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APPARATUS FOR TRANSMITTING/RECEIVING GHOST-CANCELING REFERENCE SIGNAL IN PAL TV

Background of the Invention

The present invention relates to a PAL TV that are mostly used in Europe, China and East Asia, and more particularly, to an apparatus for transmitting/receiving a ghost canceling reference (GCR) signal in PAL TV.

According to characteristics of the transmitting channel of a TV, a signal received at the receiving port contains a ghost produced by a signal transmitted to the transmitting port.

The ghost causes bad effects on picture quality. For this reason, NTSC TV cancels it at the receiving port, using a ternary sequence GCR signal with high energy and correlation gain which is transmitted at the transmitting port to a vertical blanking interval (VBI) of a TV signal.

However, the conventional ghost canceling apparatus is used only for the NTSC mode in canceling the ghost. The PAL mode does not transmit the GCR signal so that it is hard to cancel the ghost in a TV receiver of PAL mode.

Summary of the Invention

According to the present invention, there is provided an apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV, said apparatus comprising:

transmitting means for loading a ternary sequence ghost canceling reference signal on a certain line of a broadcasting signal and thereby transmitting the loading result; and

receiving means for canceling a ghost produced by characteristics of a transmitting channel using said ternary sequence ghost canceling reference signal transmitted from said transmitting means.

The ternary sequence ghost cancelling reference signal may be attained by making a ternary sequence pass through a low-pass filter and then amplitude-scaled in an amplitude scaling portion.

The ternary sequence may be 366-long.

The low-pass filter's cut-off frequency may be 5MHz in PAL B&G mode, and may be 6MHz in PAL D&K mode.

The ternary sequence ghost-canceling reference signal may be loaded within a vertical blanking interval of every even field.

The transmitting means may transmit said ternary sequence ghost-canceling reference signal upon inverting it for every frame.

The ternary sequence ghost-canceling reference signal may transmit a ghost-canceling reference signal of positive polarity in second and sixth fields and a ghost-canceling reference signal of negative polarity in fourth and eighth fields.

According to another aspect of the invention, there is provided an apparatus for transmitting a ghost-canceling reference signal in a PAL TV, said apparatus comprising:

a ghost-canceling reference signal generating portion for detecting vertical and horizontal sync signals from a broadcasting signal, catching a certain line on which a ternary sequence ghost-canceling reference signal will be loaded, from the broadcasting signal, and finally loading the ternary sequence ghost-canceling reference signal on said certain line caught; and

a ghost-canceling reference signal inserting portion for, only in said certain

line caught, selecting said ternary sequence ghost-canceling reference signal produced from said ghost-canceling reference signal generating portion, in other lines, said portion selecting and transmitting said broadcasting signal.

The ghost-canceling reference signal generating portion may be comprised of:

a ROM for storing said ternary sequence ghost-canceling reference signal of positive and negative polarities;

a counter for controlling the output of said ROM;

a digital/analog converter for converting said ROM's output signal into an analog signal;

a sync detector for detecting vertical and horizontal sync signals from said broadcasting signal; and

a controller for detecting a certain line where a ghost-canceling signal will be loaded, from the output of said sync detector, to thereby output a switching control signal of said ghost-canceling reference signal inserting portion.

The ghost-canceling reference signal generating portion may also be comprised of:

a ROM for storing said ternary sequence ghost-canceling reference signal of positive and negative polarities;

a counter for controlling the output of said ROM;

a digital/analog converter for converting said ROM's output signal into an analog signal;

a sync detector for detecting vertical and horizontal sync signals from said broadcasting signal; and

a certain line detector for detecting a certain line where said ternary sequence ghost-canceling reference signal will be loaded, from the output of said sync detector, to thereby output a switching control signal of said ghost-canceling reference signal inserting portion.

The ghost-canceling reference signal generating portion may also be comprised of :

a ROM for storing said ternary sequence ghost-canceling reference signal of positive and negative polarities;

a counter for controlling the output of said ROM;

a digital/analog converter for converting said ROM's output signal into an analog signal;

a -1 multiplier for selectively inverting the output of said digital/analog converter;

a sync detector for detecting vertical and horizontal sync signals from said

broadcasting signal; and

a controller for detecting a certain line where said ternary sequence ghost-canceling reference signal will be loaded, from the output of said sync detector, to thereby output a multiplication control signal of said -1 multiplier and a switching control signal.

