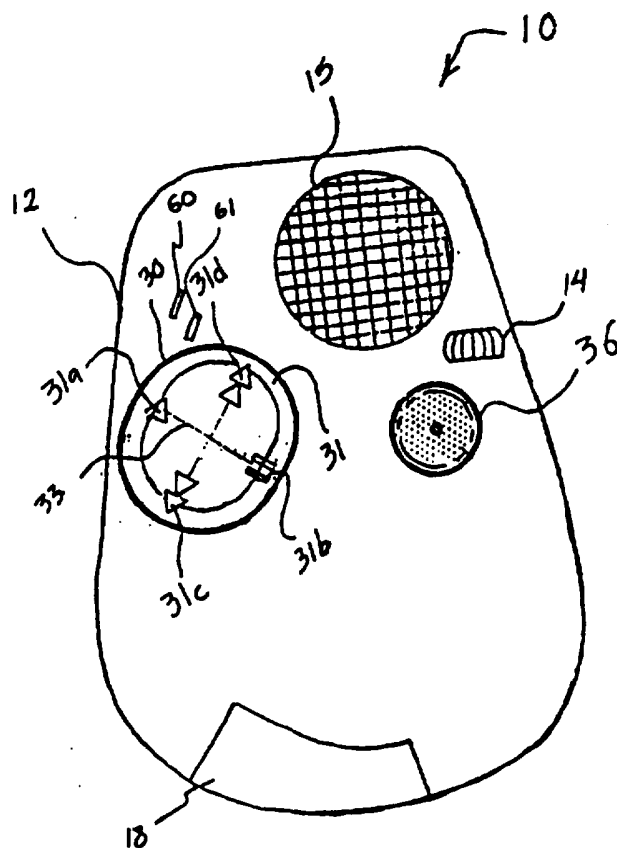# PCT

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: METHOD FOR PLAYBACK IN HAND HELD RECORDER

(57) Abstract

A solid state digital hand held recording device (10) having a multifunctional switch assembly (31). A printed circuit board, including a microcontroller electrically coupled to switch terminals, operates to control the processing of sound into electrical signals and store signals on a digital recording medium. The switch assembly actuates electrical signals, coupled to the microcontroller, thereby activating a sequence of actions (a program) stored within read-only memory device. A plurality of programs can be activated to begin instantaneous playback of any message, begin instantaneous playback of all messages, play a message at half normal speed, twice normal speed, ten times normal speed forward, and ten times normal speed backward.

METHOD FOR PLAYBACK IN HAND HELD RECORDER
BACKGROUND OF THE INVENTION

1.   Field of the Invention

This invention pertains to recording voice message devices, and in particular to hand held devices that are used for dictation, where a switch assembly on a solid state digital hand held recorder activates a playback mode whereby playing of previously recorded voice messages is accomplished.

2.   Prior Art

The method for dictating and then listening to voice messages is largely determined by the devices available for dictation. The prior art is replete with recording devices that save information by selectively magnetizing a layer of magnetic-oxide material that is bonded to a thin flexible tape, commonly referred to as cassette tape. The user listens to the recorded messages by rewinding the tape to the beginning of a message and playing it.

Tape is a medium with deficiencies that until the present invention have been unavoidable, but we have become so accustomed to them that we often forget the drawbacks. We probably owe this willingness to overlook deficiencies to the fact that dictation devices have become indispensable to business. Nevertheless, these unavoidable deficiencies have turned the process of reviewing dictation into a typical sequence of the following steps:

1)   The user records a message on a tape, or inserts a tape with a previously recorded message into a record\play device;

2)   The user rewinds the tape to the beginning of the message previously recorded by repeatedly rewinding for a moment and then listening to the current tape position to ascertain whether the beginning of the message has been reached. If the user is not the person who recorded the message and the message is long, the user may have to repeat the process many times.

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The recording medium of cassette tape forces the
speaker to use the above process because the tape is
analog and linear. In the prior art, a user cannot
simply pick up a recording device and press a single
switch and expect to hear a message that starts from
the beginning. The user is forced to begin a search
of the tape to find the beginning of a message, or
wait while rewinding the tape to the beginning if the
message is recorded at the beginning of the cassette.
If the device cannot play and rewind at the same time
allowing the user to hear sound, the user might miss
the beginning if there is more than one message on the
tape.

It would be an improvement over the prior art to
be able to immediately begin listening to a recorded
message without knowing where on a recording medium
the message begins.

Another deficiency of analog tape is that prior
art methods of playing recorded sound faster or slower
than normal simply involve moving the tape faster or
slower. The result is a message that is often
unintelligible, not because the speed is too fast or
too slow to comprehend, but rather the pitch of the
recorded voice is altered substantially higher or
lower than normal. Therefore fast or slow playback is
often only useful for finding segments of blank and
recorded tape.

Therefore, it would also be an improvement over
the prior art if while playing a previously recorded
message, the speed of the message could be increased
or decreased without changing the pitch of the
recorded voice to thereby make the faster or slower
message more understandable than prior art devices
allow.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present
invention to provide a method and apparatus for

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immediately playing a previously recorded voice
message from its beginning without having to search
for where a message begins.

It is another object of the invention to provide
a method and apparatus to begin playing all messages
on the recording medium in sequence, beginning with
the first message, regardless of where on the medium
the recorder had been previously playing or recording.

It is yet another object of the invention to
provide a method and apparatus for playing a
previously recorded voice message at a faster than
normal speed without changing the pitch of the voice,
thereby producing a more intelligible sound.

It is a further object of the present invention
to provide a method and apparatus for playing a
previously recorded voice message at a slower than
normal speed without changing the pitch of the voice,
thereby producing a more intelligible sound.

