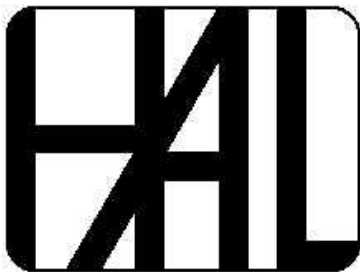


2550

ELECTRONIC KEYS

**INSTRUCTION
MANUAL**



HAL COMMUNICATIONS CORP.[®]

BOX 365

URBANA, ILLINOIS 61801

QUALITY COMMUNICATIONS EQUIPMENT

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SPECIFICATIONS 2550 KEYER

Speed Range:	5 to 60 WPM
Monitor:	Variable volume and tone Internal Speaker External Audio Output
Keyer Switch:	-150 V, 150 mA (Grid Block) +250 V, 150 mA (Cathode)
Front Panel Controls:	Speed / Tune Control Volume / AC Power Control
Rear Panel Connections:	Power Cord, Fuse, Ground Screw, Keyed Output, Audio Output, Hand Key Input, Paddle Input, ID Control, DC Input
Power Requirements:	105 to 125 VAC or 210 to 250 VAC, 50 to 60 Hz; 12 VDC, 400 mA.
Cabinet:	Satin-finish Front Panel, Gray crackle cabinet
Mechanical:	6½" W × 3½" H × 6" D (16.51 × 8.89 × 5.24 cm) 3½ lbs. net weight (1.59 kg)

I. GENERAL INFORMATION

1.1 Description

The HAL 2550 is a solid-state, electronic keyer designed for transmitting Morse code. A successor to HAL Communication's popular 1550 keyer, the 2550 provides many advanced operating features:

1. The master clock is keyed to assure that all code units, including the first in a stream, are of uniform length.
2. When a "squeeze" paddle is used, iambic keying (alternate dots and dashes) will be generated when both paddles are closed. All alpha-numeric characters except P and X may be sent with a single squeeze of the paddles. Single-lever paddles may also be used but without the iambic feature.
3. A dot memory permits generation and retention of a dot that is keyed before a preceding dash is completed. The 2550 will complete the dash, insert a space, and generate a dot. Dots, dashes, and spaces are self-completing.
4. A sidetone oscillator and speaker are included in the 2550 to permit monitoring of the keyer output. A front-panel control adjusts the volume and the pitch of the tone is adjustable by means of an internal potentiometer. The sidetone output is also connected to an external audio output jack for connection to the receiver audio system or an external amplifier. The internal speaker is disconnected when the external audio output jack is used.
5. A high-voltage transistor switch will key either grid-blocked or cathode types of transmitter keying circuits.
6. The 2550 will operate from power sources of 105 to 125 VAC, 210 to 250 VAC, or 12 VDC (400 mA). The internal power supply is electronically regulated.
7. Provision is included for a hand-key input for maximum versatility.
8. A two-message identifier feature is available as an option for the 2550 keyer. The identifier can be factory programmed with two user-specified messages, with up to a maximum of 62 dots, dashes, and spaces per message. The messages are generated in a PROM (Programmable Read Only Memory) integrated circuit installed in a socket on the keyer circuit board. Additional PROM's can be purchased from the factory to facilitate changing of the ID messages.

The keyer circuitry is constructed on a single G-10 glass-epoxy plated circuit board that connects to the panel mounted controls with a 16 pin connector to simplify maintenance. The cabinet is an attractive and rugged two piece assembly with a gray cover and satin-finish front panel. All output/input connections are conveniently located on the rear panel.

1.2 Instrument Identification

Your keyer is identified by a serial number engraved on the rear panel. It is suggested that you record it in the place provided on the title page of this manual. Please refer to the serial number when contacting the factory for information or service.

1.3 Accessories Furnished

The 2550 keyer is shipped with the following accessories:

- 1 SPST, N.O. push-button switch
- 2 Two-circuit plugs
- 2 One-circuit plugs
- 1 Phono plug
- 1 24 inch length, two-conductor shielded cable
- 3 24 inch lengths, single-conductor shielded cable
- 1 Operating and service manual

Additionally, the 2550 keyer with identifier option is also furnished with these accessories:

- 2 SPST, N.O. push-button switch
- 1 Two-circuit plug
- 1 24 inch length, two-conductor shielded cable

II. INSTALLATION

2.1 Initial Inspection

When you unpack your 2550 keyer, examine it carefully. If evidence of shipping damage is found, contact the carrier immediately. Before discarding the packing materials, check that all accessories are accounted for. If any are missing, please notify the factory in writing.