The ghost-canceling reference signal inserting portion may be comprised of a multiplexer for selectively outputting the output of said digital/analog converter or said broadcasting signal according to a switching control signal of said controller.

According to a further aspect of the invention, there is provided an apparatus for receiving a ghost-canceling reference signal in a PAL TV, said apparatus comprising:

a sync separator for separating a sync signal from a baseband broadcasting signal input;

a ghost-canceling reference signal storage for storing the same ternary sequence ghost-canceling reference signal as that transmitted from said transmitting means;

a digital filter for canceling a ghost produced due to characteristics of a transmitting channel from said baseband broadcasting signal input; and

an operating portion for catching a line where said ternary sequence ghost-canceling reference signal is loaded, from the output of said sync separator, thereby attaining said ternary sequence ghost-canceling reference signal, and then comparing it with a signal of said ghost-canceling reference signal storage, to thereby obtain a coefficient of said digital filter.

Preferably, the operating portion catches a line for every even field where said ternary sequence ghost-canceling reference signal is loaded, using said sync signal separated from said sync separator, attains a ghost-canceling reference signal by performing subtractions by a predetermined number, and then compares said ghost-canceling reference signal with the signal of said ghost-canceling reference signal storage, to thereby obtain a coefficient of said digital filter needed in canceling a ghost produced due to characteristics of a transmitting channel.

The subtraction may be made in groups by 8, 16, or 32 fields.

Preferably, said digital filter is comprised of:

a finite impulse response filter for canceling a close-in ghost; and

an infinite impulse response filter for canceling a long ghost.

The receiving means may further comprise:

an analog/digital converter for converting said baseband broadcasting signal input into a digital signal, and outputting it to said digital filter and operating portion; and

a digital/analog converter for converting the output of said digital filter into an analog signal.

Brief Description of the Attached Drawings

In order that the invention might be more fully understood, embodiments of the invention will be described by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a block diagram of a ghost canceling reference signal transmitting apparatus according to an embodiment of the present invention;

FIGS. 2A, 2B and 2C are detailed block diagrams of FIG 1;

FIG. 3 is a diagram showing a ternary sequence applied to an embodiment of the present invention;

FIG. 4 is a frequency characteristic diagram of a low-pass filter (LPF) applied

to an embodiment of the present invention;

FIGS. 5A-5D show ghost canceling reference signal waveforms of positive and negative polarities attained by an embodiment of the present invention in PAL B&G and PAL D&K modes;

FIG. 6 is a block diagram of an embodiment of the present invention to produce the ghost canceling reference signal;

FIG. 7 is a waveform of an embodiment of the present invention to explain the transmitting sequence of the ghost canceling reference signal;

FIG. 8 is a block diagram showing a ghost canceling reference signal receiving apparatus of an embodiment of the present invention;

FIG. 9 is a waveform diagram to explain the operation of the operating part shown in FIG. 8 ;

FIG. 10 is a diagram which shows one example of a finite impulse response filter (FIR filter) related to the digital filter of FIG 8; and

FIGS. 11A-11E are waveform diagrams to explain the operation of the FIR filter of FIG 10.

Detailed Description of Preferred Embodiments

Preferred embodiments of the apparatus for transmitting/receiving ghost-canceling reference signal of the present invention are described in detail hereinafter, by way of example only, with reference to the attached drawings.

Referring to FIG. 1, the apparatus for transmitting/receiving ghost-canceling reference signal is comprised of a GCR signal generating portion 10 and GCR signal inserting portion 20. GCR signal generating portion 10 detects vertical and horizontal sync signals Vsync and Hsync from a broadcasting signal, catches a certain line on which a ternary sequence GCR signal will be loaded, from the broadcasting signal, and finally loads the waveform of the ternary sequence GCR signal on the certain line caught. The GCR signal inserting portion 20 selects the ternary sequence GCR signal produced from the GCR signal generating portion 10, only in the certain caught line, and selects and outputs a program to be broadcast in other lines.

As shown in FIG. 2A, GCR signal generating portion 10 is composed of a read only memory (ROM) 11 for storing the ternary sequence GCR signal of positive and negative polarities, a counter 12 for controlling the output of ROM 11, a digital/analog converter 13 for converting ROM 11's output signal into an analog signal, a sync detector 14 for detecting vertical and horizontal sync signals Vsync and Hsync from a broadcasting program signal, and a controller 15 for detecting a certain

line where the ternary sequence GCR signal is loaded, from the output of sync detector 14, to thereby output a switching controlling signal S1.

