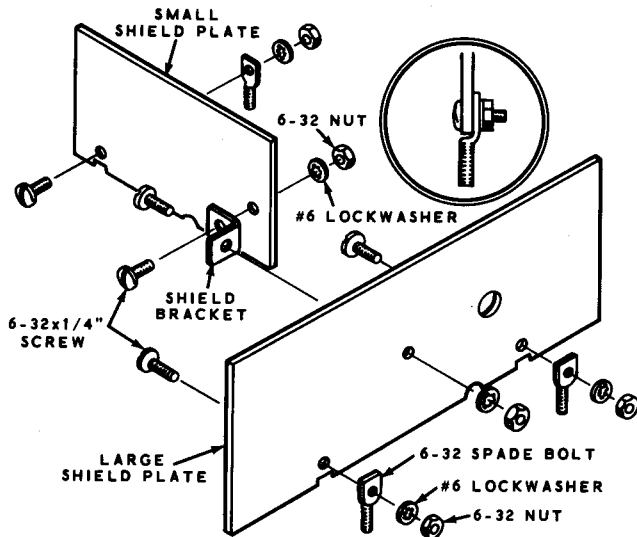


PICTORIAL 16

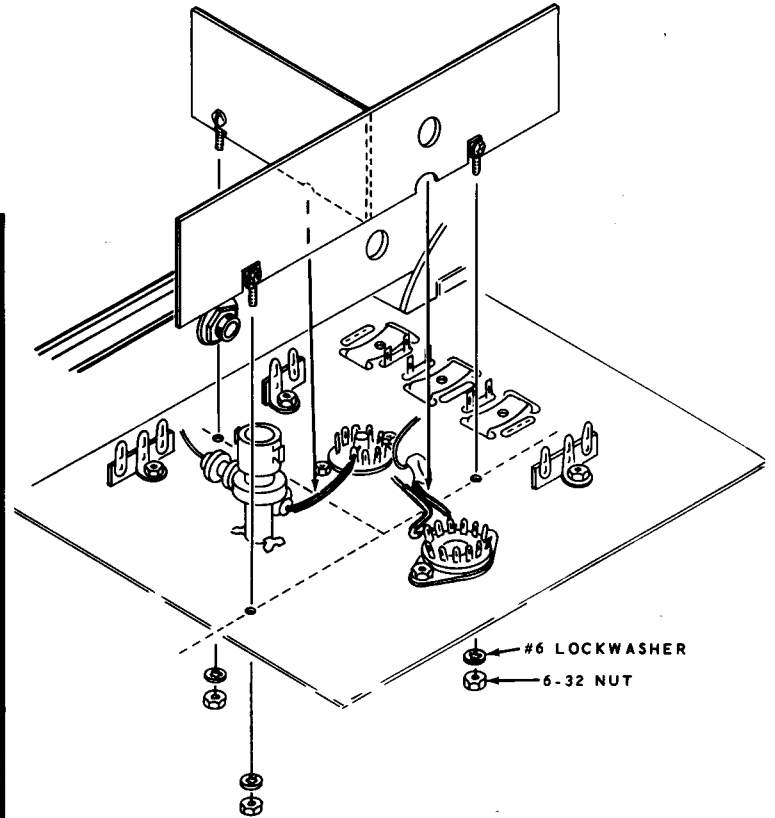
## FINAL WIRING

Refer to Pictorial 16 for the following steps.

- ( ) Refer to Detail 16A to assemble the oscillator-final amplifier shield.

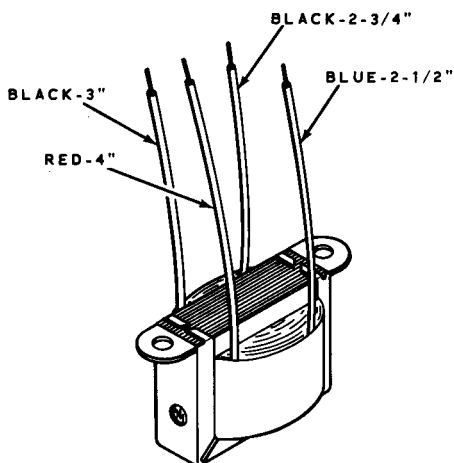


Detail 16A

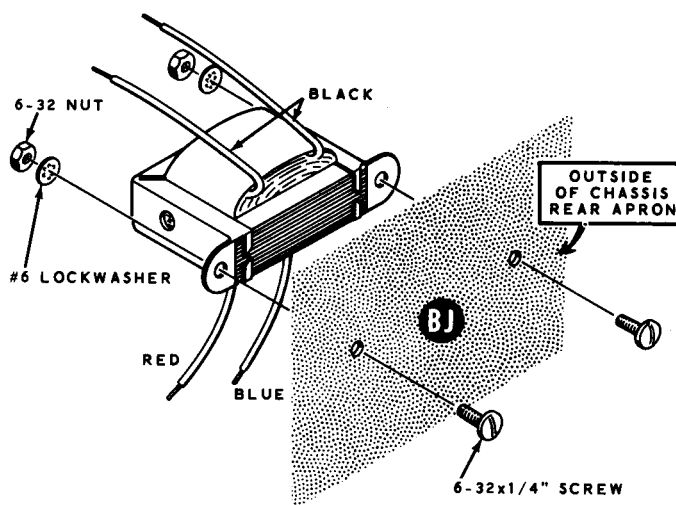


Detail 16B

- ( ) Locate a shield bracket (#204-102), a small shield plate (#206-334), and a large shield plate (#206-335).
- ( ) Place the shorter arm of the shield bracket against the small shield plate at the mounting hole as shown in Detail 16A. The folded edge of the shield bracket should be flush with the edge of the smaller shield plate. Use 6-32 x 1/4" hardware to mount the shield bracket to the smaller shield plate.
- ( ) Align the small hole near the center of the larger shield plate with the hole in the free arm of the shield bracket and mount the larger shield plate to the bracket. Use 6-32 x 1/4" hardware.
- ( ) Mount the three spade bolts to the assembled shield with 6-32 x 1/4" hardware. Position spade bolts as shown in the inset.
- ( ) Place a 2-1/2" length of sleeving on the brown wire coming from lug 1 of tube socket V9.
- ( ) Mount the bottom RF shield assembly to the chassis and route the wires as shown in Detail 16B. Use three #6 lockwashers and three 6-32 nuts. Be sure no wires are pinched under the shield before tightening the nuts.
- ( ) Locate the free end of the brown wire coming from lug 1 of tube socket V9. Connect this wire to lug 5 of tube socket V8 (S-3).