These and other objects not specifically recited
are realized in a solid state digital hand held
recording device having a single function and
multifunctional switch assemblies. A printed circuit
board including a microcontroller electrically coupled
to said switch assemblies operates to control the
processing of sound into electrical signals and store
said signals on a digital recording medium. A single,
manually operable rocker-pad functioning as the
multifunctional switch assembly is centrally mounted
upon a pivot support of the hand held recording
device. The rocker-pad actuates electrical signals
coupled to said microcontroller thereby activating a
sequence of actions (a program) stored within the
microcontroller in a read-only memory (ROM) device. A
plurality of programs can be activated by the manually
operable rocker-pad to process digitally recorded
sound as the user desires.

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Also disclosed is a method for playing any
previously recorded digital message. The process of
playing back a message without knowing where the
message begins in flash memory on the recording medium
includes the steps of (i) placing the recording device
in the idle mode, and (ii) pressing the play switch to
activate a microcontroller program that instructs the
microcontroller to find an address pointer in memory
that always defines the point in said memory that the
recording device is to begin playing. If the user
pauses a message that is playing, the address pointer
does not move so that play can be resumed from the
point of interruption. If the user records a new
message, the address pointer points to the beginning
of the new message. If the recording device is in
idle mode and the user presses the reverse or fast-
forward switch, the address pointer points to the
beginning of the previous or subsequent message
relative to the message that the address pointer was
pointing to before a switch was activated.

Also disclosed is a method for instantaneously
playing all messages recorded beginning with the
first message recorded on the recording medium. This
process includes the steps of (i) placing the
recording device in the idle mode, and (ii) pressing
and holding the play switch to begin playback.

A further disclosure is the method for playing a
previously recorded message forward at half-speed,
which includes the steps of (i) playing any previously
recorded message, and (ii) while the message is
playing, pressing the play switch again to toggle
between normal speed and half-speed playback.

Also disclosed is the method for playing a
previously recorded message forward at twice normal
speed, which includes the steps of (i) playing any
previously recorded message, and (ii) while the

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message is playing, pressing and holding the play
switch to enable twice-speed playback.

A further disclosure is the method for playing in
a forward direction a previously recorded message at
up to ten times normal speed, which includes the steps
of (i) playing any previously recorded message, and
(ii) while the message is playing, pressing and
holding the fast-forward switch to enable ten times
normal speed forward playback.

The last disclosure is the method for playing in
a backward direction a previously recorded message at
up to ten times normal speed, which includes the steps
of (i) playing any previously recorded message, and
(ii) while the message is playing, pressing and
holding the reverse switch to enable ten times normal
speed backward playback.

These and other objects and advantages of the
present invention will be set forth in the description
which follows, and will be apparent to those skilled
in the art based on the description taken in
combination with the accompanying drawings. The
objects and advantages of the invention may be
realized and obtained by means of the instruments and
combinations particularly pointed out in the appended
claims.

DESCRIPTION OF THE DRAWINGS

Figure 1A is a front view of a hand held digital
recording device with a multifunctional switch
assembly made in accordance with the principles of the
present invention;

Figure 1B is a perspective view of the
multifunctional switch and the contact elements
beneath from fig. 1A;

Figure 1C is a perspective view of the record
switch and the contact element beneath from fig. 1A;

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Figure 2A is a flowchart of steps for playing any message without having to search for the beginning of the message on the recording medium;

Figure 2B is a diagram representing the memory structure of the scenario represented by the process of fig. 2A;

Figure 3A is a flowchart of steps for playing all messages on the recording medium, beginning with the first recorded message;

Figure 3B is a diagram representing the memory structure of the scenario represented by the process of fig. 3A;

Figure 4 is a flowchart of steps for playing a message forward at twice normal speed;

Figure 5 is a flowchart of steps for playing a message forward at ten times normal speed;

Figure 6 is a flowchart of steps for playing a message backward at ten times normal speed;

Figure 7 is a flowchart of steps for playing a message forward at half normal speed.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1A illustrates the features of a hand held, solid state digital recording device 10. The hand held recorder includes a casement 12 containing a microphone element 14, a speaker element 15, a printed circuit board 13 (fragmented view, figure 1B), and a recording medium 18 (partially visible). The printed circuit board 13 beneath the face of the casement 12 includes a microcontroller 20 with an internal read only memory (ROM), said microcontroller being electrically coupled to the recording medium 18 and to switch terminals 33 (multifunctional) and 36 (record) disposed on said circuit board 13 and appearing through openings in the casement 12. These components in generic form are well known within the industry.

The switch terminals 33 and 36 differ from each other in structure. Switch element 33 is a rocker-pad

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pivotally mounted upon a pivot support (not shown) and
is disclosed in detail in the parent applications.
The pivot support allows the rocker-pad 33 to tilt
about said pivot support, being responsive to manual
manipulation of said rocker-pad 33. The rocker-pad 33
includes a periphery portion 30 with at least four
lateral extremities 31a, 31b, 31c, 31d having
electrical contacts 32a, 32b, 32c, 32d (figure 1B)
beneath the rocker-pad 33 and parallel to the circuit
board 13. Electrical switch terminals 22a, 22b, 22c,
22d (figure 1B) disposed under the rocker-pad 30 are
aligned with said electrical contacts 32. When the
rocker-pad 33 is manipulated, an electrical contact
corresponding to the rocker-pad extremity 31 makes
contact with a corresponding switch terminal 22. The
functions executable by manipulating the rocker-pad 33
are many, despite there being only four specific
labels 31a, 31b, 31c, 31d corresponding to the rocker-
pad 33 extremities. The four labels are play 31a,
fast-forward 31d, pause 31b, and reverse 31c.

An electrical signal is produced by making an
electrical contact between one of the electrical
contacts 32 and the corresponding switch terminal 22
disposed beneath. The signal goes to the
microcontroller which determines which switch of the
rocker-pad 33 was pressed, whether the record switch
36 was pressed, or a combination of the two. The
microcontroller accesses the appropriate segment of
internal ROM memory containing the instructions for
executing the appropriate function. The switches 33
and 36 may also be operated in conjunction to produce
an electrical signal defining a process that can not
be activated by pressing a single switch.

