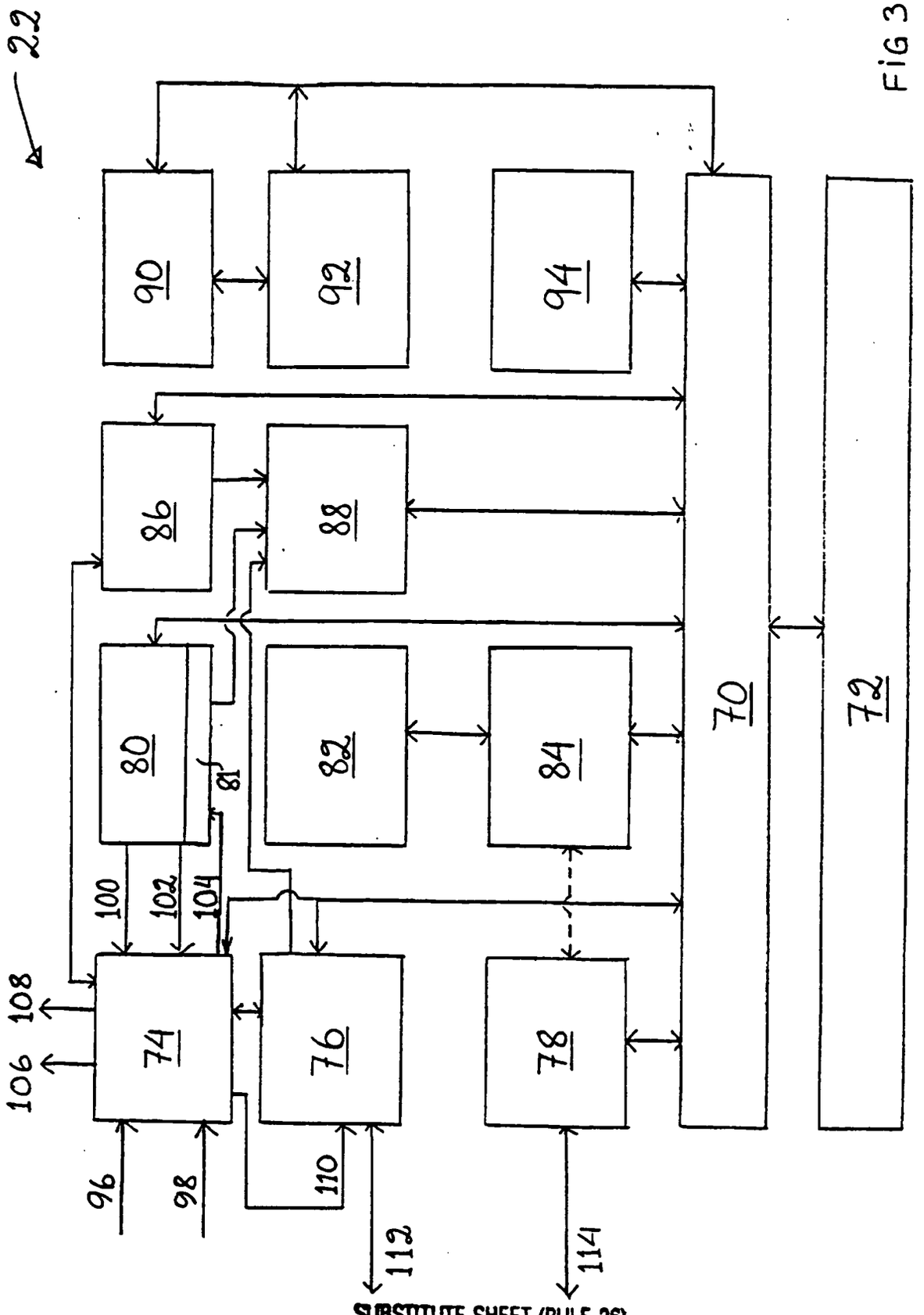
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FIG 3

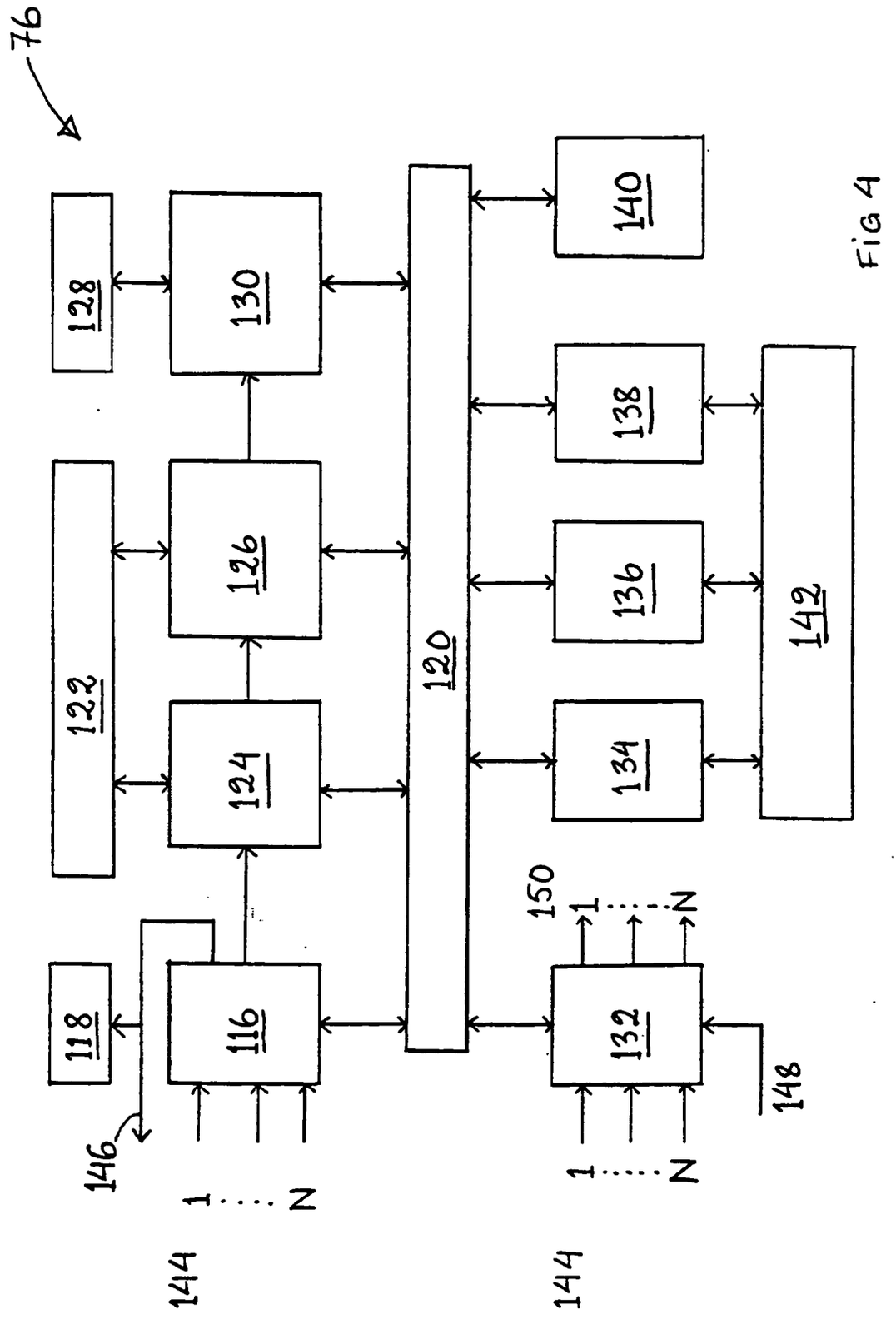
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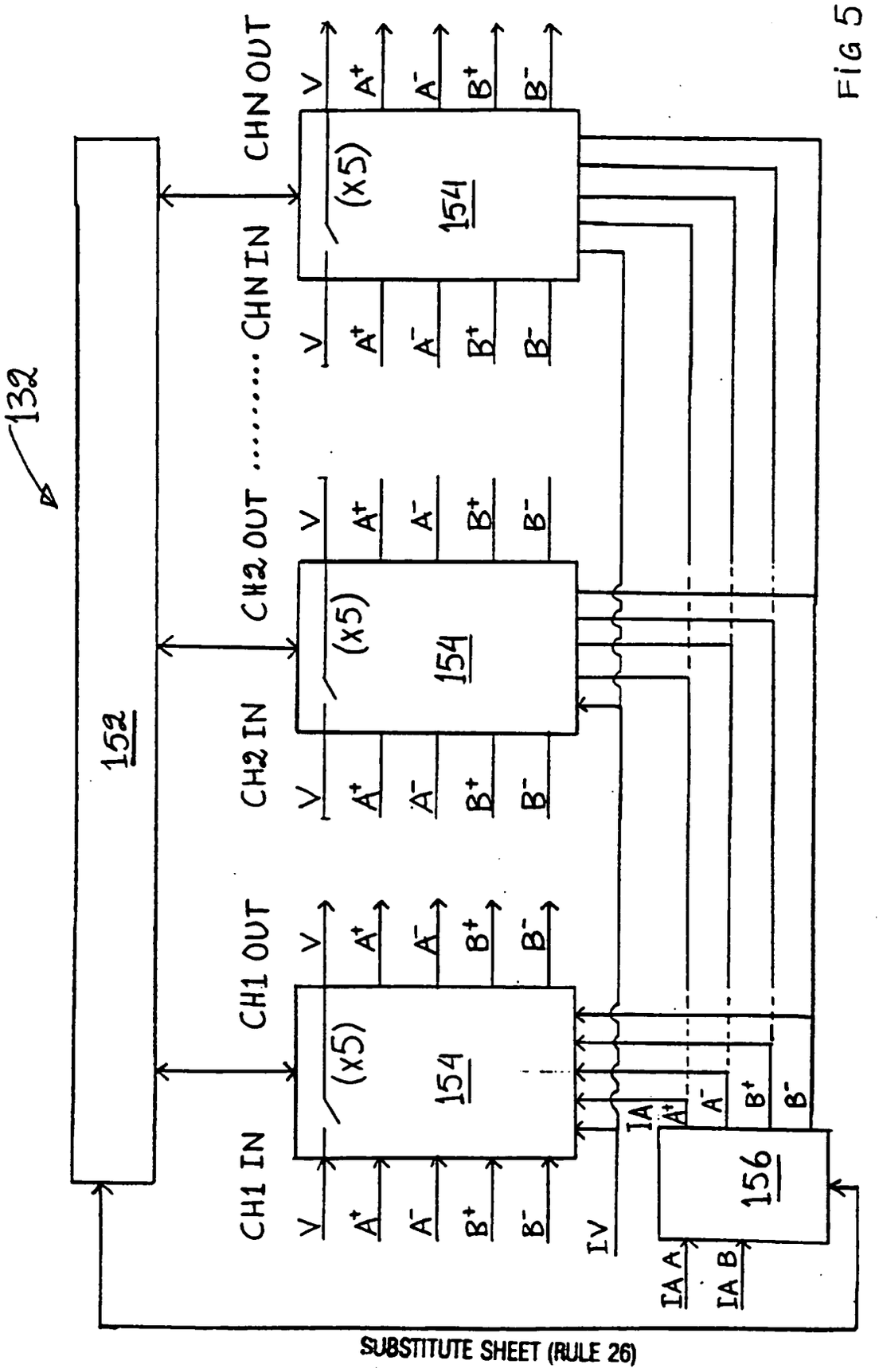
Fig 4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CH1 IN
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IV
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IA B

