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[54] **ELECTRONIC TELEVISION PROGRAM GUIDE FOR A TELEVISION SYSTEM HAVING TWO TUNERS**

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[21] Appl. No.: **415,181**

[22] Filed: **Mar. 31, 1995**

[51] **Int. Cl.**[6] ..... **H04N 5/44**

[52] **U.S. Cl.** ..... **348/563**; 348/565; 348/906

[58] **Field of Search** ..... 348/6, 7, 10, 12, 348/13, 460, 461, 465, 467, 473, 478, 476, 477, 479, 486, 553, 563, 564, 565, 567, 569, 570, 906

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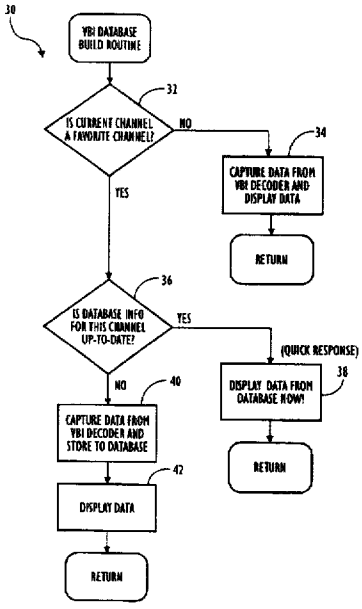
*Attorney, Agent, or Firm*—McDermott, Will & Emery

[57] **ABSTRACT**

A method and device for receiving and storing an electronic television (TV) program guide. In a satellite, cable or broadcast TV system, electronic TV program guides may be coded into the video signals received by the TV receiver. Many currently available TV receivers also allow users to program a list of "select-channels." When the receiver is in its select-channel mode, the receiver only tunes to the channels the user stored in the list of select channels. The present invention limits the memory and processing power required to store an electronic TV program guide by only storing program guide information associated with the channels stored by the user in connection with the select-channels function of the receiver. In receivers having a second tuner, the second tuner may be used to automatically update the stored program guide.

