Description

The present invention is concerned with apparatus for controlling a television receiver or similar system and especially with control apparatus including provisions for displaying operating instructions.

Some television receivers and video cassette recorders have character generation provisions for displaying a "menu" of user control choices on the screen of a picture display device such as a picture tube. Such a system is described in U. S. patent US-A-4,626,892, entitled "Television System with Menu Like Function Control Selection", issued to K. E. Nortrup, B. W. Beyers, Jr. and J. S. Fuhrer on December 2, 1986.

In prior control menu systems, the displayed control choices depend on the features that the manufacturer selects for a given receiver model.

The present inventor has recognized that displaying one or more control choices in a menu may lead to confusion depending on input signal conditions, especially considering that signal conditions usually change from channel to channel. For example, in a television receiver with multiple audio processing mode choices corresponding monaural audio reproduction, stereophonic audio reproduction and reproduction of a second audio program (e.g., for a second language), displaying a menu with all three audio processing mode choices when the received television signal is not modulated with stereophonic and/or second audio program information may lead to confusion since the selection of the stereophonic or second audio program processing mode will not produce the expected response.

To avoid such confusion, in a television system constructed in accordance with the present invention, the displayed control choices in a menu, such as a audio processing mode menu, are dynamically changed in response to input signal conditions, e.g., the absence or presence of stereophonic and/or second audio program components of a received RF television signal.

The present invention will be explained with respect to the accompanying drawing in which:

FIGURE 1 shows a block diagram of a television receiver employing a preferred embodiment of the invention;

FIGURE 1a shows a frequency spectrum of a composite audio signal processed by the television receiver shown in FIGURE 1 and is useful in understanding its operation; and

FIGURES 2 and 2a-2d show a flow chart of a portion of a program of a microprocessor employed in the television receiver shown in FIGURE 1 and useful in understanding the present invention.

The present invention will be described with reference to a television receiver suitable for use in the United States where the NTSC television transmission standard as modified by the BTSC transmission standard for multichannel sound is employed. However, it is to be understood that the same principles may be applied to television receivers suitable for use in other countries where different transmission standards are employed.

The television receiver shown in FIGURE 1 includes an RF signal input for receiving RF television signals, e.g., from a broadcast receiving antenna 1, and a tuner 3 for selecting the RF television signal corresponding to a channel desired by a user and producing a corresponding IF television signal under the control of a tuning control unit 5. The IF signal includes an amplitude modulated picture carrier component centered at 45.75 MHz and a frequency modulated carrier component at 41.25 MHz.

In a video processing section 7, the IF video carrier component is filtered by a video IF filter (VIF) 9 and demodulated by a video demodulator 11 to produce a baseband video signal. Video processing section 7 also has an auxiliary baseband video signal input for receiving an "auxiliary" baseband video signal from an external source such as a video tape recorder or video disc player. A video source selector switch 13 selectively couples one of the "main" video signals derived from the RF signal selected by tuner 3 or the "auxiliary" video signal received at the auxiliary video signal input to a picture processing unit 15 under user control. Picture processing unit 15 separates the luminance and chrominance components of the video signal received from selector switch 13 to produce, e.g., red (R), green (G) and blue (B), color components suitable for producing a picture on the screen of picture tube 17. Picture processing unit 15 has control inputs (not shown) for controlling the brightness, contrast, sharpness, color level (or saturation) and tint (or hue) of the reproduced picture.

In a sound processing section 19, the IF video and sound carrier components are filtered by a sound IF (SIF) filter 21. The filtered video and sound carrier components mixed to produce an intercarrier difference frequency modulated sound carrier component (e.g., at 4.5 MHz in the U.S.) and the intercarrier sound carrier component is demodulated in a sound demodulator 23 to produce an audio signal.

The audio signal produced by demodulator 23 contains at least a baseband component corresponding to monaural audio information and may contain one or more higher frequency components corresponding stereophonic and second audio program information, depending on what is being transmitted for the selected channel. The frequency spectrum of a "composite" audio signal containing components corresponding to monaural ("mono"), stereophonic ("stereo") and second audio program (SAP) information according to the BTSC multichannel band standard employed in the U.S. is graphically represented in FIGURE 1a. The composite audio

signal contains baseband component between 50 Hz and 15 KHz, an amplitude modulated double sideband suppressed carrier (AM-DSB-SC) component centered at 31.468 KHz corresponding to twice the horizontal deflection frequency (2H), a pilot signal at 15.734 KHz corresponding to the horizontal deflection frequency (H), and a frequency modulated (FM) subcarrier component at 48.820 KHz corresponding to five times the horizontal deflection frequency. The baseband component corresponds to monaural information for monaural reproduction and corresponds to the sum of the left and right stereophonic components (L+R) for stereophonic reproduction. The AM-DSB-SC component corresponds to the difference of the left and right stereophonic components (L-R) for stereophonic reproduction. The pilot signal is utilized to demodulate the AM-DSB-SC component. The FM component corresponds to a second audio program, e.g., a second language version of the main program, and is always monaural. Both of the L-R and SAP components are subjected to dynamic amplitude and frequency responsive "compression" according to the dbx® systems in the transmitter and, as will be explained below, to a complementary "expansion" in the receiver. Since the bandwidth of a composite audio signal is much wider than the conventional monaural audio signal different IF filter sections, described above, are employed to process the video and sound components to inhibit degradation of the reproduced audio information due to contamination from the video component.

