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(54) METHOD AND SYSTEM FOR UPDATING A CONTROL DEVICE DATABASE VIA FLASHING LIGHT

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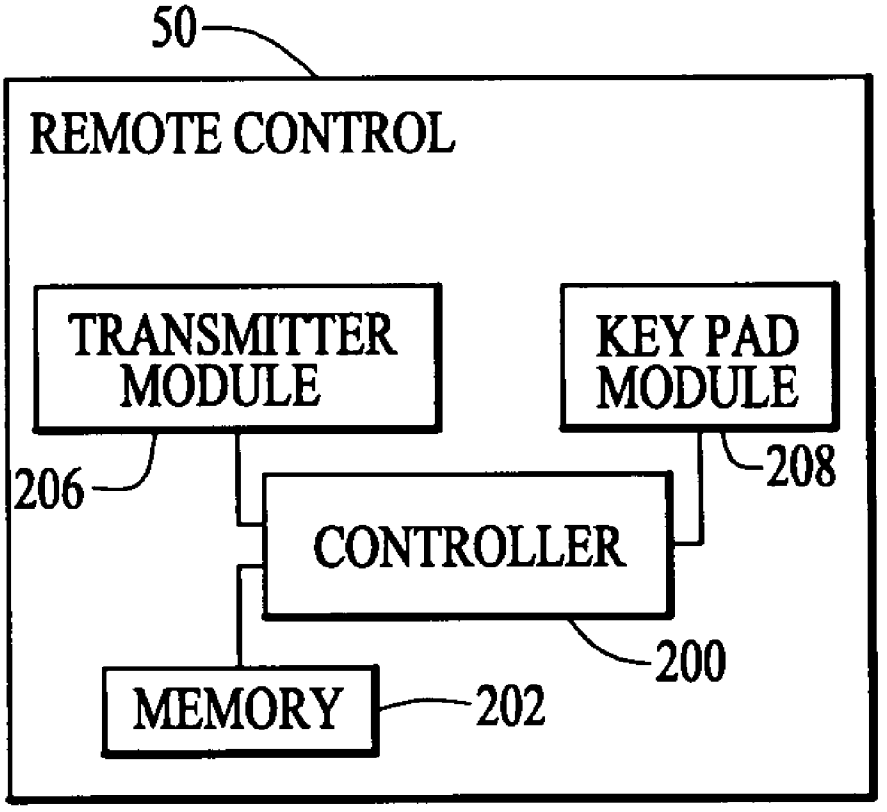
(52) **U.S. Cl.** **398/106**

(57) **ABSTRACT**

A system for delivering codes to a remote control for controlling a number of electronic devices includes a receiver for receiving a signal from a transmitter. A display connected to the receiver has a mechanism for flashing visible-light to the remote control, the flashed visible-light being related to the signal. The remote control includes a code database and mechanisms for receiving flashed visible-light and converting it into a code storable in the database. A method for acquiring updated codes includes storing codes for controlled apparatus in a code database. Data related to additional device codes are then transmitted to a processing device connected to a visual display. The data are flashed as visible-light from the display and received by the remote control. Received visible-light is converted into at least one device code and used to update the code database in the remote control.



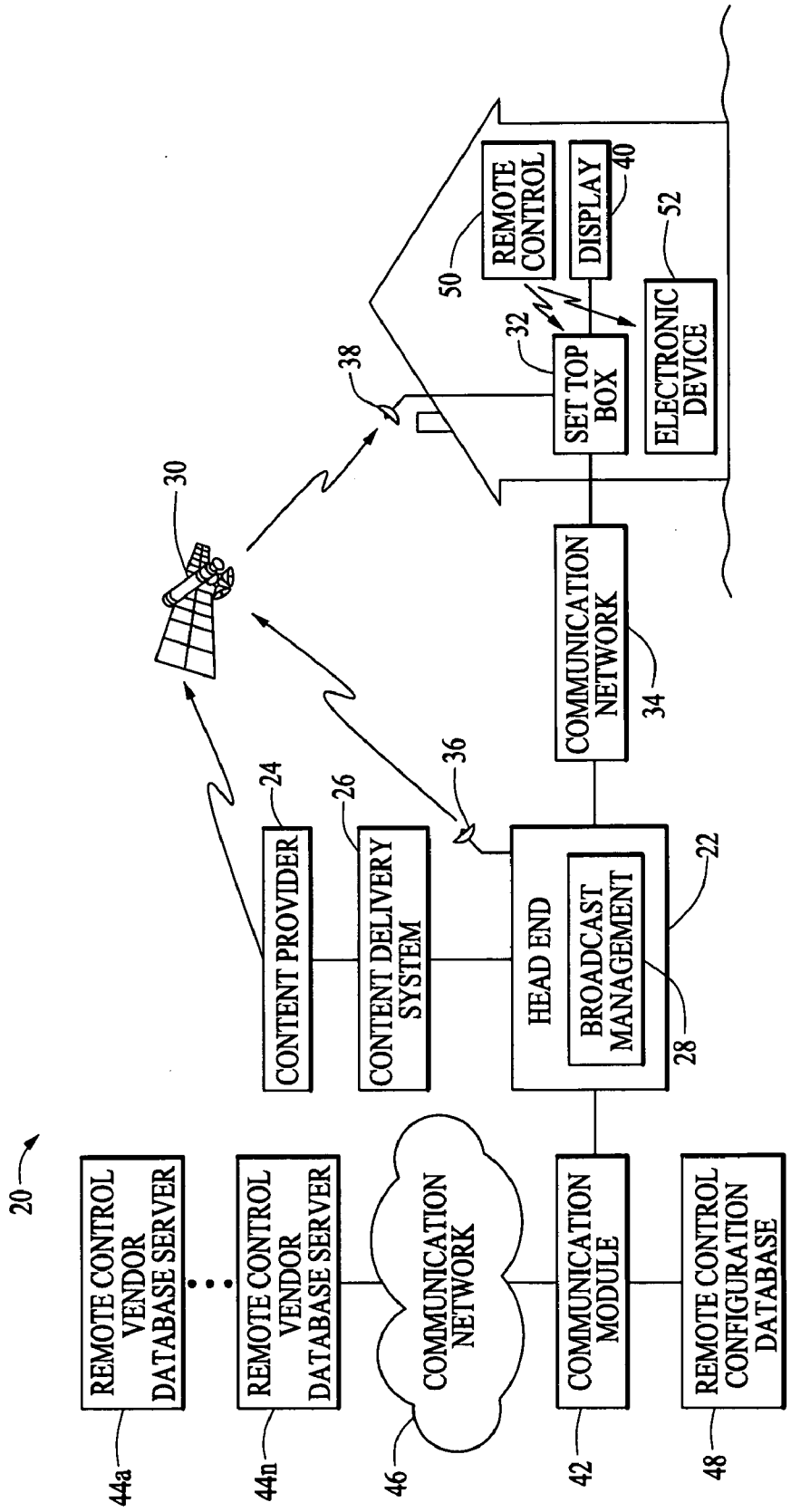

20
REMOTE CONTROL VENDOR DATABASE SERVER
44a
REMOTE CONTROL VENDOR DATABASE SERVER
44n
COMMUNICATION NETWORK
46
COMMUNICATION MODULE
42
REMOTE CONTROL CONFIGURATION DATABASE
48
CONTENT PROVIDER
24
CONTENT DELIVERY SYSTEM
26
HEAD END
BROADCAST MANAGEMENT
22
28
36
COMMUNICATION NETWORK
34
30
38
SET TOP BOX
32
REMOTE CONTROL
50
DISPLAY
40
ELECTRONIC DEVICE
52

Fig. 1

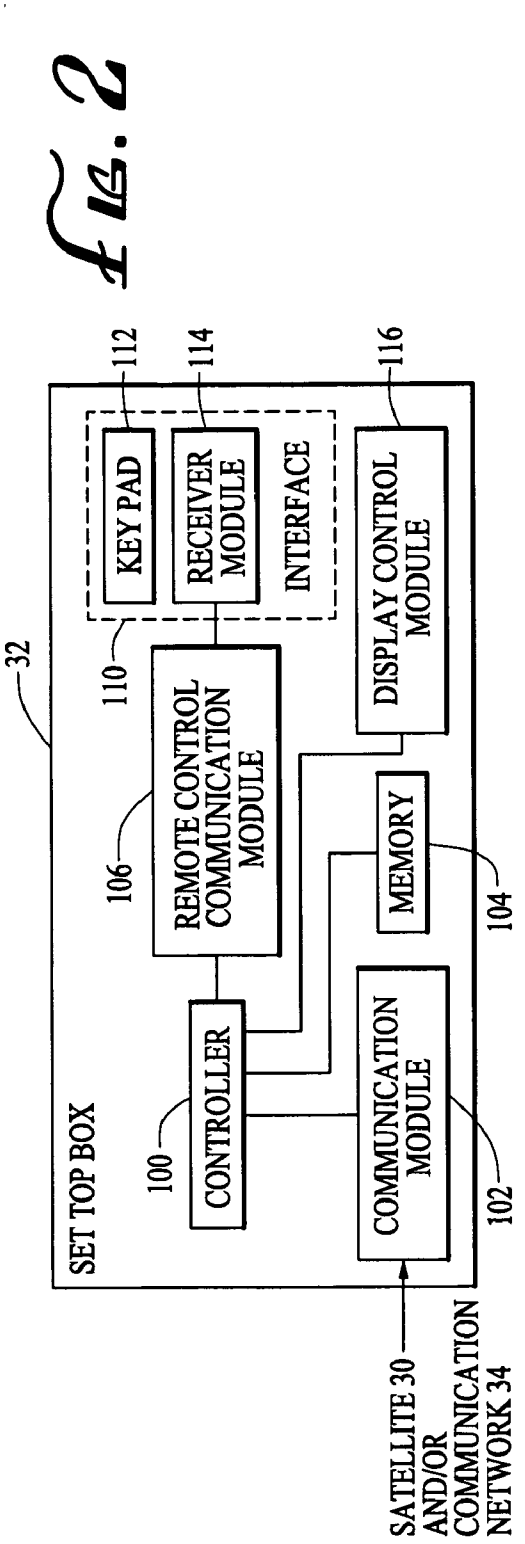

SET TOP BOX
32
SATELLITE 30 AND/OR COMMUNICATION NETWORK 34
CONTROLLER
100
COMMUNICATION MODULE
102
MEMORY
104
REMOTE CONTROL COMMUNICATION MODULE
106
110
INTERFACE
KEY PAD
112
RECEIVER MODULE
114
DISPLAY CONTROL MODULE
116

FIG. 2

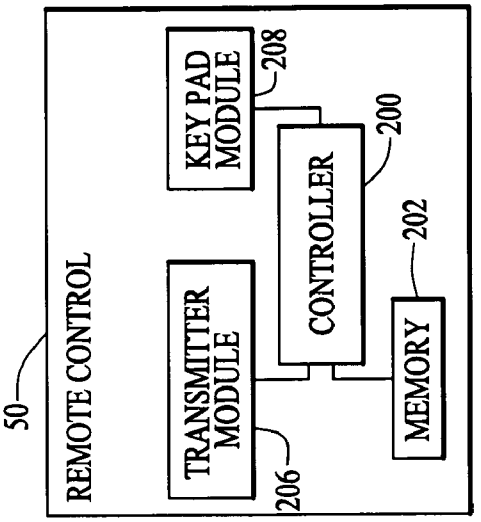

REMOTE CONTROL
50
TRANSMITTER MODULE
206
CONTROLLER
200
KEY PAD MODULE
208
MEMORY
202

FIG. 3

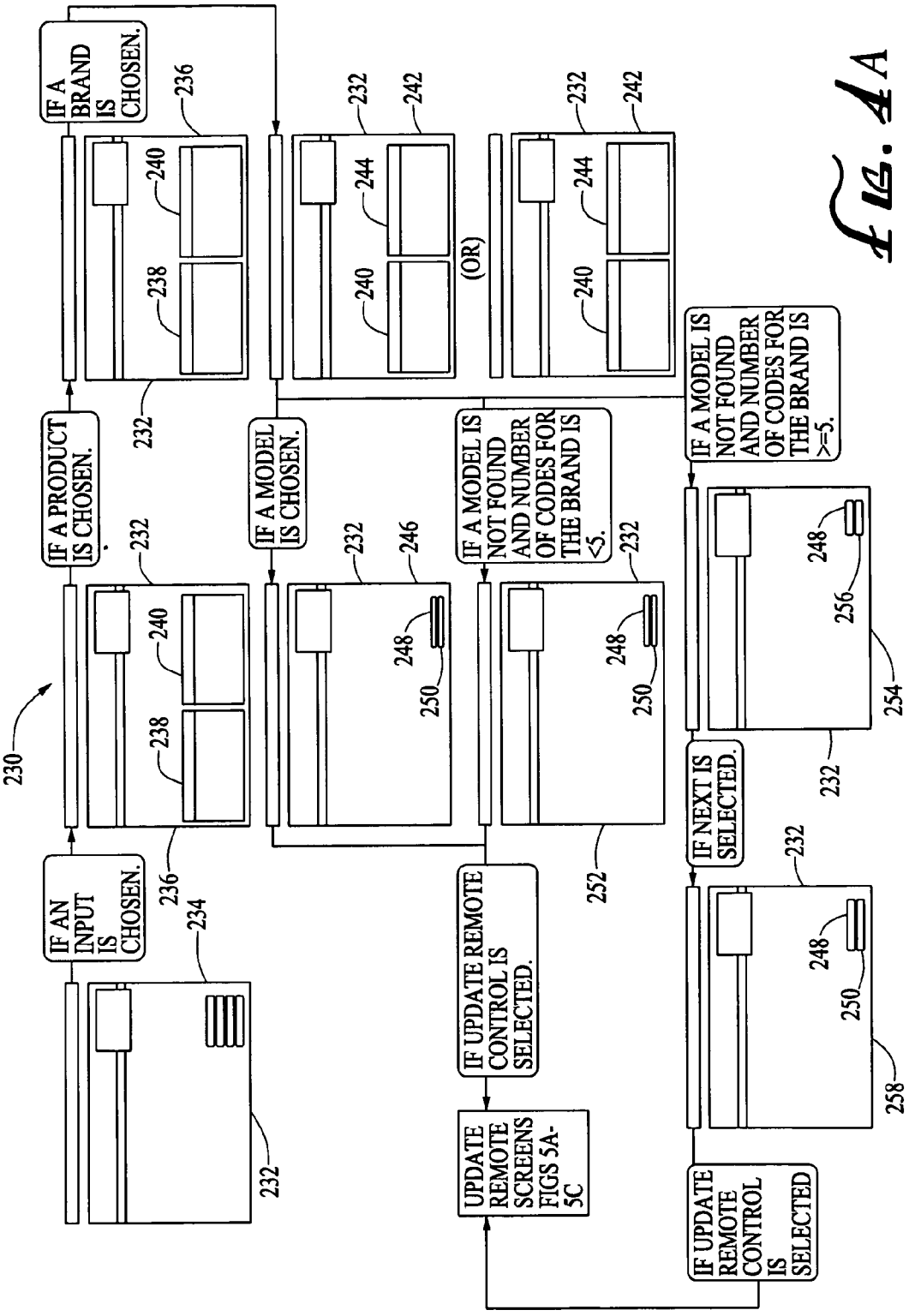

IF A BRAND IS CHOSEN.
IF A PRODUCT IS CHOSEN.
IF AN INPUT IS CHOSEN.
IF A MODEL IS CHOSEN.
IF A MODEL IS NOT FOUND AND NUMBER OF CODES FOR THE BRAND IS <5.
IF A MODEL IS NOT FOUND AND NUMBER OF CODES FOR THE BRAND IS >=5.
IF NEXT IS SELECTED.
IF UPDATE REMOTE CONTROL IS SELECTED.
UPDATE REMOTE SCREENS FIGS 5A-5C
IF UPDATE REMOTE CONTROL IS SELECTED
(OR)
230
232
234
236
238
240
242
244
246
248
250
252
254
256
258