**15 Claims, 4 Drawing Sheets**



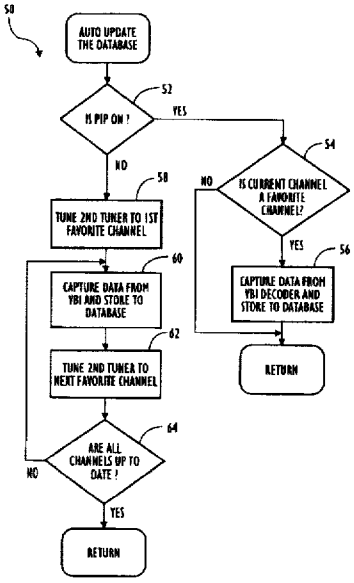



FIG. 1

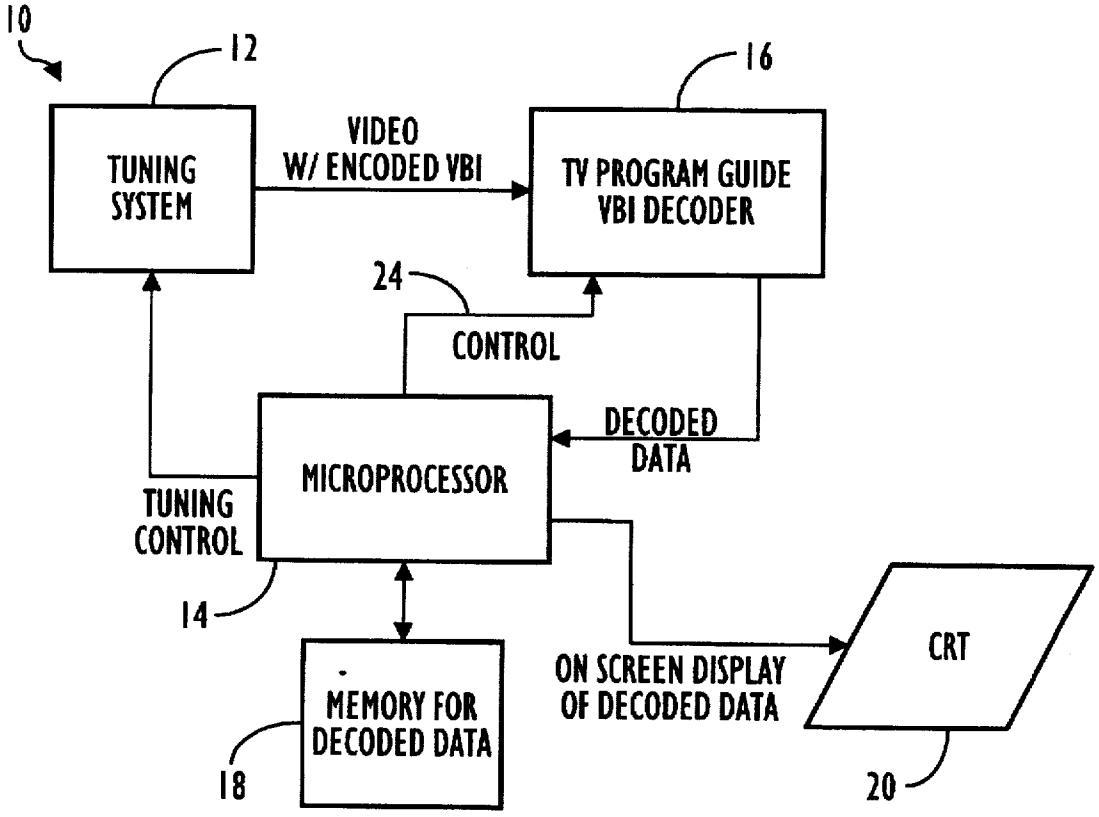

10
12
16
TUNING SYSTEM
VIDEO W/ ENCODED VBI
TV PROGRAM GUIDE VBI DECODER
24
CONTROL
DECODED DATA
MICROPROCESSOR
TUNING CONTROL
14
MEMORY FOR DECODED DATA
18
ON SCREEN DISPLAY OF DECODED DATA
CRT
20