Detail 16C



Detail 16D

- ( ) Locate the free lead of the capacitor coming from lug 3 of tube socket V9. Connect this lead to lug 6 of tube socket V8 (NS).
- ( ) Locate the free lead of the choke coming from lug 9 of tube socket V8. Connect this lead to lug 3 of terminal strip B (S-3).
- ( ) Place a 1-1/4" length of sleeving on each lead of a 10  $\Omega$  (brown-black-black) resistor.
- ( ) Connect this 10  $\Omega$  resistor from lug 1 of phone jack BG (NS) to lug 2 of phono socket BH (NS).
- ( ) Connect a 1-1/2" bare wire from lug 1 of phono socket BH (S-1), to lug 2 of phone jack BG (S-1).
- ( ) Cut the leads of the AF output transformer (#51-55) to the lengths indicated in Detail 16C. Measure the leads from where they come out of the transformer.

**CAUTION:** Do not cut into the stranded wires when removing the insulation.

- ( ) Remove 1/4" of insulation from the end of each transformer lead. Twist together the small strands of wire at the end of each lead; then melt a small amount of solder on each exposed lead end.

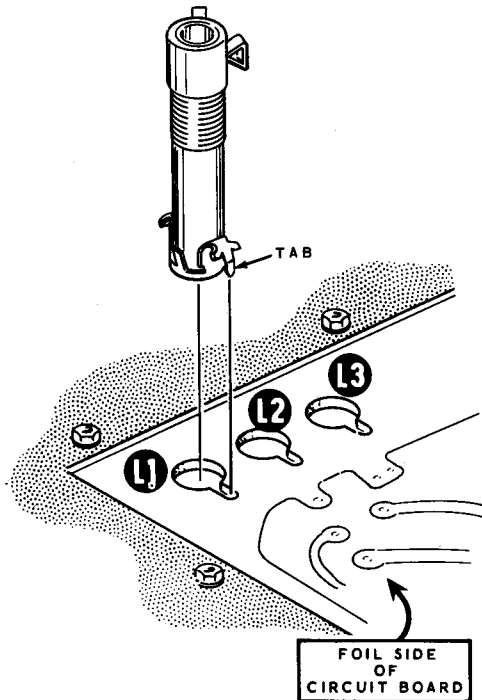
**NOTE:** When mounting the AF output transformer, be sure the blue and red leads extend toward the circuit board.

- ( ) Refer to Detail 16D and mount the AF output transformer at BJ. Use 6-32 x 1/4" hardware.

Connect the AF output transformer leads as follows:

<u>LEAD COLOR</u>	<u>CONNECT TO</u>
( ) Long black	lug 1 of phone jack BG (S-2).
( ) Short black	lug 2 of phono socket BH (S-2).
( ) Red	lug 4 of octal socket BF (S-2).
( ) Blue	circuit board hole L (S-1).

**NOTE:** Position the blue lead of the AF output transformer up and away from the circuit board.



Detail 16E

Refer to Detail 16E for mounting six unshielded coils to the circuit board.

Mount the coils on the circuit board and connect the capacitors as follows:

- ( ) 15-meter RF coil (#40-363) at L1.
- ( ) 130 pf resin capacitor between lug 1 (NS) and lug 2 (NS) of coil L1.
- ( ) 40-meter RF coil (#40-796) at L2.
- ( ) 47 pf resin capacitor between lug 1 (NS) and lug 2 (NS) of coil L2.
- ( ) 80-meter RF coil (#40-795) at L3.
- ( ) 75 pf resin capacitor between lug 1 (NS) and lug 2 (NS) of coil L3.

- ( ) 40/80-meter heterodyne oscillator coil (#40-797) at L6.
- ( ) 10 pf disc capacitor between lug 1 (NS) and lug 2 (NS) of coil L6.
- ( ) 40/80-meter heterodyne oscillator coil (#40-797) at L5.
- ( ) 15-meter heterodyne oscillator coil (#40-360) at L4.
- ( ) Insert one lead of a .005  $\mu$ fd disc capacitor through lug 2 of coil L6 (NS), through lug 2 of coil L5 (S-2), to lug 2 of coil L4 (NS). Connect the other lead to circuit board hole AA (S-1).
- ( ) Connect a 100 K $\Omega$  (brown-black-yellow) resistor from lug 2 of coil L6 (S-4) to circuit board hole P (S-1).
- ( ) Insert one lead of a .02  $\mu$ fd disc capacitor through lug 2 of coil L1 (S-3) through lug 2 of coil L2 (S-3) to lug 2 of coil L3 (NS). Connect the other lead to circuit board hole Z (S-1).
- ( ) Connect a 22 K $\Omega$  (red-red-orange) 2 watt resistor from lug 2 of coil L3 (S-3) to circuit board hole G (S-1).

NOTE: The Band switch will be partially wired before installing it. To make it easier to locate the lugs, each lug position (hole), on each wafer, is assigned a number even though some holes do not have lugs. Each wafer of the 4-wafer switch is assigned a letter. Beginning with the front wafer, the wafers are identified as A, B, C, and D. Wafer C has lugs on the front of the wafer and also on the rear of the wafer. Since the lugs are electrically connected, the front and rear lugs have the same number and will be identified as F for front and R for rear in the following wiring instructions. See Details 16F and 16H. Also observe that a metal grounding wafer is located between wafers B and C.

NOTE: The following lengths of black hookup wire are listed in the sequence that they are wired.

( ) Prepare the following lengths of black hookup wire.

2"	2"
1-3/4"	3-1/4"
1-1/4"	4-1/4"
2-1/4"	

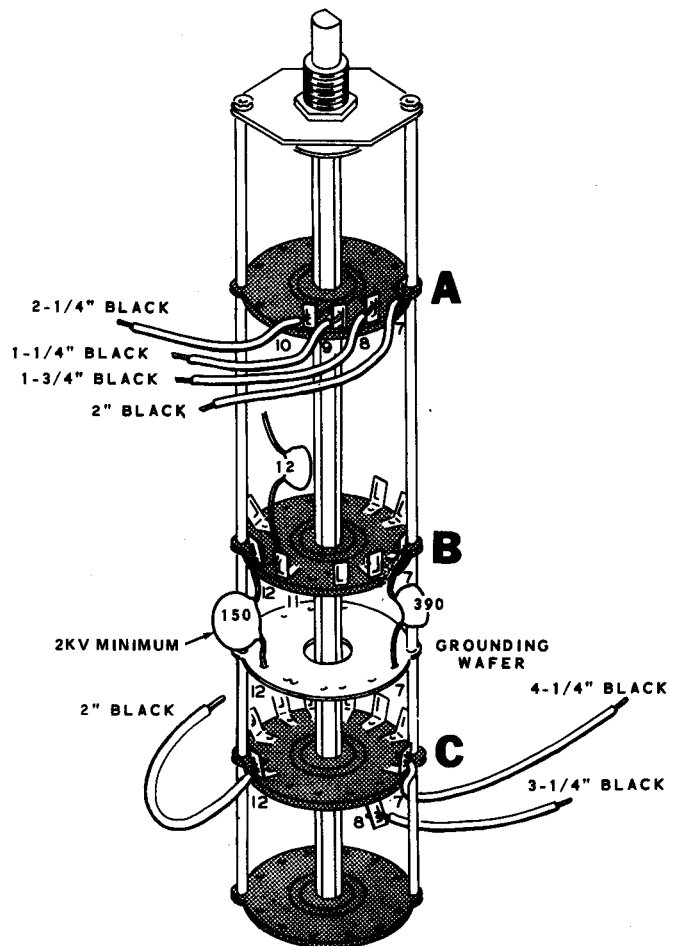
Refer to Detail 16F for the following steps.

