The "Iambimatic" Concept

Unique Feature for Relay-Type Electronic Keyer

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Conventional electronic keying has greatly improved the ease and precision of c.w. operation for a great many amateurs. The standard "el" key makes it very easy to send letters consisting of strings of dots or dashes. Letters which contain dots alternated with dashes (requiring a back-and-forth motion) have encouraged the use of memories in more complex keyers, such as the Ultimatic[1] and Penultimatic.[2] The latter keyer recognizes the problem of dropping dots in letters like *k*; the dot memory provides greater reliability, and also eases the timing requirements of the operator. The former keyer adds a dual lever, a dash memory, and automatic spacing.

The "Iambimatic" concept is somewhat different. It works entirely like the conventional electronic keyer when used with a single paddle keying lever; it is self-completing and uses no memories.

The Iambimatic feature comes to light when used with double-paddle keying levers. If both levers are closed for a time (a long "squeeze"), dots alternated with dashes come forth from the keyer (. – . – . –).[3] This feature greatly reduces the effort required to send certain letters. A *CQ*, for example, is sent as follows:

C: one long squeeze. A little "English" is used to close the dash lever slightly ahead of the dot lever; the squeeze must be released at the end of the letter.

Q: the same as above, except that the dot lever is not actuated until after the first dash has been sent.

Other characters are also simplified (A, L, X, R, AR, SK, etc.). Sending these or a *CQ* on the Iambimatic gives one the funny feeling that the key is sending the letters on its own.

Dot/dash selection is simple. If only one lever is closed, then the dot or dash corresponding to that lever will be sent. If both levers are squeezed at roughly the same time, the first lever closed will determine the dot/dash selection. If both levers are closed from the time of the end of the last dot or dash, then the next dot or dash will be the opposite of the last one sent.

The Iambimatic concept may be applied to practically any keyer. Three examples will be given: Iambimatic modification of the HA-1 ("TO") keyer, a home-brew Iambimatic keyer, and a universal Iambimatic modification design.

HA-1 Adapter

Fig. 1 shows the very simple modification for the Hallicrafters HA-1 keyer; the circuit has performed perfectly at K8OCO for the last two years. Basically the circuit consists of a flip-flop, formed by neon bulbs V_1 and V_2, and a transistor gate, Q_1. One neon bulb will light if the dot contact only is grounded and the other will light if the dash contact only is grounded. If both levers are closed, the bulb corresponding to the lever closed first will light and the other will

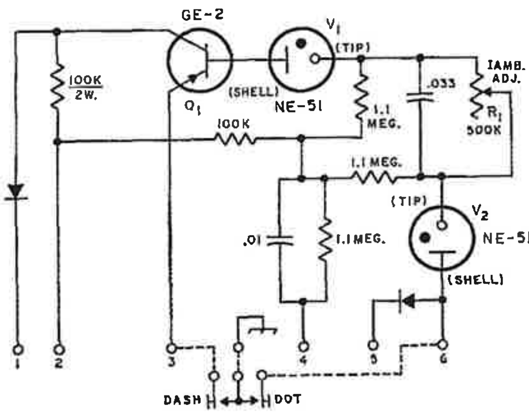

Fig. 1—Circuit of the Iambimatic adapter for the Hallicrafters HA-1 ("TO") keyer. Capacitances are in microfarads; unless indicated otherwise, resistances are in ohms (K = 1000), and fixed resistors are ½-watt. Capacitors are ceramic. Diodes are any silicon. Transistor Q_1 is a G.E. type. See author's note at end of article.

R_1—Linear-taper control.

V_1, V_2—Matched pair of NE-51 neon bulbs (see text). (Note that connections should be made to the tips and shells of the neon bulbs as indicated.)

Connections to numbered terminals are as follows:

1—Remove original connections from Pin 8, SO_1, of HA-1 keyer, and shift these connections to Terminal 1 of adapter.

2—To −105 volts regulated at Pin 7 of V_6 in HA-1.

3—Connect to Pin 8, SO_1, of HA-1.

4—Connect to Pin 3 or 4, SO_1, of HA-1.

5—Remove original connections from Pin 5, SO_1, of HA-1, and shift these connections to Terminal 5 of adapter.

6—Connect to Pin 5, SO_1, of HA-1.

