Description

This invention relates to television receivers having a picture-in-picture function and, more particularly, to such apparatus which is capable of receiving and concurrently displaying television programmes broadcast over different television channels by different television broadcast systems (such as television programmes broadcast over M, B/G, I, K or L systems).

Different television standards have been developed in different countries, particularly in the United States, Europe and Japan. Consequently, television receiving apparatus for a particular country must, of course, be compatible with the television standards adopted in that country. In most instances, because of the relatively limited range over which a broadcast television signal may be received, and because generally uniform standards have been adopted in different geographic regions around the world, the fact that different countries may broadcast television programmes in accordance with different television standards does not present a serious problem. For example, one standard is used in North America (primarily the United States, Canada and Mexico), another standard is used in the United Kingdom, yet another standard is used in Western Europe, a further standard is used in France and yet another standard is used in Eastern Europe. For the most part, substantially the same standard has been adopted in Japan as is used in North America.

Television standards are based upon particular parameters of a typical television signal. For example, two basic standards have been developed around the world based upon the number of horizontal lines in a video frame and the number of fields transmitted per second (that is, the vertical frequency). These two broad standards are known as the 525/60 system, which is used primarily in North America and Japan, and the 625/50 system, which is used primarily throughout Europe. Another parameter associated with particular television standards is the separation between the carrier frequency onto which the video information is modulated and the carrier frequency onto which the audio information is modulated. This channel separation between the video and audio broadcast frequencies is reflected in the difference between the video intermediate frequency (IF) and the audio IF which are generated when a television programme is received. This video/audio channel separation ranges from about 4.5 MHz in North America to about 6.5 MHz in Eastern Europe and in France.

Yet another parameter that is basic to a television standard is the manner in which colour information is multiplexed for transmission. Typical of the colour standards are the NTSC, PAL and SECAM standards. Normally, demodulating circuitry that is used to recover colour information multiplexed in accordance with one standard is not readily usable to demodulate colour information that has been multiplexed in accordance with a different standard.

A still further parameter that differs from one television standard to another is the specific IF f_p to which the broadcast video signal is converted. As is known, although the broadcast frequency may change from one channel to the next (for example, in the United States there are twelve VHF frequencies and 70 UHF frequencies which provide 82 broadcast channels), regardless of the particular channel to which a television receiver is tuned, only one video IF is generated. This video frequency f_p varies from, for example, 58.75 MHz in Japan to 45.75 MHz in the United States to 39.5 MHz in the United Kingdom.

There are primarily six different television standards used throughout the world. These standards have become known as the B, G, I, K, L and M standards; and the M standard is used in North America and Japan, with certain parameters of the M standard used in Japan being different from those parameters used in the United States, such as the video IF frequency mentioned above. For convenience, these standards are summarized in Table 1 as follows:

TABLE 1

TV Standard (television broadcast system)

	B	G	I	K	L	M
Number of scanning lines	625	625	625	625	625	525
Vertical frequency (Hz)	50	50	50	50	50	60
fs-fp (MHz)	+ 5.5	+ 5.5	+ 6	+ 6.5	+ 6.5	+ 4.5
Difference between fp and adjacent channel (MHz)	-1.25	-1.25	-1.25	-1.25	-1.25	-1.25
Channel band width (MHz)	7	8	8	8	8	6
Audio modulation system	FM	FM	FM	FM	AM	FM
Popular name of system	West European system	West European system	U.K. system	East European system	French system	American system

As used throughout this specification, the expression "television broadcast system" means the particular television standard which is used to create television signals that are broadcast over a preselected broadcast channel.

Television signals are broadcast in accordance with a single type of television broadcast system in a particular region, such as in Japan or in North America, and since the source of a different type of television broadcast system is so distant (for example, Europe), it is highly unlikely, if not impossible, for a television receiver in the particular region to receive television signals broadcast in accordance with a different system (such as from Europe). Thus, it is highly unlikely for a television receiver in the United States (which receives television signals in accordance with the M standard) to receive television signals broadcast in accordance with the B, G, I, K or L standard. However, in Europe where heterogeneous television broadcast systems exist, it is likely that a television receiver in one country, such as in Germany, may receive television signals broadcast by different television broadcast systems (as may emanate from France or Eastern Europe). That is, it is likely that such a television receiver may be able to pick up television signals broadcast over different channels by B, G, K or L standards. Normally, the same broadcast frequency, or channel, is not used by two or more broadcasting stations that are sufficiently proximate to be picked up by one television receiver, as this would result in interference.

Rather than provide different television sets, each compatible with a respective television broadcast system, for use in those areas that are able to receive television signals broadcast by different systems, it is desirable to provide a single television receiver having multiple standard capabilities. For example, it is desirable to manufacture a television receiver for use in Germany that is capable of receiving and displaying television programmes broadcast in accordance with B, G, K or L systems. Such a television receiver has been proposed, wherein different band-pass filters, trap filters and IF circuit operating characteristics, all consistent with different respective television broadcast systems, may be selected by the user. Of course, for proper selection of these filters and operating characteristics (referred to generally as demodulating parameters), the user should be provided with an indication of the type of television broadcast system that is being used to broadcast a television programme over a particular broadcast channel.

Still further, with the recent introduction of television receivers having the so-called picture-in-picture function, it is desirable to display one picture of one television programme broadcast in accordance with one type of television broadcast system and simultaneously display, on the same display screen, a picture of another television programme broadcast in accordance with a different type of television broadcast system. An example of such a television receiver is disclosed in JP-A-1-164 187.

In picture-in-picture television receivers capable of receiving television programmes broadcast in accordance with different television broadcast systems, as proposed heretofore, identical television broadcast system identifying circuitry is provided in each demodulator that is used to produce a respective one of the "picture-in-picture" pictures. This results in a relatively expensive television receiver having complicated wiring and resulting in a device of relatively large size. Furthermore, identification of a particular type of television broadcast system being used to transmit the received television signals generally is dependent upon detecting the difference between the video and audio IF frequencies (Table 1 indicates that detection of this IF frequency difference provides a relatively accurate identification of the type of television broadcast system being used). However, when the broadcast channel to which one (or more) of the demodulators is tuned is changed, there is a substantial delay before the video and audio IF frequencies of that new channel are identified. Consequently, there is a substantial delay before the video and audio IF frequencies of that new channel are identified. Consequently, there is a delay in identifying the type of television broadcast system being used to transmit the television signals over this new channel and, as a result, a display of the corresponding video picture is delayed. The resultant blanking of the display screen is undesired and annoying. A prior art television receiver which memorizes the television standards corresponding to the channels is disclosed in EP-A- 217 123.

According to the present invention there is provided television receiving apparatus for receiving television signals broadcast over preselected broadcast channels by different television broadcast systems and including a plurality of demodulator means for concurrently displaying television programmes broadcast by different television broadcast systems, the apparatus comprising:

processor means for selecting a broadcast channel to be demodulated by at least one of said demodulator means;

detecting means for detecting if television signals are broadcast over the selected broadcast channel and, if so, determining a sound carrier frequency derived from said television signals to identify as a function of the determined sound carrier frequency the television broadcast system associated with said selected broadcast channel and by which said detected television signals are broadcast;

memory means for storing an indication of the selected broadcast channel and an identity of the television broadcast system associated therewith;

means for advancing said processor means to select another broadcast channel whereby an indication of said other broadcast channel and the identity of a television broadcast system associated therewith are stored in said memory means; and

retrieval means for retrieving from said memory means broadcast channel indications and the identities of associated television broadcast systems and for controlling said plurality of demodulator means therewith for concurrently displaying television programmes broadcast over said retrieved broadcast channels.

According to the present invention there is also provided television receiving apparatus for receiving television signals broadcast over preselected broadcast channels by different television broadcast systems and including a plurality of demodulator means for demodulating video and audio signals from received television signals and for concurrently displaying television programmes broadcast by different television broadcast systems, said apparatus comprising:

microprocessor means operative sequentially to select broadcast channels to be demodulated by at least one of said demodulator means to determine if television signals are being broadcast over each selected channel and, if so, to identify the television broadcast system associated with each channel over which television signals are being broadcast;

memory means for storing indications of the respective broadcast channels over which television signals are determined to be broadcast and identities of the television broadcast systems associated with those broadcast channels;

parameter setting means included in each demodulator means for setting the operating parameters thereof compatible with a selected television broadcast system; and

read-out means for reading out from said memory means and supplying to a selected demodulator means a broadcast channel indication and a television broadcast system identity to set the operating parameters of said selected demodulator means such that television signals broadcast over the read out broadcast channel are demodulated and displayed.

In accordance with an embodiment of this invention, television receiving apparatus is provided for receiving television signals broadcast over preselected broadcast channels by different television broadcast systems.

When television signals are broadcast over a selected broadcast channel, the audio carrier frequency of the television signals broadcast over the channel is determined. The television broadcast system is identified as a function of the sound carrier frequency derived from the broadcast television signals and, in a preferred embodiment, the television broadcast system is identified as a function of $f_s - f_p$, wherein f_s is the audio carrier frequency and f_p is the video carrier frequency. In a preferred embodiment, f_s is the audio IF frequency and f_p

is the video IF frequency derived from the received television signals.

Each demodulator includes a tuner tunable to a broadcast channel selected by the processor. Preferably, each demodulator also includes an IF circuit coupled to the tuner for producing video IF signals from the television signals broadcast over the channel to which the tuner is tuned. A determination of whether television signals are being broadcast over a particular channel is made as a function of the level of the video IF signals produced by the IF circuit.

Each demodulator also includes audio IF circuitry for producing sound IF signals from the television signals which are broadcast over the channel to which the tuner is tuned. A determination of the sound carrier frequency is made as a function of the sound IF signal level.