Connect one end of the following black wires to the Band switch; leave the other end free:

WIRE LENGTH      BANDSWITCH LUG

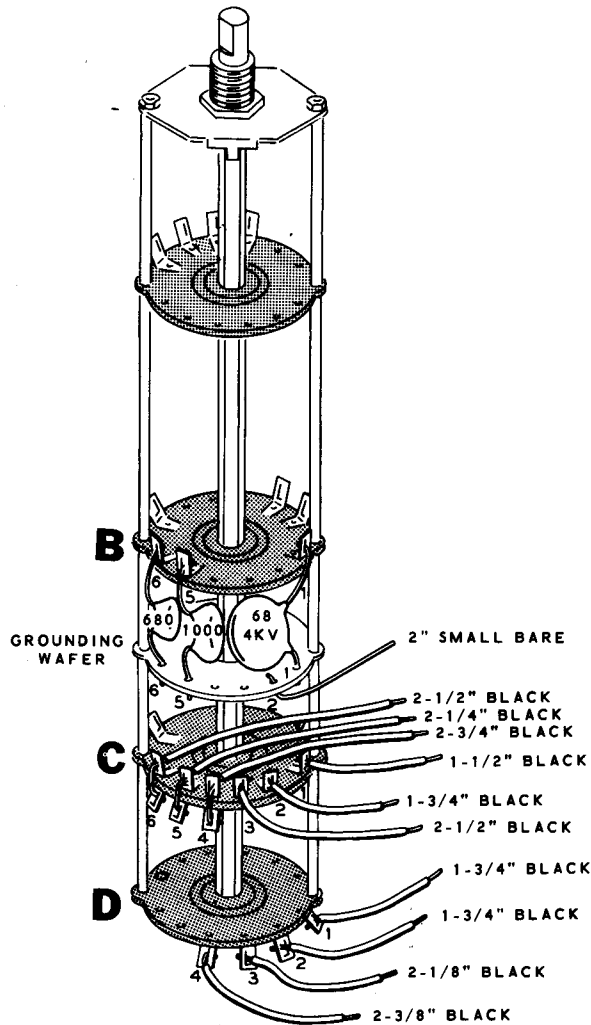
( ) 2"	A7 (S-1).
( ) 1-3/4"	A8 (S-1).
( ) 1-1/4"	A9 (S-1).
( ) 2-1/4"	A10 (S-1).
( ) 2"	C12 (S-1).
( ) 3-1/4"	C8 (S-1).
( ) 4-1/4"	C7 (S-1).

( ) Connect a 150 pf (2KV or 4 KV) disc capacitor from Band switch lug B12 (S-1) to grounding wafer hole 12 (S-1).



Detail 16F

- ( ) Cut one lead of a 12 pf resin capacitor to 1" length. Connect this lead to Band switch lug B11 (NS). Leave the other lead free.
- ( ) Connect a 390 pf resin capacitor from Band switch lug B7 (NS) to grounding wafer hole 7 (NS).



Detail 16G

Refer to Detail 16G for the following steps:

- (1) Connect a 680 pf resin capacitor from Band switch lug B6 (S-1) to grounding wafer hole 6 (S-1).
- (2) Connect a 1000 pf resin capacitor from Band switch lug B5 (S-1) to grounding wafer hole 5 (S-1).
- (3) Connect a 68 pf 4 KV disc capacitor from Band switch lug B1 (S-1) to grounding wafer hole 1 (S-1).
- (4) Connect one end of a 2" length of small bare wire to grounding wafer hole 2 (S-1). Leave the other end free.

(5) Prepare the following lengths of black hook-up wire:

2-1/2"	1-1/2"
2-1/4"	2-3/8"
2-3/4"	2-1/8"
2-1/2"	1-3/4"
1-3/4"	1-3/4"

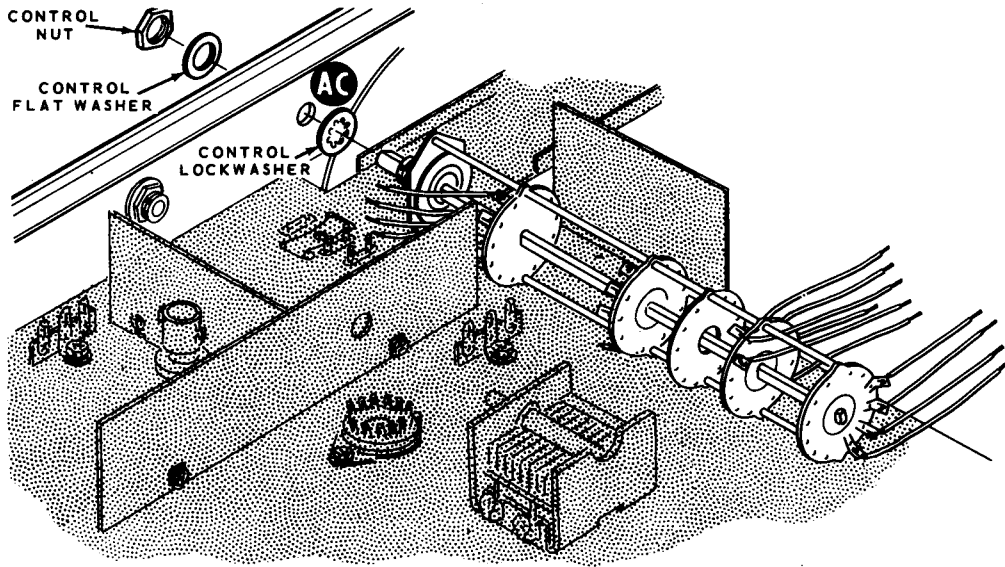
Connect one end of the following black wires to the Band switch; leave the other end free:

WIRE LENGTH	BAND SWITCH LUG
( ) 2-1/2"	C6, F, and R (S-3).
( ) 2-1/4"	C5, F, and R (S-3).
( ) 2-3/4"	C4, F, and R (S-3).
( ) 2-1/2"	C3 (S-1).
( ) 1-3/4"	C2 (S-1).
( ) 1-1/2"	C1 (S-1).
( ) 2-3/8"	D4 (S-1).
( ) 2-1/8"	D3 (S-1).
( ) 1-3/4"	D2 (S-1).
( ) 1-3/4"	D1 (S-1).

