There is known in the case of commercial video recorders based on the helical scanning method the use for head drum and magnetic tape drives of automatic motor controls, which produce conditions regarding the reference position of video heads and magnetic tape which are optimum for the interaction of the two drives.

Said precision controls, also called servo controls, are determined by reference signals, which serve as a common source for the interlinking of the various control arrangements.

In the VHS standard it is laid down, for example, that the magnetic tape must wrap around a head drum with two magnetic heads by slightly more than 180^0. A field is recorded in a track in the 180^0 wrap around region by each magnetic head which is in engagement with the magnetic tape. Further lines are recorded in a region extending beyond 180^0 by some 3^0, so that an overlapping zone of two adjacent tracks is obtained during the recording of some six lines. The position of said overlapping zone is fixed in its mean correlation at 6.5 ± 1.5 lines prior to the arrival of a vertical sync pulse. It is also the so-called switching position for the switching over of the magnetic heads during play-back. For the switching on and off of the magnetic heads in said switching position there are attached e.g. at the periphery of the head drum in a fixed correlation one or more small magnets, which generate in one or more stationary coils at the start of each magnetic track pulses from which the head switch-over is derived. Since both the arrangement of the magnets and also the position of the generator coils are subject to tolerances, mechanical adjustment e.g. of the coils is required in order to achieve the required correlation of the head switching pulse with the vertical pulse. Optical generators are also known for the generation of head switching pulses, which have to be adjusted just like the electromechanical generators. It is possible to replace a mechanical adjustment by settable electric circuits, e.g. by variation of the run time of one-shot multivibrators.

The setting of the head switching pulse generator in the factory or during a service requires, because of the high degree of accuracy required, considerable outlay on measuring equipment and calls for skilled operating personnel. Experience also shows that mechanical-electrical settings of this kind are liable to be somewhat unreliable.

The aim of the invention is to simply the setting operation so that an optimum setting can be achieved with small outlay.

This aim is achieved by the invention described in claim 1. Advantageous developments are described in the dependent claims.

There is known from DE-A-2 211 704 a tape driving device in which, by means of stored correction signals which are correlated with various angular positions of the tape drive shaft and are scannable in synchrony with rotation of the latter, differences between the actual value of the tape speed and the actual value of the tape driving speed are offset by addition of the correc-

tion signals to the deviation signals. The obtaining of the correction signals (in a setting operation during recording and playback of a signal of stable frequency) and their correlation take place by means of a pulse generator connected to the tape drive shaft. By means of said method disclosed there it is possible simply to improve the synchronism between recording speed and playback speed in the case of a video recorder.

There is known from DE-B2-2 339 406 a recording and playback device for video signals, in which a new recording is able to follow an existing recording free from interference. To this end the servo system for the tape drive is first of all prepared for the new recording by synchronizing it with the vertical sync pulses of the new recording, there being derived from said vertical sync pulses and from the sync pulses of the existing recording which are scanned with the stationary monitoring head signals and said signals being stored. Said signals, which are passed during the new recording to a first control input of the tape drive servo system, moreover serve as the desired signal, while the tacho signals produced with a tacho-generator of the tape drive, which are passed to a second control input of the tape drive servo system, form the actual signal. No provision is however also made there for the generation and storing of a correction signal for a time correction of the head switching pulses on the basis of a wrong setting of the head switching pulse generator.

The invention consists in principle in no longer modifying an actual mechanical state resulting from the mounting of the pulse generator. Signals are therefore emitted whose time sequence does not conform to the times laid down by the respective system standard. In a service position, obtained by switches or bridges during a setting operation, the respective timing error of the pulse position is corrected by means of a step-wise or continuously varying correction signal, which is added to the signal generated by the pulse generator. Said correction signal is generated e.g. in a ramp generator and stored in a non-volatile store in conjunction with the signals emitted by the pulse generator on the attainment of a desired value conforming to the standard. After cancellation of the service position the respective stored correction signal is added to the non-set signals as a correction value.

Such an offsetting operation pre-supposes that a setting is already obtained automatically without any special setting operation during the mounting of the unit, namely by the laying down of a particular bolted-on position for the head switching pulse generator. The head switching pulses generated by the pulse generator must in fact be generated earlier than 6.5 lines in time prior to the arrival of the vertical pulses from the video signal in order to achieve a correction by delaying of the pulses emitted.