FIG. 4A

FIG. 4B

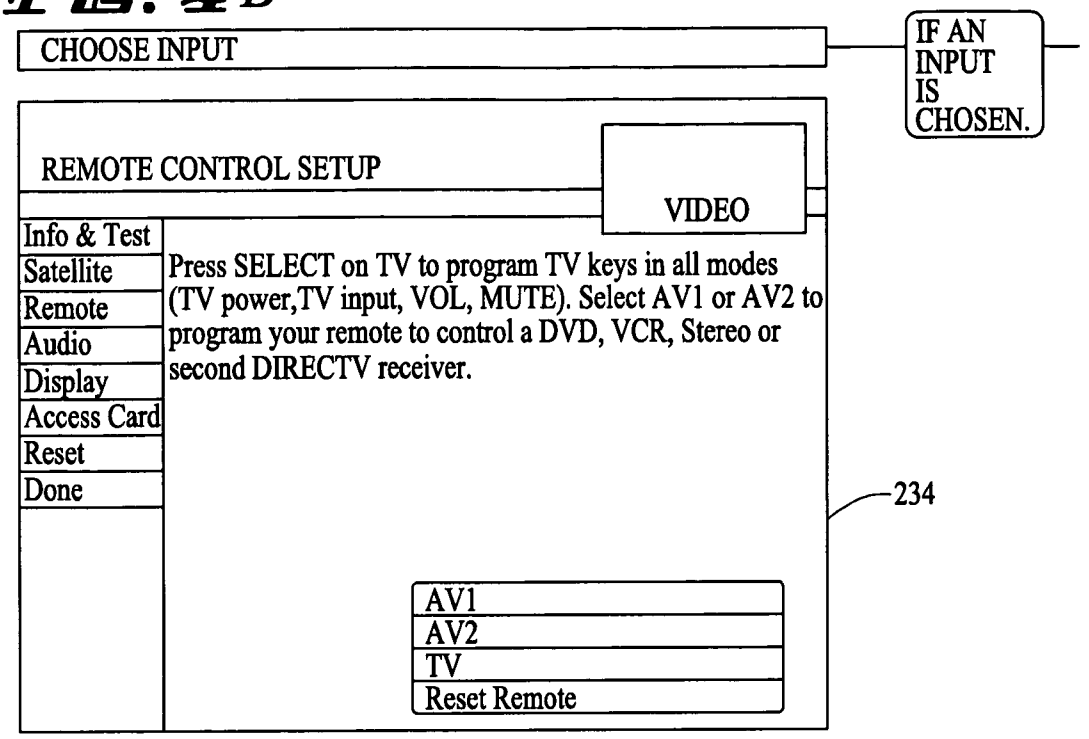

CHOOSE INPUT
IF AN INPUT IS CHOSEN.
REMOTE CONTROL SETUP
VIDEO
Info & Test
Satellite
Remote
Audio
Display
Access Card
Reset
Done
Press SELECT on TV to program TV keys in all modes (TV power,TV input, VOL, MUTE). Select AV1 or AV2 to program your remote to control a DVD, VCR, Stereo or second DIRECTV receiver.
234
AV1
AV2
TV
Reset Remote

FIG. 4C

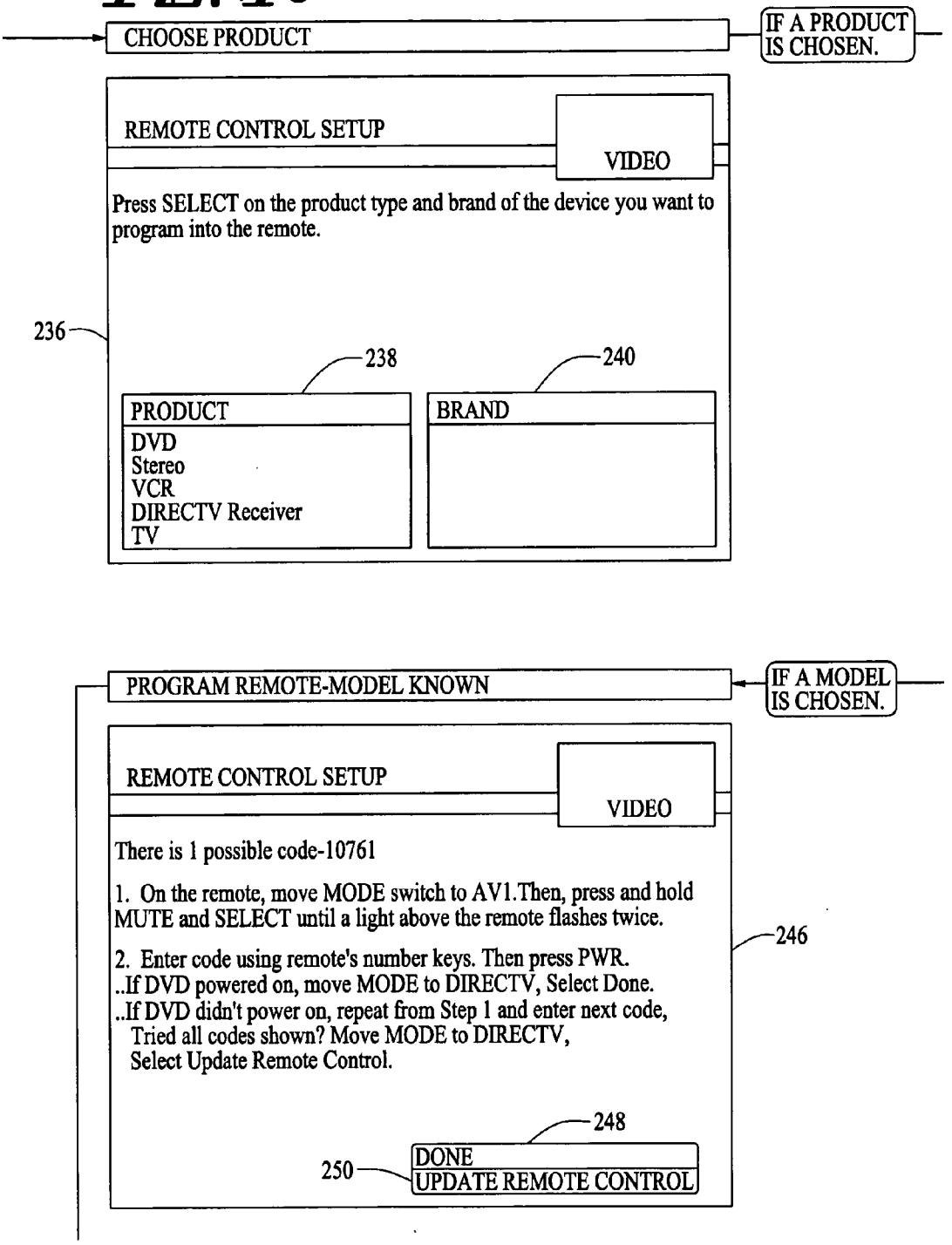
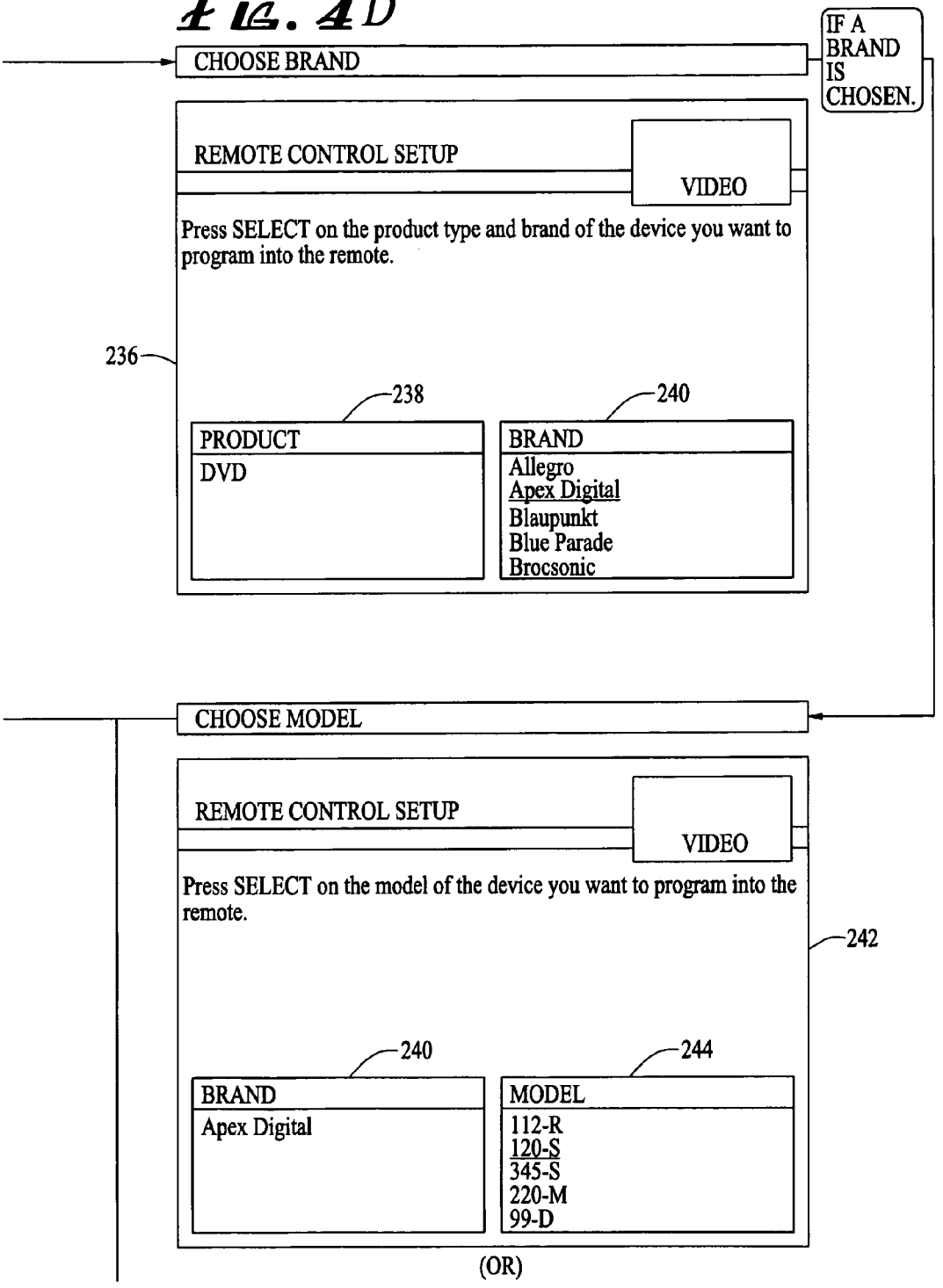

CHOOSE PRODUCT
IF A PRODUCT IS CHOSEN.
REMOTE CONTROL SETUP
VIDEO
Press SELECT on the product type and brand of the device you want to program into the remote.
236
238
240
PRODUCT
DVD
Stereo
VCR
DIRECTV Receiver
TV
BRAND
PROGRAM REMOTE-MODEL KNOWN
IF A MODEL IS CHOSEN.
REMOTE CONTROL SETUP
VIDEO
There is 1 possible code-10761
1. On the remote, move MODE switch to AV1.Then, press and hold MUTE and SELECT until a light above the remote flashes twice.
2. Enter code using remote's number keys. Then press PWR.
..If DVD powered on, move MODE to DIRECTV, Select Done.
..If DVD didn't power on, repeat from Step 1 and enter next code,
Tried all codes shown? Move MODE to DIRECTV,
Select Update Remote Control.
246
248
250
DONE
UPDATE REMOTE CONTROL

FIG. 4D


CHOOSE BRAND
IF A BRAND IS CHOSEN.
REMOTE CONTROL SETUP
VIDEO
Press SELECT on the product type and brand of the device you want to program into the remote.
236
238
240
PRODUCT
DVD
BRAND
Allegro
Apex Digital
Blaupunkt
Blue Parade
Brocsonic
CHOOSE MODEL
REMOTE CONTROL SETUP
VIDEO
Press SELECT on the model of the device you want to program into the remote.
242
240
244
BRAND
Apex Digital
MODEL
112-R
120-S
345-S
220-M
99-D
(OR)

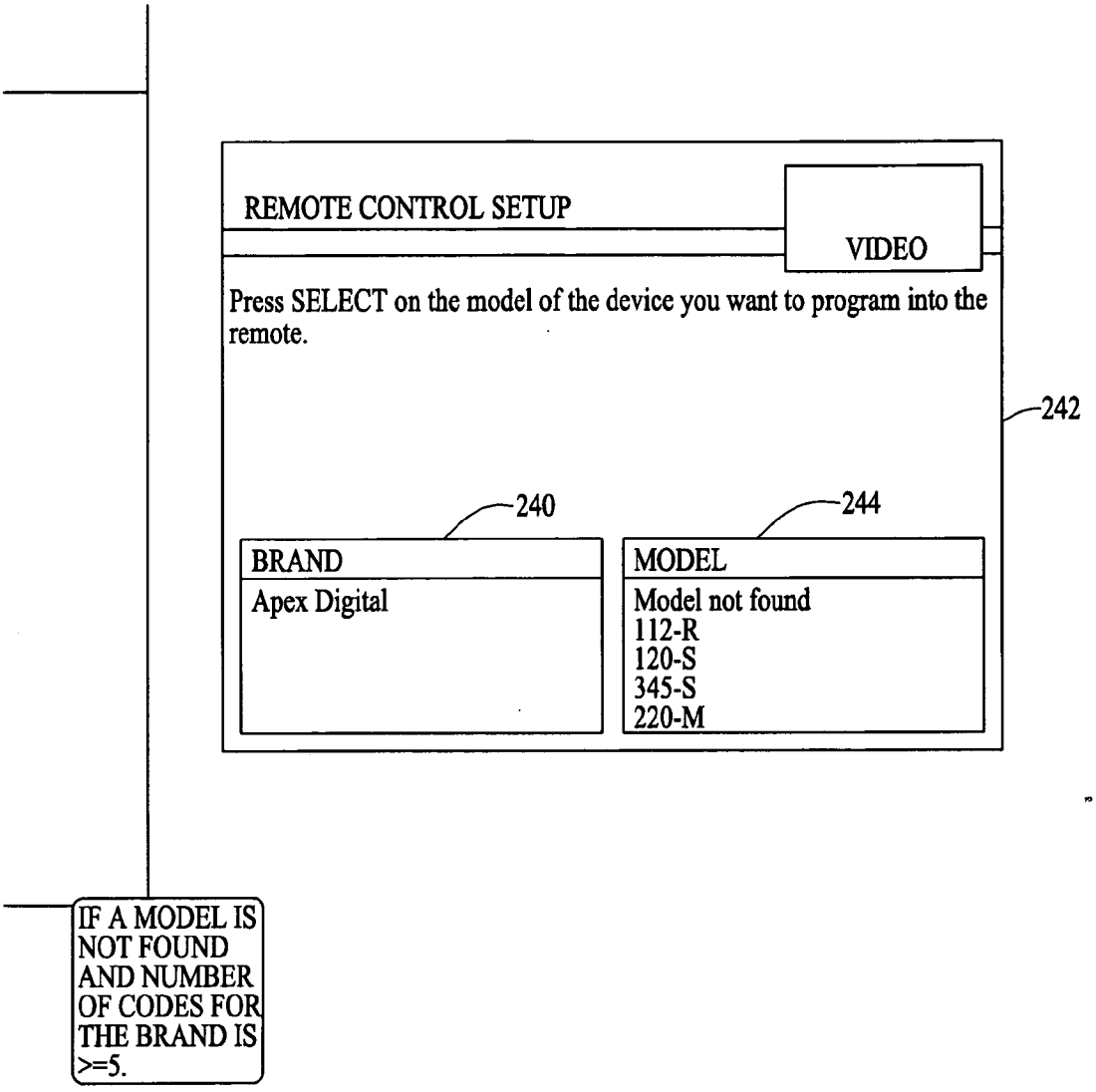

REMOTE CONTROL SETUP
VIDEO
Press SELECT on the model of the device you want to program into the remote.
242
240
244
BRAND
Apex Digital
MODEL
Model not found
112-R
120-S
345-S
220-M
IF A MODEL IS NOT FOUND AND NUMBER OF CODES FOR THE BRAND IS >=5.