Fig 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/01056

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04N 7/08
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)

IPC6: H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, 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.
P,X	EP 0620689 A1 (CABLE SERVICE TECHNOLOGIES), 19 October 1994 (19.10.94), claim 1, abstract, Mentioned in the application	1,2,5
P,A	--	3,4
X	US 4814883 A (MICHAEL C. PERINE ET AL), 21 March 1989 (21.03.89), column 9, line 12 - line 34; column 11, line 10 - line 41; column 12, line 24 - line 29, abstract	1-3
Y		10
A	--	4,5

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
25 January 1996	29 -01- 1996
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Bengt Jonsson Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/01056

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 4638359 A (JOHN N. WATSON), 20 January 1987 (20.01.87), column 1, line 46 - line 59, abstract	1,2
Y		4
A		3,5
	--	
X	WO 9417633 A1 (SCIENTIFIC-ATLANTA, INC.), 4 August 1994 (04.08.94), page 1, line 16 - page 2, line 27; page 3, line 5 - line 21, claims 1-7, abstract	6-8
Y		11
	--	
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Y		4,11
A		10
	--	
Y	WO 9321732 A1 (AVID TECHNOLOGY, INC.), 28 October 1993 (28.10.93), page 10, line 1 - page 11, line 11, abstract, Mentioned in the application	10
	--	
X	WO 9419906 A1 (HENRY VON KOHORN), 1 Sept 1994 (01.09.94), abstract, see claims 1,30,31,38,42,52	12
	--	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

05/01/96

International application No.
PCT/SE 95/01056

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0620689	19/10/94	NONE	
US-A- 4814883	21/03/89	NONE	
US-A- 4638359	20/01/87	CA-A- 1212455 JP-B- 7083319 JP-A- 59226530	07/10/86 06/09/95 19/12/84
WO-A1- 9417633	04/08/94	NONE	
US-A- 5029014	02/07/91	NONE	
WO-A1- 9321732	28/10/93	NONE	
WO-A1- 9419906	01/09/94	NONE	

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(51) International Patent Classification 6 :
H04N 7/08, 7/10, 11/00, H04H 1/02, 7/00 | **A1**

(11) International Publication Number: **WO 97/29591**

(43) International Publication Date: 14 August 1997 (14.08.97)

(21) International Application Number: PCT/US97/01849

(22) International Filing Date: 7 February 1997 (07.02.97)

(30) Priority Data:
08/597,432 8 February 1996 (08.02.96) US

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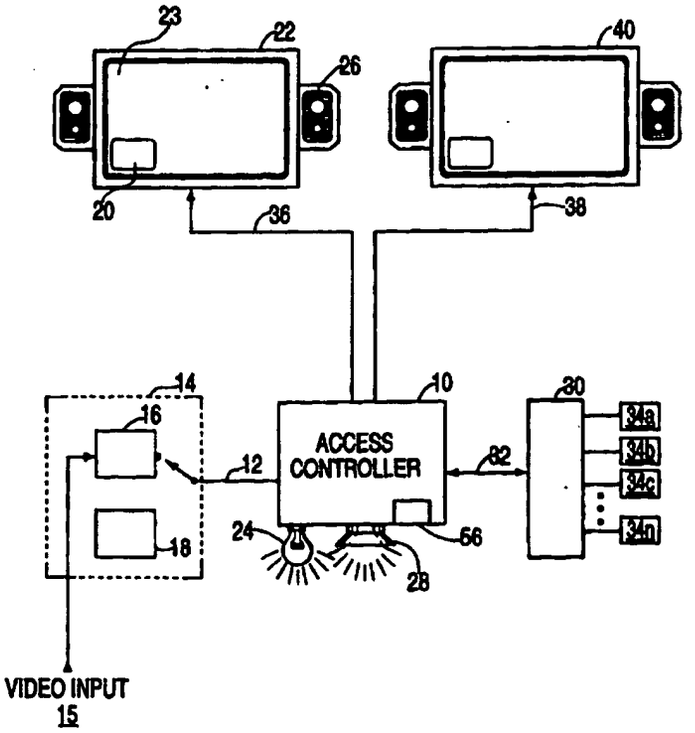
(81) Designated States: AU, CA, IL, JP, KR, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: MEDIA ONLINE SERVICES ACCESS SYSTEM AND METHOD

(57) Abstract

A system is disclosed for providing direct automated access to an online information services provider (34a, 34n) through an address embedded in a video or audio programm, commercial message, or news story. The system operates with video or audio programs (15) which are received through broadcast, cable or pre-recorded media, and which are encoded in either analog or digital formats. The address of an online information provider is encoded in a vertical blanking interval or other non-displayed portion of an electronic signal which represents the video or audio program so as not to interfere with the programs as displayed or transduced on a television or audio sound system (22, 40). The online information provider address is detected and decoded from the electronic signal and used in establishing a direct digital communication link to the online information provider (34a, 34n).



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MEDIA ONLINE SERVICES ACCESS SYSTEM AND METHOD

The present invention relates to an electronic information access system and more specifically to a media online services access system which provides direct, automated access to an online information provider through an address embedded in an electronic signal which carries a program segment (e.g., through television, radio, or a pre-recorded video or audio medium).

BACKGROUND OF THE INVENTION

Heretofore, media receiving and display systems such as television and radio receivers have been linked to interactive information providers in only very limited ways. Some systems exist which permit the exchange of digital information with the viewer of a television program over or in combination with a television signal, but such systems have provided access to a single information source available from, for example, the broadcast or cable television operator. In such systems, the selection of information services has been entirely within the control of the broadcast or cable television operator. At the same time, some television and radio broadcasters have begun announcing an Internet address for viewer inquiries during the course of program transmission. Access to this Internet address requires the user to utilize his or her computer. No system yet exists which provides automated and direct user access to online information providers through an address embedded in a video or audio program signal.

The recent explosion in the usage of online information services through digital networks such as the Internet, Prodigy (R), America Online (R) and Compuserve (R), for example, indicate that the demand for access to readily available up-to-date or detailed information is increasing. The viewer of a video program, whether the program is received through

broadcast, or cable means or from a pre-recorded medium, may often seek to discover more information which relates to a topic presented in the video program. Since television programs and recordings are of finite length, they do not contain all the related information which a consumer may wish, and the information contained therein may not be timely. Therefore, it would be desirable for there to be a system which automatically and directly provides access to an online information provider through an address which can be extracted from an audio or video program such as a television program, commercial or news story. With such system, several benefits would be obtained. For example, adults and children viewing an educational or historical video program could easily locate additional materials provided in text or still picture by the producers of the video program by accessing more information from the producers digitally through the online address. Consumers seeking more information about a specific advertised product could easily find such information by accessing the online address of an information provider designated by the advertiser. News program viewers seeking specific information from news stories or more detailed information could easily access such information through an online information provider designated by the producers of such program.

The online services access system could be used to provide still other benefits to consumers, business owners, and the government. For example, an automobile manufacturer could make information available directly to a consumer through an online address embedded in a video presentation so the consumer could reach its online site quickly to ask for more information, to request a test drive, or to purchase parts. Through such system, a grocery store could advertise and receive orders through its online site from customers for home delivery, or for other shopping needs. A catalog

retailer could use such system to provide rapid access to consumers, after airing a commercial, to its catalog in online form and to enable orders to be placed readily through its online site. A record company could use such system to enable customers to order a recording while listening to a song or viewing a music video. Government agencies, e.g., the Internal Revenue Service, military recruiters, or health agencies, for example, could use such system to provide consumers with readily available information following the airing of public service announcements regarding regulations, programs, or public health concerns, e.g., cancer, AIDS, and heart disease. Educators and students could use such system to obtain more detailed or up-to-the-minute information from online bulletin boards and databases regarding topics presented in a video program, even though the program was recorded some time in the past.

Systems exist at present in which digitally encoded information is transmitted and received through a modified video signal of a conventional television transmission. For example, a system is described in U.S. Patent No. 4,894,789 wherein a digital information signal is transmitted during the vertical blanking interval of an analog broadcast television signal and decoded and displayed on the television screen in addition to the analog broadcast video signal.

U.S. Patent No. 5,128,752 describes a system in which a retailer broadcasts information for reception upon a conventional television set regarding products available through a central location. The system includes a decoder for displaying the product information on the television screen, and also a token generator for producing tokens, at the user's option, to be redeemed when a product is purchased. The broadcast information includes data related to token redemption and value considerations available upon purchase of the product.

U.S. Patent No. 5,285,278 describes a system in which coupon-related digital information is received from a transmitted television signal through a decoder. The decoder records the coupon-related data for later readout and redemption when a product is purchased.

U.S. Patent No. 4,905,094 ("the '094 Patent") describes an interactive cable television system in which a subscriber tunes to a channel and requests connection to a remote location by either dialing a predetermined telephone number or accessing a cable television channel. When the system identifies the subscriber the television set displays the frame of video (and possibly accompanying audio information) describing products or services which may be viewed and purchased. The '094 Patent does not describe the extraction of encoded address information from the television signal, or a system enabling a television program viewer to access online information providers by establishing connection automatically through such extracted address.

