



(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **94110680.9**

(51) Int. Cl.⁶ : **E05B 49/00**

(22) Date of filing : **08.07.94**

(30) Priority : **13.07.93 IT TO930517**

(43) Date of publication of application :
18.01.95 Bulletin 95/03

(84) Designated Contracting States :
DE FR GB

(71) Applicant : **TRW SIPEA S.p.A.**
Via XXV Aprile, 46
I-10042 Nichelino (IT)

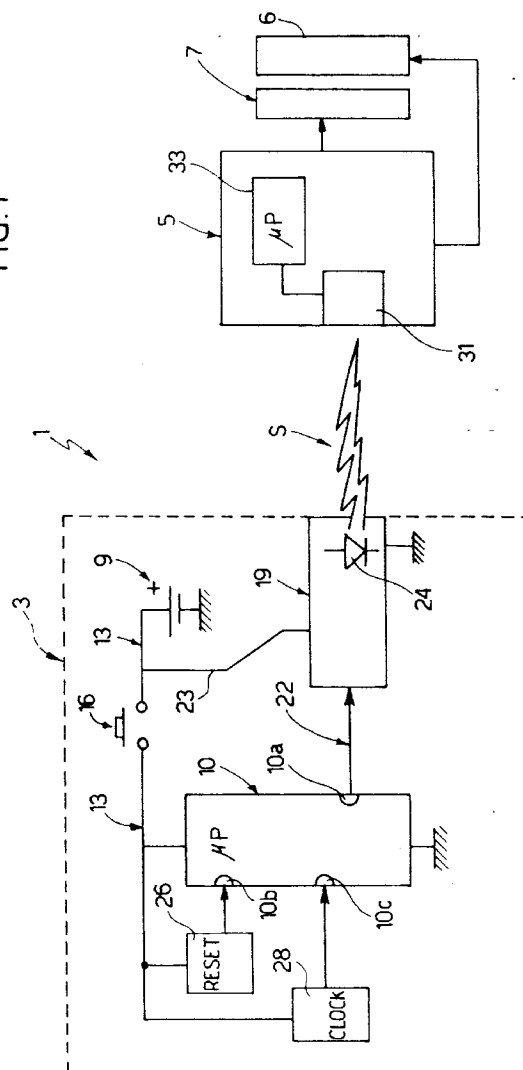
(72) Inventor : **Cagliero, Sergio**
Corso Roma, 53
I-10024 Moncalieri (IT)

(74) Representative : **Cerbaro, Elena et al**
c/o Studio Torta, Via Viotti 9
I-10121 Torino (IT)

(54) **Actuator remote control system, particularly for vehicles.**

(57) A remote control system (1) wherein a transmitter (3), following closure of a push-button switch (16), provides for cyclically generating a digital code, which cyclic generation of the code is cut off automatically at the end of a predetermined time (T) following closure of the switch (16); the system (1) also including a receiver (5) for detecting the generated code and enabling or disabling an alarm system (7) connected to the receiver (5).

FIG.1



The present invention relates to an actuator remote control system, particularly for vehicles.

Actuator remote control systems are known comprising a transmitter conveniently housed in a small portable casing, and a receiver installed on a vehicle and connected to the actuator means of the vehicle alarm system.

The transmitter generates a digital code which is picked up and decoded by the receiver for enabling/disabling the alarm system and one or more actuators, e.g. for locking/unlocking the vehicle doors, luggage compartment door, fuel filler cover, etc.

Known transmitters present at least one push-button switch on the casing, which, when closed, provides for supplying the transmitter and generating the code. To re-transmit the code, the button must be released and pressed again.

As such, in the event the code transmitted the first time the switch is operated fails to be picked up by the receiver, e.g. on account of misalignment of the transmitter and receiver, the button must be released and pressed again and the transmitter oriented each time until the code is finally picked up.

This therefore makes enabling/disabling of the alarm system and actuators extremely troublesome.

