DON'T OVERLOOK THE BC–457!

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There are amateurs, owners of expensive transmitters using high-class vfo equipment, who have joined the MARS in good faith only to discover that the specialized design of their factory-made equipment prevents their operation on the 4-mc frequencies used by the MARS nets to which they have been assigned. This causes them embarrassment and their nets are deprived of the participation of interested members.

Two solutions suggest themselves. The first is to undertake to modify the tuning range of the existing transmitter—an operation which the average owner is reluctant to perform, since it would tend to depreciate the value of his equipment. The other is to acquire a separate transmitter especially for use on MARS net frequencies.

To those MARSmen planning a second transmitter, the writer recommends the BC–457. To date this has been the least costly of the SCR–274 (ARC–5) series, and needs no frequency conversion for MARS use since its normal tuning range is from 4.0 to 5.3 megacycles. Circuit conversion for a-c line operation requires little previous knowledge of the unit, and may be accomplished in an hour or two.

As used at this station, the BC–457 modification includes a specially planned power supply and a separate operating control box. The power supply as shown in figure 1 provides regulated oscillator plate and p. a. screen voltage, in the interest of stable operation and clean keying. A special feature of this power supply is the use of a 24-volt transformer which eliminates the need for rewiring the heaters, and which allows for use of 24-volt d. c. for operating the keying relay.

The initial step in the BC–457 conversion is the matter of the antenna relay. This relay is too slow acting to be useful, so it should be removed from the chassis and discarded. To accomplish this, remove the two screws holding the relay to the inside of the front panel, lift out the relay and clip off the black and white connecting leads just above the chassis. When the relay is removed a spiral relay contactor spring will remain attached to the panel assembly. Move this contactor so that it rests firmly on the antenna binding post screw. Following this, drill a small hole in the front

