The invention concerns a video recorder having an equalizing circuit according to the preamble of claim 1 or 6.

An equalizing circuit arranged in the signal path for processing the frequency-modulated luminance signals of a video recorder, which contains a band-pass filter adapted to the deviation range of the portion of the frequency-modulated luminance signal directly representative of the luminance, is known from German patent specification 3809394. The band-pass filter consists of a filter circuit arranged in the signal path, and a coupling element connected downstream of this. Furthermore, a diode switch is connected in parallel with the output of the filter circuit. If the amplitudes of the oscillations of the frequency-modulated luminance signal at the output of the filter circuit, pass a so-called threshold voltage of the diode switch, that is defined in the knee region of the characteristic of the diode switch, in this knee region the diode switch changes from the blocking state to a conducting state and, together with the filter circuit and the forward resistance of the diode switch, forms a monostable element with an amplitude-dependent delay in the propagation time of the frequency-modulated luminance signals. In this switching state of the equalizing circuit the propagation time of the frequency-modulated luminance signals is delayed in accordance with a propagation time correction, dependent upon the amplitude of these oscillations. This propagation time delay compensates frequency and phase response errors, especially in the low-frequency region of the lower sideband of the carrier frequencies of the frequency-modulated luminance signals adjacent to the deviation range of the carriers, so that the amplitude-modulated luminance signals at the output of the frequency demodulator have a linear frequency response up to very high video frequencies (beyond 3 MHz) and consequently a high picture resolution is achieved without additional noise during playback of the videotape.

On the other hand, the resonance effect basically triggering the fundamentals or carriers of the frequency-modulated luminance signal comes into play at low oscillation amplitudes of the transmitting frequency-modulated luminance signals, which do not exceed the threshold voltage of the diode switch and thus maintain the diode switch in the blocking state, so that the equalizing circuit operates in the band-pass filter state. As a result, the low oscillations of the lower sideband of the frequency-modulated luminance signals, on which the carriers of the frequency-modulated luminance signals are superimposed, are suppressed and, with adequate amplitude in the region of their antinode, can carry the carriers of the frequency-modulated luminance signals out of the operating range of the frequency demodulator. Furthermore, this increases the carrier amplitude itself and reduces noise signals in the frequency range of the carriers.

On the one hand these measures will reproduce a sharper video image on the screen, and on the other hand largely eliminate interfering edge noise during playback, especially vertical luminance edges and disturbing reflections and so-called maverick "streaks".

However, the use of these measures has shown that the quality of the recording of video signals on the videotape of a videocassette and the quality of the videotapes varies so widely that it is not possible to find a design of a known equalizing circuit that can detect to a satisfactory degree the wide range of quality differences in the video cassettes.

The invention is based on the aim of further developing a video recorder of the type stated in the preamble, in that in a very wide region of a disturbed oscillating response of the frequency-modulated luminance signal the equalizing circuit on the one hand provides, as far as possible, amplitude-dependent propagation time compensation and, on the other

hand, compensation of the disturbed oscillations, so as to ensure lowest possible interference at greatest possible picture sharpness. This aim is achieved according to the invention by the steps stated in the characterising part of claim 1 or claim 6.

The solution of this aim is based on the knowledge that during the playback of video pictures, playback interference mainly occurs when the amplitudes of slow oscillations of the lower sideband of the frequency-modulated luminance signals fall within the order of magnitude of carriers of the frequency-modulated luminance signals. A considerable reduction in these playback disturbances can therefore be obtained by reducing the ratios of the amplitudes of the low oscillations of the lower sideband to the amplitudes of the carriers of the frequency-modulated luminance signals of this sideband. These steps of the invention enable the output level of a transmission circuit connected upstream of the equalizing circuit, or the operating level of the trigger, to be set via the calculated mean default rate and a resulting control signal, so that the equalizing circuit acts essentially as an amplitude-controlled monostable element and produces video playback with the best possible picture sharpness and lowest possible picture interference due to streaks and edge noise.

During video playback, as soon as additional interference occurs at a default rate which considerably exceeds the average default rate, the level of the frequency-modulated luminance signal at the input of the equalizing circuit or the voltage threshold value at the trigger varies so widely that the equalizing circuit transfers from the disturbed frequency-modulated luminance signals to the switching state of a band-pass filter circuit, and during the continuation of the particularly high interference rate operates predominantly in the band-pass state and compensates the

disturbed waveform of the oscillations of the frequency-modulated luminance signals so that they no longer produce noticeable interference on the screen.