FIG. 4E

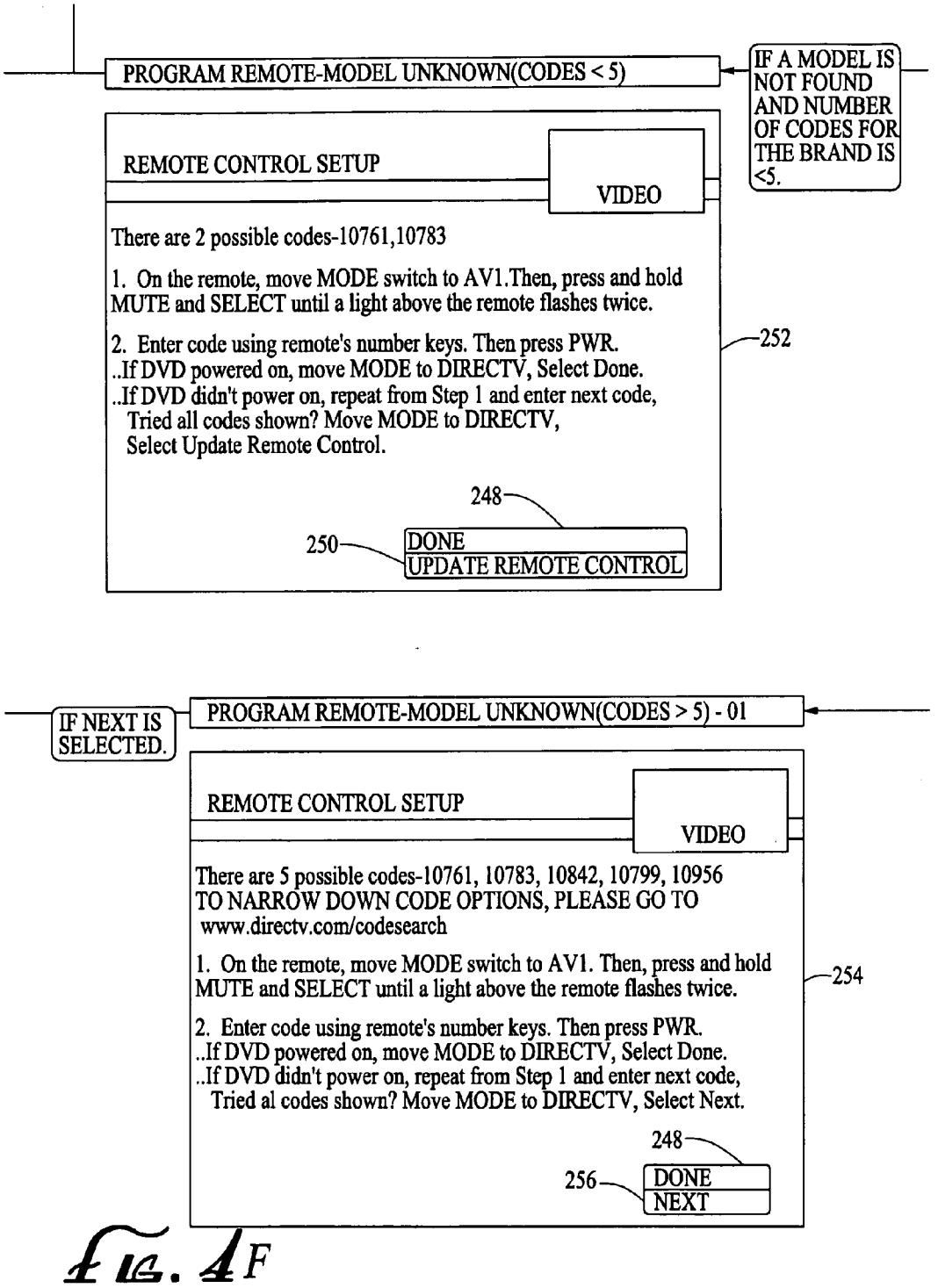

PROGRAM REMOTE-MODEL UNKNOWN(CODES < 5)
IF A MODEL IS NOT FOUND AND NUMBER OF CODES FOR THE BRAND IS <5.
REMOTE CONTROL SETUP
VIDEO
There are 2 possible codes-10761,10783
1. On the remote, move MODE switch to AV1.Then, press and hold MUTE and SELECT until a light above the remote flashes twice.
2. Enter code using remote's number keys. Then press PWR.
..If DVD powered on, move MODE to DIRECTV, Select Done.
..If DVD didn't power on, repeat from Step 1 and enter next code,
Tried all codes shown? Move MODE to DIRECTV,
Select Update Remote Control.
252
248
250
DONE
UPDATE REMOTE CONTROL
IF NEXT IS SELECTED.
PROGRAM REMOTE-MODEL UNKNOWN(CODES > 5) - 01
REMOTE CONTROL SETUP
VIDEO
There are 5 possible codes-10761, 10783, 10842, 10799, 10956
TO NARROW DOWN CODE OPTIONS, PLEASE GO TO
www.directv.com/codesearch
1. On the remote, move MODE switch to AV1. Then, press and hold MUTE and SELECT until a light above the remote flashes twice.
2. Enter code using remote's number keys. Then press PWR.
..If DVD powered on, move MODE to DIRECTV, Select Done.
..If DVD didn't power on, repeat from Step 1 and enter next code,
Tried al codes shown? Move MODE to DIRECTV, Select Next.
254
248
256
DONE
NEXT

FIG. 4F

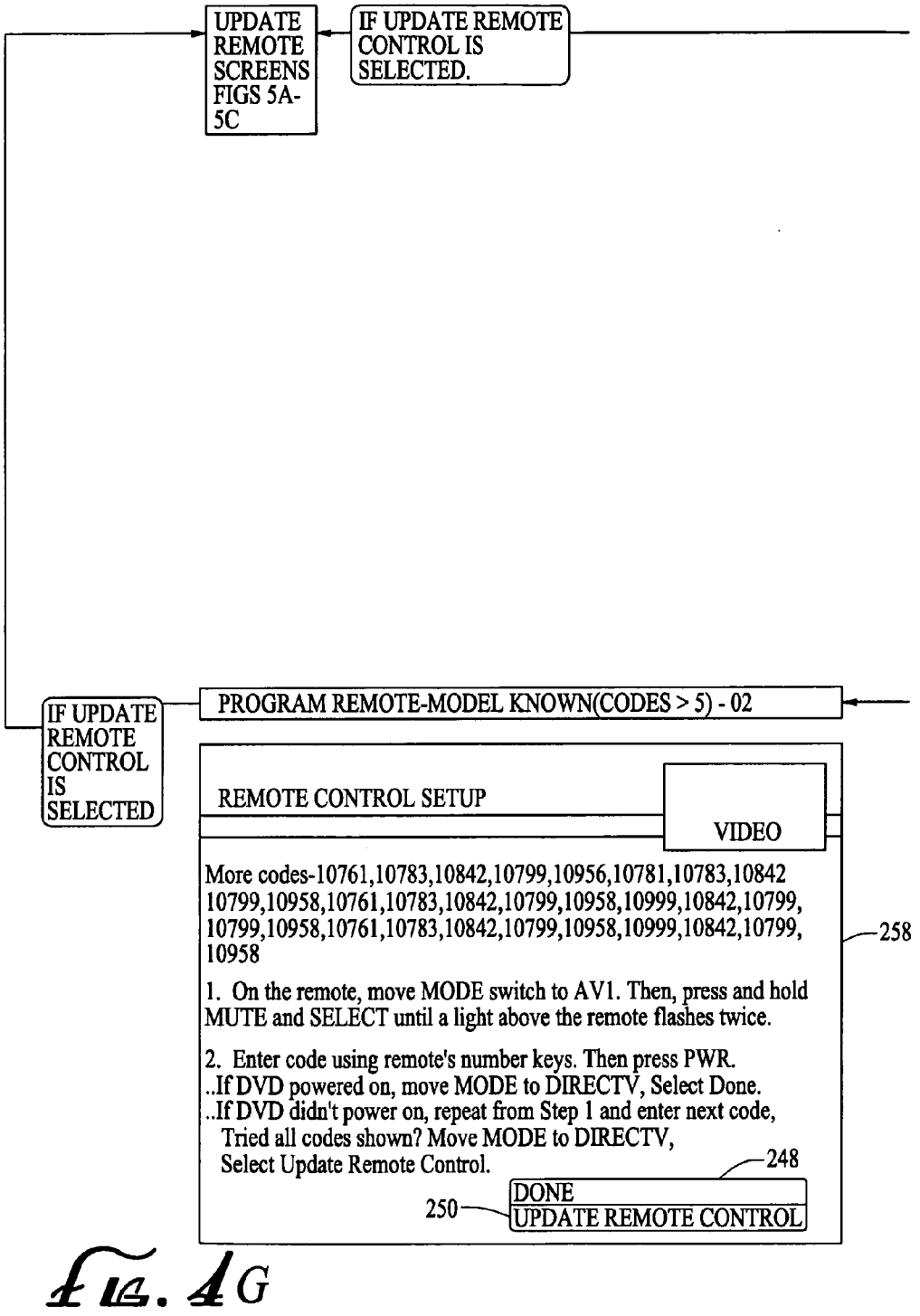

IF UPDATE REMOTE CONTROL IS SELECTED.
UPDATE REMOTE SCREENS FIGS 5A-5C
IF UPDATE REMOTE CONTROL IS SELECTED
PROGRAM REMOTE-MODEL KNOWN(CODES > 5) - 02
REMOTE CONTROL SETUP
VIDEO
More codes-10761,10783,10842,10799,10956,10781,10783,10842
10799,10958,10761,10783,10842,10799,10958,10999,10842,10799,
10799,10958,10761,10783,10842,10799,10958,10999,10842,10799,
10958
1. On the remote, move MODE switch to AV1. Then, press and hold MUTE and SELECT until a light above the remote flashes twice.
2. Enter code using remote's number keys. Then press PWR.
..If DVD powered on, move MODE to DIRECTV, Select Done.
..If DVD didn't power on, repeat from Step 1 and enter next code,
Tried all codes shown? Move MODE to DIRECTV,
Select Update Remote Control.
248
250
DONE
UPDATE REMOTE CONTROL
258

FIG. 4G

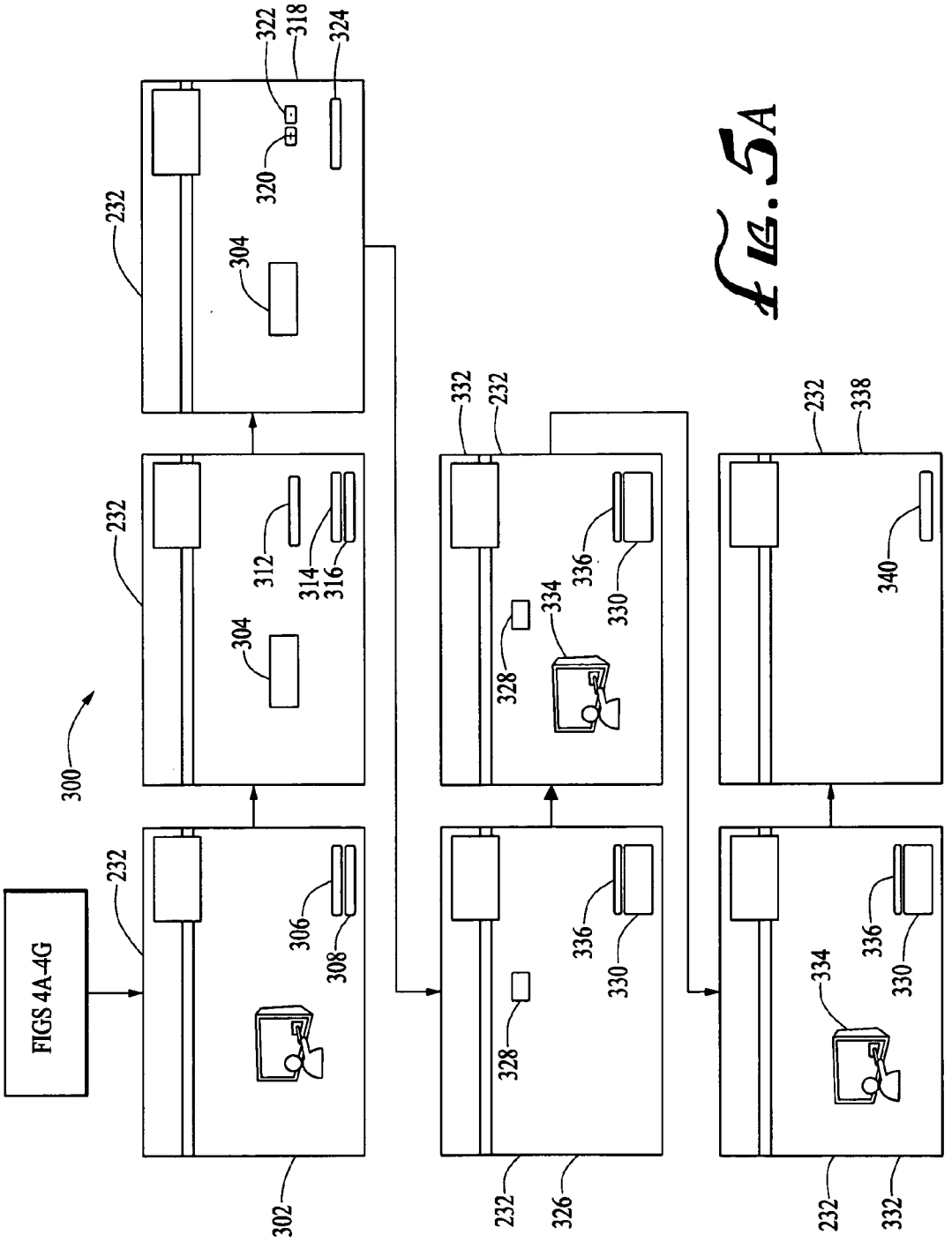

FIGS 4A-4G
300
232
302
304
306
308
312
314
316
318
320
322
324
326
328
330
332
334
336
338
340

FIG. 5A

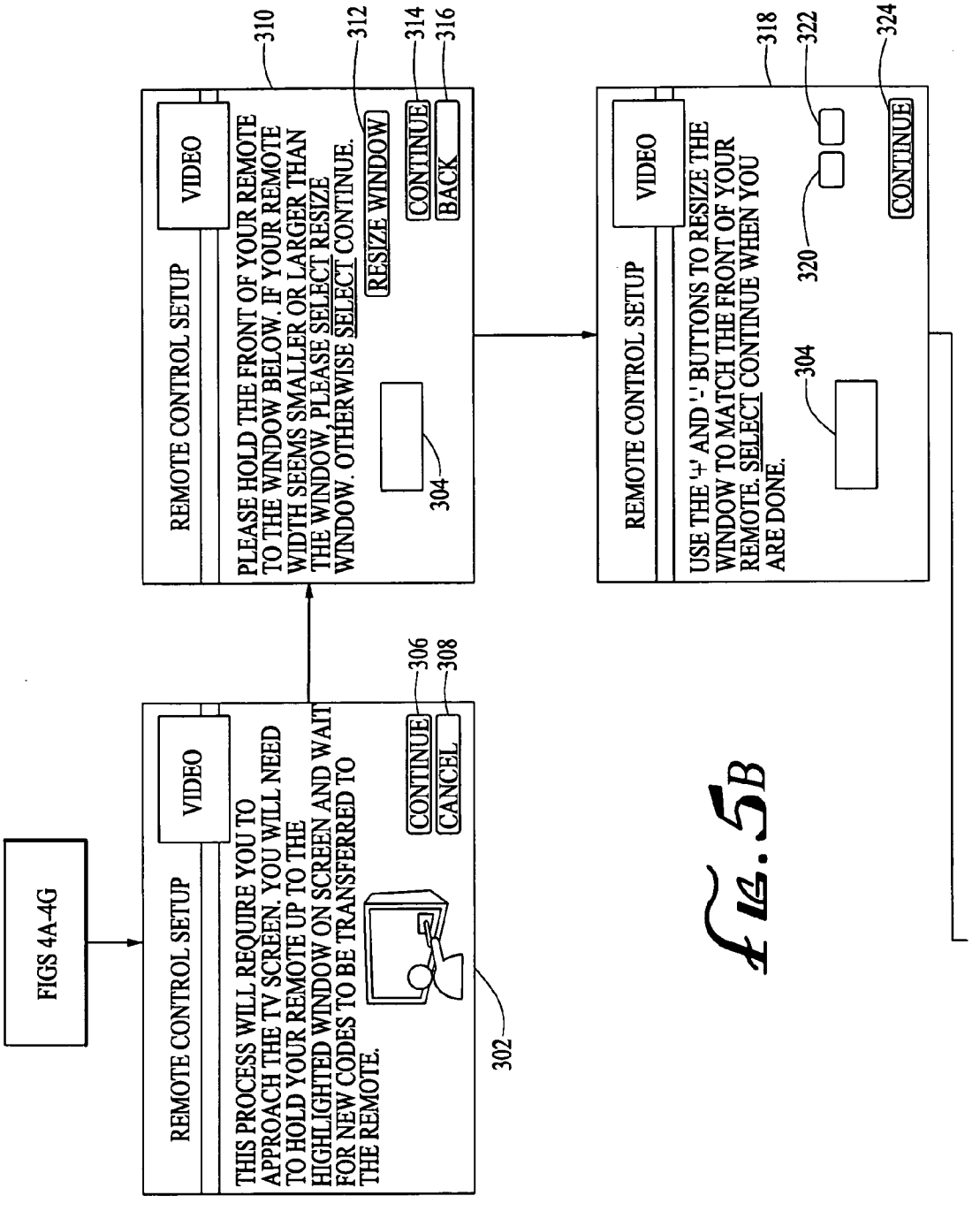

FIGS 4A-4G
REMOTE CONTROL SETUP
VIDEO
THIS PROCESS WILL REQUIRE YOU TO APPROACH THE TV SCREEN. YOU WILL NEED TO HOLD YOUR REMOTE UP TO THE HIGHLIGHTED WINDOW ON SCREEN AND WAIT FOR NEW CODES TO BE TRANSFERRED TO THE REMOTE.
CONTINUE
CANCEL
302
306
308
REMOTE CONTROL SETUP
VIDEO
PLEASE HOLD THE FRONT OF YOUR REMOTE TO THE WINDOW BELOW. IF YOUR REMOTE WIDTH SEEMS SMALLER OR LARGER THAN THE WINDOW, PLEASE SELECT RESIZE WINDOW. OTHERWISE SELECT CONTINUE.
RESIZE WINDOW
CONTINUE
BACK
304
310
312
314
316
REMOTE CONTROL SETUP
VIDEO
USE THE '+' AND '-' BUTTONS TO RESIZE THE WINDOW TO MATCH THE FRONT OF YOUR REMOTE. SELECT CONTINUE WHEN YOU ARE DONE.
304
320
322
CONTINUE
318
324