Thus, systems exist which are capable of providing interactive user access through a broadcast or cable television signal. However, such systems are limited in the access they provide to information sources directly available through the unitary cable or broadcast provider. By contrast, the present invention facilitates direct automated user access to an unlimited number of online information providers through provider addresses which are embedded in the electronic signal which carries an video or audio program.

Accordingly, it is an object of the invention to provide a system for extracting an address of an online information provider from an electronic signal which carries an video or audio program.

It is a further object of the invention to provide a system which indicates to the program user (i.e., viewer or listener), after extracting an online

information provider address, that more information is available.

Still another object of the invention is to provide an automated system which, upon receipt of a single user command, directly and automatically establishes a digital connection with an online information provider through an address extracted from an electronic signal which carries a video or audio program.

Another object of the invention is to provide a system which converts information signals received from an online information provider to a form capable of being displayed on a conventional reproducing system such as a television set.

These and other objects are provided by the media online services access system of the present invention.

SUMMARY OF THE INVENTION

The media online services access system of the present invention provides a system and process which links video and audio program content with online information signal content. The system provides heretofore unattained direct automated user access from a media program such as a received or pre-recorded television or radio (audio) signal to an online information provider through a link provided in the media program. The access system receives an electronic signal representing a video or audio program or a combined audio/video program from an available medium (e.g., broadcast and cable television and radio, or a pre-recorded medium such as a tape or disc). Embedded in the electronic signal, for example, in the vertical blanking interval, or otherwise encoded in the electronic signal in such manner as not to interfere with the displayed image, is an information signal representing an electronic address of an online information provider. The online information provider

can be any one of millions of interactive information providers which can be accessed through exchange of digital information signals, for example, a publisher who is available through the Internet for interactive transactions. As the media program is received for reproduction on a video display or audio sound system, the access system extracts the embedded electronic address for use in directly accessing the online information provider at the selection of the user.

Preferably, the address is stored at the time of extraction, for use in accessing the online information provider at the selection of the user. The duration in which an extracted signal address is stored may be relatively short, as in the case where the address is transmitted and refreshed continuously or at very short intervals, e.g., once per each frame of a video signal, or it may be longer, as when an address is transmitted only at selected intervals of a program.

Upon successfully extracting an electronic address, the access system provides a indicator signal to the user that more information is available. The indicator signal may take the form of a message displayed on a video screen, or other indicators such as a light, a sound or a wireless tactile indicator, e.g., vibrating wristband or clip-on unit. Alternatively, the video or audio program may contain a logo or message to be displayed for the user at points in the program which coincide with the presence of an embedded online information provider address, which, in such case, would eliminate the need for the access system to incorporate specific structure to provide indication to the user, in response to successful extraction of an online provider address.

After receiving the indicator signal, if the user desires more information, the user may request access to the online information provider through a command to the access system, e.g., through pushbutton,

user control keypad, voice command, mouse, touchpad, touchscreen, or other such input. Upon receiving such command, the access system automatically establishes a digital communication link with the online information provider through transmission of a signal containing the extracted address. Preferably, upon establishment of such communication link, the access system enables interactive communications with the online information provider.

In another embodiment of the invention, the extracted address can be used without first being stored, as in cases where a connection already exists between the access system and a network. Where such connection exists, the access system provides an indicator signal to the user upon successful extraction of an online information provider address. However, in this embodiment, the access system waits to receive a user command to initiate access, and only after receiving such command does the access system extract the next received address from the electronic signal and use it to establish a direct connection to the online information provider.

In a preferred embodiment, after accessing an online services provider, the access system receives information from the online information provider and processes it for reproduction on a video or audio reproducing system. For example, the information can be displayed on the television screen in place of the television broadcast signal, on a separate computer monitor or other display device, or together with the television broadcast signal in a picture-in-picture format. In this way, the user can fully explore all of the related information available from the online information provider. Preferably, the access system is provided with hardware to reformat the received information signal for display upon an otherwise incompatible system, for example, to convert a digitally

encoded video signal to an analog signal for reproduction on a conventional television set. Preferably, the access system is also provided with hardware for receiving and processing user commands for transmission to the online information provider for providing user communication transactions with the provider.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block and schematic diagram illustrating the online services access system in accordance with the present invention.

FIG. 2 is a block and schematic diagram of an access controller used in the online access system of FIG. 1.

FIG. 3 is a block and schematic diagram of another embodiment of an access controller used with a computer in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An online services access system according to the present invention is illustrated in FIG. 1. Referring to FIG. 1, the online services access system includes access controller 10 which incorporates all components necessary to provide online access and to access received online information signals. Access controller 10 is constructed to receive an electronic signal 12 from a broadcast, cable or prerecorded medium program in conventional form from a video signal source 14. Video signal source 14 can be selectively switchable to provide output from a channel selector 16 connected to a cable or broadcast video input 15 or from a video playback system 18 which may be, for example, a videocassette recorder or an analog or digital videodisc device. It will be appreciated that channel selector 16 may be provided in a unit separate from playback system 18, or within access controller 10 itself. Alternatively, access controller 10 can be constructed to receive and decode program signals at radio frequency

as received from a broadcast or cable video source, or as downconverted to baseband, by for example, the front end receiving circuitry of a video cassette recorder or digital video disc device. It will also be appreciated that the function and results provided by access controller 10 are not dependent upon which of many available playback systems is connected thereto, whether such systems are analog or digital in format, or whether such playback systems operate upon videotape, audiotape, or disc media.

Access controller 10 is connected via a primary output signal line 36 to a conventional reproducing system 22 such as a television set, and is optionally connected through a second output signal line 38 to a high resolution reproducing system 40, such as a computer monitor. In addition, access controller 10 is connected to a public or private network 30 through an information signal carrier 32, e.g., telephone line, coaxial cable, fiber optic link, cellular, radiotelephone, or satellite link. Network 30, which may be any private or public local area network or wide area network such as an office network, company network, public Internet or circuit-switched network is used to route address and information signals between access controller 10 and a selected one of a plurality of online information providers 34a, 34b, 34c, . . . 34n. Access controller 10 receives from the online information provider, through network 30, information signals having a video or audio program content and selectively provides, through appropriate conventional processing, a conventional program signal or a high resolution signal for reproduction upon standard reproducing system 22, or high resolution reproducing system 40, respectively.

The internal construction of access controller 10 is described with reference to FIG. 2. Access controller 10 is provided with an address extractor 42

which receives the electronic signal 12. Address extractor 42 includes hardware and/or software to detect, decode and store an address which has been embedded in a video or audio program signal. Among the ways which exist to detect an address signal transmitted in conjunction with an analog video signal, address extractor 42 may be constructed to detect a digital address which is transmitted during a vertical blanking interval or other portion of a conventional video signal in such manner that displayed image quality is not affected. For example, the address signal can be transmitted during a portion of a video signal such as in the vertical interval, in sync or through changes in the luminance or chroma signals. Address extraction 42 is constructed to electronically store, e.g., via a register or memory device (not shown), the detected address for use in accessing the online services provider at the selection of the user. The address signal may be transmitted at very short intervals, e.g., once for each frame of a video program such that storing and refreshing of the extracted address signal occurs at very short intervals. Alternatively, the address signal may be transmitted at longer intervals, i.e., at discrete intervals in a program such that the duration in which an extracted address signal is stored is much longer.

In such cases in which video or audio program is encoded digitally, address extractor 42 may be constructed in any of several existing ways to detect an address signal which is received in conjunction with a digitally encoded video or audio electronic signal 12. The details of the construction of address extractor 42 are well known in the art and need not be described in further detail.

Address extractor 42 has an output connection to an indicator signal generator 46. The indicator signal generator 46 signals the user that more

information relating to the program is available, such information being accessible through an electronic address when address extractor 42 has decoded such address from the electronic signal 12. Indicator signal generator 46 causes, for example, a video image 20 (e.g., picture within picture, logo, or icon) to be displayed with the video program signal on reproducing system 22 to signal the user that an address of an online provider has been stored and that additional information is available. Instead, or in addition to such visual display, indicator signal generator 46 may signal the user by activating a light 24 or other visual indicator located on an exterior panel of access controller 10 or of reproducing system 22. Alternatively, indicator signal generator may cause a sound to be produced on a speaker 26 of reproducing system 22, or by a speaker 28 provided in access controller 10. Here again, the design of indicator signal generator 46 is well known in the art.

Access controller 10 is provided with a user input interface 56 for receiving a user command which automatically initiates establishment of a direct digital communication link to an online information provider through an address detected from the electronic signal 12 by address extractor 42 and permits interactive communication between the user and the online information provider. It will be appreciated that many conventional input interfaces are well suited for use as user interface 56 because of their compatibility with conventional television and audio sound systems. Among such input interfaces are infrared, radio and audio frequency interfaces which decode single key or multiple key sequence input from a wired or wireless remote user control. Preferably, user input interface 56 detects when a special purpose button on a remote user control has been pressed and provides a responsive signal which automatically causes the stored

address of the online provider to be retrieved and transmitted. User input interface 56 can also be constructed to detect when a special sequence of keys has been pressed on a conventional user control (e.g., a sequence such as "ENTER," "ENTER," "+VOLUME") and to enable interactive communication with the online information provider. Alternatively, user input interface 56 can be implemented by any appropriate microcomputer type user interface, e.g., mouse, touchpad, touchscreen, trackball, joystick, pushbutton, eraser head, or other such device. Preferably, user interface 56 is constructed to provide and receive transmission of digital information signals through modem 54 to the online information provider, thereby enabling interactive user access with the online provider for conducting detailed information searches, conducting transactions, and sending or posting messages to the accessed provider.

Access controller 10 is provided with a modem 54 for transmitting and receiving digital information signals between access controller 10 and public switching network 30 through an information signal carrier line 32. Modem 54 demodulates incoming information signals and outputs them to processor 58 which extracts a video and/or an audio signal 38. Preferably, access controller 10 includes a signal converter 62 for adjusting or converting an incompatible signal for display upon conventional reproducing system 22, such as a television set, either in place of the television signal, superimposed over the television signal, or in picture-in-picture format, as controlled by the user. Alternatively, processor 58 provides the video signal on line 38 to a high resolution reproducing system 40, such as a computer monitor. Indicator signal generator 46 may also incorporate a switch (not shown) which automatically switches off the primary output signal 36 whenever a signal appears at the output of

signal converter 62. In this manner, information signals received from online information providers will be automatically displayed on conventional reproducing system 22 in place of the ordinarily displayed video signal 36. Processor 58 can also receive the input video or audio electronic program signal through a line 55 output from address extractor 42 (although direct connection of the electronic signal line 12 is possible). In this manner, processor 58 may be constructed to operate upon the video or audio signal in conjunction with information signals received from an online information provider to generate a "picture within picture" signal for display upon conventional reproducing system 22.