Connect dash contact of keying lever to Pin 8, SO_1, of HA-1. Connect dot contact of lever to Pin 5, SQ_1, of HA-1. Connect lever to Pin 1, SO_1, of HA-1.

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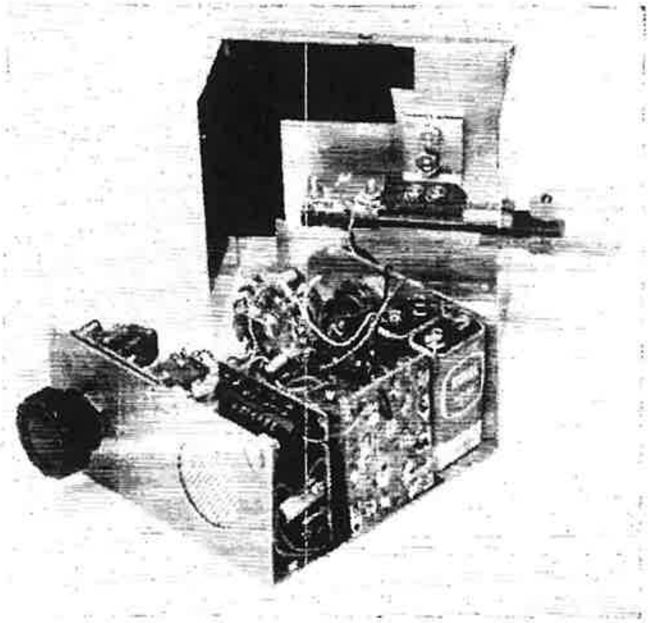
[1] Kanda, "The 'Ultimatic'—Transistorized," *QST*, Sept., Oct., 1960.

[2] Muir, "The Penultimatic Electronic Keyer," *QST*, March, 1962.

[3] Like the iambic meter of classical Latin poetry, in which the bards would alternate short and long syllables.



Front view of K8OCO's keyer, showing the speaker grille, and some details of the monitor and Iambimatic circuit boards. The tape strips in the cover are to avoid grounding some of the exposed circuitry.

remain off; a pulse from the closing of the relay in the HA-1 at the end of the dot or dash will trip the flip-flop and the other lamp will be lighted. Thus the bulbs will alternate at the end of every dot or dash. The gate, Q_1, is designed to close the dash contact of the HA-1 whenever the dash bulb is lit. Thus a . – . – . – sequence follows when both levers are squeezed.

The components were assembled on a small board which was mounted in the HA-1 keyer next to the relay. Be careful not to place the neon bulbs too close to anything else, or the transistor too close to a heat source. The neon bulbs have to be closely matched; buy a boxful and try various combinations. With both levers closed, plug in a pair of bulbs and rock the 500K variable until the circuit "iambimates" (goes . – . – . –). When you find a pair of bulbs that "iambimate," mark the maximum and minimum settings of R_1 that give reliable "iambimation" across the entire speed range; then leave the resistor set between these two points. Use the bulb combination that gives the greatest difference between the maximum and minimum marks.

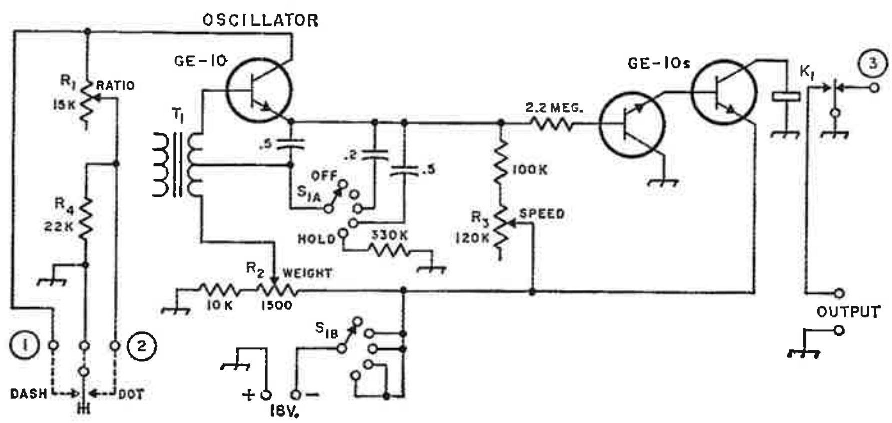


Fig. 2—Basic keyer circuit. If side-tone-monitor and/or Iambimatic feature of Figs. 3 and 4 are to be added, connect similarly-numbered terminals together. Capacitances are in microfarads and, unless indicated otherwise, resistances are in ohms (K = 1000). Capacitors are 10-volt ceramic; fixed resistors are ½-watt. Transistors are G.E. types.