An indicator for a setting may be e.g. an oscillographic picture, on which the vertical pulses coming from the reference tape are shown with the head switching pulses.

The invention will be explained in detail from an example with reference to the figure.

The latter shows in a block circuit diagram a possibility for the electrical correction of a wrongly set pulse generator during a service.

The service setting takes place during the playback of a reference tape which has been recorded exactly according to standard. For the setting a connection is required which is made by the switch S1.

In the pulse generator 1 pulses are generated by the rotation of a head drum 2, which serve on the one hand for the synchronisation of the servo controls and on the other as a reference for the switching over of the magnetic heads arranged in the head drum. It is laid down e.g. according to the VHS standard that the head switching, i.e. the emission of a pulse during playback, must take place 6.5 lines prior to the arrival of a vertical sync pulse recovered from the recorded FM with a tolerance of ± 1.5 lines. In order to determine the wrong setting of the non-settable pulse generator 1, the vertical sync pulses recovered from the FM of the played back reference tape and the signals supplied from the pulse generator 1 are e.g. compared with one another on a screen in terms of their phase position at the output A of a phase positioner 5. During the setting operation there is generated in the ramp generator 3 a signal varying in its magnitude between two extreme values and controlled by the frequency converter 6, which is fed via storage means 4 to the phase positioner 5. At the output A of phase positioner 5 there appears as a function of the correction signal generated in the ramp generator 3 the signal varying in time from generator 1. If the phase position of the signal at the output A coincides with the value laid down by the standard, switch S1 is opened. The last correction value generated by the ramp generator 3 is stored in storage means 4 and the setting operation for correction of the time at which the head switching takes place is concluded. All the signals generated by pulse generator 1 are now, with the aid of the correction signals deposited in the storage means 4, outputted in the phase positioner 5 delayed in time by the wrong amount of the mechanical pre-setting. Storage and delaying may take place in analog or else in digital form. The delayed signals from the phase positioner 5 are made available for the head switching at the output A. In addition they serve for the generation of the phase error voltage for the servo controls of the magnetic tape drive during playback.

The setting described above has been described with reference to a block circuit diagram as an exemplifying embodiment with known structural elements. It is also possible, however, to realize the sequences described in a setting routine with the aid of a microcomputer or microprocessor and to integrate large sections of the structural elements in such a computer or processor. It is moreover possible to automate the setting operation still further with the aid of a sequence generator, by e.g. several

comparison measurements taking place by continuous measurement with a storage means in strictly predetermined steps.

Claims

1. Video recorder with a rotating head drum partly wrapped around with a magnetic tape and bearing magnetic heads, with a pulse generator (1) generating signals due to the rotation of the head drum, in which signal differences in time caused by wrong mechanical setting of the pulse generator (1) compared with the values prescribed by the respective system are modifiable in a service setting operation by correction signals from a generator (3), which are stored in a non-volatile storage means (4) and after completion of the setting operation added as a time correction to the signals supplied by the pulse generator (1).

2. Video recorder according to claim 1, characterised in that the generator (3) is a ramp generator.

3. Video recorder according to claim 1 or 2, characterised in that the service setting operation takes place during playback of a reference tape.

4. Video recorder according to any one of claims 1 to 3, characterised in that the service setting operation is carried out in a microprocessor or microcomputer.

5. Video recorder according to claim 4, characterised in that the microprocessor or microcomputer is also used in the servo and sequence controls.

6. Video recorder according to any one of claims 4 and 5, characterised in that the microprocessor or microcomputer is brought into the service setting operation by a pulse or by a statically acting signal into a setting routine.

7. Video recorder according to any one of claims 1 to 6, characterised in that the pulse generator (1) has no possibility of mechanical adjustment.

8. Video recorder according to any one of claims 1 - 7, characterised in that the ramp generator (3) is controlled by signals which are derived by a frequency convertor (6) from the signals from the pulse generator (1).

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8. Video recorder according to any one of claims 1 - 7, characterised in that the ramp generator (3) is controlled by signals which are derived by a frequency convertor (6) from the signals from the pulse generator (1).

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9. Video recorder according to any one of claims 1 to 8, characterised in that the ramp curve is step-shaped, or is rising and falling continuously or in a triangle shape, and after attainment of a maximum value drops back to its minimum value.

10. Video recorder according to any one of claims 1 - 10, characterised in that during a complete rotation of the head drum the ramp curve is not modified.