The setting of the level of the frequency-modulated luminance signals prior to the input of the equalizing circuit, like the setting of the operating level of the trigger of the equalizing circuit, operates as an adjustment in a range in which the equalizing circuit is permanently set to the playback of video pictures of optimum sharpness. Because of this, the playback by a video recorder according to the invention is optimally matched to the recording quality of a video recording on a videotape, to the quality of the tape material and to the playback characteristics of the video recorder. With the steps according to the invention it is therefore possible to reproduce on a screen video presentations of poor recording quality and poor playback channel transmission quality, with greater improvement in quality compared to the previously known state-of-the-art video playback - relatively undisturbed and with the best possible sharpness.

The sub-claims, which are explained in further detail in the description which follows, indicate advantageous forms of the invention. The associated drawings show:

Fig. 1: a block diagram of a development of the signal path according to the invention for the frequency-modulated luminance signals read from a recording medium in a video recorder,

Fig. 2: Graphs a), b), c) for the production of the control signal dependent on default rate of the missing oscillations for setting an optimum quality of the video playback,

Fig. 3: Graphs of the frequency response of the frequency-modulated luminance signals at the signal input of the equalizing circuit of the practical form shown in Figure 1 for a recording, and high, medium and low-quality FM transmission,

Fig. 4: Graphs a) to d3) of the cycle of the frequency-modulated luminance signal at the signal input of the equalizing circuit (4a), at the input of the trigger (4b), the output signals of the missing-oscillation detector (4c1, 4c2, 4c3) and the default rate of the default signals (4d1, 4d2, 4d3) at high, medium and low transmission quality,

Fig. 5: A block diagram of a further practical example of the signal path according to the invention for the frequency-modulated luminance signals read from a recording medium in a video recorder,

Fig. 6: Graphs a) to c2) for the mode of operation of the missing-oscillation detector contained in the interference recognition circuit of the practical example shown in Figure 5, with a local, particularly high interference rate.

Figure 1 shows a block diagram of a practical example of the signal path 1 contained in a video recorder for the frequency-modulated luminance signals read from a videotape 2. This practical example extends from the videotape 2 loaded into the video recorder up to the frequency demodulator 3 arranged in the signal path 1 for converting the modulation of the frequency-modulated luminance signals from FM to AM. The video signals recorded on the videotape 2 are scanned by a video head 4 of the video recorder and fed to the signal input 13 of the frequency demodulator 3 via a head amplifier 5, a separating filter circuit 6, a buffer

amplifier 10, an equalizing circuit 11 and a further buffer amplifier 12. The separating filter circuit 6 separates the frequency-modulated luminance signals from other video signals read from the videotape 2. In the practical example shown the equalizing circuit 11 consists mainly of an inductive filter circuit element 14, a capacitive coupling element 15 connected downstream of this and, connected to the signal path 1 between the filter circuit element 14 and the coupling element 15, a trigger 16 whose operating level U16 can be adjusted by a control signal at a control input 27. The filter circuit element 14 and the coupling element 15 of the equalizing circuit 11 are each designed and constructed so that in the blocked state of the trigger 16 these two circuit elements form a band-pass filter 19 whose bandwidth transmits the deviation range of the carrier of the frequency-modulated luminance signal, whose frequency directly represents the luminance of the transmitted line of the video image. On the other hand, the design and construction of the filter circuit element 14 is such that in the conducting state of the trigger 16 the filter circuit element 14, together with its forward resistance 25, forms a monostable element 14/25 with an amplitude-dependent delay time. This monostable element largely compensates the phase error that the frequency-modulated luminance signal has been subjected to during recording onto the videotape 2 and during scanning. An interference recognition circuit 21 that in the practical example shown contains a missing-oscillation detector 22, a default rate circuit 23 and a control signal generator 24, is connected to the signal path 1 in the equalizing circuit 11 via a further buffer amplifier 20. The missing-oscillation detector 22 detects missing or individual oscillations of the frequency-modulated luminance signals transmitted on the signal path 1, and on detection generates a default signal F indicating the missing points. From the default rate of these default signals F the default rate circuit 23 generates an electrical default rate signal 30

(Fig. 2a), from which the control signal generator 24 produces a control signal 31 (Fig. 2b) corresponding to the magnitude of the default rate signal 30 for the control input 27 of the trigger 16.