Each demodulator may include a plurality of band-pass filters, each individually connectable between the tuner and the IF circuit, and each being tuned to a frequency established by a respective television broadcast system. The reception of television signals is detected by selecting a particular filter for connection between the tuner and the IF circuit as a function of the broadcast channel which is selected by the processor. Thus, depending upon the selected broadcast channel, f_p is established.

Each demodulator may include a plurality of audio band-pass filters each individually connectable to the sound IF circuit and each being tuned to a respective sound IF frequency. The sound carrier frequency of the received television signals is determined by sequentially connecting the audio band-pass filters to the sound IF circuit and selecting the one audio band-pass filter which results in the sound IF signal having the largest level. As a result, $f_s - f_p$ is determined.

As an alternative, the reception of the television signals over a selected broadcast channel may be detected by sequentially connecting individual filters, each tuned to a frequency f_p, between the tuner and the IF circuit, and selecting the particular filter (and, thus, f_p) which results in the one video IF signal having the largest level. Then, the sound IF frequency is determined, such as described above.

After channel indications and television broadcast system identities have been stored in the memory, any desired channel may be read out to select a broadcast channel to be received by the apparatus; and the associated television broadcast system identity likewise is read out and used to set the parameters of a demodulator to enable the television signals broadcast over that selected channel to be demodulated and displayed. Different broadcast channel indications (and associated television broadcast system identities) may be read from the memory and used to configure different channels simultaneously. Different television pictures may be superimposed on the same display screen by using the picture-in-picture function of the apparatus.

The invention will now be described by way of example with reference to the accompanying drawings, throughout which like parts are referred to by like references, and in which:

Figures 1A and 1B are schematic representations of a picture-in-picture display;

Figures 2A and 2B, in combination, comprise a block diagram of previously proposed television receiving apparatus for receiving television signals broadcast by different television broadcast systems; and

Figures 3A and 3B, in combination, comprise a block diagram of an embodiment of the present invention.

Before describing the features and advantages of the present invention, reference is made to Figures 1A and 1B which are schematic illustrations of a picture-in-picture display format that can be used with embodiments of the present invention. As is known, an inset picture 2 may be displayed as an inset in a main or primary picture 1 as both television pictures are displayed simultaneously on the same display screen of a television receiver, as shown in Figure 1A. Typically, television receiving apparatus capable of providing a picture-in-picture display includes two demodulators, referred to as demodulators A and B. These two demodulators are of substantially similar construction and each includes a tuner independently tunable to a desired broadcast channel. The demodulators also include demodulating, detecting and processing circuitry to generate the video pictures shown in Figure 1A. Preferably, the main picture 1 and the inset picture 2 may be interchanged such that the television programme which produces the inset picture 2 may be displayed as the main picture 1 and vice-versa.

Figure 1B illustrates an alterative picture-in-picture display of the main picture 1 and the inset picture 2. In this alternative display, the two pictures may be of substantially the same size, each occupying approximately half the display screen. In both the Figure 1A and Figure 1B versions, the audio information which accompanies the television programme from which the main picture 1 is displayed is reproduced. In some receiving apparatus an audio selector switch is provided to enable the user to select for sound reproduction the audio information which accompanies either the main picture 1 or the inset picture 2.

Turning now to Figures 2A and 2B, a block diagram representing television receiving apparatus proposed heretofore for receiving television receiving broadcast simultaneously over two different channels by two different television broadcast systems is illustrated. The apparatus comprises a distributor in, and two demodulators, designated A and B, each including a tuner 5 and a signal processing circuit 7 (referred to as a signal processor). The apparatus also includes a central processing unit (CPU) 6, a video selecting circuit 8, a picture

tube 9, an audio selector switch 10 and an audio transducer, such as a loudspeaker 11. The distributor 4 is coupled to an antenna 3 to receive television signals which are broadcast by, for example, over-the-air transmission. The distributor 4 is coupled to tuners 5A and 5B and supplies the broadcast television signals to each of them. The tuners 5A and 5B are coupled to the CPU 6 and receive channel selection signals therefor. For example, each tuner 5A and 5B may include a frequency synthesizer to generate a tuning frequency in response to a control signal supplied from the CPU 6. Such electronic tuning devices are known, and further description thereof is not provided herein.

The tuner 5A is coupled to a signal processor 7A and, similarly, the tuner 5B is coupled to a signal processor 7B. The signal processors 7A and 7B are substantially identical and, only the signal processor 7A is illustrated in detail and described.

The signal processor 7A includes an IF circuit 15A to produce video IF signals and, for convenience, is referred to as a VIF circuit. The VIF circuit 15A is coupled to the tuner 5A by a selected one of band-pass filters 13A. Preferably, the band-pass filters 13A are formed as surface acoustic wave (SAW) filters, and each is tuned to a particular VIF used by a respective television broadcast system. For example, one of the IF frequencies to which an SAW filter is tuned is about 58.75 MHz, the IF frequency adopted by the M system in Japan. Another SAW filter is tuned to 45.75 MHz, the IF frequency adopted by the M system in the United States. Yet another filter is tuned to 39.5 MHz, the IF frequency adopted by the I system. Other SAW filters are tuned to other frequency; and although four SAW filters are illustrated in Figure 2A, it will be appreciated that there may be as many filters as there are different standard IF frequencies. Switches 12A and 14A are controlled by a television system identifying circuit 25A, to be described, for connecting a selected one of the SAW band-pass filters between the tuner 5A and the VIF circuit 15A. It is appreciated that, depending upon the particular television broadcast system by which television signals are broadcast to the illustrated apparatus, the selection of a particular one of the SAW band-pass filters will produce an optimum VIF signal at the output of the VIF circuit 15A. The VIF circuit 15A is also coupled to the identifying circuit 25A and has its characteristics modified in response to a control signal supplied to the identifying circuit 25A so as to enhance the VIF signal produced thereby.

The output of the VIF circuit 15A is coupled to a video signal processor 19A by way of an array of trap filters 17A. As is known, both audio IF signals and VIF signals are present at the output of the VIF circuit 15A. The audio IF signals are separately processed to recover audio information transmitted with the television signals, as will be described. The video information included in the VIF signals are processed by the video signal processor 19A from which luminance and chrominance components are recovered and supplied to the video selecting circuit 8 for display on the picture tube 9. The trap filters 17A serve substantially to eliminate the audio IF components and adjacent channel components included at the output of the VIF circuit 15a and, thus, block these components from the video signal processor 19A. The trap filters 17A comprise an array of trap circuits, each tuned to, for example, the audio IF frequency and/or adjacent channel frequencies of a particular television broadcast system. Switching circuits 16A and 18A are controlled by the identifying circuit 25A to connect one of the trap filters 17A between the output of the VIF circuit 15A and the input of the video signal processor 19A.

The output of the VIF circuit 15A is coupled to a sound IF circuit 23A, referred to as an SIF circuit. The SIF circuit 23A recovers the audio signals which have been broadcast as part of the television signals. An array of band-pass filters 21A is provided to pass the SIF signal and block the VIF signal provided at the output of the VIF circuit 15A. Each of these audio band-pass filters included in the array 21A is tuned to the SIF of a particular television broadcast system. For example, in the M system used in the United States, the video and audio IF signals produced at the output of the VIF circuit 15A inherently "beat" together to produce a difference frequency (f_s - f_p) equal to 4.5 MHz, wherein f_p is the VIF and f_s is the audio IF. The sound IF signal supplied to the SIF circuit 23A exhibits this 4.5 MHz carrier frequency. Accordingly, one of the audio band-pass filters in the array 21A is tuned to this difference frequency of 4.5 MHz and exhibits a pass-band sufficient to block the VIF signal from being supplied therethrough to the SIF circuit 23A. In similar manner, the remaining audio band-pass filters included in the array 21A are tuned to the difference frequencies noted in Table 1, so as to pass the SIF signal produced at the output of the VIF circuit 15A by respective television broadcast systems.

Switches 20A and 22A are controlled by the identifying circuit 25A to select a particular one of these audio band-pass filters for connection between the output of the VIF circuit 15A and the input of the SIF circuit 23A.

The output of the SIF circuit 23A is demodulated and amplified by an amplifier 24A and coupled to the loudspeaker 11 by the audio selector switch 10 which is controlled by the CPU 6, as will be described.

The identifying circuit 25A is coupled to the VIF circuit 15A and to the SIF circuit 23A, and is supplied with the video and sound IF signals (the VIF and SIF signals). It is appreciated that these frequencies are established by the particular television broadcast system by which the received television signals are broadcast. It is further recognized that the VIF and SIF signals will exhibit their largest respective magnitudes when the prop-

er video band-pass filter in the array 13A is connected to the VIF circuit 15A, and when the proper audio band-pass filter in the array 21A is connected to the SIF circuit 23A. That is, when those filters which are tuned to the video and sound IFs of the particular television broadcast system then being received are selected, the VIF and SIF signal levels will be the largest; and the VIF and SIF circuits 15A and 23A supply the video and sound IFs to the identifying circuit 25A. The identifying circuit 25A senses the difference frequency $f_s - f_p$ and, in one embodiment is provided with a look-up table which stores the various operating characteristics of the signal processor 7A as a function of the television broadcast system processor 7A as a function of the television broadcast system identified by this difference frequency $f_s - f_p$. Thus, once the television signals then being received over the television channel selected by the tuner 5A is identified, the settings of the switches 12A and 14A, 16A and 18A, 20A and 22A and the settings of the VIF circuit 15A and SIF circuit 13A are read out. Consequently, the desired video band-pass filter, trap filter and audio band-pass filter are selected as a function of the identified television broadcast system, as are the operating characteristics of the VIF and SIF circuits 15A and 23A. Hence, once the television broadcast system which is being used to broadcast the television signals then being received over the channel to which the tuner 5A is tuned is identified, the operating characteristics of the signal processor 7A are established to provide optimum reception of those television signals.