The operation of the system will now be described. An electronic signal 12, such as a signal from a video or audio program from channel selector 16 or playback system 18, e.g., prerecorded videotape, or an analog or digital video disc, containing an embedded signal representing the electronic address of an online information provider in the blanking interval or other non-displayed portion of the electronic signal 12 is received by address extractor 42. From the electronic signal 12, address extractor 42 detects, decodes and stores a digital address of the online services provider, if any such address is embedded therein. If an address is successfully decoded and stored, address extractor 42 activates, through signal line 44, indicator signal generator 46. Indicator signal generator 46 then produces an indicator signal and overlays or encodes it onto a conventional program signal 36 to be displayed or transduced by conventional reproducing system 22. Alternatively, indicator signal generator 46 produces a signal on line 50 which activates a special purpose indicator, e.g., illuminating a light 24 or producing a sound on a speaker 28 of access controller 10.

If the user wants to access the online information provider, the user gives such command to access controller 10 by, for example, pushing a special button on his or her remote control device. The remote control device transmits a command signal to user interface 56 which receives the command signal. User interface 56 in turn, produces a signal which is applied to address extractor 42 to retrieve the stored address of the online information provider. Under appropriate software or hardware control, the address is transmitted via modem 54 over network 30 to an online information provider, e.g., 34c.

Once access to the online information provider has been established, access controller 10 can automatically receive digital information signals through modem 54 from the online information provider. Received information signals are operated upon by processor 58 for displaying upon conventional TV reproducing system 22 or high resolution reproducing system 40, e.g., a computer monitor or other display device. Preferably, received signals which are incapable of being directly displayed upon conventional reproducing system 22, e.g., a conventional television set, are converted by a signal converter 62 for display thereon. Information signals received from an online information provider may be displayed as still or moving images in place of the ordinarily displayed video signal on the conventional reproducing system 22, or may be displayed as part of a "picture within picture" display in conjunction with the ordinarily displayed video signal on conventional reproducing system 22 or on the computer monitor 40 or other display device.

After access has been established, user commands received through user interface 56 are transmitted as information signals through modem 54 to the online information provider, thereby providing interactive user access with the online provider and

enabling searching for detailed information, conducting transactions, sending or posting messages to the accessed provider and any other actions that can ordinarily be conducted through an online connection.

Another embodiment of the invention is illustrated in FIG. 3. FIG. 3 shows an embodiment which operates in conjunction with an available computer 164. In this embodiment, access controller 110 does not require an internal processor or modem because such functions are provided by a computer 164 attached thereto. In addition, computer 164 also provides a monitor and audio reproducing components which function as high resolution reproducing system 40. Address extractor 142, indicator signal generator 146, and user input interface 156 of access controller 110 are connected through an output interface 166 for providing decoded address output, indicator signals, and user commands, respectively, to computer 164. In other respects, access controller 110 is connected to receive an electronic signal 12 and provide a conventional program signal 122 and a signal 150 to indicator 124 or indicator 128, in like manner as in the self-contained embodiment of access controller 10 described in the foregoing (FIG. 2). It will be appreciated that the computer supported embodiment of the invention (FIG. 3) provides the same function and operates in essentially the same manner as the self-contained embodiment (FIGS. 1-2) and need not be described in any further detail.

In still another embodiment of the invention, with reference to FIGS. 1-3, a connection to network 30 is maintained continuously by access controller 10 through modem 54 or the modem provided in computer 164. This embodiment will be described with reference to the access controller 10 shown in FIG. 2, although the skilled person in the art will readily understand the structural modifications required for operation in accordance with the access controller shown in FIG. 3.

In this embodiment, address extractor 42 detects and decodes an online information provider address embedded in the video or audio program signal, but does not store the address.

As described in the foregoing embodiments of the invention, address extractor 42 provides a signal to indicator signal generator 46 when it successfully detects an online information provider address in the electronic signal. Address extractor 42 detects and decodes the embedded address and passes it to modem 54. Modem 54, in turn, only uses the extracted address if it has first received a user command to initiate access to the online information provider. It will be appreciated that this embodiment of the invention can be used with a video or an audio program signal wherein the online information provider address is frequently or continuously transmitted. Modem 54 is provided with hardware and/or software to automatically establish, upon receiving a user command to initiate online access, a direct digital communication link with the online information provider associated with the next received online information provider address.

As an example of the operation of this non-address storing embodiment of the invention, a video or an audio program signal having a frequently transmitted embedded signal containing an online information provider address is received through line 12 by address extractor 42. Address extractor 42 detects and decodes the online information provider address, but does not store it before passing it to modem 54. Modem 54 does nothing with the online information provider address unless a user command to initiate access has first been received from user interface 56. If such user command has been received, modem 54 transmits a signal over network 30 using the next received address to establish a digital communication link with the online information provider. The function and operation

of the non-address storing embodiment is otherwise the same as in the other described embodiments of the invention and need not be described in any further detail.

In yet another embodiment of the invention, automated direct user access to online information providers is achieved without incorporating an indicator signal generator 46, 146 (FIG. 3) into the access controller 10. In this embodiment, the video or audio program as produced incorporates a visual or auditory indicator, such as a logo or message, which is automatically displayed or sounded by conventional reproducing system 22 and/or high resolution reproducing system 40 during portions of the program when an online information provider address is present in the underlying electronic program signal. Through the visual or auditory indicator, the user is made aware of the availability of the online information provider address. Therefore, in this embodiment of the invention, address extractor 42 may be constructed and used in a manner so as to detect and decode an embedded online information provider address only after receiving a user command to initiate access to the online information provider. The skilled person in the art will appreciate that this embodiment of the invention operates in other respects as in the other embodiments of the invention described in the foregoing and need not be described in further detail.

While the invention has been particularly described and illustrated with reference to preferred embodiments thereof, it will be understood by those skilled in the art that changes in the above description or illustration may be made with respect to form or detail without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A method of providing to a user of online information services, at the time of viewing a video program represented by an electronic signal, direct digital communication access to an online information provider through a link provided in said video program, comprising:

electronically extracting an address associated with an online information provider from an information signal embedded in said electronic signal;

indicating to the user that an address has been extracted permitting communication with an online information provider; and

automatically using said extracted address, in response to a user initiated command, to establish a direct digital communication link with the online information provider associated with said extracted address.

2. The method in accordance with Claim 1 further comprising using said direct communication link to provide interactive exchange of information between said online information provider and the user.

3. The method in accordance with Claim 1 wherein said step of indicating includes producing a visual indication to be displayed on the system wherein said program is displayed.

4. The method in accordance with Claim 1 wherein said step of indicating includes producing an auditory indication to be sounded on a speaker where an audio portion of said program is reproduced.

5. The method in accordance with Claim 1 wherein said step of indicating includes activating a sensory indicator on a system separate from that on which said program is reproduced.

6. The method in accordance with Claim 1 wherein said step of indicating further includes indicating that more information relating to the content

of said video program is available through said extracted address.

7. A method of providing online information services to a user of such online services, comprising the steps of:

providing an audio or video signal having an embedded information signal representing the address of an online information provider;

extracting and storing the address of said online information provider from said audio or video signal;

automatically using said stored address, in response to a user initiated command, to transmit a signal to connect said user with the online information provider associated with said stored address; and

receiving online information signals from said online information provider.

8. A method of providing to a user of online information services, at the time of viewing a video program represented by an electronic signal, direct digital communication access to an online information provider through a link provided in said video program, comprising:

indicating to the user that an address is available for extraction from said electronic signal which permits communication with an online information provider;

automatically electronically extracting, in response to a user initiated command, an address associated with an online information provider from an information signal embedded in said electronic signal, and using said extracted address to establish a direct digital communication link with the online information provider associated with said extracted address.

9. A media online services access system for providing to a user of online information services, while viewing or listening to a video or audio program

represented by an electronic signal, a direct digital communication link with an online information provider through a link provided in said electronic signal, comprising:

electronic detecting means for extracting an address associated with an online information provider from an information signal embedded in said electronic signal;

means for indicating to the user that an address has been extracted which permits communication with an online information provider; and

means responsive to a user initiated command for automatically establishing a direct digital communication link with the online information provider associated with said extracted address.

10. The media online services access system in accordance with Claim 9 wherein said program is a video program, further comprising:

means for receiving an information signal from said online information provider; and

means for displaying an image signal detected from said received information signal.

11. The media online services access system in accordance with Claim 9 wherein said indicating means comprises a visual indicator displayed on a system on which said program is displayed.

12. The media online services access system in accordance with Claim 9 wherein said program is an audio program.

13. The media online services access system in accordance with Claim 9 further comprising a user control device coupled to said system to permit said user to interactively communicate with said online information provider.

14. The media online services access system in accordance with Claim 9 wherein said means further includes means for indicating that more information

relating to the content of said video program is available through said extracted address.

15. A media online services access system for providing to a user of online information services, while viewing or listening to a video or audio program represented by an electronic signal, a direct digital communication link with an online information provider through a link provided in said electronic signal, comprising:

means for extracting and storing an address associated with an online information provider from an information signal embedded in said electronic signal;

means for indicating to the user that an address has been extracted which permits communication with an online information provider; and

means responsive to a user initiated command for automatically establishing a direct digital communication link with the online information provider associated with said stored address.

16. The media online services access system in accordance with Claim 15 wherein said means further includes means for indicating that more information relating to the content of said video program is available through said extracted address.

17. A media online services access system for providing to a user of online information services, while viewing or listening to a video or audio program represented by an electronic signal, a direct digital communication link with an online information provider through a link provided in said electronic signal, comprising:

means for indicating to the user that an address is available for extraction from said electronic signal which permits communication with an online information provider; and

means responsive to a user initiated

command for extracting an address associated with an online information provider from an information signal embedded in said electronic signal, and for automatically establishing a direct digital communication link with the online information provider associated with said extracted address.