FIG. 5B

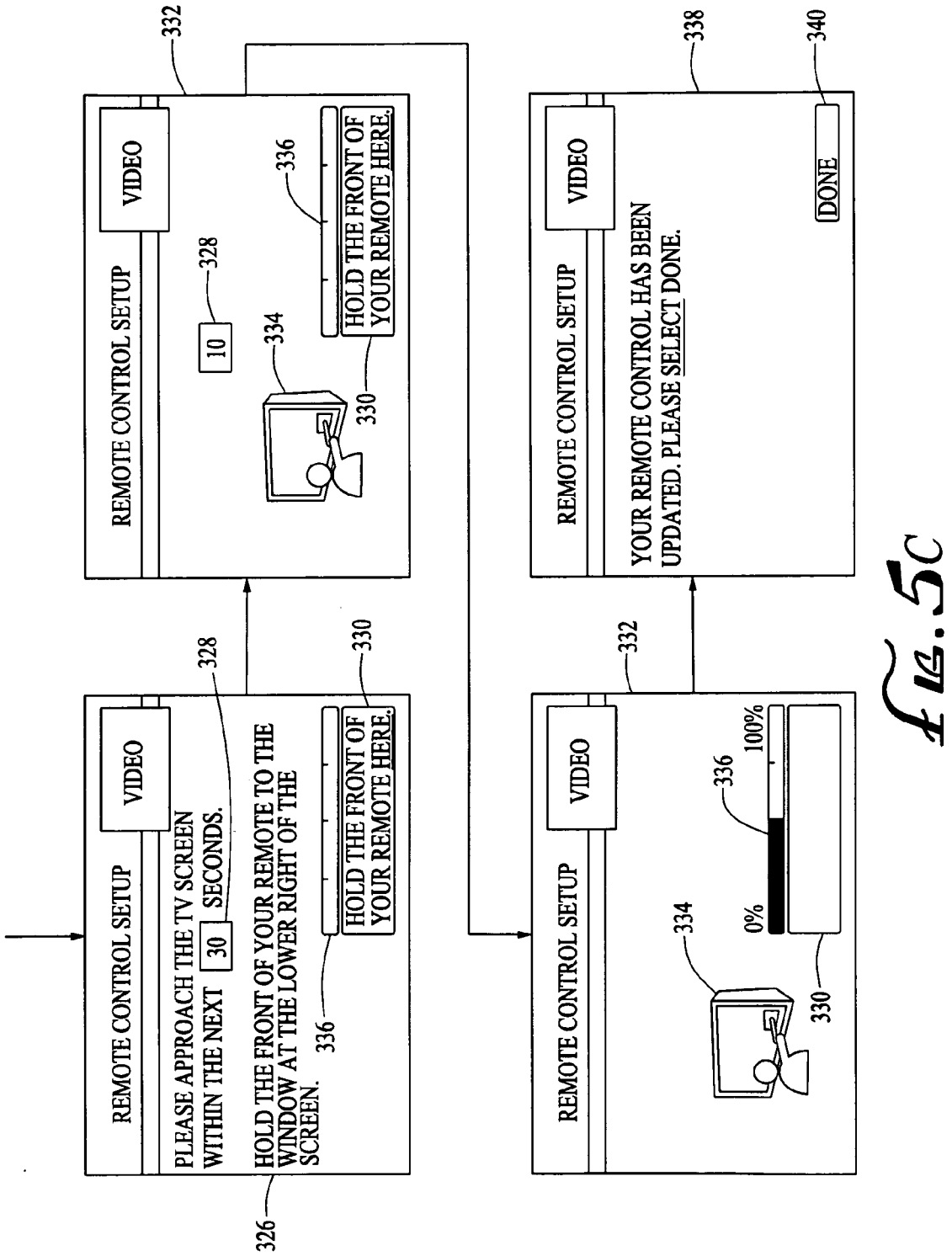

REMOTE CONTROL SETUP
VIDEO
PLEASE APPROACH THE TV SCREEN WITHIN THE NEXT 30 SECONDS.
HOLD THE FRONT OF YOUR REMOTE TO THE WINDOW AT THE LOWER RIGHT OF THE SCREEN.
HOLD THE FRONT OF YOUR REMOTE HERE.
326
328
330
332
334
336
10
REMOTE CONTROL SETUP
VIDEO
HOLD THE FRONT OF YOUR REMOTE HERE.
REMOTE CONTROL SETUP
VIDEO
YOUR REMOTE CONTROL HAS BEEN UPDATED. PLEASE SELECT DONE.
DONE
338
340
REMOTE CONTROL SETUP
VIDEO
0%
100%

FIG. 5C

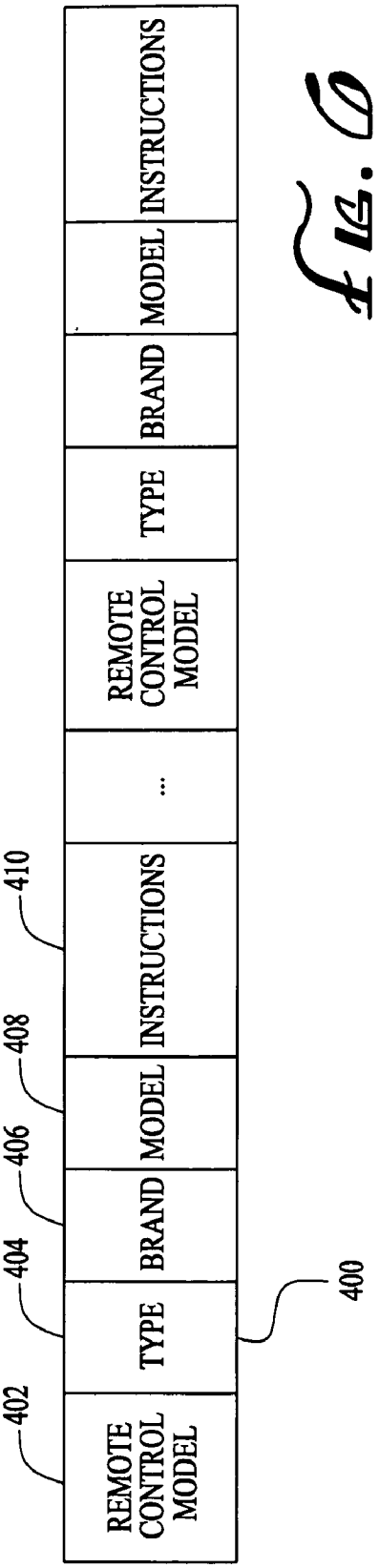

REMOTE CONTROL MODEL
TYPE
BRAND
MODEL
INSTRUCTIONS
...
REMOTE CONTROL MODEL
TYPE
BRAND
MODEL
INSTRUCTIONS
402
404
406
408
410
400

FIG. 6

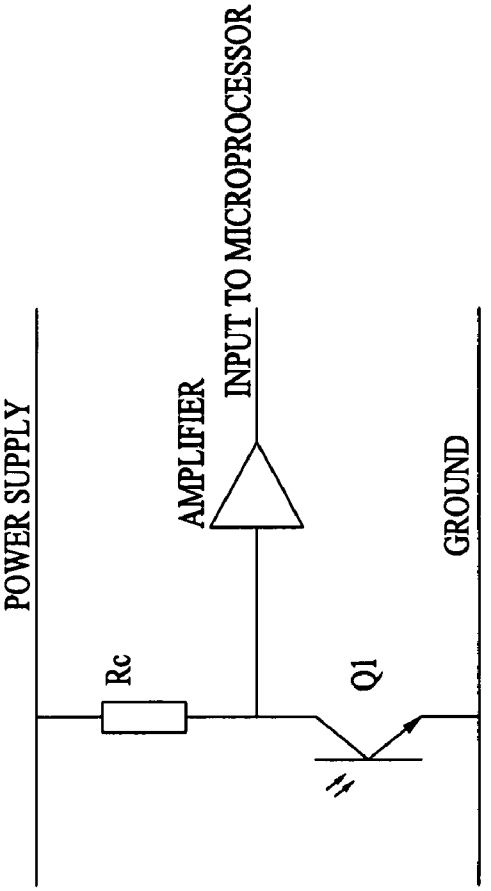

POWER SUPPLY
Rc
AMPLIFIER
INPUT TO MICROPROCESSOR
Q1
GROUND

FIG. 13

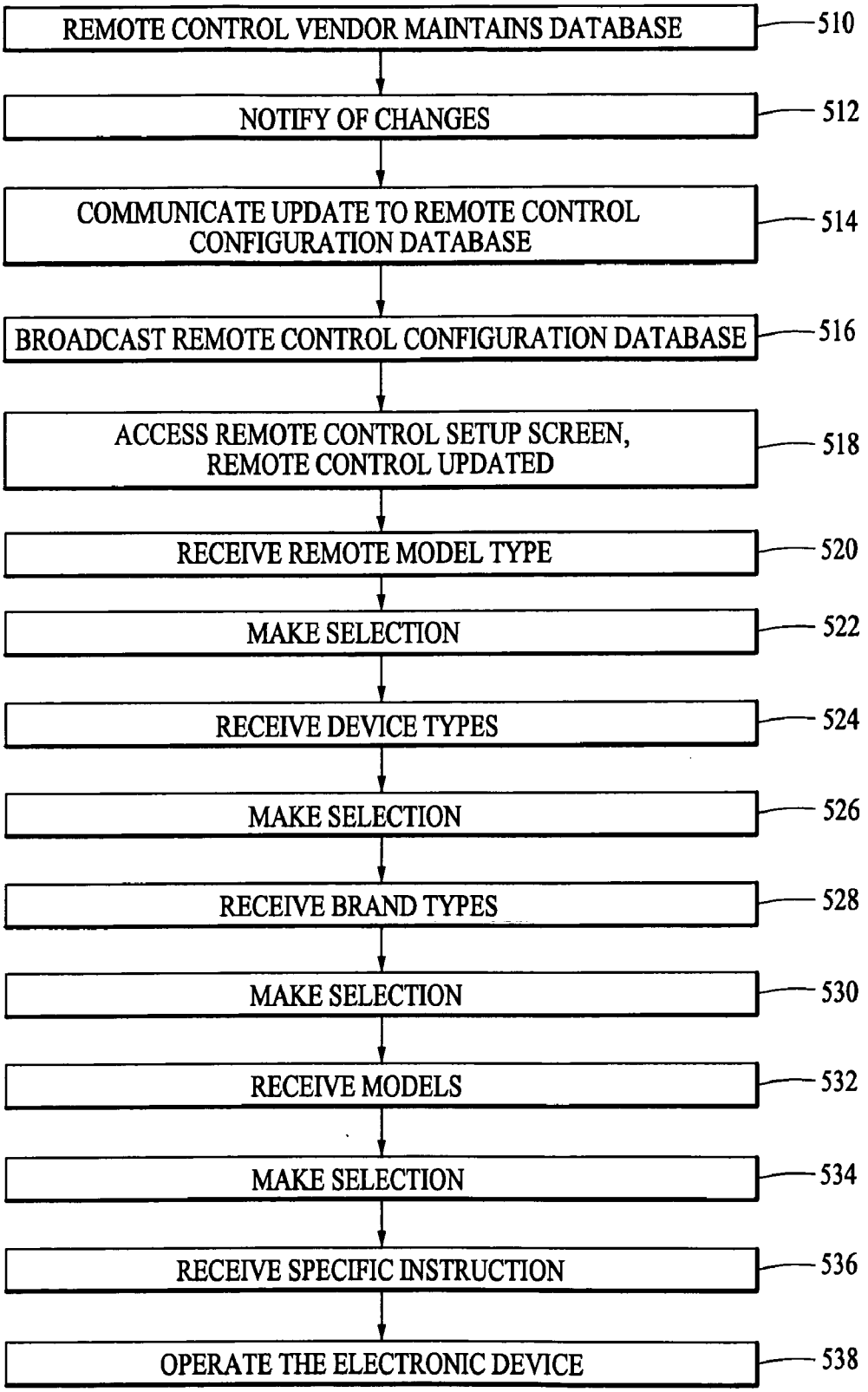

REMOTE CONTROL VENDOR MAINTAINS DATABASE
510
NOTIFY OF CHANGES
512
COMMUNICATE UPDATE TO REMOTE CONTROL CONFIGURATION DATABASE
514
BROADCAST REMOTE CONTROL CONFIGURATION DATABASE
516
ACCESS REMOTE CONTROL SETUP SCREEN, REMOTE CONTROL UPDATED
518
RECEIVE REMOTE MODEL TYPE
520
MAKE SELECTION
522
RECEIVE DEVICE TYPES
524
MAKE SELECTION
526
RECEIVE BRAND TYPES
528
MAKE SELECTION
530
RECEIVE MODELS
532
MAKE SELECTION
534
RECEIVE SPECIFIC INSTRUCTION
536
OPERATE THE ELECTRONIC DEVICE
538

