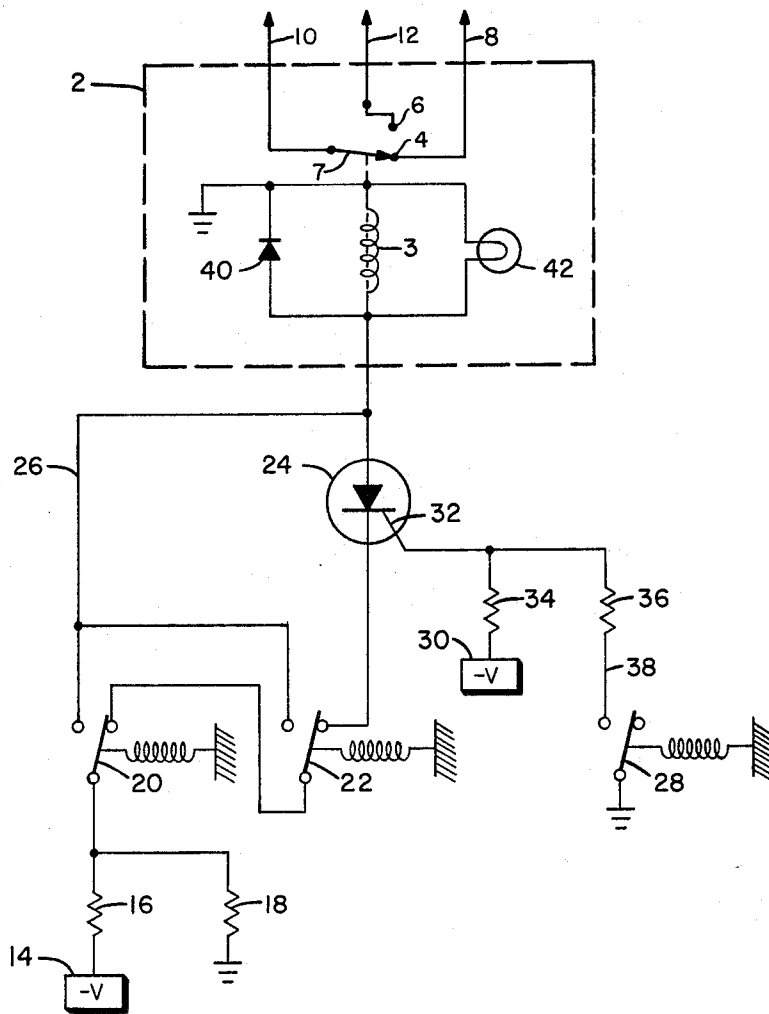


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R. L. HOISETH ET AL
ELECTRONIC CASE SHIFT MEANS

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3,288,261

ELECTRONIC CASE SHIFT MEANS

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7 Claims. (Cl. 197-71)

The invention relates to an electronic shift and shift lock circuit for an electric typewriter keyboard which is used to cause upper case characters to be printed.

In co-pending application Serial Number 453,990 filed May 7, 1965, and assigned to assignee of the instant invention and which also relates to an electronic circuit for shift and shift lock keys, it was pointed out that the prior art has made little or no provision for an electronic shift and shift lock circuit. While the circuit disclosed by the above co-pending application does provide an effective electronic circuit for the shift and shift lock keys, it utilizes two relays, one of which is quite complex, as well as two rectifiers. The present invention improves over the above co-pending application in that it is considerably simplified and is therefore more economical and trouble-free.

The present invention includes a signal generator, including a single-pole double-throw signal relay, which has its output contacts coupled to an encoder. When the relay is in its normally de-energized position, its normally closed contacts provide a signal to the encoder representing a lower case character. When the relay is energized, the normally open contacts are closed and a signal is presented to the encoder which represents an upper case character. Each shift key as well as the shift lock key has a single-pole, double-throw switch attached thereto. Whenever either of the shift keys is depressed, a potential is applied directly to the relay which energizes it and causes the upper case signal to be produced. If the shift lock key is depressed, it couples a gating signal to the gate terminal of a silicon controlled rectifier. A silicon controlled rectifier, SCR, is a three junction semiconductor device that normally represents an open circuit but switches rapidly to the conducting state of a single junction silicon rectifier when an appropriate gate signal is applied to the gate terminal. In the present case, the gating signal causes the rectifier to conduct and hold the relay energized. The relay will stay energized until such time as either of the shift keys is depressed which will break the circuit from the potential source to the anode of the rectifier.

The figure discloses the electrical circuitry forming the novel shift and shift lock circuit which produces encoded signals representing upper case and lower case characters.

Consider now the operation of the circuit shown in the FIGURE. The signal generator 2 includes relay coil 3, normally closed contact 4 and normally open contact 6, and switch element 7. In its de-energized position, it provides a signal to the encoder (not shown) on lines 8 and 10 which represent the lower case character. In its energized position, switch element 7 is pulled, such that normally closed contact 4 is open, and normally open contact 6 closed to provide a signal on lines 10 and 12 to the encoder which represent an upper case character. A source of potential 14 is coupled through resistors 16 and 18 to ground. The potential at the junction of resistors 16 and 18 is coupled through movable contacts 20 and 22 of the shift keys to the anode of the silicon controlled rectifier 24. When either of the shift keys is depressed, movable contact 20 or 22 will couple the potential from source 14 directly to the coil 3 of relay 2 through line 26, thus energizing the relay. When the shift keys are released, their spring loaded movable con-