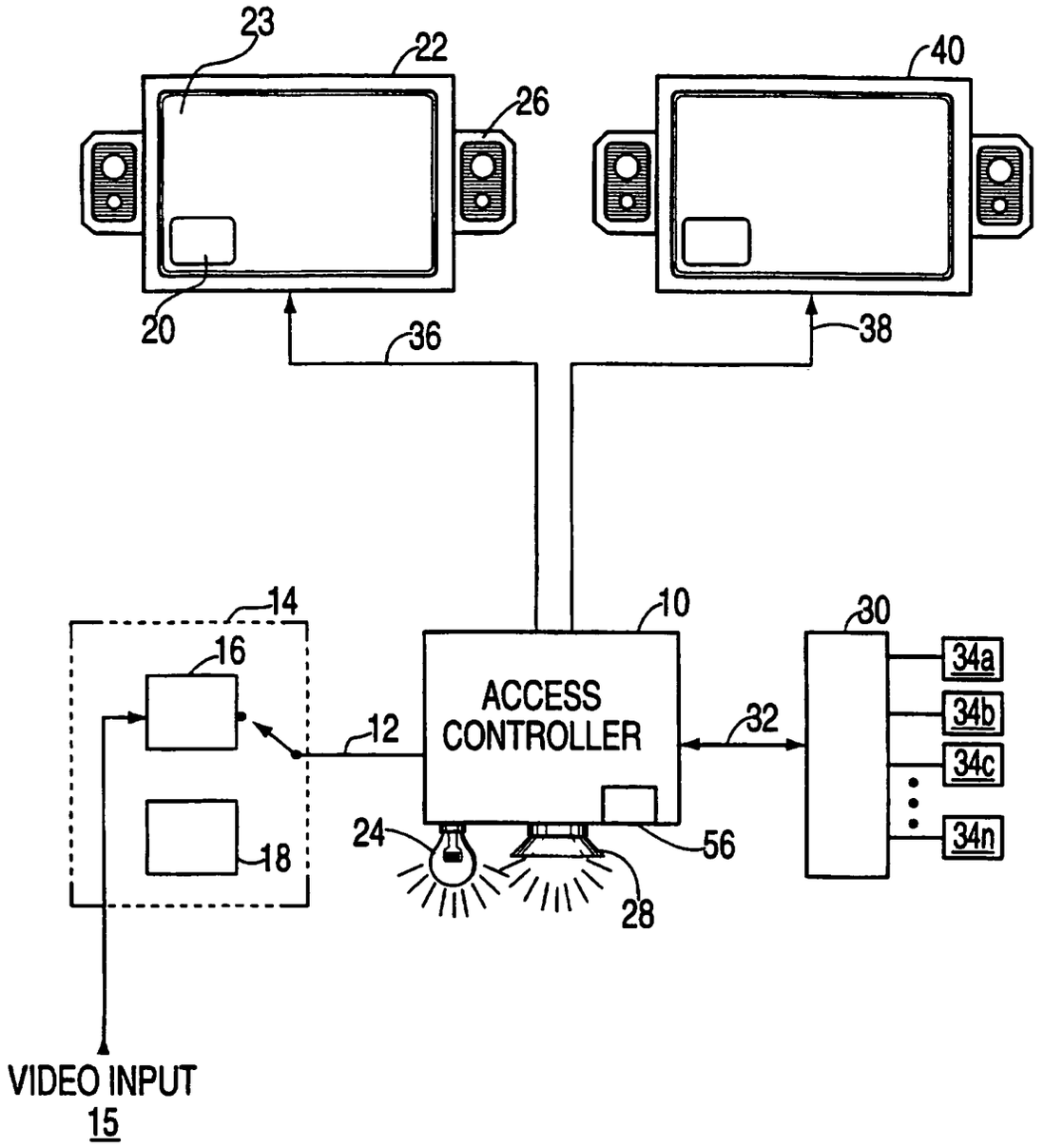
23
22
26
40
20
36
38
14
16
10
30
ACCESS
CONTROLLER
12
32
34a
34b
34c
34n
18
24
56
28
VIDEO INPUT
15

FIG. 1

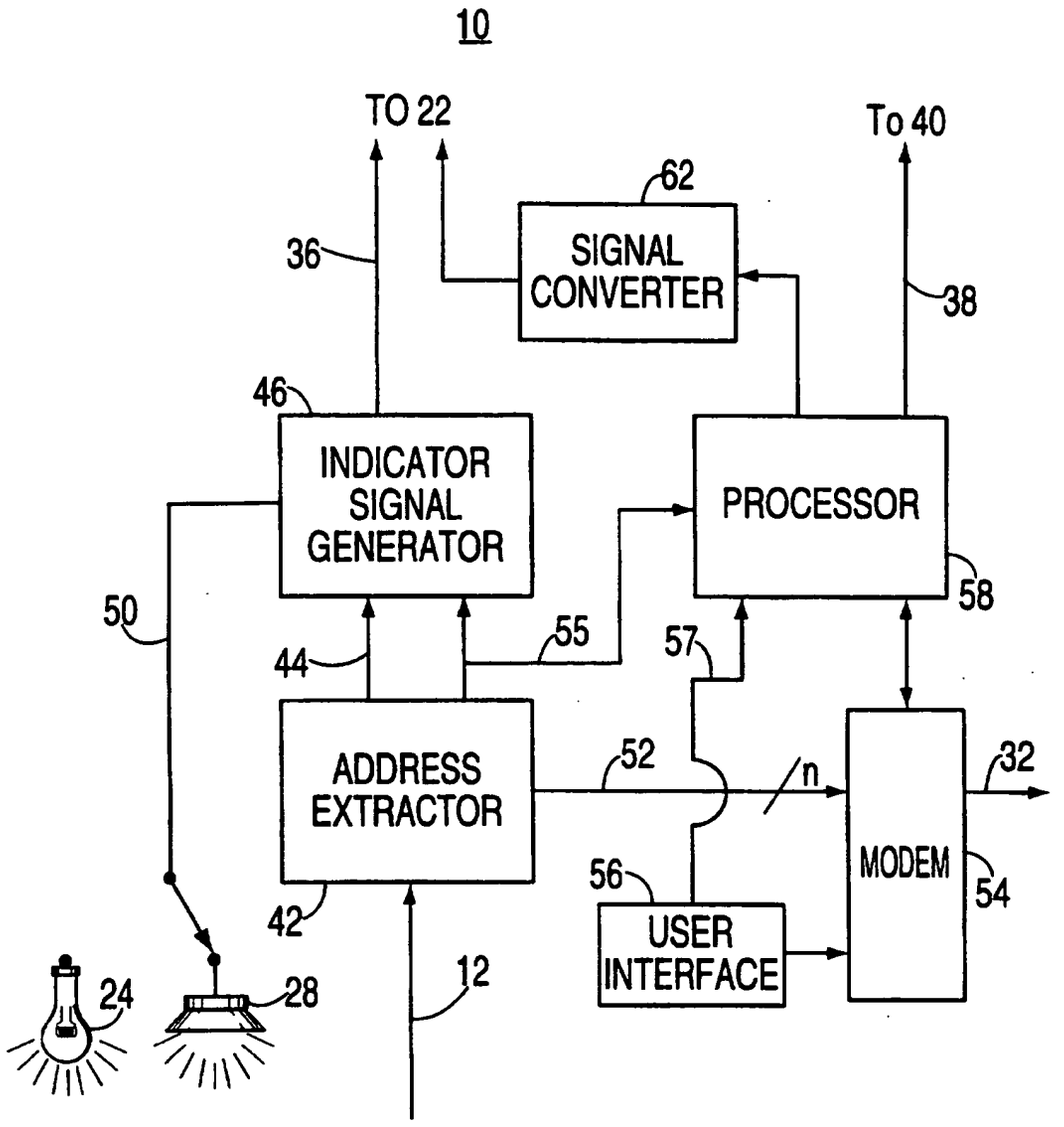
10
TO 22
To 40
62
SIGNAL CONVERTER
36
38
46
INDICATOR SIGNAL GENERATOR
PROCESSOR
58
50
55
57
44
ADDRESS EXTRACTOR
52
n
32
MODEM
54
56
USER INTERFACE
42
12
24
28

FIG. 2

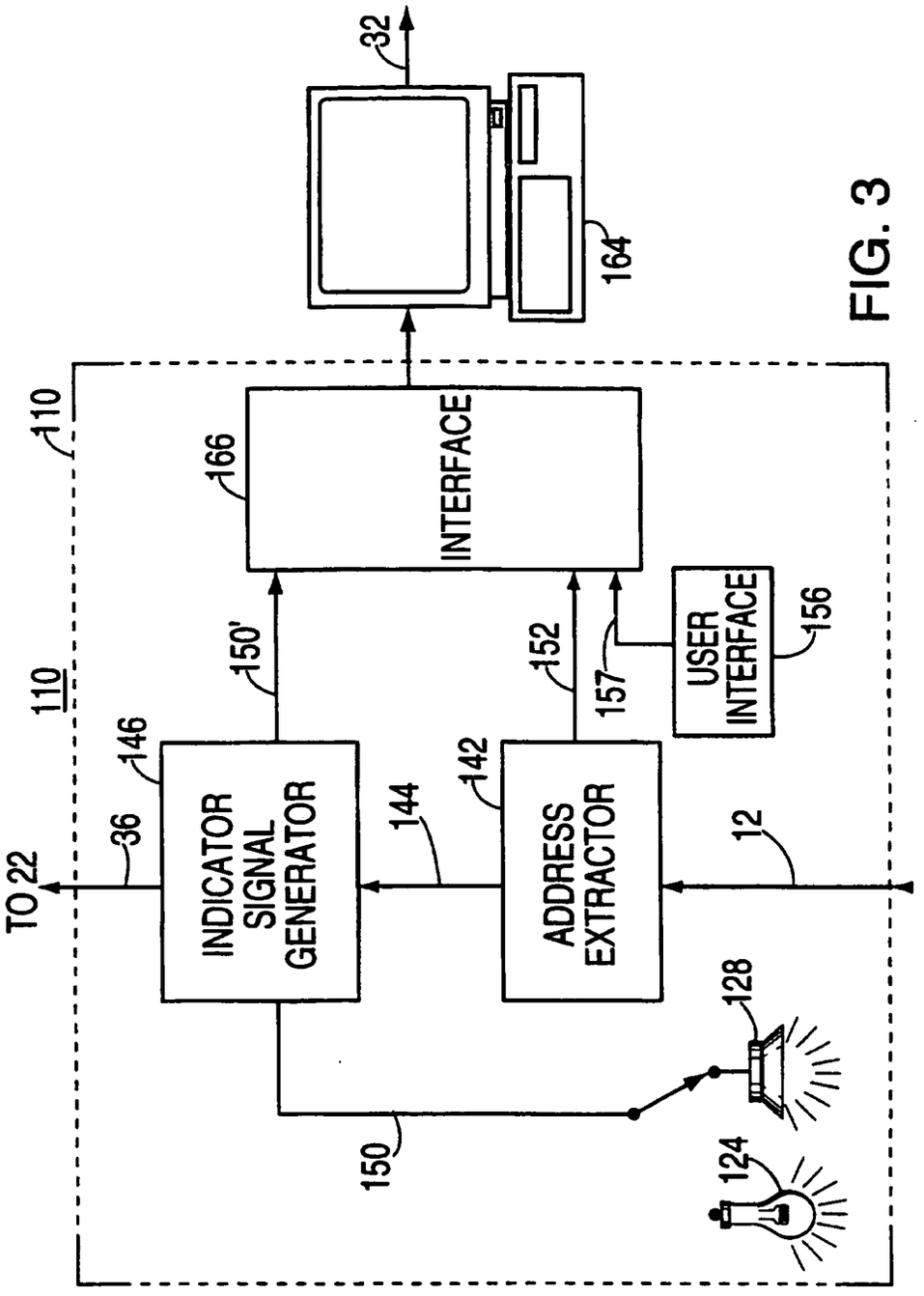
32
164
110
166
INTERFACE
150'
152
157
USER INTERFACE
156
110
146
142
144
12
36
TO 22
INDICATOR SIGNAL GENERATOR
ADDRESS EXTRACTOR
128
150
124