Returning now to FIGURE 1, the remainder of sound processing section 19 and the control portion of the television receiver will now be described.

The audio signal produced by sound demodulator 23 is coupled to a multichannel sound (MTS) decoder 25. During the following discussion it will be initially assumed that the stereo (L-R) and SAP components are present (i.e., they have been modulated on to the sound carrier of the RF signal for the selected television channel).

The mono (or L+R), pilot and L-R components are separated from the composite audio signal by a lowpass filter (LPF) 27. The mono/L+R component is already a baseband signal and therefore need not be demodulated. However, to separate it from the other components of the composite signal, when they are present, it is filtered by a lowpass filter (LPF) 29. To demodulate the L-R component, the 2H suppressed carrier is regenerated in phase locked loop (PLL) 31 by locking the frequency and phase of a voltage controlled oscillator (not shown) to that of the pilot signal and the resultant regenerated subcarrier is used by a synchronous detector 30 to produce a baseband L-R signal.

The SAP component is generated from composite audio signal by a bandpass filter (BPF) 33 and demodulated by a PLL type of FM detector 35 to produce a baseband SAP signal. The baseband L-R and SAP signals are coupled to a stereo/SAP selector switch 37 which is controlled, as will be explained below, to select either a stereo or a SAP audio reproduction mode by coupling the respective one of the L-R or SAP baseband signals to an expander 39. Expander 39 performs a dynamic amplitude and frequency responsive "expansion" of the selected component which is complementary to "compression" performed in the transmitter.

The mono/L+R signal produced at the output of LPF 29 and the baseband L-R or SAP signal produced at the output of expander 39 are coupled to a matrix 41, which is controlled as will also be explained below, to produce left (L) and right (R) baseband audio signals in either a monaural, stereophonic or SAP reproduction. In the monaural reproduction mode, the L and R audio signals are each derived solely from the baseband mono/L+R signal. In the stereophonic reproduction mode, the L and R audio signals are stereophonic components derived by adding and subtracting the baseband mono/L+R and L-R signals. In the SAP reproduction mode, the L and R audio signals are each derived solely from the baseband SAP signal.

Audio processing section 19 also has auxiliary left and right audio signal inputs for receiving auxiliary left and right baseband audio signals from an external source such as a video tape recorder or video disc player. The "main" and "auxiliary" L and R signals are coupled to an audio source selector switch 43, which under user control, selectively couples one pair to an audio amplifier unit 45. Audio amplifier unit 45 controls the volume, balance, bass and treble of L and R audio output signals in response to respective control signals. The L and R audio output signals are coupled to respective speakers 47 and 49.

In response to an "expanded stereo" control signal, audio amplifier unit 45 can also selectively combine a portion of the left audio signal with the right audio signal and a portion of the right audio with the left audio signal to produce an "expanded stereo" effect (when stereo information is present) in which there is a perceived gerater spacial separation between the left and right audio responses reaching the ear. This perception of greater stereo separation is created by cancelling the cross-coupled sound from right speaker 49 that arrives at the left ear and the cross-coupled sound from left speaker 47 that arrives at the right ear. This works like stereo headphones to isolate the left and right audio responses that arrive at the ears so that the speakers are perceived to be further apart.

A control section 51 is responsible for controlling various portions of the television receiver previously described. The heart of control section 51 is a microprocessor 53. Microprocessor 53 operates in accordance with a program of instructions stored in a programmable read only memory (PROM) 55. Data processed in

accordance with the program is stored in memory locations of a random access memory (RAM) 57. The portion of the program with which the present invention is concerned is shown in FIGURE 2.

Microprocessor 53 receives user initiated command signals from a control panel 59 mounted on the television receiver and also from a remote control transmitter (not shown) via a remote control receiver 61. Control panel 59 includes various pushbutton switch keys for controlling various receiver functions such as tuning the receiver "on" and "off", selecting channels and controlling the volume level. However only those with which the present embodiment of the invention are directly concerned are specifically shown. Remote control transmitter 61 includes similar pushbutton switch keys.

In response to the user initiated command signals, microprocessor 53 generates control signals for various portions of the television receiver such as: an on/off control signal for the power supply section (not shown); a channel selection control signal for tuner control unit 5; a video source selection control signal for video source selector switch 13; brightness, contrast, sharpness, color level and tint control signals (not shown) for picture processing unit 15; stereo/SAP and stereo/mono mode selection control signals for stereo/SAP mode selector switch 37 and matrix 41; an audio source selection control signal for audio source selector switch 43; and volume, balance, bass and treble control signals for audio amplifier section 45.

Under the control of microprocessor 53, a character generator 63 generates character representative signals suitable for displaying alphanumeric characters on the screen of picture tube 17. The character representative signals are coupled to picture processing unit 15. Microprocessor 53 controls character generator 63 to display such information as the channel number of the presently selected channel, status information (e.g., whether or not stereo and SAP information is being received), operating instructions, and various "menus" of user control choices (e.g., for adjusting picture properties such as brightness, contrast, sharpness, color level or tint; adjusting audio properties such as volume, balance bass and treble; and selecting between monaural, stereophonic or SAP audio processing modes of operation). The use of menus is desirable since it allows the same user entry keys to be used to select different control choices.

