~~System for recording and detecting marking signals~~ Recording and evaluating system for cue signals.

The invention relates to a system for recording and detecting marking signals which can be stored on and scanned from a record carrier and which can be distinguished from one another, comprising a recording device for recording the marking signals to be stored and a detection device for detecting the marking signals being scanned, the recording device comprising a generator device for generating the marking signals to be stored and the detection device comprising a detector means for detecting the marking signals being scanned, which generator device comprises a first generator stage for generating a first signal having a first frequency, a second generator stage for generating a second signal having a second frequency, the first frequency and the second frequency being different, a first time-control stage by means of which the length of time of the first signal can be defined, and a second time-control stage by means of which the length of time of the second signal can be defined, the first time-control stage defining a given value T for the length of the first signal and the second time-control stage at the same time defining the value zero for the length of the second signal in order to generate a marking signal of a first type consisting only of the first signal, and the first time-control stage defining the value T for the length of the first signal and the second time-control stage at the same time defining the value T for the length of the second signal in order to generate a marking signal of a second type consisting of the first signal and of the second signal, said detector means comprising a first detector stage for detecting a signal scanned from the record carrier and corresponding to the first signal, a second detector stage for detecting a signal scanned from the record carrier and corresponding to the second signal, which stages each supply an output signal when the relevant corresponding signal occurs, and a logic stage which follows the two detector stages and which, depending on the output signals of the two detector stages, generates and supplies detection signals corresponding to the marking signals scanned from the record carrier.

Such a system is employed in a dictation system manufactured and marketed by the Applicant and referred to as the "mini-cassette dictation system", the

system comprising desk-top dictation machines and portable dictation machines, which enable dictations to be recorded as well as reproduced, and transcription machines, which are only suitable for the reproduction of dictations. In this known dictation system, the system employed therein for recording and detecting marking signals, which is of the type defined in the opening paragraph, enables marking signals of two different types to be recorded on the record carrier in the form of a magnetic tape to mark specific dictated passages by recording the marking signals and to locate these passages by detection of the marking signals scanned. In this system a marking signal of a first type, which is constituted by a first sinewave signal having a frequency of 40 Hz, which appears, for example, for a length of time of 650 ms and which is recorded on the magnetic tape at a given normal speed of transport of said tape, then enables the end of a dictation to be marked. By means of a marking signal of the second type, constituted by the first sinewave signal having a frequency of 40 Hz and a second sinewave signal having a frequency of 1500 Hz, which signals are generated simultaneously for the same length of time of 650 ms and are recorded on the magnetic tape at the same normal speed of transport of this tape, it is possible to mark dictated passages for which the dictator has given or wishes to give special instructions, indications for correction or the like, to be observed during transcription of the dictation. As is evident from the foregoing, the marking signals of the first and the second type in the known system differ from each other in that a marking signal of the first type comprises only one signal having a given frequency and a given length, and a marking signal of the second type comprises two signals, one signal having the same frequency as the first marking signal and the other signal having a different frequency, which signals both have the same length as the first marking signal.

In the known system the marking signals of the first and the second type scanned from the tape are detected at a speed of transport of the magnetic tape which is higher than the speed at which the marking signals are recorded, this speed of transport being, for example, a factor of 20 higher than the speed of transport during recording of the marking signals. This higher speed of transport during detection of the marking signals being scanned results in the signals forming the marking signals being subjected to a frequency conversion by a factor of 20, so that during detection of a marking signal of the first type a signal having a frequency of 800 Hz is obtained, which corresponds to the first sinewave signal of a frequency of 40 Hz, and during detection of a marking

signal of the second type a signal having a frequency of 800 Hz, corresponding to the first sinewave signal having a frequency of 40 Hz, and a signal having a frequency of 30 kHz, corresponding to the second sinewave signal having a frequency of 1500 Hz, is scanned from the magnetic tape. For this reason the detection device for the marking signals of the first and the second type scanned from the magnetic tape in the known system comprises detector means comprising a first detector stage for detecting a signal of a frequency of 800 Hz and a second detector stage for detecting a signal of a frequency of 30 kHz, both stages each supplying an output signal when the corresponding signal occurs, which output signal is applied to a logic stage following the two detector stages. If only the first detector stage supplies such an output signal the logic stage will produce a detection signal corresponding to a marking signal of the first type. If both detector stages supply an output signal the logic stage will supply a detection signal corresponding to a marking signal of the second type. These detection signals can be applied to an optical or acoustic signalling device. However, they may also be applied to a stop device for stopping the drive system for the magnetic tape, so that upon detection of a marking signal the magnetic tape transport is discontinued in that the drive system for the magnetic tape is switched off.

In the known system for recording and detecting marking signals, as described in the foregoing, it is possible only to record and detect different marking signals of a first and a second type. This is found to be a drawback limiting the use of the apparatuses of the known dictation system because it proves that there is a need for further marking possibilities by means of marking signals, which cannot be realised with the known system for recording and detecting marking signals.

