

Attention FT-901 owners: For about \$20.00 and a few hours of time you can now add 30 meters to your rig. W5AH literally walks you through the mods to get you on amateur radio's newest band.

How To Add 30 Meters To The Yaesu FT-901 Transceiver

BY BOB ALEXANDER*, W5AH

Since its introduction in 1978, the Yaesu FT-901 has been a very popular transceiver. However, it does not provide for the new WARC bands. Now that 30 meters is open for use, FT-901 owners have been unable to use the new band.

Thirty meters can be added to the FT-901 by using the (unmarked) Auxiliary position of the band switch, and the WWV/JJY sections of the XTAL Unit and VCO Unit. The megaHertz portion of the frequency display is programmed by a diode matrix IC and must be modified to read correctly. The project can be completed in a few hours for a cost of about \$20. A v.t.v.m. with r.f. probe and a frequency counter are needed for alignment purposes.

The WWV/JJY position of the band switch will be inoperative after completion of the modification. Ten MHz WWV and 30 meters will be on the Auxiliary position of the band switch. The Auxiliary position must be used in order to obtain enough capacity in the transmitter pi network for proper loading.

The PLL Unit operates 8.9875 MHz above the transceiver operating frequency. For 10.000 to 10.500 MHz operation, PLL output must be 18.9875 to 19.4875 MHz. The changes to be made in the XTAL Unit and VCO Unit permit operation over this frequency range.

The first production lot of the FT-901 had 5 MHz WWV installed, and all later units had 15 MHz WWV. Japanese versions all had 5 MHz WWV. Some of the modification steps depend on which version is being modified.

XTAL Unit (PB1711)

There are two different board layouts for the XTAL Unit. The newer boards have



The transceiver, front view.

an Auxiliary section silk screened on the board, but no parts installed. Parts are numbered the same way on both boards and only the layout is different.

Remove the XTAL Unit from the transceiver and make the following changes. Replace X1310, the 29.4875 MHz crystal (19.4875 MHz in units with 5 MHz WWV), with a 24.4875 MHz crystal. The crystal is available from Yaesu. Replace C1337 with a 120 pF capacitor. Unsolder and remove cable connector pin 11 from the circuit board. On the foil side of the board, connect a jumper wire from pin 12 of the connector to the hole at pin 11. Reinstall the XTAL Unit.

Remove the VCO Unit from the transceiver. Connect a jumper wire between

pin 10 and pin 18 of the edge connector. The even-numbered pins are on the component side of the board and are counted from left to right. In units with 5 MHz WWV, MJ12 (VCO edge connector) on the main chassis has pin 10 grounded. Unsolder pin 10 from the ground connection. A wire from the band switch will be connected to it later. Next reinstall the VCO Unit.

Counter Unit

Remove the counter unit from the transceiver and install the components as shown in the illustration. In units with 15 MHz WWV, connect a wire from the Auxiliary feed-through capacitor to the new parts as shown. In units with 5 MHz WWV