The television receiver so far described is generally similar to currently available RCA brand name television receivers employing CTC-140 chassis described in "RCA Color Television Basic Service Data", 1987 CTC-140 and in the "CTC 140 Color TV Chassis Technical Training Manual" available from Thomson Consumer Electronics, 600 North Sherman Drive, Indianapolis, Indiana. However, the present television receiver differs from existing television receivers in that microprocessor 53 is responsive to input signal conditions for dynamically altering the contents of a menu (e.g., the audio menu) by eliminating irrelevant user control choices so that users cannot select the irrelevant control choices using the menu. In prior television receivers, such as those employing CTC-140 chassis, irrelevant control choices were not eliminated from displayed menus in response to signal conditions. This could lead to confusion to users since control choices could be selected utilizing a particular menu but the selection would not produce the expected result. The present dynamic menu feature is particularly desirable considering that signal conditions change from channel to channel.

In the present embodiment the dynamic menu provisions are applied to the audio menu as will now be explained in detail.

Control panel 59 includes "VIDEO" and "AUDIO" pushbutton switch keys for calling up respective menus. In the present embodiment, the control choices are individually and sequentially displayed. Control panel 59 also includes "+" and "-" keys for adjusting a particular control choice.

Repeatedly pressing the VIDEO key causes the following control choices to be sequentially displayed at the bottom of the screen of picture tube 17:

COLOR
TINT
CONTR (for contrast
BRIGHT (for brightness)
SHARP (for sharpness)

When the control choice is displayed, the corresponding section of picture processing unit 15 enabled for adjustment of the respective picture property. At the same time a control choice is displayed, a horizontally oriented scale is displayed beneath the control choice. Pressing the "-" key causes an indicia to move to the left and causes the corresponding parameter to "decrease". Pressing the "+" key causes the indicia to move to the right and causes the corresponding parameter to "increase". In the case of tint, pressing the "-" key corresponds to a color shift toward one color, e.g., green, and pressing the "+" key causes a color shift toward another color, e.g., red. The decrease or increase is caused by a corresponding adjustment of a control voltage which is coupled to the respective portion of picture processing unit 15 under the control of microprocessor 53.

Repeatedly pressing the AUDIO key causes the following control choices to be sequentially displayed at the bottom of the screen of picture tube 17:

TREBLE
BASS
BAL (for balance)
STEREO/SAP: MONO or STEREO or SAP (display after ":" depends on the presence of stereo and SAP in the received signal)
EXPANDED STEREO: ON or OFF (entire display depends on the presence of stereo in the received signal)

A scale is displayed beneath each of the treble, bass and balance control choices and these properties are adjusted by pressing the "-" and "+" keys in a manner similar to that described with respect to the picture properties. In the case of balance, pressing the "-" key causes an increase in the left audio volume level and pressing the "+" key causes an increase in the right audio volume level. Since adjusting the volume levels of both left and right audio channels at the same time is a frequently performed adjustment, special "volume up" and "volume down" keys (not shown) are provided and a "volume" control choice is not part of the audio menu.

The last two control choices (STEREO/SAP and EXPANDED STEREO) are of particular interest since, as is indicated, their inclusion in the audio menu or content is dynamically changed as a function of the presence of stereophonic and SAP information in the received RF television signal, as will be explained below. However, for the present, it will be assumed that the received television signal includes both stereo and SAP information.

When "STEREO/SAP" is displayed, the monophonic, stereophonic or SAP reproduction modes may be selected (again assuming that stereo and SAP information is present in the received RF television signal) by repeatedly pressing either the "-" key or the "+" key. As either one of the "-" or "+" keys is repeatedly pressed, the reproduction mode displayed after the ":" will sequentially change as follows:

STEREO/SAP : MONO
STEREO/SAP : STEREO
STEREO/SAP : SAP

The same sequence is produced independent of which are of the "-" or "+" keys is pressed. When a particular reproduction mode is displayed, STEREO/SAP selector switch 37 and matrix 41 are controlled in response to respective control signals from microprocessor 53 to produce the selected response.

When "EXPANDED STEREO" is displayed, the "expanded stereo" mode may be turned on or off (assuming that stereo information is present in the received RF television signal) by repeatedly pressing either the "-" key or "+" key. As one of the "-" or "+" keys is repeatedly pressed, the condition for "expanded stereo" displayed after the ":" will sequentially change as follows:

EXPANDED STEREO : OFF
EXPANDED STEREO : ON

When "ON" is displayed, microprocessor 53 causes audio amplifier section 45 to combine the left and right audio signals as described above. When "OFF" is displayed, audio amplifier 37 is caused not to combine the left and right audio signals.