(6) Refer to Detail 16H and position the Band switch as shown. Mount the Band switch at AC. Use a control lockwasher, a control flat washer, and a control nut.

Refer to Pictorial 16 and connect the wires coming from Band switch AC as follows:

BAND SWITCH LUG	CONNECT TO
( ) A7	lug 2 of L11 (S-1).
( ) A8	lug 2 of L10 (S-2).
( ) A9	lug 2 of L9 (S-1).
( ) A10	lug 6 of V8 (S-2).



Detail 16H

**BAND SWITCH LUG**

**CONNECT TO**

( ) Cut sleeving to the following lengths:

3/4"		3"
2"		5-1/2"

NOTE: Refer to inset drawing #1 on Pictorial 16 for the following four steps.

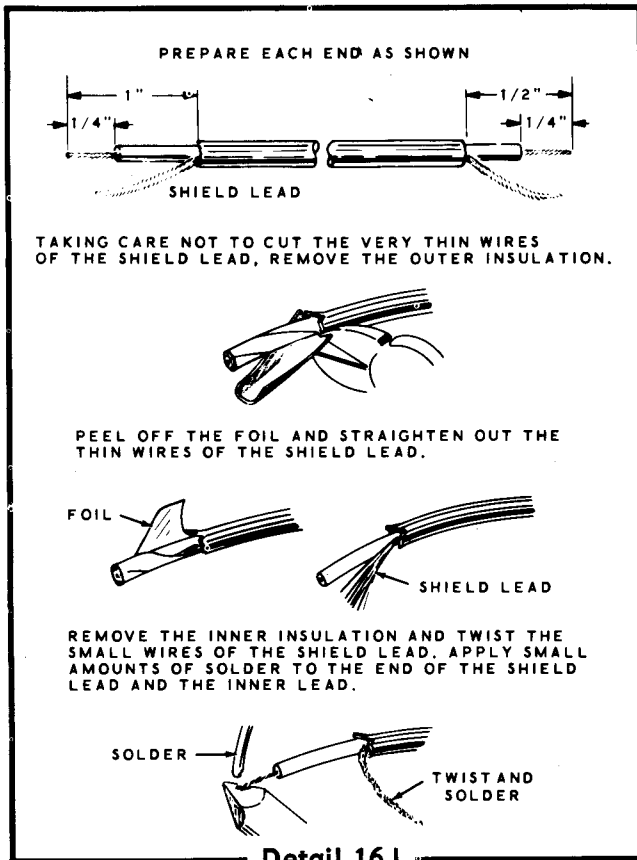
- ( ) C12 circuit board pin W (S-1).
- ( ) C1 circuit board pin U (S-1).
- (✓) C2 circuit board pin T (S-1).
- ( ) C3 circuit board hole Q (S-1).
- ( ) C6 lug 1 of L4 (S-1).
- ( ) C5 lug 1 of L5 (S-1).
- ( ) C4 lug 1 of L6 (S-2).
- ( ) C7 circuit board hole R (S-1).
- ( ) C8 lug 2 of L4 (S-2).
- (✓) D1 lug 1 of L3 (S-2).
- ( ) D2 lug 1 of L2 (S-2).
- ( ) D3 lug 1 of L1 (S-2).
- (✓) D4 circuit board hole S (S-1).

In the following steps, you will be directed to install sleeving and to connect the wires which have one end connected to final tank coil L12. Refer to inset drawing #2 on Pictorial 16.

- (✓) Place a 3/4" length of sleeving on the bare wire coming from lug 4; connect this wire to Band switch lug B11 (NS). Cut off the excess lead length.
- (✓) Place a 2" length of sleeving on the bare wire coming from lug 3; connect this wire to Band switch lug B9 (S-1). Cut off the excess lead length.
- (✓) Place a 3" length of sleeving on the bare wire coming from lug 2; connect this wire to Band switch lug B8 (S-1). Cut off the excess lead length.
- (✓) Place a 5-1/2" length of sleeving on the bare wire coming from lug 1; connect this wire to Band switch lug B7 (NS). Cut off the excess lead length.

(✓) Connect the free end of the bare wire coming from the ground wafer of the Band switch to crystal ground pin BB (S-1).

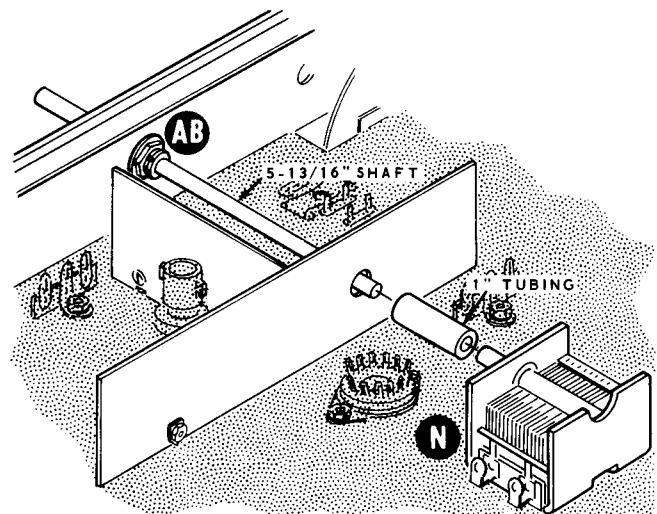
(✓) Connect the free lead of the 12 pf resin capacitor coming from Band switch lug B11 to lug 2 of trimmer capacitor U (S-1).



- (✓) Refer to Detail 16J and prepare one 11-1/2" length of coaxial cable.
- (✓) Refer to Pictorial 16. Connect the 1" long end of the inner lead of this cable to lug B7 (S-3) and connect the shield at this end to ground wafer hole 7 of the Band switch (S-2).
- (✓) Connect the free end of the inner lead of the coaxial cable coming from the Band switch to lug 1 of phono socket BC (S-2). Connect the shield to lug 2 of phono socket BC (S-1).
- (✓) Insert a 3-1/2" length of large bare wire through lug 1 (S-2) to lug 2 (S-1) of variable capacitor N. The free end should be positioned between the chassis and parasitic choke. Connect the other end of the wire around the wires connected to lug B11 of the Band switch (S-3).