By means of the interference recognition circuit 21 and the value of the operating level U16 that it can set, it is possible to adapt the equalizing circuit 11 to the different recording qualities of the videotapes 2 and to the transmission quality of the scanned recording up to the signal input 28 of the equalizing circuit 11 in the signal path 1 for the frequency-modulated luminance signals. Above the frequency axis f of the graph in Figure 3 is shown the frequency response of the amplitudes A(FM) of the frequency-modulated luminance signals for a high-quality recording (curve 32), a recording of normal quality (curve 33) and a low-quality recording (curve 34) at the signal input 28 of the equalizing circuit 11. This graph indicates a deviation range 35 for the carriers 36 of the frequency-modulated luminance signals, whose frequency f(L) denotes the luminance value of the transmitted luminance. Adjacent to this deviation range and extending to lower frequencies is the lower sideband 37 whose oscillations 38 are responsible for the image resolution in respect of the sharpness of the video image being played back. In the practical example shown, the frequency f(L) of the carrier, shown schematically, is 2.5-times higher than the frequency f(SB) of the sideband oscillation represented by the vertical line 38, which is superimposed on the carrier 36. This superimposition has the result that the oscillation cycle of the carriers extends downwards from the region of the zero line of the frequency-modulated luminance signals transmitted on the signal path 1, and this causes interference during demodulation in the frequency demodulator 3, as is shown schematically in graph a) of Figure 4. In this graph the cycles 38.1, 38.2 and 38.3 of the sideband oscillation 38 are shown schematically for a

recording of high quality (38.1), a recording of normal quality (38.2) and a recording of low quality (38.3), onto which the carriers 36 of a recording of high quality, a recording of normal quality and a recording of low quality are superimposed, so as to produce the cycles 39.1, 39.2 and 39.3 of a frequency-modulated luminance signal of a recording of high quality (39.1), normal quality (39.2) and low quality (39.3). It can be seen from this illustration that the half-cycle 39.22 of the oscillation cycle 39.2 of a normal recording quality and the half-cycles 39.32 and 39.35 of the oscillation cycle 39.3 of a low-quality recording do not pass through the zero line 26 of the frequency-modulated luminance signal. Furthermore, the lines 40.1, 40.2 and 40.3, which correspond to operating levels U16.1, U16.2 and U16.3 of the trigger, which are set by the control signal 31 of the interference recognition circuit 21 at the control input 27 of the trigger 16 during the transmission of frequency-modulated luminance signals of a recording of high quality (line 40.1), normal quality (line 40.2) and low quality (line 40.3), are drawn in graph a) of Figure 4. In the region around the zero line 26 that is bounded by the lines 40.1 or 40.2 or 40.3, the equalizing circuit 11 operates as a band-pass filter for the carriers 36 of the frequency-modulated luminance signals, and outside this region as an amplitude-controlled monostable whose propagation time delay is determined by the portion of the amplitude exceeding these limiting lines 40.1, 40.2 or 40.3. In the practical example shown the changeover corresponds to the knee of the switching characteristic of a switching diode. As a result, demodulation interference caused by the changeover is avoided.

Graph b) of Figure 4 shows the oscillation cycles 45.1, 45.2 and 45.3 which the equalizing circuit has generated under the influence of the set operating levels U16.1, U16.2 and U16.3 from the oscillation cycles 39.1 to 39.3 shown in Figure 4a

of the frequency-modulated luminance signals on the signal path 1 at the signal input 29 of the trigger 16 and which are evaluated by the interference recognition circuit 21. As a result of temporary, inductive storage of the electrical energy of the portion of the half-cycles, that exceeds the operating level during the monostable circuit state of the equalizing circuit, the amplitude of the following half-cycle 39.22 is considerably increased in the band-pass filter state of the equalizing circuit 11, so that this half-cycle 45.22 of the oscillation cycle 45.2 on the signal path 1 at the signal input 29 of the trigger 16 in the practical example shown, passes through the zero line 46 (Fig. 4b), which simultaneously is the operating point line 46 of the frequency demodulator 3. Consequently, all half-cycles of the oscillation cycles 39.1 to 39.3 shown in graph a) of Figure 4, to which the oscillation cycles 45.1 to 45.3 in graph b) of Figure 4 correspond, are evaluated by the frequency demodulator 3. In graph b) of Figure 4 lines 47.1 and 47.2 are drawn close on either side of the zero or operating point line 46; these form the detection levels Ue1 and Ue2, referred to the signal path 1, of the missing-oscillation detector 22 of the interference recognition circuit 21. As soon as an oscillation of the oscillation cycles 45.1 to 45.3 shown in graph b) of Figure 4 departs from the zero or operating point line 46 and exceeds the detection level lines 47.1 or 47.2, in the practical example shown a discharge switch 41 discharges in fractions of a half-cycle the storage capacitor 42 of a charging element 43 of the missing-oscillation detector 22, so that the storage capacitor 42 can charge up until a charging limit is reached or until the next discharge occurs. The charging circuit is designed so that the charging voltage U42 at the storage capacitor 42 does not exceed a charge threshold level U44 of a charge detector 44 connected to the storage capacitor 42, within the maximum possible peak-to-peak excursion TB of one half-cycle of the carriers within the equalizing circuit 11. On the other hand,