Therefore, it is an object of the invention to meet this requirement and to construct a system of the type defined in the opening paragraph in such a way that by means of the system in accordance with the invention at least a marking signal of a third type can be generated and detected and, although it is not possible to detect the nature of such a marking signal of the third type, its presence can also be detected by means of a detection device of the prior-art system in order to guarantee compatibility between the prior-art system and the system in accordance with the invention with respect to the detection of the presence of marking signals. In accordance with the invention this object is achieved in that for generating at least one marking signal of a third type made up of the first signal and the second signal at least one of the two time-

control stages sets the length of the relevant signal which can be defined by said stage to at least a value which differs from the value T, and in that, in addition to the two detector stages for detecting the two signals scanned from the record carrier and corresponding to the first signal and the second signal, the detector means comprises a time-measurement stage for measuring the length of said at least one corresponding signal, for which at least a length which differs from the value T can be defined by means of one of the two time-control stages, which time-measurement stage depending on the measured length applies different measurement values to the logic stage in order to generate detection signals corresponding to the marking signals scanned from the record carrier. In this way it is achieved that at least a new marking signal of a third type becomes available, which signal comprises two signals of different frequencies in the same way as a known marking signal of the second type. In order to distinguish a new marking signal of the third type from a known marking signal of the second type the length of at least one signal in a marking signal of the third type is selected to differ from the length of this signal in a marking signal of the second type, so that by detection of these different lengths a marking signal of the third type can be distinguished unambiguously from a marking signal of the second type. Since such a new marking signal of the third type is made up of the same two signals as a known marking signal of the second type, a marking signal of the third type can also be detected by means of a detection device provided for the detection of a marking signal of the second type in the known system, in which the nature of a new marking signal of the third type cannot be distinguished from that of a known marking signal of the second type but in which it is very well possible to detect the presence of such marking signals of the third type. Thus, the known system and the system in accordance with the invention are compatible with respect to the detection of the presence of marking signals.

In this respect it is to be noted that, for example, from DE-OS 20 29 090, it is known *per se* to utilise marking signals having different lengths in time. However, in accordance with DE-OS 20 29 090 all these known marking signals are constituted by a single signal of given frequency, whereas in accordance with the invention the marking signals are made up of two signals of different frequencies and having different lengths in time, which has the advantage that these marking signals can be detected in a

simple manner independently of the driving speed or the speed of transport of the record carrier during detection.

In order to generate at least one marking signal of the third type both the first time-control stage and the second time-control stage can each define at least one value which differs from the values zero and T for the length of the relevant signal. However, it is found to be advantageous if for generating at least one marking signal of the third type the first time-control stage defines the value T for the length of the first signal and, at the same time, the second time-control stage defines at least a value which differs from the value T for the length of the second signal. This simplifies the generation and detection of all the marking signals because the length of the first signal of the first frequency is the same in all the marking signals of the three different types. Therefore, in order to detect all the marking signals of the three different types, it is only required to detect the mere presence of the signal corresponding to the first signal by means of the first detector stage, without the necessity of determining the length of the signal corresponding to the first signal.

It is then also found to be advantageous if for generating a marking signal of the third type the first time-control stage defines the value T for the length of the first signal and, at the same time, the second time-control stage defines the value T/2 for the length of the second signal. Such a marking signal of the third type can be distinguished very reliably and easily from the known marking signals of the first and the second type, which is an advantage for a correct detection of the marking signals.

It is further found to be advantageous if for generating at least one marking signal of the third type the two time-control stages define the same starting instant for both signals. This greatly simplifies time-control of the time-control stages.

The time-control stages may be constructed, for example, as gate circuits enabling the first and second signals, which are generated continuously by the generator stages, to pass through for the relevant length of time. However, it is found to be advantageous if the two time-control stages activate the two generator stages to generate the first and the second signals. This is advantageous for a minimal power consumption if the generator stages are constructed by means of discrete components and for a simpler program sequence, requiring a minimal storage capacity, if the generator stages are constructed by means of a microprocessor

In a system in accordance with the invention, comprising a first actuating element for starting the generation and recording of a marking signal of the first type and a second actuating element for starting the generation and recording of a marking signal of the second type, which actuating elements are known *per se* from the mini-cassette dictation system mentioned in the foregoing, it is also found to be advantageous if the generation and recording of at least one marking signal of the third type can be started by actuating one of the two actuating elements at least twice in succession within a predetermined time interval. Thus, it is not necessary to provide at least one separate actuating element for starting the generation and recording of at least one marking signal of the third type, which is an advantage in order to realize an apparatus of simple construction comprising a minimal number of actuating elements.

In a system in accordance with the invention it is also found to be advantageous if the detector means comprises a first time-measurement stage for measuring the length of the signal scanned from the record carrier and corresponding to the first signal, if the detector means comprises a second time-measurement stage for measuring the length of the signal scanned from the record carrier and corresponding to the second signal, which stages both supply their measurement values to the logic stage and, depending on the ratio between the measurement values supplied to the logic stage, said logic stage generates detection signals corresponding to the marking signals being scanned. Thus, it is achieved that the detection of the marking signals being scanned is independent of the driving speed or speed of transport of the record carrier during scanning of the marking signals.

