In the digital audio tape (DAT) standard and the so-called AES/EBU interface used for the digital connection of a plurality of appliances, there is provided a source identification which is used for the checking of all recording and/or copying processes within the framework of the standardised "Serial Copy Management System" (SCMS) of DAT.

Furthermore, in VHS and S-VHS video recorders, analogue solutions are in use or are being investigated, in which the signals on prerecorded cassettes are so modified relative to the normal standard that, when an attempt is made to copy these onto a standard recorder, they affect its synchronisation system or destroy the colour registrations or the like. These systems, which are intended to prevent unlicensed copies, can however be made ineffective by means of relatively simply add-on devices.

A system for checking recording and/or copying processes according to the introductory part of claim 1 is disclosed in EP-A-0328141.

The object of the invention is to provide a recording and/or copying system which effects a more secure checking of the recording processes.

This object is achieved by the features specified in claim 1. Advantageous developments are apparent from the appendant claims.

In accordance with the invention, auxiliary signals are used which are recorded on tape as e.g. digital sub items of information, so-called subcodes, in addition to the picture and sound signals. The tape recording or the video cassette is made identifiable as regards its original source by means of the auxiliary signal. This information can be used to correspondingly control all possible subsequent video recorders to ensure that copying restrictions, e.g. by way of copyright, are observed and to avoid unauthorised copying processes. From the decoding of the

auxiliary signal, it can be determined and e.g. distinguished,

- as to whether the cassette has been recorded by the owner himself using a camera or a camcorder and consequently is presumably free from copying restrictions or

- as to whether the cassette originates from a copying plant and consequently is presumably subject to a copying restriction or

- as to whether the cassette has been recorded via the tuner input of a video recorder and consequently can be copied possibly for private purposes without restrictions.

With the system in accordance with the invention for the checking of recording and/or copying processes, especially for video recorders and camcorders as well as in connection with digital recording on tape, auxiliary signals containing coded items of information regarding the source from which the signals that are to be recorded originate are recorded on tape during the recording of picture and/or sound signals.

Preferably, the auxiliary signals incorporating the items of information regarding the signal source are recorded separately or together for the sound and picture signal.

For example a camcorder - a combination device consisting of video camera and video recording device - in accordance with the invention when recording with the camera automatically records on the tape, in addition to the picture and/or sound signals, auxiliary signals, having a fixed predetermined coding that renders this recording identifiable as originating from a camcorder.

With a video recorder in accordance with the invention having a plurality of inputs, during the recording there are automatically recorded, in addition to the picture and/or sound signals, auxiliary signals, with a coding which is dependent on the respective input used, and which makes this recording identifiable as regards the used input.

With a video recorder in accordance with the invention to which are supplied picture and/or sound signals that already contain auxiliary signals incorporating a source dependent coding, these are used for the control of recording parameters. In addition, these auxiliary signals can be modified in accordance with predetermined rules and in dependence on the respectively used input and can be recorded on the tape.

An unaltered recording on the tape is likewise possible for identifying the source.

In the reproduction mode of a video recorder in accordance with the invention, the auxiliary signals read from the tape are emitted at the respective outputs together with the picture and/or sound signals.

Advantageously, in a video recorder in accordance with the invention, there can be devices with which picture and/or sound signals at an input can be analysed for the appertaining auxiliary signals for the identification of the source.

With the recording and/or copying system in accordance with the invention, advantageously there is caused an automatic generation of coded auxiliary signals which subsequently allow the source or the input or the input standard use to be identified from the tape.

These auxiliary signals for automatically processable identifications that are stored on the video tape serve a multitude of conceivable applications and

instances for the automatic control of matching and the checking of copying, editing, recording and reproduction functions.

The solution in accordance with the invention is applicable in future digital video recorders having diverse inputs such as for example a PAL tuner, a satellite tuner, HD-MAC, SCART, golden SCART, digital copying input, video disc or a digital camcorder. Items of information are automatically recorded on the tape regarding the input and/or the source of the video signals that are to be recorded and/or the relevant standard and, during the reproduction, these items of information are emitted from all the outputs combined with the video signal. In case a signal which is to be recorded and which is already provided with a coding is present on an input of a video recorder, the coding contained therein is evaluated and preferably used for the control of recording parameters of the recorder and is then again recorded, either unaltered or modified in accordance with certain rules, on the tape to be recorded on. For example, in accordance with the invention, a signal originating from a video disc could, in principle, cause recording to be blocked, while other signals could be re-recorded with some restriction or freely re-recorded.

In the example of the video disc for example, a one-off copy could be allowed on the tape in which the coded auxiliary information of the video disc is recorded modified on the tape and only subsequently would a further attempt at copying from the copied tape be prevented.

Due to the solution in accordance with the invention, there is provided a high degree of flexibility in logically distinguishing different cases on the basis of the source information for controlling the functioning of the equipment and for ensuring, if necessary, that copying is prevented. In addition to preventing copying, an intelligent video recorder could switch over to a lower recording quality (e.g. long-play) e.g. for input signals of lower technical quality (e.g.

PAL, SECAM) and e.g to normal speed for HDTV input signals.