It is an object of the present invention to provide a remote control system featuring a transmitter designed to overcome the drawbacks typically associated with known transmitters.

According to the present invention, there is provided a remote control system as described in Claim 1.

The present invention will be described with reference to the accompanying drawings, in which:

Figure 1 shows an electric block diagram of an actuator remote control system in accordance with the teachings of the present invention;

Figure 2 shows an operating block diagram of the Figure 1 system transmitter;

Figure 3 shows an operating block diagram of the Figure 1 system receiver;

Figure 4 shows a time graph of the signal generated by the Figure 2 transmitter.

Number 1 in Figure 1 indicates an actuator remote control system wherein a transmitter 3 supplies a control signal S to a receiver 5 connected to a number of actuators 6 (shown schematically) and to an alarm system 7, in particular the alarm system of a vehicle (not shown).

Actuators 6 may comprise, for example, actuators for locking/unlocking the vehicle doors, luggage compartment door, fuel filler cover, etc.

Transmitter 3 is housed in a small portable casing (not shown), and comprises a microprocessor 10 and a supply source 9 connected to microprocessor 10 over an electric line 13. Transmitter 3 also presents a push-button switch 16 located along line 13 and fitted to the casing (not shown) of transmitter 3.

Microprocessor 10 generates a digital word D composed of twenty-four bits: the first three bits form a so-called clock "precode" and assume fixed values (e.g. 0-1-0), whereas the actual code itself is formed by the other twenty-one bits defined during programming of microprocessor 10.

The twenty-one-bit code provides for forming up to two million different combinations.

Transmitter 1 also comprises an infrared transducer 19 supplied by source 9 over line 23, and presenting a data input connected to the output of microprocessor 10 over line 22.

Transducer 19 comprises a transmitting LED 24 with an emission wavelength of 875 nanometers.

Transducer 19 is supplied with the digital word D generated by microprocessor 10, and generates a beam of infrared rays containing the information in digital word D.

Transmitter 3 also comprises a RESET circuit 26 and a CLOCK circuit 28 connected respectively to inputs 10b, 10c of microprocessor 10 and supplied by voltage source 9 via switch 16.

Receiver 5 comprises an infrared ray transducer 31 output-connected to a decoding circuit presenting a microprocessor 33 for controlling enabling/disabling of alarm system 7 and actuators 6.

Transducer 31 receives the beam of infrared rays generated by transducer 19 and provides for determining the relative digital word D.

Operation of transmitter 3 will now be described with reference to the Figure 2 block diagram showing the sequence of logic operations performed and controlled by microprocessor 10.

To begin with, the start block goes on to block 100 which determines whether switch 16 is closed: if it is not, block 100 remains in standby mode; if it is, block 100 goes on to block 110 which provides for starting a counter (not shown), e.g. a counter in CLOCK circuit 28.

Block 110 is followed by block 120 wherein word D generated by microprocessor 10 is transmitted and supplied to transducer 19 which generates a beam of infrared rays containing the information in word D.

Block 120 is followed by block 130 which provides for a 10 millisecond wait time.

Block 130 is followed by block 140 which determines whether switch 16 is still closed: if it is not, the program is exited; if it is, block 140 goes on to block 150.

Block 150 provides for re-transmitting word D generated by microprocessor 10.

Block 150 is followed by block 160 which provides for a 200 millisecond wait time.

Block 160 is followed by block 170 which determines whether switch 16 is still closed: if it is not, the program is exited; if it is, block 170 goes on to block 180.

Block 180 determines whether the time interval

totalled by the counter (not shown) started in block 110 equals a limit value T of, say, five seconds: if it does not, block 180 goes back to block 120; if it does, the program is exited.

As such, digital word D is generated and transmitted cyclically when switch 16 is closed, and cyclic transmission of word D is arrested when switch 16 is opened.

Also, cyclic transmission of word D is cut off automatically five seconds after the switch is closed.

