

**Figure 2-1A**

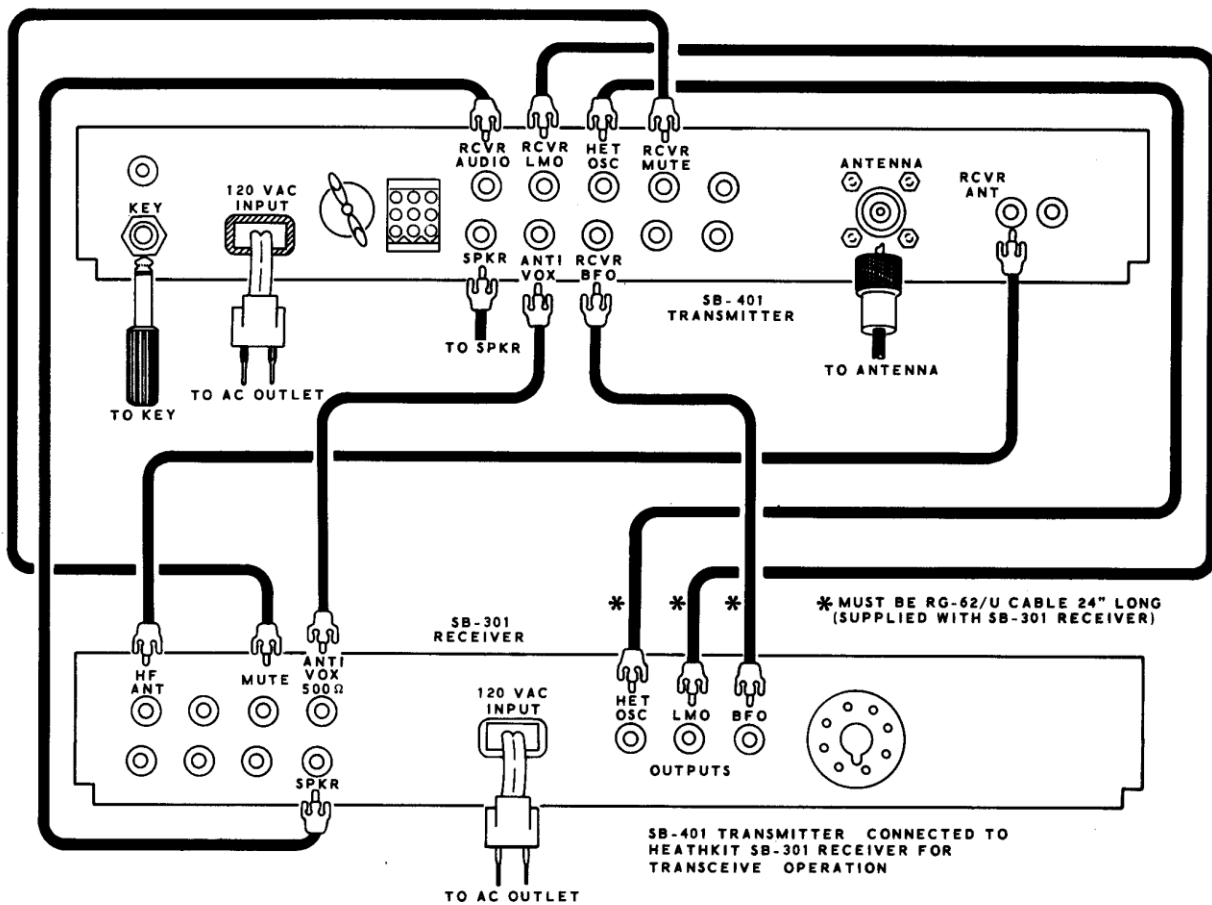


Figure 2-1B

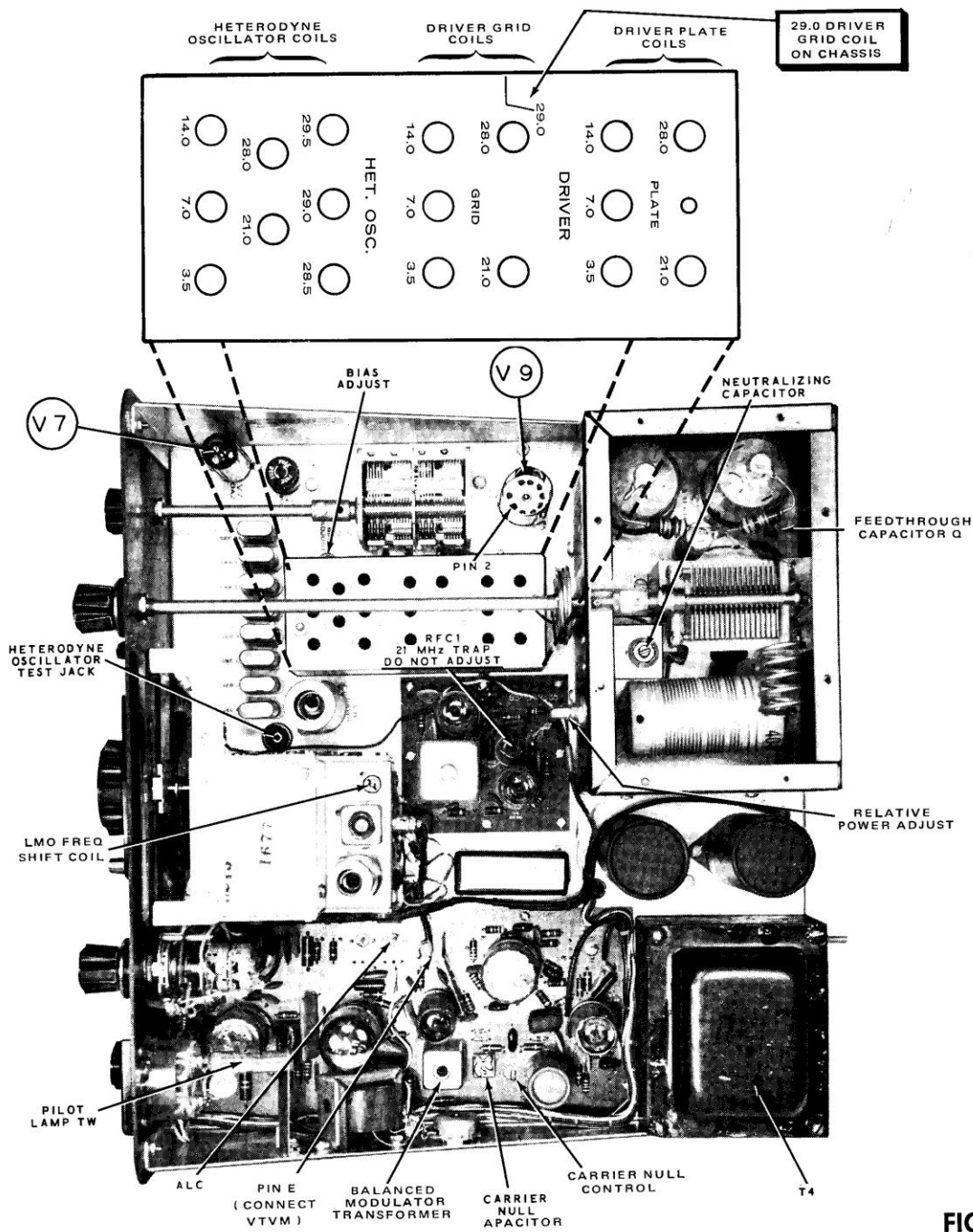


FIGURE 2-2

Two methods of alignment for your SB-401 Transmitter are given. When the Model SBA-401-1 Crystal Accessory Kit is installed, the SB-401 Transmitter is aligned as an independent transmitter. If the Crystal Accessory Kit is not installed, the SB-401 must be connected for transceiver operation to an

operating SB-303 (or SB-300, or SB-301) Receiver prior to starting alignment. If an SB-303 Receiver is used, incorporate the SB-401 Modifications listed in the SB-303 Receiver Manual under "Installation." Perform the appropriate group of steps following.

## ALIGNMENT WITH SB-303 RECEIVER AS A TRANSCEIVER

If the Accessory kit is not going to be used, the Transmitter should be connected to an SB-303 or SB-301 Receiver. Refer to Figures 2-1A and 2-1B on the fold-out from this page.