A further advantage lies in the consistent, and already stipulated in the existing standard, implementation of the proposed system in a fully new generation of equipment (digital video recorders). Hereby, some of the problems with present day copy protection systems, which always have to work with old recorders, can be avoided.

The invention will now be explained with reference to the drawings. Therein

Fig.1 shows copy protection for a recording by means of a camcorder

Fig.2 shows copy protection for a purchased cassette

Fig.3 shows copy protection for a hired cassette

Fig.4 shows copy protection for a recording by means of a desk-top recorder

Fig.1 shows an example of a copy protection arrangement for a recording by means of a camcorder 10. The output signal of the camcorder 10 can be supplied to a digital video recorder 14 via e.g. an output interface or be directly recorded on a cassette 16. The signal of the camcorder 10 supplied to the video recorder 14 can be stored on a cassette 22. In accordance with the invention, a subcoded 12 is recorded with the signal on the tape 16 as well as being present at the output of the camcorder 10. The subcode 12 contains as source identification for the camcorder 10, SI = KR for example. A copy counter CC contained in the sub code 12 contains the value 0. The word "no" is set as the copy protection information CP for the camcorder 10. Due to this copy protection information CP = "no", a desired amount of duplication is permitted. Thus the cassette 16 can be reproduced via a further digital video recorder 18

and be recorded on the cassette 22 by a third video recorder 20. The sub code 24 recorded by the video recorders 14, 20 is virtually identical to the sub code 12 produced by the camcorder 10. Preferably, the value of the copy counter CC is increased by "1" during each copying process.

Fig.2 shows an example of a copy protection arrangement for a purchased, prerecorded cassette 26. This cassette 26 contains, in addition to the item of programme information, a sub code 32 having e.g. a source identification SI = OB for indicating that it is a purchased, prerecorded cassette 26. The copy counter CC is set to "O", the copy protection information CP to "yes". A thus identified cassette 26 can be reproduced by a video recorder 28 and a back-up copy 34 can be prepared by means of a video recorder 30. The back-up copy 34 then contains a sub code in which the copy counter is set to "1". A further copy of the back-up copy 34 by means of a further video recorder 36, 38 is then no longer possible.

Fig.3 shows an example of a copy protection arrangement for a hired, prerecorded cassette 52. This cassette 52 contains, in addition to the item of program information, a sub code 50 or 58 having e.g. a source identification SI = OR for indicating that it is a hired prerecorded cassette 52. The copy counter CC is set to "O" or "1", the copy protection information CP to "yes". A thus identified cassette 52 can be reproduced by a video recorder 54. A back-up copy cannot be prepared by means of a video recorder 56.

Fig.4 shows a copy protection arrangement for a recording by means of a digital video recorder 43. The video recorder 43 can have inputs a to e for example, wherein the input a represents a camera input, input b a SCART input, input c a SCART input for HDTV signals, input d an antenna input and input e an input for an optical disc signal. In an input section 41 of the video recorder 43, the inputs a to e lead to a tuner and demodulator 46 at the outputs d1 to d4 of which

can be derived e.g. TV signals of different standards. These outputs d1 to d4 are lead to an input selection stage 42 of the video recorder 43. A recording and reproduction stage 44 which includes a digital interface out is attached to this input selection stage 42. Recorded items of information are stored on a cassette 48. This cassette 48 and the digital interface out contain a sub code as is described in Figs. 1 - 3. Thus the source identification SI can contain the information regarding the different inputs of the video recorder 43 and/or of the type of demodulation. The setting of the copy counter is dependent on the input state, likewise the copy protection information.

The video recorder 43 will copy the existing source identification code SI for the copy of a recording. In the event that a source identification code SI is not present, this is generated by the video recorder 43 in dependence on the source that is to be recorded.

CLAIMS

1. A system for the checking of recording and/or copying processes in video recorders (14) or camcorders (10), in which during the recording of - especially digital - picture and/or sound signals, auxiliary signals (12,14), which contain additional coded items of information regarding the type of recording are recorded on the tape, characterised in that the auxiliary signals contain an item of information relating to the quality of the original source from which originate the signals to be recorded and that the video - or camcorder automatically switches over to a recording quality corresponding to the quality of the original source, especially taking into account the copy generation (CC).

2. A system according to claim 1, characterised in that a video recorder having a plurality of inputs (a-e) when recording, automatically records, in addition to the picture and/or sound signals, auxiliary signals having a coding that is dependent on the respective used input and that renders this recording identifiable with respects to the used input.

3. A system according to claim 1 or 2, characterised in that a video recorder, to which picture and/or sound signals that already contain auxiliary signals having a source dependent coding are supplied for the recording, uses these for the control of recording parameters.

4. A system according to claim 1 or 2, characterised in that, a video recorder, to which picture and/or sound signals that already contain auxiliary signals having a source dependent coding are supplied for the recording, modifies these in accordance with predetermined rules and in dependence on the respective used input (a-e) and records them on the tape.

5. A system according to one or more of claims 1 to 4, characterised in that for each further copy generation a corresponding value (CC) in the auxiliary signals is incremented.