One example of an automatic identifying circuit that may be used as the circuit 25A is described in Japanese Laid-Open Patent application 63/9373.

The signal processor 7B is substantially similar to the signal processor 7A, and the identifying circuit 25A is substantially identical to the identifying circuit 25A. Thus, depending upon the frequency difference $f_s - f_p$ of the television signals then being broadcast over the particular channel to which the tuner 5B is tuned, the identifying circuit 25B operates to identify the particular television broadcast system by which those television signals are broadcast. The identifying circuit 25B may include a look-up table similar to that included in the identifying circuit 25A and, therefore, once the frequency difference $f_s - f_p$ has been determined, the television broadcast system used to transmit the television signals of the channel to which the tuner 5B is tuned is identified and the operating characteristics of the signal processor 7B are established.

The CPU 6 is coupled to the tuners 5A and 5B and establishes respective local oscillating frequencies to which they may be tuned. Thus, each tuner 5A and 5B may be tuned to the same or different television broadcast frequencies. The CPU 6 also is coupled to the selector circuit 8 and to the selector switch 10 for selecting which of the demodulated television signals will be supplied to the picture tube 9 as the main and inset pictures, and which of the demodulated audio signals will be supplied to the loudspeaker 11. Depending upon the user's operation of the CPU 6, the main television picture displayed on the picture tube 9 may be derived from the television signals processed by the signal processor 7A and the inset picture may be derived from the television signals processed by the signal processor 7B, or vice versa. Likewise, the audio signals supplied to the loudspeaker 11 may be produced either by the signal processor 7A or by the signal processor 7B as selected by the user's operation of the CPU 6.

A significant disadvantage of the television receiving apparatus illustrated in Figures 2A and 2B resides in the need for two television system, automatic identifying circuits 25A and 25B, one each for the signal processors 7A and 7B. The use of such duplicate circuitry adds to the expense and overall size of the apparatus. Furthermore, when the CPU 6 is operated to change the channel (or channels) to which the tuner 5a or the tuner 5B (or both) is tuned, a noticeable delay is produced until the identifying circuit 25A or the identifying circuit 25B (or both) satisfactorily identifies the television broadcast system by which the television signals are transmitted over the newly tuned channel(s). During this delay, the picture tube 9 is usually blanked to prevent the display of an unsatisfactory television picture while the proper band-pass and trap filters are selected and while the VIF and SIF circuits are adjusted.

Thus, if a user operates the CPU 6, for example, to change the channel to which the tuner 5A is tuned, an undesired and annoying blank picture is presented. The user may erroneously perceive the blank picture to be indicative of a malfunction of the receiving apparatus.

The embodiment of the present invention which is illustrated in Figures 3A and 3B, in which like reference numerals are used to identify those elements which have been described above, overcomes the aforementioned disadvantage found in the television receiving apparatus of Figures 2A and 2B. For convenience, Figures 3A and 3B illustrate two channels A and B for receiving and demodulating television signals broadcast by two different television broadcast systems. It will be apparent that an additional number of channels may be used to demodulate additional television signals which will provide the simultaneous display of several picture-in-picture programmes.

As shown, the tuner 5A is coupled to a channel A signal processor 27 which includes the VIF circuit 15A, the video signal processor 19A, the SIF circuit 23A and the audio amplifier 24A. The tuner 5B is coupled to a channel B signal processor 28 which includes a VIF circuit 15B, a video signal processor 19B, an SIF circuit 23B and an audio amplifier 24B. It will be appreciated that, in this regard, the signal processors 27 and 28 are

substantially similar to each other and the VIF, video signal processing, SIF and audio amplifier circuits are substantially the same as those which have been discussed above in conjunction with Figures 2A and 2B. In view of these similarities between the signal processors 27 and 28, and in the interest of brevity, only the signal processor 27 is described in further detail.

The VIF circuit 15A is coupled to the tuner 5A by an array of IF band-pass filters 29A which are similar to the aforedescribed combination of the array 13A and the switching circuits 12A and 14A. The IF band-pass filters 29 A are coupled to a CPU 26 (to be described), which selects one of the filters included in the array 29A for connecting the VIF circuit 15a to the output of the tuner 5A. The CPU 26 also is coupled to the VIF circuit 15A and supplies to the VIF circuit 15A a control signal for establishing particular operating characteristics thereof compatible with the particular band-pass filter by which the tuner output is coupled to the VIF circuit 15A.

The output of the VIF circuit 15A is coupled to the video signal processor 19A by an array 30A of trap filters. The trap filters in the array 30A may be similar to the trap filters 17A which are individually connected between the VIF circuit 15A and the video signal processor 19A by the selector switches 16A and 18A in Figures 2A and 2B. The CPU 26 coupled to the array 30A to supply a control signal thereto by which an individual trap filter is connected between the VIF circuit 15A and the video signal processor 19A.

The output of the VIF circuit 15A also is coupled to the SIF circuit 23A by an array 31A of audio band-pass filters similar to the band-pass filters 21A which are individually connected between the VIF and SIF circuits 15A and 23A by the selector switches 20A and 22A in Figure 2A. The CPU 26 is coupled to the array 31A to select and connect a particular audio band-pass filter to the input of the SIF circuit 23A. The CPU 26 is also coupled to the SIF circuit 23A to supply a control signal thereto for establishing operating characteristics of the SIF circuit 23A compatible with the particular audio band-pass filter connected thereto.

The channel A signal processor 27 includes a television system automatic identifying circuit 32 coupled to the VIF circuit 15A and the SIF circuit 23A to receive the VIF and the SIF produced thereby. The identifying circuit 32 preferably includes a look-up table which stores the operating characteristics established by each television broadcast system as indicated in Table 1, with each such system being identified by the difference frequency $f_s - f_p$, wherein f_s is the audio IF and f_p is the VIF. Thus, the identifying circuit 32 serves to identify a television broadcast system as a function of this difference frequency $f_s - f_p$. The identifying circuit 32 is coupled to the CPU 26 and supplies to the CPU 26 the television broadcast system identified thereby, as well as the operating characteristics of that system.

It will be noted that the identifying circuit 32 is included only in the channel A signal processor 27. The channel B signal processor 28 does not include an identifying circuit. As will be described, the identifying circuit 32 is used generally only during a set-up mode of operation wherein the television broadcast systems by which television signals are broadcast and received by the television receiving apparatus are identified. Once such identifications have been made, the identifying circuit 32 need not be employed to receive, demodulate and display a broadcast television programme unless the user wishes to make additional or supplemental adjustments to the channels which may be received.

The CPU 26 preferably comprises a suitably programmed microprocessor which is user-actuated as by a channel selector, remote control unit or the like, for supplying selected channel select signals to the tuners 5A and 5B by which they are tuned to desired broadcast frequencies. The CPU 26 is coupled to a non-volatile memory 33 which stores predetermined broadcast channel indications and identifications of the television broadcast systems associated with those channels. For example, the memory 33 may store data representing that channel I is associated with television broadcast system B, channel II is associated with television broadcast system G, channel III is associated with television broadcast system K, channel IV is associated with television broadcast system G, and so on. As will be described, the particular broadcast channel indication which is stored is determined by the user's operation of the CPU 26 and the television broadcast system associated therewith is identified by the identifying circuit 32 when that channel is being received. The channel indications and television broadcast system identifications are written into the memory 33 in the set-up mode, and the stored information is read from the memory 33 during a reception mode, as will be described. It is appreciated that, in addition to storing simply the identification of a television broadcast system, the operating characteristics of the signal processor 27 (and, because it is substantially identical thereto, the operating characteristics of the signal processor 28) are stored. Hence, when the CPU 26 is operated to read from the memory 33, the information defined by a user-selected broadcast channel, the operating characteristics of the television broadcast system associated with that channel also read. These characteristics are used to select individual ones of the filters 29A, 30A and 31A in the signal processor 27, individual ones of filters the 29B, 30B and 31B of the signal processor 28, compatible parameters of the VIF circuit 15A and the SIF circuit 23A and compatible parameters of VIF circuit 15B and the SIF circuit 23B. Thus, depending upon the selected broadcast channel, the signal processors 27 and 28 are disposed in respective conditions by which the television signals broadcast

over those channels are demodulated and displayed.

The CPU 26 is used both in a set-up mode, as will be described below, and in an operating mode as aforementioned. The video selecting circuit 8 and the audio selector switch 10 are controlled by the CPU 26 to select the television signals received over channel A or channel B as the main picture and inset picture, respectively, and to select the sound signals received over channel A or channel B to drive the loudspeaker 11.

The CPU 26 is also coupled to a television system setting key 34 which is manually operable by a user to supply to the CPU 26 the identification of a particular television broadcast system selected by the user. For example, if the television signals received over a selected broadcast channel during, for example, the set-up mode, are not readily identifiable by the identifying circuit 32 because of radio interference or the like, the user may, nevertheless, supply to the CPU 26 an identification of a particular television broadcast system if the user is aware of the television broadcast system which is used by that selected channel. With this identification, the CPU 26 may supply to, for example, the signal processor 27, the operating characteristics (for example, the selected filters and IF operating parameters) of that identified system.