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/01849

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :Please See Extra Sheet.
US CL :Please See Extra Sheet.
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)

U.S. : Please See Extra Sheet.

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 practicable, 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.
A	US 5,262,860 A (FITZPATRICK et al) 16 November 1993, see whole document.	1-17
A	US 5,438,355 A (PALMER) 01 August 1995, see whole document.	1-17
A,E	US 5,604,542 A (DEDRICK) 18 February 1997, see whole document.	1-17

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 23 MARCH 1997	Date of mailing of the international search report 16 APR 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer JOHN W. MILLER Telephone No. (703) 305-4795

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/01849

A. CLASSIFICATION OF SUBJECT MATTER:
IPC (6):

H04N 7/08, 7/10, 11/00; H04H 1/02, 7/00

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

348/6, 10, 465, 476; 455/6.2, 6.3

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

348/6, 7, 9, 10, 12, 13, 461, 465, 469, 473, 476, 477, 478, 479; 455/3.1, 4.1, 4.2, 5.1, 6.1, 6.2, 6.3; H04N 7/00, 7/08, 7/084, 7/087, 7/10, 11/00

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 7/00, H04L 12/00 — A1

(11) International Publication Number: **WO 97/33434**

(43) International Publication Date: 12 September 1997 (12.09.97)

(21) International Application Number: PCT/US97/03525

(22) International Filing Date: 7 March 1997 (07.03.97)

(30) Priority Data:

08/613,144	8 March 1996 (08.03.96)	US
08/615,143	14 March 1996 (14.03.96)	US
08/622,474	25 March 1996 (25.03.96)	US

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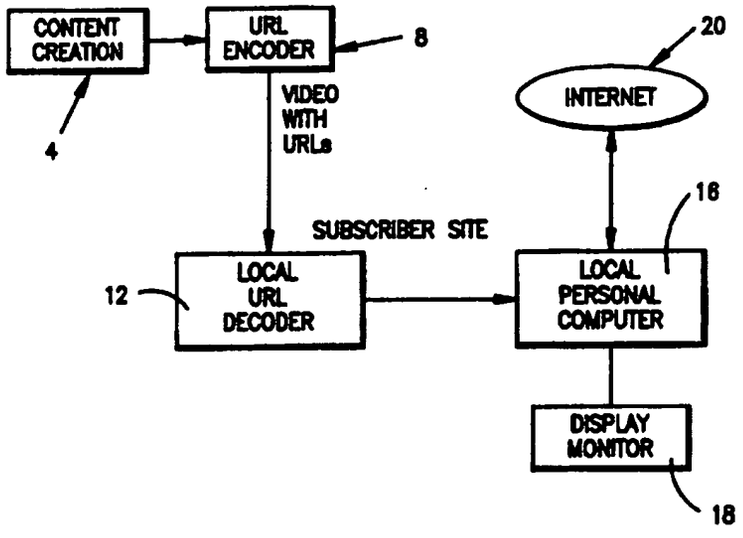
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: AN INTEGRATED INTERACTIVE VIDEO AND INTERNET SYSTEM

(57) Abstract

A system for integrating video programming with the vast information resources of the Internet (20). A computer-based system (16, 114) receives a video program and uniform resource locators (URLs). The URLs are interpreted by the system (12) to direct the system to the Web site locations to retrieve related Web pages (98). The video program signal can be displayed on a video window on a conventional personal computer screen (18). The actual retrieved Web pages can be time stamped and displayed, on another portion of the display screen (18), when predetermined related video content is displayed in the video window. The computer-based system can receive the URLs embedded in the video program (86) or directly through an Internet connection (94), at times specified by TV broadcasters in advance.



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AN INTEGRATED INTERACTIVE VIDEO AND INTERNET SYSTEM

This application is a continuation-in-part of U.S. Application Serial No. _____, filed March 14, 1996, entitled "AN INTEGRATED INTERACTIVE VIDEO AND INTERNET SYSTEM" (Attorney Docket No. 4247), which is a continuation-in-part of U.S. Application Serial No. _____, filed March 8, 1996, entitled "AN INTEGRATED INTERACTIVE VIDEO AND INTERNET SYSTEM" (Attorney Docket No. 4246).

BACKGROUND OF THE INVENTION

Today, the capabilities of computers to provide massive amounts of educational and entertainment information has exploded with the Internet. The Internet has the power to transform society through unprecedented levels of information flow between members. Currently, on-line systems offer a variety of different services to users, including news feeds, electronic databases (either searchable by the user directly on the on-line system, or downloadable to the user's own computer), private message services, electronic newsletters, real time games for play by several users at the same time, and job placement services, to name a few. However, today, most on-line communications occur merely through text. This currently stands in great contrast to the audio/visual presentation of the alternative electronic medium, television. However, it is expected that as multi-media's incessant growth continues, audio/visual programs will proliferate and text will become less and less dominant in the on-line environment. Even though these programs will be introduced, the Internet, will remain essentially user unfriendly due to its very massiveness, organization,

and randomness. Simply stated, there is no order or direction in the Internet. Specific pieces of information are many times hard to find, and harder yet, is the ability to put that piece of information into a meaningful context.

Television, on the other hand, has been criticized for being a passive medium - "chewing gum for the eyes," as Fred Allen once observed. Television has always been something you watched, not something you do. Many social critics believe that the passivity television depends on has seeped into our entire culture, turning a nation of citizens into a nation of viewers. While interactive television systems have increased the level of user interaction, and thus, provided greater learning and entertainment opportunities, vast information resources such as databases are inaccessible from such a medium.

What is needed is a means to close the gap between video programming and the information superhighway of the Internet. What is needed is a wider, richer experience integrating audio/visual and textual database elements into an organized unique interactive, educational, entertainment experience. Currently, the Internet is a repository of information on virtually any subject. However, what is needed is a mechanism for combining the user-friendly visual experience of television with the vast information resources of the Internet.

SUMMARY OF THE INVENTION

The system of the present invention combines broadcast television programming and/or video programming which appears on a VHS or Beta tape, CD-ROM, DVD or other medium, or video programming at a video server (hereinafter "video programming") with the massive Internet, creating a new

and powerful educational and entertainment medium. The system allows consumers to receive more information in a more efficient manner than either television or the Internet alone. Consumers not only can see a news report on television, but they can also read pertinent information about the report, as well as explore related information about the story. The program becomes the introduction to a particular subject, rather than the entire subject itself. The act of viewing a program has now become a more engaging, enriching experience.

The system can also create a more intimate relationship between the viewer and the program. The user might be solving problems or performing virtual experiments on the Internet site that a teacher is discussing in an educational television program. Similarly, the consumer might be solving problems that the fictional characters in a television program must solve. In both cases, the consumer is an active participant in the process, rather than a passive observer.

Instead of an undirected and unfocused exploration of Internet sites, by synching specific Internet pages to the video signal, the system puts the Internet in context. The television program producers now can decide what additional information to offer their audience. This material can now be seen in the context of the television program.

An additional advantage is that consumers don't have to search through the literally hundreds of millions of pages on the Internet to find appropriate material. The material has already been filtered by the program producers and delivered to the consumer automatically.

Another advantage of the system is that it changes the nature of

advertising. Since additional information can be given to consumers automatically, advertising can now be more substantive, allowing customers to make more informed choices. Now, the act of purchasing a product seen on television can be streamlined -- the consumer can be given the choice of buying the product instantly using the two-way capabilities of the system.

In addition, users can take advantage of the two-way capabilities of the Internet to respond to polls, to send e-mail or to link to additional sites. For example, a viewer watching a television news program, through the system of the invention, can receive a stream of Web pages which provide additional, specific information relating to the news content -- whether background on the Presidential primaries or the latest change in interest rates.

The video programming and corresponding Internet pages can be viewed on personal computers equipped with a television card, but the open software-based approach enables anyone with a television set and JAVA enables PC to experience the system of the invention.

By marrying the appeal of television with the two-way data transfer capabilities of the Internet, the system creates a powerful new medium: Television producers and Internet site creators can enhance their content to extend their brand identity and differentiate their program offerings to the millions of people who are spending more time navigating through the resources of the World Wide Web rather than watching television; advertisers can speak more directly to consumers by directly sending Web pages to the consumer instead of only displaying Web addresses in their commercials; and consumers can gain a new level of interest and interactivity over a video-based

medium. In addition to providing significant and immediate benefits to broadcasters and advertisers, the system will also present educational programmers with a way to more effectively use Internet resources in the classroom.