the charge threshold level U44 is designed so that the charging voltage U42 of the storage capacitor 42 is greater than the charge threshold level U44 when the storage capacitor 42 is charged up over the shortest cycle time of a carrier 36. The waveforms of the charging voltages U42 at the storage capacitor 42 are shown schematically in Figure 4: graph c1) for a recording of high quality, c2) for a recording of normal quality and c3) for a recording of low quality. These graphs include a line 49 to show the charge threshold level U44. In graph 4b) the half-cycle 45.22 for a normal recording quality, i.e. the operating point line 46, does not, however, pass through the following detection level line 47.2. As a result, in graph 4c2) the charging waveform 48 exceeds the line 49 of the charge threshold level U44 at time t23, so that at this instant the charge detector 44 generates a default signal F at the default rate circuit 23, which is represented in graph d2) of Figure 4 for the scanning of a videotape having normal recording quality. In the transmission of a low-quality recording shown schematically (oscillation cycle 45.3) the half-cycle 45.32 does not reach the associated detection level line 47.2 and the half-cycle 45.35 of the same oscillation cycle 45.3 does not reach the detection level line 47.1 after passing through the operating point line 46, so that the oscillation cycle 48 in graph 4c3) exceeds the line 49 of the charge threshold level U44 both at the instant t33 and instant t36, and the charge detector 44 generates a default signal F at these times, as is shown in graph d3) of figure 4 for a video playback of videotape 2 of low recording quality.

As can be seen from graph d1) - which contains no default signal F - to graph d3), the density or default rate of the default signals F increases with decreasing recording quality, so that the default rate signal 30 generated in the default rate circuit 23 from the default signals F and shown in graph b) of Figure 2, is an indication of the recording

quality and transmission quality of the frequency-modulated luminance signals up to the signal input 28 of the equalizing circuit 11. The control signal generator 24 downstream of the default rate circuit 23 produces a control signal 31 from the default rate signal 30 for setting the operating level U16 of the trigger 16 so that as far as possible all half-cycles of the oscillation cycle of the frequency-modulated luminance signals passing through the equalizing circuit 11 at least just pass through the operating point line 46. The interference recognition circuit 21 therefore sets an operating level U16 at the trigger 16 corresponding to the average recording quality of the instantaneously transmitted playback, which delivers the best possible picture sharpness with playback which is just free of interference. In the practical example shown, the operating level U16 of the trigger 16 (from U16.1 to U16.3) also falls with decreasing recording quality (curves 32 to 34 in the graph of Figure 3).

A further practical example of a signal path for the frequency-modulated video signals of a video recorder read from a recording medium 2 is shown in Figure 5. Arrangements and signals corresponding to the practical example shown in Figure 1 are identified by the same reference symbols. The practical example shown in Figure 5 basically differs from the practical example of a signal path 1 illustrated in Figure 1, in that an adjustable transmission circuit 8 in the form of an attenuator circuit 8 is connected upstream of the equalizing circuit, and that, furthermore, the control signal 31 generated by the interference recognition circuit 21 is fed to the control input 27 of the attenuator circuit 8 and that, moreover, the trigger 17 of this practical example is constructed from two switching diodes 18 connected in inverse parallel, whose operating level U17 is set by the knee of the characteristic of the two anti-parallel diodes 18. In the practical example illustrated, the attenuator circuit 8 basically consists of two reference diodes 50 connected to

the signal path 1 and a series resistance 51 arranged in the signal line 1 and connected upstream of the reference diodes. The series resistance 51, together with the forward resistances of the reference diodes set by a d.c. control current, forms a voltage divider for the frequency-modulated luminance signals arriving at the signal input 7 of the attenuator 8. Attenuation of the frequency-modulated luminance signals in the practical example of Figure 5 corresponds to an increase in the operating level U16 from U16.3 to U16.1, for example, in the practical example of Figure 1.