The manner in which the television receiving apparatus illustrated in Figures 3A and 3B operates now will be described. First, a set-up mode of operation is discussed. Let it be assumed that N broadcast channels may be selected and that a suitable manually operated device, such as a remote control unit, is operable to select any one of these N channels. Let it be further assumed that the television receiving apparatus is geographically located so as to receive television signals that are broadcast by different television broadcast systems. Initially, the user actuates the manual device, such as the aforementioned remote control unit, to select an arbitrary switching position thereon. For convenience, let it be assumed that this switching position is position 1. The CPU 26 responds to the selection of position 1 to supply to the tuner 5A a control signal which tunes the tuner 5A to a first known broadcast channel. For example, the tuner 5A may include a phase-locked loop having a programmable frequency divider; and the CPU 26 establishes the dividing ratio of that programmable divider such that a local oscillating signal of frequency corresponding to the first broadcast channel is selected. Thus, the tuner 5A is tuned to the frequency of the first broadcast channel.

During the set-up mode of operation, the tuner 5B and the signal processor 28 may be ignored. Accordingly, the signals supplied from the CPU 26 to the tuner 5B are irrelevant.

In one mode of operation of the CPU 26, a predetermined filter included in the array 29A is selected to connect the output of the tuner 5A to the VIF circuit 15A. Accordingly, the selected filter filters and IF signal produced by the tuner 5A (which now is tuned to the first broadcast frequency) to the VIF circuit 15A which supplies an IF signal to the identifying circuit 32. If the level of this IF signal exceeds a predetermined threshold, it is concluded that the tuner 5A is tuned to an actual broadcast channel. However, if the IF signal level does not exceed this threshold, the CPU 26 advances to supply another control signal to the tuner 5A whereby the tuner 5A next is tuned to another broadcast frequency. Once again, the IF output of the tuner 5A is filtered and supplied to the VIF circuit 15A which, in turn, applies an IF signal to the identifying circuit 32. As before, the level of this IF signal is compared to the threshold, and, if that IF signal level does not exceed the threshold, the foregoing process is repeated.

When the level of the IF signal produced by the VIF circuit 15A is of sufficient magnitude, that is, if it exceeds the aforementioned threshold, it is determined that the tuner 5A is tuned to a broadcast channel over which television signals are being broadcast. Accordingly, the CPU 26 stores in the memory 33 an indication of the frequency to which the tuner 5A now is tuned. For example, the memory 33 stores an indication of channel I at position 1 of the manually operated channel selector.

Next, the CPU 26 selects a first audio band-pass filter included in the array 31A to connect the output of the VIF circuit 15A to the SIF circuit 23A. The SIF signal now produced by the SIF circuit 23A is supplied to the identifying circuit 32A which detects the amplitude of the SIF signal. Then, the next audio band-pass filter included in the array 31A is connected to the SIF circuit 23A and the level of the SIF signal now produced thereby is detected. The foregoing operation is repeated until SIF signal levels produced as a result of each audio band-pass filter are detected. The audio band-pass filter which produces the SIF signal having the largest amplitude is determined by the CPU 26; and that filter is connected between the output of the VIF circuit 15A and the input of the SIF circuit 23A.

With the connection of the proper IF band-pass filter 29A and audio band-pass filter 31A, as aforementioned, the identifying circuit 32 uses the frequency difference $f_s - f_p$ to identify the television broadcast system by which the television signals received by the tuner 5A are transmitted. The identifying circuit 32 supplies the CPU 26 with the identification of this television broadcast system.

Once the CPU 26 has been provided with this television broadcast system identification, it selects the trap filter included in the array 30A by which undesired frequencies, such as the SIF carrier of an adjacent channel, the SIF carrier of the present broadcast channel and the VIF carrier of an adjacent channel, are blocked from the video signal processor 19A. Moreover, the operating characteristics of the VIF circuit 15A and the SIF circuit

23A are adjusted by the CPU 26 to be compatible with the identified television broadcast system.

The CPU controls the video selecting circuit 8 and the audio selector witch 10 so as to display a video picture and produce audible sounds derived from the television signals processed by the signal processor 27. Additionally, the CPU 26 stores in the memory 33 the identification of this television broadcast system which now is associated with the broadcast channel indication that had been stored previously when the identifying circuit 32 and the CPU 26 determined that television signals were being broadcast over the particular channel to which the tuner 5A is tuned. For example, if the identifying circuit 32 identifies the received television signals as being broadcast by television broadcast system L, the memory 33 stores for channel selector position 1 an indication that broadcast channel I is broadcasting television signals by television broadcast system L. Of course, the operating parameters associated with television broadcast system L, as noted in Table 1 above, likewise may be stored in the memory 33.

The foregoing operations are repeated from channel to channel until, for each relevant selector position of the manually operable channel selector device, an indication of that position, together with an indication of a broadcast channel and an identification of the television broadcast system by which television signals are broadcast over that channel are stored.

Of course, as the tuner 5A is tuned to each broadcast channel, verification that television signals are broadcasted thereover may be made simply by observing the television picture displayed on the picture tube 9.

In the foregoing operation, it has been assumed that, during the set-up mode, a predetermined video band-pass filter included in the array 29A is selected for each broadcast channel to which the tuner 5A is tuned. As an alternative, when the CPU 26 supplies a tuning control signal to the tuner 5A, for example, when the CPU 26 supplies a dividing ratio to the programmable frequency divider that may be included in the tuner 5A, a first of the video band-pass filters may be selected. Then, the level of the VIF signal produced by the VIF circuit 15A is detected, whereafter the next video band-pass filter included in the array 29A is selected and the VIF signal level is detected once again. This operation is repeated until all of the video band-pass filters have been selected. Then, the filter which produces the VIF signal with the largest level is selected by the CPU 26. If this VIF signal level exceeds a threshold, it is determined that television signals are being broadcast over the particular broadcast channel to which the tuner 5A is tuned. At that time, the CPU 26 stores in the memory 33 an indication of this broadcast channel and, more particularly, the frequency to which the tuner 5A is tuned. However, if the largest detected IF signal level does not exceed the aforementioned threshold, the CPU 26 is advanced to supply to the tuner 5A another tuning control signal. The tuner 5A is thus tuned to a different broadcast frequency; and the foregoing operation is repeated.

Once it has been determined that the tuner 5A is tuned to a broadcast channel over which television signals are actually being broadcast, and after the video band-pass filter included in the array 29A has been selected to produce a maximum VIF signal level, the CPU 26 next selects the appropriate band-pass filter included in the array 31A. As mentioned above, each audio band-pass filter is selected, one at a time, and the level of the SIF signal produced by the SIF circuit 23A for each such filter is detected. The filter which produces the SIF signal with the largest level is selected as the proper audio band-pass filter.

The identifying circuit 32 is then supplied with a VIF signal from the VIF circuit 15A and a SIF signal from the SIF circuit 23A. The identifying circuit 32 identifies the television broadcast system as a result of the frequency difference $f_s - f_p$. This identification is supplied to the CPU 26 and stored in memory 33 whereat it is associated with the stored indication of the channel to which the tuner 5A is tuned and the position of the manually operable channel selector device which is used to select this channel. A trap filter included in the array 30A is selected by the CPU 26 as a function of the identified television broadcast system. Then, the user may operate the aforementioned channel selector device to select another position thereon, whereupon the foregoing operation is repeated.

As a result of the aforedescribed set-up mode of operation, the memory 33 stores, for each selected position of the channel selector device, an indication of the broadcast channel over which television signals are being broadcast and an identification of the television broadcast system by which those television signals are broadcast. Thus, the memory 33 may store information of the type illustratively represented in the following Table 2.

TABLE 2

MEMORY INFORMATION

Channel Selector Position	Broadcast Channel	Television Broadcast System
1	I	G
2	II	L
3	IV	L
4	V	K
5	VII	B
6	VIII	L

Once the set-up mode has been completed, the illustrated apparatus may be operated in a viewing mode. For example, and consistent with Table 2, let is be assumed that the user wishes to watch the television programme broadcast over channel II as the main picture and the television programme broadcast over channel V as the inset picture. The aforementioned channel selection device thus may be operated by selecting channel position 3 to tune the tuner 5A to broadcast channel IV and by selecting channel position in to tune the tuner 5B to broadcast channel V. Suitable channel command signals may be supplied to the CPU 26 by the channel selector device.

In response to these command signals, the CPU 26 reads the broadcast channel indication and television broadcast system identification stored at channel selector position 3 and supplies to the tuner 5A the channel control signal to tune the tuner 5A to broadcast channel IV. Concurrently, the CPU 26 reads from the memory 33 the broadcast channel indication stored at channel position 4. Hence, the CPU 26 supplies to the tuner 5B the channel control signal to tune the tuner 5B to broadcast channel V. The user may also select the picture-in-picture display arrangement which he desires, such as the arrangement shown in Figure 1A or the arrangement shown in Figure 1B.

Consistent with the example under discussion, the CPU 26 also reads from the memory 33 the identification of television broadcast system L stored at channel selector position 3. The operating parameters of television broadcast system L are used by the CPU 26 to select the video band-pass filter from the array 29A, the trap filter from the array 30A, the audio IF band-pass filter from the array 31A, the operating parameters of the VIF circuit 15A and the operating parameters of the SIF circuit 23A used by television broadcast system L. Thus, optimum filters and operating characteristics for demodulating and displaying the television signals broadcast over channel IV are established for the signal processor 27. The television picture derived from these television signals is displayed as the main picture.

Similarly, the CPU 26 reads from the memory 33 the identification of television broadcast system K stored at channel selector position 4. The operating parameters of television broadcast system K are used by the CPU 26 to select the video band-pass filter from the array 29B, the trap filter from the array 30B, the audio IF filter from the array 31B, the operating parameters of the VIF circuit 15B and the operating parameters of the SIF circuit 23B for optimum demodulation and display of the television signals broadcast by television broadcast system K. The television picture derived from the television signals broadcast over channel V (the channel to which the tuner 58 is tuned) is displayed as the inset picture by the picture tube 9. As a result, a main picture corresponding to broadcast channel IV and an inset picture corresponding to broadcast channel V are displayed in picture-in-picture format by the picture tube 9.