When the received RF television signal is not modulated with stereo or SAP information, selection of stereo or expanded stereo or SAP reproduction modes will not produce the expected stereo or SAP responses. In accordance with the principles of the invention, microprocessor 53 is responsive to the absence stereo component in the audio signal produced by sound demodulator 23 to delete the stereo and expanded stereo reproduction mode choices from the audio menu so that they cannot be selected and is responsive to the absence of the SAP component to delete the SAP reproduction mode choice so that it cannot be selected. Thus, the user will not be confused by the selection of a reproduction mode which is rendered ineffective because of input signal conditions.

Specifically, the presence or absence of the stereo component is detected by subcarrier regeneration PLL 31. When stereo is being transmitted, a phase detector within the PLL is responsive to the output signal of the voltage controlled oscillator (not shown) of the PLL and the pilot signal of the composite audio signal produced by sound detector 23 to produce an output signal with a first level indicative of the presence of the stereo component. When stereo is not being transmitted, the pilot signal is not present and the output signal produced by the phase detector has a second level indicative of the absence of the stereo component. The "stereo indicator" output signal produced by the phase detector is coupled to microprocessor 53. In response to the first level indicative of the presence of the stereo component, microprocessor 53 causes the stereo ("STEREO/SAP:STEREO") and expanded stereo ("EXPANDED STEREO") reproduction mode choices to be included in the displayed audio menu as was indicated above so they can be selected. In response to the second level indicative of the absence of the stereo component, microprocessor 53 causes the stereo and expanded stereo reproduction mode choices to be deleted from the displayed audio menu so that they cannot be selected.

The presence or absence of the SAP component is detected by an amplitude detector within FM detector 35 responsive to the modulated SAP component. The output signal of the amplitude detector has a first level when the SAP signal is present and a second level when it is absent. A weak SAP component will be interpreted

as corresponding to the absence of the SAP component. The "SAP indicator" output signal of the amplitude detector as coupled to microprocessor 53. In response to the first level indicative of the presence of the SAP component, microprocessor 53 causes the SAP processing choice ("STEREO/SAP:SAP") to be included in the audio menu as indicated above suit can be selected. In response to the second level indicative of the absence of the SAP component, microprocessor 53 causes the SAP reproduction mode choice to be deleted from the displayed audio menu so that it cannot be selected.

As was earlier noted, the television receiver shown in FIGURE 1 has a video source selector switch 13 and an audio source selector switch 43 for selecting externally generated baseband video and audio signals from an auxiliary source such as a video cassette recorder or a video disc player. Source selector switches 13 and 43 are controlled by microprocessor 53 in response to user initiated commands generated by pressing keys of control panel 59 or of the remote control transmitter (not shown) associated with remote control receiver 61, e.g., to enter an "illegal" channel number such as 91 or 92. Source selector switches 13 and 43 operate together so that when an auxiliary source is selected, both external baseband video and audio signals must be provided from the auxiliary source.

When an auxiliary source is selected, the selection of the mono, stereo and SAP reproduction modes will be ineffective since the externally generated left and right baseband audio signals do not pass through and therefore are not processed by MTS decoder 25. To avoid any confusion that may result from selecting the ineffective mono, stereo or SAP reproduction modes under these input signal conditions, microprocessor 53 is responsive to the user initiated command for selecting the auxiliary source to eliminate the mono, stero and SAP processing mode selection choices ("STEREO/SAP") from the audio menu. However, the expanded stero ("EXPANDED STEREO") processing mode choice is not eliminated to enable the user to enjoy the enhanced (i.e., "expanded") stero mono should the externally generated left and right baseband signals be stereophonic.

FIGURES 2 and 2a-2d show a flow chart of the portion of the program stored in PROM 55 for controlling the operation of microprocessor 53 with respect to the audio menu provision described above.

FIGURE 2 indicates the organization of the program and includes command decoding and display control subroutines between sections of a main program. The command decoding subroutine decodes user initiated commands generated in response to the operation of keys of control panel 59 and remote control transmitter 61 and causes the storage of data in various memory locations of data RAM 57 to indicate what functions are "set" to be performed in the remainder of the program or in response to additional user initiated commands. The display control subroutine controls the information displayed on the screen of picture tube 17 by generating corresponding character control signals in accordance with the functions "set" in the command decoding subroutine. As will be seen with respect to FIGURES 2a-2d, the command decoding subroutine is responsive to signal conditions, e.g, the presence or absence of stereo and SAP components, and other conditions, e.g., whether or not an auxiliary signal source has been selected, to determine which functions are "set" and therefore the nature of the information display and the available user control.

FIGURE 2a shows a flow chart of the command decoding subroutine concerned with audio control. Steps 001-014 determine what the new control choice should be after the AUDIO key has been pressed by determining what the last control choice was. It is noted that if an auxiliary source has been selected, the control choice for selecting one of mono, stereo or SAP (M/ST/SAP) cannot be selected (steps 009), and that if stereo information is not present, the control choice for turning the expanded stereo function (EXPAND) on or off cannot be selected unless an auxiliary source has been selected (steps 011 and 013). Steps 015-020 determine which adjustment to make in the case of treble, bass and balance or which processing mode to change in the case of the mono, stereo and SAP (M/ST/SAP) and expanded stereo (EXPAND) control choices after one of the "+" and "-" keys has been pressed. The flow charts of the subroutines for these two control choices are shown in FIGURES 2b and 2c, respectively.