The invention will be described in more detail hereinafter with reference to exemplary embodiments which are shown in the drawings but to which the invention is not limited. Fig. 1 shows diagrammatically a dictation machine for recording and reproducing speech signals on/from a record carrier in the form of a tape, which machine comprises a system for recording and detecting marking signals, which system enables marking signals of three different types to be recorded and detected. Fig. 2 is a flow chart of a program for generating said marking signals of three different types in the machine shown in Fig. 1. Fig. 3 shows the signal waveform of a marking signal of a first type, generated in accordance with the program given in Fig. 2. Fig. 4 shows the signal waveform of a marking signal of a second type, generated in accordance with the program of Fig.2. Fig. 5 shows the signal waveform of a marking signal of a third type

generated in accordance with the program of Fig. 2. Fig. 6 is a flow chart of a program for the detection of marking signals of three different types as shown in Figs. 3, 4 and 5. Fig.7 shows a part of a recording device for marking signals of a second system in accordance with the invention for recording and detecting marking signals, which is a modification of the embodiment shown in Fig. 1. Fig. 8 shows a part of a detection device for marking signals of a third system in accordance with the invention for recording and detecting marking signals, which is a modification of the embodiment shown in Fig. 1. Fig. 9 shows a further marking signal of the third type, which can be generated by means of a system in accordance with the invention for recording and detecting marking signals. Fig. 10 shows still another marking signal of the third type, which can be generated by means of a system in accordance with the invention for recording and detecting marking signals.

Fig. 1 shows diagrammatically those parts of a desk-top dictation machine 1 which are relevant to the invention, by means of which dictation machine speech signals can be recorded on a magnetic tape 2 contained in a cassette, not shown, and can be scanned from said tape in order to be reproduced. Fig. 1 shows a part of the magnetic tape 2. The magnetic tape 2 has two tracks 3 and 4, indicated in broken lines, which can be scanned in opposite directions of transport of the magnetic tape to record and reproduce signals by means of a magnetic recording/reproducing head 5.

For scanning the track 3 the magnetic tape 2 is driven in a direction indicated by an arrow 6. This transport of the magnetic tape 2 is realised by means of a motor-driven tape-drive device 7 shown diagrammatically, which drives the magnetic tape 2 *via* winding mandrils coupled to reel hubs in a cassette, as is indicated symbolically by means of the broken lines in Fig. 1. The tape-drive device 7 comprises three control inputs 9, 10 and 11, which can be controlled by a control stage 12 to switch the tape drive device 7 to three different modes, in which tape transport is effected at the normal speed in the direction indicated by the arrow 6, at twenty times said speed in the direction indicated by the arrow 6 and at twenty times said speed in a direction opposite to that indicated by the arrow 6. The tape drive device 7 further comprises a control input 13 *via* which this device can be switched off to stop the transport of the magnetic tape 2.

In the present apparatus the control stage 12 forms part of a microprocessor 14, represented diagrammatically by a dash-dot line in Fig. 1. By means

of the control stage 12 it is possible to determine *via* interrogation inputs 15 whether a key and which key of a keyboard 16 for selecting the modes and functions of the apparatus has been actuated. In addition, the control stage 12 supplies control signals *via* control outputs 17 of this stage for controlling apparatus sections, such as the tape-drive device 7.

A microphone 18, which can be plugged into the apparatus 1, is connected to this apparatus. The output signals of the microphone 18 are applied to a recording amplifier circuit 19, whose output signals are fed to a summing stage 20. The output signals of the summing stage 20 are applied to a recording/reproduction switch 21, which transfers the signals applied to it to the magnetic head 5 in the switch position shown in solid lines in Fig. 1, to which position it is set in order to record signals. In this way speech signals corresponding to a dictated text can be recorded on the magnetic tape 2. When signals are recorded an oscillator 22 is activated, which applies a bias and erase signal to the magnetic head 5 during signal recording. The recording/reproducing switch 21 and the oscillator 22 each comprise a control input, 23 and 24 respectively, *via* which they can be controlled by the control stage 12.

For the reproduction of speech signals the control stage 12 sets the switch 21 to its dashed position in Fig. 1. As a result of this, speech signals scanned from the magnetic tape 2 by the magnetic head 5 are applied to a reproducing-amplifier circuit 25, whose output signals are fed to a loudspeaker 26 for acoustic reproduction. Instead of to the loudspeaker the output signals of the reproducing amplifier circuit 25 can be applied to a head set *via* which the dictation can be monitored for transcription.

Fig. 1 shows diagrammatically that a first dictation 27 and a second dictation 28 are stored on the magnetic tape 2. In such a dictation machine it is found to be very useful and practical if specific passages of the recorded dictation or dictations can be marked by marking signals when desired. In Fig. 1 such marking signals are indicated symbolically and bear the references M1, M2 and M3. As will become apparent from the following description the present apparatus enables marking signals of three different types to be recorded on the magnetic tape 2 and to be subsequently detected.

For this purpose the apparatus 1 comprises a system 29 for recording and detecting mutually distinguishable marking signals M1, M2 and M3 which can be recorded, stored on and scanned from the magnetic tape. For starting the generation and

recording of a marking signal M1 of the first type the apparatus 1 has a key A. For starting the generation and recording of a marking signal M2 of the second type the apparatus 1 has a key B. The generation and recording of a marking signal M3 of the third type, as will be described in detail hereinafter, can be started by actuating the key A twice in succession within a predetermined time interval. In this way it is achieved that no separate key is needed for starting the generation and recording of the marking signals of the third type. In order to start the detection of marking signals M1 of the first type a key C is provided, to start the detection of marking signals M2 of the second type a key D is provided, and to start the detection of marking signals M3 of the third type a key E is provided. The keyboard 16 comprises further keys which serve, for example, for starting the "recording" mode, the "reproduction" mode, the "fast forward" mode and the "fast reverse" mode and the like.