**CAUTION:** This large bare wire must not touch the chassis or parasitic choke.

- (✓) Connect a .001  $\mu$ fd 1.4 KV disc capacitor from lug 1 of terminal strip P (S-3) to the large bare wire coming from variable capacitor N (S-1).
- (✓) Connect a 10 pf disc capacitor from lug 1 of terminal strip K (S-4) to the large bare wire coming from variable capacitor N (S-1).
- (✓) Refer to Detail 16K and mount a 1" length of black tubing on the end of the shaft of variable capacitor N. From the front panel, insert a 5-13/16" shaft through bushing AB, through the hole in the oscillator shield, and into the open end of the 1" length of tubing on the shaft of variable capacitor N.



- ( ) Clip excess lengths of wires sticking up through the top of the circuit board.
- ( ) Check the two 2-watt resistors mounted on capacitor S and be sure that no wires nor leads touch phone jack BD.

This completes the wiring of your Heathkit Transceiver HW-16. Carefully inspect all connections for loose wire or unsoldered joints. Remove any wire clippings or solder splashes that may be lodged in the wiring. Be sure no solder bridges exist between the foils of the circuit board, Dress wires so that no ungrounded bare wire touches the chassis and that no bare wires touch other parts or connections.



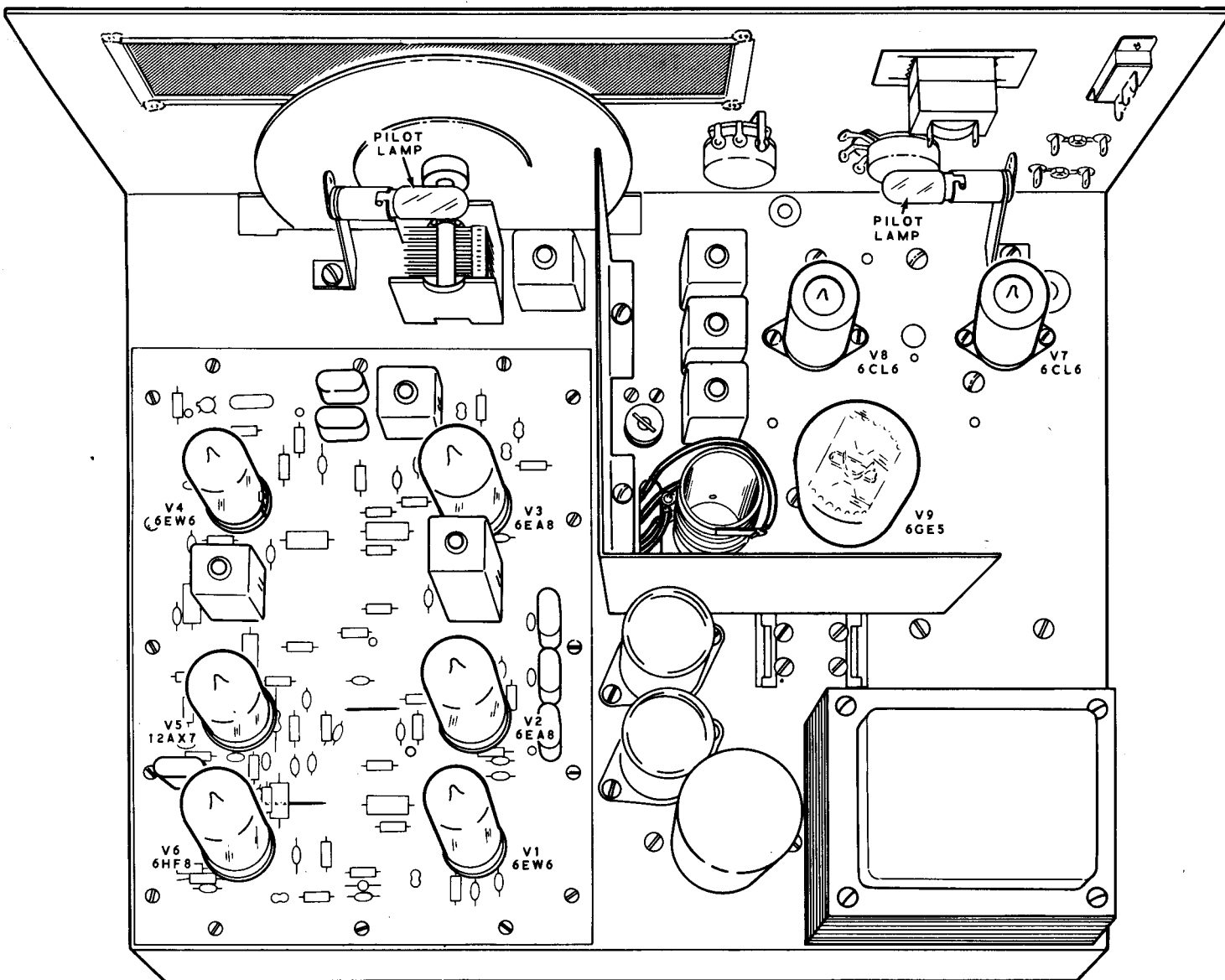
Refer to Pictorial 17 for the following steps.  
Install the tubes in the designated tube sockets  
as follows:

<u>TUBE</u>	<u>SOCKET</u>
( ) 6EW6	V1
( ) 6EA8	V2
( ) 6EA8	V3
( ) 6EW6	V4
( ) 12AX7	V5

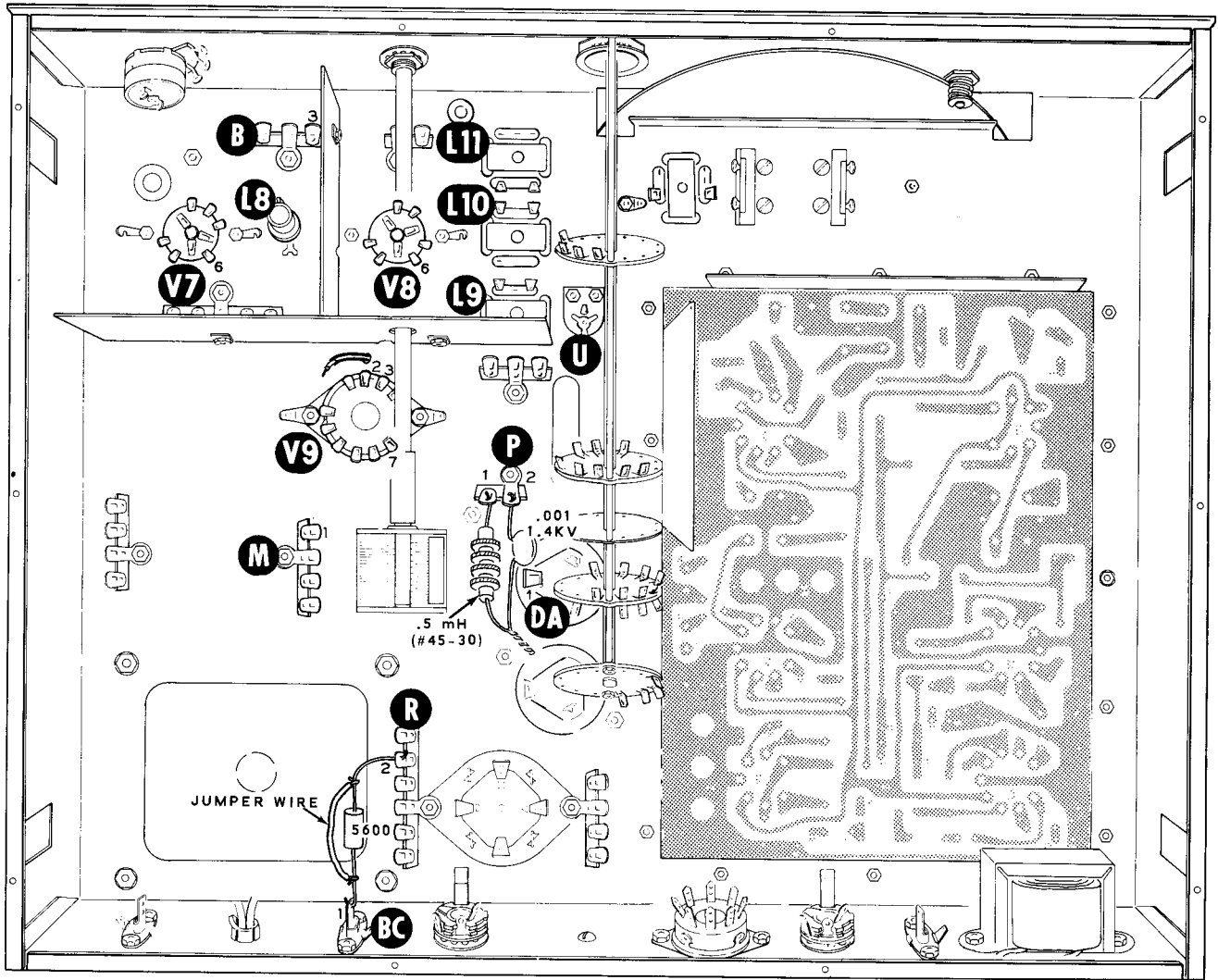
<u>TUBE</u>	<u>SOCKET</u>
( ) 6HF8	V6
( ) 6CL6	V7
( ) 6CL6	V8
( ) 6GE5	V9

(+) Install two tube shields, one shield over tube V7 and one shield over tube V8.

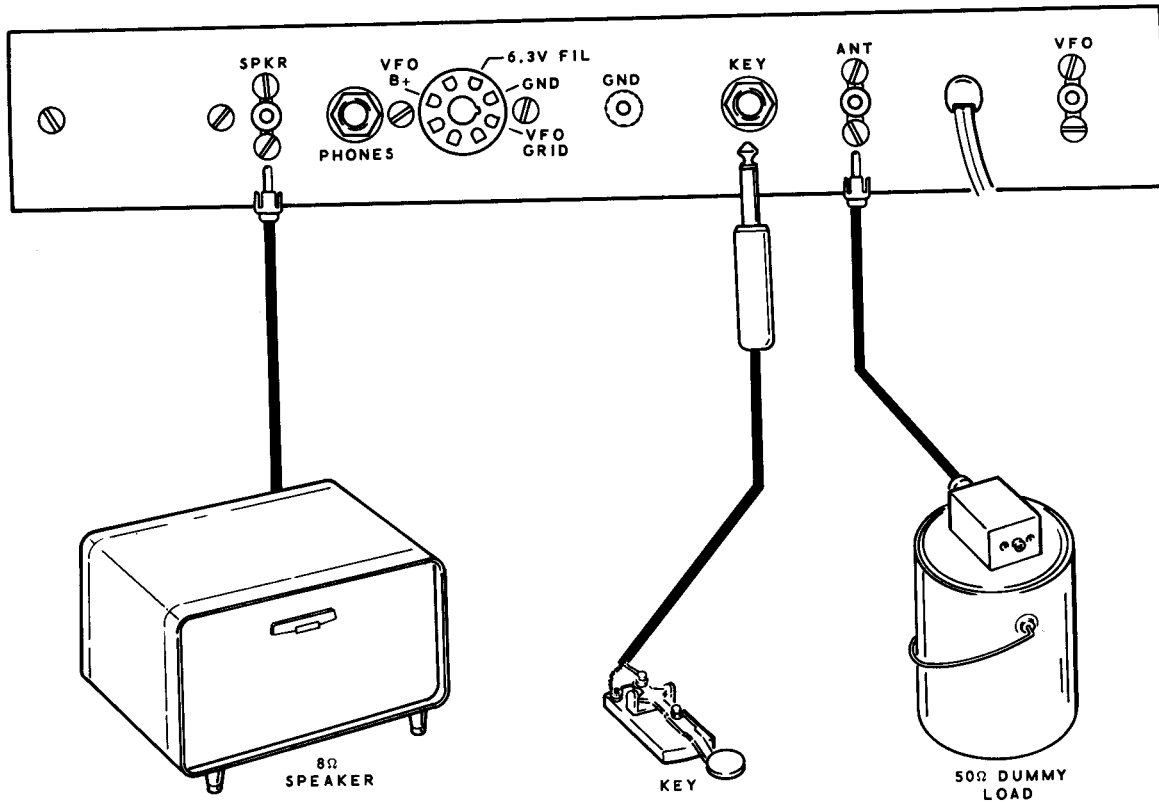
(-) Install the pilot lamps.



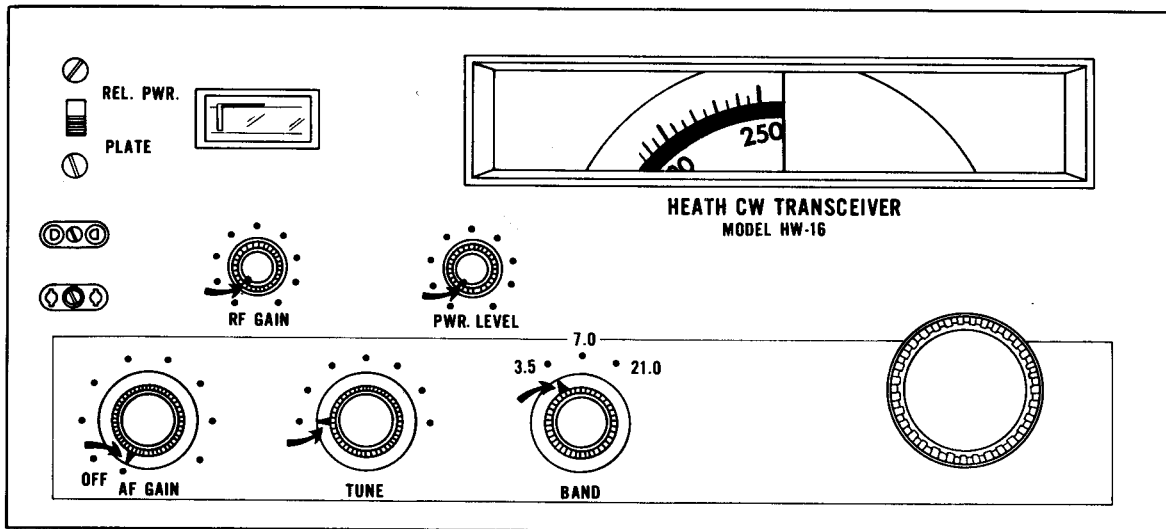
**PICTORIAL 17**



**FIGURE 1-1**



**FIGURE 1-2**



PICTORIAL 18

Refer to Pictorial 18 for the following steps.