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tacts return to their normally closed position and apply a potential to the anode of the silicon controlled rectifier. When the movable contact 28 of the shift lock key is in its normally open position, the full potential from source 30 is applied to the gate terminal 32 of the silicon controlled rectifier 24 thus hold the SCR off. However, when the shift lock key is depressed and movable contact 28 is coupled to line 38 the potential source 30 is coupled to ground through resistors 34 and 36. The potential at the junction of resistors 34 and 36 is decreased and this decreased potential, which is coupled to gate 32 of the silicon controlled rectifier, gates the SCR on and it begins to conduct, thus, energizing relay 2. Since the SCR will remain conducting until either of the shift keys is depressed, the relay 2 will remain energized. At such time as either of the shift keys is momentarily depressed, either movable contact 20 or movable contact 22 will break the circuit from the source of potential 14 to the anode of the silicon controlled rectifier 24 thus causing the rectifier to stop conducting. When the shift key is released, movable contact 20 or 22 will again apply the source of potential 14 to the anode of the rectifier but at this time the shift lock key will have been released, switch 28 will be open and the full potential from source 30 will again be applied to gate 32 of the rectifier, thus preventing it from conducting. Diode 40 when placed in a properly poled relationship across relay 2 provides a discharge path for the inductive currents produced by the relay. Also, light 42 is placed across relay 2 to indicate when the relay is energized.

Thus, it will be seen that a very simple yet effective electronic shift and shift lock circuit is disclosed.

What is claimed is:

1. An electronic shift and shift lock circuit of the type wherein when the shift lock key is depressed, the shift lock circuit remains energized until the shift key is momentarily depressed, said circuit comprising:

(a) a signal generator for alternatively producing a first electrical signal representing lower case characters and a second electrical signal representing upper case characters;

(b) first and second electrical contacts each movable between first and second positions by said shift and shift lock keys respectively; and

(c) a gate-signal controlled rectifier for coupling said first and second contacts to said signal generator such that said first signal is produced when both said contacts are in said first position and said second signal is produced when said first contact is held in said second position or when said second contact is momentarily moved from its first to its second position.

2. A circuit as in claim 1 wherein:

(a) said first contact provides a source of potential in said first position;

(b) said second contact provides a gating signal in said second position;

(c) said controlled rectifier includes an input terminal, said circuit further including an output terminal and a gating terminal;

(d) means for coupling said potential provided by said first contact in said first position to the input terminal of said rectifier;

(e) means for coupling said gating signal to said gating terminal; and

(f) means for coupling said output terminal of said rectifier to said signal generator.

3. An electronic shift and shift lock circuit for use in electronic keyboards comprising: a signal generator having an input terminal and at least two output terminals for alternatively producing a first electrical signal indicative of a first class of characters at one of said output ter-

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minals and a second electrical signal indicative of a second class of characters at the other of said output terminals in response to first and second input signals respectively as received at said input terminals; a gate-signal controlled rectifier having at least first and second electrodes and a gating electrode; means for coupling said first electrode to said input terminal; biasing means coupled to said gating electrode for coupling to a source of bias potential and normally biasing said gate-signal controlled rectifier into a first conductive state; shift lock means, including a first actuatable switch, coupled to said gating electrode for altering the biasing potential applied to said gating electrode when said actuatable switch is at least momentarily actuated for biasing said gate-signal controlled rectifier into a second conductive state, said rectifier operating to maintain said second conductive state following release of said actuatable switch; and shift means, including at least a second actuatable switch having a first contact member movable between second and third contacts, said second contact coupled to said first electrode and said third contact coupled to said second electrode, said shift means including coupling means for coupling said first contact member to a power source, said second actuatable switch normally completing a circuit path between said third contact and said second electrode, and said second actuatable switch, when actuated, operating to complete a circuit path between said second contact and said first electrode.

4. A circuit as in claim 3 wherein said signal generator comprises a relay element and further includes means for indicating when said relay element is in an actuated condition.

5. A circuit as in claim 3 wherein said gate-signal control rectifier comprises a silicon controlled rectifier having its anode terminal coupled to said input terminal and a cathode terminal coupled to said third contact.

6. A circuit as in claim 3 and further including a third actuatable switch coupled intermediate said second actuatable switch and said gate-signal control rectifier or providing an alternative means for actuating said signal generator and returning said gate-signal control rectifier to said first conductive state.

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7. An electronic shift and shift lock circuit for use in electronic keyboards comprising: a signal generator having an input terminal and at least two output terminals for alternatively producing a first electrical signal indicative of a first class of characters at one of said output terminals and a second electrical signal indicative of a second class of characters at the other of said output terminals in response to first and second input signals respectively as received at said input terminals; a gate-signal controlled rectifier having at least first and second electrodes and a gating electrode; means for coupling said first electrode to said input terminal; biasing means coupled to said gating electrode for coupling to a source of bias potential and normally biasing said gate-signal controlled rectifier into a first conductive state; shift lock means, including a first actuatable switch, coupled to said gating electrode for altering the biasing potential applied to said gating electrode when said actuatable switch is at least momentarily actuated for biasing said gate-signal controlled rectifier into a second conductive state, said rectifier operating to maintain said second conductive state following release of said actuatable switch; and selectively actuatable means for switching said gate-controlled rectifier to said first conductive state.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,288,261

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Roland L. Hoiseth et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 9, for "The" read -- This --; line 10, for "electric" read -- electronic --; column 2, line 59, strike out "said circuit further including" and insert the same, in line 60, after "terminal;" same column 2.

Signed and sealed this 12th day of September 1967.

(SEAL)

Attest:

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Attesting Officer

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Commissioner of Patents