The system 29 for recording and detecting marking signals comprises a recording device 30, indicated diagrammatically in Fig.1 by a broken-line frame, for recording the marking signals to be stored, and a detection device 31, also indicated by a broken-line frame in Fig. 1, for the detection of the marking signals being scanned. The recording device 30 comprises a generator device 32 for the generation of the marking signals to be stored. The detection device 31 comprises a detector means 33 for the detection of the marking signals being scanned.

The generator device 32 comprises a first generator stage 34 for generating a first signal of a first frequency, and a second generator stage 36 for generating a second signal of a second frequency. The frequency of the first signal is 40 Hz and the frequency of the second signal is 1500 Hz. In the present case the two generator stages 34 and 35 are realised by means of the microprocessor 14, and they supply pulse-shaped signals. The pulse-shaped signals supplied by the generator stages 34 and 35 are each applied to a filter stage, 36 and 37 respectively, in the form of a low-pass filter, which filters convert the pulse-shaped signals into sinewave signals S1 and S2, which are applied to the summing stage 20, *via* which the signals S1 and S2 are applied to the switch 21 and the magnetic head 5. The generator device 32 further comprises a first time-control stage Z1 and a second time-control stage Z2. The first time-control stage Z1 enables the length of time during which the first signal S1 occurs to be defined. The second time-control stage Z2 enables the length of time during which the second signal S2 occurs to be defined. The two time-control stages Z1 and Z2 are

also realised by means of the microprocessor 14 and are constituted by time-window stages, as will become apparent from the following description of the flow chart in Fig. 2.

The detector means 33 comprises two filter stages 38 and 39, to which the signals scanned by means of the magnetic head 5 are applied *via* the switch 21. It is to be noted that the detection of the marking signal is effected at a speed of transport of the magnetic tape 2 which is a factor of 20 higher than that during the recording of the marking signals. During the scanning of the marking signals this results in a frequency conversion of the stored signals S1 and S2, so that signals S1' and S2' corresponding to the signals S1 and S2 and having a frequency of 800 Hz and a frequency of 30 kHz are scanned. The signal S1' having a frequency of 800 Hz and corresponding to the first signal S1 can be extracted from the mixed signal applied to the filter stage 38 by means of this stage. By means of the second filter stage 39 the signal S2' having a frequency of 30 kHz and corresponding to the second signal S2 can be extracted from the mixed signal applied to this stage. The detector means 33 further comprises a detector stage 40 following the filter stage 38, to detect the signal S1' corresponding to the first signal, and a detector stage 41 following the filter stage 31, to detect the signal S2' corresponding to the second signal S2. The two detector stages 40 and 41 comprise, for example, rectifier stages on whose outputs a given output signal D1 and D2, respectively, is produced when the relevant corresponding signals S1' and S2' occur. The detector means 33 further comprises a time-measurement stage Z3 following the detector stage 40 and a time-measurement stage Z4 following the detector stage 41. The length of time for which the signals S1' and S2', corresponding to the first signal S1 and the second signal S2, appear can be measured by means of the two time-measurement stages Z3 and Z4 respectively, and in the present apparatus this is one twentieth of the length of time of the first signal S1 and the second signal S2, respectively. The two time-measurement stages Z3 and Z4 are also formed by means of the microprocessor 14 and comprise time-counting stages, as will become apparent from the following description with reference to the flow chart in Fig. 6. The two time-measurement stages Z3 and Z4 are followed by a logic stage 42, which is also realised by means of the microprocessor 14 and to which the time-measurement stages Z3 and Z4 supply measurement values C3 and C4, respectively, which differ depending on the measured lengths of the signals S1' and S2', respectively, which logic stage, depending

on the measurement values C3 and C4 applied to it, generates detection signals H1, H2 and H3 corresponding to the marking signals M1, M2 and M3 scanned from the magnetic tape 2. The logic stage 42 has three outputs P1, P2 and P3 connected to a gate circuit 43, which has its output connected to the control input 13 of the tape-drive device 7 and, when a detection signal H1, H2 and H3 appears on one of the outputs P1, P2 and P3, respectively, supplies a control signal to the control input 13 to switch off the tape-drive device 7, so that the magnetic tape 2 is no longer driven.