Ghost canceling signal inserting portion 20 is composed of a 2:1 multiplexer or an analog switch which selectively outputs the output of digital/analog converter 13 or the output of the broadcasting program according to switching control signal S1 of controller 15.

As shown in FIG. 3, the ghost canceling reference signal transmitting apparatus of the present invention composed as above, produces a 494-long ternary sequence GCR signal from a 366-long ternary sequence, using a low-pass filter having frequency characteristics of FIG. 4.

The original length of the ternary sequence is 183. However, this length becomes 366 by inserting 0 for every sample so that interference between symbols is reduced. The full line of FIG. 4 is indicated to produce a PAL B&G (for European) GCR signal whose cut-off frequency is 5MHz, whereas the dotted line is to produce a PAL D&K (for Chinese) GCR signal whose cut-off frequency is 6MHz.

FIG. 5 shows the ternary sequence GCR signal of positive and negative polarities attained using the ternary sequence of FIG. 3 and the low-pass filter having frequency characteristics of FIG. 4. FIGS. 5A and 5B show GCR signal waveforms of positive and negative polarities for PAL B&G, respectively, FIGS. 5C and 5D showing GCR signal waveforms of positive and negative polarities for PAL D&K,

respectively.

FIGS. 5A-5D are signal waveforms attained by amplitude-scaling the ternary sequence GCR signal passing through the low-pass filter with characteristics of FIG. 4.

That is, the ternary sequence GCR signal to be used in the present embodiment is converted into signal waveforms like FIGS. 5A-5D through low-pass filter 31 with frequency characteristics of FIG. 4 and through amplitude scaling portion 32 which amplitude-scales the output of low-pass filter 31, as shown in FIG. 6.

The ternary sequence GCR signal attained by the ternary sequence passing through low-pass filter 31 and amplitude scaling portion 32 as above is stored in ROM 11 shown in FIG. 2A, 2B or 2C. The output of ROM 11 is output as an analog signal sequentially through digital/analog converter 13 according to a counter 12.

From vertical and horizontal sync signals Vsync and Hsync detected from sync detector 14, controller 15 senses a certain line on which the ternary sequence GCR signal will be loaded to thereby control switching of the multiplexer of GCR signal inserting portion 20. In this state, the ternary sequence GCR signal is inserted into a certain line of a broadcasting program, and transmitted through a transmitting port.

The ternary sequence GCR signal is transmitted by an 8 field transmitting sequence as shown in Table 1 below (since one period of signal is eight fields in the PAL TV, whereas the period is four fields in the NTSC TV). The GCR signal is

loaded on one certain line (line 318, for example) of VBI of every even field because the waveforms within the VBI of even and odd fields are different in the PAL TV.

TABLE 1.

FIELD NUMBER	2	4	6	8
GCR SIGNAL POLARITY	+	-	+	–

As shown in Table 1, from second and sixth fields, the GCR signal of positive polarity (+) is sent. From the fourth and eighth fields, the GCR signal of negative polarity (-) is sent. That is, the polarity of the GCR signal is inverted for every frame, to improve its signal-to-noise (S/N) ratio and also cancel a sync and color burst at the receiving port. As a result, only the GCR signal is obtained.

For example, the polarity of the GCR signal becomes different in transmitting signals of the second field F2 and fourth field F4, as shown in FIG. 7 so that the sync and color burst are canceled and the amplitude of the GCR signal is doubled by subtracting the signals of the second and fourth fields. This finally improves the S/N ratio.

Here, parameters concerned will be given in Table 2 below, and the period between samples is a reciprocal ($1/4f_{sc}$) of 4 times ($4f_{sc}$) a color subcarrier frequency.

TABLE 2.