FIG. 2

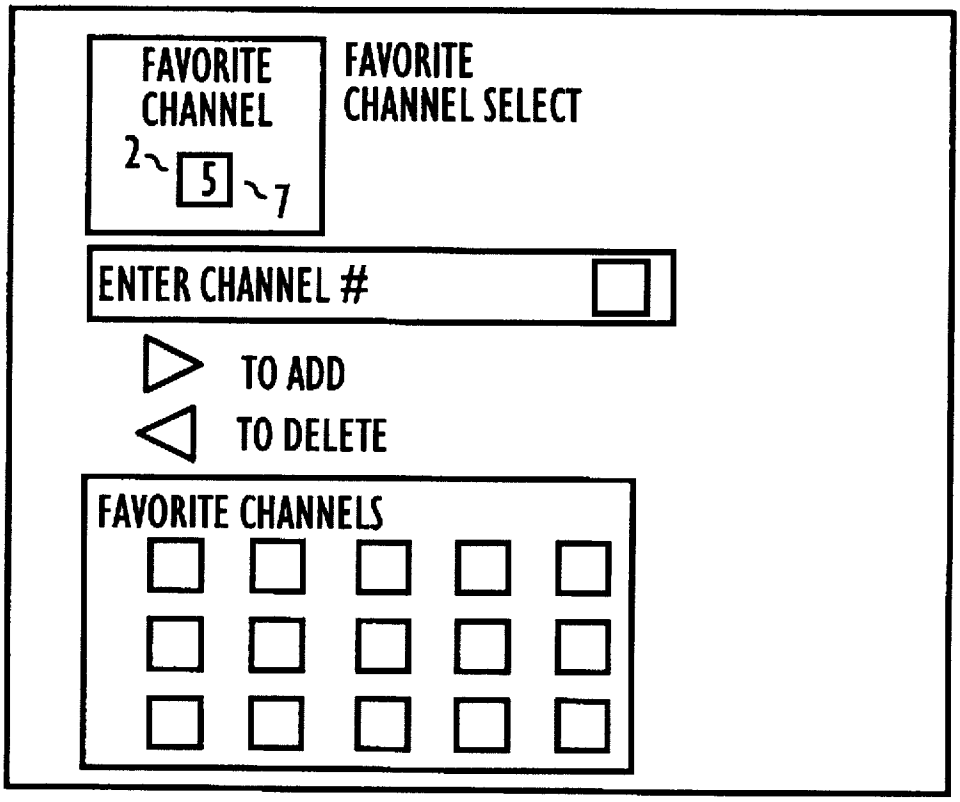

FAVORITE CHANNEL
2
5
7
FAVORITE CHANNEL SELECT
ENTER CHANNEL #
TO ADD
TO DELETE
FAVORITE CHANNELS

FIG. 3

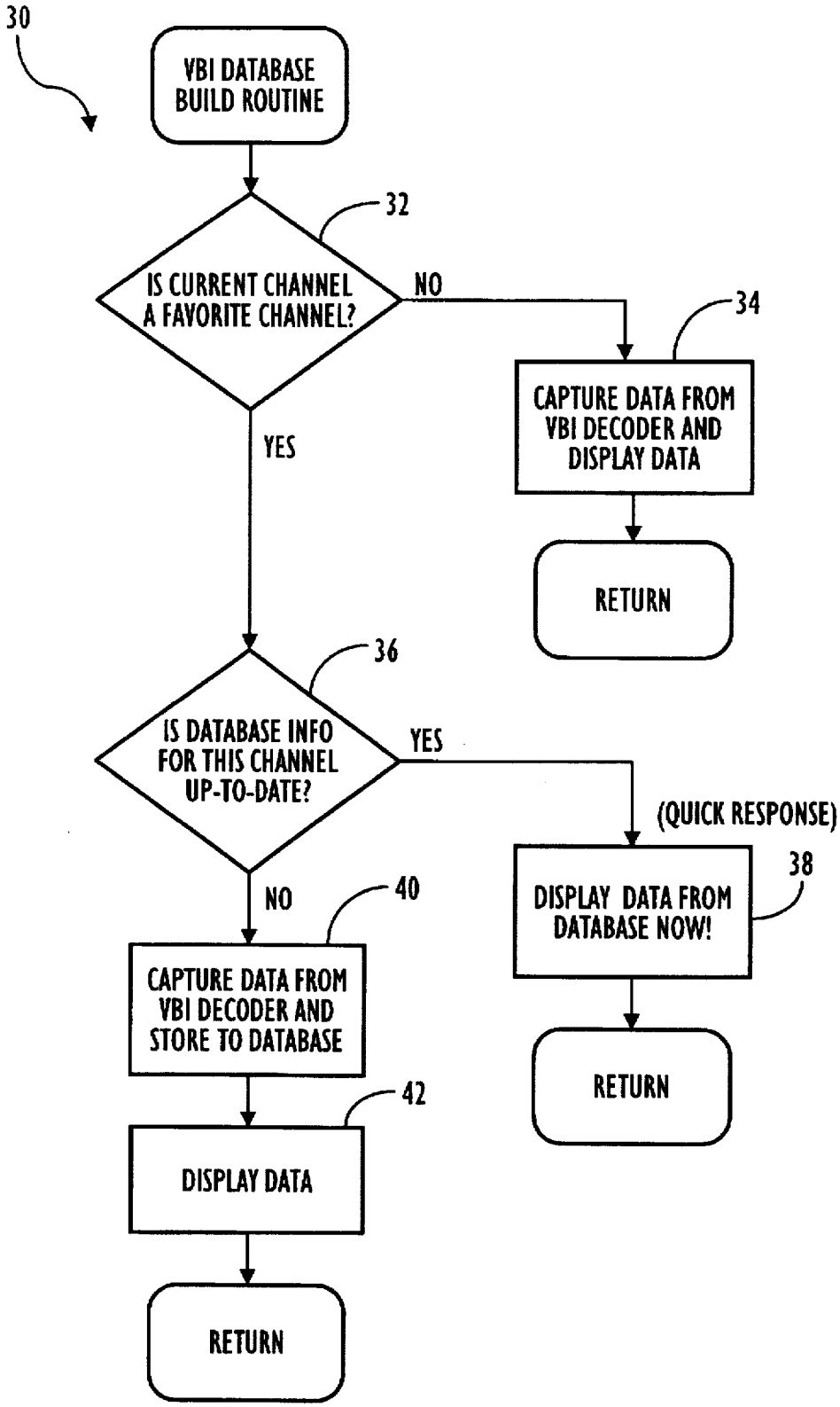
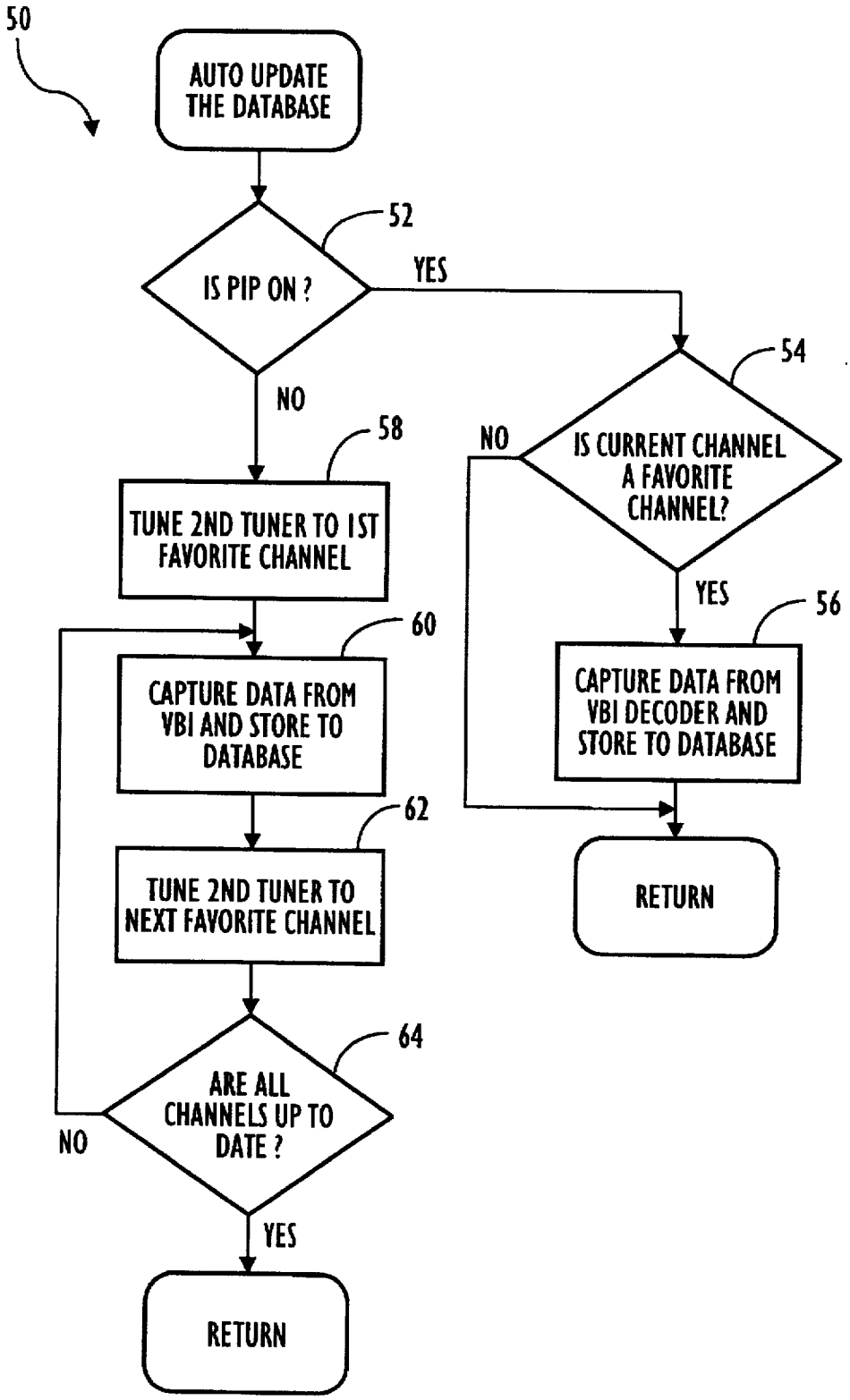