A program sequence performed in the microprocessor 14 of the apparatus 1 in order to generate the marking signals M1, M2 and M3 of the three different types by means of the system 29 for recording and detecting marking signals will now be described with reference to the flow chart in Fig. 2. This program sequence is started in the block 44. In the next block 45 it is ascertained whether the key A has been actuated. If this is the case, a time window for the time interval T1 of, for example, 500 ms is started in block 46. Subsequently, it is checked in block 47 whether the key A has been actuated a second time. If this is the case, the operator of the apparatus has given the command to generate a marking signal M3 of the third type and to record this signal on the magnetic tape. After this, in block 48 a "marking-signal recording" mode is started, in which the tape-drive device 7 drives the magnetic tape 2 in the direction indicated by the arrow 6 with the normal speed of transport, in which the recording/reproducing switch 21 is set to the switch position shown in solid lines in Fig. 1, and in which the oscillator 22 is started to generate a bias signal. Subsequently, in block 49, a time-window stage constituting the time-control stage Z1 for a time interval T of, for example, 650 ms is started and substantially at the same time a time-window stage constituting the time-control stage Z2 for the time interval T/2, *i.e.* 325 ms, is started. In block 50 this results in the generator stage 34 for the generation of the first signal S1 being activated by the time-window stage Z1 for the time interval T and substantially at the same starting instant the generator stage 35 for the generation of the second signal S2 being activated by the time-window stage Z2 for the time interval T/2. In the blocks 48, 49 and 50 pulse-shaped signals are generated, which are converted into sinewave signals S1 and S2 by the filter stages 36 and 37. In this way a marking signal M3 of the third type is generated, as is shown in Fig. 5. After the block 50 the program proceeds with block 51, which represents a number of further program steps. Upon completion of these program steps in block 51 the program of Fig. 2 continues in block 45.

When it is found in block 47 that the key A has not been actuated two times it is ascertained in block 52 whether the time interval T1 of the time window started in block 46 has expired. The time interval T1 of the time window defines the time within which the key A is to be actuated twice in order to produce the command for generating and recording a marking signal M3 of the third type. If the time interval T1 has not expired the program is continued in block 47. However, if the time interval T1 has elapsed, which means that the key A has been actuated only once by the operator of the apparatus to give the command for generating a marking signal M1 of the first type, the "marking-signal recording" mode is started in block 53 in a way similar to that in block 48. Subsequently, in block 54, the time-window stage constituting the time-control stage Z1 is activated for the time interval T of 650 ms and substantially at the same time the time-window stage constituting the time-control stage Z2 is set to zero. After this, in block 55, this causes the generator stage 34 to be activated by the time-window stage Z1 for the time interval T, the generator stage 35 not being activated by the time window stage Z2. A marking signal M1 of the first type, as is illustrated in Fig. 3, is now generated in blocks 53, 54 and 55. After the block 55, the program proceeds with block 51.

If it is found in block 45 that the key A has not been actuated, it is subsequently checked in block 56 whether the key B has been actuated. If this is not the case, the program proceeds with block 51. However, if said key has been actuated, *i.e.* if the operator of the apparatus has given the command to generate the marking signal M2 of the second type, the "marking-signal recording" mode is started in block 57 in analogy to the blocks 48 and 53. Subsequently, in block 58, the time-window stage constituting the time-control stage Z1 for the time interval T of 650 ms is activated and substantially at the same time the time-window stage constituting the time-control stage Z2 for the time interval T is activated. In block 59 this results in the two generator stages 34 and 35 being activated substantially at the same time by the two time-window stages Z1 and Z2 for the time interval T. A marking signal M2 of the second type as shown in Fig. 4 is now generated in blocks 57, 58 and 59. After the block 59 the program proceeds with block 51.

Hereinafter a program sequence carried out in the microprocessor 14 of the apparatus 1 will be described with reference to the flow chart in Fig. 6, which program sequence serves to detect the marking signals M1, M2 and M3 of three

different types generated as described above. This program sequence is started in block 60. Subsequently, it is ascertained in block 61 whether one of the three keys C, D and E has been actuated. If this is not the case, the program proceeds with block 62, which represents a plurality of program steps. After completion of these program steps in block 62 the present program again proceeds with block 61.

If it is found in block 61 that one of the three keys C, D and E has been actuated, an identification signal is stored in block 63, in order to indicate which of these three keys C, D and E has been actuated. After this the "marking-signal detection" mode is started in block 64, the tape-drive device 7 first driving the magnetic tape 2 at twenty times the normal speed of transport in a direction opposite to that indicated by the arrow 6 until the beginning of the magnetic tape 2 is situated opposite the magnetic head 5, after which the tape-drive device 7 drives the magnetic tape 2 at twenty times the normal speed of transport in the direction indicated by the arrow 6 and the recording/reproducing switch 21 is set to the switch-position shown in broken lines in Fig. 1. Subsequently, it is checked in block 65 whether an output signal D1 appears on the output of the detector stage 40. If this is not the case, the program proceeds with block 62. However, if said output signal is available, which means that a signal S1' is scanned from the magnetic tape 2, a time-counting stage constituting the time-measurement stage Z3 is started in block 66. In block 67 it is subsequently ascertained whether an output signal D2 appears on the output of the detector stage 41. If this is not the case, *i.e.* if no signal S2' is scanned from the magnetic tape, a time-counting stage constituting the time-measurement stage Z4 is set to zero in block 68, the time-measurement stage Z4 then storing the count zero as a measurement value C4. However, if in block 67 an output signal D2 is detected, which means that a signal S2' is scanned from the magnetic tape 2, the time counting stage constituting the time-measurement stage Z4 is started in block 69. Subsequently, it is ascertained in block 70 whether the output signal D2 of the detector stage 41 is still available. If this is the case the program proceeds with block 70 as long as the output signal D2 is available. When it is ascertained in block 70 that the output signal D2 of the detector stage 41 is no longer available, the time-counting stage constituting the time-measurement stage Z4 is stopped in block 71, the count then reached being stored in the time-measurement stage Z4 as the measurement value C4. After block 71, in the same way as after block 68, the program sequence proceeds with block 72, in which it is checked whether the output

signal D1 of the detector stage 40 is still available. If this is the case, the program sequence is continued in block 72 as long as the output signal D1 is available. If it is found in block 72 that the output signal D1 of the detector stage 40 is no longer available, the time-counting stage constituted by the time-measurement stage Z3 is stopped in block 73, the count then reached being stored in the time-measurement stage Z3 as the measurement value C3.