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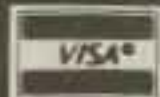
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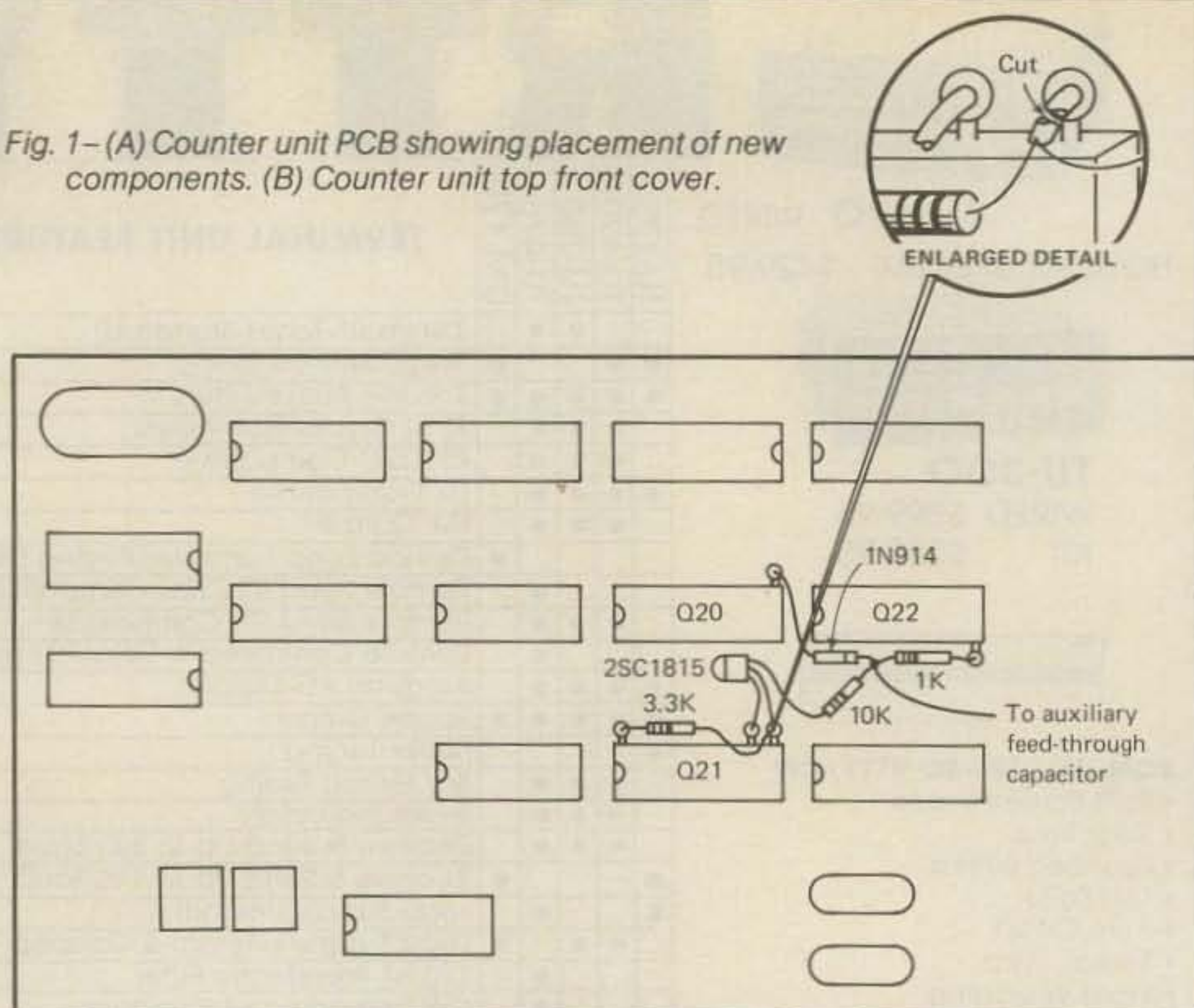
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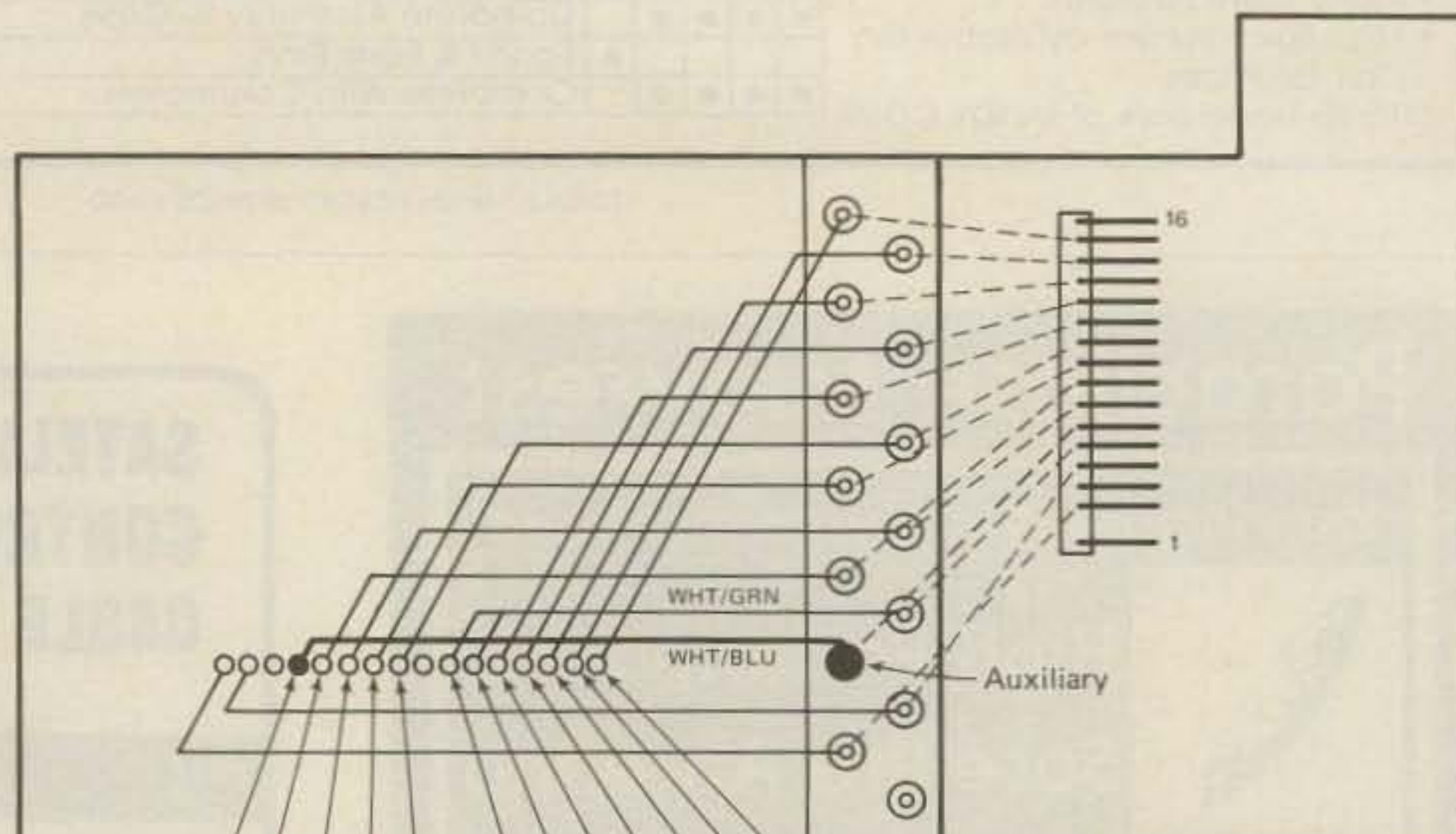
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Fig. 1—(A) Counter unit PCB showing placement of new components. (B) Counter unit top front cover.