FIG. 7

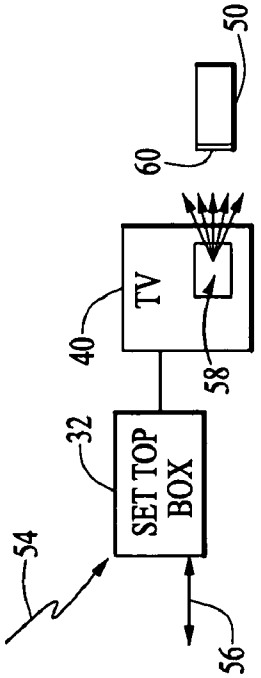


Fig. 8

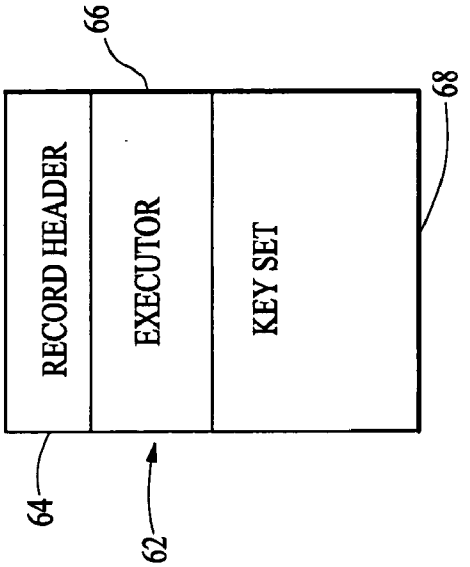


Fig. 9

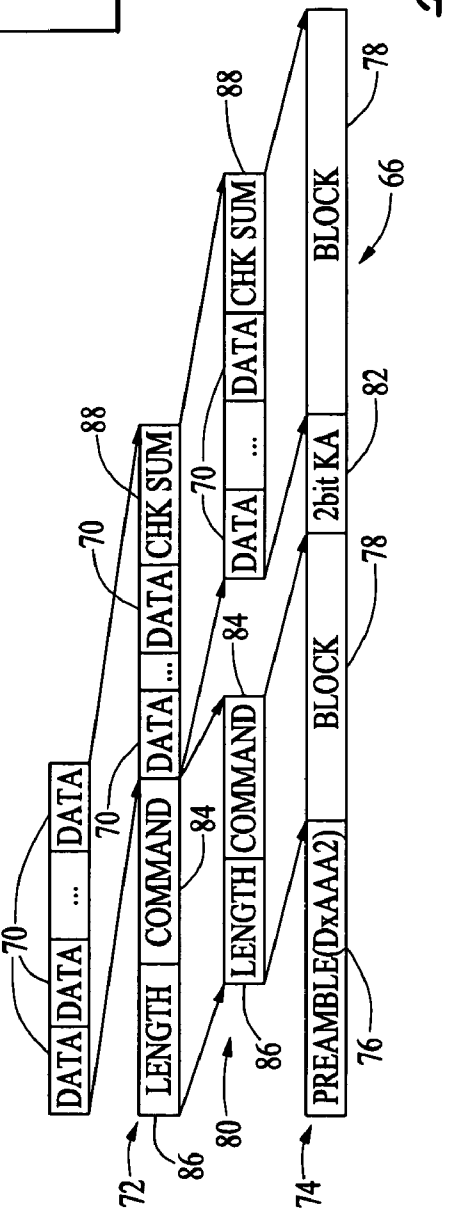


Fig. 10

Fig. 11

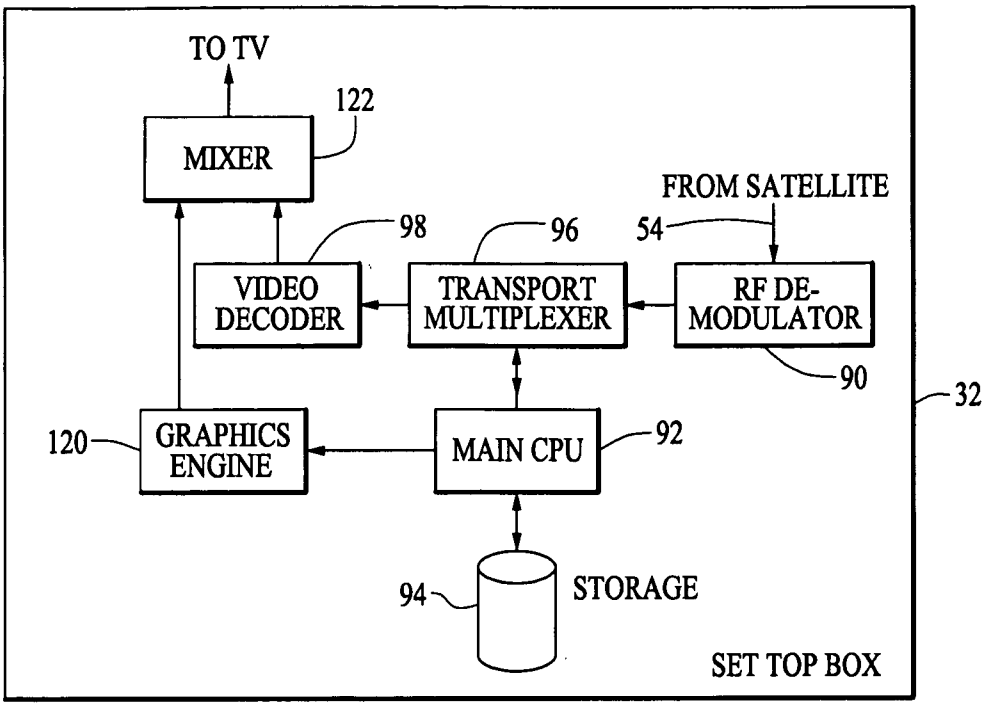
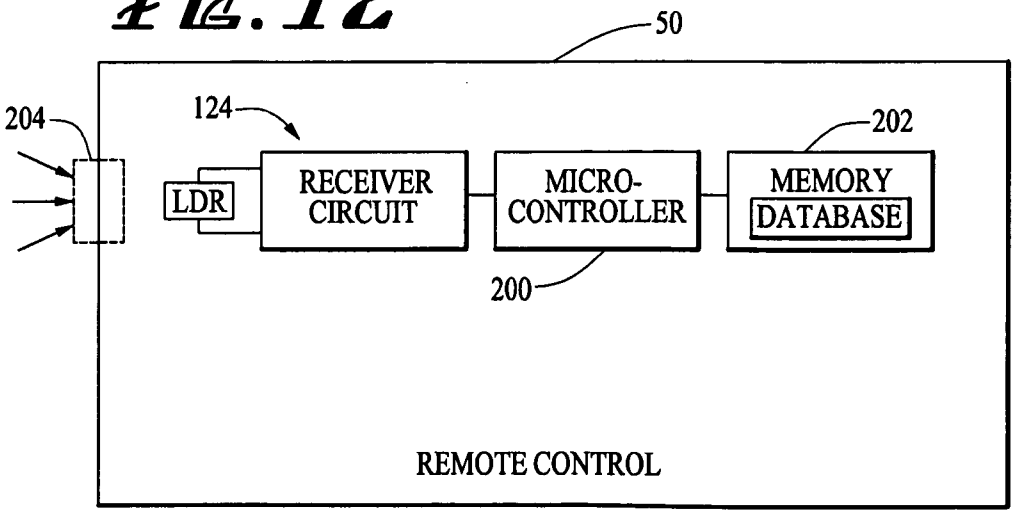

TO TV
122
MIXER
FROM SATELLITE
98
96
54
VIDEO DECODER
TRANSPORT MULTIPLEXER
RF DE-MODULATOR
90
32
120
GRAPHICS ENGINE
MAIN CPU
92
94
STORAGE
SET TOP BOX

Fig. 12


50
204
124
202
LDR
RECEIVER CIRCUIT
MICRO-CONTROLLER
MEMORY
DATABASE
200
REMOTE CONTROL

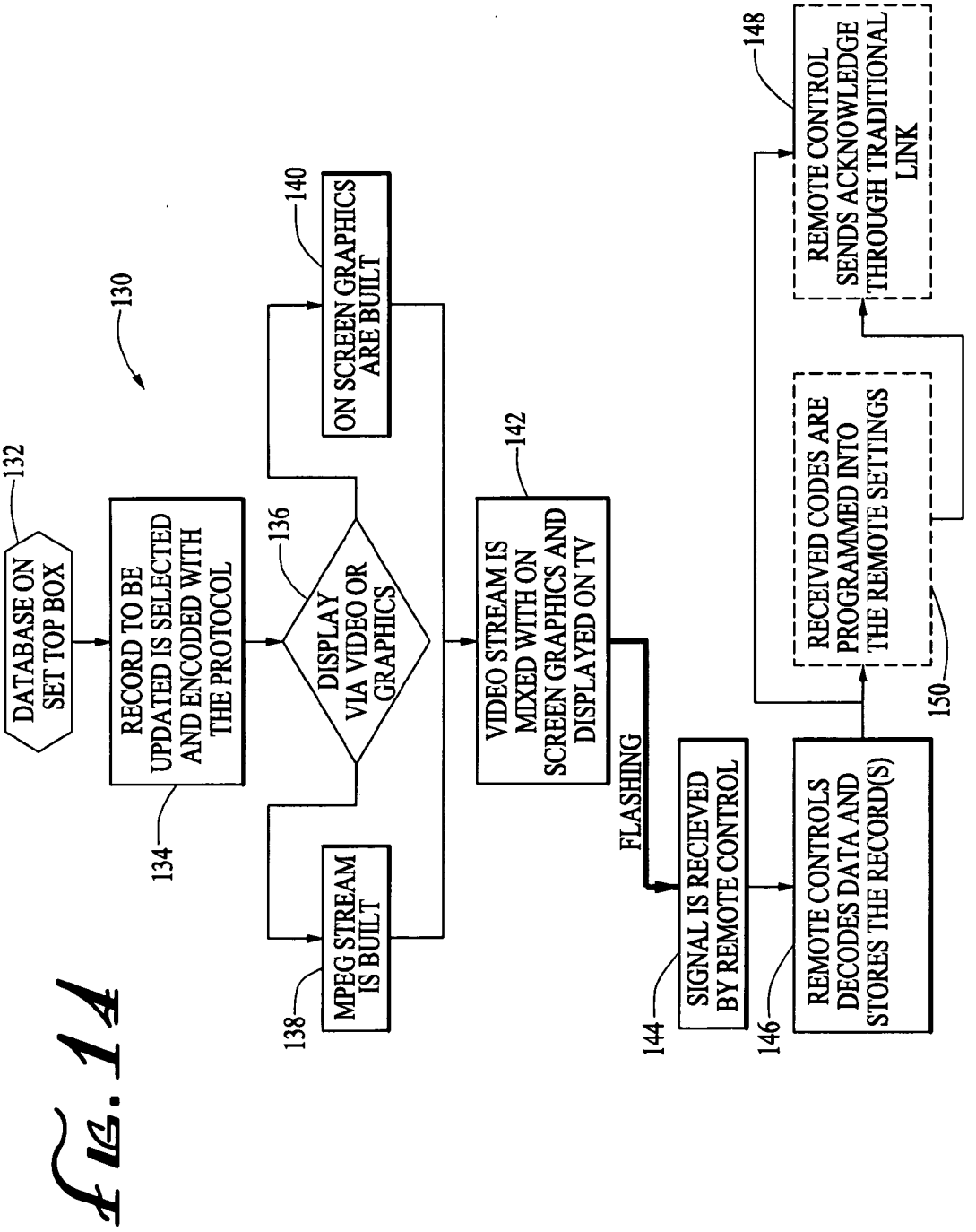

130
132
DATABASE ON SET TOP BOX
RECORD TO BE UPDATED IS SELECTED AND ENCODED WITH THE PROTOCOL
134
136
DISPLAY VIA VIDEO OR GRAPHICS
138
MPEG STREAM IS BUILT
140
ON SCREEN GRAPHICS ARE BUILT
142
VIDEO STREAM IS MIXED WITH ON SCREEN GRAPHICS AND DISPLAYED ON TV
FLASHING
144
SIGNAL IS RECIEVED BY REMOTE CONTROL
146
REMOTE CONTROLS DECODES DATA AND STORES THE RECORD(S)
148
REMOTE CONTROL SENDS ACKNOWLEDGE THROUGH TRADITIONAL LINK
150
RECEIVED CODES ARE PROGRAMMED INTO THE REMOTE SETTINGS

FIG. 14

METHOD AND SYSTEM FOR UPDATING A CONTROL DEVICE DATABASE VIA FLASHING LIGHT

CROSS-REFERENCE TO PRIOR APPLICATIONS

[0001] Not Applicable

U.S. GOVERNMENT SUPPORT

[0002] Not Applicable

BACKGROUND OF THE INVENTION

[0003] The present invention relates generally to programming a control device. More particularly, the present invention relates to using visible-light to provide a remote control device with updated device codes.

[0004] A remote control is an electronic device used for the remote operation of a machine or electronic device. Typically, a remote control is used to issue commands from a distance to a television (TV) or some other consumer electronic device (e.g., stereo systems, video cassette recorders (VCR), digital video disc (DVD) players, digital video recorders (DVR), etc.). In the 21st Century, many homes have so many consumer electronic devices that there may be as many as four or more remote control devices in just one room of any given home. For example, in order to operate a home theater system, a user may require one remote control for a cable or satellite receiver, another remote control for the VCR, a further remote control for the DVD player, yet another remote control for the TV and audio amplifier, etc. Often, these remote controls must be used sequentially, and this can be confusing, unwieldy and frustrating to the user.

[0005] Remote control devices associated with these consumer electronic devices are usually small, wireless, handheld objects with an array of buttons for adjusting various settings such as channel/station, volume, on/off, etc. Most remote controls are battery-powered and communicate to their respective devices via infra-red (IR) and/or radio signals. Usually, each brand/manufacturer assigns a particular and/or unique IR device code (usually in the form of a number) to the particular device the remote control is communicating with and/or controlling. Each IR device code identifies an associated collection of particular and/or unique IR device commands. Each IR device command comprises a series of bits corresponding to a function on a device (e.g., "volume up", "volume down", "channel up", "channel down", "on/off" or the like). Thus, a user's selection of a particular device code automatically selects the device commands associated with that particular device code. The IR device command is determined by the original manufacturer of the device (e.g., Sony determines the IR device commands for a Sony TV). The IR device code is determined by the manufacturer of a remote control associated with a particular device (e.g., a TV, VCR, etc.) and may only function for that particular remote control model. Thus, an electronics manufacturer can assign a particular IR device code (i.e., the device code itself comprising one or more device commands) to a specific brand/model TV set it manufactures and another particular IR device code (comprising one or more device commands) to a specific brand/model VCR it also manufactures. Other electronics manufacturers use different IR device codes (comprising one or more device commands) for their products.

[0006] A universal remote control device is a type of remote control device that can be programmed to operate various brands of one or more types of consumer electronic devices. Some universal remote control devices can only control a set number of consumer electronic devices, as determined by the number of device codes (and their associated device commands) programmed into the remote control device by the manufacturer of the universal remote control device, while other universal remote control devices allow the user to program in new control device codes (and their associated device commands) to the universal remote. Typically, universal remote control devices have built-in descriptions, commonly referred to as a code library or database, on how to communicate with other devices such as TV's and DVD players. These code libraries may be in the form of collections of device commands; each collection being identified by a particular device code. The code library or database stores all the device codes and their associated device commands. However, as new consumer electronic devices are constantly entering the marketplace, these code libraries become outdated over time and the remote control device must be updated to accommodate this. A printed list of device codes may come with the remote control at the time the remote control is purchased as either a stand-alone product or included with a consumer product (e.g., TV, VCR, etc.). The printed list of device codes represents device codes (and their associated device commands) already programmed into the remote control device. However, this list of device codes may already be out-of-date at the time purchase due to ever increasing numbers of new consumer electronic devices coming into the marketplace. The current method of "updating" a remote control device is to replace it with another remote control device having a newer, more recent code library or database. The old remote control device may be thrown away, cannibalized for parts or refurbished with an updated code library in order to replace a remote control with an outdated code library.

[0007] Even remote control devices sold with a particular electronic device may include universal remote capabilities for other types of devices, which allows the remote control device to control other devices beyond the particular device (e.g., a VCR remote programmed to operate various brands of televisions) the remote control came with at the time of purchase. Large numbers of device codes (and their associated device commands) for various brands and models of electronic devices can be stored within a memory of a remote control device (i.e., in a code library or database within the memory). As the number of devices increases, the number of device codes and their associated device commands in the code library or database (stored in a non-volatile storage memory in the remote control device) also increases. The code library or database is loaded into the remote control device at the time the remote control device is manufactured. Most universal remote controls sold today are device-based remote controls where the user presses a button associated with a desired device (e.g., a TV) to select that device (i.e., the TV) for control and then uses the remaining buttons to actually control the functions of that single device (i.e., the TV). To start controlling another device (e.g., a VCR), the user presses a different device button (i.e., the button marked "VCR") and the remote then starts sending commands to the new device (i.e., the VCR). Typical "mode" buttons on this type of remote control device are labeled "TV", "DVD", "Receiver", etc. Each different type of device (e.g., TV, VCR or the like) controlled by the same remote control more than likely uses a different device code (i.e., the device code for the

TV is different from the device code for the VCR even if both devices were made by the same brand manufacturer).

[0008] A television set-top box (e.g., a satellite broadcast set-top box, a cable converter box, etc.) may also include a remote control code library or database having a number of device codes and associated device commands in order to aid a consumer in programming the remote control associated with the set-top box to be used to control various other devices (e.g., a TV, a DVD player, an audio system, etc.). Typically, the term "set-top box" (STB) describes a device that connects to a TV and some external source of signal, and turns the signal into content then displayed on the TV screen. Before cable-ready TV sets, a set-top box known as a cable converter box was used to receive analog cable TV channels and convert them to video that could be seen on a regular TV. Cable converter boxes are still used to descramble premium cable channels and to receive digital cable channels through a coaxial cable that is operationally connected to a cable service provider.

[0009] STBs are also well-known to consumers who subscribe to a satellite broadcast network. Most satellite TV customers get their programming through a direct broadcast satellite (DBS) provider (e.g., DirecTV). The provider selects programs and digitally broadcasts them to subscribers as a set package. There are five major components involved in a direct to home (DTH) satellite system: the programming source, the broadcast center, the satellite, the satellite dish and the receiver (i.e., the STB). Programming sources are simply the channels that provide programming for broadcast. The broadcast center is the central hub of the system. At the broadcast center, the television provider receives signals from various programming sources and beams a broadcast signal to satellites in geostationary orbit. The satellites receive the signals from the broadcast station and rebroadcast the signals to the ground. The subscriber's dish picks up the signals from the satellite (or multiple satellites) and passes the signals on to the STB in the subscriber's house. The STB processes the signals and passes the signals on to a TV connected to the STB. The STB is also known as an Integrated Receiver and Decoder (IRD).

[0010] Like the remote control device, as the number of different brands/models of consumer electronic devices increases, the database (stored in a non-volatile storage memory in the STB) also increases. Like the code library or database in the remote control device, a code library or database is loaded into the STB at the time the STB is manufactured. This makes the code library or database in the STB as static as the code library or database in the remote control device. Likewise, the STB may be equally in need to be updated as new types, models and brands of consumer electronic devices enter the marketplace. A user seeks to control a desired device (e.g., a TV) by selecting the type of desired device (i.e., the TV) and brand name (e.g., SONY) of the desired device (i.e., the TV) that are stored in the programming codes in the fixed database of the STB. The user can access these device codes through a set-up feature associated with the STB. The user programs the remote control device with one of the codes and tests the remote control device by trying to use the remote control device on the desired device (i.e., the TV). If the desired device (i.e., the TV) responds, programming is stopped. However, there is a chance that the desired device (i.e., the TV) may not work and another code may be entered. As with programming the remote control device using codes stored in the remote control device's code library or database, as outlined below, several device codes may be entered before the proper code for the desired device is found.