After this, the quotient of the counts C4 and C3 of the time-counting stages Z4 and Z3 is generated in block 74. Subsequently, it is ascertained in block 75 whether this quotient is zero. If it is zero, which means that a marking signal M1 of the first type has been scanned, it is checked in block 76 whether the key C has been actuated, which key is to be actuated to detect and process a marking signal M1 of the first type. The test in block 76 is carried out by checking the identification signal stored in block 63. If it is found in block 76 that key C has not been actuated, the program proceeds with block 62. However, if it is found in block 76 that the key C has been actuated the logic stage 42 will produce a detection signal H1 on its output P1 in block 77. This detection signal H1 indicates that, as desired, a marking signal M1 of the first type has been detected. This detection signal H1 is applied to the control input 13 of the tape-drive device 7 *via* the gate circuit 43, to switch off the drive when such a marking signal is detected. Obviously, the detection signal H1 can also be utilised in another manner, for example in that it is applied to an optical display device to indicate the presence of a marking signal of the first type. After the block 77, the program sequence proceeds with block 62.

When it is found in block 75 that the quotient of the counts C4 and C3 formed in block 74 is not zero, it is subsequently ascertained in block 78 whether the quotient formed in block 74 has the value ½. If this is the case, which means that a marking signal M3 of the third type has been scanned, it is checked in block 79 whether the key E has been actuated, which key is to be actuated in order to detect and process a marking signal M3 of the third type. If this is not the case, *i.e.* if the key E has not been actuated, the program sequence proceeds with block 62. However, if the key E has been actuated, the logic stage 42 will produce a detection signal H3 on its output P3 in block 80. This detection signal H3 indicates that, as desired, a marking signal M3 of the third type has been detected. After block 80 the program sequence proceeds with block 62.

If it is found in block 78 that the quotient of the counts C4 and C3 generated in block 74 is not ½, this means that in the present case the quotient should have the value 1, *i.e.* a marking signal M2 of the second type must be available, so that no separate check whether the quotient has the value 1 is necessary. Therefore, the program sequence proceeds with block 81 without this check. In block 81 it is checked whether the key D has been actuated, which key is to be actuated in order to detect and process a marking signal M2 of the second type. If it is found in block 81 that the key D has been actuated the logic stage 42 will produce a detection signal H2 on its output P2 in the block 82. This detection signal H2 indicates that, as desired, a marking signal M2 of the second type has been detected. After block 82 the program sequence proceeds with block 62. If it is found in block 81 that the key D has not been actuated, it must be assumed that a marking-signal detection process has been started erroneously, in which case the generation of a detection signal by the logic stage 42 is inhibited and the program sequence consequently proceeds with block 62.

As will be apparent from the above description the system in accordance with the invention very simply enables marking signals of three different types to be recorded on the magnetic tape and to be processed after they have been scanned from the magnetic tape. Figs. 3, 4 and 5 show that the marking signal M1 of the first type only consists of the signal S1, which has a frequency of 40 Hz and a length T, and that the marking signal M2 of the second type and the marking signal M3 of the third type comprise the first signal S1, which has a frequency of 40 Hz, and the second signal S2, which has a frequency of 1500 Hz, the first signal S1 having a length T both in the marking signals M1 and M2. The difference between the marking signal M2 of the second type and the marking signal M3 of the third type resides in the fact that the length of the second signal S2 in the marking signal M3 of the third type is only T/2, whereas in the marking signal M2 of the second type it is T. In this way it is achieved that the marking signals of the second and the third type can be distinguished from one another unambiguously and correctly. However, since the marking signals of the second type and of the third type are both made up of the same signals S1 and S2, it is achieved that marking signals of these two types can also be detected by means of a detection device which does not comprise time-measurement stages for the lengths of the signals S1' and S2' corresponding to the signals S1 and S2 but which comprises only detector stages by means of which the mere presence of the corresponding signals

S1' and S2' can be detected. Such a detection device does not enable marking signals of the second type and marking signals of the third type to be distinguished from one another, but it does enable the presence of such marking signals to be detected. Since the quotient, *i.e.* the ratio between the measurement values of the time-measurement stages, is used for the detection of the marking signals, the advantage is obtained that detection is independent of the speed of transport of the magnetic tape during scanning of the marking signals.