(A)



(B)

a blue/white wire is connected between the feed-through capacitor and the main board. Cut the wire at the board and connect it to the new parts as shown in the illustration. Reinstall the counter unit.

Band Switch (S1)

The band-switch wiring for units with 15 MHz WWV differs slightly from those with 5 MHz WWV (see illustration). The band switch wafers are designated A through O beginning at the front of the transceiver. Trimmer boards A, B, and C must be folded out of the way for access to the Auxiliary terminals of the wafers.

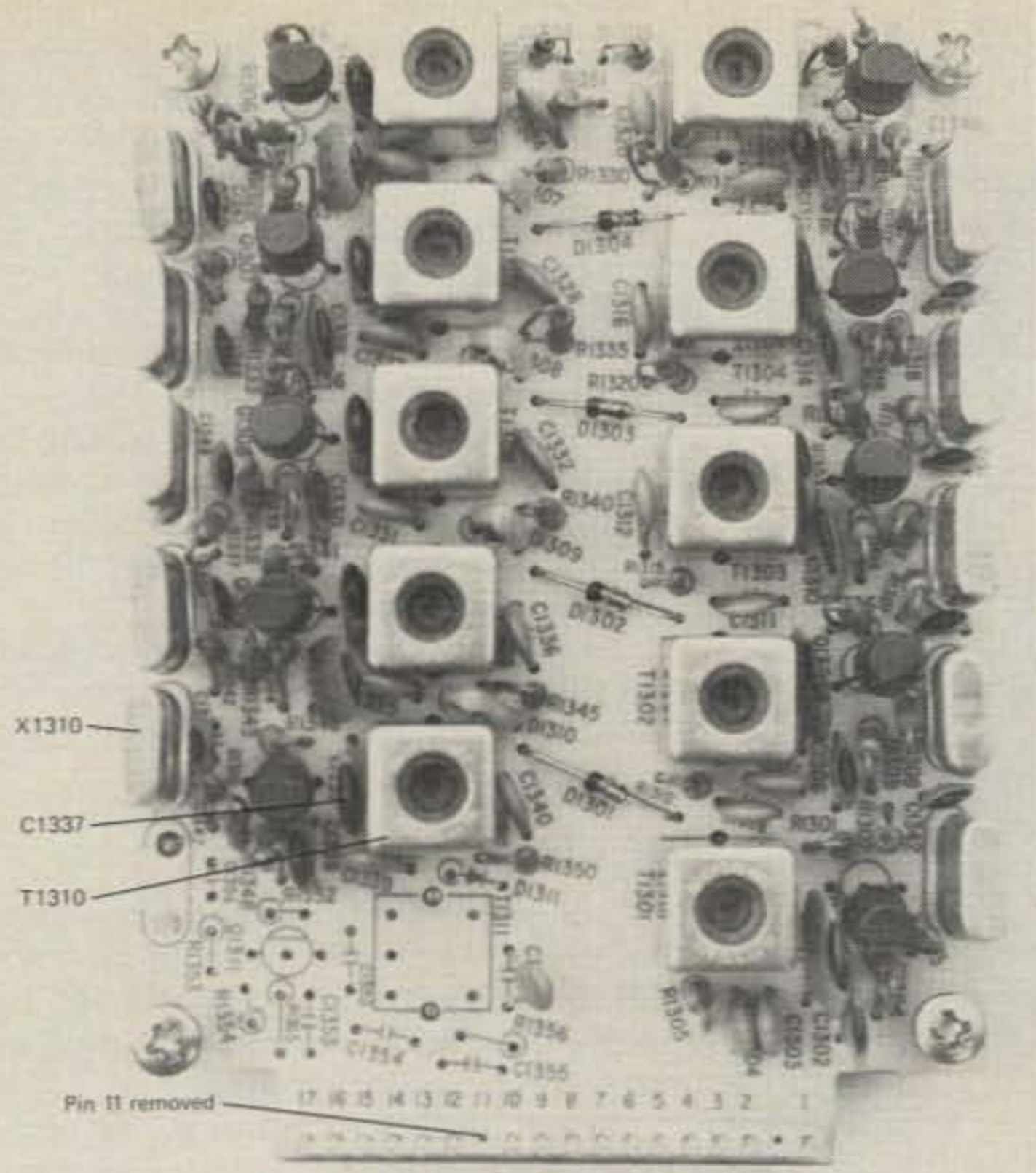
Rewire the band switch as follows for units with 15 MHz WWV. On S1E and S1G connect a jumper wire between the Auxil-