The time graph of the signal generated by transmitter 5 is a sequence of codes as illustrated in Figure 4 which shows: a first transmission of digital word D (step A) when switch 16 is closed, followed by a 10 millisecond wait time (step B); and re-transmission of word D (step C) followed by a 200 millisecond wait time (step G).

Figure 4 also shows a further transmission of word D (A1) followed by a 10 millisecond wait time (B1); and re-transmission of word D (C1) followed by a 200 millisecond wait time (G1).

The above transmissions and wait times (steps A-B-C-G) are repeated cyclically as long as switch 16 remains closed; and, five seconds after switch 16 is closed, no signal is generated (step E) even if switch 16 is still closed.

Figure 3 shows a block diagram of the operations performed and/or controlled by microprocessor 33 of receiver 5.

To begin with, the start block goes on to block 200 wherein receiver 5 switches to standby awaiting the digital word. On receiving the digital word, block 200 goes on to block 210 by which the digital word is decoded and recognized.

More specifically, block 210 compares the incoming digital code with a reference digital code stored in receiver 5: in the event the two codes are correlated in predetermined manner, block 210 goes on to block 220; conversely, block 210 goes back to block 200.

Block 220 provides in known manner for enabling/disabling alarm system 7 and controlling actuators 6 for locking/unlocking the vehicle doors.

Block 220 is followed by block 260 which disables reception for as long as the sequence of digital words is received continuously and for a subsequent predetermined time Td of, say, 800-1000 milliseconds.

Block 260 then goes back to block 200.

The above receiving mode of block 260 is necessary to prevent oscillation of actuators 6 as a result of cyclic transmission of the code by transmitter 3.

The advantages of the present invention are as follows. Firstly, transmitter 3 provides for cyclically transmitting digital word D (and the relative code) when push-button switch 16 is operated only once, so that the code is re-generated fully automatically with no need for repeat operation of the switch.

Secondly, automatically cutting off generation of

word D at the end of interval T (five seconds) prevents rundown of the transmitter batteries in the event, for example, of inadvertent prolonged operation of switch 16.

Clearly, changes may be made to the system as described and illustrated herein without, however, departing from the scope of the present invention.

Claims

1) An actuator remote control system, particularly for vehicles, wherein a transmitter (3) transmits a digital identification code to a receiver (5) presenting means (31) for receiving and transducing said digital code;

said receiver (5) presenting enabling means (210) for generating an enabling signal in the event the received digital identification code and at least one reference code are correlated in predetermined manner;

said transmitter (3) comprising:

- means (10) for generating said digital code; and
- switch means (16) operated manually for transmitting said code;

characterized in that said transmitter (3) comprises means (110; 120; 130; 150; 160; 180) for cyclically generating said code;

said cyclic generating means repeatedly generating said code for a predetermined time interval (T) following operation of said switch means (16).

2) A system as claimed in Claim 1, characterized in that said transmitter (3) comprises means (110; 120; 130; 150; 160; 180) for generating a sequence of codes in response to operation of said switch means (16).

3) A system as claimed in Claim 1 or 2, characterized in that said cyclic generating means comprise:

first means (120) for generating said code;

first hold means (130) for generating a first wait time of predetermined duration; and

second means (150) for generating said code and enabled at the end of said first wait time.

4) A system as claimed in Claim 3, characterized in that said cyclic generating means comprise:

second hold means (160) enabled after said second generating means (150) and generating a second wait time of predetermined duration.

5) A system as claimed in Claim 4, characterized in that it comprises means (110, 180) which, following operation of said switch (16), provide for sequentially and repeatedly enabling said first generating means (120), said first hold means (130), said second generating means (150) and said second hold means (160).

6) A system as claimed in Claim 4 or 5, characterized in that it comprises means (110, 180) for dis-

abling said first generating means (120), said first hold means (130), said second generating means (150) and said second hold means (160) at the end of a predetermined time (T) following operation of said switch (16).