30
VBI DATABASE BUILD ROUTINE
32
IS CURRENT CHANNEL A FAVORITE CHANNEL?
NO
34
CAPTURE DATA FROM VBI DECODER AND DISPLAY DATA
RETURN
YES
36
IS DATABASE INFO FOR THIS CHANNEL UP-TO-DATE?
YES
(QUICK RESPONSE)
38
DISPLAY DATA FROM DATABASE NOW!
RETURN
NO
40
CAPTURE DATA FROM VBI DECODER AND STORE TO DATABASE
42
DISPLAY DATA
RETURN

FIG.4


50
AUTO UPDATE THE DATABASE
52
IS PIP ON ?
YES
NO
54
IS CURRENT CHANNEL A FAVORITE CHANNEL?
NO
YES
56
CAPTURE DATA FROM VBI DECODER AND STORE TO DATABASE
RETURN
58
TUNE 2ND TUNER TO 1ST FAVORITE CHANNEL
60
CAPTURE DATA FROM VBI AND STORE TO DATABASE
62
TUNE 2ND TUNER TO NEXT FAVORITE CHANNEL
64
ARE ALL CHANNELS UP TO DATE ?
NO
YES
RETURN

# ELECTRONIC TELEVISION PROGRAM GUIDE FOR A TELEVISION SYSTEM HAVING TWO TUNERS

## BACKGROUND OF THE INVENTION

This invention relates in general to electronic program guides for television (TV) receivers. More particularly, the present invention relates to a specially designed electronic TV program guide having improved flexibility, versatility, and cost savings over known electronic TV program guides.

A typical electronic TV program guide is a database of programming information encoded into the video signals broadcast over a satellite, cable or broadcast TV system. The database is decoded from the received video signals, then stored in the satellite receiver, cable TV decoder, the TV receiver itself, or other similar such unit. The electronic program guide information may be viewed and/or searched by displaying the guide on the TV screen upon demand. In comparison with printed TV program guides, electronic guides offer larger capacity, electronic searching, last-minute updates, and other features that are not practical with printed paper guides.

However, because of the large number of stations available on satellite and cable TV systems, the memory and processing requirements for electronically storing and searching through the potentially enormous amounts of program information available for satellite and cable services can prohibit a cost-effective and simple implementation of an electronic TV program guide. Others have attempted to reduce the memory and processing burdens associated with electronic TV program guides. For example, U.S. Pat. No. 5,038,211 issued to Hallenbeck discloses an online TV program information system that stores from a broadcast datastream only program information that meets selection criteria determined by the user. However, the Hallenbeck system calls for the user to program several potentially long and involved selection criteria. As illustrated in FIG. 1 of the Hallenbeck patent, the selection criteria 17 may include a service list 17*a*, types of programming list 17*b*, times of listings 17*c*, and other criteria 17*d*.

Thus, there is still a need for a TV receiver that stores an electronic TV program guide according to selection criteria determined by the user, wherein the selection criteria and method of storing and updating the program information provide improved flexibility, versatility, and cost savings over known methods of receiving and storing electronic TV program guides.

## SUMMARY OF THE INVENTION

The present invention provides a method and device for receiving and storing an electronic television (TV) program guide. In a satellite, cable or broadcast TV system, electronic TV program guides may be coded into the video signals received by the TV receiver. Many currently available TV receivers also allow users to program a list of "select-channels." When the receiver is in its "select-channel mode," the receiver only tunes to the channels the user stored in the list of select channels. The present invention limits the memory and processing power required to store an electronic TV program guide by only storing program guide information associated with the channels stored by the user in connection with the select-channel function of the receiver. By limiting the amount of channels that can be programmed into the select-channels list, the maximum memory that will be needed to store the TV program guide can be determined ahead of time. In receivers having a



second tuner, the second tuner may be used to automatically update the stored program guide.