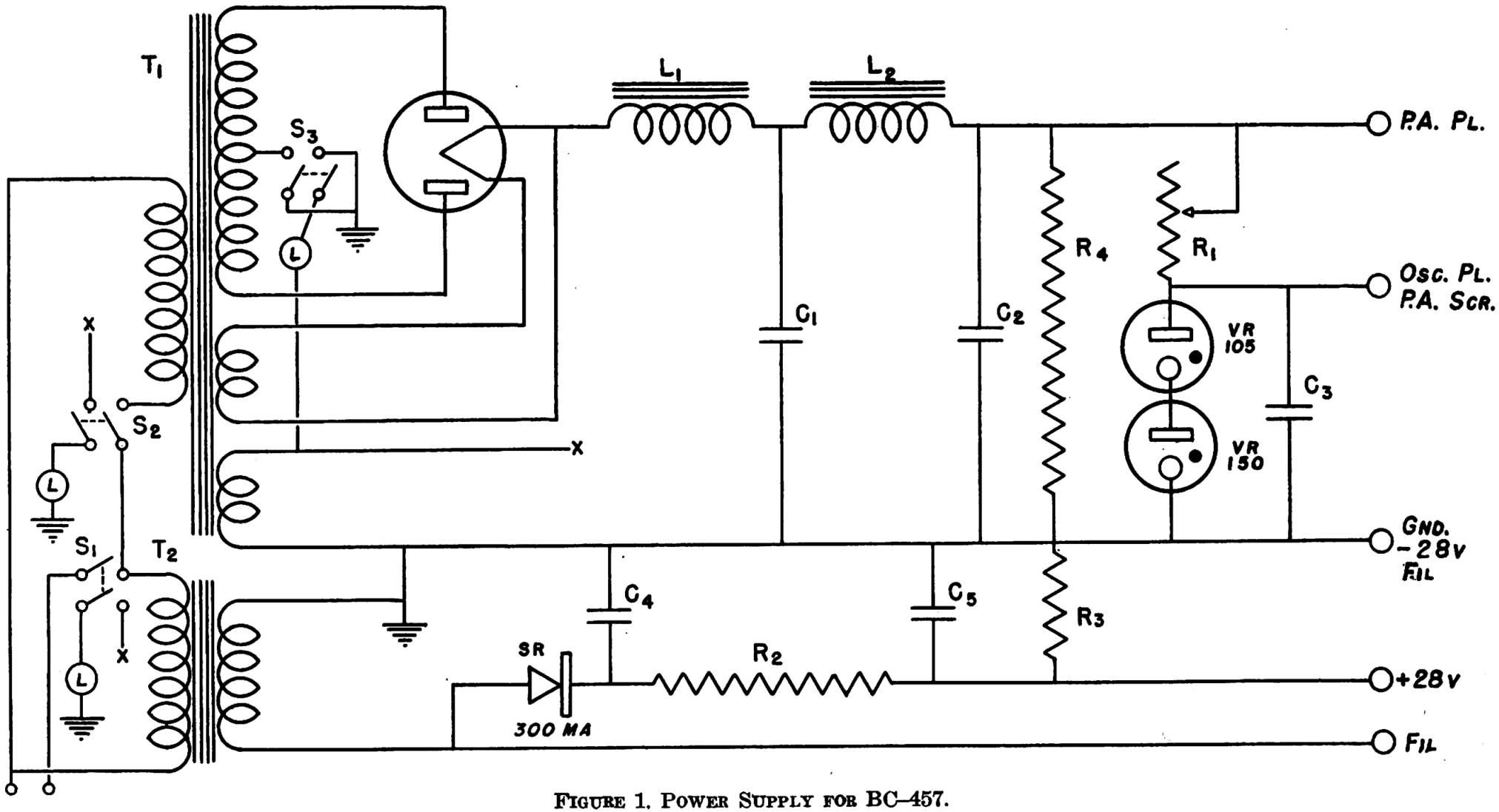

FIGURE 1. POWER SUPPLY FOR BC–457.

panel to the left of the antenna binding post and mount a second binding post to serve as a ground connection.

The rotary antenna tuning inductor may be removed or left in the unit at the option of the convertor. The writer chose to retain this coil against the time when he might need it for use with a single wire antenna worked against ground. In the AØIA conversion the inductance of the antenna coil was run down to a minimum, and left unused. R-f output is taken by link coupling, using the single-turn variable link within the p. a. tank inductor. If a 300-ohm line is used with this link, it will be necessary to add four turns of wire in series with the single-turn link. These additional turns should be of solid-conductor, well-insulated wire, wound around the bottom of the p. a. coil form. The variable turn will allow some latitude in loading the p. a.

With this accomplished, the bottom cover plate of the chassis is removed. Inspect the power receptacle at the rear of the chassis to see which of the figure 2 "Before" diagrams it matches. You may either use this receptacle as is, soldering your power cable leads to its contacts outside the chassis, or you may remove it and substitute another receptacle for which a standard plug is available.

If you prefer to install a standard male chassis receptacle, use one with six contacts and connect wires from pins No. 6 and No. 7 on the old chassis socket to pins No. 5 and No. 6 of the new chassis receptacle. The other wires are connected to the correspondingly numbered pins.

Having decided the matter of the chassis power receptacle, perform and check the following operations:

1. Remove from the chassis completely the *black* wire connected to pin No. 2 of the power receptacle;
2. Remove the *black* wire from pin No. 5 of the same receptacle and reconnect it to pin No. 1, in addition to the wire already attached to pin No. 1.

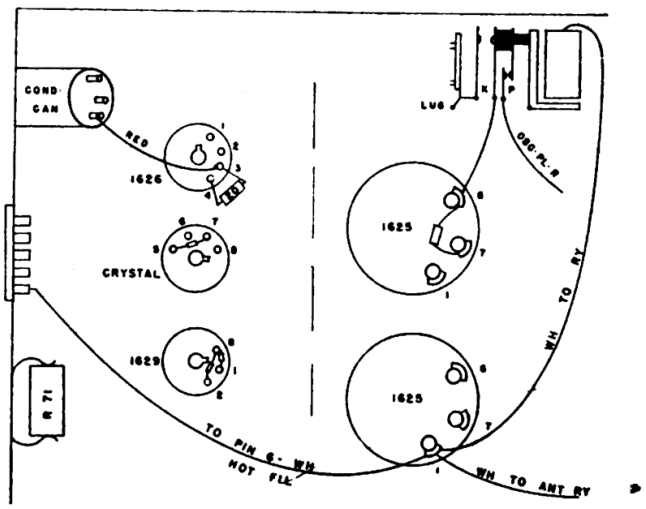

FIGURE 2. UNDER CHASSIS VIEW BEFORE CONVERSION.