Recently, several media companies have joined to create a system for linking the Internet and television on the personal computer, called "Intercast." In this system, content will be provided simultaneously with the TV video signal. This system, however, requires that stripped down Web pages be sent in the vertical blanking interval (VBI) of the video signal, using up to three scan lines limiting effective bandwidth to approximately 28.8 kbps. This approach, however, requires specialized hardware to both insert the Web pages into the VBI and extract these codes at each PC since it takes up to three scan lines of the VBI. Thus, the complexity and cost of the PC is increased. Because the Web pages are transmitted with the video signal, the Intercast system is not a true "two-way" system, but merely a one-way "piggyback" system. In addition, the Intercast is an analog video product, and thus, cannot handle digital video data.

The system of the present invention, on the other hand, is a much more flexible, but less complex, system. The present invention supports either analog or digital television broadcasts without broadcasters or end-users having to alter their existing systems, thus enabling broadcasters to reach a wide audience within a short time.

In a first embodiment, the actual Web pages are not forced into the very limited bandwidth of the vertical blanking interval (VBI). Instead, merely eight fields of line 21 of the VBI are used to deliver the relevant Internet Web page

addresses to the PC. These addresses are called "uniform resource locators" (URLs). The system then directs the particular Web browser to retrieve the identified Web pages from the Internet. Upon receipt of the particular Web page(s), the system syncs the Web page(s) to the video signal, and at the appropriate times, presents the Web pages on one portion of the computer screen with the television video signal, shown in a window on another portion of the screen, and thus, provides the synergistic Internet and television experience. One of the advantages of the system of the present invention is that no specialized chip set need be produced and implemented into the standard PC. Thus, complexity is kept to a minimum.

In another preferred embodiment of the present invention, the VBI is not used to transmit the URLs to the user. In this alternative embodiment, member broadcasters enter the Internet through a member account, and will be provided with a graphical user interface for pre-scheduling Internet addresses, or URLs, for transmission to users at particular times of day. This interface could also be used to transmit real time live transmissions of URLs to users at the same time as a broadcast. The URLs are stored in a "Link File" for later transmission over the Internet to the user at the broadcasters entered time, which corresponds to the broadcast time of an associated program. This embodiment eliminates the need to place the URLs in the VBI, and also allows the broadcaster to store more than one Link File for transmission to users in different time zones, for example. Further, more than one broadcaster could access the same master schedule if desired, and add or delete certain URLs to personalize the program for their local audiences. Also, personalization can be taken to the single user, or small group

of users, by having the system send a different stream of URLs to each user, depending on a unique user profile, for example. Thus, the personalization feature of the present invention allows each user to receive information uniquely relevant to their interests, demographics, history, etc. This embodiment makes the transmission of URLs to the user even less complex than the first embodiment disclosed herein.

Thus, it is an object of the present invention to provide order and direction to the Internet by using television signals to place, orient and control such information in a meaningful context.

It is an object of the present invention to create a more intimate relationship between the viewer and the program by enriching the learning experience through the provision of more in-depth information.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram of the system design, showing the receipt and decoding of video signals at the subscriber location using the method of the present invention.

Figure 2 is a diagram showing an alternative system embodiment to achieve the integration of the Internet information with the video content by decoding the uniform resource locators at a server site and then transmitting the URLs to the subscriber stations via the Internet.

Figure 3 is a flow diagram of the basic software design of the present invention.

Figure 4 is a diagram showing another preferred system embodiment to

achieve the direct transmission of URLs over the Internet to the user at a broadcaster's entered time without encoding the URLs into the VBI.

PREFERRED EMBODIMENT

The system of the present invention combines the rich visual capabilities of television with the vast resources of the Internet. As shown in Figure 1, a preferred embodiment of the invention is a computer based system for receiving a video program along with embedded uniform resource locators (URLs)--which direct the user's computer 16 to address locations, or Web sites, on the Internet 20 to retrieve related Web pages. These Web pages correspond to the video presentation. The particular video programming can be delivered in analog, digital or digitally compressed formats (e.g., MPEG2) via any transmission means, including satellite, cable, wire, or television broadcast.

The video programming is preferably created at a centralized location, i.e., content creation 4 as shown in Figure 1, for distribution to subscribers in their homes, for example. Program creation is accomplished according to any conventional means known in the art. After a video program is created, uniform resource locators are embedded, in one preferred embodiment, into the vertical blank interval of the video programming by the URL encoder 8, shown in Figure 1. In this embodiment, the URLs are encoded onto eight fields of line 21 of the VBI. Line 21 is the line associated with close captioning, among other things. However, the URLs could also be embedded in other fields of the VBI, in the horizontal portion of the video, as part of the audio channel, or in any subcarrier to the video. Preferably, the URLs have associated time stamps which indicate to

the subscriber stations when, during the video program, to display the particular Web pages addressed by the URLs.

The particular information in line 21 is not part of the visual part of the program, and thus, is not perceptible to the human eye, thereby making it ideal to send data information to the users. While the bandwidth capacity of line 21 is limited, because the system of the present invention transmits only the uniform resource locators (URLs), and not full Web pages, there is more than enough capacity. Furthermore, no additional hardware is necessary at the PC 16 to implement the elements of the present invention. Thus, the present invention has the additional advantages of being very efficient and takes advantage of conventional hardware.

Once the video program is created, it can be transmitted to user sites over any transmission means, including broadcast, cable, satellite, or Internet, and may reside on video servers. Furthermore, the video program, with embedded URLs, can be encoded on a VHS or Beta tape, DVD or other medium.

Preferably, each receiver station comprises any Intel x86 machine (preferably a 486 processor, pentium processor, etc.), an Apple Computer, UNIX or any other type of standard computer workstation. The local PC 16 is preferably connected to either a cable and/or broadcast television connection or to a local VCR or other video source. At each subscriber site, the local personal computer 16 preferably receives the cable transmission by cable connection on the back of the personal computer 16. The video/audio program can then be processed for display on the computer screen using any conventional PC card capable of displaying NTSC signals on a computer monitor, such as a WinTV card. In

addition to the cable connection, however, in the present invention there is also an Internet 20 connection created concurrently with the cable connection.

The Internet 20 connection can be via high-speed line, RF, conventional modem or by way of two-way cable carrying the video programming. The local PC 16 has Internet access via any of the current ASCII software mechanisms. In a preferred embodiment, at each subscriber home, an associated local URL decoder 12 receives the cable video television program, as shown in Figure 1. The local URL decoder 12 extracts the URLs, preferably embedded in the vertical blanking interval, with the use of any conventional VBI decoder device. The URL decoder 12 may be either a stand-alone unit or a card which is implemented into the personal computer 16.

In another preferred embodiment shown in Figure 2, the uniform resource locators (URLs) are encoded into the video in the same manner as described above. Again, the URLs are preferably encoded onto eight fields of line 21 of the VBI. However, the URL decoder 24 is located at the server site, as opposed to the subscriber location. When the decoder 24 receives the video program signal, it strips out the URL codes on line 21 of the VBI and delivers these codes independently to an Internet server 28. The URL code is then subsequently delivered over the Internet 20 to the user PC 16. Simultaneously, the video is broadcast over conventional broadcast or cable transmission means 36 to the user's personal computer 16.

Another preferred embodiment of the system, shown in Figure 4, does not depend on, or even use, the VBI. In this preferred embodiment, the system will run an online service over the Internet 20. This service will be in the form of an

Internet Web site 62 that provides a user-interface to a database 78 and to one or more associated data servers 90. The service will provide member-accounts to TV broadcasters 66 who sign up to use the system of the invention in conjunction with their broadcasts. Each member broadcaster will enter the service at their computer 70 through Web browser software 74 using their member account by entering various identification and password information. Once within their account, the member will be provided with a graphical user interface for pre-scheduling URLs for transmission to users 118 over a direct Internet connection 94 at particular times of day. The same user interface, or a variation on it, can be used by broadcasters for live transmission 82 of URLs to users at the same time as a broadcast 86.

For example, one example of this interface might be a scheduling calendar (daily, weekly, monthly, yearly) in which the broadcaster 66 may allocate time periods which coincide with their broadcasts 86, and during which they will send out URLs to their users to link to Web pages. For each time period (for example, a particular hour long period during the day) determined by the broadcaster 66 to be a broadcast period (a period during which they want to transmit URLs that correspond to a television show being broadcast from their TV broadcast facility 110 to the external TV 114 of the user 118 at that time), the broadcaster 66 may then enter a series of URLs into an associated file ("Link File") for transmission over the Internet 20 at that time. This Link File might have a user interface such as a spreadsheet, table, or list, or it could be simply a tab-delimited or paragraph-delimited text-file. As an example, each of the records in the Link File consists of a data structure which could contain information such as:

(<timecode>,<URL>,<label or title>,<additional information>,<additional information>,...)

The above data structure is just one example. The records in the Link File preferably specify the time, Internet address (i.e. URL), label (such as an associated name), and some optional additional information, for each Web page the broadcaster 66 desires to launch during a show.

When a broadcaster 66 modifies their calendar and/or the Link File associated with any given time period(s) in their calendar, this information is saved into the database 78 that is attached to the site 62. Each broadcaster 66 may maintain multiple calendars in the database 78 if they broadcast in different time zones, for example.

The database 78 provides the Link File records for upcoming time periods to a server 90, which may be one server or a distributed network of server programs on multiple computers across the network, to be utilized for scaling to large national or global audiences. The server 90 provides the Link File records, including the URLs, to the user's personal computer 16, which is connected via a network. Examples of possible networks include the public Internet 94, a direct private network, or even a wireless network.

One feature of the above embodiment is that one or more broadcasters 66 may utilize the same schedule in the database 78 for their own broadcasts 86 or during the same broadcast. For example, a network broadcaster may develop a master schedule and various affiliate broadcasters may subscribe to that schedule or copy it (in the database) and add or delete specific URLs in the schedule for their local audiences or unique programming. This scheme enables affiliates to

insert URLs for local advertisers or local subjects into a sequence of more general URLs provided by their network broadcaster 66. In other words, the affiliate can add links that ride on the network feed and then redistribute it to their local audiences.