Switch element 36 is a manually operable record
switch. Switch terminal 24 (figure 1C) is disposed
under the record switch 36 and aligned to make contact
between an electrical contact 25 disposed beneath the

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record switch and the switch terminal 24 when the
record switch 36 is pressed. The electrical signal
produced by depressing the record switch 36 also sends
a signal to the microcontroller 20 which accesses the
5   appropriate segment of ROM memory containing the
instructions for executing whatever function is
defined by pressing the record switch 36 alone or in
conjunction with the multifunction switch 33.

          Figure 2A is a flowchart of the steps for playing
10   a previously recorded message, without having to
search for the beginning of the message as is required
in the prior art. In effect, a user with a recorder
in idle mode immediately begins playing a message at
the touch of a switch, regardless of where in a
15   message the user might have stopped while recording or
playing. One of the points of novelty is that
virtually no time is required to prepare a recording
medium to begin playing a message as in the prior art.
The recording medium of the present invention is
20   digital flash memory. Flash memory enables
instantaneous access to any segment of the memory,
delayed only by the time it takes for a user to press
a switch, and for a digital microcontroller to execute
a program. Thus, the user perceives the recorder's
25   response to the user's action to be immediate.

          As shown by step 1, designated 110, a preliminary
step is to put the recorder in idle mode. This means
that the recorder is not playing or recording.

          Step 2 designated 120 shows that the user presses
30   the multifunctional rocker-pad switch labeled with the
play symbol 31a. The user hears a message, and a
green LED 60 is lit. One of the points of novelty in
this scenario is that the user did not have to wait
while the recording medium moved to the beginning of
35   the message played. The digital nature of the flash
memory enabled a message to begin playing the moment
the play switch was pressed.

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Figure 2B is a diagram of the flash digital
memory structure used in the present invention. The
box 130 represents the entire memory space available
for use. Because the memory is digital, any segment
of memory is accessible in the same amount of time.
The arrow 131 shows that play began with message B.

Figure 3A is a flowchart of the steps for playing
all the messages on the recording medium, beginning
with the first recorded message. In effect, a user
places the recorder in idle mode, and then enters a
playback mode that begins with the first message
recorded on the recording medium.

As shown by step 1, designated 210, a preliminary
step is to put the recorder in idle mode. This means
that the recorder is not playing or recording.

Step 2 designated 220 shows that the user presses
and holds the rocker-pad switch labeled with the play
symbol 31a. The green LED 60 lights during playback.
Again, the user did not have to wait on the recording
medium, but instead of just beginning playback at the
current message, flash memory was accessed at the
memory segment where the first recorded message is
stored.

Figure 3B is a diagram of the flash digital
memory structure used in the present invention,
represented by box 230. Arrow 231 represents the
recorder enabling the play of all messages starting
with the first recorded message by moving from a
current position at the beginning of message D.

Figure 4 is a flowchart of the steps for playing
back any message at two times the normal speed, normal
speed being defined as the speed at which the
recording was made. In essence, a user plays any
previously recorded message and while playing enters
the twice normal speed playback mode.

Step 1 designated by 310 shows that the
preliminary step is to begin the playback of any

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message, chosen here to be message A.   The green LED
60 will be lit.

Step 2 designated 320 shows that the user again
presses the rocker-pad 33 switch labeled with the play
symbol 31a.   The green LED 60 is still lit during
twice normal speed playback mode.   When a recorded
voice is played at a faster than normal speed, the
usual result is a rise in the pitch of the voice.   One
of the points of novelty of the present invention is
the elimination of this characteristic change in
pitch.   This effect is enabled by the digital nature
of the recording.   By changing the sampling rate of
the recorded message, the length of play is reduced.

Figure 5 is a flowchart of the steps for playing
back any message in a forward direction at ten times
the normal speed, normal speed being defined as the
speed at which the recording was made.   In essence, a
user plays any previously recorded message and then
enters the ten times normal speed forward playback
mode.

Step 1 designated by 410 shows that the
preliminary step is to begin the playback of any
message, chosen here to be message A.   The green LED
60 will be lit.

Step 2 designated as 420 shows that the user
presses and holds the rocker-pad 33 switch labeled
with the fast-forward symbol 31d, as long as the user
desires to play the message forward at ten times the
normal speed.   The green LED 60 will be lit during
playback.   When a recorded voice is played at a faster
than normal speed, the usual result is a rise in the
pitch of the voice.   As explained, changing the
sampling rate of digital data eliminates this problem.

Figure 6 is a flowchart of the steps for playing
back any message backward at ten times the normal
speed, normal speed being defined as the speed at
which the recording was made.   In essence, a user

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plays any previously recorded message and then enters
the ten times normal speed reverse playback mode.

Step 1 designated by 510 shows that the
preliminary step is to begin the playback of any
message, chosen here to be message A. The green LED
60 will be lit.

Step 2 designated as 520 shows that the user
presses and holds the rocker-pad 33 switch labeled
with the reverse symbol 31c, as long as the user
desires to play the message in reverse at ten times
the normal speed. The green LED 60 will be lit during
playback.

Figure 6 is a flowchart of the steps for playing
back any message forward at half normal speed, normal
speed being defined as the speed at which the
recording was made. In essence, a user plays any
previously recorded message and then enters the half
normal speed forward playback mode.

Step 1 designated by 610 shows that the
preliminary step is to begin the playback of any
message, chosen here to be message A. The green LED
60 will be lit.