2.2 Key Paddle Connections

To take full advantage of the 2550's iambic feature, a dual-paddle "squeeze" key such as the HAL Model FYO key lever should be used. The key contacts are connected to the keyer circuitry through the "PADDLE" jack on the rear panel.

Locate a two-circuit phone jack and a length of two-conductor shielded cable and connect to the key as shown in Figure 1a. The standard convention for wiring of "squeeze" paddles is to connect the paddle actuated by your thumb to generate dots and the paddle actuated by the first finger to generate dashes. Obviously, the connections will be different for right and left-handed individuals.

2.3 Preliminary Checkout

Connect the power cord to an AC source of the proper voltage (nominal 115 or 230 VAC) and frequency (50 to 60 Hz).

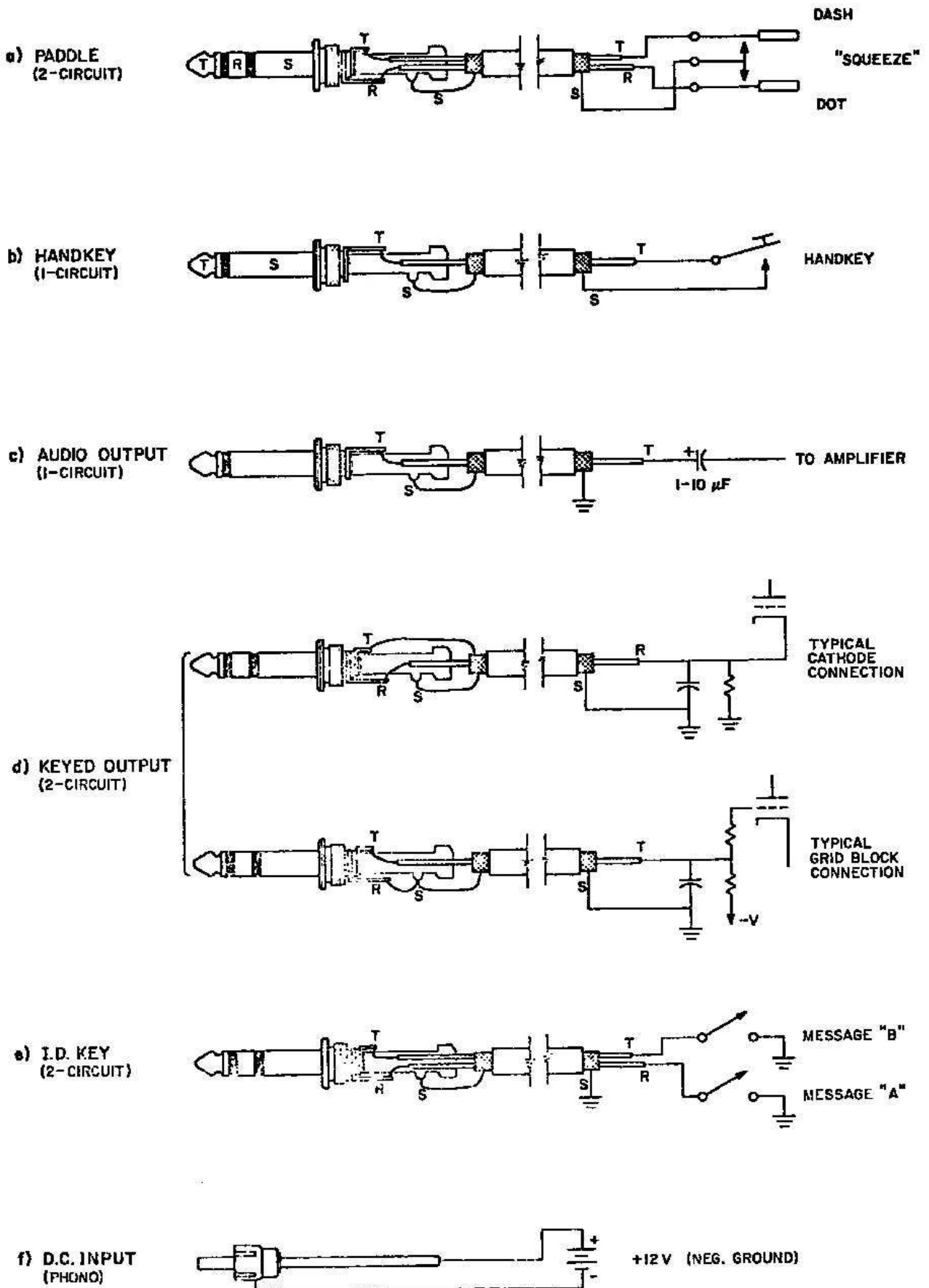
NOTE: The keyer can be supplied for either 115 or 230 VAC (nominal) operation. The 2550 is normally wired for 115 VAC operation unless otherwise indicated by a tag attached to the power cord. Before connecting the power cord, be certain that the voltage of the outlet corresponds to the keyer input voltage rating.