In one embodiment, the present invention includes a television receiver having: a tuning system capable of tuning to predetermined frequency channels and converting radio frequencies received on the predetermined frequency channels to video signals; a decoder receiving the video signals from the tuning system and decoding a database coded into the video signals; a microprocessor controlling the tuning system and the decoder; a first memory controlled by the microprocessor and storing a programmed subset of the predetermined frequency channels; a second memory controlled by the microprocessor and storing the decoded database; the microprocessor programmed to control the decoder such that the microprocessor stores in the second memory only database information associated with the programmed subset of the predetermined frequency channels stored in the first memory; and a display device coupled to a character generator and the microprocessor for displaying the database information on a screen of the display device.

In the above-described embodiment, the microprocessor makes the database information available for display on the screen according to the following protocol. If the tuning system is tuned to one of the predetermined frequency channels that is not among the programmed subset of the predetermined frequency channels, the database information associated with the one of the predetermined frequency channels is captured and made available for display on the screen but not stored in the second memory. If the tuning system is tuned to one of the programmed subset of the predetermined frequency channels, the microprocessor determines whether the database information associated with the one of the programmed subset channels and stored in the second memory is current. If the database information associated with the one of the programmed subset channels and stored in the second memory is current, the database information associated with the one of the programed subset channels and stored in the second memory is read from the second memory and made available for display on the screen. If the database information associated with the one of the programmed subset channels and stored in the second memory is not current, the database information associated with the one of the programmed subset channels is captured and stored to the second memory, and the database information associated with the one of the programmed subset channels and stored in the second memory is read from the second memory and made available for display on the screen.

In a further embodiment, the tuning system comprises a first and second tuner, and the microprocessor automatically updates the database information in the second memory according to the following protocol. Tune the second tuner to one of the programmed subset of the predetermined frequency channels, capture the database information associated with the one of the programmed subset channels, and store the captured database information to the second memory.

In a method of the present invention, there is provided a method of storing database information in a television receiver, the steps comprising: storing in a first memory a subset of the available predetermined frequency channels that a tuning system of the receiver may tune to; providing the receiver with a select-channel mode wherein the tuning system only tunes to the programmed subset of the predetermined frequency channels stored in the first memory; decoding database information from video signals received by the tuning system on the predetermined frequency chan-

nels; and storing in a second memory only information from the database associated with the programmed subset of the predetermined frequency channels stored in the first memory.

Preferably, in the above-described method, the database information is made available for display on a screen of a display device according to the following protocol. If the tuning system is tuned to one of the predetermined frequency channels that is not among the programmed subset of the predetermined frequency channels, the database information associated with the one of the predetermined frequency channels is captured and made available for display on the screen but not stored in the second memory. If the tuning system is tuned to one of the programmed subset of the predetermined frequency channels, the microprocessor determines whether the database information associated with the one of the programmed subset channels and stored in the second memory is current. If the database information associated with the one of the programmed subset channels and stored in the second memory is current, the database information associated with the one of the programmed subset channels and stored in the second memory is read from the second memory and made available for display on the screen. If the database information associated with the one of the programmed subset channels and stored in the second memory is not current, the database information associated with the one of the programmed subset channels is captured and stored to the second memory, and the database information associated with the one of the programmed subset channels and stored in the second memory is read from the second memory and made available for display on the screen.

In another aspect of the above-described method, the tuning system comprises a first and second tuner, and the database information in the second memory is automatically updated according to the following protocol. Tune the second tuner to one of the programmed subset of the predetermined frequency channels, capture the database information associated with the one of the programmed subset channels, and store the captured database information to the second memory.

The invention itself, together with further objects and attendant advantages, will best be understood by reference to the following detailed description, taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an electronic TV program guide controller embodying the present invention.

FIG. 2 illustrates an example of an on-screen display that would appear on the display device of FIG. 1 when the user is programming channels into the select-channel list.

FIG. 3 is a flow diagram of a program for storing an electronic TV program guide using the controller shown in FIG. 1. The program shown in FIG. 3 may be implemented on a single tuner system.

FIG. 4 is another flow diagram of a program for storing an electronic TV program guide using the controller shown in FIG. 1. The program shown in FIG. 4 may be implemented on a multi-tuner system.

## DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an electronic TV program guide controller **10** embodying the present invention. As shown, the controller **10** generally includes a tuning system **12** coupled to a microprocessor **14** and a decoder **16**. The microprocessor **14** includes memory space **18** for storing decoded data. The microprocessor **14** further includes an internal VRAM memory (not shown) and character generator (also not shown) for supplying on-screen displays to a display device **20**. Preferably, the display device **20** is a cathode ray tube (CRT), but it may also be any other type of known display device such as a liquid crystal display (LCD).

In general, the tuning system **12** is a conventional tuning system of the type available in standard TV receivers. The tuning system **12** may be provided with two separate tuners (not shown), wherein the second tuner provides picture-in-picture (PIP) functions in a known manner. The tuning system **12** converts RF signals to video and audio by tuning to selected frequencies (also know as channels or stations).