5

7) A system as claimed in any one of the foregoing Claims, characterized in that it comprises means (140; 170) for detecting operation of said switch (16) and for disabling said cyclic code generating means (110; 120; 130; 150; 160; 180) upon said switch (16) being disabled.

10

8) A system as claimed in any one of the foregoing Claims, characterized in that said receiver (5) comprises disabling means (260) for temporarily disabling reception following generation of said enabling signal.

15

9) A system as claimed in Claim 8, characterized in that said disabling means (260) provide for disabling reception for as long as said code is received continuously and for a subsequent predetermined time Td.

20

25

30

35

40

45

50

55

FIG. 1

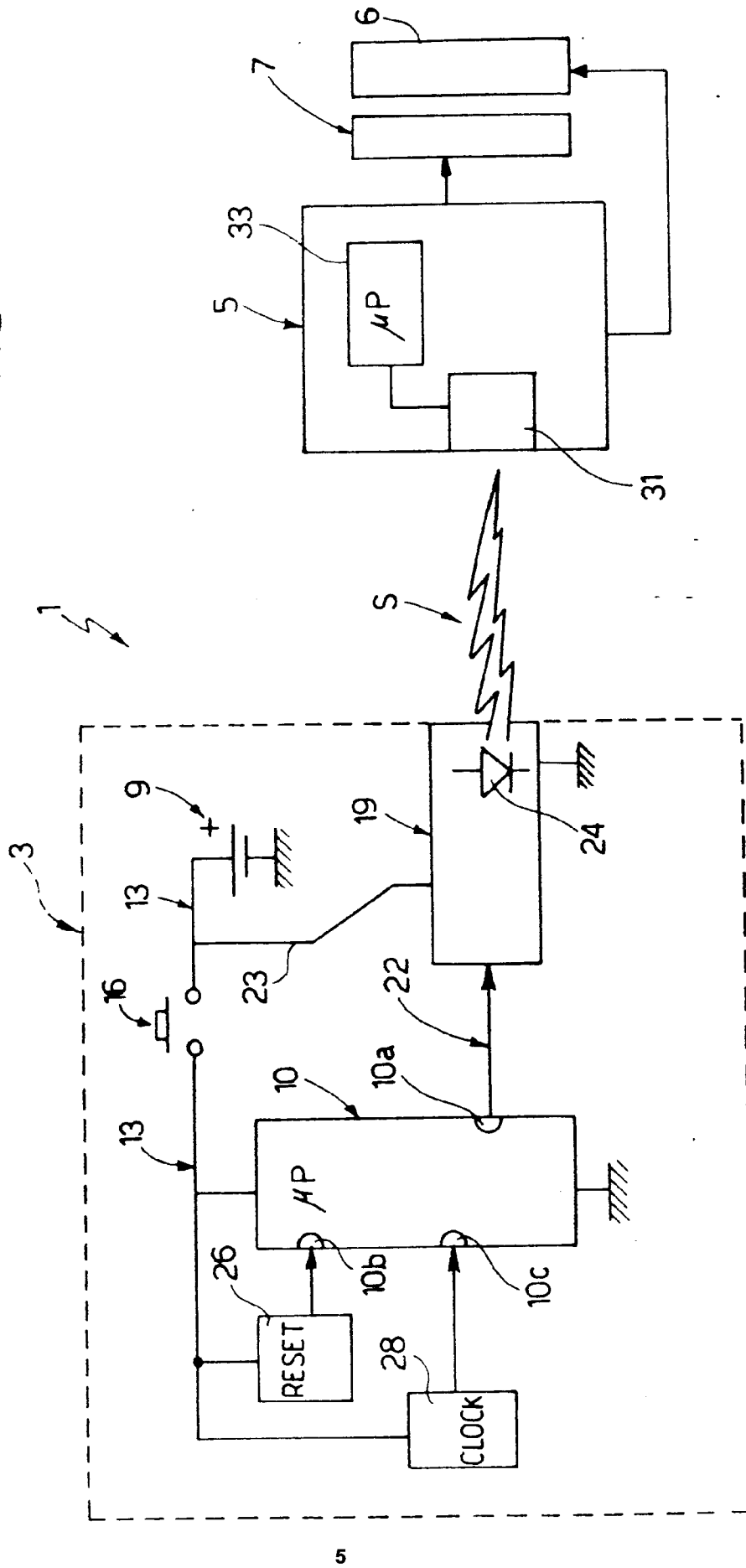


FIG. 2

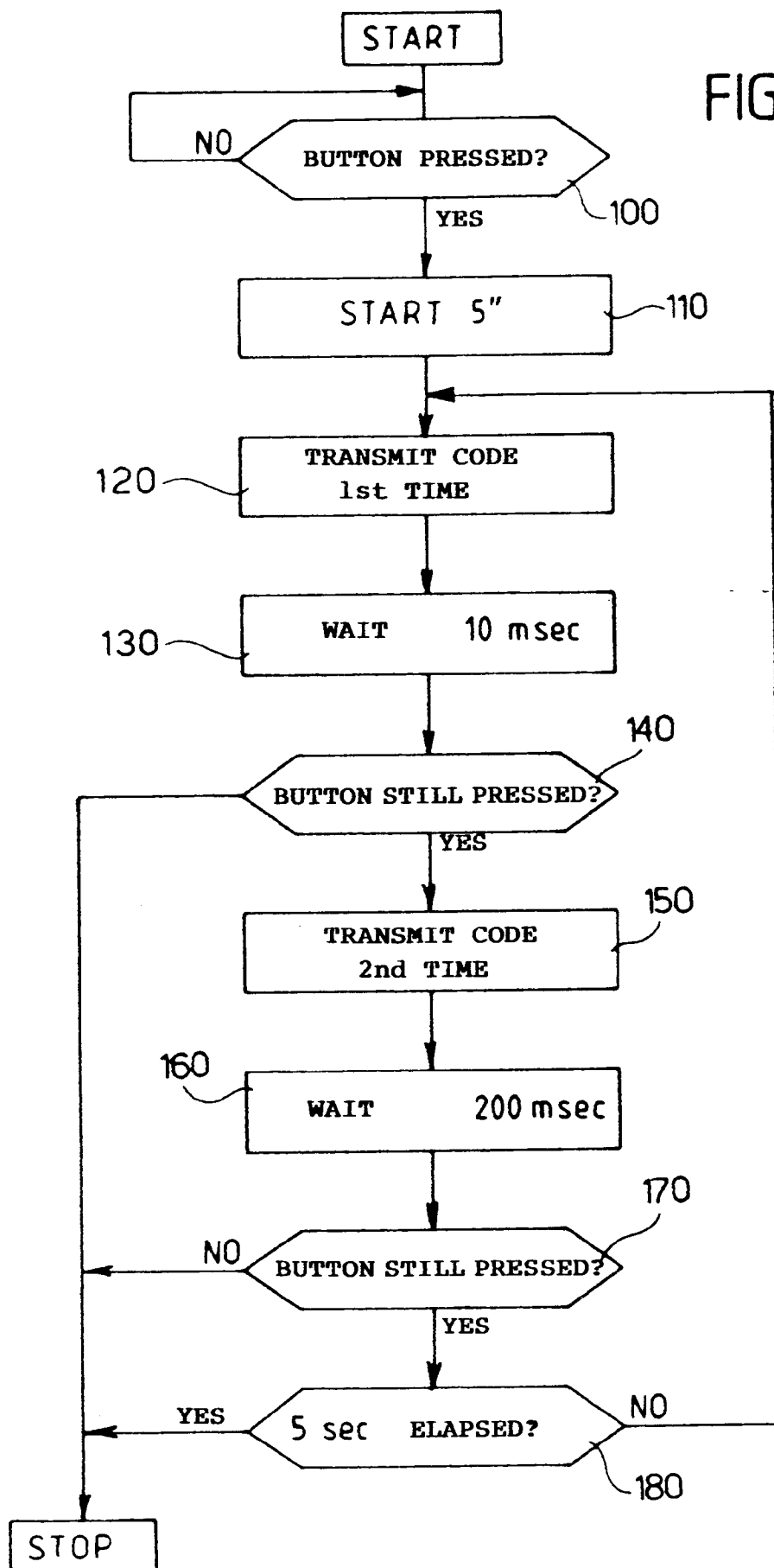


FIG. 3

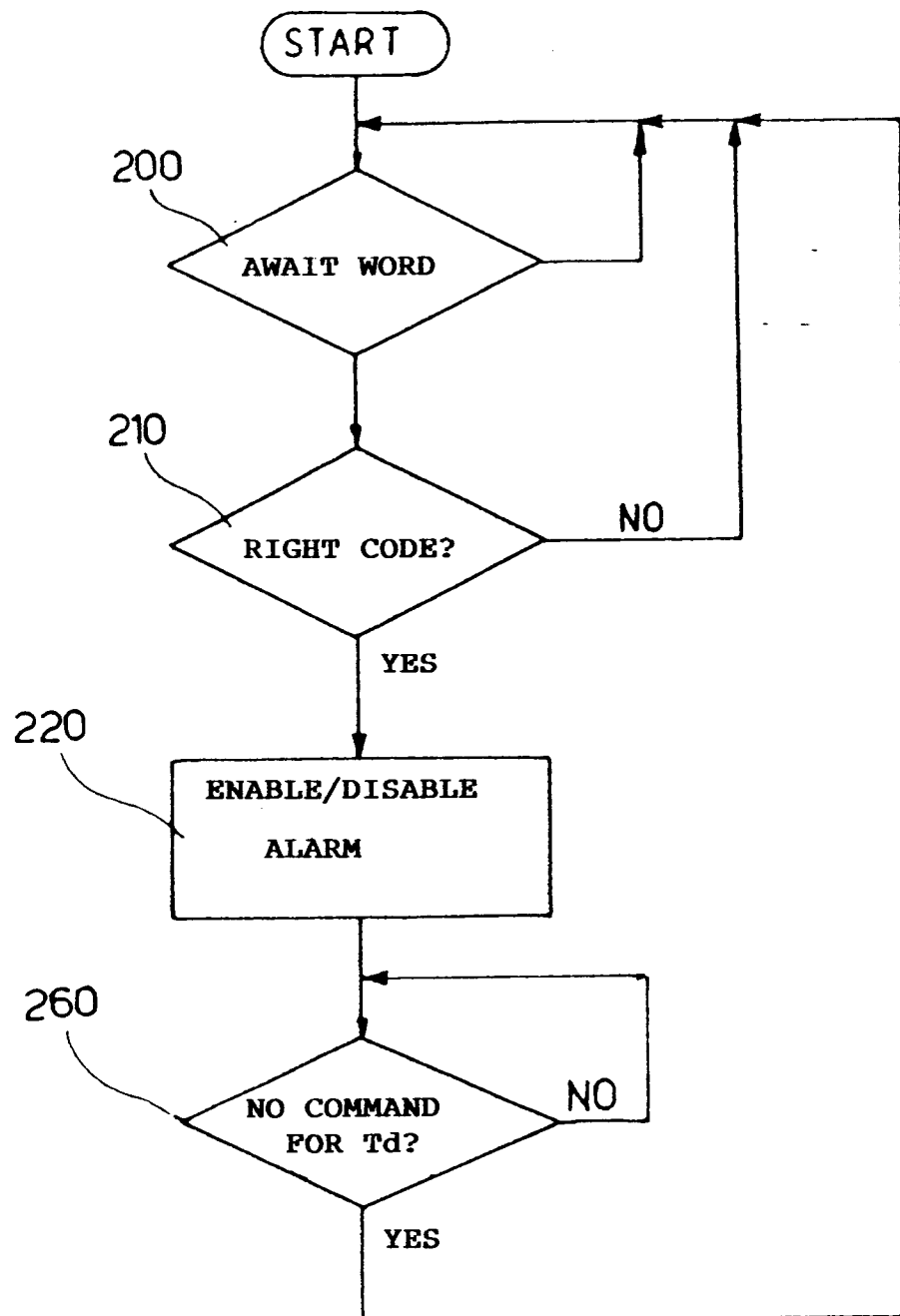
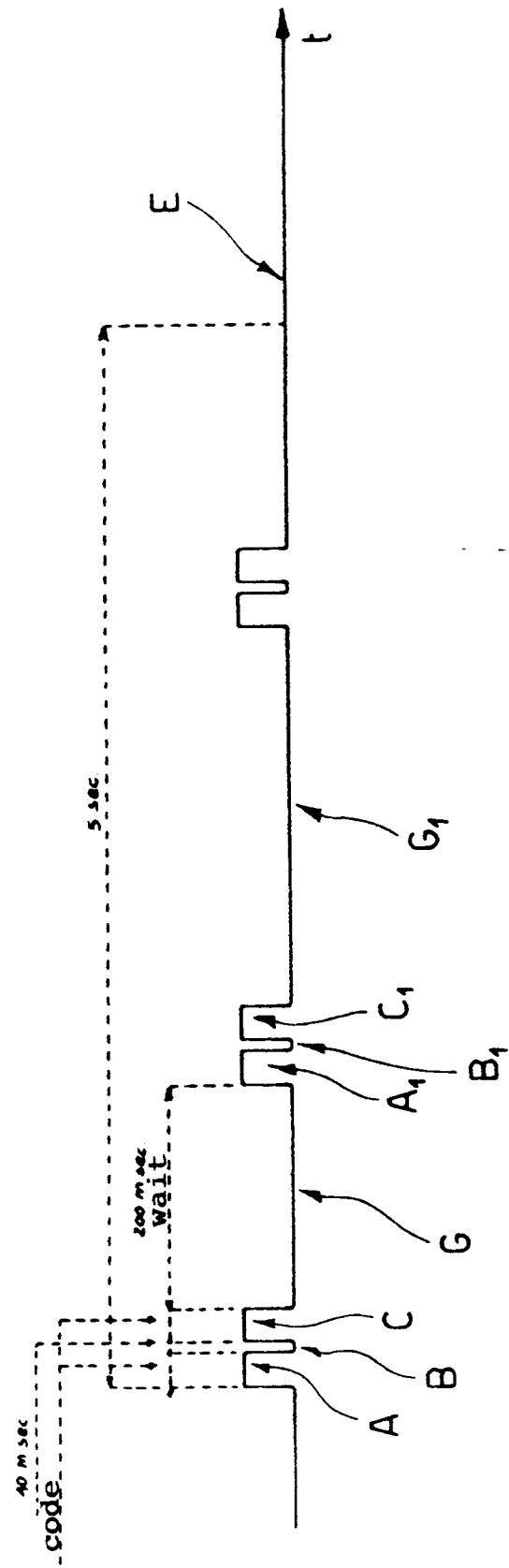


FIG. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 11 0680

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 196 203 (PARR) * page 1, line 105 - line 127 * * page 3, line 113 - page 4, line 28; figures 5,6 *	1-6	E05B49/00
A	---	8,9	
X	EP-A-0 099 762 (LEWINER,HENNION) * page 6, line 30 - page 7, line 8; figure 1 *	1,2	
A	-----	3,5-7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 September 1994	Examiner Herbelet, J.C.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.92 (P04C01)