To insure operator safety, connect the power cord to a three-prong outlet with safety ground. DO NOT attempt to defeat the grounding prong of the keyer cordset. To do so will void the warranty.

Turn the keyer on by rotating the volume control in a clockwise direction. Set the volume control to approximately the middle of its rotation ("12 o'clock"). If your keyer is equipped with the optional identifier, a code stream may be generated when the keyer is first turned on. This is a normal characteristic caused by clearing of the logic from the indeterminate turn-on states. After the ID has cleared itself, the keyer operation may be tested. Set the speed control to "12 o'clock".

Plug-in the paddle connector at the jack labeled "PADDLE" on the rear panel. Pressing the paddle with your thumb should generate a series of dots at a speed of approximately 20 to 25 words-per-minute. Pressing the other paddle with the first finger should produce a string of dashes. Squeezing the two paddles together should produce an alternate string of dots and dashes. The speed control should allow adjustment of the speed over the approximate range of 5 to 60 WPM. Rotating the speed control past the minimum speed (all the way CCW) will switch the keyer into a continuous key-down condition for tuning. Since this is a continuous key-down mode, care should be taken to avoid over-heating the transmitter when this feature is used.

To test the dot-memory feature, set the keyer to the slowest speed (SPEED control CCW), touch and release first the dash and then the dot levers in rapid succession. The keyer should generate a full length dash, a space and then a dot. This feature works at all speeds but is easiest to test at slow speeds.



Before connecting the 2550 to the transmitter, it is highly recommended that you practice and become proficient in the use of the squeeze paddle.

If the keyer fails any of the above tests, first make sure that the paddle connections and procedures are correct, and then consult the factory if the problem is not resolved.

2.4 Hand Key Connections

The HANDKEY input to the keyer is used when the operator wishes to by-pass the automatic keying features, but still take advantage of the sidetone monitor and the solid-state keyer feature.

Connect the hand key to a single-circuit plug through a length of shielded cable and plug it into the "HANDKEY" jack on the rear panel. Shielded cable is preferred to minimize the possibility of pick-up of stray RF energy. Closing the hand key should generate a sidetone output.

An alternate, less obvious use of the HANDKEY input is to connect to either the MKB-1 or DKB-2010 keyboards to permit transmitter keying by either the keyer or keyboard. Use the "CATHODE" output of the keyboards for this connection.

Another alternate use of the HANDKEY input is for a remotely-located tune switch. A miniature SPST, N.O. push-button switch is furnished for this application, if desired. To connect the switch, wire as shown in Figure 1b, substituting the switch for the hand key. The switch can be located at any convenient location in your station.

2.5 Transmitter Connections

The output stage of the keyer is a high-voltage switching transistor. When connected to the transmitter, this electronic switch takes the place of the normal hand key. The keyer may be connected for either cathode or grid-blocked keying (but not both at the same time), depending on which connection is used on the two-circuit "KEYED OUTPUT" jack on the rear panel.

Before attempting to connect the keyer to the transmitter keying terminals, examine the transmitter circuit diagram carefully to determine the keying method used. The keyer cannot be used with "floating" key circuits; one of the two keying terminals must be grounded within the transmitter.

The transistor keying switch is rated to withstand 250 Volts at up to 150 mA in cathode keying service. For grid-blocked keying, the voltage at the key should not exceed -150 Volts, and the current should not be greater than 150 mA. Before connecting the keyer, measure the voltage across the keying terminals of the transmitter with the key open and the current through the key when it is closed to ensure that these ratings are not exceeded.

Some transmitters (such as the Yaesu FTDX-560 and several of the Swan transceivers) include a wave-shaping filter in the key line, with a capacitor connected directly across the key terminals. The charge stored in this capacitor can produce a current surge large enough to damage the keyer's switching transistor when the transmitter is keyed. If such a capacitor is present in your transmitter, a resistance of between 100 and 390 ohms must be inserted in series with the line to the keyer. Use a ½ Watt resistor, choosing the highest value in this range that does not degrade transmitter performance. The resistor can be mounted inside the phone plug used to connect to the keyer output jack.

CAUTION: HIGH VOLTAGES MAY BE PRESENT AT THE TRANSMITTER KEYING TERMINALS.

UNPLUG THE TRANSMITTER AND THE KEYER BEFORE MAKING THE FOLLOWING CONNECTIONS.