Marking signals of the three types described in the foregoing are recorded on the magnetic tape by a dictator in order to mark dictations or dictated passages. Marking signals of the first type, for example, mark the end of a dictation on a magnetic tape if no specific instructions, wishes or requirements for its transcription have been given. Such a marking signal of the first type is recorded on the magnetic tape when the end of such a dictation stored on the magnetic tape is situated opposite the recording/reproducing head. Marking signals of the second type mark, for example, a part of a dictation stored on the magnetic tape for which the dictator wishes to give or has given a special instruction such as an insert, a correction or another message relating or not relating to the dictation, which message may also be stored on the magnetic tape or, alternatively, on a separate storage element, such as a further magnetic tape or a note. Marking signals of the third type mark, for example, the end or the beginning of a dictation on the magnetic tape to be handled with special attention or priority during transcription; such dictations are referred as priority dictations.

It is obvious that by means of a system in accordance with the invention for recording and detecting marking signals as described above a further marking signal of the third type or also a plurality of such further marking signals of the third type can be stored on the magnetic tape. For example, such a further marking signal of the third type may be made up of the first signal S1, having a frequency of 40 Hz and a length T, and the second signal S2, having a frequency of 1500 Hz and a length T/4. Such a further marking signal of the first type may be used, for example, for marking the end of a group of related dictations stored on the magnetic tape, which group of dictations has been dictated, for example, by a single person, or which group of dictations relates to the same subject. Such a group of related dictations can also be obtained, for example, in that the dictations have been transmitted to a dictation machine which can be connected to the telephone network *via* the telephone network during a single

uninterrupted call, the recording of such a further marking signal of the third type in this dictation machine being started automatically when the transmission of these dictations and the call have ended.

In the embodiment of a second system 29 for recording and detecting marking signals in accordance with the invention, shown partly in Fig. 7, the generator stages 34 and 35 and the time-control stages Z1 and Z2 of the generator device 32 of the recording device 30 are constructed by means of discrete components without the use of the microprocessor 14, in contradistinction to the system shown in Fig. 1. The two generator stages 34 and 35 are constructed as sinewave generators, which continually supply the first signal S1 and the second signal S2. In the present case the two time-control stages Z1 and Z2 are constructed as gate circuits which can be controlled by the control stage 12 and which each time transfer the signals S1 and S2 supplied by the generator stages 34 and 35 for a length of time defined by the control stage 12. The signals S1 and S2 transferred by the time-control stages Z1 and Z2 are applied directly to the summing stage 20, from which the signals S1 and S2 are fed to the magnetic recording/reproducing head to be recorded on the magnetic tape. In the present case it is not necessary to provide filter stages for the signals S1 and S2 before the application of these signals to the summing stage 20.

In a third embodiment of the system 29 for recording and detecting marking signals in accordance with the invention, shown only partly in Fig. 8, the detector means 33 of the detection device 31 is of a construction which differs from that in the system shown in Fig. 1. In said detector means 33 the detector stage 40, by means of which the signal S1' corresponding to the signal S1 can be detected, is not followed by a time-measurement stage. In said detector means 33 the output signal D1 of the detector stage 40 is applied directly to the logic stage 42. Thus, this detector stage 33 only detects the presence of the corresponding signals S1' and not the length of this signal S1', which is possible if the length of the signal S1 and consequently that of the corresponding signal S1' is equal in all the marking signals of the three different types. In processing the marking signals only the presence of the corresponding signal S1' is detected, and in order to distinguish the different types of marking signals, the length of the signal S2' corresponding to the signal S2 is measured, and the logic stage 47 processes the measurement value C4 thus determined together with the output signal D1 of the detector stage 40. In this system 29 the detection signals H1, H2 and H3 are

not applied to the gate circuit but they are each applied to indicator lights L1, L2 and L3 respectively, which are for example turned on briefly to indicate the presence of a mark of the first, the second or the third type, respectively.

Fig.9 shows an example of a further marking signal M4 of the third type. This marking signal M4 is made up of the first signal S1 of a frequency of 40 Hz, for which a length T has been selected, and of the second signal S2 of a frequency of 1500 Hz, for which a length T/2 has been selected, the instant at which the second signal S2 occurs being shifted by a time T/4 relative to the instant at which the first signal S1 appears. Such a marking signal can be processed advantageously because during its processing the instant at which the time-measurement stage for measuring the length of the signal S2' corresponding to the second signal is started is non-critical in relation to the start of the time-measurement stage for measuring the length of the signal S1' corresponding to the first signal S1.

In the case of the further marking signal M5 of the third type shown in Fig. 10 the first signal S1 again has a length T and the second signal S2 has a length T/2 but is now formed by two components each having a length of T/4, spaced from one another by an interval of T/2. This marking signal has the advantage that despite the different lengths of the two signals S1 and S2 the two signals S1 and S2 have the same starting point and the same end point, so that during processing of these signals the time-measurement stages for measuring the lengths of the signals S1' and S2' corresponding to the signals S1 and S2 can be started and stopped at the same time.