K_1—10-mw. 5000-ohm s.p.d.t. miniature d.c. relay (Lafayette 99C6091).

R_1, R_2, R_3—Linear-taper control.

R_4—22,000 ohms, ½-watt.

S_1—Miniature rotary switch, 1 section, 2 poles, 5 positions Centralab PA1003, PA2003, or similar).

T_1—Transistor input transformer: 2000-ohm c.t. primary (d.c. resistance 150 ohms) (Argonne AR-115, or similar). Use primary only.

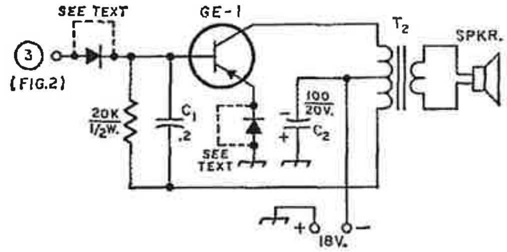


Fig. 3—Sidetone monitor circuit. Connect Terminal 3 to Terminal 3 of Fig. 2. Capacitances are in microfarads; resistances are in ohms (K = 1000). C_1 is 10-volt ceramic; C_2 is miniature electrolytic. Diodes are any silicon; they may be omitted *if the circuit of Fig. 4 is not used*. Transistor is a G.E. type. T_2 is a transistor output transformer, 500 ohms c.t. to voice coil. Speaker used in original unit is 2-inch.

A Complete Iambimatic Keyer

The circuit of the home-brew Iambimatic keyer in the photographs is shown in Figs. 2, 3, and 4. These represent the basic keying unit, monitor, and Iambimatic feature. Fig. 2 represents a fully satisfactory conventional keyer which can be used alone or with the other two options. It is basically a transistor version of the "POO-Key, Jr."[4] The very-low-leakage silicon transistors used (GE-10) make this circuit possible, and render the performance independent of temperature and individual transistor characteristics. In the oscillator circuit (at the left in Fig. 2) the transistor gets a positive bias from R_2 which also serves as a weight control. Different capacitors (exact values depend on the characteristics of T_1) are switched in for speed ranges of 10–20 w.p.m., 15–30 w.p.m., and 20–40 w.p.m.: other switch positions are OFF and HOLD. R_4 is used to suppress an occasional short dash; its resistance should be as low as possible without disturbing normal operation.

Fig. 3 is the circuit of the monitor, which was stolen from W5LAN.[5] The resistor-capacitor combination may be modified to change the tone. The volume level is not overpowering, but is quite acceptable. The two diodes are to isolate the monitor from the Iambimatic feature (these two sections share the n.c. contact of K_1 to ground); the diodes may be omitted if the latter circuit is not used.

Fig. 4 is the diagram of the Iambimatic feature. The circuit is similar in principle to Fig. 1. However, a transistor flip-flop is used here; transistor gates are used to key the flip-flop. The GE-2 transistor and the relay K_2 form the dash gate. Diodes CR_1 and CR_2 may be omitted (replace with a short) if the circuit of Fig. 4 is to be used with the circuit of Fig. 2. Omit CR_3 if the circuit of Fig. 4 is *not* to be used with the circuit of Fig. 3. The combination of 470K resistor and 0.02-μf. capacitor may have to be changed for extremely fast speeds.

The keyer in the photographs contains the circuitry of Figs. 2, 3, and 4 in a 2 × 2 × 4-inch Minibox. Each of the three sections is built on a 2 × 2-inch circuit board. Two 9-volt transistor radio batteries power the unit: battery drain is 50 mw. key-up and 160 mw. key-down. Voltages between 13 and 22 have been used successfully.

The keying levers are homebrew. Each lever consists of half the length of a thin jig- or coping-

[4] Livingston, "The Poo-Key, Jr.," *QST*, Sept., 1961.

[5] Old, "Transistorized Electronic Key and Monitor," *QST*, May, 1959.