Refer to Figure 1d and connect a shielded cable from a two-circuit jack (keyer connection) to the type of jack (or terminals) required for the keyed input of your transmitter. Note that different jumpers are required at the two-conductor plug for cathode and grid-block keying. Connection for a cathode-keyed transmitter requires connection of the cable center conductor to the "ring" of the plug and the shield to BOTH the "tip" and "sleeve" of the plug. Conversely, connection for grid-block keying requires connection of the center conductor to the "tip" of the jack and the shield to BOTH the "ring" and "sleeve". As before, a shielded cable is preferred to minimize stray RF pickup. It is also VERY IMPORTANT that the ground terminal (labeled "GND") on the keyer rear panel be connected to the transmitter and station grounds with as short a lead as possible to further prevent stray RF interference with the keyer operation.

CAUTION: POTENTIALLY LETHAL VOLTAGES MAY BE PRESENT AT THE PHONE PLUG TIP OR RING CONTACTS WHEN THE TRANSMITTER IS TURNED ON. DO NOT CONNECT OR DISCONNECT THE KEYING CABLE FROM THE KEYER WITHOUT FIRST SWITCHING THE TRANSMITTER OFF.

Once the keying cable has been prepared and connected to the keyer and transmitter, the keyer and transmitter may be turned on. Operation of the paddle key (or hand key, if connected) should generate a sidetone and key the transmitter.

2.6 Audio Output Connection

The audio signal from the sidetone oscillator may be coupled to an external circuit via the "AUDIO OUTPUT" jack. As shown in Figure 1c, connect the center conductor of a shielded cable to the "tip" contact of a one-circuit phone plug and the shield to the "sleeve" contact. The other end of the cable should be connected to the desired external device with the shield to the device ground. When plugged into the keyer, the internal sidetone speaker of the keyer is disconnected and the audio level is controlled by the keyer's VOLUME control. The maximum amplitude of the audio output signal is 2 volts peak-to-peak when connected to a 600 ohm load and 1.75 volts peak-to-peak into an 8 ohm load.

2.7 DC Input Connection

The "DC INPUT" jack on the rear panel of your keyer allows you to operate the unit from an external 12 volt DC source. When using this feature, the AC line cord must be disconnected. The on-off switch on the VOLUME control does not operate when an external supply is used.

As shown in Figure 1f, a phono plug is used to connect the external power source to the DC INPUT jack. The positive (+) terminal of the external supply should be connected to the center pin of the plug and the negative (-) terminal to the plug shell.

The rear panel 1/8 amp. fuse protects only the internal AC power supply of the 2550 and is not in the circuit when an external DC power source is used. Therefore some protection should be provided for the external DC power source. The 2550 requires approximately 400 mA when operated from an external 12 VDC source.

2.8 Identifier Control Connection

The I.D. KEY input jack on the rear panel is used to control the identifier section of the keyer. The jack is only functional on keyers purchased with the identifier option. Two separate messages are controlled from this jack, each of which can be as long as a total of 62 dots, dashes, and spaces. Two external switch closures to ground are required to control the identifier section. The switches should be of the momentary-action SPST, N.O. type. Two miniature push-button switches are furnished that can be placed in a convenient location in your station.

Refer to Figure 1e and connect a two-circuit plug to a piece of two-conductor shielded cable. Connect the ID switches to the other end of the cable, being careful to note which switch is for message A and which is for message B. As before, shielded cable should be used.

Operation of either identifier message is initiated by momentarily pressing either switch. If it is desired to repeat a message, hold the button down for as many repeats as desired. An additional operating feature of the identifier section is, that the operation of the two messages is iambic; that is, if both message switches are closed (held down), the two messages will alternate.

Test the operation of the identifier by connecting the ID switches to the keyer and turning the keyer on. Cycle each identifier message once to assure that all logic is cleared from its turn-on state. Pressing message A button should trigger the code stream stored as message A and similarly for message B. Holding one of the buttons down should cause the message to repeat; holding both buttons down should cause the two messages to alternate.

III. OPERATING YOUR KEYER

3.1 Introduction

The many advanced features of the 2550 keyer make it easy to produce flawless Morse code signals. The operating tips presented in this section will help you to take full advantage of your keyer's capabilities. Be sure you have read, understood, and followed the directions of the previous sections of this manual. As mentioned earlier, it will be worthwhile to read these paragraphs and practice using the keyer alone before trying it with the transmitter, especially if you are not familiar with iambic or dot memory features.

3.2 Controls

Your HAL 2550 keyer has only four control functions which need be adjusted during normal operation. A fifth, the sidetone monitor tone control, is normally adjusted only when the keyer is first installed.

Volume Control and Power Switch:

The AC power switch is ganged to the volume control shaft. Rotating the knob clockwise switches the keyer on. The volume control adjusts the amplitude of the sidetone monitor output, as well as the amplitude of the audio signal at the AUDIO OUTPUT jack on the rear panel.