iary terminal and the 20 meter terminal. On S1I locate the gray or gray/white wire going from the Auxiliary terminal to coil L10. The wire may connect to S1J and then to L10. Cut the wire at the coil and connect it to the 20 meter terminal of S1I.

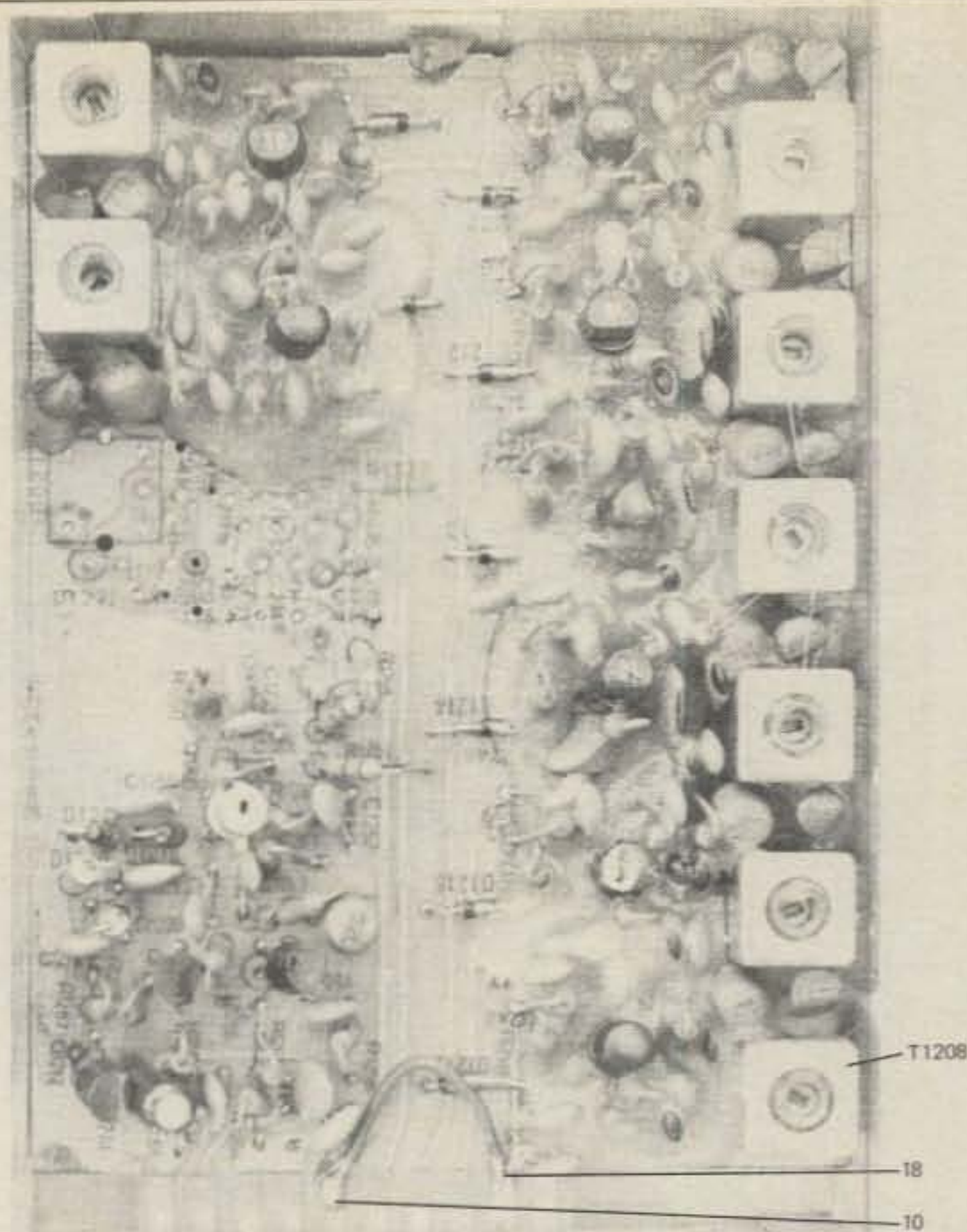
Rewire the band switch as follows for units with 5 MHz WWV. On S1A connect a wire to the Auxiliary terminal. Connect the other end to pin 10 of MJ12 (VCO Unit). On S1E, S1G, and S1I connect a jumper wire between the Auxiliary terminal and the 20 meter terminal.