PAL TV	B & G	D & K
GCR SIGNAL HIGHEST FREQUENCY	5MHz	6MHz
PEDESTAL HEIGHT	350mV	350mV
PEDESTAL STARTING POINT	177th SAMPLE	177th SAMPLE
PEDESTAL ENDING POINT	1100th SAMPLE	1100th SAMPLE
GCR SIGNAL STARTING POINT	213th SAMPLE	213th SAMPLE
GCR SIGNAL LENGTH	494 SAMPLES	494 SAMPLES
GCR SIGNAL LOWEST LEVEL	0mV	0mV
GCR SIGNAL HIGHEST LEVEL	700mV	700mV

Meanwhile, FIG. 2B shows another embodiment of GCR signal generating portion 10 which is comprised of a read only memory (ROM) 11 for storing the GCR signal of positive and negative polarities, a counter 12 for controlling the output of ROM 11, a digital/analog converter 13 for converting ROM 11's output signal to an analog, a sync detector 14 for detecting vertical and horizontal signals Vsync and

Hsync from the broadcasting program signal, and a certain line detector 16 for outputting switching controlling signal S1 by detecting a certain line on which the ternary sequence GCR signal is to be loaded, from the output of sync detector 14. However, the operation of this embodiment is the same as that of the first embodiment so that the effects concerned will be omitted.

Furthermore, still another embodiment of GCR signal generating portion 10 is shown in FIG. 2C, which attains the GCR signal of positive and negative polarities by storing only the GCR signal of positive and negative polarities in ROM 11 and additionally providing a -1 multiplier 17 at the output port of digital/analog converter 13 for multiplying -1. The -1 multiplier inverts the output of ROM 11. In this case, the capacity of ROM 11 can be reduced.

Controller 15 should be constructed to control the multiplying operation of multiplier 17. For example, in case that only the GCR signal of positive polarity is stored in ROM 11, in order to attain the GCR signal of negative polarity, it must be multiplied by -1 in multiplier 17. In order to output the GCR signal of positive polarity, it must not be multiplied by -1 in multiplier 17.

FIG. 8 shows a block diagram of the receiving block of the PAL TV ghost-canceling reference signal transmitting/receiving apparatus of the present invention, which is composed of an analog/digital converter 41 for converting a baseband broadcasting signal input into a digital signal, a sync separator 42 for separating its

sync signal from the baseband broadcasting signal input, a GCR signal storage 43 where the same GCR signal is stored as that stored in ROM 11 of the transmitting block, a digital filter 44 for canceling the ghost of the output of analog/digital converter 41 produced due to characteristics of the transmitting channel, an operating portion 45 for catching a line on which the GCR signal is loaded, from the output of sync separator 42, and subtracting as many as a predetermined number to thereby attain the GCR signal free from its sync signal and color burst and with an S/N ratio improved as well, and

finally comparing the resultant GCR signal with the signal of GCR signal storage 43 to obtain a filter coefficient of digital filter 44 needed in canceling the ghost produced due to characteristics of the transmitting channel, and a digital/analog converter 46 for converting the output of digital filter 44 into an analog signal. The GCR signal receiving apparatus composed as above may be put into a TV or VCR, or may be used independently.

The digital filter 44 is composed of a finite impulse response (FIR) and an infinite impulse response (IIR).

In a ghost canceling reference signal receiving apparatus composed as above, analog/digital converter 41 converts, into a digital signal, an analog signal input as a baseband signal into which the GCR signal transmitted from a broadcasting station as stated before is converted via a tuner and intermediate frequency demodulating port

(not shown). The converted digital signal is output to a digital filter 44.

The sync separator 42 separates a sync signal from the baseband broadcasting signal input to thereby output a separated sync signal to operating portion 45. Sequentially, operating portion 45 catches a line on which the ternary sequence GCR signal is put, using the sync signal attained from sync separator 42 and subtracts by a predetermined number to thereby attain a GCR signal with its sync signal and color burst canceled and an S/N ratio improved.

The operating portion 45 performs subtraction in groups by 8, 16 or 32 fields because the characteristics of the transmitting channel may be changed over time when too many fields are subtracted. For example, if field 4 (F4) is subtracted from field 2 (F2), in other words, when the average is taken by subtracting them, only a GCR signal free from sync signal and color burst is produced as shown in FIG 9. This GCR signal includes ghost signal (a) produced by the characteristics of the transmitting channel.

A ghost signal a remaining after subtraction in operating portion 45 is canceled by digital filter 44. Speaking in more detail, a ghost signal (a) is canceled upon comparing the GCR signal attained by subtraction in operating portion 45 with that stored in GCR signal storage 50, thereby non-real-time obtaining a coefficient of digital filter 44 needed in canceling the ghost produced due to characteristics of a transmitting channel, and then applying the coefficient to digital filter 44.

Therefore, in digital filter 44, its FIR filter cancels close-in ghost produced near the original ternary sequence GCR signal transmitted from the transmitting port, and the IIR filter cancels long ghost produced relatively far away, compared with the ghost canceling signal transmitted from the transmitting port. As a result, the ghost produced due to the characteristics of the transmitting channel is completely canceled.