Position the Transceiver so that the front panel faces you.

- (L) Turn all switch and control shafts fully counterclockwise.
- ( ) Turn the two variable capacitor shafts so the plates of the capacitors are fully meshed (closed).
- (L) Install two 1/2" diameter knobs; one knob on the shaft of the RF Gain control and one knob on the shaft of the Pwr Level control. Position the pointers on the knobs as indicated by the arrows in the Pictorial. Tighten the setscrews.
- (L) Install three 1-1/8" diameter knobs; one knob on the shaft of the AF Gain control, one knob on the shaft of the Tune capacitor, and one knob on the shaft of the Band switch. Position the pointers on the knobs as indicated by the arrows in the Pictorial, and tighten the setscrews.

- ( ) Install the 2" diameter knob on the shaft of the Main Tuning Dial capacitor and tighten the setscrew.

**NOTE:** Be sure the dial hub assembly setscrew is loose enough to allow the Main Tuning Dial to turn without opening the plates of the variable capacitor.

- ( ) Turn the Main Tuning Dial knob clockwise until the number 250 appears. Continue turning the knob until the outermost edge of the base line beneath the numbers appears under the escutcheon index line; tighten the setscrew in the dial hub assembly.
- ( ) Turn the Main Tuning Dial knob counterclockwise until the plates of the variable capacitor are fully open. The outermost edge, nearest zero, should appear under the escutcheon index line.

This completes the basic assembly of your Heathkit HW-16 Transceiver. Proceed to the Initial Test. Attaching the bottom chassis plate, the feet, and the top cover will be accomplished in the Final Assembly.

# INITIAL TEST

Before applying power to the Transceiver, complete the preliminary resistance checks given in this section. Perform these checks to be sure there are no short circuits or open connections that would cause damage to the Transceiver components. During the Initial Test, checking the pilot lamps, tube filaments, and the tone oscillator circuit indicates that the power supply and receiver output stage are operating.

For initial testing and alignment of the Transceiver, the equipment listed below, or their equivalents, are necessary.

1. An 11 megohm input VTVM (a 20 K $\Omega$ /V VOM may also be used).
2. A 50  $\Omega$  nonreactive dummy load that is capable of 100 watts dissipation, such as the Heathkit Cantenna, Model HN-31.
3. Crystals:
  - 7.030 MHz or slightly higher frequency.
  - 3500 kHz or slightly higher frequency.
  - 3750 kHz or slightly lower frequency.

If the following resistances are taken with a VOM, the probes (polarity) may need to be reversed to obtain the proper resistance readings.

Check the following resistances. Wait for meter to reach full reading. If any of the resistance readings are lower than specified, refer to the In Case Of Difficulty section on Page 48. Refer to Figure 1-1 (fold-out from Page 38) for test and adjustment points.

- ( ) Pin 7 of tube socket V9 to ground - over 100 K $\Omega$ . *120K*
- ( ) Pin 3 of tube socket V9 to ground - over 20 K $\Omega$ . *21K*
- ( ) Pin 6 of tube socket V8 to ground - over 15 K $\Omega$ . *16K + 20K*
- ( ) Pin 6 of tube socket V7 to ground - over 15 K $\Omega$ . *11 18 K*

Figure 1-2 (fold-out from Page 38) shows the initial test setup.

- ( ) Cut the speaker wires to the length required for your installation. Refer to Figure 1-2A to attach a phono plug to the speaker wires.
- ( ) Connect an 8  $\Omega$  speaker, such as the Heathkit Communications Speaker, Model SB-600, or HS-24, to the SPKR phono socket on the rear of the chassis.
- ( ) Connect the 50  $\Omega$  dummy load to the ANT phono socket on the rear of the chassis. If necessary, refer to Figure 1-2A and attach a phono plug to the 50  $\Omega$  dummy load antenna.

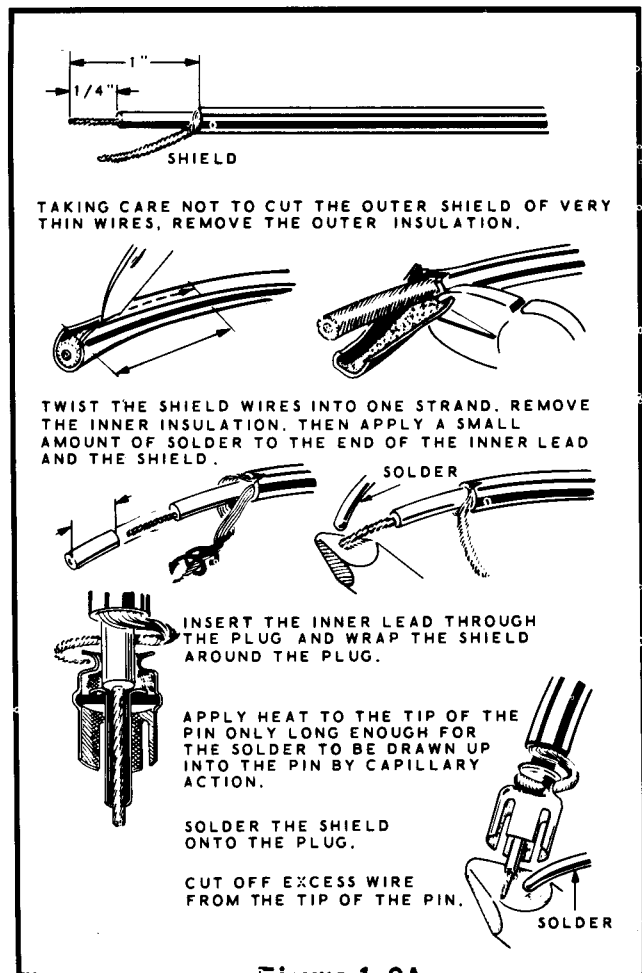
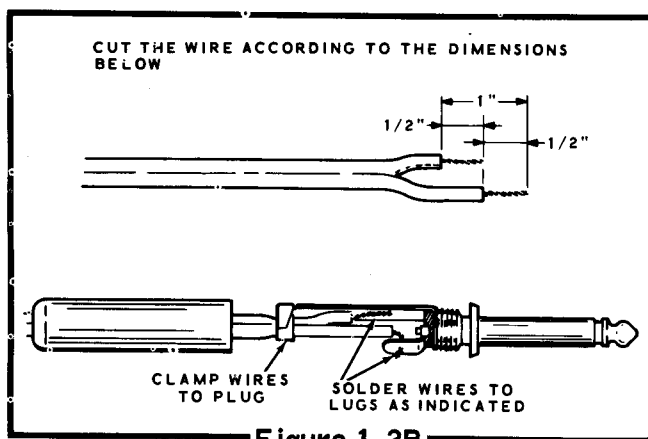