The remaining band-switch wiring is the same for all transceivers. On S1K the 160 through 15 meter terminals are tied together. Connect a jumper wire between the Auxiliary terminal and the 160-15 meter terminals.

Say You Saw It In CQ

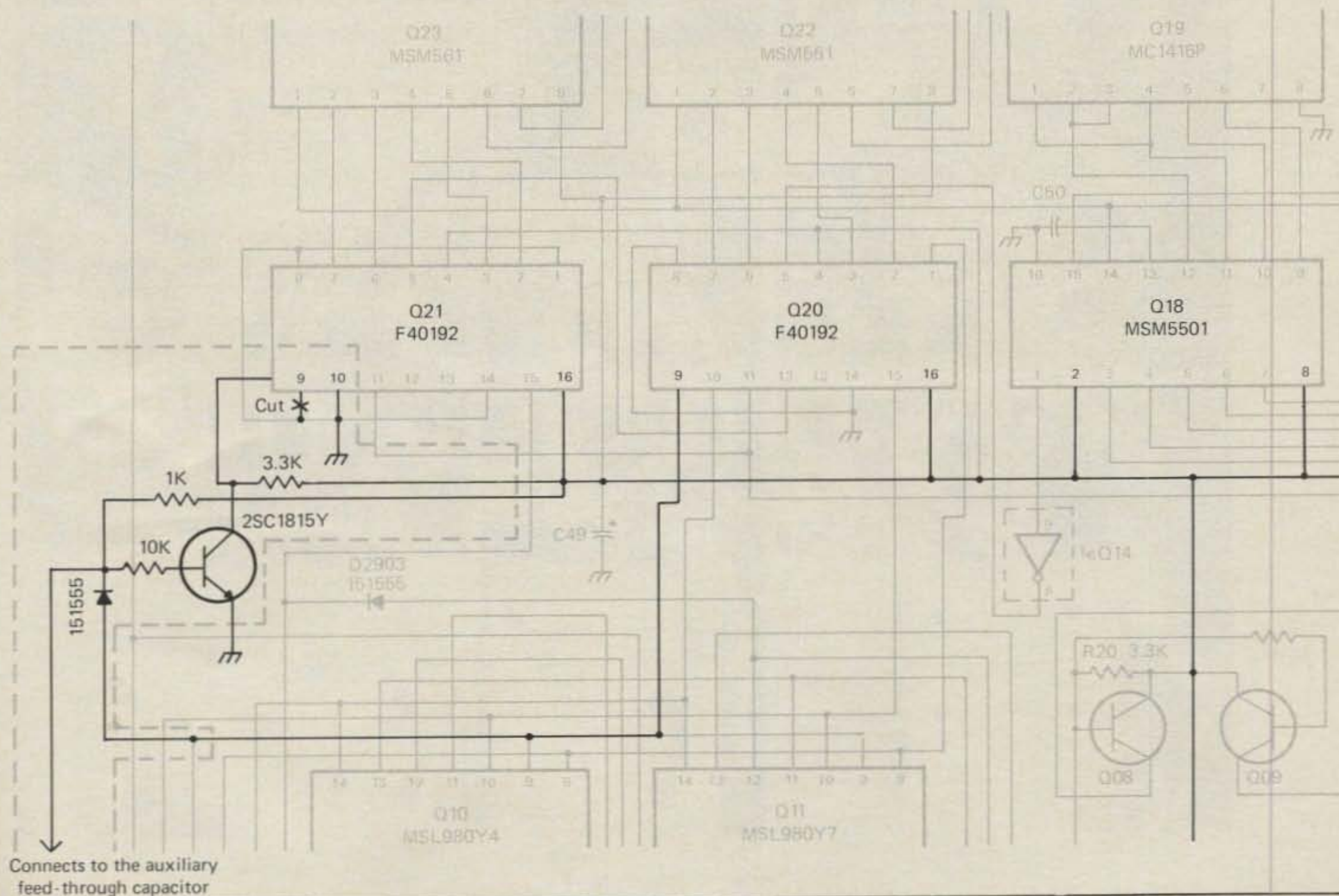


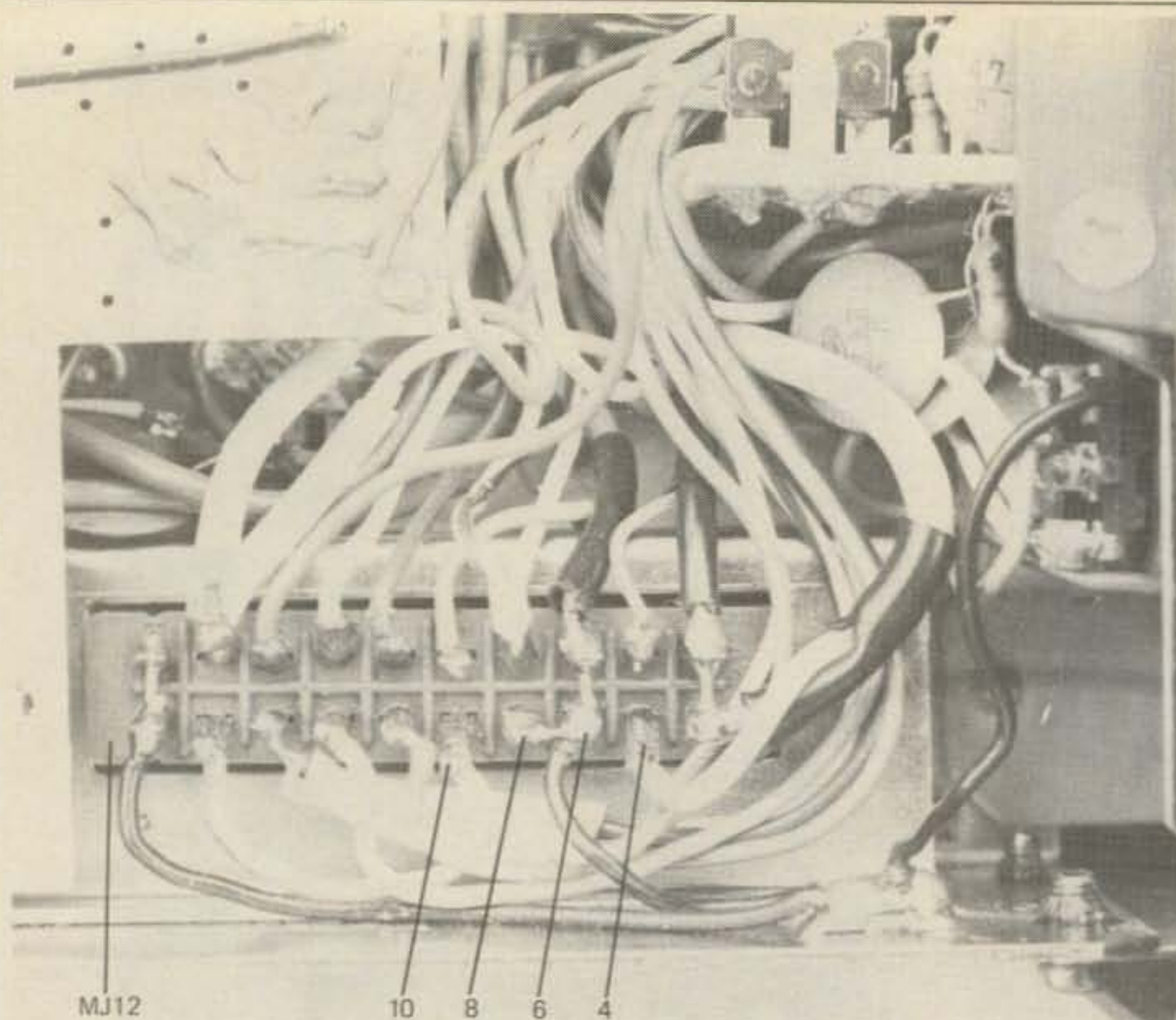
The XTAL Unit (PB1711). Pin 11 is removed from the edge connector. X1310 is at the lower left.