The thin line 52 of graph a) of Figure 6 shows one oscillation cycle of the frequency-modulated luminance signals at the signal input 28 of the equalizing circuit 11 for normal recording quality of video playback. This recording quality corresponds to a default rate of default signals F extending to a separating line 53 in graph a) of Figure 2, that produces a default rate signal 30 in the default rate circuit 23. This default rate signal in turn produces a control current I in the control current generator 24 of the interference detection circuit 21, which sets the attenuation value of the attenuator circuit 8, so that the mean value of the amplitudes of the normal half-cycles 52.0 to 52.2, 52.8 and 52.9 of the frequency-modulated luminance signals at the signal input 28 of the equalizing circuit 11 assumes a specific ratio to the operating level U17.0 projected at this signal input 28. This ratio is set via the d.c. control signal so that the playback has the best possible picture sharpness with lowest possible picture interference. Distortion of this oscillation cycle, which triggers additional default signals F in the interference detection circuit 21, as shown in graphs b1) and c1) of Figure 6, is indicated between the half-cycles 52.2 and 52.8 of the oscillation cycle 52 of the frequency-modulated luminance signals. In the case of a high incidence, these

additional default signals F considerably increase the default rate of the default signals F, which is illustrated after the separating line 53 in graph a) of Figure 2, and leads to a considerable increase in the default rate signal 30, which graph b) of Figure 2 clearly shows. This occasional rise in the default rate signal 30 causes a change in the d.c. control current I in the control signal generator 24, so that the attenuation value of the attenuator circuit 8 is increased. The oscillation cycle of the luminance signal additionally attenuated by the increased interference rate shown to the right of the separating line 53 in the graphs of Figure 2 is illustrated in graph a) of Figure 6 by the thick line 54. Due to the attenuation of the original oscillation cycle 52 of the frequency-modulated luminance signals, proportionally more sections of the oscillation cycle of the frequency-modulated luminance signals reach the band-pass filter circuit state of the equalizing circuit 11, namely those parts of the oscillation cycle 54 that lie between the lines 40.4 and 40.5 of the operating level U17 of the trigger 17 projected on to the signal input 28 of the equalizing circuit 11. Due to this step, the oscillations of the distorted part of the oscillation cycle 54 will be more centralized about the zero line 46 of the oscillation cycle 54 of the frequency-modulated luminance signals by the equalizing circuit 11. At the same time, this zero line 46 is the operating point line of the frequency demodulator 3. As a consequence, in the disturbed zone noise signals on the screen are considerably reduced and the video playback is set to the best possible sharpness. The interference zone, now corrected by the interference recognition circuit 21, generates an increased default rate of default signals F corresponding to it, which is added to the default rate of default signals corresponding to the recording quality, as is shown after the separating line 55 in graph a) of Fig. 2 and which produces an increased value of default rate signals 30 until it is no longer present, as shown schematically in

graphs b) and c) of Figure 2; whereas the control signal concerned with the increased interference rate adjusts the attenuator circuit 8 so that the oscillation cycle 54 of the frequency-modulated luminance signal appears at the signal input 28 of the equalizing circuit 11. This setting is maintained via the additional default rate of default signals F (graph c2 or Figure 6), which in the adjusted state of the control signal 31 (graph c) of Figure 2) indicates the magnitude of the interference of the interference point and whose generation is shown schematically in graphs b) and c) of Figure 6, until the local interference point with the increased default rate has again disappeared.

Furthermore, in the practical example shown in Figure 5, an integrating gain control 56 is connected to the signal path 1 prior to the signal input 28 of the equalizing circuit 11. This gain control measures the average signal level on the signal path 1 prior to the signal input 28 of the equalizing circuit 11 and in the practical example shown adjusts the control current through the reference diodes 50 of the attenuator circuit 8 as necessary, so that the average signal level upstream of the signal input 28 of the equalizing circuit 11 does not fall below a value below which the playback quality of the video playback is considerably reduced as a result of too low a signal level.

In a further practical example, not shown, the adjustable transmission circuit 8 prior to the signal input 28 of the equalizing circuit 11 is a balanced amplifier whose gain is set to the respective required value by a control signal at a control input.