[0011] Problems arise when a user purchases a new and/or updated brand/model of electronic device (e.g., a new television, a new audio/stereo system, a new DVR, etc.) and the user's universal remote control device does not work with the new electronic device. Manufacturers of consumer appliances and devices often reuse the same device codes on many similar devices (though for each manufacturer and device type, there are usually multiple device codes in use since there may be several different models of the same type of device made by the manufacturer). Thus, a new device may share the same IR code as an older device made by the same manufacturer. However, as time goes by, new device codes can be added and/or old device codes modified and/or updated. A universal remote control device that was designed for use when VCRs dominated the marketplace may not function with a relatively new consumer electronic device, such as a DVR. Thus, after a few years, the code library or database of device codes within the remote control device can become outdated and unable to function with new devices. Depending on the age and quality of the remote control device, the memory of the remote control device may not include the device codes for relatively new consumer electronic devices. In this case, the memory within the remote control device must be updated with device codes that correspond to new and/or updated electronic devices. Thus, there is a need for a way to update remote control devices with new device codes and/or associate old device codes with newer consumer electronic devices. In sum, while remote control devices that are able to control multiple consumer electronic devices have "built-in" descriptions (i.e., codes) of how to communicate with other consumer electronic devices, as new devices are made, these "built-in" descriptions become out-dated unless the code library or database of the remote control device can be updated.

[0012] If a remote control device having universal remote functionality does not work with a particular new device that a consumer has purchased, the consumer can check the user's manual that came with the universal remote device when the consumer purchased it (i.e., if the user can even find his/her user's manual assuming that he/she even bothered to keep the user's manual), and then look up the appropriate device code for the particular device (i.e., brand, type of device, model, etc.) he/she purchased as well as the steps on how to program the remote control device to associate the appropriate device code with the new consumer electronic device. Although most users of remote control devices often have no difficulty operating a remote control device after the remote control device has been set-up and/or programmed for them, the very act of programming a universal remote control device can be a daunting process to technologically-unsophisticated individuals who have trouble understanding the programming instructions for the remote control device that require certain buttons to be pushed in certain sequences. Typically, a user will contact a customer service representative via telephone in order to learn the appropriate device code for the new consumer electronic device and be instructed in how to program the remote control device into associating the device code with the new consumer electronic device. While this helps the user, telephone calls to customer service call centers can be costly when one adds up all the thousands upon thousands of code-related customer service calls made each year

by consumers. In some cases, it may be necessary for either the customer, cable company or DBS provider to incur the expense of replacing the remote control device if the remote control device is not responsive to any of the device codes provided to the consumer.

[0013] Some universal remotes allow the list of codes programmed into the database of the remote control device to be updated to support new brands or models of devices not currently supported by that remote control device. Some universal remote control devices accomplish this by allowing audible signals to be sent over a telephone to a receiver on the remote. If the remote user calls customer service, an operator can have the caller place the remote control device next to the telephone's speaker and then send a signal over the telephone to an audio receiver of the remote control device in order to upgrade the remote control device for any requested new brand or model of a particular type of supported consumer electronic device. A drawback to this approach is that the audio receiver on the remote control device may not be sensitive enough to pick up the audio signal and/or the telephone's speaker does not emit a clear enough audio signal for the remote control device's audio receiver to pick up on. Another drawback is that background noise can interfere with and distort the audio signal picked up by the remote control device's audio receiver. Other models of remote control devices allow codes to be upgraded by connecting the remote control device to a personal computer via a USB cable or the like and the new and/or updated codes are downloaded into the memory of the remote control device. Still other remote control devices have IR learning features that allow the remote control devices to "learn" the code for any button on many other IR remote controls. This functionality allows the remote control device to learn functions not supported by default for a particular device. A drawback of this approach is that the learning remote control device needs a functioning teaching remote control device.

[0014] Accordingly, there is a need for an improved system and method for adding/updating consumer electronic device codes in a remote control device. There is also a need for a system and method that reduces the need to periodically replace remote control devices. There is a need for a system and method that provides a remote control device that can "learn" the commands of new consumer electronic devices and update the code library or database of the remote control device. There is also a need for an improved system and method to transmit these updated/new codes to the remote control device without the need for cables or teaching remotes. There is a further need for a system and method of adding/updating device codes in the code library or database of a remote control device that reduces and/or eliminates the need for a user to consult a customer service representative. There is an additional need for a system and method of adding/updating device codes in a remote control device that uses existing communications connections between the remote control device and the source of the new/updated device codes. The present invention satisfies these needs and provides other related advantages.

SUMMARY OF THE INVENTION

[0015] The present invention is useful in a variety of ways. The system and method embodying the present invention uses visible-light from a display (e.g., a computer monitor, a television or the like) to program a remote control device with updated IR, RF or visible light device codes delivered to a receiver (via satellite or other broadcast system) connected to the display. The present invention reduces the need for a consumer to speak with a customer service representative at a call center in order to obtain updated device codes. The present invention keeps a device code database current. The present invention further reduces the need to periodically replace remote control devices. The system and method aim to make the code library or database in the remote control device updatable by the end user.

[0016] The method and system for updating the code library of a remote control device is based upon flashing visible-light shown on a video display (e.g., a television, a computer monitor or the like) to a remote control device capable of receiving visible-light and converting the visible-light into an electrical signal that can then be processed into a code to be stored in the code library of the remote control device. As mentioned above, the method and system can be based on an STB connected to a TV where custom-built mpeg streams are used to display the flashing lights. Alternatively, the method and system can be based on a personal computer having a computer monitor.

[0017] In accordance with an embodiment of the present invention, a system delivers device codes to a remote control having a device code database whereby the remote control is capable of controlling a number of electronic devices via at least one device code specific to each electronic device. This system includes a receiver for receiving a signal originating from a transmitter. A display is operationally connected to the receiver. The display has a mechanism for flashing visible-light to the remote control, wherein the visible-light is related to the signal.

[0018] The remote control includes a mechanism for receiving the visible-light. The mechanism for receiving visible-light comprises a light dependent resistor (LDR). A lens disposed between the LDR and the display focuses light on the visible-light receiving mechanism. The remote control also includes a mechanism for converting the received visible-light into at least one device code to be stored in the device code database. The mechanism for converting the received visible-light comprises a microprocessor. The remote control is positioned adjacent to the display in order to reduce visible-light incoming to the remote control from light sources other than the display.

[0019] The remote control includes a mechanism for adjusting the mechanism for flashing visible-light. The mechanism for flashing visible-light comprises a graphical user interface on the display and/or an area of the display running a video stream. The area of the display running the video stream is adjustable in size to accommodate a light-receiving end of the remote control. The mechanism for flashing visible-light also comprises a non-flashing dark border portion projected on the display surrounding a visible-light flashing portion projected on the display.

[0020] A light shield engages the remote control about the light-receiving end in order to reduce the amount of ambient visible-light reaching the light-receiving end of the remote control.

[0021] The system also includes a mechanism for initiating a device code update. The system additionally includes a satellite disposed between the transmitter and the receiver, receiving an uplink signal comprising the signal from the transmitter. The signal received by the receiver comprises a downlink signal from the satellite, wherein the downlink signal is related to the uplink signal, and the visible-light

flashed to the remote control is related to the downlink signal. The uplink signal is related to the at least one device code.

[0022] In accordance with another embodiment, a method for acquiring updated device codes for a controlled apparatus, comprises storing a plurality of device codes for a plurality of controlled apparatus in a code database of a remote control. Data related to additional device codes are generated and the generated data are transmitted from a transmission source to a processing device operationally connected to a display.

[0023] The generated data are flashed in the form of visible-light from the display to the remote control. The flashed visible-light is received in the remote control and converted into at least one device code. The code database is updated in the remote control with the at least one device code.

[0024] The transmitting step includes routing the generated data through a satellite network to the display.

[0025] The method includes using the remote control to access the generated data. The method also includes using the remote control to operate different controlled apparatus, wherein the different controlled apparatus are manufactured by at least one manufacturer.

[0026] A particular device code is selected from a plurality of device codes to operate a particular controlled apparatus. According to the method, at least one of the device codes is used to operate a particular controlled apparatus. The particular controlled apparatus is a selected one of a television, a CD player, a DVD player, a DVR, a stereo system, a VCR, a personal computer, a personal digital assistant; a cable converter, and a set-top box.

[0027] The method includes adjusting a graphical user interface projected on the display in order to flash the visible-light. The method further includes initiating a device code update.

[0028] Other features and advantages of the invention will become more apparent from the following detailed description, taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The accompanying drawings illustrate the invention. In such drawings:

[0030] FIG. **1** is a block diagrammatic view of an illustrative system;

[0031] FIG. **2** is a block diagrammatic view of a set top box;

[0032] FIG. **3** is block diagrammatic view of a remote control;

[0033] FIG. **4**A-**4**G are screen displays of various aspects of a graphical user interface used during programming of a remote control device;

[0034] FIG. **5**A-**5**C are screen displays of various aspects of a graphical user interface used to flash light to a remote control device during programming of the remote control device;

[0035] FIG. **6** is a diagrammatic view of a broadcast remote control configuration database;

[0036] FIG. **6** is a flowchart illustrating a method for operating the present disclosure;

[0037] FIG. **7** is a flowchart illustrating a method for operating the present disclosure;

[0038] FIG. **8** is a diagrammatic view of a system for programming a remote control device;

[0039] FIG. **9** is a diagrammatic view of a database record;

[0040] FIG. **10** illustrates the steps in encoding data and building a data frame;

[0041] FIG. **11** is a diagrammatic view illustrating video signal generation in a set top box;

[0042] FIG. **12** is another block diagrammatic view of a remote control;

[0043] FIG. **13** is an illustrative light detection circuit; and

[0044] FIG. **14** is a process flow for updating one or more records in a remote control.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0045] The present invention is an improved system and method for adding/updating device codes in a remote control. The present invention provides a system and method to transmit these updated/new codes to the remote control without the need for cables or teaching remotes. The present invention further provides a system and method of adding/updating device codes in a remote control that reduces and/or eliminates the need for a user to consult a customer service representative. The present invention further provides a system and method of adding/updating device codes in a remote control that uses existing communications connections between the remote control and the source of the new/updated device codes. For purposes of clarity, the same reference numbers will be used in the figures to identify similar elements. As used herein, the term "module" refers to an Application Specific Integrated Circuit (ASIC), an electronic circuit, a processor (shared, dedicated, or group) and memory that execute one or more software or firmware programs, a combinational logic circuit, and/or other suitable components that provide the described functionality. It should also be understood that steps within a method may be executed in different order without altering the principles of the present description

[0046] While the following description is made with respect to example DIRECTV broadcast services and systems, it should be understood that many other delivery systems are readily applicable to disclosed systems and methods. Such systems include other wireless distribution systems, wired or cable distribution systems, cable television distribution systems, Ultra High Frequency (UHF)/Very High Frequency (VHF) radio frequency systems or other terrestrial broadcast systems (e.g., Multi-channel Multi-point Distribution System (MMDS), Local Multi-point Distribution System (LMDS) or the like), Internet-based distribution systems, cellular distribution systems, power-line broadcast systems, any point-to-point and/or multicast Internet Protocol (IP) delivery network, and fiber optic networks. Further, the different functions collectively allocated among a head end (HE), integrated receiver/decoders (IRDs) and a content delivery network (CDN) as described below can be reallocated as desired without departing from the intended scope of the present invention.

[0047] As shown in the drawings for purposes of illustration, the present invention is concerned with a method and system for updating a code library of a remote control device, as seen in FIGS. **1**-**14**. A communications system **20** includes a head end **22** that is used as a transmitter or transmission source, a plurality of content providers, one of which is shown as reference number **24**, and a content delivery system **26**. The content providers **24** may deliver content through the content delivery system **26** to the head end **22**. The head end **22** may include a broadcast management module **28** used for broadcasting the content and various other data, such as remote

control configuration data as will be described below. A satellite **30** may represent several satellites or a network of satellites. The satellites **30** may be used to communicate the different types of information or portions of content from the head end **22** to a user device such as a set top box **32** which acts as a receiver. The set top box **32** may also be referred to as an IRD. Communications through the satellite **30** may take place at any suitable frequency including, but not limited to, Ka band, Ku band, C band or the like. Signals to the satellite **30** are known as uplink signals while signals from the satellite are known as downlink signals. The user device can also come in various other forms including, but not limited to a personal computer, a cable converter box, a portable media player, a personal digital assistant, a cellular telephone or the like.

[0048] In addition to the satellite **30**, various types of information including, but not limited to, security information, encryption and decryption information, content, or remote control configuration database information may be communicated terrestrially using various communications networks **34** including, but not limited to, public switch telephone networks, cellular telephone networks, terrestrial wireless systems, stratospheric platforms, optical fiber networks, coaxial cable systems, cable television systems, broadcast television, or the like. In a cable television system, all content and the remote control data are communicated terrestrially. Data and content may be communicated through an uplink antenna **36** through the satellite **30** which, in turn, communicates the signals to a receiving antenna **38** in communication with the set top box **32**. The set top box **32** is in communication with and/or operationally connected (e.g., electro-mechanically) to a display **40**. The display **40** can come in various forms including, but not limited to, a television monitor, a computer monitor, as part of a portable media player, as part of a personal digital assistant, as part of a cellular telephone, as part of an mp3 player or similar device, as part of a digital camera, or any other device that includes a display that is capable of running graphics and/or video.

[0049] A communication module **42** may be in communication with the head end **22**. It should be noted that communications module **42** may be included within the head end **22** or as a separate device. The communication module **42** is used for communicating with a remote control vendor database server **44**. The remote control vendor database server **44** may collectively comprise a number of individual remote control vendor database servers. The remote control vendor database server includes a database of remote control devices provided by a particular vendor. This database includes types of devices, model numbers of the devices, brands of the devices, and programming information related to the devices including, but not limited to, programming codes. The communications module **42** communicates with the remote control vendors through a communication network **46**. The communication network **46** includes various types of communications mechanisms set forth with respect to the communication network **34**. However, the communication network **46** may be differently configured than the communication network **34** (i.e., the communication network **46** in any configuration may be different than the communication network **34** in an implementation).

[0050] The communication module **42** is in communication with the remote control configuration database **48**. The communication module **42** may be computer-based such as a server. The remote control configuration database **48** may be a memory within the communication module **42** or within the head end **22**. The remote control configuration database **48** is updated periodically through the communication module **42**. The communication module **42** may receive a notification that the remote control vendor database of a particular remote control vendor has been updated. The communication module **42** may then retrieve the information. The remote control vendor database server **44** may also periodically send updates to the communication module **42** automatically. As is evident, various ways for receiving and updating the remote control configuration database **48** may be performed.

[0051] The set top box **32** is in communication with a remote control device **50**. The remote control **50** is able to communicate (send and/or receive) with the set top box **32** and/or another electronic device **52** using various types of communication including, but not limited to, infra-red (IR), radio frequency (RF), visible light or the like.

[0052] The electronic device **52** may have a remote control input that may be desirable to be controlled by the remote control **50**. The electronic device can come in various forms including, but not limited to, a television, a CD player, a DVD player, a DVR, an audio/stereo system, an alarm system, a VCR, a personal computer, a personal digital assistant; a cellular telephone, a cable converter box, a set-top box or the like. The discussion, above and below, relates to a method to update the programming of the remote control **50** that allows the remote control **50** to operate one or more of the foregoing electronic devices **52**.

[0053] As seen in FIG. **2**, the set top box **32** includes a controller **100** that is in communication with a communication module **102**. The communication module **102** is used to communicate through the communication network **34**, the satellite **30** and/or both. The communication module **102** may be used to receive various types of information including, but not limited to, some or all of the contents of the remote control configuration database **48** and other content. The controller **100** may store the remote control communication database within a memory **104**. The memory **104** may include various types of memory, including a flash memory. All or only portions of the remote control configuration database **48** can be stored in the memory **104**. The communication module **102** is capable of monitoring the data within the database **48** and retrieving the data according to a remote control communications module **106**. The remote control communications module **106** is used to control the programming of the remote control **50** through the set top box **32**. The remote control communications module **106** is in communication with an interface **110** that may include a key pad **112** directly on the set top box **32** or a receiver module **114**, or both. The receiver module **114** may include an RF, IR or visible light interface for communicating with the remote control device **50**. The controller **100** may also be coupled to a display control module **116** which operates in response to the remote control communications module **106**. That is, various screen displays may be generated for the programming of the remote control device **50**. This allows the user to interact with the set top box **32** for the programming. The remote control communications module **106** may be activated using a screen display for configuring the remote control device **50**. Once the remote control process is activated through the interface **110**, various screen displays may be generated on the display **40** through the display control module **116**. Selections by the interface module **110** will control the communications module **102** to obtain various information from the broadcasted remote con-

trol configuration database. The operation of the set top box **32** and screen displays is further described in FIGS. **4A-6**.

[0054] According to FIG. **3**, a remote control **50** is illustrated in further detail. The remote control **50** may also include a controller **200** that is coupled to a memory **202**. The memory **202** may store various configuration information received from the set top box **32**. The controller **200** may be used to control a transceiver module **206** that may be used to transmit RF, IR or visible light signals to the interface **110** of the set top box **32**. A keypad module **208** generates various signals that are communicated through the transmitter module **206** and, ultimately, to the interface **110** of the set top box **32**. The memory **202** may include a database of various types of configurations for the remote control device **50**. The keypad module **208**, as described below, may be used to configure the remote control device **50** to a particular configuration within the remote control database within the memory **202**.