Step 2 designated as 620 shows that the user
presses the rocker-pad 33 switch labeled with the play
symbol 31a. The green LED 60 will be lit during
playback. To return to normal speed, the user needs
only to again press the play switch. In effect, if a
message is playing, the play switch acts as a toggle
between half normal and normal playback speed. When a
recorded voice is played at a slower than normal
speed, the usual result is a fall in the pitch of the
voice being heard.

It is to be understood that the described
embodiments of the invention are illustrative only,
and that modifications thereof may occur to those
skilled in the art. Accordingly, this invention is
not to be regarded as limited to the embodiments

disclosed, but is to be limited only as defined by the appended claims herein.

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CLAIMS

What is claimed is:

1.   A device for enabling playback of a pre-recorded message without having to search for the beginning of said message, yet enabling the instantaneous playback of said message, said device comprising:

a solid state digital hand held recording device having a multifunctional switch assembly, a digital recording medium including a region forming a continuity of pre-recorded message, a printed circuit board including a microcontroller electrically coupled to the multifunctional switch assembly and operable to (i) control the processing of sound into electrical signals, (ii) store said electrical signals on the recording medium, and (iii) play sound from the stored electrical signals; and

sequencing playback means coupled to the circuit board and activated by the multifunctional switch assembly and including means for playing the pre-recorded message stored on the recording medium by finding an address pointer stored in memory that identifies a point in memory where playback of said message should begin with no manual involvement of the user other than activating the the multifunctional switch assembly to play the pre-recorded message from said point.

2.   A device as defined in claim 1, wherein the multifunctional switch assembly includes a single, manually operable rocker-pad mounted upon the hand held recording device, said rocker-pad including means for activating playback of the pre-recorded message.

3.   A device as defined in claim 1, wherein the digital recording medium includes a flash memory unit that is electrically coupled to said device whereby voice messages may be recorded thereon.

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4.   A device as defined in claim 1, wherein the microcontroller includes a read-only memory for storage of microcontroller instructions for executing the function of message recording.

5.   A method for playing an existing message stored on a recording medium in a hand held recording device without having to search for a beginning of said message, said method comprising the steps of:
        a) placing the recording device in the idle mode where all functions of said device are inactive; and
        b) activating a play switch causing the recording device to:
                i)   search for an address pointer stored in memory that always defines the point on a recording medium where the recording device is to play; and
                ii)   begin play of the existing message at said point.

6.   A method as defined in claim 5, further providing a method for playing back all existing messages on the recording medium beginning with the first recorded message, wherein step b) comprises the step of activating and holding the play switch to begin playback.

7.   A method as defined in claim 5, further providing a method for half normal speed playback, wherein step b) comprises the step of activating the play switch again while the message is playing to toggle between normal speed and half-speed playback mode.

8.   A method as defined in claim 5, further providing a method for twice normal speed playback, wherein step b) further comprises the step of activating and holding the play switch to enable twice normal speed playback mode.

9.   A method as defined in claim 5, further providing
a method for ten time normal speed forward playback,
wherein step b) further comprises the step of
activating and holding the fast-forward switch to
enable ten times normal speed forward playback mode.

10. A method as defined in claim 5, further providing
a method for ten times normal speed reverse playback,
wherein step b) further comprises the step of
activating and holding the reverse switch to enable
ten times normal speed backward playback mode.

11. A device as defined in claim 1, wherein said
device further comprises playback means coupled to the
circuit board and activated by the multifunctional
switch assembly and including means for playing all
pre-recorded messages on the recording medium by
finding an address pointer that points to the
beginning of a first message on the recording medium
and beginning play of said first message from said
address pointer with no manual involvement of the user
other than activating the multifunctional switch means
to play all pre-recorded messages.

12. A device as defined in claim 11, wherein the
microcontroller includes a read-only memory for
storage of microcontroller instructions for executing
the function of playing all previously recorded
messages beginning with the first message on the
recording medium.

13. A device as defined in claim 1, wherein said
device further comprises playback means coupled to the
circuit board and activated by the multifunctional
switch assembly and including means for playing a pre-
recorded message stored on the recording medium at
half normal speed without changing voice pitch by

decreasing a sampling rate of said message with no
manual involvement of the user other than activating
the multifunctional switch means to play the pre-
recorded message.

14. A device as defined in claim 13, wherein the
microcontroller includes a read-only memory for
storage of microcontroller instructions for executing
the function of playing a previously recorded message
at half normal speed.

15. A device as defined in claim 1, wherein the
device further comprises playback means coupled to the
circuit board and activated by the multifunctional
switch assembly and including means for playing a pre-
recorded message stored on the recording medium at
twice normal speed without changing voice pitch by
increasing a sampling rate of said message with no
manual involvement of the user other than activating
the multifunctional switch means to play the pre-
recorded message.

16. A device as defined in claim 15, wherein the
microcontroller includes a read-only memory for
storage of microcontroller instructions for executing
the function of playing a previously recorded message
at twice normal speed.

17. A device as defined in claim 1, wherein said
device further comprises playback means coupled to the
circuit board and activated by the multifunctional
switch assembly and including means for playing a pre-
recorded message stored on the recording medium at ten
times normal speed without changing voice pitch in a
forward direction increasing a sampling rate of said
message with no manual involvement of the user other

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than activating the multifunctional switch means to
play the pre-recorded message

18. A device as defined in claim 17, wherein the
microcontroller includes a read-only memory for
storage of microcontroller instructions for executing
the function of playing a previously recorded message
at ten times normal speed in a forward direction.

19. A device as defined in claim 1, wherein said
device further comprises playback means coupled to the
circuit board and activated by the multifunctional
switch assembly and including means for playing a pre-
recorded message stored on the recording medium at ten
times normal speed without changing voice pitch in a
reverse direction increasing a sampling rate of said
message with no manual involvement of the user other
than activating the multifunctional switch means to
play the pre-recorded message.