The following test equipment is required for alignment of the Transmitter.

1. A 50  $\Omega$  nonreactive dummy load (such as Heathkit Model HN-31 Antenna).
2. An 11 megohm input VTVM (such as Heathkit Model IM-11).
3. An RF probe for the VTVM (such as Heathkit Model 309-C).
4. A CW key plugged into the Key jack. CAUTION: Do not depress the key until specifically instructed to do so.

NOTE: In the following steps, the switches and controls to be set are on the Transmitter unless otherwise stated.

Refer to Figure 2-2 (fold-out from Page 93) for test points and adjustment locations.

- ( ) Remove tube V9 from the transmitter.
- ( ) Connect the SB-401 Transmitter to the SB-303 Receiver as shown in Figure 2-1A.

### 8.6 MEGAHERTZ TRAP

- ( ) Preset the notch of the variable capacitor on terminal board #1 as it is shown in inset #1 of Figure 2-2.

### 21 MEGAHERTZ TRAP

The 21 MHz trap (RFC1) was preset at the factory. Do not change the setting of this trap.

### CARRIER GENERATOR

- ( ) Plug the line cord into a 120 volt AC outlet.
- ( ) Set the Transmitter controls as follows:

FUNCTION switch	TRCV
Receiver FUNCTION switch	STBY
FREQ. CONTROL	LOCKED
MODE switch	CW
LEVEL control	Fully clockwise

- ( ) Connect the VTVM RF probe to pin E on the top of the carrier generator circuit board.
- ( ) Depress the key. This should close both relays.
- ( ) Use the alignment tool to adjust the balanced modulator transformer for a maximum indication on the VTVM. If there are two peaks, the peak that occurs with the slug nearest the top of the transformer is the correct one. (Approximately 1 to 1.5 volts.)
- ( ) Open the key.
- ( ) Set the Receiver and Transmitter MODE switches to USB.
- ( ) Short lug 2 (marked) of the MIC connector to the chassis with a jumper wire, or connect a microphone and press the push-to-talk button; then, with the VTVM still connected to Pin E, alternately adjust the CARRIER NULL control and the capacitor for a minimum indication on the VTVM.
- ( ) Disconnect the VTVM.
- ( ) Turn the METER switch to ALC.
- ( ) Adjust the ALC ADJUST control for a zero meter reading.
- ( ) Remove the jumper wire from lug 2 of the MIC connector, or release the microphone button.
- ( ) Return the Transmitter MODE switch to the CW position.

**NOTE:** When the METER switch is in the ALC position during transmitter standby, the meter will normally indicate full-scale deflection.

### DRIVER

- ( ) Set the DRIVER control to the first mark from the fully counterclockwise marking on the panel as shown in inset #2.
- ( ) Set the slide rule and the LMO dials to zero.
- ( ) Insert the VTVM RF probe into pin 2 of tube socket V9.

**NOTE:** Leave the LEVEL control in the fully clockwise position.

- ( ) Set the FUNCTION switch to the TRCV position.

**NOTE:** When you align each driver and heterodyne oscillator coil in the following steps, first read the step all the way through. Then, key the Transmitter and perform the adjustment with the alignment tool. Release the key as soon as the step is completed.

Some of the coils are on the bottom of the chassis, but can be adjusted from the top of the chassis.

- ( ) Set both BAND switches to 3.5.
- ( ) Adjust the slug of the 3.5 DRIVER grid coil for a maximum indication on the VTVM. (Readings of approximately 1.5 volts or higher are normal. A definite peak should be obtained.)
- ( ) Peak the 3.5 HET OSC. (heterodyne oscillator) coil for maximum.
- ( ) Set the Receiver and Transmitter BAND switches to 7.0 and adjust the slug of the 7.0 DRIVER grid coil for a maximum indication on the VTVM.
- ( ) Adjust the 7.0 HET OSC coil for maximum.
- ( ) In the same way, adjust the DRIVER grid coil and the HET OSC coil at each band switch position 14.0 through 28.0. Be sure both receiver and transmitter band switches are always set to the same band.
- ( ) In the same way, turn the BAND switches to 28.5 and 29.5 and peak the HET OSC coil for each band.
- ( ) Remove the VTVM probe from tube socket V9.