Claims

1. Video recorder

- having an equalizing circuit (11) arranged in the signal path (1) for processing the frequency-modulated luminance signals, which equalizing circuit
  - in a first control state forms a band-pass filter (19) adapted to the deviation range of the carriers of the frequency-modulated luminance signal portion representative of the luminance and
  - in a second control state forms an amplitude-controlled monostable element (14/18) which progressively delays the phase of the frequency-modulated luminance signal as the signal amplitude increases,
- and having a trigger (17) that switches over the equalizing circuit from a first to a second control state when the cycle (52) of the frequency-modulated luminance signal passes a predetermined operating level (U17) in the equalizing circuit,

characterised in that

- the equalizing circuit (11) is preceded by a transmission circuit (8) that can be adjusted to a given output level via a control input (27)
- and that an interference recognition circuit (21) is connected to the signal path (1) for detecting missing individual oscillations of the frequency-modulated luminance signals transmitted in the equalizing circuit, or any such oscillations that do not pass a given recognition level (Ue) of the interference recognition circuit, and for generating a control signal (31) representative of the rate (default rate signal) (30) of such individual oscillations for the control input (27) of the transmission circuit of a shape such that as the default rate of an oscillation curve of the frequency modulated luminance signal increases, the equalizing

circuit is switched to the band-pass filter circuit state for an increasing portion of that oscillation curve.

2. Video recorder according to claim 1, characterised in that the transmission circuit (8) is an attenuator circuit whose attenuation factors can be adjusted via a control input (27).

3. Video recorder according to claim 1, characterised in that the transmission circuit (8) is an adjustable amplifier with a control input whose amplification factor can be adjusted via that control input.

4. Video recorder according to claim 2, characterised in that the attenuator circuit (8) is a symmetrical voltage divider circuit comprising a series resistance (51) in the signal path (1) of the frequency-modulated luminance signals and two d.c.-controlled diode paths (50) arranged symmetrically therewith.

5. Video recorder according to any of claims 1 to 4, characterised in that there is connected between the signal path (1) and the transmission circuit (8) an integrating gain control (56) which additionally controls the output level of the transmission circuit in such a way that the average signal level of the frequency-modulated luminance signal (54) at the signal input (28) of the equalizing circuit (11) does not drop below a predetermined minimum level.

6. Video recorder
- having an equalizing circuit (11) arranged in the signal path (1) for processing the frequency-modulated luminance signals, which equalizing circuit

- in a first control state forms a band-pass filter (19) adapted to the deviation range of the carriers of the frequency-modulated luminance signal portion representative of the luminance and
- in a second control state forms an amplitude-controlled monostable element (14/25) which progressively delays the phase of the frequency-modulated luminance signal as the signal amplitude increases,

- and having a trigger (16) that switches over the equalizing circuit from a first to a second control state when the oscillation cycle (39) of the frequency-modulated luminance signal passes a predetermined operating level (U16) in the equalizing circuit, characterised in that
- the operating level (U16) of the trigger (16) can be adjusted via a control input (27)
- and that an interference recognition circuit (21) is connected to the signal path (1) for detecting missing individual oscillations (45.22, 45.32, 45.35) of the frequency-modulated luminance signals (45) transmitted in the equalizing circuit, or any such oscillations that do not pass a given recognition level (Ue) of the interference recognition circuit, and for generating a control signal (31) representative of the rate (default rate signal) (30) of such individual oscillations for the control input (27) of the trigger (16) a shape such that as the default rate of an oscillation curve of the frequency-modulated luminance signal increases, the equalizing circuit is switched to the band-pass filter circuit state for an increasing portion of that oscillation curve.

7. Video recorder according to any of claims 1 to 6, characterised in that the interference recognition circuit (21) comprises the following functional groups:

a missing-oscillation detector (22) for detecting in the frequency-modulated luminance signal (39, 54) and indicating via a default signal (F) any missing individual oscillations or oscillations that do not pass a given recognition level (Ue) of the interference recognition circuit, a default rate circuit (23) for generating a default rate signal (30) from the default signals (F), and a current generator (24) connected downstream for generating a control signal (31) in response to the shape of the default rate signal.

8. Video recorder according to any of claims 1 to 7, characterised in that the operating level of the trigger (16, 17) is the mean value of a switching range formed in the manner of a diode switch changing over from the blocking range to the conducting range.