20. A device as defined in claim 19, wherein the
microcontroller includes a read-only memory for
storage of microcontroller instructions for executing
the function of playing a previously recorded message
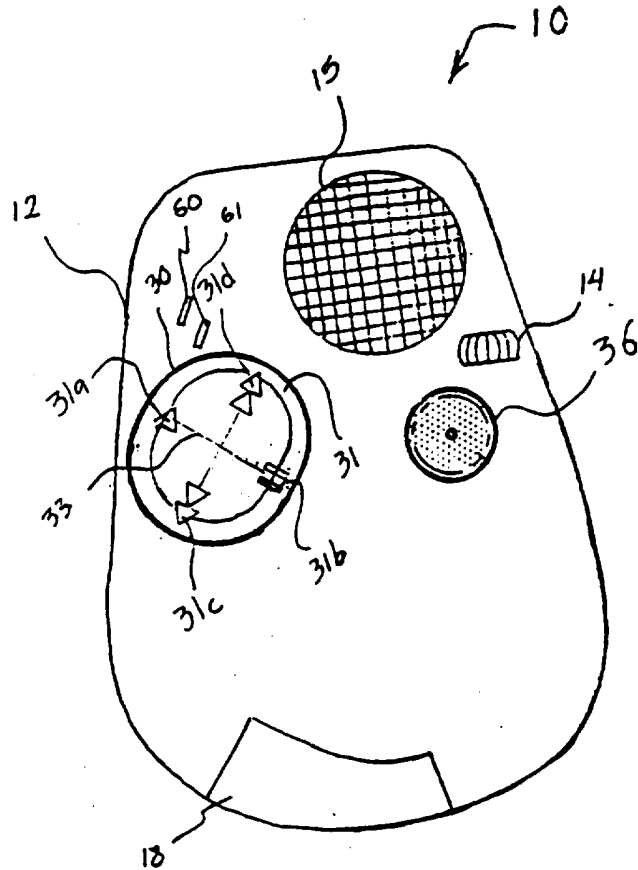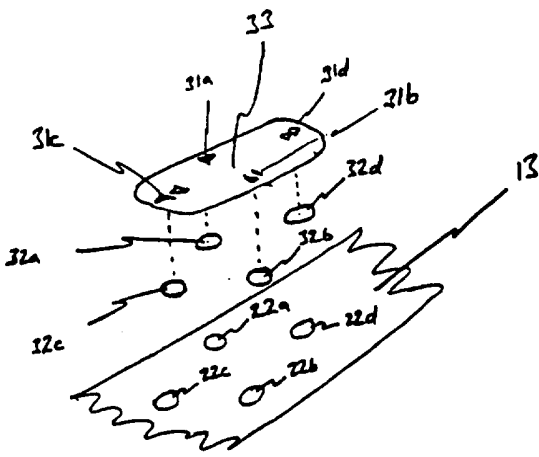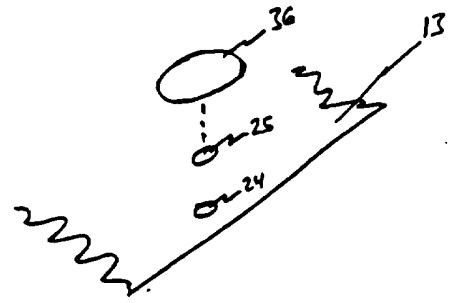at ten times normal speed in a reverse direction.

FIGURE 1A

FIGURE 1B

FIGURE 1C
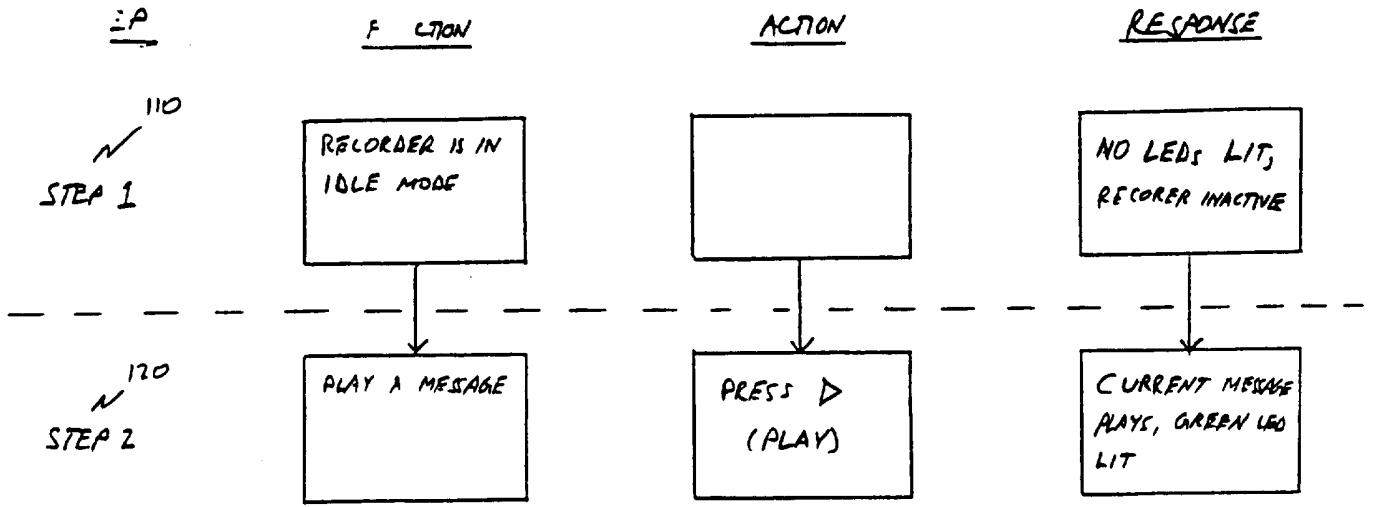
FIGURE 2A: PRE-RECORDED MESSAGE PLAYBACK