Figure 1-2A

NOTE: The Heathkit Electronic Keyer, Model HD-10, can be used with this Transceiver.

Be sure that your keyer has a phone plug that mates with the Key jack on the Transceiver or prepare a wire and phone plug assembly as follows:

- ( ) Cut a wire to the length required for your installation. Refer to Figure 1-2B and prepare the wire and phone plug assembly for connecting your key to the Transceiver KEY jack. Connect the other end of the wire to the terminals of your key.



- ( ) Connect your key to the Transceiver KEY jack. When the equipment is on and the key is open, there is about 80 V DC across the terminals.
- ( ) Be sure that the AF GAIN control is in the OFF position and connect the line cord to a 120 volt 50/60 Hz AC outlet.

**CAUTION: BEFORE APPLYING POWER TO THE TRANSCEIVER, NOTE THAT LETHAL VOLTAGES ARE PRESENT BOTH ABOVE AND BELOW THE CHASSIS. DO NOT TOUCH ANY HIGH VOLTAGE POINTS WITH YOUR HANDS. USE WELL INSULATED TOOLS FOR ANY ADJUSTMENTS ON THE CHASSIS.**

- ( ) Turn the AF GAIN control to the 12 o'clock position.
- ( ) Wait a few minutes to allow the tubes to warm up and then check all pilot lamps and tube filaments. All should be lit and the tube envelopes should begin to feel warm.

**CAUTION: After the Transceiver has been operating for 1/2 hour or more, the tube envelopes may get hot enough to burn your fingers.**

- ( ) When you close the key, a tone should be audible in the speaker. If no tone is heard, refer to the In Case Of Difficulty section of the Manual.

## ALIGNMENT

NOTE: The coils and transformers in your Transceiver have been preset at the factory. Only slight readjustments should be necessary during the following alignment procedure.

### TRANSMITTER ALIGNMENT

- ( ) Check that the 50  $\Omega$  dummy load is connected to the ANT socket and that the line cord is connected to the 120 volt AC outlet.

NOTE: Two crystal sockets are supplied in order to accommodate two different types of plug-in crystals. Only one crystal can be used at a time. Refer to the Operation section of this Manual for crystal information and the differences in the two sockets.

**CAUTION: Never use a crystal with a VFO nor more than one crystal at the same time, because the Transceiver may transmit on two frequencies simultaneously.**

- ( ) Plug a 40-meter crystal (7.030 MHz or slightly higher) into the proper crystal socket on the front panel.
- ( ) Set the front panel controls as follows:
  - AF GAIN - 12 o'clock position.
  - BAND - 21.0.
  - PWR LEVEL - fully counterclockwise.
  - REL PWR-PLATE - REL PWR.

If you do not get the results specified while you are performing the following steps, refer to the In Case Of Difficulty section of the Manual.

- (✓) Close the key and adjust the TUNE capacitor for a maximum meter reading.
- ( ) Set the REL PWR-PLATE switch to the PLATE position. The meter should read approximately 100, which indicates a V9 plate current flow of approximately 100 ma.
- ( ) Turn the PWR LEVEL control clockwise to check that the meter pointer moves up-scale.
- ( ) Turn the AF GAIN control OFF.
- ( ) Set the Transceiver on its side with the power transformer at the bottom.
- (✓) Turn the AF GAIN control to 12 o'clock position.

Refer to Figure 1-1 for the test and adjustment points.

- (✓) Set the VTVM to the -150 VDC scale. Hold the DC probe of the VTVM on lug 3 of terminal strip B and connect the common probe to the chassis.
- ( ) Close the key and, from the top of the chassis, adjust the slug in crystal oscillator coil L8 for a maximum reading on the VTVM. Then turn the slug clockwise one turn.

NOTE: Leave the negative (-) probe of the VTVM connected to the chassis until directed to remove it.

- (✓) Lay the Transceiver down with the bottom of the chassis facing up.

NOTE: The Heath Company has provided an alignment tool with this kit. Use this alignment tool to adjust the position of the slugs in all adjustable coils except crystal oscillator coil L8.

- (✓) Connect the DC probe of the VTVM to lug 1 of terminal strip M, close the key, and adjust the slug in 15-meter driver coil L9 for a maximum reading on the VTVM. Do not disconnect the DC probe of the VTVM from lug 1 of terminal strip M.

- ( ) Set the BAND switch to the 7.0 MHz position and check that the REL PWR-PLATE switch is in the REL PWR position.
- ( ) Close the key and adjust the TUNE capacitor for a maximum REL PWR reading, then adjust the slug in 40-meter coil L10 for a maximum reading on the VTVM.
- ( ) Set the BAND switch to the 3.5 MHz position.
- ( ) Remove the 40-meter crystal and install an 80-meter crystal (3500 kHz or slightly higher frequency).
- ( ) Close the key and adjust the TUNE capacitor for a maximum REL PWR reading, then adjust the slug in 80-meter driver coil L11 for a maximum reading on the VTVM.
- (✓) Turn the AF GAIN control to the OFF position and disconnect the line cord from the 120 volt AC outlet.
- (✓) Use a screwdriver with an insulated handle and short lug 1 of electrolytic capacitor DA to chassis.
- ( ) Disconnect both probes of the VTVM from the Transceiver.
- ( ) Disconnect the red wire which is protected with black sleeving, from lug 2 of tube socket V9, and then position the sleeving over the exposed end of the wire.
- ( ) Remove the .001  $\mu$ fd 1.4 KV disc capacitor lead and the .5 mH choke lead from lug 1 of electrolytic capacitor DA and solder these two free leads to each other.

CAUTION: The exposed ends of the wire and leads must not touch anything.

- ( ) Locate the 5600  $\Omega$  (green-blue-red) resistor which has one lead connected to the ANT jack; temporarily connect a jumper wire across this resistor.
- ( ) Set the Transceiver on its side with the power transformer at the bottom.