Speed Control and Tune Switch:

The tune switch is ganged to the speed control shaft. Rotating the knob to a full counter-clockwise (CCW) position actuates the tune switch. The tune switch locks the switching transistor in the key-down condition, holding the transmitter on for tuning and adjustment. The tune switch parallels the hand key contacts. The transmitter will be held continuously in key-down condition as long as the tune switch is actuated. Care should be taken to avoid overheating the transmitter with long intervals of tune operation.

The speed control allows adjustment of the 2550's keying speed from approximately 5 to 60 words-per-minute. The ratio of dot to dash duration is precisely maintained at 1:3 over the entire speed range.

Tone Control:

The pitch of the sidetone monitor is adjusted by a small control located on the circuit board (inside the cabinet). The pitch control is the trimming potentiometer that is located in the central portion of the circuit board. Be careful not to adjust the power supply voltage control at the right-rear of the circuit board. Use a small insulated alignment screw-driver to adjust the pitchcontrol. Be very careful; potentially lethal voltages are exposed when the cover is removed from the cabinet.

3.3 Operating Modes

The HAL 2550 keyer offers three basic modes of operation:

1. Automatic dots and dashes (single or multiple)
2. Iambic (alternate dots and dashes)
3. Dot Memory (trailing dot is remembered)

Your keyer is capable of all three modes of operation. The mode selected is determined by the manner in which the keying paddles are manipulated.

Automatic Dot and Dash Operation:

In the simplest mode of operation, one or more dots or dashes are generated whenever the appropriate paddle is closed. When the dot lever is depressed, a dot commences immediately. If the dot lever is released before this initial dot and its succeeding space are completed, the keyer will complete the dot and generate a space of equal length before the next character is initiated.

If the dot lever is depressed and held, a series of dots will be produced, separated from each other by spaces, until the lever is released. As in the case of a single dot, if the lever is released during the transmission of a dot, the dot and its succeeding space will be automatically completed.

Dashes, which are exactly three times as long as dots, are sent in the same manner. If a dash is the first character to be sent, it commences immediately upon depressing the dash key lever. If the dash lever is released before the dash is completed, the keyer automatically, completes the dash and generates a space (equal in length to a dot) before the next character is initiated.

Depressing the dash lever and holding it produces a string of dashes separated by spaces. The last dash in the series will be completed even if the lever is released before the end of the dash. However, if the dash lever is depressed and released during a given dash, the keyer will not generate an additional dash.

Iambic Operation:

The iambic mode of operation is very convenient for transmitting many code combinations. Using this feature, all International Morse code characters except "p" and "x" and some of the punctuation marks can be produced with only one operation of the key paddles.

When both key levers are depressed and held, the keyer generates a series of alternating dots and dashes. The character which starts the string is determined by which lever is depressed first. For example, if the dash lever is depressed, followed by the dot lever and both levers are held closed, the series will begin with a dash (-·-·-·-·-· etc.).

To send the letter "C" (-·-·) the dash lever is depressed first. The dot lever is then depressed before the completion of the first dash. Both levers are released at the beginning of the second dot. To send an "F" (·-·-), the dot lever is depressed first and held. After the start of the second dot, the dash lever is depressed. After the dash has been sent and the third dot begun, both levers are released. To transmit letters ending in a dash, release the dot lever during or after the final dot and then release the dash paddle during the final dash.

Dot Memory Feature:

The dot memory is useful in transmitting code sequences which end in a dash followed by a "trailing" dot (for example, the letters C, F, G and N). The dot memory is "set" (instructed to remember that a final dot is to be sent) by the following procedure: during the final dash, release the dash lever and touch and release the dot lever. Alternately, the dash lever may be held closed when the dot lever is closed, but the dot lever must be opened last (all during the transmission of the dash). If the dash lever is the last to be released, the dot

will not be retained in the dot memory. Therefore, if the dot memory has been set accidentally, it can be cleared if the dash paddle is activated after the dot is stored but before the end of the final dash. This technique is only useful at the slower CW speeds, however.