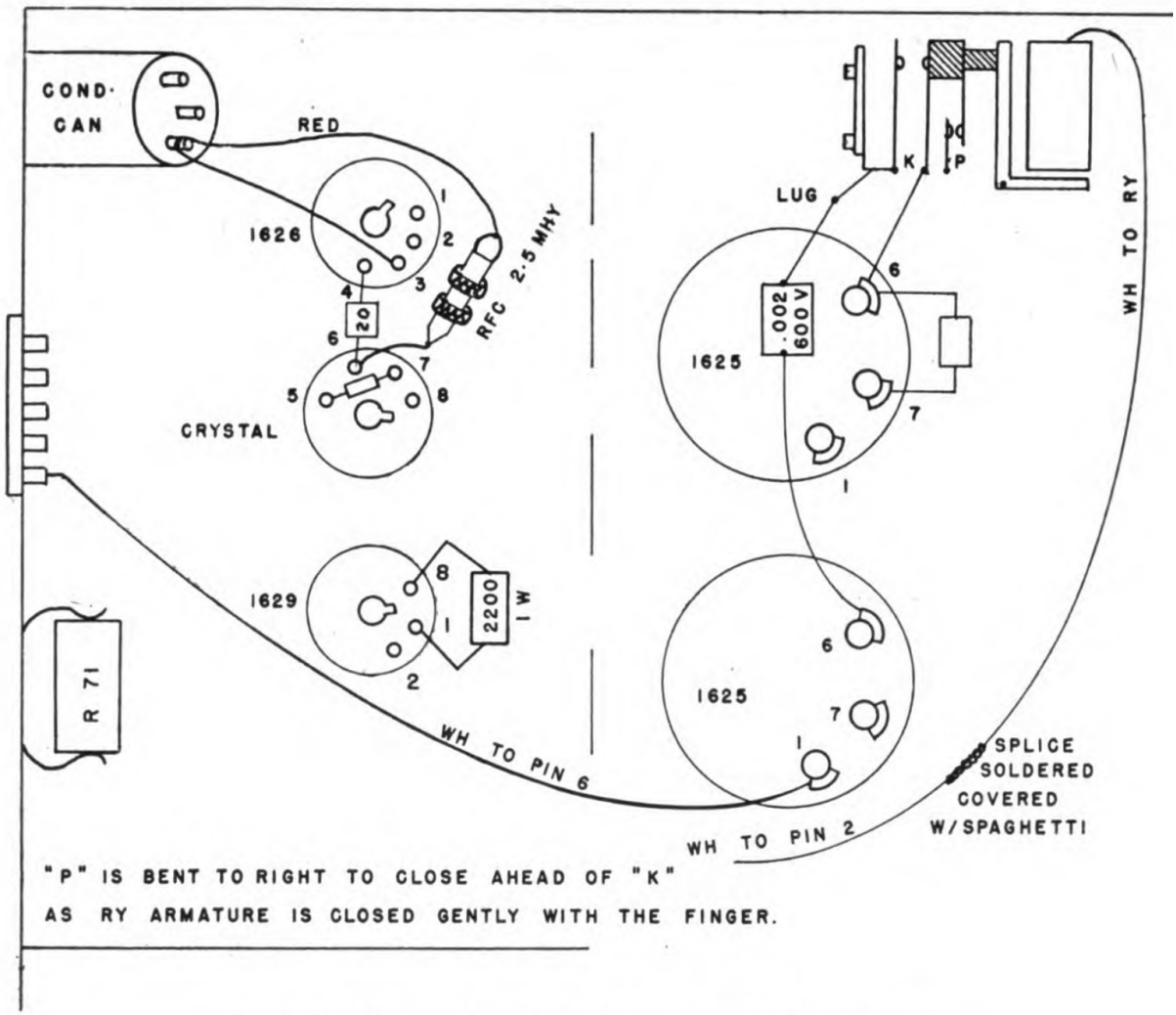

FIGURE 3. UNDER CHASSIS VIEW AFTER CONVERSION.

3. Remove the two right-hand wires connected to pin No. 1 of the "lower" 1625 socket. Solder them together and insulate the joint. One of these wires goes to the keying relay; the other went to the antenna relay.

4. Pull the severed wires from the antenna relay down through the chassis holes. Disconnect the *black* wire or discard it. Dress the *white* wire along the inner side of the chassis to the power receptacle and connect it to pin No. 2.