The VCO Unit (PB1710). Jumper wire is connected between pins 10 and 18 of the edge connector.

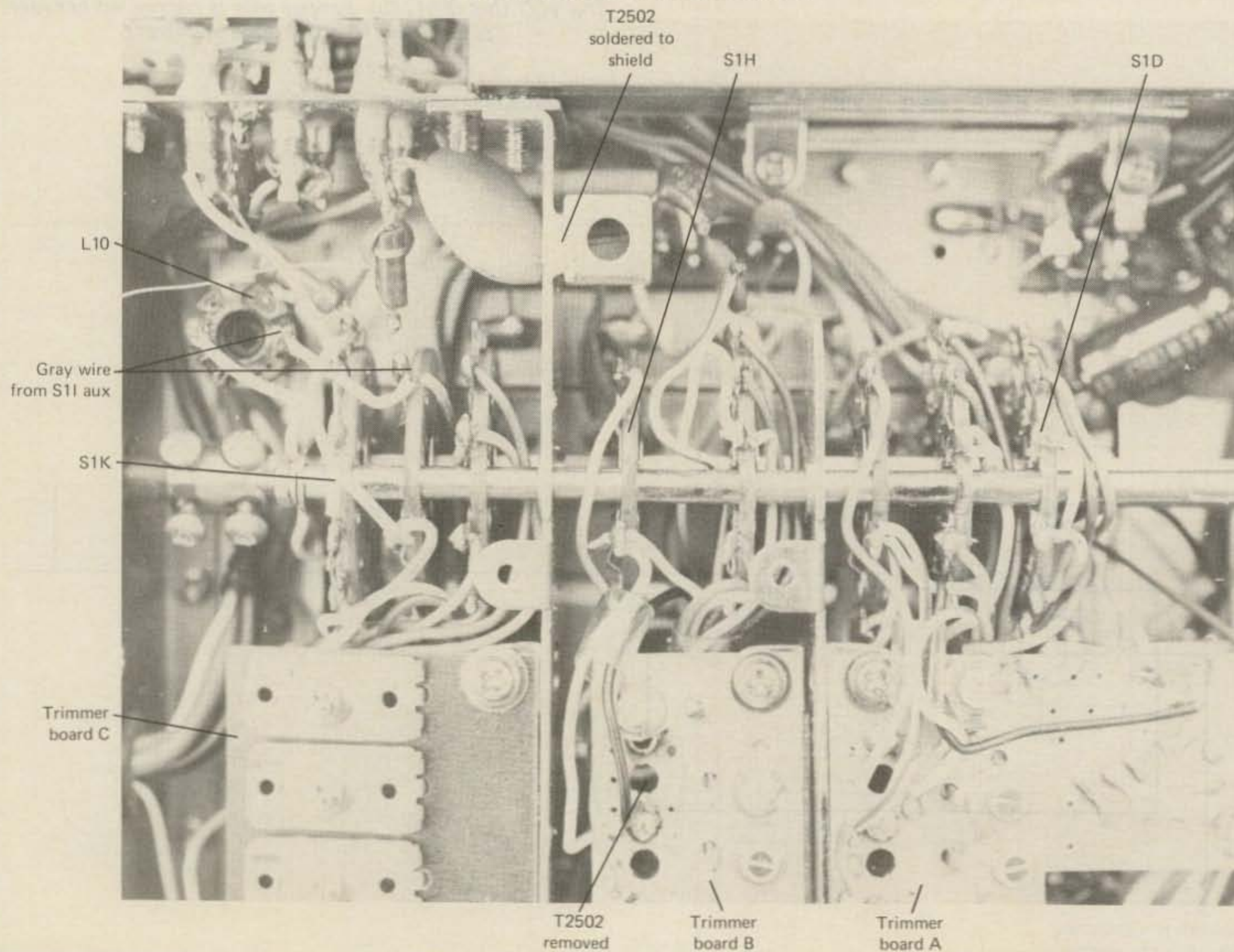
Fig. 2- Partial schematic of the counter unit showing the additional components.





MJ12 (the VCO Unit).

The band switch (S1). Sections D through K are shown. Trimmer boards A, B, and C are to the left of the switch. T2502 is soldered to the shield plate to the right of S1H.