Typically, the electronic TV program guide information is encoded according to a predetermined format, then broadcast in some portion of the video/audio broadcast. In one approach, the program data is encoded in the vertical blanking interval (VBI) of one or more stations. Thus, the decoder **16** may be a VBI decoder that decodes TV program data from the VBI of one or more channels. Preferably, a control line **24** from the microprocessor **14** informs the decoder **16** of the data's format and the channel or channels on which data can be found.

The actual program information contained in a particular electronic TV program guide varies depending on the entity providing the database. For example, the database provider may include in the database program title, start time, duration, network, local affiliate, synopsis, program type (i.e., situation comedy, talk, movie, etc.), motion picture rating, trait bits (i.e., adult language, nudity, violence, etc.), channel number, current time (grenitch time), current date, stereo indication, separate audio program (SAP) indication, closed caption (CC) indication, commercials, coupon number (used for special purchase discounts).

The microprocessor **14** may be a standard commercially available integrated circuit, for example, one of the MC6800-family of microprocessors manufactured by Motorola, which is found in many currently manufactured TV receivers. The microprocessor **14** acts according to stored programs, either in internal memory (not shown) or external memory **18**, to control most of the TV receiver's functions. The memory **18** may be standard dynamic random access memory (RAM) having parallel or serial access. According to the present invention, the. microprocessor **14** also generates data for the on-screen program data display, and executes all decisions regarding program data capture, storage and display.

According to the present invention, one of the functions controlled by the microprocessor is a "select-channel" feature. An example of such a select-channel feature is sold under the tradename "Favorite Station," and is available on models CT31SF21S, CT-31SF31S and PT-51G30 televisions sold by Matsushita Electric Corporation Of America, the assignee of the present invention. The typical select-channel feature allows the user, through a remote control unit (not shown), the microprocessor **14** (including its VRAM memory and character generator), tuning system **12**, and display-device/CRT **20**, to program a set of select channels (up to a fixed number, for example 15), whereby the microprocessor **14** controls the tuning system **12** to skip over non-programmed channels in response to a channel-change request, and only stop on the select channels. Thus, when the TV receiver is in its select-channel mode, channel change requests automatically move through the listed and

stored channels, thereby saving users considerable time by not stopping on channels that are never watched.

The microprocessor **14**, via its VRAM and character generator, generates an on-screen display on the display/CRT **20** which makes programming the desired stations relatively easy. An example of such a display is shown in FIG. **2** in connection with the Matsushita "Favorite Station" feature. The user presses the appropriate buttons to display the channel selection screen shown in FIG. **2**, enters a channel number, then presses left or right arrow keys on the remote or the settop to add the channel to the select-channel list or delete the channel from the select-channel list. The box at the bottom of the screen shows the complete content of the select-channel list. The Matsushita models CT31SF21S, CT-31SF31S and PT-51G30 televisions also provide an "Auto Channel Program" mode in which the first fifteen channels selected while the TV receiver is in this mode are automatically loaded into the select-channel list. This makes programming the select-channel list even easier.

A key feature of the present invention is the use of the select-channel features, which are already present in commercially available TV receivers, to control the storage of electronic TV program guide information. The stored TV program guide information is limited to the channels that the consumer had already stored when setting up the select-channel feature. This requires considerably less memory and processing power than storing all of the available program data for all of the available channels.

FIG. **3** is a flow diagram of a program **30** for automatically updating the electronic TV program guide according to the select-channel list previously programmed and stored in connection with a select-channel feature. The program **30** may be implemented on the microprocessor **14** of the controller **10** shown in FIG. **1** using a single-tuner tuning system **12**. The program **30** begins at block **32** by determining whether the current channel is one of the select channels. As previously noted, the microprocessor **14** has a database of user-selected channels (up to 15 for the Matsushita "Favorite Station" feature). When the microprocessor **14** processes a command to access one of these channels, either by direct channel number entry, or by normal channel scan, or by select-channel scan, the microprocessor **14** compares the requested channel with the previously programmed and stored select-channel list.

If the current channel is not on the stored select-channel list, the program **30** moves to block **34** where the microprocessor **14** captures data from the decoder **16** and passes it to the VRAM of a character generator (not shown) preferably located in the microprocessor **14**. Thus, for current channels that are not on the select-channel list, the TV program guide data is made available for immediate on-screen display, but is not stored in the database in memory **18**. From block **34**, the program **30** is returned to its beginning.

If the current channel examined in block **32** is on the select-channel list, the program **30** moves to block **36** and determines whether the stored database information associated with the subject channel is current. The microprocessor **14** determines whether the database information is current by comparing the stored program start time and duration with the TV receiver's current real time clock. If the calculated program end time is earlier than the real time clock, the stored database information is not current. Also, after having watched a select channel for a period of time, the incoming database for that select channel will be decoded and compared with the database stored in memory **18**. If some aspect of the database information has changed, the stored database information is updated, and an indication is automatically provided to the viewer, either by momentarily displaying the new data on the display screen, or by flashing a small icon on the display screen.

If the stored database information associated with the subject channel is current, in block **38**, the microprocessor **14** copies the stored database for the subject channel from the memory **18** to the VRAM of the character generator (not shown) in the microprocessor **14**. This eliminates the inherent delay that results from piecing together (byte by byte) the text as it is received field by field or frame by frame in the VBI. The stored database for the subject channel is then displayed on the CRT **20**.