[0055] For purposes of illustration, as seen in FIG. **8**, the set top box **32** is connected to the display **40** (in the form of a television which, in this case, serves as both the display **40** and one of the electronic devices **52** to be controlled by the remote control device **50**) for updating the remote control code library by flashing modulated visible-light shown on the display **40** to the remote control device **50** which has a mechanism for receiving the flashed visible-light and converting the flashed visible-light into a new code to be stored in the code library. In the alternative, the visible-light can be flashed to the remote control device **50** by a light emitting diode on the set top box **32**. The set top box **32** will have the code library, or portions of the code library stored in its memory **104**. Updates to the code library on the set top box **32** are done through a download via a satellite signal **54** from the satellite **30** or a broadband signal **56** from a cable television system or the like. Alternatively, a personal computer can be substituted for the set top box **32**, and the computer's monitor serves as the display **40**. The personal computer may likewise be connected to receive a satellite signal **54** from a satellite system **30** or a broadband signal **56** from a cable television system or the like. A button on the remote control device **50** can be depressed to activate a program stored in the memory **104** of the set top box **32**. The microprocessor or controller **100** of the set top box **32** then runs a program that starts the graphical user interface, described above and below, that the user interacts with to update the code library of the remote control device **50**.

[0056] The set top box **32** will send one or more records from the code library in the memory **104** of the set top box **32** to the code library or database in the memory **202** of the remote control device **50** as update messages (as illustrated in FIGS. **4A-5C**). Each record is associated with a device code that is itself associated with one or more device commands, as outlined above. In this manner, transfer of a record from the code library of the set top box **32** transfers the device codes and device commands associated with that record to the code library of the remote control device **50**. This is done by encoding data comprising the record(s) to a video stream (e.g., a custom-built mpeg) comprising a flashing visible-light sequence of alternating black boxes or frames and white boxes or frames (where a black frame represents a digital '0' and a white frame represents a digital '1' or vice versa). In this manner, data (i.e., the records) in the form of digital ones and zeroes is communicated to the remote control device **50** in the form of modulated visible-light. The foregoing colors and duration of the digital ones and zeroes can be implemented in other forms (i.e., the digital "1" and digital "0" can be in various forms including, a pulse of white is a digital "1" while a pulse of black is a digital "0", a digital "1" comprises unequal pulses of black and white while a digital "0" comprises equal pulses of black and white, etc.). Other implementations could exist, such as showing different symbols, either in the form of multiple symbols for a larger range of values (e.g. two hundred fifty six (256) unique symbols to represent a byte), or an encoded symbol (e.g. a bar code). Alternately, variations in light intensity and/or color could be used to differentiate data values. The frame rate is at thirty (30) Hz (i.e., thirty (30) bits per second) with one (1) byte per key associated with remote control device **50**. The video stream is displayed on the television **40** in a dedicated area **58** on the display **40** that is sized and configured to generally match the dimensions of an end of the remote control device **50**. The general matching of the dimensions provides that the dedicated area **58** is not too big on a large screen display (e.g., large screen TV) or too small on a small screen TV. The video stream sequence is generated by software/hardware in the set top box **32**, as explained in more detail below. A light sensor **60** is located on the end of the remote control device **50** sized and configured to generally match the dedicated area **58**. Sizing of the dedicated area **58** also assists the user in reducing the incidence of light on the light sensor **60** that does not originate from the video stream. The light sensor **60** will detect the changes in light in the video stream shown in the dedicated area **58** and decode these light changes into a new code library entry. Alternatively, instead of a video stream, an on-screen display or graphics generated by the set top box **32** can be used to flash the visible-light. An interruption of the CPU within the set top box **32** could cause the on-screen graphics to introduce delays in the sequence so the on-screen graphics will be adapted to be prioritized in the same manner as a video stream in order to prevent delays from occurring. The adapted protocol will be able to handle large changes in timing and not assume that the bits arrive approximately at the expected time. In yet another alternative, an LED on the set top box **32** (e.g., the LED used to indicate whether the set top box **32** is powered up or not) can be used as the mechanism for flashing visible-light to the remote control device **50** (with the lack of signal-to-noise ratio in the power LED being compensated for) with the on and off states of the LED correlating to digital ones and zeroes. On-screen graphics can comprise a video layer and a two-dimensional graphics layer where part of the GUI blinks on and off. In a further alternative, a personal computer and connected to a personal computer monitor can be used to create the flashing, either through a video stream such as mpeg or shockwave flash, or through direct graphics manipulation.

[0057] As outlined above, the code library is a database that contains the information for how the remote control device **50** should control other electronic devices **52**. FIG. **9** illustrates the form of a database record **62** which includes a record header **64** that contains an identifier for the record **62** in the form of a five (5) digit number. The record **62** also includes an executor **66** that describes how the remote control device **50** should communicate with the electronic device **52**. The executor **66** may be a simple reference to an already known protocol such as NEC or Philips RC5, or could be a description of a custom protocol. The record **62** additionally includes a key set **68** that describes how keys on the DIRECTV remote control device match the keys on the remote control that

originally came with a particular electronic device **52** and what data should be sent on key presses.

[0058] With respect to an illustrative example of a communication protocol, when the database record **62** is to be transmitted, the database record **62** is first encoded in a transmission protocol format. FIG. **10** illustrates steps in the encoding of data **70** and the building of a data frame **72**. The data **70** in inserted into the data frame **72**. An encoded burst **74** includes a header or preamble **76**, a number of blocks **78** in which portions of the data frame **72** (i.e., data chunks **80**) are inserted, and a two (2) bit keep-alive (KA) **82**. The header **76** allows a circuit to measure the signal variations and adjust circuit settings prior to signal start. The header **76** also contains a special sequence of bits that allows for the detection of exactly when the transmission starts. A command field **84** indicates the type of data **70** and actions for the remote control device **50** upon reception. A length field **86** is added to the data frame **72** to indicate the length of the transmission and a checksum (CHK SUM) **88** is appended to the data frame **72** to allow for verification of data integrity. The data **70** is then broken up in blocks **78** of four (4) bytes. The preamble or header **76** is added to the front of the encoded burst **74** and keep-alive (KA) bits **82**, with the pattern "10" are inserted between the blocks **78**. The KA bits **82** are inserted in the video steam at known places to allow for detection of timing slip or incorrect reception; allowing for an early termination or resynchronization. The protocol can be adapted to one that includes an upper limit for the number of consecutive identical bits to control the variations in DC through an electrical circuit. It should be noted that the foregoing is for purposes of illustration only and that the communications protocol can be implemented in different ways (e.g., the communication protocol may not need KAs; the KAs do not need to be "10"; there is no need for a preamble or the preamble may be different; etc.).

[0059] With respect to video signal generation, as seen in FIGS. **2** and **11**, the database (or portions of the database) is received by the set top box **32** through the satellite signal **54**. The received data is demodulated in an RF demodulator **90** and routed to a central processing unit (CPU) **92** of the set top box **32**. The CPU **92** stores the data records on local storage **94** for later use.

[0060] As outlined above, a video signal comprises modulated light in the form of a sequence of black boxes or frames and white boxes or frames, where a black frame represents a digital zero ('0') and a white frame represents a digital one ('1'). As outlined above, the digital ones and zeros can be implemented in various other ways including a digital one (or digital zero) being identified by two equal boxes or frames of black and white, or by two different length boxes of black and white, etc. This video signal can be generated in a number of ways including, without limitation, two ways, through a video stream, by using on-screen graphics or the like. If a video stream is used, the CPU **92** will encode the data record of interest with the above-described protocol and build an mpeg video stream from the encoded data. This video stream is routed to a video decoder **98** where the mpeg video stream is decoded and sent to the television (i.e., the display **40**). Alternatively, the video stream can be routed through a transport multiplexer **96** to the video decoder **98**. If on-screen graphics are used, when needed the CPU **92** will encode the data record of interest with the above-described protocol and generate on-screen graphics of the data. The on-screen graphics is sent to a graphics engine **120** for rendering and is then mixed with a video stream in a mixer **122** and ultimately sent to the television (i.e., the display **40**). Alternatively, the on-screen graphics does not have to be mixed with the video stream (e.g., the video stream may be turned off).

[0061] With respect to light detection within the remote control device **50**, as seen in FIGS. **3**, **8**, **12** and **13**, the light sensor **60**, as illustrated by a light detection circuit **124**, is based on a light sensitive component (i.e., a transducer) that registers changes in light and transforms these to an electrical signal which is then amplified and detected by the microprocessor. As seen in FIG. **12**, a mechanism for receiving visible light in the remote control device **50** comprises a light sensitive component that comes in various forms including, but not limited to, a light dependent resistor (LDR) (shown in FIG. **12**; also referred to as a photoresistor, a photoconductor, a photocell or the like), a photodiode, a phototransistor, a temperature-sensitive device (i.e., light changes temperature) or the like. The LDR is made from a high-resistance semiconductor and can be chosen so that sensitivity to a desired wavelength(s) of light is optimized, and or an optical filter can be inserted in front of the LDR to limit interfering light. Light hitting the LDR causes resistance to fall (resistance decreases with increasing incident light) and allows current to flow through the LDR. Current from the LDR enters a receiver circuit where the current is converted into a voltage. The receiver circuit is part of the transceiver module **206** connected to the microcontroller **200**. The microcontroller **200** runs a program that converts the voltage from the transceiver module **206** into a device code (and associated device commands) that is then stored in the code database in the memory **202**. In essence, the microcontroller **200** converts the visible-light signals back to logic '1' and '0's which will be assembled by the microcontroller **200** to form the original transmitted code data to be stored in the memory **202** of the remote control device **50**. FIG. **13** illustrates a simple circuit diagram representation of an alternative light detection circuit that uses a phototransistor (Q**1**) as the transducer in a common-emitter configuration. The light-detection circuit **124** may be enabled/disabled by letting the microprocessor **200** control the power supply rail. The phototransistor Q**1** can be chosen so that sensitivity to a desired wavelength(s) of light is optimized, and or an optical filter can be inserted in front of the phototransistor to limit interfering light. The use of filtering enables the remote control device **50** to work accurately in a multitude of conditions, such as flashing light of different wavelengths/frequencies. Ensuring adequate light levels is addressed since, in a typical setting, there may be variations in ambient light and variations in the light intensity of the light flashed from the display **40**. A lens **204** can be positioned on the end of the remote control device **50** between the display **40** and the phototransistor Q**1** in order to focus the flashing visible-light received by the remote control device **50** on the phototransistor Q**1**. The lens **204** may vary in size and run the entire width of the end of the remote control device **50**. Using filters (e.g., in the form of special coatings on the lens **204** or specialized lens materials) in the remote control device **50** to filter out specific wavelengths of light (i.e., specific colors or wavelengths of the electromagnetic spectrum) helps to minimize the impact of ambient light hitting the phototransistor Q**1**. The output from the phototransistor Q**1** is fed to an amplifier which may include automatic gain control (AGC) and filtering prior to feeding the signal to the microprocessor (i.e., the micro-controller **200**). The use of AGC enables the light detection circuit of the remote control device **50** to work

accurately in a multitude of conditions, such as variations in ambient light in a room where the data transfer is taking place, variations in brightness and contrast settings of different televisions as well as changes in distance when the user is holding the remote control device **50** against the television (i.e., the display **40**) during the updating process **300**. Filtering is performed in an amplifier before the current is input to the microprocessor or microcontroller **200**. For higher frequencies, the filter may be needed to compensate for pulsing light from over-scan signals on the display **40** or from pulsing light from fluorescent light in the room. For lower frequencies, the filter may be needed to compensate for slow variations in ambient light. Ambient light can be reduced by placing a light shield around an end of the remote control device **50** to be programmed/updated. The light shield (similar in function to a camera lens hood) can be attached around the end of the remote control device **50** facing the display in order to reduce levels of ambient light being picked up by the light detection circuit. In another alternative, the visible-light flashed by the display **40** may be a specific bandwidth(s) of light that is less than the full-spectrum encompassed by white light with the light detection circuit being capable of only detecting only this specific bandwidth(s). In an additional embodiment, the light sensor **60**/light detection circuit **124** and transceiver module **206** may be adapted for optical recognition of symbols.

[0062] FIG. **14** provides a simplified process flow **130** for updating one or more records in the remote control device **50**. Device codes are stored in the database of the set top box **32**. There is a file or record for each device code which is correlated in a table stored within the memory **94**, **104**. As described above and below, the set top box **32** reads the record(s) associated with the code(s), and builds an mpeg video file or graphics played on the screen of the display **40**. In step **132**, codes are stored within the code database located on the memory storage **94**, **104** in the set top box **32**. In step **134**, the code record to be updated is selected and encoded with the protocol described above. In step **136**, a choice can be made between displaying via video or graphics. If video is chosen, in step **138** an mpeg stream or equivalent is built. If graphics is chosen, in step **140** on-screen graphics are built. The mpeg stream or graphics is built on the fly from the records from the database. Alternatively, the codes (in the form of an mpeg file or graphics file) are stored in the database of the memory **104**. Whether mpeg file or graphics file, in step **142** a video stream is mixed with mpeg file and/or on-screen graphics and displayed on the television so that a visible-light signal from the video stream/on-screen graphics is flashed to and received by the remote control device in step **144**. The video stream is played once on the screen. The video sequence can be built in advance or dynamically on the set top box **32**. Building the video sequence dynamically on the set top box **32** minimizes the memory usage of having to store pre-built data. The light signals may be of different forms, as outlined above (i.e., the digital one ("1") and digital ("0") can be in various forms including, a pulse of white is a digital "1" while a pulse of black is a digital "0", a digital "1" comprises unequal pulses of black and white while a digital "0" comprises equal pulses of black and white, etc.). As outlined above and below, a binary '1' is encoded to a white box or frame and a binary '0' to a black box or frame. Other implementations could exist, such as showing different symbols, either in the form of multiple symbols for a larger range of values (e.g. two hundred fifty six (256) unique symbols to represent a byte), or an encoded symbol (e.g. a bar code). Alternately, variations in light intensity and/or color could be used to differentiate data values. The remote control decodes data from the visible-light signal and stores the record(s) in step **146**. The remote control then sends an acknowledge through a traditional link in step **148**. However, the sending of an acknowledgement can be optional. Alternatively, before the remote control sends the acknowledge, the received codes are programmed into the remote settings in step **150**.

[0063] Referring to FIG. **4**A, an overview of a process **230** for updating a remote control device **50** is illustrated that comprises a plurality of screen displays of a graphical user interface (GUI) **232** which forms the basis of a mechanism for flashing visible-light to the remote control device **50**. For purposes of illustration only, the remote control device is a DIRECTV remote control device. FIGS. **4**B-**4**G are enlarged views of various portions of the process **230**. The screen displays of the GUI **232** may ultimately include various instructions and selections for programming the remote control device **50**. The screen displays may be generated by the display control module **116** of FIG. **2**. A user activates a code database updating function by depressing one or more keys on the keypad module **208** of the remote control **50** while pointing the remote control device **50** towards the set top box **32**, using the transmitter module **206** to transmit RF, IR or visible light signals to the interface **110** of the set top box **32**. Alternatively, the set top box **32** includes buttons/keys that can be used for setting up the process **230**. Otherwise, the remote control device **50** instructs the set top box **32** to go into program mode by the user pressing and holding a key on the remote control device **50**. After that, the remote control device **50** has no control over the process **230** other than to make selections from choices on the display **40**. The keypad **112** on the set top box **32** can also be used to make selections from choices on the display **40**.

[0064] Once the remote control setup program is launched by the set top box **32**, the graphical user interface **232** on the display **40** display a selection screen **234** for the user to choose an input (FIG. **4**B). The user is prompted to press SELECT on the TV to program TV keys in all modes (TV power, TV input, VOL, MUTE). The user is asked to select AV1 or AV2 to program the remote control device **50** to control a DVD, VCR, stereo or second DIRECTV receiver. The user can select the desired choice by using input keys on the keypad module **208** of the remote control **50** or the keypad **112** of the set top box **32** to highlight the desired choice. Once an input has been chosen, the GUI **232** displays another selection screen **236** for choosing a product and a brand. The user manipulates the keys on the remote control device **50** to highlight or otherwise indicate the user's desired selection. Once the selection is highlighted or otherwise indicated, the user is prompted to press the SELECT button on the remote control device **50** on the product type and brand of the device the user wants to program into the remote control device **50**. For purposes of illustration, and not limitation, a non-exclusive list of products displayed include a DVD, stereo, VCR, DIRECTV Receiver, and a TV. Once the user manipulates the input keys on the keypad module **208** of the remote control **50** or the keypad **112** on the set top box **32** to highlight the desired product in a product box **238** (FIG. **4**C). Once the product is selected in the product box **238**, the communications module **102** and the set top box **32** may then receive information on various brands of televisions being broadcast in the remote control configuration database which are then displayed in

the brand box **240** (FIG. **4**D). The selection screen **236** then provides prompts for selecting various brands. For example, it is illustrated that a DVD product has been selected and a list of brands (e.g., Allegro, Apex Digital, Blaupunkt, Blue Parade, Brocsonic, etc.) are displayed. Again, the keys of the remote control device **50** (or the keys on the set top box **32**) are used to highlight or otherwise indicate the desired brand selection (e.g., in this case, Apex Digital is selected). If a brand is chosen, the user is then prompted by another selection screen **242** of the GUI **232** to choose a model by pressing SELECT on the model of the device the user wants to program into the remote control device **50**. As seen in FIG. **4**D, the selection screen **242** illustrates various types of models (e.g., 112-R, 120-S, 345-S, 220-M, 99-D, etc.) in a model box **244**. Numerous models may be available for any particular manufacturer. In this example, model 120-S is selected.