In the flow chart shown in FIGURE 2b, steps 021-027 determine which of the mono, stereo or SAP processing modes should be selected after one of the "+" or "-" keys is pressed by determining what the last mode was and by examining whether or not stereo information (step 024) and SAP information (step 026) is present.

In the flow chart shown in FIGURE 2c, steps 028-029 determine the status (i.e, "on" or "off") of the stereo expansion function by determining what the status was previously set to.

FIGURE 2d shows the flow chart of the portion of the display control subroutine concerned with audio control. Steps 031-047 determine what to display in the menu based on what control choice was set in the command decoding subroutine shown in FIGURES 2a-2c. Only the control choice (treble, bass and balance) or processing mode choices (mono, stereo, SAP and expanded stereo) which was previously "set" in the command decoding subroutine will be displayed. Thus, if stereo or SAP information is not in the received RF television signal or an auxiliary source was selected, the corresponding processing mode choices ("STEREO/SAP:STEREO" or "STEREO/SAP:SAP") will not be displayed in the menu. Similarly if stereo information is not present, unless an auxiliary source is selected, the expanded stereo processing mode choices ("EX-

PANDED STEREO:ON") and "(EXPANDED STEREO:OFF") will not be displayed.

Certain modifications can be made to the described embodiment. The display of a control or processing mode choice can be turned off under automatically program control off if a key is not pressed within a certain time. "Channel up" and "channel down" or "volume up" or "volume down" keys can be used as the "+" and "-" keys. The SAP or stereo presence detectors can include provisions for determining the presence of noise for indicating the "absence" of the receptive signal under severe noise conditions. A preferred processing mode, e.g., such as stereo, can be initially selected upon the application of power to the receiver or when a new channel is selected. In the audio menu, when all of the control choices have been sequentially displayed, the menu can be made to terminate automatically. These and other modifications are contemplated to be within the scope of the following claims.

Claims

1. Apparatus for use in a television receiver, said apparatus comprising:

input means (3,5,19) for providing an input signal bearing at least one of audio and video information;

signal processor means (25) responsive to said input signal and capable of operating in a plurality of processing modes for processing said input signal to produce an output signal;

character generator means (63) for generating a character signal suitable for displaying on a display device, a selection menu including said processing modes available for selection by a user;

user input means (59) for allowing a user to enter command signals for selecting ones of said processing modes via said selection menu; and **characterized by** detector means (31,35) responsive to said input signal for generating a characteristic indicative-signal indicating the presence or absence of a particular characteristic of said input signal; and

control means (53) coupled to said character generator means for determining which one or more of said plurality of processing modes are included in said selection menu in response to said characteristic indicative signal, said control means limiting, in accordance with the content of said input signal, the available processing modes which can be selected by a user.

2. The apparatus defined in claim 1, **characterized in that:** said input signal is an IF signal and said IF signal includes a sound carrier component which is modulated with at least monaural audio information and possibly also auxiliary audio information;

said signal processor means (25) is controlled by said processor control means to selectively produce at least one of a monaural audio output signal corresponding to said monaural audio information and an auxiliary audio output signal corresponding to said auxiliary audio information under the control of said processor control means;

said characteristic indicative signal indicates whether or not said sound carrier is modulated with said auxiliary audio information; and

said character generator means (63) is controlled by said character signal control means (53) to generate a character display signal suitable for displaying a first menu including both a first processing control option corresponding to the production of said monaural audio output signal and a second processing control option corresponding to the production of said auxiliary audio output signal when said sound carrier is modulated with said monaural audio information and also said auxiliary audio information; and a second menu including said first processing control option but not said second processing control option when said sound carrier is modulated with said monaural audio information but not said auxiliary audio information under the control of said character signal control means.

3. The apparatus defined in claim 2, **characterized in that**

said auxiliary audio information is related to the reproduction of a second audio program.

4. The apparatus defined in claim 2, **characterized in that**

said auxiliary audio information is related to stereophonic audio reproduction.

5. The apparatus defined in claim 1, **characterized in that**

said input signal is an IF signal and said IF signal includes a sound carrier modulated to represent at least monaural audio information and possibly also one or both of stereophonic audio information and second audio program information;

PANDED STEREO:ON") and "(EXPANDED STEREO:OFF") will not be displayed.

Certain modifications can be made to the described embodiment. The display of a control or processing mode choice can be turned off under automatically program control off if a key is not pressed within a certain time. "Channel up" and "channel down" or "volume up" or "volume down" keys can be used as the "+" and "-" keys. The SAP or stereo presence detectors can include provisions for determining the presence of noise for indicating the "absence" of the receptive signal under severe noise conditions. A preferred processing mode, e.g., such as stereo, can be initially selected upon the application of power to the receiver or when a new channel is selected. In the audio menu, when all of the control choices have been sequentially displayed, the menu can be made to terminate automatically. These and other modifications are contemplated to be within the scope of the following claims.