It is appreciated that in the viewing mode, the proper setting of the signal processors 27 and 28 is not dependent upon the present operation of the identifying circuit 32. Rather, since the television broadcast system used by each broadcast channel has been selected heretofore during the set-up mode, the CPU 26 acts to

establish the proper settings of the signal processors 27 and 28 quickly and easily merely by reading out this information from the memory 33. Consequently, there is no noticeable delay in displaying television pictures when the tuning conditions of the tuners 5A and/or 5B are changed. For example, if the channel selector device is operated such that the tuner 5A now is to be tuned to broadcast channel I, the CPU 26 merely reads from the memory 33 the broadcast channel indication and television broadcast system identification stored at channel selector position 1. The tuner 5A thus is tuned promptly to channel I and the signal processor 27 is set to be compatible with the operating parameters of television broadcast system G. The delay heretofore associated with the identifying circuit 32 once the tuner 5A is changed is obviated. That is, it is not necessary to wait for the identifying circuit 32 to identify the television broadcast system by which television signals are broadcast over channel I before the signal processor 27 is set properly.

Furthermore, it is appreciated that only one identifying circuit 32 is needed to identify the television broadcast systems which are used by the broadcast channels that can be received by the illustrated apparatus. This is because such identification is needed only during the set-up mode, whereupon the particular filters and operating characteristics of the VIF and SIF circuits are selected. Thereafter, when a user wishes to receive a particular broadcast channel over which television signals are actually broadcast, the selection of that channel results in the reading out of the identity of the television broadcast system used by that channel and, thus, during this viewing operation, the signal processor is properly configured to be compatible with the selected channel.

The function previously performed by the identifying circuit 32 during the set-up mode need not be carried out again during the viewing mode. Hence, there is little, if any, delay in displaying a television picture when the tuner 5A or the tuner 5B is changed over to a new broadcast channel.

Various changes and modifications can of course be made. For example, the description of the signal processors 27 and 28 is based upon the operation of a television receiving apparatus as an inter-carrier sound receiver wherein the video and sound signals are separated after both have passed through the VIF circuit. Nevertheless, it will be appreciated that the present invention is equally applicable to a split carrier sound receiver; and it is understood that the particular frequencies to which the audio and band-pass filters are tuned will, of course, be compatible with such a split carrier system. Furthermore, although only two signal processors 27 and 28 are shown, a larger number of signal processors may be used with additional tuners to display a main picture and several inset pictures. Nevertheless, even if several signal processors are employed, only a single identifying circuit is needed.

Claims

1. Television receiving apparatus for receiving television signals broadcast over preselected broadcast channels by different television broadcast systems and including a plurality of demodulator means (27, 28) for concurrently displaying television programmes broadcast by different television broadcast systems, the apparatus comprising:
processor means (26) for selecting a broadcast channel to be demodulated by at least one of said demodulator means (27, 28);
detecting means (32) for detecting if television signals are broadcast over the selected broadcast channel and, if so, determining a sound carrier frequency derived from said television signals to identify as a function of the determined sound carrier frequency the television broadcast system associated with said selected broadcast channel and by which said detected television signals are broadcast;
memory means (33) for storing an indication of the selected broadcast channel and an identity of the television broadcast system associated therewith;
means for advancing said processor means (26) to select another broadcast channel whereby an indication of said other broadcast channel and the identity of a television broadcast system associated therewith are stored in said memory means (33); and
retrieval means (26) for retrieving from said memory means (33) broadcast channel indications and the identities of associated television broadcast systems and for controlling said plurality of demodulator means (27, 28) therewith for concurrently displaying television programmes broadcast over said retrieved broadcast channels.

2. Apparatus according to claim 1 wherein each of said demodulator means (27, 28) includes tuner means (5A, 5B) tunable to a broadcast channel selected by said processor means (26).

3. Apparatus according to claim 2 wherein each of said demodulator means (27, 28) further includes inter-

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establish the proper settings of the signal processors 27 and 28 quickly and easily merely by reading out this information from the memory 33. Consequently, there is no noticeable delay in displaying television pictures when the tuning conditions of the tuners 5A and/or 5B are changed. For example, if the channel selector device is operated such that the tuner 5A now is to be tuned to broadcast channel I, the CPU 26 merely reads from the memory 33 the broadcast channel indication and television broadcast system identification stored at channel selector position 1. The tuner 5A thus is tuned promptly to channel I and the signal processor 27 is set to be compatible with the operating parameters of television broadcast system G. The delay heretofore associated with the identifying circuit 32 once the tuner 5A is changed is obviated. That is, it is not necessary to wait for the identifying circuit 32 to identify the television broadcast system by which television signals are broadcast over channel I before the signal processor 27 is set properly.

Furthermore, it is appreciated that only one identifying circuit 32 is needed to identify the television broadcast systems which are used by the broadcast channels that can be received by the illustrated apparatus. This is because such identification is needed only during the set-up mode, whereupon the particular filters and operating characteristics of the VIF and SIF circuits are selected. Thereafter, when a user wishes to receive a particular broadcast channel over which television signals are actually broadcast, the selection of that channel results in the reading out of the identity of the television broadcast system used by that channel and, thus, during this viewing operation, the signal processor is properly configured to be compatible with the selected channel.

The function previously performed by the identifying circuit 32 during the set-up mode need not be carried out again during the viewing mode. Hence, there is little, if any, delay in displaying a television picture when the tuner 5A or the tuner 5B is changed over to a new broadcast channel.

Various changes and modifications can of course be made. For example, the description of the signal processors 27 and 28 is based upon the operation of a television receiving apparatus as an inter-carrier sound receiver wherein the video and sound signals are separated after both have passed through the VIF circuit. Nevertheless, it will be appreciated that the present invention is equally applicable to a split carrier sound receiver; and it is understood that the particular frequencies to which the audio and band-pass filters are tuned will, of course, be compatible with such a split carrier system. Furthermore, although only two signal processors 27 and 28 are shown, a larger number of signal processors may be used with additional tuners to display a main picture and several inset pictures. Nevertheless, even if several signal processors are employed, only a single identifying circuit is needed.

Claims

1. Television receiving apparatus for receiving television signals broadcast over preselected broadcast channels by different television broadcast systems and including a plurality of demodulator means (27, 28) for concurrently displaying television programmes broadcast by different television broadcast systems, the apparatus comprising:
processor means (26) for selecting a broadcast channel to be demodulated by at least one of said demodulator means (27, 28);
detecting means (32) for detecting if television signals are broadcast over the selected broadcast channel and, if so, determining a sound carrier frequency derived from said television signals to identify as a function of the determined sound carrier frequency the television broadcast system associated with said selected broadcast channel and by which said detected television signals are broadcast;
memory means (33) for storing an indication of the selected broadcast channel and an identity of the television broadcast system associated therewith;
means for advancing said processor means (26) to select another broadcast channel whereby an indication of said other broadcast channel and the identity of a television broadcast system associated therewith are stored in said memory means (33); and
retrieval means (26) for retrieving from said memory means (33) broadcast channel indications and the identities of associated television broadcast systems and for controlling said plurality of demodulator means (27, 28) therewith for concurrently displaying television programmes broadcast over said retrieved broadcast channels.

2. Apparatus according to claim 1 wherein each of said demodulator means (27, 28) includes tuner means (5A, 5B) tunable to a broadcast channel selected by said processor means (26).

3. Apparatus according to claim 2 wherein each of said demodulator means (27, 28) further includes inter-

mediate frequency (IF) means (15A, 15B) coupled to said tuner means (5A, 5B) for producing video IF signals from the television signals broadcast over the channel to which said tuner means (5A, 5B) is tuned; and said detecting means (32) comprises level detecting means for detecting the level of the video IF signals produced by a predetermined demodulator means (27, 28), whereby the channel to which said tuner means (5A, 5B) is tuned is detected as a broadcast channel as a function of the video IF signal level.

4. Apparatus according to claim 3 wherein each demodulator means (27, 28) further includes sound intermediate frequency (SIF) means (23A, 23B) for producing sound IF signals from the television signals broadcast over the channel to which said tuner means (5A, 5B) is tuned; and said detecting means (32) additionally includes means for detecting the level of the IF signals produced by the SIF means (23A, 23B) included in said predetermined demodulator means (27, 28), whereby the sound carrier frequency of the television signals broadcast over said channel to which said tuner means (5) is tuned is determined as a function of the sound IF signal level.

5. Apparatus according to claim 4 wherein each demodulator means (27, 28) includes a plurality of filter means (29A, 29B) each individually connectable between said tuner means (5A, 5B) and said IF means (15A, 15B) and each being tuned to a frequency f_p established by a respective television broadcast system; and said detecting means (32) also includes filter select means for selecting one of said plurality of filter means (29A, 29B) in said predetermined demodulator means (27, 28) as a function of the selected broadcast channel.

6. Apparatus according to claim 5 wherein each demodulator means (27, 28) further includes a plurality of audio band-pass filter means (31A, 31B), each individually connectable to said SIF means (23A, 23B) and each being tuned to a frequency established by a respective television broadcast system; and said detecting means (32) further includes sound filter select means for sequentially connecting said audio band-pass filter means (31A, 31B) to said SIF means (23A, 23B) in said predetermined demodulator means (27, 28) and selecting the one audio band-pass filter means (31a, 31B) which results in the sound IF signal having the largest detected level, and means for identifying the television broadcast system as a function of the frequency to which the selected audio band-pass filter means (31A, 31B) is tuned.