FIGURE 2B

STEP	FUNCTION	ACTION	RESPONSE

/ 210

STEP 1

| RECORDER IS IN IDLE MODE | | NO LEDs LIT, RECORDER INACTIVE |

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STEP 2

| PLAYBACK ALL MESSAGES BEGINNING WITH FIRST ON RECORDING MEDIUM | PRESS AND HOLD D (PLAY) | ALL MESSAGES PLAY, GREEN LED LIT |
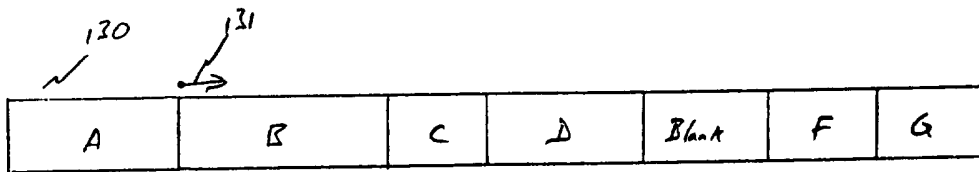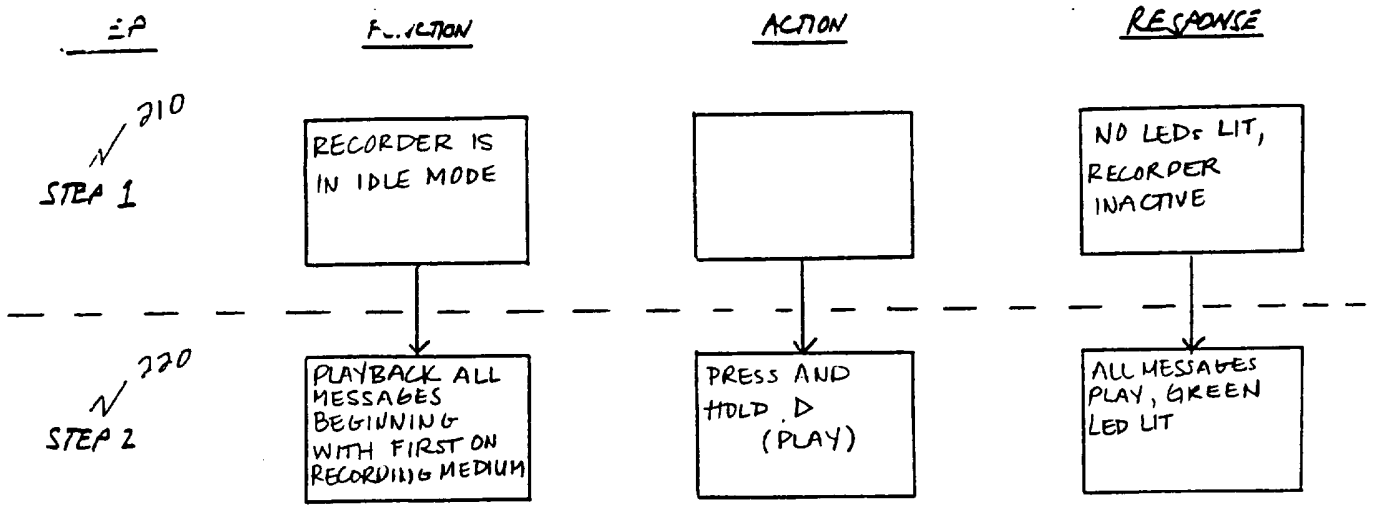
FIGURE 3A : PLAYBACK OF ALL MESSAGES

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| A | B | Blank | C | D |

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FIGURE 3B

_P	_ACTION_	ACTION	RESPONSE
STEP 1 310	PLAY MESSAGE A	PRESS ▷ (PLAY)	MESSAGE A PLAYS, GREEN LED LIT
STEP 2 320	PLAY MESSAGE A AT TWICE NORMAL SPEED	PRESS AND HOLD ▷ (PLAY)	MESSAGE A PLAYS AT TWICE NORMAL SPEED, GREEN LED LIT
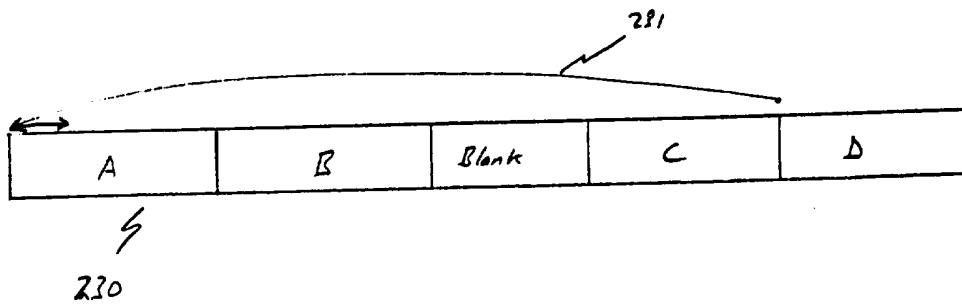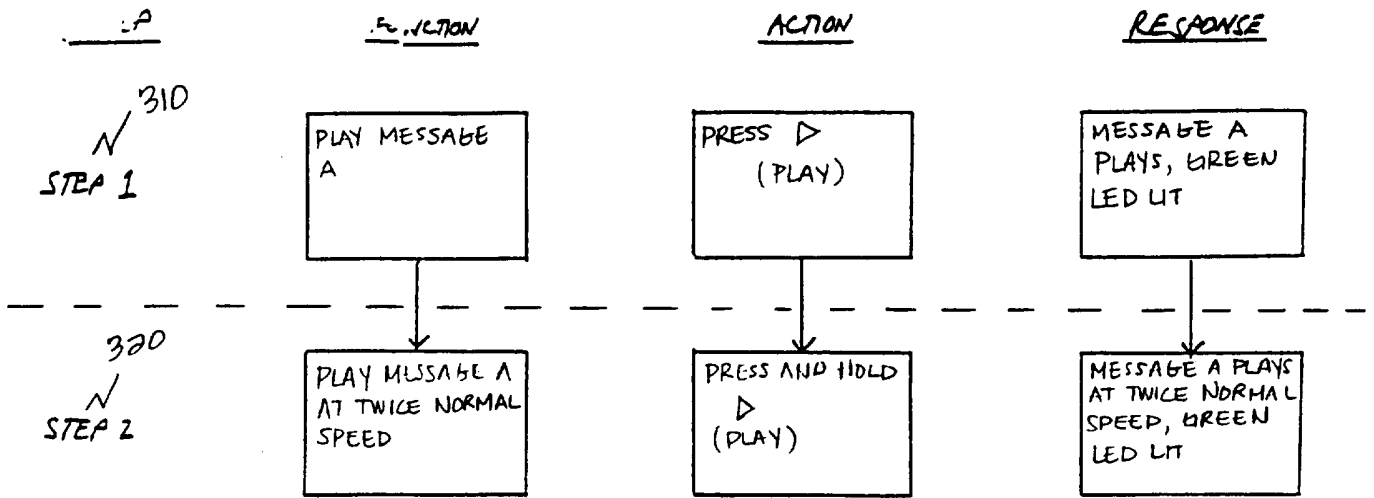
FIGURE 4: PLAYBACK AT TWICE NORMAL SPEED