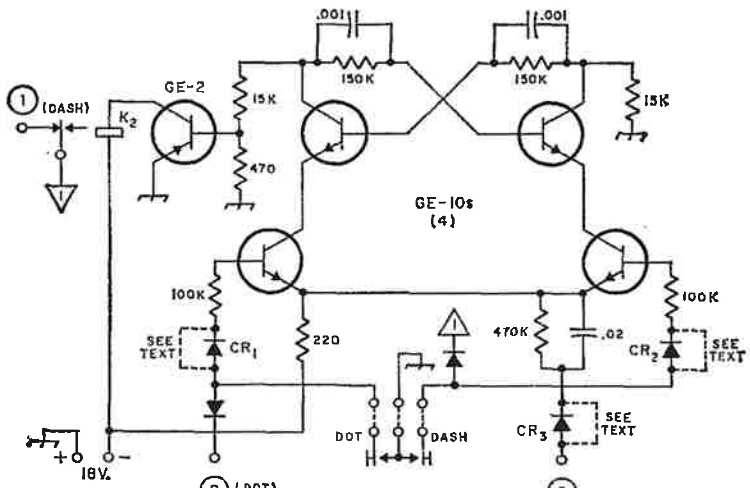
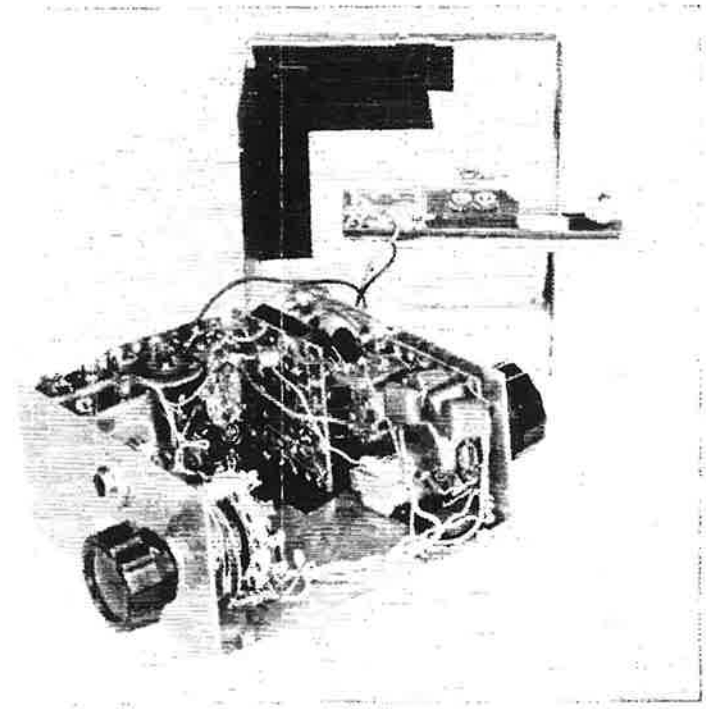


Fig. 4—Circuit of the Iambimatic feature for the keyer circuit of Fig. 2, or for other relay-type keyers with negative voltage at the key-lever terminals. When used with the circuits of Figs. 2 and/or 3, similarly-numbered terminals should be connected together. Diodes CR_1 and CR_2 may be omitted when this circuit is combined with that of Fig. 2. CR_3 need be used only when this circuit is combined with that of Fig. 3. When used with other relay-type keyers, Terminals 1 and 2 *should be connected, respectively, to the dash- and dot-lever terminals of the keyer. Terminal 3 should be connected* to ground through a spare set of normally-closed contacts on the output relay of the keyer.
Capacitances are in microfarads; resistances are in ohms (K = 1000). Capacitors are 10-volt ceramic; resistors are ½-watt. Transistors are G.E. types. Diodes are any silicon. K_2 is similar to K_1, Fig. 2.



Rear view of the Iambimatic keyer. The circuit board at the right contains most of the components of the basic keyer, including the speed control. Immediately to the left is the sidetone monitor unit. The third board to the right of the batteries contains the circuitry of the Iambimatic feature. The speed-range switch is in the foreground.

saw blade. Small pieces of foam rubber are used for spacing and to remove contact bounce. The saw blades are soldered to part of a copper-clad circuit board which is bolted (copper removed around bolts to preserve insulation from ground) to a solid piece of steel. This is firmly secured to the bottom of the Minibox.