7. Apparatus according to claim 4 wherein each demodulator means (27, 28) includes a plurality of filter means (29A, 29B) each individually connectable between said tuner means (5) and said IF means (15A, 15B) and each being tuned to a frequency f_p established by a respective television broadcast system; and said detecting means (32) further includes filter select means for sequentially connecting said filter means (29A, 29B) between said tuner means (5) and said IF means (15A, 15B) in said predetermined demodulator means (27, 28) and selecting the one filter means (29A, 29B) which results in the video IF signal having the largest detected level.

8. Apparatus according to claim 7 wherein each demodulator means (27, 28) further includes a plurality of audio band-pass filter means (31A, 31B), each individually connectable to said SIF means (23A, 23B) and each being tuned to a frequency established by a respective television broadcast system; and said detecting means (32) further includes sound filter select means for sequentially connecting said audio band-pass filter means (31A, 31B) to said SIF means (23A, 23B) in said predetermined demodulator means (27, 28) and selecting the one audio band-pass filter means (31A, 31B) which results in the sound IF signal having the largest detected level, and means for identifying the television broadcast system as a function of the frequency to which the selected audio band-pass filter means (31A, 31B) is tuned.

9. Apparatus according to claim 4 wherein each demodulator means (27, 28) includes: a plurality of filter means (29A, 29B) each individually connectable between the tuner means (5A, 5B) and the IF means (15A, 15B) of said demodulator means (27, 28) and each being tuned to a frequency established by a respective television broadcast system, and a plurality of audio band-pass filter means (31a, 31B) each individually connectable to the SIF means (23A, 23B) of said demodulator means (27, 28) and each being tuned to a frequency established by a respective television broadcast system; and wherein said retrieval means (26) includes selecting means for selecting a respective filter means (29A, 29B) and a respective audio band-pass filter means (31a, 31B) in each demodulator means (27, 28) in accordance with the television broadcast system identities retrieved from said memory means (33).

10. Apparatus according to claim 9 wherein said selecting means (26) includes manually operable read-out means (34) for reading out from said memory means (33) a respective television broadcast system identity

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for each demodulator means (27, 28).

11. Apparatus according to claim 1 wherein each demodulator means (27, 28) is operable to receive television signals broadcast by an inter-carrier television broadcast system.

12. Apparatus according to claim 1 wherein each demodulator means (27, 28) is operable to receive television signals broadcast by a split-carrier television broadcast system.

13. Apparatus according to claim 1 further including display means (9) for superimposing a television picture derived from one demodulator means (27, 28) on a television picture derived from another demodulator means (27, 28).

14. Apparatus according to claim 13 further comprising loudspeaker means (11) for producing audible sounds derived from the broadcast channel demodulated by said demodulator means (27, 28), and means for supplying to said loudspeaker means (11) audio signals recovered from a broadcast channel by a selected one of said demodulator means (27, 28).

15. Television receiving apparatus for receiving television signals broadcast over preselected broadcast channels by different television broadcast systems and including a plurality of demodulator means (27, 28) for demodulating video and audio signals from received television signals and for concurrently displaying television programmes broadcast by different television broadcast systems, said apparatus comprising :
microprocessor means (26) operative sequentially to select broadcast channels to be demodulated by at least one of said demodulator means (27, 28) to determine if television signals are being broadcast over each selected channel and, if so, to identify the television broadcast system associated with each channel over which television signals are being broadcast;
memory means (33) for storing indications of the respective broadcast channels over which television signals are determined to be broadcast and identities of the television broadcast systems associated with those broadcast channels;
parameter setting means included in each demodulator means (27, 28) for setting the operating parameters thereof compatible with a selected television broadcast system; and
read-out means for reading out from said memory means (33) and supplying to a selected demodulator means (27, 28) a broadcast channel indication and a television broadcast system identity to set the operating parameters of said selected demodulator means (27, 28) such that television signals broadcast over the read out broadcast channel are demodulated and displayed.

Patentansprüche

1. Fernsehempfangsgerät für den Empfang von Fernsehsignalen, die über vorgewählte Sendekanäle von verschiedenen Fernsehsendesystemen ausgesendet sind, und mit einer Vielzahl von Demodulatoreinrichtungen (27, 28) für die gleichzeitige Anzeige von Fernsehprogrammen, die von unterschiedlichen Fernsehsendesystemen ausgesendet sind, umfassend:
eine Verarbeitungseinrichtung (26) für die Auswahl eines durch zumindest eine der Demodulatoreinrichtungen (27,28) zu demodulierenden Sendekanals,
eine Detektoreinrichtung (32) zur Feststellung, ob Fernsehsignale über den ausgewählten Sendekanal gesendet werden, und in dem Fall, daß solche Signale gesendet werden, zur Bestimmung einer aus den betreffenden Fernsehsignalen abgeleiteten Tonträgerfrequenz für die Identifizierung des Fernsehsendesystems, welches dem genannten ausgewählten Sendekanal zugehörig ist und durch das die ermittelten Fernsehsignale gesendet sind, als Funktion der bestimmten Tonträgerfrequenz,
eine Speichereinrichtung (33) zur Speicherung einer Anzeige des ausgewählten Sendekanals und einer Identität des diesem zugehörigen Fernsehsendesystems,
eine Einrichtung zum Fortschalten der Verarbeitungseinrichtung (26) für die Auswahl eines weiteren Sendekanals, wobei eine Anzeige des betreffenden weiteren Sendekanals und die Identität eines dazugehörigen Fernsehsendesystems in der genannten Speichereinrichtung (33) gespeichert werden,
und eine Wiederauffindungseinrichtung (26) zum Wiederauffinden von Sendekanal-Anzeigen und der Identitäten der zugehörigen Fernsehsendesysteme aus der genannten Speichereinrichtung (33) und zum damit erfolgenden Steuern der Vielzahl von Demodulatoreinrichtungen (27,28) für die gleichzeitige Anzeige von Fernsehprogrammen, die über die wiederaufgefundenen Sendekanäle gesendet werden.

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2. Gerät nach Anspruch 1, wobei jede der Demodulatoreinrichtungen (27, 28) eine Abstimmeinrichtung (5A, 5B) umfaßt, die auf einen durch die Verarbeitungseinrichtung (26) ausgewählten Sendekanal abstimmbar ist.

3. Gerät nach Anspruch 2, wobei jede der Demodulatoreinrichtungen (27,28) ferner eine Zwischenfrequenz-(ZF)-Einrichtung (15A, 15B) umfaßt, die mit der Abstimmeinrichtung (5A, 5B) verbunden ist für die Erzeugung von Video-ZF-Signalen aus den Fernsehsignalen, die über den Kanal ausgesendet sind, auf den die Abstimmeinrichtung (5A, 5B) abgestimmt ist,
und wobei die Detektoreinrichtung (32) eine Pegelerfassungseinrichtung zur Ermittlung des Pegels der Video-ZF-Signale umfaßt, die durch eine bestimmte Demodulatoreinrichtung (27, 28) erzeugt sind, wobei der Kanal, auf den die Abstimmeinrichtung (5A, 5B) abgestimmt ist, als Funktion des Video-ZF-Signalpegels als ein Sendekanal ermittelt wird.

4. Gerät nach Anspruch 3, wobei jede Demodulatoreinrichtung (27, 28) ferner Ton-Zwischenfrequenz-Einrichtungen (23A, 23B) für die Erzeugung von Ton-Zwischenfrequenzsignalen aus den Fernsehsignalen umfaßt, die über den Kanal ausgesendet sind, auf den die Abstimmeinrichtung (5A, 5B) abgestimmt ist, und wobei die Detektoreinrichtung (32) zusätzlich eine Einrichtung zur Ermittlung des Pegels der durch die Ton-Zwischenfrequenz-Einrichtung (23A, 23B), die in der bestimmten Modulatoreinrichtung (27,28) enthalten ist, erzeugten Zwischenfrequenzsignale umfaßt,
wobei die Tonträgerfrequenz der Fernsehsignale, die über den Kanal ausgesendet sind, auf den die Abstimmeinrichtung (5) abgestimmt ist, als Funktion des Ton-Zwischenfrequenz-Signalpegels bestimmt ist.

5. Gerät nach Anspruch 4, wobei jede Demodulatoreinrichtung (27, 28) eine Vielzahl von Filtereinrichtungen (29A, 29B) aufweist, deren jede individuell zwischen der Abstimmeinrichtung (5A, 5B) und der genannten Zwischenfrequenzeinrichtung (15A, 15B) einschaltbar und auf eine Frequenz fp abgestimmt ist, die durch ein entsprechendes Fernsehsende-System bestimmt ist,
und wobei die genannte Detektoreinrichtung (32) ferner Filterauswahleinrichtungen umfaßt für die Auswahl einer der Vielzahl von Filtereinrichtungen (29A, 29B) in der genannten bestimmten Demodulatoreinrichtung (27, 28) als Funktion des ausgewählten Sendekanals.

6. Gerät nach Anspruch 5, wobei jede Demodulatoreinrichtung (27, 28) ferner eine Vielzahl von Audio-Bandpaßfiltereinrichtungen (31A, 31B) umfaßt, deren jede individuell mit der Ton-Zwischenfrequenzeinrichtung (23A, 23B) verbindbar und auf eine Frequenz abgestimmt ist, die durch ein entsprechendes Fernsehsendesystem bestimmt ist,
und wobei die genannte Detektoreinrichtung (32) ferner Tonfilter-Auswahleinrichtungen für die sequentielle Verbindung der genannten Audio-Bandpaßfiltereinrichtungen (31A, 31B) mit der genannten Ton-Zwischenfrequenzeinrichtung (23A, 23B) in der genannten bestimmten Demodulatoreinrichtung (27, 28) und für die Auswahl der einen Audio-Bandpaßfiltereinrichtung (31A, 31B), die das Ton-Zwischenfrequenzsignal mit dem größten ermittelten Pegel liefert,
und Einrichtungen umfaßt für die Identifizierung des Fernsehsendesystems als Funktion der Frequenz, auf die die ausgewählte Audio-Bandpaßfiltereinrichtung (31A, 31B) abgestimmt ist.