STEP	FUNCTION	ACTION	RESPONSE

410

STEP 1

| PLAY MESSAGE A | PRESS ▷ (PLAY) | MESSAGE A PLAYS, GREEN LED LIT |

- -

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STEP 2

| PLAY MESSAGE A AT TEN TIMES NORMAL SPEED | PRESS AND HOLD ▷▷ (FAST FORWARD) | MESSAGE A PLAYS AT TEN TIMES NORMAL SPEED, GREEN LED LIT |
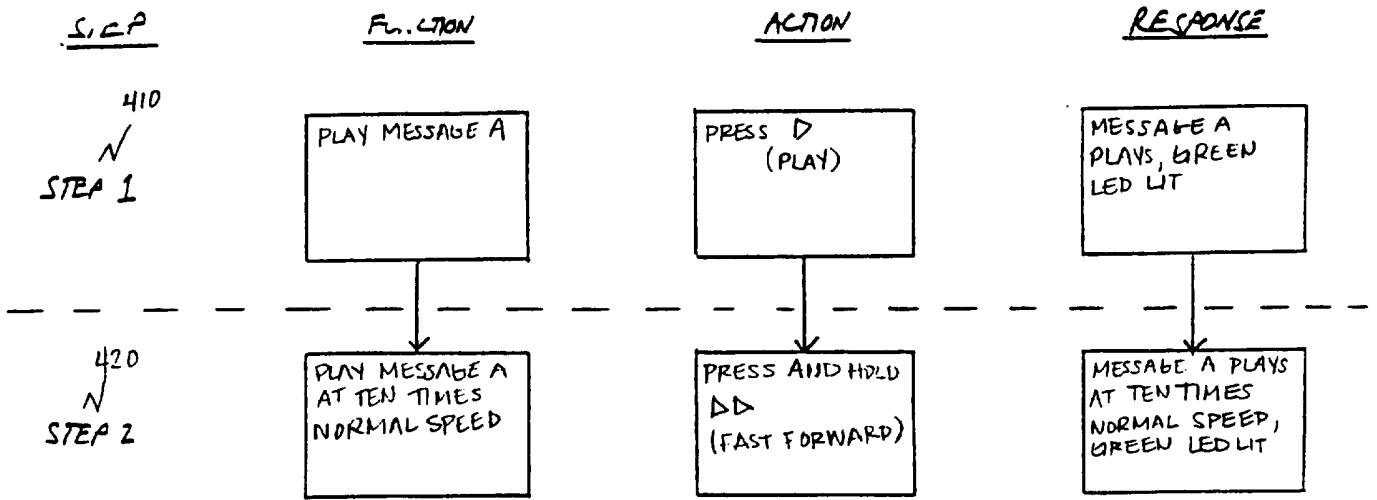
FIGURE 5: PLAY AT TEN TIMES NORMAL SPEED

STEP	F. CTION	ACTION	RESPONSE
510 ∕ STEP 1	PLAY MESSAGE A	PRESS ▷ (PLAY)	MESSAGE A PLAYS, GREEN LED LIT
520 ∕ STEP 2	PLAY MESSAGE A IN REVERSE AT TEN TIMES NORMAL SPEED	PRESS AND HOLD ◁◁ (REVERSE)	MESSAGE A PLAYS IN REVERSE AT TEN TIMES NORMAL SPEED, GREEN LED LIT
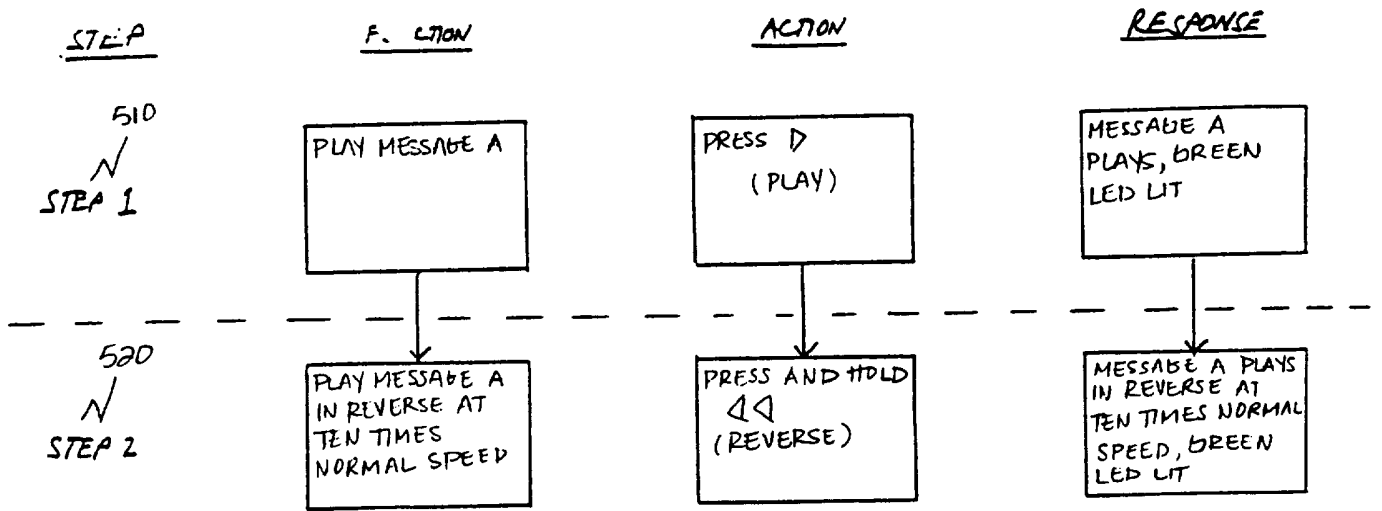
FIGURE 6: PLAYBACK IN REVERSE AT TEN TIMES NORMAL SPEED