5. Check your socket connections with the "after" diagram of figure.

Proceeding with the under chassis circuit changes, connect a 0.002 microfarad, 600-volt cathode bypass capacitor from pin No. 6 of the "lower" 1625 socket to the unused lug on the keying relay, as shown in Figure 3. This capacitor may be a molded paper one, but a mica capacitor is to be preferred.

Study closely the diagrams of the three tube sockets and other elements at the rear of the chassis (see figs. 3 and 4). Remove one end of the 20-ohm resistor from pin No. 3 of the 1626 oscillator socket, and reconnect it to unused pin No. 6 of the crystal socket. To this same pin No. 6 connect one end of a 2.5 millihenry, 100 milliampere

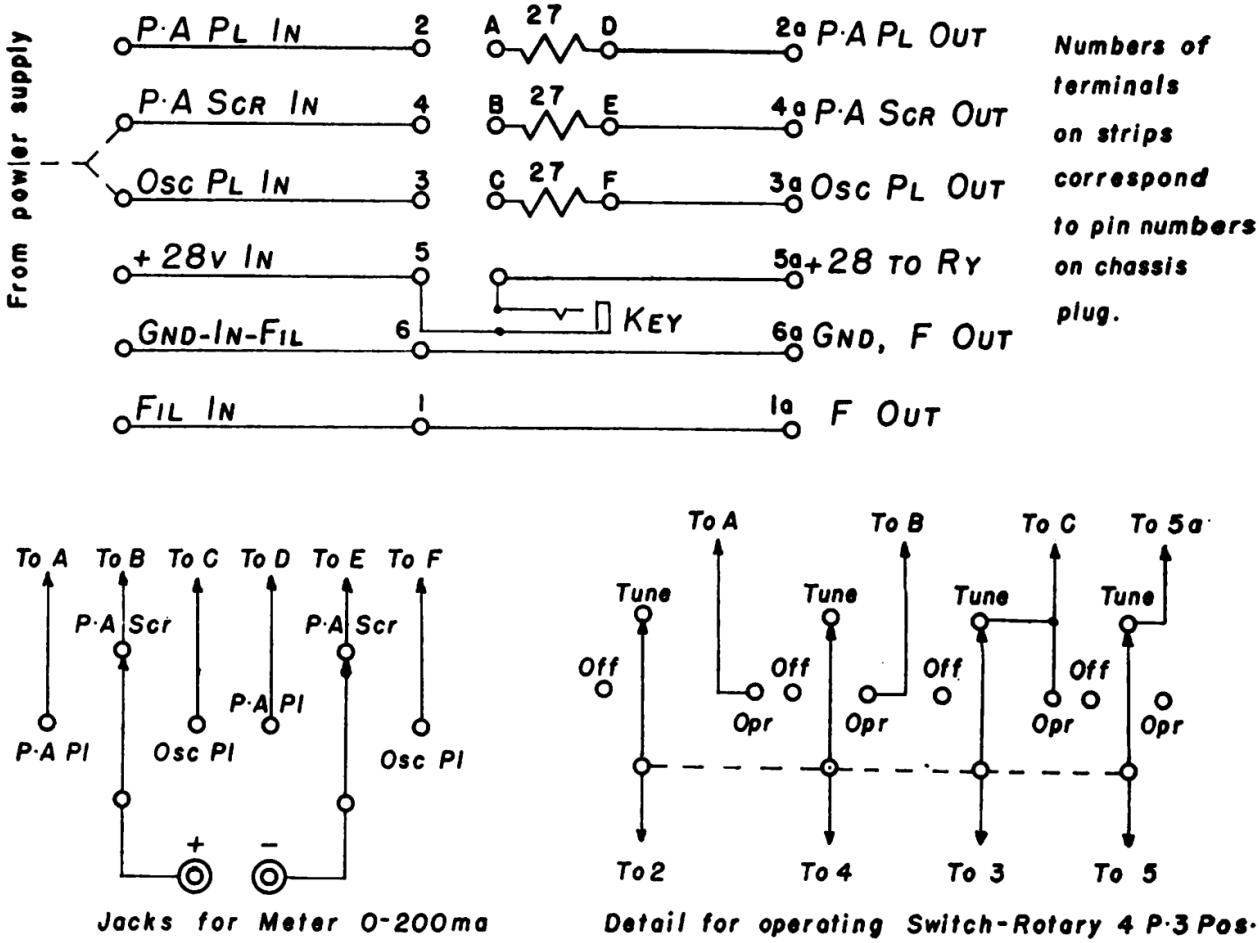

FIGURE 4. CONTROL BOX FOR CONVERTED BC–457.

r-f choke. The other end of the r-f choke connects to the left-hand terminal of the cam capacitor mounted on the rear chassis wall. Dress the r-f choke in a vertical position with maximum clearance from other connections and components.