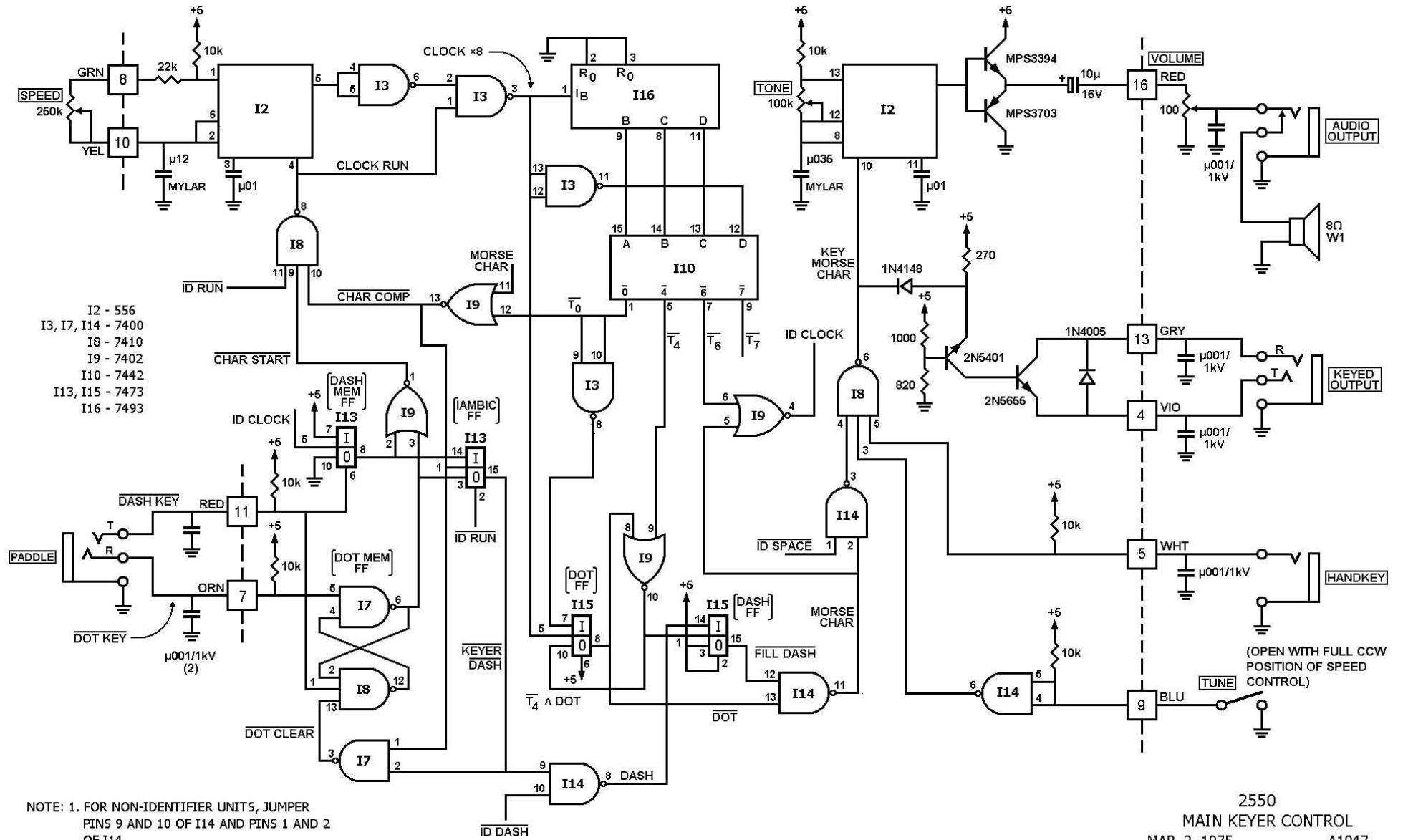
To transmit a dot last, either iambic OR dot memory features may be used. When using the iambic mode, release the dash lever first, during a dot. Then, release the dot paddle, also during the dot. Obviously, this will be very difficult to do at higher CW speeds. To use the dot memory feature, release the dash lever during the dash, and then release the dot lever. This procedure is obviously better, particularly for higher speed operation.