When explaining this procedure with reference to FIGS. 10, and 11A-11E, upon the FIR filter being configured as shown in FIG. 10 by the FIR filter coefficient attained from operating portion 45, a signal shown in FIG. 11B is obtained by letting the signal, which is attained through the aforementioned subtraction and shown in FIG. 11A, pass through a delay (Z^{-10}) and then a -0.1 multiplier.

When the signal of FIG. 11B is added to the signal that is originally input to the delay (Z^{-10}), a signal like FIG. 11C is attained to cancel, as a result, a ghost produced due to the characteristics of the transmitting channel. However, in this case, a secondary ghost b is produced.

When the signal of FIG. 11C is added to a signal of FIG. 11D that has passed through the delay (Z^{-10}) and a 0.01 multiplier, the secondary ghost is canceled as seen in FIG. 11E. However, a third ghost c is produced.

Accordingly, the secondary and third ghosts are successively produced via the FIR filter. However, they can be completely canceled by the IIR filter composed of a filter coefficient attained from operating portion 45. A detailed explanation will be

omitted because its principle is general.

The coefficient of digital filter 44 attained from operating portion 45 is downloaded to digital filter 44 during VBI, in order not to cause any effects on a picture. From this point on, a signal free from ghost is output from digital/analog converter 46 in real time.

In those embodiments of the present invention, a 366-long ternary sequence is used. However, a ternary sequence of a length different therefrom may be used. It would be therefore obvious to enable a variety of modifications, not confined to the scope of the abovestated embodiments.

As discussed above, in the embodiments of the present invention a ternary sequence GCR signal used currently in NTSC mode may be adapted to PAL mode so that a ghost produced due to the characteristics of a transmitting channel is completely canceled even in PAL mode. In addition, those embodiments use a GCR signal made with a ternary sequence, rendering its energy and correlation gain higher.

This invention is capable of canceling ghosts at high speed through correlative operation because the transmission occupying line of the GCR signal is one line within a vertical blanking interval, and a ternary sequence GCR signal composed of elements 1, 0, and -1 is used.

Accordingly, the GCR signal transmitting/receiving apparatus of the present invention is usefully adaptable to PAL TVs, VCRs and set-top boxes.

The embodiments have been described by way of example only, and modifications are possible with the spirit and scope of the invention as defined in the appended claims.

Claims:

1. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV, said apparatus comprising:

transmitting means for loading a ternary sequence ghost canceling reference signal on a certain line of a broadcasting signal and thereby transmitting the loading result; and

receiving means for canceling a ghost produced by characteristics of a transmitting channel using said ternary sequence ghost canceling reference signal transmitted from said transmitting means.

2. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 1, wherein said ternary sequence ghost canceling reference signal is attained by making a ternary sequence pass through a low-pass filter and then amplitude-scaled in an amplitude scaling portion.

3. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 1, wherein said ternary sequence is 366-long.

4. An apparatus for transmitting/receiving a ghost-canceling reference signal

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in a PAL TV as claimed in claim 2, wherein said ternary sequence is 366-long.

5. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 2, wherein said low-pass filter's cut-off frequency is 5MHz in PAL B&G mode, and 6MHz in PAL D&K mode.

6. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 1, wherein said ternary sequence ghost-canceling reference signal is loaded within a vertical blanking interval of every even field.

7. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 1, wherein said transmitting means transmits said ternary sequence ghost-canceling reference signal upon inverting it for every frame.

8. An apparatus for transmitting/receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 7, wherein said ternary sequence ghost-canceling reference signal transmits a ghost-canceling reference signal of positive polarity in second and sixth fields and a ghost-canceling reference signal of negative polarity in fourth and eighth fields.



9. An apparatus for transmitting a ghost-canceling reference signal in a PAL TV, said apparatus comprising:

a ghost-canceling reference signal generating portion for detecting vertical and horizontal sync signals from a broadcasting signal, catching a certain line on which a ternary sequence ghost-canceling reference signal will be loaded, from the broadcasting signal, and finally loading the ternary sequence ghost-canceling reference signal on said certain line caught; and

a ghost-canceling reference signal inserting portion for, only in said certain line caught, selecting said ternary sequence ghost-canceling reference signal produced from said ghost-canceling reference signal generating portion, in other lines, said portion selecting and transmitting said broadcasting signal.