7. Gerät nach Anspruch 4, wobei jede Demodulatoreinrichtung (27, 28) eine Vielzahl von Filtereinrichtungen (29A, 29B) umfaßt, deren jede individuell zwischen der genannten Abstimmeinrichtung (5) und der genannten Zwischenfrequenzeinrichtung (15A, 15B) einschaltbar und auf eine Frequenz fp abgestimmt ist, die durch ein entsprechendes Fernsehsendesystem bestimmt ist,
und wobei die genannte Detektoreinrichtung (32) ferner Filterauswahleinrichtungen umfaßt für den sequentiellen Anschluß der genannten Filtereinrichtungen (29A, 29B) zwischen der Abstimmeinrichtung (5) und der Zwischenfrequenzeinrichtung (15A, 15B) in der bestimmten Demodulatoreinrichtung (27, 28) und für die Auswahl der einen Filtereinrichtung (29A, 29B), die zu dem Video-Zwischenfrequenzsignal mit dem größten ermittelten Pegel führt.

8. Gerät nach Anspruch 7, wobei jede Demodulatoreinrichtung (27, 28) ferner eine Vielzahl von Audio-Bandpaßfiltereinrichtungen (31A, 31B) aufweist, deren jede mit der Ton-Zwischenfrequenzeinrichtung (23A, 23B) individuell verbindbar und auf eine Frequenz abgestimmt ist, die durch ein entsprechendes Fernsehsendesystem bestimmt ist,
und wobei die genannte Detektoreinrichtung (32) ferner eine Tonfilter-Auswahleinrichtung für die sequentielle Verbindung der betreffenden Audio-Bandpaßfiltereinrichtung (31A, 31B) mit der genannten Ton-Zwischenfrequenzeinrichtung (23A, 23B) in der genannten bestimmten Demodulatoreinrichtung (27, 28) und

für die Auswahl der einen Audio-Bandpaßfiltereinrichtung (31A, 31B), die zu dem Ton-Zwischenfrequenzsignal mit dem höchsten ermittelten Pegel führt, und eine Einrichtung umfaßt zur Identifizierung des Fernsehsendesystems als Funktion der Frequenz, auf die die ausgewählte Audio-Bandpaßfiltereinrichtung (31A, 31B) abgestimmt ist.

9. Gerät nach Anspruch 4, wobei jede Demodulatoreinrichtung (27, 28) eine Vielzahl von Filtereinrichtungen (29A, 29B), deren jede individuell zwischen der Abstimmeinrichtung (5A, 5B) und der Zwischenfrequenzeinrichtung (15A, 15B) der Demodulatoreinrichtung (27, 28) einschaltbar und auf eine Frequenz abgestimmt ist, die durch ein entsprechendes Fernsehsendesystem bestimmt ist,
und eine Vielzahl von Audio-Bandpaßfiltereinrichtungen (31a, 31B) umfaßt, deren jede individuell mit der Ton-Zwischenfrequenzeinrichtung (23A, 23B) der genannten Demodulatoreinrichtung (27, 28) verbindbar und auf eine Frequenz abgestimmt ist, die durch ein entsprechendes Fernsehsendesystem bestimmt ist, und wobei die genannte Wiederauffindungseinrichtung (26) eine Auswahleinrichtung umfaßt für die Auswahl einer entsprechenden Filtereinrichtung (29A, 29B) und einer entsprechenden Audio-Bandpaßfiltereinrichtung (31a, 31B) in der jeweiligen Demodulatoreinrichtung (27, 28) in Übereinstimmung mit den Fernsehsendesystem-Identitäten, die aus der genannten Speichereinrichtung (33) wiederaufgefunden sind.

10. Gerät nach Anspruch 9, wobei die Auswahleinrichtung (26) eine manuell betreibbare Leseeinrichtung (34) zum Auslesen einer entsprechenden Fernsehsendesystem-Identität für die jeweilige Demodulatoreinrichtung (27, 28) aus der genannten Speichereinrichtung (33) umfaßt.

11. Gerät nach Anspruch 1, wobei jede Demodulatoreinrichtung (27, 28) derart betreibbar ist, daß Fernsehsignale empfangen werden, die von einem Differenzträger-Fernsehsendesystem (Intercarrier-System) gesendet sind.

12. Gerät nach Anspruch 1, wobei jede Demodulatoreinrichtung (27, 28) derart betreibbar ist, daß Fernsehsignale empfangen werden, die von einem Fernsehsendesystem mit getrennten Trägern (Splitcarrier-System) gesendet sind.

13. Gerät nach Anspruch 1, umfassend ferner eine Anzeigeeinrichtung (9) zum Überlagern eines von einer Demodulatoreinrichtung (27, 28) gewonnenen Fernsehbildes über ein Fernsehbild, welches von einer weiteren Demodulatoreinrichtung (27, 28) gewonnen ist.

14. Gerät nach Anspruch 13, umfassend ferner eine Lautsprechereinrichtung (11) für die Wiedergabe von hörbaren Tönen, die aus dem Sendekanal gewonnen sind, der durch die genannte Demodulatoreinrichtung (27, 28) demoduliert ist,
und Einrichtungen zur Lieferung von Audiosignalen aus einem von einer ausgewählten Demodulatoreinrichtung der Demodulatoreinrichtungen (27, 28) wiedergewonnenen Sendekanal an die genannte Lautsprechereinrichtung (11).

15. Fernsehempfangsgerät für den Empfang von Fernsehsignalen, die über vorgewählte Sendekanäle von unterschiedlichen Fernsehsendesystemen ausgesendet sind, und mit einer Vielzahl von Demodulatoreinrichtungen (27, 28) zur Demodulation von Video- und Audiosignalen aus den empfangenen Fernsehsignalen und zur gleichzeitigen Anzeige von Fernsehprogrammen, die von unterschiedlichen Fernsehsendesystemen ausgesendet sind, umfassend:
eine Mikroprozessoreinrichtung (26), die so betrieben ist, daß sie sequentiell durch zumindest eine der Demodulatoreinrichtungen (27, 28) zu demodulierende Sendekanäle auswählt zur Bestimmung, ob Fernsehsignale über den jeweils ausgewählten Kanal gesendet werden, und in dem Fall, daß solche Signale ausgesendet werden, zur Identifizierung des dem jeweiligen Kanal, über den die Fernsehsignale gesendet sind, zugehörigen Fernsehsendesystems,
eine Speichereinrichtung (33) zur Speicherung von Anzeigen der entsprechenden Sendekanäle, über die Fernsehsignale als gesendet bestimmt sind, und von Identitäten der Fernsehsendesysteme, die jenen Sendekanälen zugehörig sind, Parameter-Einstelleinrichtungen, die in jeder Demodulatoreinrichtung (27, 28) enthalten sind für die Einstellung der mit einem ausgewählten Fernsehsendesystem kompatiblen Betriebsparameter der betreffenden Demodulatoreinrichtung, und Leseeinrichtungen zum Auslesen einer Sendekanal-Anzeige und einer Fernsehsendesystem-Identität aus der betreffenden Speichereinrichtung (33) und zur Abgabe an eine ausgewählte Demodulatoreinrichtung (27, 28) für die Einstellung der Betriebsparameter der betreffenden ausgewählten Demodulatoreinrichtung (27, 28), derart, daß die Fern-

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sehsignale, die über den ausgelesenen Sendekanal gesendet sind, demoduliert und angezeigt werden.

Revendications

1. Appareil récepteur de télévision pour recevoir des signaux de télévision diffusés sur des canaux de diffusion présélectionnés par des procédés de diffusion de télévision différents et comportant une pluralité de moyens formant des démodulateurs (27, 28) pour afficher en même temps des programmes de télévision diffusés par des procédés de diffusion de télévision différents, l'appareil comprenant:
   - des moyens formant processeur (26) pour sélectionner un canal de diffusion à démoduler par au moins un desdits moyens formant des démodulateurs (27, 28);
   - des moyens de détection (32) pour détecter si des signaux de télévision sont diffusés sur le canal de diffusion sélectionné et, si c'est le cas, déterminer une fréquence porteuse son obtenue à partir desdits signaux de télévision pour identifier, en fonction de la fréquence porteuse son déterminée, le procédé de diffusion de télévision associé audit canal de diffusion sélectionné et par lequel lesdits signaux de télévision détectés sont diffusés;
   - des moyens formant mémoire (33) pour mémoriser une indication du canal de diffusion sélectionné et une identité du procédé de diffusion de télévision associé à celui-ci;
   - des moyens pour faire avancer lesdits moyens formant processeur (26) pour sélectionner un autre canal de diffusion , ce par quoi une indication dudit autre canal de diffusion et l'identité d'un procédé de diffusion de télévision associé à celui-ci sont mémorisées dans lesdits moyens formant mémoire (33); et
   - des moyens d'extraction (26) pour extraire desdits moyens formant mémoire (33) des indications de canaux de diffusion et les identités des procédés de diffusion de télévision associés et pour commander ladite pluralité de moyens formant des démodulateurs (27, 28) avec celles-ci pour afficher en même temps des programmes de télévision diffusés sur lesdits canaux de diffusion extraits.