If the answer to the inquiry in block **36** is no, the program **30** moves to block **40** and captures TV program guide data from the decoder **16** to store to the database in memory **18**. If in block **36** it is determined that the stored data is not current, the microprocessor **14** clears the old data from the memory **18**. The microprocessor **14** then starts the process of accepting TV program guide data from the decoder **16** and storing it in the memory **18**. Preferably, the program **30** includes one of the many known memory management techniques to manage data storage in the memory **18**. In block **40**, the microprocessor **14** copies the stored database for the subject channel from the memory **18** to the VRAM of the character generator (not shown) in the microprocessor **14**. The stored database for the subject channel is then displayed on the CRT **20**.

FIG. **4** is another flow diagram of a program **50** for storing an electronic TV program guide using the controller **10** shown in FIG. **1**. The program **50** shown in FIG. **4** may be implemented on a multi-tuner tuning system **12**, for example, a tuning system having "picture-in-picture" (PIP) features supplied by a second tuner. In block **52**, the program **50** determines whether the PIP feature is on. If the answer to this inquiry is yes, the program **50** moves to block **54** where the microprocessor **14** checks the tuned channel of the second tuner against the select-channel list stored in memory **18**. If the answer to the inquiry in block **54** is yes, the program **50** moves to block **56** where the microprocessor **14** captures data from the decoder **16** and stores it in the TV program guide database in memory **18**. Again, there is preferably one of the conventional memory management used here to insure no wasted memory space. If the current channel is not one of the select channels stored in memory **18**, the program **50** moves from block **54** to the beginning of the program.

If the answer to the inquiry in block **52** is no, the PIP second tuner of the tuning system **12** is used to sequence through the stored list of select channels to thereby update the TV program guide information in the database stored in memory **18**. In block **58**, the microprocessor **14** tunes the PIP tuner to a first channel in the stored select-channel list, or to a first channel in the stored select-channel list that is not up to date. In block **60**, the microprocessor **14** clears the old data from the TV program guide database in memory **18**. The microprocessor **14** then starts the process of accepting TV program guide data from the decoder **16** and storing it in the database in memory **18**.

In block **62**, the microprocessor **14** tunes the PIP tuner to the next channel in the select-channel list. In block **64**, if all of the select channels are up to date, the program **50** returns to its beginning. If in block **64**, all of the select channels are not up to date, the program **50** returns to block **60** where the microprocessor **14** clears the old data from the TV program

guide database in memory **18**, then starts again the process of accepting TV program guide data from the decoder **16** and storing it in the database in memory **18**.

Thus, the present invention provides several advantages. The memory and processor requirements of the present invention are reduced by limiting stored TV program data to the channels previously stored by the user in connection with using the select-channel features found on many currently available TV sets. Thus, the two features may be activated simultaneously by configuring the select-channel list. Updating is made significantly more efficient by using the second (PIP) tuner found in many currently available TV sets to update the TV program database.

Of course, it should be understood that a wide range of changes and modifications can be made to the preferred embodiment described above. It is therefore intended that the foregoing detailed description be regarded as illustrative rather than limiting and that it be understood that it is the following claims, including all equivalents, which are intended to define the scope of this invention.

What is claimed is:

**1**. A television receiver comprising:

a tuning system capable of tuning to predetermined frequency channels and converting radio frequencies received on said predetermined frequency channels to video signals;

a decoder receiving said video signals from said tuning system and decoding a database coded in said video signals;

a microprocessor controlling said tuning system and said decoder;

a first memory controlled by said microprocessor and storing a programmed subset of said predetermined frequency channels;

a second memory controlled by said microprocessor and storing said decoded database;

said microprocessor programmed to control said decoder such that said microprocessor stores in said second memory only database information associated with said programmed subset of said predetermined frequency channels stored in said first memory;

a display device coupled to a character generator and said microprocessor for displaying said database information on a screen of said display device;

said microprocessor making said database information available for display on said screen according to the following protocol:

if said tuning system is tuned to one of said predetermined frequency channels that is not among said programmed subset of said predetermined frequency channels, the database information associated with said one of said predetermined frequency channels is captured and made available for display on said screen but not stored in said second memory;

if said tuning system is tuned to one of said programmed subset of said predetermined frequency channels said microprocessor determines whether said database information associated with said one of said programmed subset channels and stored in said second memory is current;

if said database information associated with said one of said programmed subset channels and stored in said second memory is current, the database information associated with said one of said programmed subset channels and stored in said second memory is read from said second memory and made available for display on said screen;

if said database information associated with said one of said programmed subset channels and stored in said second memory is not current, the database information associated with said one of said programmed subset channels is captured and stored to said second memory, and the database information associated with said one of said programmed subset channels and stored in said second memory is read from said second memory and made available for display on said screen.

**2**. The receiver of claim **1** wherein:

said radio frequencies comprise television channels; and

said decoded database information comprises program information associated with said television channels.