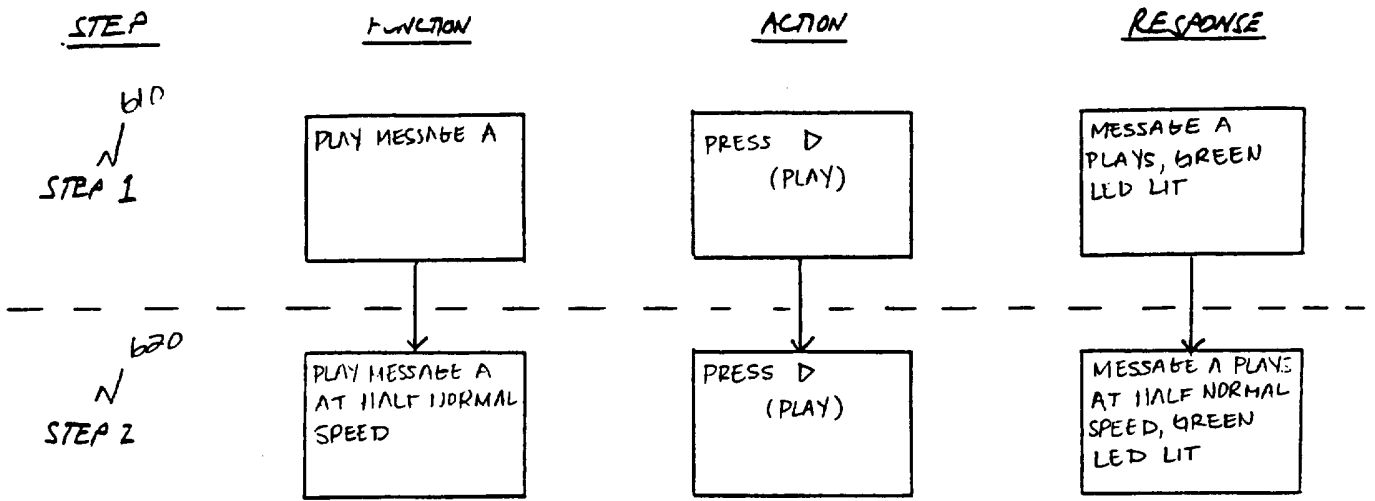| <u>STEP</u>	<u>FUNCTION</u>	<u>ACTION</u>	<u>RESPONSE</u>
610 STEP 1	PLAY MESSAGE A	PRESS ▷ (PLAY)	MESSAGE A PLAYS, GREEN LED LIT
620 STEP 2	PLAY MESSAGE A AT HALF NORMAL SPEED	PRESS ▷ (PLAY)	MESSAGE A PLAYS AT HALF NORMAL SPEED, GREEN LED LIT

FIGURE 7: PLAYBACK AT HALF NORMAL SPEED

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/14891

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6)   :G10L 3/00
US CL   :395/2.79, 2.87

According to International Patent Classification (IPC) or to both national classification and IPC

B.   FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/2.79, 2.87

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Microsoft Press Dictionary

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C.   DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,398,220 (BARKER) 14 MARCH 1995; see Figs. 1A-4; cols. 1 and 5.	1-2, 11-22, 14, 16, 18, 20
Y	US, A, 4,468,751 (PLUNKETT JR.) 28 AUGUST 1984; see Figs. 1, 3, 6; cols. 1 and 4.	1-2, 11-12, 14, 16 ,18, 20
Y	Microsoft Computer Press Dictionary, 2nd ed., Doyle, 1994; see pg 168.	3
Y	US, A, 5,394,445 (BALL ET AL.) 28 FEBRUARY 1995; see cols. 5-7.	5-10
Y	EP, A, 0 402 911 (HITACHI, LTD) 19 DECEMBER 1990; see pgs. 2, 10.	13, 15, 17, 19

[X] Further documents are listed in the continuation of Box C.   [ ] See patent family annex.

	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 JANUARY 1996	**14 FEB 1996**

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer JOHN MICHAEL GROVER
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Form PCT/ISA/210 (second sheet)(July 1992)*

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE, A, 42 07 447 A1 (HOLZER) 16 SEPTEMBER 1993; see Figs. 1-5	1-20

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS, IEEE

search terms: DICTAT?, HAND HELD, MEMOR? (2A) SCAN, INDEX?, STORAG?.