2. Appareil selon la revendication 1, dans lequel chacun desdits moyens formant des démodulateurs (27, 28) comporte des moyens formant syntoniseur (5A, 5B) accordables sur un canal de diffusion selectionné par lesdits moyens formant processeur (26).

3. Appareil selon la revendication 2, dans lequel chacun desdits moyens formant démodulateur (27, 28) comprend en outre des moyens (15A, 15B) à fréquence intermédiaire (FI) reliés auxdits moyens formant syntoniseur (5A, 5B) pour produire des signaux FI vidéo à partir des signaux de télévision diffusés sur le canal sur lequel lesdits moyens formant syntoniseur (5A, 5B) sont accordés; et lesdits moyens de détection (32) comprennent des moyens de détection de niveau pour détecter le niveau des signaux FI vidéo produits par des moyens prédéterminés formant démodulateur (27, 28), ce par quoi le canal sur lequel lesdits moyens formant syntoniseur (5A, 5B) sont accordés est détecté comme étant un canal de diffusion en fonction du niveau du signal FI vidéo.

4. Appareil selon la revendication 3, dans lequel chaque moyen formant démodulateur (27, 28) comprend en outre des moyens à fréquence intermédiaire son (23A, 23B) pour produire des signaux à fréquence intermédiaire (FI) à partir des signaux de télévision diffusés sur le canal sur lequel lesdits moyens formant syntoniseur (5A, 5B) sont accordés; et lesdits moyens de détection (32) comprennent en outre des moyens pour détecter le niveau des signaux à fréquence intermédiaire produits par les moyens SIF (23A, 23B) compris dans lesdits moyens prédéterminés formant démodulateur (27, 28), ce par quoi la fréquence de la porteuse son des signaux de télévision diffusés sur ledit canal sur lequel lesdits moyens formant syntoniseur (5) sont accordés est déterminée d'après le niveau du signal son à fréquence intermédiaire.

5. Appareil selon la revendication 4, dans lequel chaque moyen formant démodulateur (27, 28) comprend une pluralité de moyens formant des filtres (29A, 29B), chacun connectable individuellement entre lesdits moyens formant syntoniseur (5A, 5B) et lesdits moyens à fréquence intermédiaire (15A, 15B) et chacun étant accordé sur une fréquence f_p établie par un procédé respectif de diffusion de télévision; et lesdits moyens de détection (32) comportent également des moyens de sélection de filtre pour sélectionner un moyen parmi ladite pluralité de moyens formant des filtres (29A, 29B) dans lesdits moyens prédéterminés formant démodulateur (27, 28) en fonction du canal de diffusion sélectionné.

6. Appareil selon la revendication 5, dans lequel chaque moyen formant démodulateur (27, 28) comprend

en outre une pluralité de moyens formant des filtres passe-bande audio (31A, 31B), chacun connectable individuellement auxdits moyens à fréquence intermédiaire son (23A, 23B) et chacun étant accordé sur une fréquence établie par un procédé de diffusion de télévision respectif; et lesdits moyens de détection (32) comprennent en outre des moyens de sélection de filtres pour connecter séquentiellement lesdits moyens formant des filtres passe-bande audio (31A, 31B) auxdits moyens à fréquence intermédiaire son (23A, 23B) dans lesdits moyens prédéterminés formant des démodulateurs (27, 28) et sélectionner le moyen formant filtre passe-bande audio (31A, 31B) qui produit le signal à fréquence intermédiaire son ayant le niveau détecté le plus élevé, et des moyens pour identifier le procédé de diffusion de télévision en fonction de la fréquence sur laquelle les moyens sélectionnés formant filtre passe-bande audio (31A, 31B) sont accordés.

7. Appareil selon la revendication 4, dans lequel chaque moyen formant démodulateur (27, 28) comporte une pluralité de moyens formant des filtres (29A, 29B), chacun connectable individuellement entre lesdits moyens formant syntoniseur (5) et lesdits moyens à fréquence intermédiaire (15A, 15B) et chacun étant accordé sur une fréquence f_p établie par un procédé respectif de diffusion de télévision, et lesdits moyens de détection (32) comprennent en outre des moyens de sélection de filtres pour connecter séquentiellement lesdits moyens formant des filtres (29A, 29B) entre lesdits moyens formant syntoniseur (5) et lesdits moyens à fréquence intermédiaire (15A, 15B) dans lesdits moyens prédéterminés formant des démodulateurs (27, 28) et sélectionner le moyen formant filtre (29A, 29B) qui a pour résultat le signal à fréquence intermédiaire ayant le niveau détecté le plus élevé.

8. Appareil selon la revendication 7, dans lequel chaque moyen formant démodulateur (27, 28) comprend en outre une pluralité de moyens formant des filtres passe-bande audio (31A, 31B), chacun connectable individuellement auxdits moyens à fréquence intermédiaire son (23A, 23B) et chacun étant accordé sur une fréquence établie par un procédé respectif de diffusion de télévision; et lesdits moyens de détection (32) comprennent en outre des moyens de sélection de filtres audio pour connecter séquentiellement lesdits moyens formant des filtres passe-bande audio (31A, 31B) auxdits moyens à fréquence intermédiaire son (23A, 23B) dans lesdits moyens prédéterminés formant démodulateur (27, 28) et sélectionner le moyen formant filtre passe-bande audio (31A, 31B) qui a pour résultat le signal son à fréquence intermédiaire ayant le niveau le plus élevé, et des moyens pour identifier le procédé de diffusion de télévision en fonction de la fréquence sur laquelle les moyens formant des filtres passe-bande audio (31A, 31B) sont accordés.

9. Appareil selon la revendication 4, dans lequel chaque moyen formant démodulateur (27, 28) comprend une plusralité de moyens formant des filtres (29A, 29B), chacun connectable individuellement entre les moyens formant syntoniseur (5A, 5B) et les moyens à fréquence intermédiaire (15A, 15B) desdits moyens formant des démodulateurs (27, 28) et chacun étant accordé sur une fréquence établie par un procédé de diffusion de télévision respectif, et une pluralité de moyens formant des filtres passe-bande audio (31A, 31B), chacun connectable individuellement aux moyens à fréquence intermédiaire son (23A, 23B) desdits moyens formant des démodulateurs (27, 28), et chacun étant accordé sur une fréquence établie par un procédé respectif de diffusion de télévision; et dans lequel lesdits moyens d'extraction (26) comportent des moyens de sélection pour sélectionner un moyen respectif formant filtre (29A, 29B) et un moyen respectif formant filtre passe-bande audio (31A, 31B) dans chaque moyen formant démodulateur (27, 28) selon les identités des procédés de diffusion de télévision extraites desdits moyens formant mémoire (33).

10. Appareil selon la revendication (9), dans lequel lesdits moyens de sélection (26) comportent des moyens de lecture à commande manuelle (34) pour lire dans lesdits moyens formant mémoire une identité respective de procédé de diffusion de télévision pour chaque moyen formant démodulateur (27, 28).

11. Appareil selon la revendication 1, dans lequel chaque moyen formant démodulateur (27, 28) fonctionne pour recevoir des signaux de télévision diffusés par un procédé de diffusion de télévision du type interporteuse.

12. Appareil selon la revendication 1, dans lequel chaque moyen démodulateur (27, 28) fonctionne pour recevoir des signaux de télévision diffusés par un procédé de diffusion de télévision à porteuses séparées.

13. Appareil selon la revendication 1, comprenant en outre des moyens d'affichage (9) pour superposer une image de télévision obtenue à partir d'un moyen formant démodulateur (27, 28) sur une image de télévi-

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sion obtenue à partir d'un autre moyen formant démodulateur (27, 28).

14. Appareil selon la revendication 13, comprenant en outre des moyens formant haut-parleur (11) pour produire des sons audibles obtenus à partir du canal de diffusion démodulé par lesdits moyens formant démodulateur (27, 28) et des moyens pour fournir auxdits moyens formant haut-parleur (11) des signaux audio extrait d'un canal de diffusion par un moyen sélectionné parmi lesdits moyens formant des démodulateurs (27, 28).

15. Appareil récepteur de télévision pour recevoir des signaux de télévision diffusés sur des canaux de diffusion présélectionnés par des procédés de diffusion de télévision différents et comportant une pluralité de moyens formant des démodulateurs (27, 28) pour démoduler des signaux vidéo et audio à partir de signaux de télévision reçus et pour afficher simultanément des programmes de télévision diffusés par des procédés de diffusion de télévision différents, ledit appareil comprenant:
    - des moyens formant microprocesseur (26) fonctionnant séquentiellement pour sélectionner des canaux de diffusion à démoduler par au moins un desdits moyens formant des démodulateurs (27, 28) pour déterminer si des signaux de télévision sont diffusés sur chaque canal sélectionné et, si c'est le cas, pour identifier le procédé de diffusion de télévision associé à chaque canal sur lequel des signaux de télévision sont diffusés;
    - des moyens formant mémoire (33) pour mémoriser des indications des canaux de diffusion respectifs sur lesquels des signaux de télévision sont déterminés comme étant diffusés et des identités des procédés de diffusion de télévision associés à ces canaux de diffusion;
    - des moyens de réglage de paramètres compris dans chaque moyen formant démodulateur (27, 28) pour régler les paramètres de fonctionnement de celui-ci de telle manière qu'ils soient compatibles avec un procédé de diffusion de télévision sélectionné; et
    - des moyens de lecture pour lire dans lesdits moyens formant mémoire (33) et fournir à un moyen sélectionné formant démodulateur (27, 28) une indication de canal de diffusion et une identité de procédé de diffusion de télévision pour régler les paramètres de fonctionnement dudit moyen sélectionné formant démodulateur (27, 28) de telle manière que les signaux de télévision diffusés sur le canal de diffusion lu soient démodulés et affichés.