3.4 Identifier Option Operation

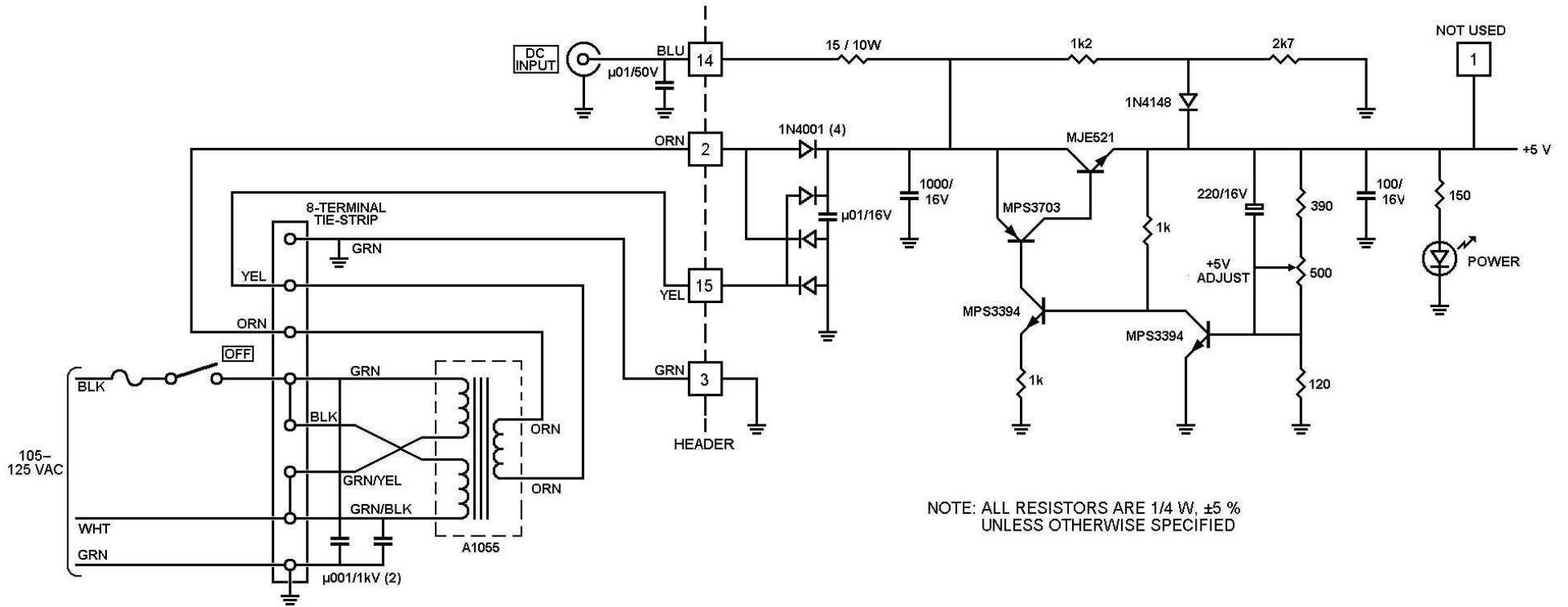
When supplied with the identifier option, the 2550 keyer can generate upon command two user-specified messages. As mentioned previously, each message can have a maximum length equivalent to a total of 62 dots, dashes and spaces (between letters spaces between words require three memory locations). once initiated by the proper message switch the entire message programmed will be transmitted at the same speed as adjusted by the speed control for the squeeze paddle. Operation of the squeeze-paddle during the transmission of an ID message will not garble the ID. However, operation of either the tune switch or the hand key will override the identifier output.

The operation of the two message switches is iambic. If both switches are held closed, the two messages will alternate, starting with whichever message whose corresponding switch was closed first.

When first turning the keyer on it is possible that the identifier control will set to a state which will cause message A to be triggered by the switch for message B (or vice-versa). This is only an initial turn-on condition. Each time the keyer power is turned on, both ID messages should be triggered in turn. After the first cycling of the two messages, the ID message will be triggered by its proper switch. Since this is a function of the random nature of the turn-on state, this state may or may not occur each time the keyer power is turned on.

