PORTABLE MORSE CODE SIGNALING DEVICE

Inventors: Donald W. Johnson, Linton; Ronald J. Stovall, Crane; Larry A. Wheelock, Bloomfield, all of Ind.

Assignee: The United States of America as represented by the Secretary of the Navy

Filed: Dec. 28, 1970

Appl. No.: 101,693

U.S. Cl. 340/321 R, 178/26 R, 340/345 R

Int. Cl. H04F 15/04

Field of Search 345/321, 345

References Cited

UNITED STATES PATENTS

3,021,516 2/1962 Spitz et al. 340/345

3,142,052 7/1964 Tambert 340/321

3,300,582 1/1967 Himes et al. 340/345 X

3,496,294 2/1970 Emanuels 178/26 X

Primary Examiner—Harold I. Pitts
Attorney—R. S. Sciascia, H. H. Losche and Paul S. Collignon

ABSTRACT

A signaling device for producing a light that flashes a Morse code signal. A light source is energized by a source of energy and circuit means are provided to energize the light source according to an output signal from a shift register comprised of a plurality of flip-flops. A diode encoder having a plurality of switches is provided to select flip-flops that are to be set which, upon clearing of the shift register, provides a Morse code signal. A first oscillator is provided to pulse the shift register and a second oscillator is provided to pulse the diode encoder for resetting the flip-flops.

3 Claims, 4 Drawing Figures
The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties therefor or therefor.

BACKGROUND OF THE INVENTION

The present invention relates to a hand-held signaling device and more particularly to a signaling device which will flash an infrared Morse code signal.

Various hand-held signaling devices are available for flashing Morse coded signals. For example, in U. S. Pat. No. 3,001,185, which issued Sept. 19, 1961, to Charles L. Cleek, there is shown a hand-held signaling device which has a shutter that is mechanically actuated by depressing a trigger. The depression of the trigger also closes a normally open circuit and energizes a light source.

Another signaling device is shown in U. S. Pat. No. 3,142,052, which issued July 21, 1964, to N. E. Tamberl. A spring wound motor is provided for driving an electric generator and a rotatable contact member. The generator energizes a light source and the rotatable contact member engages a plurality of spaced contacts to open and close a circuit thereby de-energizing and energizing the light source.

SUMMARY OF THE INVENTION

The present invention relates to a signaling device which flashes a coded signal which is electronically generated. A selector ring is provided for selecting one pair of a plurality of pairs of letters which can be generated. A shift register having a plurality of flip-flops is provided and a first oscillator is provided for pulsing the shift register which, upon clearing, provides a coded output which causes a light emitting diode to be energized and de-energized. A second oscillator is provided to pulse an encoder which selects different letters which are to be transmitted and resets the flip-flops in the shift register. A tone oscillator is also provided so that an audio signal can be received by a viewer.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referred first to FIG. 1 of the drawing there is shown a hand-held signaling device having a case 11, off-on switch 12, code selector ring 13, light source 14 and lens 15. By way of example, in order to make the case 11 more water-tight, off-on switch 12 and a plurality of switches which are operated by code selector ring 13, might be of the reed type which are pivotable by magnetic means. Batteries 16 are provided for energizing light source 14.

Referred now to FIGS. 2, 3, and 5 of the drawings, formation of Morse code letters is accomplished by presetting specific flip-flops in a shift register 17 and then clearing shift register 17 by pulsing the common shift line 18. Shift register 17 is made up of eight flip-flops 21-28 and the common shift line 18 is supplied with pulses from period oscillator 29 which is comprised of transistors 31 and 32. A non-inverting buffer 33 provides the necessary current to drive shift line 18. Shift line 18 is continuously pulsed which results in a continuous clearing of the flip-flops in shift register 17.

A diode encoder 34 is provided to select a particular pair of letters that are to be generated from the output of shift register 17. Switches 41-48 are provided to diode encoder 34, along with diodes 51-57, and a particular pair of switches are selected and closed by operating code selector ring 13. As shown in FIG. 3 of the drawings switches 41 and 42 are paired, 43 and 44 are paired, 45 and 46 are paired, and 47 and 48 are paired.

A pair of input lines 58 and 59 are provided for encoder 34 and the set terminals of flip-flops 22, 24, 26, and 28 are connected to lines 58 and 59. Isolation diode 51 is placed between line 58 and the set terminals of flip-flops 22, 24, 26, and 28, and likewise, isolation diode 52 is placed between line 59 and the set terminals of flip-flops 22, 24, 26, and 28. It can thus be seen that flip-flops 22, 24, 26, and 28 are set when either line 58 or line 59 is pulsed. The set terminal of flip-flop 23 is connected to line 58 through switch 42 and isolation diode 57 and also the set terminal of flip-flop 23 is connected to line 59 through switch 45 and isolation diode 56. Additionally, the set terminal of flip-flop 23 is connected to line 59 through switch 47 and diode 57. The set terminal of flip-flop 25 is connected to line 59 through switch 41 and isolation diode 55. The set terminal of flip-flop 27 is connected to line 58 through switch 44 and isolation diode 53 and also to line 58 through switch 43 and isolation diode 54. Letter oscillator 61 is provided for pulsing encoder 34 and non-inverting buffer 62 provides the necessary current. Lines 58 and 59 are alternately pulsed to achieve the two letter Morse code combinations which result from a particular switch setting. As shown in FIG. 8 of the drawings, when switches 41 and 42 are closed, the letters R and D are formed, when switches 43 and 44 are closed, the letters M and U are formed, when switches 45 and 46 are closed, the letters E and S are formed, and when switches 47 and 48 are closed, the letters T and H are formed.