[0065] Referring now to FIG. **4**C, specific instructions in response to the selected model are displayed on a remote control selection screen **246** for programming a remote control device **50** with a known model. The specific instructions may include a code used for selecting a particular configuration within the remote control device **50**. As illustrated in FIG. **4**C, for model 120-S, there is one possible code (e.g., 10761). For Step 1, the user is prompted to, on the remote control device **50**, move MODE switch to AV1. Then, press and hold MUTE and SELECT until a light (typically, a light-emitting diode) on the remote control device **50**, typically located above the keypad on the face of the remote control device **50**, flashes twice. For Step 2, the user is then prompted to enter the code using the remote control device's 50 number keys or alternatively, using the keypad **112** on the set top box **32** to enter the code. The user is then prompted to press PWR (i.e., power). If the DVD powered on, the user is instructed to move MODE to DIRECTV and then select DONE **248**. If the DVD did not power on, the user is told to repeat Step 1 and enter the next code. If the user has tried all the codes shown, the user is instructed to move MODE to DIRECTV and then select UPDATE REMOTE CONTROL **250**.

[0066] If UPDATE REMOTE CONTROL **250** is selected, the user is directed to another process **300** for updating the remote control device **50**, illustrated in FIGS. **5**A-**5**C, that comprises another plurality of screen displays of the GUI **232**. FIG. **5**A, illustrates an overview of the process **300** for updating a remote control device **50**. FIGS. **5**B and **5**C are enlarged views of various portions of the process **300** for remote control setup. A screen **302** of the GUI **232** on the display **40** informs the user that this process **300** will require the user to approach the TV screen of the display **40** (of whatever type of monitor device is in use) and that the user needs to hold the remote control device **50** up to a highlighted area or window **304** on the screen and to wait for new codes to be transferred to the remote control device **50**. A black background may be provided around the area **304** in order to reduce additional ambient-light from the television being picked up by the light-detection circuit of the remote control device **50**. This non-flashing dark border would be projected on the display **40** surrounding the visible-light flashing area **304** projected on the display **40**. The user is prompted to use input keys on the remote control device **50** to hit CONTINUE **306** or CANCEL **308**. Once the user chooses CONTINUE, a new screen **310** on the GUI asks the user to please hold the front of the remote control device **50** to the window **304**. The screen **310** prompts the user to select RESIZE WINDOW **312** if the dimensions of a light-receiving end of the remote control device **50** seems smaller or larger than the window **304**. Otherwise, the user is prompted to select CONTINUE **314**. The user also has the option of selecting BACK **316** in order to return to the previous screen **302**. If the user selects CONTINUE **314**, another screen **318** prompts the user to use the plus ("+") and minus ("−") "buttons" **320**, **322** on the screen **318** by highlighting and selecting the buttons **320**, **322** on the screen **318** using the keys on the remote control device **50** or keypad **112** of the set top box **32**. Alternatively, the user may use plus ("+") and minus ("−") keys located on the remote control device **50**. This serves as one aspect of a mechanism for adjusting the mechanism for flashing visible-light by letting the user resize the window **304** for flashing visible-light which optimizes the light intensity (e.g., size the window **304** up on small displays **40**) and helps to avoid user discomfort (e.g., size the window **304** down on large displays). Once the user has used the plus ("+") and minus ("−") "buttons" **320**, **322** to resize the window **304** to match the dimensions of the front of the remote control device **50**, the user is prompted to use the keys on the remote control device to select CONTINUE **324** when the user is done.

[0067] A new screen **326** prompts the user to approach the screen within a period of time identified by a countdown box **328** on the screen **326**. Typically, the user will be given thirty (30) seconds to approach the screen **326** but this time period may be adjusted to provide longer or shorter durations. The user is also instructed to hold the front of the remote control device **50** adjacent to a box or window **330** at the lower right portion of the screen **326**. Positioning the remote control device **50** adjacent to the window **330** reduces ambient visible-light and/or visible-light from light sources other than the display from incoming to the remote control device **50**. Alternatively, the window **330** may be positioned anywhere on the screen **326**. A new screen **332** includes a graphic **334** illustrating how the user is supposed to hold the remote control device **50** against the screen of the display **40** while the countdown box **328** continues to indicate the decreasing amount of time the user has to comply with the instructions. When the countdown reaches zero (0), the countdown box **328** disappears and the window **330** flashes visible light as part of a video feed or stream (in a manner described in more detail below) to a light-sensor (described in more detail below) located on the end of the remote control device **50** adjacent to the window **330**. The flashing of the visible light transmits the new codes to the remote control device **50**. A download indicator **336** illustrates (e.g., zero percent to one hundred percent) how much of the code has been transmitted to the remote control device **50**. When the code download to the remote control device **50** is complete, a new screen **338** appears informing the user that the code database of the remote control device **50** has been updated and instructs the user to select the DONE button **340** to complete the process **300** and automatically restart the process **230** to program the remote control device **50**.

[0068] However, an alternative selection process occurs if a user selects "Model Not Found" in the model box **244**, as seen in FIG. **4**E, and the number of codes for that brand is less then five (5) with specific instructions displayed on a remote control selection screen **252**, similar to the screen **246**, for programming the remote control device **50** for the unknown model. As illustrated in FIG. **4**F, for the brand of the unknown model, there are two possible codes (e.g., 10761 and 10783). For Step 1, the user is prompted to, on the remote control device **50**, move MODE switch to AV1. Then, press and hold

MUTE and SELECT until a light (typically, a light-emitting diode) on the remote control device **50**, typically located above the keypad on the face of the remote control device **50**, flashes twice. For Step 2, the user is then prompted to enter the code using the remote control device's 50 number keys. Then user is then prompted to press PWR (i.e., power). If the DVD powered on, the user is instructed to move MODE to DIRECTV and then select DONE **248**. If the DVD did not power on, the user is told to repeat Step 1 and enter the next code. If the user has tried all the codes shown, the user is instructed to move MODE to DIRECTV and then select UPDATE REMOTE CONTROL **250** which directs the user to the process **300** for updating the remote control device **50**, illustrated in FIGS. **5**A-**5**C, and described above. Once the user goes through the updating process **300**, the user is now able to use the newly downloaded codes to program the remote control device **50** using the process **230**.

[0069] Yet another alternative selection process occurs if a user selects "Model Not Found" in the model box **244**, as seen in FIG. **4**E, and the number of codes for that brand is greater than or equal to five (5) with specific instructions displayed on a remote control selection screen **254**, similar to the screens **246**, **252**, for programming the remote control device **50** for the unknown model. As illustrated in FIG. **4**F, for the brand of the unknown model, there are five possible codes (e.g., 10761, 10783, 10842, 10799 and 10956). To narrow down the options, the user is instructed to go to a website to search for the most likely codes. For Step 1, the user is prompted to, on the remote control device **50**, move MODE switch to AV1. Then, press and hold MUTE and SELECT until a light (typically, a light-emitting diode) on the remote control device **50**, typically located above the keypad on the face of the remote control device **50**, flashes twice. For Step 2, the user is then prompted to enter the code using the remote control device's 50 number keys. The user is then prompted to press PWR (i.e., power). If the DVD powered on, the user is instructed to move MODE to DIRECTV and then select DONE **248**. If the DVD did not power on, the user is told to repeat Step 1 and enter the next code. If the user has tried all the codes shown, the user is instructed to move MODE to DIRECTV and then select NEXT **256** which directs the user to another screen **258** (FIG. **4**G) which provides additional codes to be entered in the same manner as Steps 1 and 2 described above. However, if the user has tried all the codes shown, the user is instructed to move MODE to DIRECTV and then select UPDATE REMOTE CONTROL **250** which directs the user to the process **300** for updating the remote control device **50**, illustrated in FIGS. **5**A-**5**C, and described above. Once the user goes through the updating process **300**, the user is now able to use the newly downloaded codes to program the remote control device **50** using the process **230**.

[0070] While the processes **230**, **300** described above are illustrated using a DIRECTV remote control, the process **230** can include a user making a selection from a plurality of different types or models of remote control devices **50** (e.g., a remote control for a particular type/brand/model of electronic device, a universal remote control, etc.) to program. The process **300** may automatically size the window **304** for the programming of a known type or model of remote control device **50**. It should be noted that the keys on the set top box **32** can be used during the programming processes **230**, **300** as an alternative to using the keys on the remote control device **50**.

[0071] As will be described below, when moving from display-to-display, various information may be selected from the continually-broadcast remote control configuration database. The information received will be used to populate the screen display. Referring now to FIG. **6**, a portion of a broadcast stream **400** having the remote control configuration database is illustrated. The remote control configuration database may be broadcast in a carousel-type manner. That is, the data may continuously be broadcast at a lower speed than that of normal content. Various types of information may be broadcast including, without limitation, remote control model **402**, device type information **404**, brand information **406**, model information **408**, and instruction information **410**. This information may be repeated for various brands, types and models. As mentioned above, this may be broadcast continually to allow the set top box **32** to receive the information required to form the various displays described above in FIGS. **4**A-**5**C. In this manner, the whole remote control database is not required to be stored within the set top box **32**, thus freeing up memory for other purposes. Updates may be periodically inserted into the broadcast data stream.

[0072] Referring now to FIG. **7**, one method **500** for operating the remote control configuration system is set forth. In step **510**, as new products are developed, the database is updated. The product vendor, remote control suppliers for the product vendors or other may update the database. In step **512**, notification may be performed that changes have been made to the database. The presence of the changes may be communicated to the communication module **42** illustrated in FIG. **1**. In step **514**, the updates to the remote control database **48** may be communicated from the vendor server **44** to the database **48**. This may be instigated periodically at the communication module **50** illustrated in FIG. **1** or upon receipt of a notification such as that in step **512**. In step **516**, the remote control configuration database **48** is broadcast in a continual manner from the head end **22**. The broadcast management module **28** may be used to control the broadcasting of the remote control configuration database **48**. When the remote control configuration database **48** is updated, the updates are automatically inserted into the carousel for broadcasting the remote control database **48**. In step **518**, the remote control set-up screens (FIGS. **4**A-**5**C) are accessed by a user by activating one of the interfaces **110** illustrated in FIG. **2**. The remote control set-up screens may be accessed through selections on the keys of the remote control **50** or on a key pad on the set top box **32**. In this manner, the code database/library in the remote control device **50** is updated in the manner described above and below. In step **520**, the remote control model types are received. In step **522**, a selection of the model type is performed. In step **524**, various device types may be received through the broadcast remote control configuration database **48**. Once the types of device are received, a selection may be made using one of the interfaces in step **526**. Upon selection of the device type, the brand types may be received and displayed on the display **40** in step **528**. In step **530**, a selection is made for the type of brand. The set top box **32** then receives the portions of the remote control configuration database **48** corresponding to the models. In step **532**, the model identifiers are provided on the display **40**. In step **534**, a model is selected. In step **536**, specific instructions may be received in response to the specific model. For example, various instructions may include depressing certain buttons or entering certain codes. Once the remote control device **50** is programmed, the remote control device **50** may be used to oper-

ate the electronic device **52** (step **538**). As can be seen, the remote control device **50** can also be programmed for various numbers of different devices **52**, if desired. Known types of selector switches may be provided for selecting audio, visual, TVs, and the like on various types of remote control devices **50**. Each selection may be programmed separately.

[0073] In the alternative, the system and method described above can be adapted to use audio (i.e., sound) by itself or in combination with visible light to program a remote control device **50** having an audio receiver with updated codes.

[0074] The system and method described above can be adapted to transmit data between any device capable of flashing light in the manner described above and any device capable of receiving and processing light flashed to the device in the manner described above. For example, a set top box **32** connected to a display **40** (or personal computer connected to a monitor) can be used in the manner described above to transmit any type of data to any type of device adapted to receive and process flashed visible-light. In this manner, data can be transmitted to devices other than remote controls **50** such as a personal digital assistant, a personal computer, an ipod, an iphone, a cellular telephone, a digital camera or the like. Likewise, any device capable of transmitting and/or receiving information (e.g., a personal digital assistant, a cellular telephone or any device described above or its equivalent) can be used as an alternative to the set top box **32**.

[0075] Additional embodiments of the present invention may be made by combining various elements of one of the above-described embodiments with various elements of another one or more of the above-described embodiments.

[0076] The above-described embodiments of the present invention are illustrative only and not limiting. It will thus be apparent to those skilled in the art that various changes and modifications may be made without departing from this invention in its broader aspects. Therefore, the appended claims encompass all such changes and modifications as falling within the true spirit and scope of this invention.

What is claimed is:

1. A system for delivering device codes to a remote control having a device code database whereby the remote control is capable of controlling a number of electronic devices via at least one device code specific to each electronic device, comprising:

a transmitter;

a receiver receiving a signal originating from the transmitter; and

a display operationally connected to the receiver, having means for flashing visible-light to the remote control, wherein the flashed visible-light is related to the signal;

wherein the remote control includes means for receiving the flashed visible-light, and means for converting received visible-light into at least one device code to be stored in the device code database.

2. The system of claim **1**, wherein the remote control is positioned adjacent to the display in order to reduce visible-light incoming to the remote control from light sources other than the display.

3. The system of claim **1**, wherein the means for flashing visible-light comprises a graphical user interface on the display.

4. The system of claim **1**, wherein the means for flashing visible-light comprises an area of the display running a video stream.

5. The system of claim **4**, wherein the area is adjustable in size to accommodate a light-receiving end of the remote control.

6. The system of claim **5**, further comprising a light shield engaging the remote control about the light-receiving end in order to reduce the amount of ambient visible-light reaching the light-receiving end of the remote control.

7. The system of claim **1**, wherein the means for flashing visible-light comprises a non-flashing dark border portion projected on the display surrounding a visible-light flashing portion projected on the display.

8. The system of claim **1**, wherein the remote control includes means for adjusting the means for flashing visible-light.

9. The system of claim **1**, wherein the means for receiving visible-light comprises an LDR.

10. The system of claim **9**, wherein the means for receiving visible-light further comprises a lens disposed between the LDR and the display.

11. The system of claim **1**, wherein the means for converting received visible-light further comprises a microprocessor.

12. The system of claim **1**, further comprising means for initiating a device code update.

13. The system of claim **1**, further comprising a satellite disposed between the transmitter and the receiver, receiving an uplink signal comprising the signal from the transmitter; wherein the signal received by the receiver comprises a downlink signal from the satellite, wherein the downlink signal is related to the uplink signal, and the visible-light flashed to the remote control is related to the downlink signal.

14. The system of claim **1**, wherein the uplink signal is related to the at least one device code.

15. A method for acquiring updated device codes for a controlled apparatus, comprising the steps of:

storing a plurality of device codes for a plurality of controlled apparatus in a code database of a remote control

generating data related to additional device codes;

transmitting the generated data from a transmission source to a processing device operationally connected to a display;

flashing the generated data from the display to the remote control;

receiving the flashed visible-light with the remote control;

converting the received flashed visible-light into at least one device code; and

updating the code database in the remote control with the at least one device code.

16. The method of claim **15**, wherein the transmitting step further comprises the step of routing the generated data through a satellite network to the display.

17. The method of claim **15**, further comprising the step of using the remote control to access the generated data.

18. The method of claim **15**, further comprising the step of using the remote control to operate different controlled apparatus, wherein the different controlled apparatus are manufactured by a common manufacturer or different manufacturers.

19. The method of claim **15**, further comprising the step of selecting a particular device code from a plurality of device codes to operate a particular controlled apparatus.

20. The method of claim **15**, further comprising the step of using at least one of the codes to operate a particular controlled apparatus.

21. The method of claim **20**, wherein the particular controlled apparatus is a selected one of a television, a CD player, a DVD player, a DVR, a stereo system, a VCR, a personal computer, a personal digital assistant, a cable converter and a set-top box.

22. The method of claim **15**, further comprising the step of adjusting a graphical user interface projected on the display in order to flash the visible-light.

23. The method of claim **15**, further comprising the step of initiating a device code update.

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