Continue to the 1629 indicator tube socket. Remove and discard the two small resistors connected between pins No. 1, No. 2, and No. 3. Do not disturb any other connections to these pins. Connect a 2200-ohm, 1-watt resistor between pin No. 1 and pin No. 8 (it may be found necessary to remove resistor R71 temporarily from its clip mounting while doing this job).

This completes the actual conversion. Before replacing the covers on the transmitter, locate the short contact springs ("P" in figure 3) and bend them slightly together so that the contacts will close just before the contacts at "K." This starts the oscillator ahead of the p. a. and tends to reduce chirps and clicks.

The power supply for the converted BS–457 is shown in figure 1. It comprises a source of unregulated high-voltage d. c. for the p. a. plates; regulated 255-volt d. c. for the oscillator plate and p. a. screens; 24-volt a. c. for the tube heaters; and 24-volt d. c. for the keying relay. Double-pole, single-throw toggle switches with associated 6.3-volt pilot lamps are included to afford control and indication for the filament power, plate power, and operate-standby functions. The latter

toggle switch and indicator may be left out of the power supply assembly if the AØIA control box scheme is used.

The only adjustment required for the power supply is the setting of the current limiting resistor in the VR branch. This rheostat should be adjusted under key-down conditions so that the VR tubes will draw five milliamperes, measured, or will maintain a very faint glow. With key up the VR tubes should draw no more than their rated maximum current.

Power Supply Parts List

T1	Power Transformer	Primary: 110–120 V a. c.; 60 cycles. Secondary #1: 800 to 1200 V CT; 200 ma. Secondary #2: 5 volts at 3 amperes. Secondary #3: 6.3 volts at 3 amperes.
T2	Filament Transformer	Primary: 110–120 V a. c.; 60 cycles. Secondary: 24 volts at 3 amperes.
C1 C2	HV Filter Capacitors	4 mfd; 600 volts; oil-filled.
C3	Buffer Capacitor	4 to 8 mfd; 450 volts; electrolytic.
C4 C5	LV Filter Capacitors	40 mfd; 150 volts; electrolytic.
*L1	Swinging Choke	4 to 10 henrys; 200 milliamperes.
L2	Smoothing Choke	10 henrys; 200 milliamperes.
R1	Limiting Resistor	10,000 ohms; 50 watts; rheostat.
R2	LV Filter Resistor	50 ohms; 10 watts.
R3	LV Bleeder Resistor	6800 ohms; 2 watts.
R4	HV Bleeder Resistor	50,000 ohms; 10 watts.
--	LV Rectifier	Selenium; 300 milliamperes; 36 volts.
--	HV Rectifier	Tube; 5R4GY.

*The swinging choke need not be used if the r. m. s. voltage per plate of the 5R4GY does not exceed 450 volts.

The control box scheme diagrammed in figure 4 is well worth using. At AØIA it is used to enable adjustment of the vfo to zero beat with signals in the receiver without swishing a strong signal across the band. Provision for this mode of operation was built into the control box. A four-pole, three-position rotary switch is used for the purpose, which affords the following control functions:

1. *Standby:* heaters on; all h. v. off
2. *Tune:* heaters and oscillators on; p. a. off
3. *Operate:* all voltages applied for normal operation

The control box is a 4- by 6-inch unit which contains, in addition to the control switch mentioned above a two-pole, three-position meter switch, pin-tip jacks for connecting a milliammeter, meter shunt resistors and a key jack. Internal connections are made to six-contact terminal strips as illustrated in figure 5. The meter used with this particular installation is a Weston 0–200 milliammeter, with which 27-ohm shunts are used to read p. a. plate, p. a. screen and oscillator plate currents. Other meters may require shunts of different values.

The conversion described above involves a minimum of expense and labor, and has been planned so that no intimate knowledge of the circuits is involved. Anyone can make the conversion who is able to read a simple diagram. So, get busy, fellows: I'll see you on MARS!