Claims

1. Apparatus for use in a television receiver, said apparatus comprising:

input means (3,5,19) for providing an input signal bearing at least one of audio and video information;

signal processor means (25) responsive to said input signal and capable of operating in a plurality of processing modes for processing said input signal to produce an output signal;

character generator means (63) for generating a character signal suitable for displaying on a display device, a selection menu including said processing modes available for selection by a user;

user input means (59) for allowing a user to enter command signals for selecting ones of said processing modes via said selection menu; and **characterized by** detector means (31,35) responsive to said input signal for generating a characteristic indicative-signal indicating the presence or absence of a particular characteristic of said input signal; and

control means (53) coupled to said character generator means for determining which one or more of said plurality of processing modes are included in said selection menu in response to said characteristic indicative signal, said control means limiting, in accordance with the content of said input signal, the available processing modes which can be selected by a user.

2. The apparatus defined in claim 1, **characterized in that:** said input signal is an IF signal and said IF signal includes a sound carrier component which is modulated with at least monaural audio information and possibly also auxiliary audio information;

said signal processor means (25) is controlled by said processor control means to selectively produce at least one of a monaural audio output signal corresponding to said monaural audio information and an auxiliary audio output signal corresponding to said auxiliary audio information under the control of said processor control means;

said characteristic indicative signal indicates whether or not said sound carrier is modulated with said auxiliary audio information; and

said character generator means (63) is controlled by said character signal control means (53) to generate a character display signal suitable for displaying a first menu including both a first processing control option corresponding to the production of said monaural audio output signal and a second processing control option corresponding to the production of said auxiliary audio output signal when said sound carrier is modulated with said monaural audio information and also said auxiliary audio information; and a second menu including said first processing control option but not said second processing control option when said sound carrier is modulated with said monaural audio information but not said auxiliary audio information under the control of said character signal control means.

3. The apparatus defined in claim 2, **characterized in that**

said auxiliary audio information is related to the reproduction of a second audio program.

4. The apparatus defined in claim 2, **characterized in that**

said auxiliary audio information is related to stereophonic audio reproduction.

5. The apparatus defined in claim 1, **characterized in that**

said input signal is an IF signal and said IF signal includes a sound carrier modulated to represent at least monaural audio information and possibly also one or both of stereophonic audio information and second audio program information;

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said signal processor means (25) is controlled by said processor control means to selectively produce a monaural output signal corresponding to said monaural output left and right stereophonic output signals corresponding to a combination of said monaural audio information and said stereophonic audio information; and a second audio program output signal corresponding to said second audio program information;

said signal detector means (31,35) generates a first characteristic indicative signal indicating whether or not said sound carrier is modulated to represent said stereophonic audio information and a second characteristic indicative signal indicating whether or not said sound carrier is modulated to represent said second audio program information; and

said character generator means (63) is controlled by said character signal control means (53) to generate a character display signal suitable for displaying a first menu including all of a first processing control option corresponding to the production of said monaural output signal, a second processing option corresponding to the production of said left and right stereophonic audio signals, and a third processing option corresponding to the production of said second audio program signal when said sound carrier is modulated to within said monaural information, said stereophonic and said second audio program information; a second menu including said first and second processing options but not said third processing option when said sound carrier is modulated with said monaural information and said stereophonic information but not with said second audio program information; and a third menu including said first processing option but not said second and third processing-options when said sound carrier is modulated with said monaural information but not with said stereophonic and said second audio program information.

6. The apparatus recited in claim 1, **characterized in that**

said character generator means (63) is controlled by said character signal control means (53) to generate said character signal so that processing options are presented sequentially in time.

Patentansprüche

1. Vorrichtung zur Verwendung in einem Fernsehempfänger, umfassend:
Eingabemittel (3, 5, 19) zur Lieferung eines Eingabesignales, das Ton- und Bildinformation oder mindestens eins davon enthält;
ein Signalverarbeitungsmittel (25), das auf das Eingabesignal anspricht und in der Lage ist, in einer Mehrzahl von Betriebsarten zu arbeiten, um das Eingabesignal zu verarbeiten und ein Ausgabesignal zu erzeugen;
ein Zeichengeneratormittel (63) zur Erzeugung eines zur Anzeige auf einer Anzeigevorrichtung geeigneten Zeichensignales, wobei ein Auswahlmenü die Betriebsarten enthält, die dem Benutzer zur Auswahl stehen;
ein Benutzereingabemittel (59), das dem Benutzer ermöglicht, Steuersignale zur Auswahl einer der Betriebsarten über das Auswahlmenü einzugeben;
gekennzeichnet durch auf das Eingabesignal ansprechende Erfassungsmittel (31, 35), die auf das genannte Eingabesignal ansprechen und ein spezifisches Angabesignal erzeugen, das die Anwesenheit oder Abwesenheit eines besonderen Merkmales des Eingabesignales angibt; und
ein mit dem Zeichengeneratormittel verbundenes Steuerungsmittel (53) zur Festlegung, welches oder welche der Mehrzahl von Betriebsarten entsprechend dem spezifischen Angabesignal ins Auswahlmenü aufgenommen werden, wobei dieses Steuerungsmittel entsprechend dem Inhalt des Eingabesignales die zur Verfügung stehenden Betriebsarten begrenzt, die der Benutzer auswählen kann.

2. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, daß** das Eingabesignal ein ZF-Signal ist und das ZF-Signal einen Tonträgeranteil enthält, der mindestens mit monauraler Toninformation und möglicherweise auch mit Zusatztoninformation moduliert ist;
das Signalverarbeitungsmittel (25) durch das Verarbeitungssteuerungsmittel gesteuert wird, um ein der monauralen Toninformation entsprechendes monaurales Tonausgabesignal oder ein der Zusatztoninformation entsprechendes Zusatztonausgabesignal oder beide zu erzeugen;
das spezifische Angabesignal angibt, ob der Tonträger mit der Zusatztoninformation moduliert ist, oder nicht; und
das Zeichengeneratormittel (63) durch das Zeichensignalsteuerungsmittel (53) gesteuert ist, um ein Zeichenanzeigesignal zu erzeugen, das geeignet ist, ein erstes Menü anzuzeigen, das eine erste Verarbeitungssteuerungsoption enthält, die der Erzeugung des monauralen Tonausgabesignales entspricht, und

eine zweite Verarbeitungssteuerungsoption, die der Erzeugung des Zusatztonausgabesignales entspricht, wenn der Tonträger mit der monauralen Toninformation und auch mit der Zusatztoninformation moduliert ist; und Toninformation; und ein zweites Menü, das die erste Verarbeitungssteuerungsoption enthält, aber nicht die zweite Verarbeitungssteuerungsoption, wenn der Tonträger mit der monauralen Toninformation moduliert ist, aber nicht mit der Zusatztoninformation.

3. Vorrichtung nach Patentanspruch 2, **dadurch gekennzeichnet, daß** die Zusatztoninformation die Wiedergabe eines zweiten Tonprogrammes betrifft.

4. Vorrichtung nach Patentanspruch 2, **dadurch gekennzeichnet, daß** die Zusatztoninformation stereophone Wiedergabe betrifft.

5. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, daß** das Eingabesignal ein ZF-Signal ist und dieses ZF-Signal einen Tonträger enthält, der derart moduliert ist, daß er mindestens monaurale Toninformation darstellt und möglicherweise auch stereophone Toninformation oder Information für ein zweites Tonprogramm oder beides;
das Signalverarbeitungsmittel (25) durch das Verarbeitungssteuerungsmittel gesteuert wird, um wahlweise ein monaurales Ausgabesignal entsprechend der monauralen Ausgabe zu erzeugen, linke und rechte stereophone Ausgabesignale entsprechend einer Kombination der monauralen Toninformation und der stereophonen Toninformation, und ein Ausgabesignal des zweiten Tonprogrammes, das der Toninformation des zweiten Tonprogrammes entspricht;
das Signalverarbeitungsmittel (31, 35) ein erstes spezifisches Angabesignal erzeugt, das angibt, ob der Tonträger derart moduliert ist, daß er stereophone Toninformation darstellt, oder nicht und ein zweites spezifisches Angabesignal, das angibt, ob der Tonträger derart moduliert ist, daß er Toninformation für ein zweites Tonprogramm darstellt, oder nicht; und
das Zeichengeneratormittel (63) durch das Zeichensignalsteuerungsmittel (53) gesteuert wird, um ein Zeichenanzeigesignal zu erzeugen, das geeignet ist, ein erstes Menü anzuzeigen, das sowohl eine erste Verarbeitungssteuerungsoption enthält, die der Erzeugung des monauralen Ausgabesignales entspricht, als auch eine zweite Verarbeitungsoption, die der Erzeugung des linken und des rechten stereophonen Tonsignales entspricht, als auch eine dritte Verarbeitungsoption, die der Erzeugung des zweiten Tonprogrammsignales entspricht, wenn der Tonträger mit der monauralen Information, der stereophonen und der zweiten Tonprogramminformation moduliert ist; ein zweites Menü, das die erste und zweite Verarbeitungsoption enthält, aber nicht die dritte Verarbeitungsoption, wenn der Tonträger mit der monauralen Information und der stereophonen Information moduliert ist, aber nicht mit der zweiten Tonprogramminformation; und ein drittes Menü, das die erste Verarbeitungsoption enthält, aber nicht die zweite und dritte Verarbeitungsoption, wenn der Tonträger mit der monauralen Information moduliert ist, aber nicht mit der stereophonen und der zweiten Tonprogramminformation.

6. Vorrichtung nach Patentanspruch 1, **dadurch gekennzeichnet, daß** das Zeichengeneratormittel (63) durch das Zeichensignalsteuerungsmittel (53) gesteuert wird, um das Zeichensignal derart zu erzeugen, daß Verarbeitungsoptionen in zeitlicher Folge dargestellt werden.

