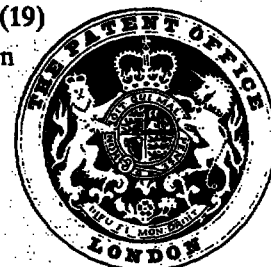


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## (54) A MAGNETIC TAPE RECORDING UNIT

(71) We, LICENTIA PATENT VERWALTUNGS G.m.b.H., of 1 Theodor-Stern-Kai, 6 Frankfurt/Main 70, Federal Republic of Germany, a German body corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The invention relates to a magnetic tape recording unit having a circuit arrangement for changeover of the bias of a magnetic tape recording head. The invention is particularly suitable for matching the magnetic tape unit to different types of tapes, such as iron oxide and chromium dioxide tapes, or to different tape speeds.

In magnetic tape recording units, particularly in cassette recorders, it is often desired to use different types of tapes, such as, in addition to the conventional iron oxide - ( $\text{Fe}_2\text{O}_3$ ) - tapes also chromium dioxide - ( $\text{CrO}_2$ ) - tapes. For matching to the specific properties of the two types of tapes, it is necessary to changeover certain parts of the electrical circuitry of the unit.

When using chromium dioxide tapes the following requirements are made individually:

1. A high power of the erasing oscillator,
2. Increase in the bias current to the recording head by approximately  $3\text{d}^\circ$ .
3. Variation of the time constant of the tape response compensation in the case of reproduction from 120 Vs to approximately 50 to 70 Vs.

A circuit arrangement is known (Funktechnik 1973, volume 14, page 494 to 495), by which these requirements are fulfilled.

The known circuit arrangement requires a mechanical switch for this. The necessary changeovers are achieved either directly through the mechanical switch or by means of electronic circuits, which are controlled by the mechanical switch and likewise act as a switch. The two first requirements are fulfilled by increasing the supply voltage of the erasing oscillator by means of the mechanical switch, a zener diode connected to earth being short circuited. The required attenuation of the high frequencies on the reproduction from a chromium dioxide tape is realized in that, with the help of a switching transistor, one part of a RC network present is disconnected. The mechanical switch is a two-pole switch, which is arranged to apply a voltage to one point of the electrical circuit, and to earth a second point in one position and to reverse this in the other position. These points are connected to apply a voltage or to earth electronic switches, for example transistors, which are turned on or off in dependence on the potential at their control electrodes.

The known circuit arrangement is relatively expensive and correspondingly costly to produce.

The invention seeks to provide a simplified circuit for changeover of the bias.

According to the invention, there is provided a magnetic tape recording unit comprising a circuit arrangement for the changeover of the bias of the recording head, the circuit arrangement comprising an impedance selectively connectible in parallel with the recording head of the unit to reduce the bias current through the recording head.

Preferably the parallel impedance has values which give it a high impedance to sound frequencies.

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The unnecessary changeover of the erase oscillator circuit to change the erase power can be avoided by the invention. Since in the case of conventional tape recorders, the high frequency bias for the recording head and the voltage for the erase head are taken from a common oscillator, hitherto the power of the oscillator was switched over in order to achieve the increased values necessary for the chromium dioxide tapes. Since, for erasing chromium dioxide tapes, a greater power is necessary than in the conventional iron oxide tapes, the technical world hitherto started from the fact that when using chromium dioxide tapes the originally low erase power must be increased by reversal. Use is made of the realisation that even the iron oxide tapes can be erased without disadvantages with greater power so that a changeover of the erase power and thus a changeover of the oscillator circuit is not necessary at all.

The provision of an additional impedance selectively connectable to the recording head for the reduction of the high frequency bias current through the recording head during recording on iron oxide tapes enables a constructional simplification which can be achieved in that the changeover can be undertaken by a single pole switch.

With a single pole switch achieving change-over by connecting the additional impedance or a branch of an equalization network operative during the playback, with a fixed potential, for example earth, then all three above-mentioned requirements can be fulfilled in a simple manner when using chromium dioxide tapes. The superfluous reduction of the erase power is dispensed with, whereby a very high erase power for iron oxide tapes results as an advantage.

One embodiment of the invention will now be described, by way of example with reference to the drawing, the single figure of which shows a part of the circuit of a magnetic tape recorder.