Iambimatic Feature for Other Keyers

The circuit of either Fig. 4 or Fig. 5 may be used to convert any keyer *with a relay* to an Iambimatic keyer. It is easy to determine which circuit to use: Simply place a voltmeter from ground to either the dot or dash terminal of your present keyer. If a negative voltage is registered, use the circuit of Fig. 4; if a positive voltage, use the circuit of Fig. 5.

In either case connect Terminal 1 to the former dash terminal of your keyer and Terminal 2 to the former dot terminal. Use a dual-paddle keying lever and connect it to the new key-lever terminals in either Fig. 4 or Fig. 5. Connect Terminal 3 to a spare normally-closed contact to ground on the keying relay. Then connect up the 18 volts (batteries or a voltage doubler from the filament supply). Close both paddles and listen for the "iambimation.

Once the Iambimatic keyer has been completed, it will take a short time to get used to it. Start with *CQ*, and then practice your way down the alphabet. After a while you will wonder how you ever managed to get along with a conventional electronic keyer. QST—

[AUTHOR'S NOTE: Heat from the HA-1 keyer may cause excessive leakage in Q_1, making iambimation impossible. To avoid this, it may be advisable to place Q_1 apart from the main circuit, toward the cooler back end of the HA-1. Also, the lack of light may cause V_1 and V_2 to become unstable. This trouble may be cured by wiring in a small pilot lamp, placing it close to V_1 and V_2 to provide illumination.]

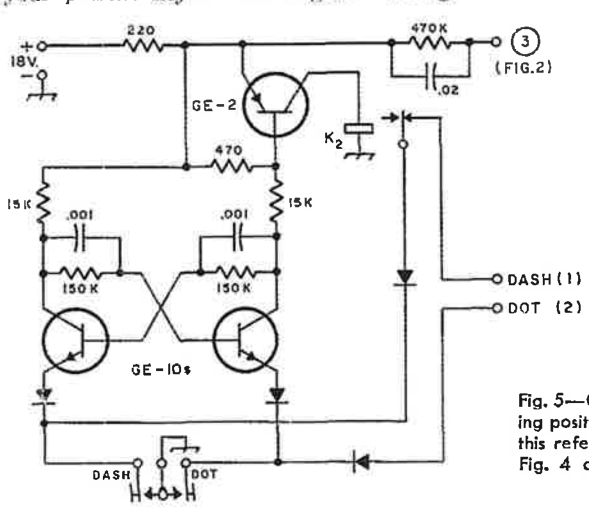


Fig. 5—Circuit equivalent to that of Fig. 4 for keyers having positive voltage at the key-lever terminals. Except for this reference to polarity, the content of the caption of Fig. 4 applies here. This version cannot be used with the circuit of Fig. 2.

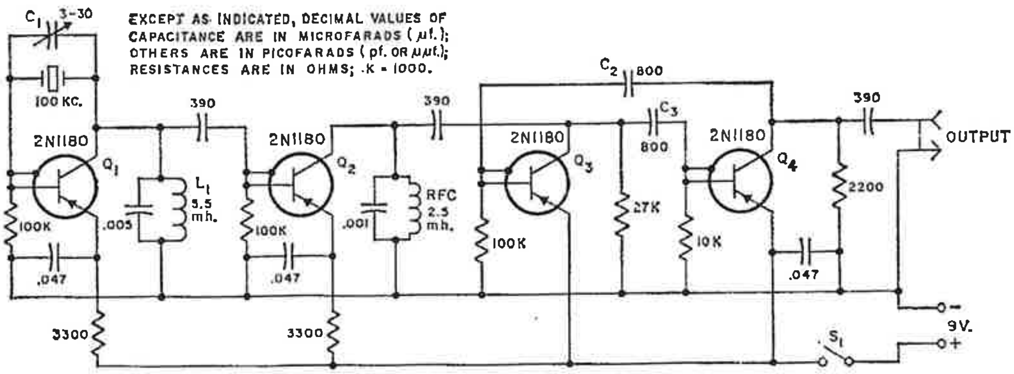


Fig. 1—Circuit of the 50-kc. frequency standard. Resistors are ½ watt, 10% tolerance; 0.047-μf. capacitors are Mylar, other fixed capacitors are ceramic.

C_1—3-30-μf. mica trimmer.
C_2, C_3—800-pf. disk ceramic (Centralab CE-801).
L_1—Iron-slug adjustable, 0.5-5 millihenrys (Miller 6313).
S_1—S.p.s.t. toggle.