10. An apparatus for transmitting a ghost-canceling reference signal in a PAL TV as claimed in claim 9, wherein said ghost-canceling reference signal generating portion is comprised of:

a ROM for storing said ternary sequence ghost-canceling reference signal of positive and negative polarities;

a counter for controlling the output of said ROM;

a digital/analog converter for converting said ROM's output signal into an analog signal;

a sync detector for detecting vertical and horizontal sync signals from said broadcasting signal; and

a controller for detecting a certain line where a ghost-canceling signal will be loaded, from the output of said sync detector, to thereby output a switching control signal of said ghost-canceling reference signal inserting portion.

11. An apparatus for transmitting a ghost-canceling reference signal in a PAL TV as claimed in claim 9, wherein said ghost-canceling reference signal generating portion is comprised of:

a ROM for storing said ternary sequence ghost-canceling reference signal of positive and negative polarities;

a counter for controlling the output of said ROM;

a digital/analog converter for converting said ROM's output signal into an analog signal;

a sync detector for detecting vertical and horizontal sync signals from said broadcasting signal; and

a certain line detector for detecting a certain line where said ternary sequence ghost-canceling reference signal will be loaded, from the output of said sync detector, to thereby output a switching control signal of said ghost-canceling reference signal inserting portion.



12. An apparatus for transmitting a ghost-canceling reference signal in PAL TV as claimed in claim 9, wherein said ghost-canceling reference signal generating portion is comprised of :

a ROM for storing said ternary sequence ghost-canceling reference signal of positive and negative polarities;

a counter for controlling the output of said ROM;

a digital/analog converter for converting said ROM's output signal into an analog signal;

a -1 multiplier for selectively inverting the output of said digital/analog converter;

a sync detector for detecting vertical and horizontal sync signals from said broadcasting signal; and

a controller for detecting a certain line where said ternary sequence ghost-canceling reference signal will be loaded, from the output of said sync detector, to thereby output a multiplication control signal of said -1 multiplier and a switching control signal.

13. An apparatus for transmitting a ghost-canceling reference signal in a PAL TV as claimed in claim 9, wherein said ghost-canceling reference signal inserting

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portion is comprised of a multiplexer for selectively outputting the output of said digital/analog converter or said broadcasting signal according to a switching control signal of said controller.

14. An apparatus for transmitting a ghost-canceling reference signal in a PAL TV as claimed in claim 9, wherein said ghost-canceling reference signal inserting portion is comprised of a switch for selectively outputting the output of said digital/analog converter or said broadcasting signal according to a switching control signal of said controller.

15. An apparatus for receiving a ghost-canceling reference signal in a PAL TV, said apparatus comprising:

a sync separator for separating a sync signal from a baseband broadcasting signal input;

a ghost-canceling reference signal storage for storing the same ternary sequence ghost-canceling reference signal as that transmitted from said transmitting means;

a digital filter for canceling a ghost produced due to characteristics of a transmitting channel from said baseband broadcasting signal input; and

an operating portion for catching a line where said ternary sequence ghost-



canceling reference signal is loaded, from the output of said sync separator, thereby attaining said ternary sequence ghost-canceling reference signal, and then comparing it with a signal of said ghost-canceling reference signal storage, to thereby obtain a coefficient of said digital filter.

16. An apparatus for receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 15, wherein said operating portion catches a line for every even field where said ternary sequence ghost-canceling reference signal is loaded, using said sync signal separated from said sync separator, attains a ghost-canceling reference signal by performing subtractions by a predetermined number, and then compares said ghost-canceling reference signal with the signal of said ghost-canceling reference signal storage, to thereby obtain a coefficient of said digital filter needed in canceling a ghost produced due to characteristics of a transmitting channel.

17. An apparatus for receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 16, wherein said subtraction is made in groups by 8, 16, or 32 fields.

18. An apparatus for receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 15, wherein said digital filter is comprised of:

a finite impulse response filter for canceling a close-in ghost; and

an infinite impulse response filter for canceling a long ghost.

19. An apparatus for receiving a ghost-canceling reference signal in a PAL TV as claimed in claim 15, wherein said receiving means further comprises:

an analog/digital converter for converting said baseband broadcasting signal input into a digital signal, and outputting it to said digital filter and operating portion; and

a digital/analog converter for converting the output of said digital filter into an analog signal.