Alternate pulses on lines 58 and 59 result from the NAND logic between flip-flop 63 and selector gate 64, which includes two NAND gates 65 and 66. Flip-flop 63 is toggled by the buffered output of letter oscillator 61 and the output of NAND gate 65 is high when the 1 output of flip-flop 63 is low and the A output of buffer 62 goes low. This logical condition is satisfied with every other pulse from letter oscillator 61. The output of NAND gate 66 goes high when the 0 output of flip-flop 63 goes low at the same time the A output of buffer 62 is low.

The output voltage taken from flip-flop 21, which is represented as waveform g in FIG. 4 of the drawings, provides one source of the driving voltage for current amplifier 67 which drives light emitting diode 68. In order to provide an audio signal as well as a visual one, the coded driving voltage is interrupted at an audio rate. The actual driving voltage applied to current amplifier 67, which includes transistors 71, 72, and 73, is a composite voltage logically generated from the output of shift register 17 and a tone oscillator 74. Voltage is applied to the input of transistor 71 only when the outputs from flip-flop 21 and flip-flop 75 are in their low states. As shown in FIGS. 2 and 3 of the drawings, the output of flip-flop 21 and the output of flip-flop 75 are combined in NAND gate 76.

Tone oscillator 74 is comprised of a unijunction transistor 77 utilized in a relaxation circuit comprised of resistors 81, 82, and 83 and capacitor 84. The output across resistor 83 is used to operate a voltage amplifier circuit comprised of transistor 85 and resistor 86. This arrangement serves to square the output waveform and make it compatible with the toggle input of flip-flop 75. Flip-flop 75 serves to generate a square wave voltage used for one logic input to NAND gate 76, with the other logic input being supplied from flip-flop 21 in shift register 17.

In operation, assuming the letters D and R are to be transmitted in Morse code, selector ring 13 is turned to a marked position and switches 41 and 42 are closed. The other switches in encoder 34 remain open. The buffered output from letter oscillator 61 alternately pulses input lines 58 and 59. (See waveform b of FIG. 4). Assuming that line 58 is first pulse,
3,668,684

(see waveform e) flip-flops 22, 23, 24, 26 and 28 are set, as shown in FIGS. 3 and 5 of the drawings, due to switch 42 being closed. Next the period oscillator 29 will provide pulses, to the common shift line 18 of shift register 17. (See waveform a of FIG. 4). The output from flip-flop 21 will represent, in Morse code, the letter D (−−) (see waveform g) and this output is supplied as one input to gate 76. Tone oscillator 74 also supplies an output to gate 76 and the output from gate 76, which is illustrated as waveform h in FIG. 4, is supplied to amplifier 76 and light emitting diode 68. By way of example, diode 68 might be of the type PEX 1206 manufactured by Texas Instruments, Inc., Dallas, Texas, and which is designed to emit near-infrared light when forward biased. It should be noted that the device shown in FIG. 3 does not transmit any sound, but rather is designed so that the infrared light can be detected and then converted into sound by an appropriate receiver.

As shown by waveforms c and d of FIG. 4, the outputs of flip-flop 63 alternately go high and low, which alternately pulses lines 58 and 59. When line 59 is pulsed, (see waveform f) flip-flops 22, 24, 25, 26, and 28 are set, as shown in FIGS. 3 and 5 of the drawings, due to switch 41 being closed. Pulses from period oscillator 29, which are applied to common shift line 18, will clear shift register 17 and the output from flip-flop 21 will represent, in Morse code, the letter R (−−). As long as switches 41 and 42 remain closed, and with lines 58 and 59 being alternately pulsed, the letters D and R will be alternately transmitted in Morse code. As illustrated in FIG. 5 of the drawings, other switch settings will cause other letter combinations to be flashed by diode 68.

We claim:

1. A hand-held signaling device for flashing light in Morse Code comprising,
   a light source,
   normally open circuit means for energizing said light source
   including a source of energy,
   a shift register having a plurality of flip-flops for intermittently closing said normally open circuit means and energizing said light source,
   an encoder having a plurality of switches arranged in first and second circuit paths and connected to selected flip-flops in said shift register,
   a first oscillator connected to said shift register for pulsing and clearing said flip-flops in said shift register,
   a second oscillator, and
   a selector gate connected between said second oscillator and said encoder for alternately switching the output of said second oscillator to said first and second circuit paths whereby a first arrangement of flip-flop settings is made in said shift register when said first circuit path is connected between said encoder and said shift register thereby intermittently energizing said light source to flash in Morse Code a first alphabetical letter when said shift register is pulsed and cleared, and whereby a second arrangement of flip-flop settings is made in said shift register when said second circuit path is connected between said encoder and said shift register thereby intermittently energizing said light source to flash in Morse Code a second alphabetical letter different from said first alphabetical letter when said shift register is pulsed and cleared.

2. A hand-held signaling device as set forth in claim 1 wherein said light source is a light emitting diode.

3. A hand-held signaling device as set forth in claim 1 having a tone oscillator and a NAND gate for combining the output of said shift register and the output of said tone oscillator whereby the output of said shift register is interrupted at an audio rate.