As will be apparent from the foregoing, there are several embodiments of a system for recording and processing marking signals in accordance with the invention. For example, the recording device for marking signals in such a system may be incorporated in a separate recording apparatus which is constructed only to record dictations and its detection device may be incorporated in a separate reproducing apparatus, which is constructed only for transcription. Such a system for recording and reproducing marking signals can be employed not only in a dictation system for recording and reproducing dictations but also in other systems for recording and reproducing other information signals. Recording of the marking signals may be effected in the "recording" mode of an apparatus, in the "reproducing" mode of an apparatus, or also in the "stop" mode of an apparatus. The marking signals need not be recorded together with the information signals in the same track of a record carrier but

they may also be recorded in a separate track. Moreover, the marking signals of the third type may have further signal compositions. For example, such a further marking signal of the third type may be composed of the first signal S1 having a length T and the second signal S2 having a length 2T. Alternatively, such a further marking signal of the third type may be made up of the first signal S1 having a length T/3 and the second signal S2 having a length T. In the case of the last-mentioned marking signal of the third type the first signal S1 consequently has a length which differs from the value T.

Claims:

1. A system (1) for recording and detecting marking signals (M1, M2) which can be stored on and scanned from a record carrier (2) and which can be distinguished from one another, comprising a recording device (30) for recording the marking signals (M1, M2) to be stored and a detection device (29) for detecting the marking signals being scanned, the recording device (30) comprising a generator device (32) for generating the marking signals (M1, M2) to be stored and the detection device (29) comprising a detector means (33) for detecting the marking signals (M1, M2) being scanned, which generator device (32) comprises a first generator stage (34, 36) for generating a first signal (S1) having a first frequency, a second generator stage (35, 37) for generating a second signal (S2) having a second frequency, the first frequency and the second frequency being different, a first time-control stage (Z1) by means of which the length of time of the first signal (S1) can be defined, and a second time-control stage (Z2) by means of which the length of time of the second signal (S2) can be defined, the first time-control stage (Z1) defining a given value T for the length of the first signal (S1) and the second time-control stage (Z2) at the same time defining the value zero for the length of the second signal (S2) in order to generate a marking signal of a first type (M1) consisting only of the first signal (S1), and the first time-control stage (Z1) defining the value T for the length of the first signal (S1) and the second time-control stage (Z2) at the same time defining the value T for the length of the second signal in order to generate a marking signal of a second type (M2) consisting of the first signal (S1) and of the second signal (S2), said detector means (33) comprising a first detector stage (38, 40) for detecting a signal (S1') scanned from the record carrier (2) and corresponding to the first signal (S1), a second detector stage (39, 41) for detecting a signal (S2') scanned from the record carrier and corresponding to the second signal (S2), which stages each supply an output signal (D1, D2) when the relevant corresponding signal (S1', S2',) occurs, and a logic stage (42) which follows the two detector stages and which, depending on the output signals of the two detector stages (38-41), generates and supplies detection signals (H1, H2) corresponding to the marking

signals (M1, M2) scanned from the record carrier (2), characterised in that for generating at least one marking signal of a third type (M3) made up of the first signal (S1) and the second signal (S2) at least one of the two time-control stages (Z1, Z2) sets the length of the relevant signal which can be defined by said stage to at least a value which differs from the value T, and in that, in addition to the two detector stages (38-41) for detecting the two signals (S1', S2') scanned from the record carrier and corresponding to the first signal (S1) and the second signal (S2), the detector means (33) comprises a time-measurement stage (Z3, Z4) for measuring the length of said at least one corresponding signal, for which at least a length which differs from the value T can be defined by means of one of the two time-control stages (Z1, Z2), which time-measurement stage depending on the measured length applies different measurement values to the logic stage (42) in order to generate detection signals (H1-H3) corresponding to the marking signals (M1-M3) scanned from the record carrier (2).

2. A system as claimed in Claim 1, characterised in that for generating at least one marking signal of the third type (M3) the first time-control stage (Z1) defines the value T for the length of the first signal (S1) and, at the same time, the second time-control stage (Z2) defines at least a value which differs from the value T for the length of the second signal (S2).

3. A system as claimed in Claim 2, characterised in that for generating a marking signal of the third type (M3) the first time-control stage (Z1) defines the value T for the length of the first signal (S1) and, at the same time, the second time-control stage (Z2) defines the value T/2 for the length of the second signal (S2).

4. A system as claimed in any one of the preceding Claims, characterised in that for generating at least one marking signal of the third type (M3) the two time-control stages (Z1, Z2) define the same starting instant for the lengths of both signals (S1, S2).

5. A system as claimed in any one of the preceding Claims, characterised in that the two time-control stages (Z1, Z2) activate the two generator stages (34-37) to generate the first signal (S1) and the second signal (S2).

6. A system as claimed in any one of the preceding Claims, comprising a first actuating element (A) for starting the generation and recording of a marking signal of the first type (M1) and a second actuating element (B) for starting the generation and recording of a marking signal of the second type (M2), characterised in that the

generation and recording of at least one marking signal of the third type (M3) can be started by actuating one of the two actuating elements (A, B) at least twice in succession within a given time interval.

7. A system as claimed in any one of the preceding Claims, characterised in that the detector means comprises a first time-measurement stage (Z3) for measuring the length of the signal (S1') scanned from the record carrier (2) and corresponding to the first signal (S1), and a second time-measurement stage (Z4) for measuring the length of the signal (S2') scanned from the record carrier (2) and corresponding to the second signal S2), which stages both supply their measurement values to the logic stage (42), and in that depending on the ratio between the measurement values supplied to the logic stage said logic stage generates detection signals (H1-H3) corresponding to the marking signals (M1-M3) being scanned.