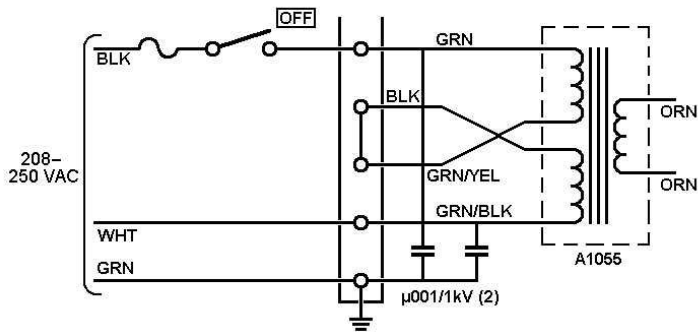


2550
 MAIN KEYER CONTROL
 MAR. 2, 1975 A1047

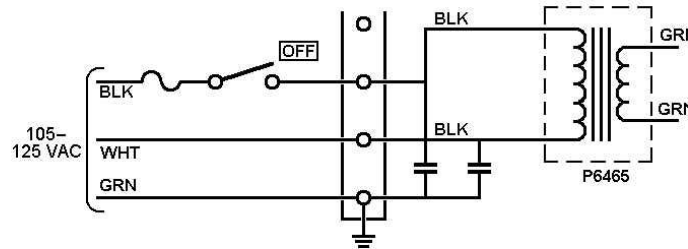


NOTE: ALL RESISTORS ARE 1/4 W, ±5 % UNLESS OTHERWISE SPECIFIED

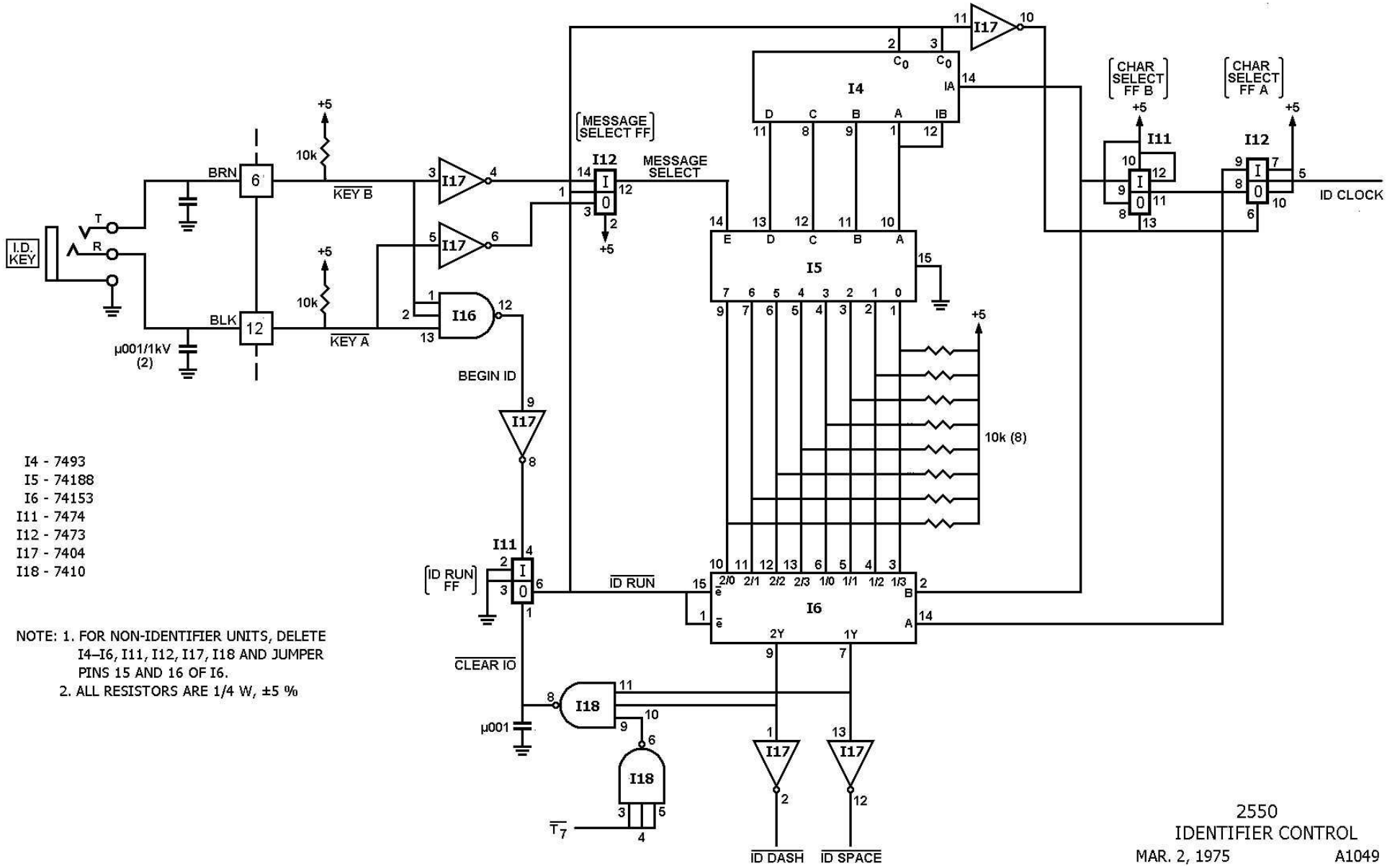
ALTERNATE 208-250 VAC TRANSFORMER CONNECTION



TRANSFORMER CONNECTION SERIAL NO'S 101 - 150 ONLY



2550
POWER SUPPLY
MAR. 2, 1975 A1048



- I4 - 7493
- I5 - 74188
- I6 - 74153
- I11 - 7474
- I12 - 7473
- I17 - 7404
- I18 - 7410

NOTE: 1. FOR NON-IDENTIFIER UNITS, DELETE I4-I6, I11, I12, I17, I18 AND JUMPER PINS 15 AND 16 OF I6.
 2. ALL RESISTORS ARE 1/4 W, ±5 %

2550
 IDENTIFIER CONTROL
 MAR. 2, 1975 A1049