The above embodiment can also enable personalization in the form of unique series of URLs specific to each user's unique profile, which is directly sent over the Internet 20 to each user's specific client software 106. This can be achieved from the broadcaster 66 to each individual user 118, or to particular collections of users. To accomplish personalization, the service may send a different stream of URLs to each user's client software program 106. The stream of URLs sent would depend on a user profile stored in the database 78 or the client software program 106, a user profile which is built on demand or over time for each user 118 based on criteria such as the location of the user, choices the user makes while using a client software program 106, or choices the broadcaster 66 makes during a broadcast 86, or automatic choices made by an algorithm (such as a filter) residing on the service 62. Personalization enables each user to receive URLs which are uniquely relevant to their interests, demographics, history, or behavior in the system.

System Operation

Once the URLs have reached the personal computer 16, system operation is similar for all of the embodiments diagramed in Figures 1, 2, and 4.

In a preferred embodiment, a JAVA enabled browser 98 as well as specialized software 106 for performing part of the method of the present invention are installed on the computer 16. The JAVA enabled browser 98

allows the computer 16 to retrieve the Web pages 102 and is preferred software, since it is platform independent, and thus, enables efficient and flexible transfer of programs, images, etc., over the Internet 20. The specialized interface software 106 (hereinafter, "client software"), attached as Appendix A, acts as an interface between the video programming and the Internet functions of the present invention. The client software 106 retrieves URLs from the video program (embodiment of Figure 1) or directly from the Internet connection (embodiments of Figures 2 and 4), interprets these URLs and directs the JAVA enabled browser 98 to retrieve the particular relevant Web pages 102, and synchronizes the retrieved Web pages to the video content for display on the user's computer 16, as shown in Figures 3 and 4 and explained in more detail below.

In a preferred method, the URLs are encoded and embedded into the video signal by inserting them into the vertical blanking interval (VBI), as mentioned above.

In another preferred embodiment, the URLs are entered by member TV broadcasters 66 along with specified times for transmitting the URLs to the user. At the appropriate times, the URLs are sent directly over the Internet to the user's PC 16 via the client software 106 over a direct point-to-point or multicasting connection.

One method of the present invention has the capability to detect identical URLs sent directly after one another which causes the browser not to fetch URLs in these particular cases. As shown in Figure 3, once the URL code is received at the computer, the client software 106 first interprets the URL and determines in step 42 whether the particular URL has been received previously. If it has already

been received, the next received URL is interpreted for determination of prior receipt. If the particular URL has not been detected before, the software checks for misspelling in step 46 and any other errors, and if errors exist, corrects these particular errors. Once again, it is determined whether the URL has been previously detected. If it has, the next URL is accessed in step 38. If the URL has not been detected, the specific URL is added to the URL list in step 54. The specific URL is then sent to the Web browser, preferably a JAVA enabled browser 98. Upon receipt of the URL, the browser 98, in step 58, will access the Web site address 122 (Figure 4) indicated by the URL and retrieve the cited Web page(s) 102 via the Internet.

Viewers can view the integrated presentation in the following manner. As mentioned above, the video signal is processed and displayed on a video window on the PC screen using a WinTV card, for example. The corresponding audio is forwarded to the audio card and sent to the PC speakers.

The actual retrieved Web pages 102, referenced by the URL, are optionally time stamped to be displayed on the computer screen when predetermined related video content is displayed in the video window, thus, enlightening and enhancing the video presentation by providing in-depth information related to the video content thereto. Another section on the screen is also preferably used to represent an operational control panel. This control panel provides a list of the URLs that have been broadcast and correspondingly received by the computer 16. This control panel is updated to add a URL code each time a new URL code is received by the PC 16. This list gives the subscriber the flexibility to go back and retrieve particularly informative or interesting Web pages that have already been

displayed earlier in the program, or alternatively, to print them out for future reference. Furthermore, the list could include URLs referring to Web pages not displayed with the broadcast program, but that provide further information on a certain topic of interest to the viewer.

The present invention can best be understood with reference to an example. A viewer can begin watching a musical video featuring a new band, for example. As the video is received by the PC 16, URLs are either being extracted from the vertical blanking interval or are being received directly via the Internet 20, and are being interpreted by the client software 106. Upon direction and command, the JAVA enabled browser 98 retrieves particular Web pages 102 from Internet 20 Web sites identified in the URLs. These Web pages 102 will then be displayed on the video screen at particular times. Thus, for example, while the viewer is watching the music video, biographical information on the band can also be displayed adjacently to the video window. Web pages 102 could also include an upcoming concert schedule, or even audio clips of the band's music may be downloaded from the Internet 20. As another example, a user could be watching a program relating to financial news. While the narrator is shown discussing high tech stocks, Web pages corresponding to detailed financial performance information on high tech stocks, environment and characteristics can be displayed with the video on the computer screen. When the program narrator switches to a discussion on the weekly performance of the Dow Jones, Web pages presenting related financial performance information can be simultaneously displayed. Thus, it is evident that the present invention profoundly enriches the viewing and learning experience.

It is understood that there can exist alternative embodiments for use with the present invention. For example, the user can view the interactive program using a television set 114 or other display monitor in conjunction with the display screen of the personal computer 16. In this embodiment, the relevant Web pages are shown on the personal computer 16 while the video program is displayed on the television monitor 114. In this alternative embodiment, a cable set top box receives the television program from the multichannel cable. The personal computer 16 also receives the video program from the multi-channel cable and extracts the URLs, embedded in the vertical blanking interval of the video signal or directly transmitted 94 over the Internet 20. The client software 106 extracts the URLs and retrieves the particular Web pages as described above. The Web pages are then synchronized with the particular video frames and presented to the user. It is understood that a hyperlink may exist on the Web site that will allow the user to automatically load the client software and call up the specific television channel referenced in the Web site. For example, someone browsing the Internet 20 may come upon a major television network's Web site. They scroll to an interesting story then click on an hyperlink to turn on the software which tunes the TV window to the network to enhance the information residing at the Web site.

Furthermore, instead of receiving the video program from a transmission means, the video program can be addressed directly from the user site if the video program, with embedded URLs, is stored on a VHS, Beta, DVD or other medium. In this embodiment, the user PC 16 and/or television 114 are connected to a VCR, DVD player or other appropriate device.

Using the foregoing embodiments, methods and processes, the system of the present invention creates a synergistic experience combining the vast resources of the Internet with the presentation capabilities of television.

CLAIMS

We claim:

1. A system for presenting integrated television programming and corresponding related Internet information segments obtained from Web sites on the Internet (20), the system comprising:

a means (16) for receiving programming, wherein the programming contains a video signal (36), an audio signal and one or more embedded uniform resource locators, wherein the embedded uniform resource locators specify one or more Internet addresses of the information segments which relate specifically to the content of the video and audio signals of the programming;

a controller means (16), connected to the receiving means (16), comprising:

a means (12) for decoding the uniform resource locators to determine the specified Internet addresses;

a means (16), connected to the decoding means (12), for retrieving the one or more Internet information segments residing at the determined Internet addresses; and

a display means (18), connected to the controller (16) and receiving means (16), for presenting the video and audio signals concurrently with the Internet information segments.

2. An integrated television and Internet programming reception system integrating relevant Internet (20) information segments obtained from Web sites on the Internet with television programming content, the system comprising:

a means (16) for receiving programming, wherein the programming contains a video signal (36), an audio signal and one or more uniform resource locators, wherein the uniform resource locators are embedded in the vertical blanking interval of the video signal (36) and specify one or more Internet addresses of the information segments which relate specifically to the content of the video and audio signals of the programming;

a means (12), connected to the receiving means (16), for extracting the embedded uniform resource locators from the video signal (36);

a controller means (16), connected to the receiving means (16), comprising:

a means (12) for interpreting the uniform resource locators to determine the specified Internet addresses;

a means (16), connected to the decoding means (12), for retrieving the one or more Internet information segments residing at the determined Internet addresses; and

a display means (18), connected to the controller (16) and receiving means (16), for presenting the video and audio signals concurrently with the Internet information segments.

3. A method for integrating television program content with relevant information pages from the Internet, the method comprising the steps of:

receiving programming, the programming containing a video signal (36), an audio signal and one or more uniform resource locators, wherein the uniform resource locators are embedded in the vertical blanking interval of the video signal (36) and specify one or more Internet addresses of the relevant Internet information pages which relate specifically to the content of the video and audio signals of the programming;

extracting the uniform resource locators from the video signal;

interpreting the uniform resource locators to determine the specified Internet addresses;

retrieving the one or more Internet information segments residing at the determined Internet addresses; and

presenting the video and audio signals concurrently with the Internet information segments.

4. A system for presenting integrated television programming and corresponding related Internet information segments obtained from Web sites (62) on the Internet (20), the system comprising:

a first means (16, 114) for receiving programming, wherein the programming contains a video signal and an audio signal;

a second means (106) for receiving one or more uniform resource locators, wherein the uniform resource locators specify one or more Internet addresses (102) of the information segments which relate

specifically to the content of the video and audio signals of the received programming;

a controller means (16), connected to the second receiving means (106), comprising:

a means (12) for decoding the uniform resource locators to determine the specified Internet addresses (102);

a means (98), connected to the decoding means (12), for retrieving the one or more Internet information segments residing at the determined Internet addresses (102); and

a display means (18, 114), connected to the controller (16) and the first and second receiving means (16, 106, 114), for presenting the video and audio signals concurrently with the Internet information segments (102).

5. The system of claim 4, further comprising:

a means (70, 74) for entering information at a member broadcaster Web site (62), including the uniform resource locators corresponding to a particular program and a time at which the particular program will be received by the first receiving means (16, 114); and

a means (70) for storing the entered information.

6. The system of claim 5, further comprising:

a means (74) for sending the stored uniform resource locators at the time at which the particular program will be received by the first receiving means (16, 114), directly over an Internet connection (94) to the second receiving means (106).

7. A method for integrating television program content with relevant information pages from the Internet (20), the method comprising the steps of:

receiving programming, the programming containing a video signal and an audio signal;

receiving one or more uniform resource locators, wherein the uniform resource locators specify one or more Internet addresses (102) of the relevant Internet information pages which relate specifically to the content of the video and audio signals of the programming;

interpreting the uniform resource locators to determine the specified Internet addresses;

retrieving the one or more Internet information segments residing at the determined Internet addresses (102); and

presenting the video and audio signals concurrently with the Internet information segments.

8. The method of claim 7, further comprising the steps of:

entering information at a member broadcaster Web site, including the uniform resource locators corresponding to a particular program and a