- ( ) Install the 6CL6 driver tube (V9). The tube shield will be installed later.

- ( ) Turn the FUNCTION switch to the TRCV position.
- ( ) Connect the VTVM RF probe to the bare wire connected between pins 5 of tube sockets V10 and V11 on the bottom of the chassis.

**NOTE:** Leave the LEVEL control in the fully clockwise position.

- ( ) Turn both BAND switches to 3.5.



- ( ) Key the Transmitter and adjust the slug of the 3.5 driver PLATE coil for a maximum indication on the VTVM. (Readings of 35 volts or higher should be obtained, depending on band.)
- ( ) Readjust the slug of the 3.5 GRID driver coil for a maximum indication on the VTVM.
- ( ) Place both BAND switches in the 7.0 position.
- ( ) Adjust the slug of the 7.0 PLATE driver coil for a maximum indication on the VTVM.
- ( ) Readjust the slug of the 7.0 GRID coil for a maximum indication on the VTVM.
- ( ) Repeat this same procedure for each setting of the BAND switch through 28.0 by adjusting the corresponding PLATE and GRID driver coils for a maximum indication on the VTVM.
- ( ) Set the BAND switches to 29.0. Adjust the DRIVER control on the panel for a maximum indication on the VTVM.
- ( ) Adjust the slug of the 29.0 driver grid coil (on the chassis by the rear section of the driver capacitor) for a maximum indication on the VTVM.

## 8.6 MEGAHERTZ TRAP ADJUSTMENT

NOTE: Leave the VTVM RF probe connected to the bare wire between pins 5 of V10 and V11.

- ( ) Remove the 15.895 megahertz crystal from the SB-303 Receiver.
- ( ) Place the Transmitter BAND switch in the 7.0 position and set the LMO slide rule Dial to 3.
- ( ) Place the FUNCTION switch in the SPOT position.
- ( ) Turn the MODE switch on the Transmitter to the CW position.
- ( ) Advance the LEVEL control fully clockwise.
- ( ) Set the DRIVER control fully clockwise.
- ( ) Set the FREQ control to UNLOCKED.
- ( ) Adjust the variable capacitor on terminal board #1 (see Figure 2-2 fold-out from Page 93) for minimum on the VTVM.

- ( ) Disconnect the VTVM.
- ( ) Replace the 15.895 MHz crystal.

### CARRIER NULL ADJUSTMENT

NOTE: Leave the VTVM RF probe connected to the bare wire between pins 5 of V10 and V11.

- ( ) Place the BAND switches in the 3.5 position.
- ( ) Key the Transmitter and adjust the DRIVER control for a maximum indication on the VTVM.
- ( ) Rotate the LEVEL control fully counterclockwise.
- ( ) Place the MODE switch in the USB position.

NOTE: The object of the following CARRIER NULL adjustments is to reduce the carrier output as much as possible. If the following adjustments will not reduce the VTVM reading to approximately "0", perform the balanced modulator transformer adjustment again (to eliminate possible interaction).

- ( ) Short lug 2 of the MIC connector to the chassis with a jumper wire, or connect a microphone and press the push-to-talk button; then alternately adjust the CARRIER NULL control and capacitor for a minimum indication on the VTVM.

- ( ) Place the MODE switch in the LSB position and adjust the CARRIER NULL capacitor to the same VTVM reading obtained in the USB position.
- ( ) Place the MODE switch in the USB position and adjust the CARRIER NULL control for a minimum indication on the VTVM.
- ( ) Place the MODE switch in the LSB position and adjust the CARRIER NULL capacitor to the same VTVM reading obtained in the previous step.
- ( ) Repeat the previous two steps until the same VTVM reading is obtained in the USB and LSB positions of the MODE switch.

NOTE: The preceding five adjustments can be checked after the Transmitter is in the cabinet by using a receiver set to the operating frequency and observing the "S" meter for minimum readings as the adjustments are made.

- ( ) Return the FUNCTION switch to STBY.