**3**. The receiver of claim **1** wherein said database information is coded into a vertical blanking interval of said video signals.

**4**. The receiver of claim **1** having a selected station mode wherein said microprocessor controls said tuning system to only tune to said programmed subset of said predetermined frequency channels stored in said first memory.

**5**. The receiver of claim **1** wherein said tuning system comprises a first and second tuner, and said microprocessor automatically updates said database information in second memory according to the following protocol:

tune said second tuner to one of said programmed subset of said predetermined frequency channels;

capture the database information associated with said one of said programmed subset channels; and

store said captured database information to said second memory.

**6**. The receiver of claim **1** wherein said tuning system comprises a first and second tuner, and said microprocessor automatically updates said database information in second memory according to the following protocol:

sequentially tune said second tuner to each one of said programmed subset of said predetermined frequency channels;

determine whether the database associated with any of said programmed subset of channels is not current;

capture the database information for those programmed subset channels that are not current;

store said captured database information to said second memory.

**7**. The receiver of claim **1** wherein said tuning system comprises a first and second tuner, and said microprocessor automatically updates said database information in second memory according to the following protocol:

sequentially tune said second tuner to each one of said programmed subset of said predetermined frequency channels;

determine whether the database associated with each of said programmed subset of channels is current;

capture the database information for those programmed subset channels that are not current;

store said captured database information to said second memory.

**8**. A television receiver comprising:

a tuning system capable of tuning to predetermined frequency channels and converting radio frequencies received on said predetermined frequency channels to video signals;

a decoder receiving said video signals from said tuning system and decoding a database coded in said video signals;

a microprocessor controlling said tuning system and said decoder;

a first memory for storing a subset of the available predetermined frequency channels;

a second memory controlled by said microprocessor and storing said decoded database;

said tuning system comprising a first and second tuner; and

said microprocessor automatically updating said database information in said second memory according to the following protocol:

tune said second tuner to one of said programmed subset channels of said predetermined frequency channels;

capture the database information associated with said one of said programmed subset channels; and

store said captured database information to said second memory.

**9**. The receiver of claim **8** wherein said database information is coded into a vertical blanking interval of said video signals.

**10**. A method of storing database information in a television receiver, the steps comprising:

storing in a first memory a subset of the available predetermined frequency channels that a tuning system of the receiver may tune to;

providing the receiver with a selected station mode wherein said tuning system only tunes to said programmed subset of said predetermined frequency channels stored in said first memory;

decoding database information from video signals received by said tuning system on said predetermined frequency channels;

storing in a second memory only database information associated with said programmed subset of said predetermined frequency channels stored in said first memory.

**11**. The method of claim **10** wherein said database information is made available for display on a screen of a display device according to the following protocol:

if said tuning system is tuned to one of said predetermined frequency channels that is not among said programmed subset of said predetermined frequency channels, the database information associated with said one of said predetermined frequency channels is captured and made available for display on said screen but not stored in said second memory;

if said tuning system is tuned to one of said programmed subset of said predetermined frequency channels said microprocessor determines whether said database information associated with said one of said programmed subset channels and stored in said second memory is current;

if said database information associated with said one af said programmed subset channels and stored in said second memory is current, the database information associated with said one of said programmed subset channels and stored in said second memory is read from said second memory and made available for display on said screen;

if said database information associated with said one of said programmed subset channels and stored in said second memory is not current, the database information associated with said one of said programmed subset channels is captured and stored to said second memory, and the database information associated with said one of said programmed subset channels and stored in said second memory is read from said second memory and made available for on said screen.

**12**. The method of claim **11** wherein said database information is coded into a vertical blanking interval of said video signals.

**13**. The method of claim **11** wherein said tuning system comprises a first and second tuner, and said database information in said second memory is automatically updated according to the following protocol:

tune said second tuner to one of said programmed subset of said predetermined frequency channels;

capture the database information associated with said one of said programmed subset channels; and

store said captured database information to said second memory.

**14**. The method of claim **11** wherein said tuning system comprises a first and second tuner, and said database information in said second memory is automatically updated according to the following protocol:

sequentially tune said second tuner to each one of said programmed subset of said predetermined frequency channels;

determine whether the database associated with any of said programmed subset of channels is not current;

capture the database information for those programmed subset channels that are not current;

store said captured database information to said second memory.

**15**. The method of claim **11** wherein said tuning system comprises a first and second tuner, and said database information in said second memory is automatically updated according to the following protocol:

sequentially tune said second tuner to each one of said programmed subset of said predetermined frequency channels;

determine whether the database associated with each of said programmed subset of channels is current;

capture the database information for those programmed subset channels that are not current;

store said captured database information to said second memory.

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UNITED STATES PATENT AND TRADEMARK OFFICE

# CERTIFICATE OF CORRECTION

PATENT NO. : 5,699,125

DATED : December 16, 1997

INVENTOR(S) : RZESZEWSKI et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Col. 9, line 56: "af" should read --of--

Col. 10, line 14: After "for" insert --display--

Signed and Sealed this

Sixth Day of October, 1998

*Attest:*

*Attesting Officer*

BRUCE LEHMAN

*Commissioner of Patents and Trademarks*