The signal to be recorded is fed to the sound head 1 via a high value resistor 2.

The erase and bias voltage is produced in a high frequency generator 3, which voltage on the one hand is fed as an erase voltage directly to the erase head 4 and on the other hand as bias voltage also to the sound head 1 via a series impedance comprising a capacitance 5 and a resistance 6. The feed-in of the high frequency bias to the sound head 1 likewise takes place in a highly resistive manner due to the last named series impedance.

Now it is possible, by means of a single pole changeover switch 7, to optionally connect the sound head in parallel with an additional impedance, which comprises the series circuit of the capacitance 8 and of the resistance 9. In the position of the switch,

characterized by  $Fe_2O_3$ , the additional load impedance is connected directly to earth. Since one pole of the sound head 1 is likewise earthed, a division of the high frequency bias current fed via the series impedance (capacitance 5 and resistance 6) occurs between the sound head 1 and the additional impedance (capacitance 8 and resistance 9) so that the bias current flowing through the sound head is reduced.

In the position  $CrO_2$  of the single pole change-over switch the parallel circuit of the additional impedance 8, 9 is eliminated and the high frequency bias current assumes its increased value for the recording on chromium dioxide tapes. In this position, however, a branch (capacitance 10 and resistance 11) of an equalizing network effective in playback, is connected to earth, which network is effective together with a signal amplifier 12. In the case of tape reproduction, a signal scanned by the playback head arrives at the input 13 of the signal amplifier which can be taken off, after equalization and amplification, at the output 14. In the position  $CrO_2$  of the single pole change-over switch 7 there takes place, by the connection of the branch 10, 11 of the equalizing network of the signal amplifier 12 to earth, a reduction of the high frequencies, since, over all, a less strong amplitude increase is necessary due to the higher susceptibility of the chromium dioxide tapes in the region of higher frequencies during reproduction.

In the case of a cassette tape recorder, the changeover switch 7 can be actuated directly by the insertion of the cassette, which is provided for this purpose, in dependence on the type of tape located therein, with a corresponding mechanical coding. By the use of a single single-poled change-over switch, there result low switching forces, so that the mechanical resistance which possibly has to be overcome when inserting the cassette is low. Thus the illustrated embodiment of the invention not only represents a simplification with regard to circuitry which has a cost saving effect, but also facilitates a simplified operability of a cassette tape recorder.

The application possibilities of the invention extend not only to the matching of magnetic tape units to different tape types, wherein also the use of, for example, cobalt tapes or multi-layer tapes is included, but quite generally to the matching of the high frequencies bias to the recording conditions in question, such as different tape speeds. The advantage of the uniform erase voltage in so doing remains in each case maintained. The erase power must in each case be so dimensioned that it is adequate for all the types of operation occurring.

The values of the additional impedance 8,

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wherein a playback facility is provided and 9 are selected so that it does indeed conduct at the high frequencies of the high frequency generator 3, a significant current as compared to the bias current. However, the additional impedance has a high impedance to the sound frequencies, relative to the impedance of the sound head 1, so that the additional impedance has little influence on the passage of the sound frequency signals to the sound head.

WHAT WE CLAIM IS:-

1. A magnetic tape recording unit comprising a circuit arrangement for the changeover of the bias of the recording head, the circuit arrangement comprising an impedance selectively connectible in parallel with the recording head of the unit to reduce the bias current through the recording head.
2. A unit according to claim 1, wherein the parallel impedance has values which give it a high impedance to sound frequencies.
3. A unit according to claim 1 or 2,

the selective connection is carried out by a single pole changeover switch which selectively connects either the parallel impedance or one branch of an equalising network of a playback signal amplifier provided in the unit to a fixed potential.

4. A unit according to claim 3, wherein, for a cassette tape recorder, the changeover switch is arranged to be actuated mechanically directly by the insertion of a cassette which has a mechanical coding for the actuation of the switch in dependence on the type of tape contained therein.

5. A magnetic tape recording unit comprising a circuit arrangement for the changeover of the bias of the recording head substantially as described herein with reference to the drawing.

J. F. WILLIAMS & CO.,  
Chartered Patent Agents,  
113 Kingsway,  
London WC2B 5QP.  
For the Applicants.

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