Revendications

1. Appareil pour utilisation dans un récepteur de télévision, ledit appareil comprenant :
des moyens d'entrée (3, 5, 19) pour fournir un signal d'entrée qui contient des informations son et vidéo ou au moins l'une des deux ;
des moyens de traitement de signal (25) qui réagissent au signal d'entrée mentionné et qui sont capables de fonctionner dans une pluralité de modes de traitement pour traiter ledit signal d'entrée pour produire un signal de sortie ;
des moyens de génération de caractère (63) pour générer un signal de caractère approprié pour visualisation sur un dispositif de visualisation, un menu de sélection comprenant les modes de traitement mentionnés disponibles pour être sélectionnés par un utilisateur ;
des moyens d'entrée utilisateur (59) pour permettre à un utilisateur d'entrer des signaux de commande pour sélectionner l'un des modes de traitement mentionnés par l'intermédiaire du menu de sélection mentionné
caractérisé par des moyens de détection (31, 35) qui réagissent au signal d'entrée mentionné pour gé-

nérer un signal indicatif caractéristique qui indique la présence ou l'absence d'une caractéristique particulière du signal d'entrée mentionné et des moyens de commande (53) couplés aux moyens de génération de caractère pour déterminer lequel ou lesquels des modes de traitements compris dans la pluralité mentionnée des modes de traitement sont inclus dans ledit menu de sélection en réponse au signal indicatif caractéristique mentionné, les moyens de commande mentionnés limitant, en conformité avec le contenu du signal d'entrée mentionné, les modes de traitement disponibles qui peuvent être sélectionnés par un utilisateur.

2. Appareil défini dans la revendication 1, **caractérisé en ce** que ledit signal d'entrée est un signal FI et que ledit signal FI comprend une composante de porteuse son qui est modulée avec au moins des informations son monaurales et éventuellement aussi des informations son auxiliaires ;
les moyens de traitement de signal mentionnés (25) sont commandés par les moyens de commande de traitement mentionnés pour produire un signal de sortie son monaural correspondant aux informations son monaurales mentionnées et un signal de sortie son auxiliaire correspondant aux informations son auxiliaires ou les deux ;
ledit signal indicatif caractéristique indique si ladite porteuse son est modulée avec les informations son auxiliaires mentionnées ou non et
les moyens de génération de caractère mentionnés (63) sont commandés par les moyens de commande de signal de caractère mentionnés (53) pour générer un signal de visualisation de caractère approprié pour visualiser un premier menu comprenant à la fois une première option de commande de traitement correspondant à la production du signal de sortie son monaural et une seconde option de commande de traitement correspondant à la production du signal de sortie son auxiliaire mentionné lorsque ladite porteuse son est modulée avec les informations son monaurales mentionnées et aussi les informations son auxiliaires mentionnées ; et des informations son ; et un second menu comprenant ladite première option de commande de traitement mais pas ladite seconde option de commande de traitement lorsque ladite porteuse son est modulée avec les informations son monaurales mentionnées mais pas les informations son auxiliaires mentionnées.

3. Appareil selon la revendication 2, **caractérisé en ce** que les dites informations son auxiliaires se rapportent à la reproduction d'un second programme son.

4. Appareil selon la revendication 2, **caractérisé en ce** que les dites informations son auxiliaires se rapportent à la reproduction son stéréophonique.

5. Appareil selon la définition 1, **caractérisé en ce** que ledit signal d'entrée est un signal FI et ledit signal FI comprend une porteuse son modulée pour représenter au moins des informations son monaurales et, si possible, également les informations son stéréophoniques ou les informations de second programme son ou les deux ;
les moyens de traitement de signal (25) sont commandés par les moyens de commande de traitement mentionnés pour produire sélectivement un signal de sortie monaural correspondant à la sortie monaurale, des signaux de sortie stéréophonique gauche et droit de sortie correspondant à une combinaison des informations son monaurales mentionnéees et des informations son stéréophoniques mentionnées ; et un signal de sortie de second programme son correspondant aux informations de second programme son mentionnées ;
des moyens de détection de signal mentionnés (31, 35) génèrent un premier signal indicatif caractéristique indiquant si la porteuse son est modulée ou non pour représenter les informations son stéréophoniques mentionnées et un second signal indicatif caractéristique indiquant si une porteuse son est modulée ou non pour représenter les informations de second programme son mentionnées ; et
les moyens de génération de caractère mentionnés (63) sont commandés par les moyens de commande de signal de caractère mentionnés (53) pour générer un signal de visualisation de caractère approprié pour visualiser un premier menu comprenant aussi bien une première option de commande de traitement correspondant à la production du signal de sortie monaural mentionné, qu'une seconde option de traitement correspondant à la production des signaux son stéréophonique gauche et droits mentionnés et qu'une troisième option de traitement correspondant à la production du signal de second programme son mentionné lorsque ladite porteuse son est modulée avec les informations monaurales mentionnées, des informations stéréophoniques et des informations de second programme son mentionnées ; un second menu comprenant les première et seconde options de traitement mentionnées mais pas la troisième option de traitement lorsque ladite porteuse son est modulée avec les informations monaurales mentionnées

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et les informations stéréophoniques mentionnées mais pas avec les informations de second programme son mentionnées ; et un troisième menu comprenant ladite première option de traitement mais pas les seconde et troisième options de traitement mentionnées lorsque ladite porteuse son est modulée avec les informations monaurales mentionnées mais pas avec les informations stéréophoniques et les informations de second programme son mentionnées.

6. Appareil selon la revendication 1, **caractérisé en ce** que les moyens de génération de caractère mentionnés (63) sont commandés par les moyens de commande de signal de caractère mentionnés pour générer ledit signal de caractère si bien que les options de traitement sont présentées successivement dans le temps.