Final Amplifier

S1L, S1M, S1N, and S1O are located inside the final-amplifier enclosure. S1M is the front side of the middle wafer, and S1N is the rear side. On S1N connect a jumper wire between the common terminal and the one immediately above it. On S1O connect a heavy jumper wire to the Auxiliary terminal. The other end will be connected later.

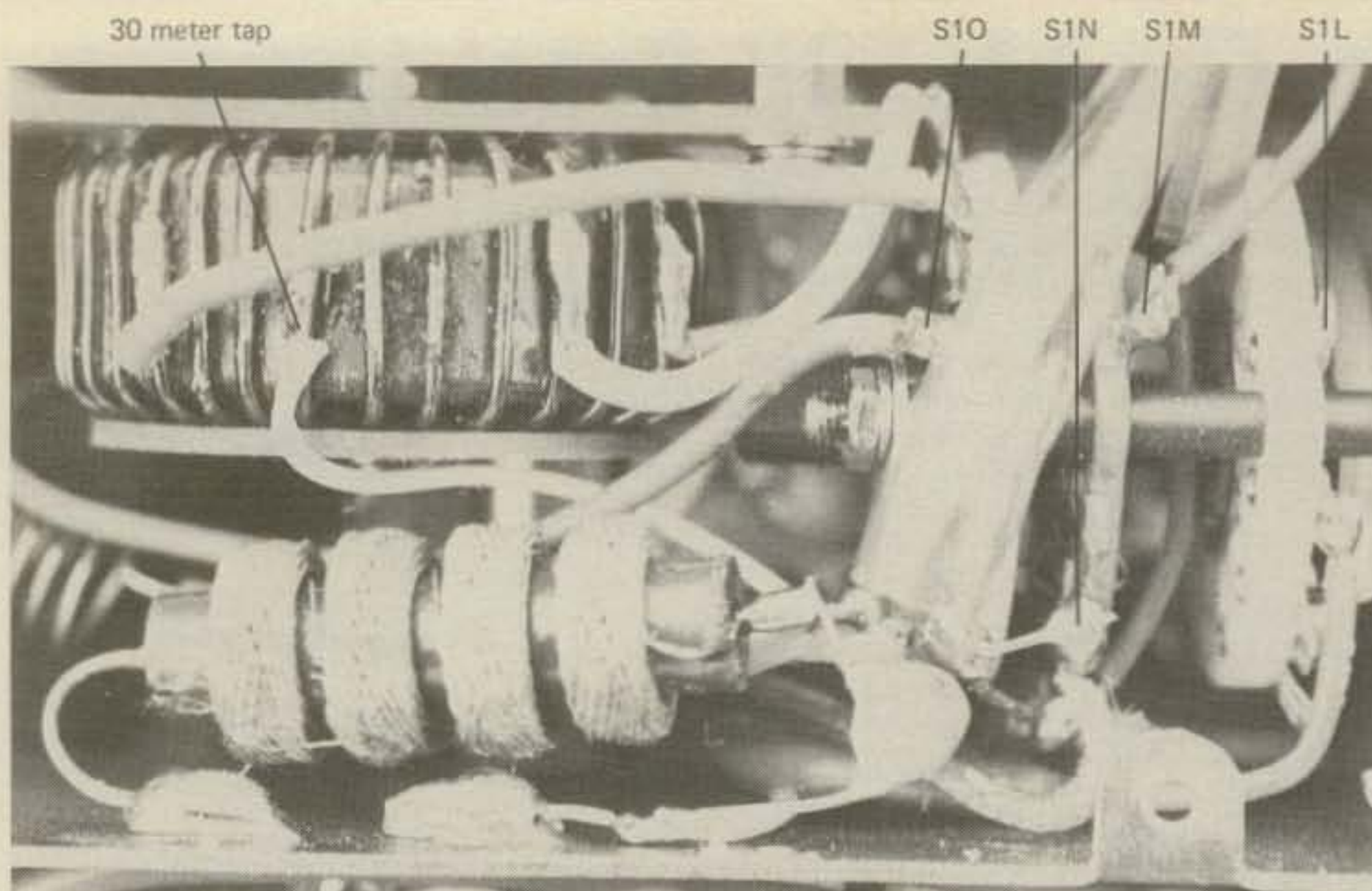
On loading coil L1 carefully scrape the enamel off the coil between the 40 meter tap (orange wire) and the 20 meter tap (yellow wire) three turns from the 40 meter tap. Tin the wire.

Connect the free end of the wire previously connected to S1O to L1 at the prepared position. This completes the band-switch wiring.

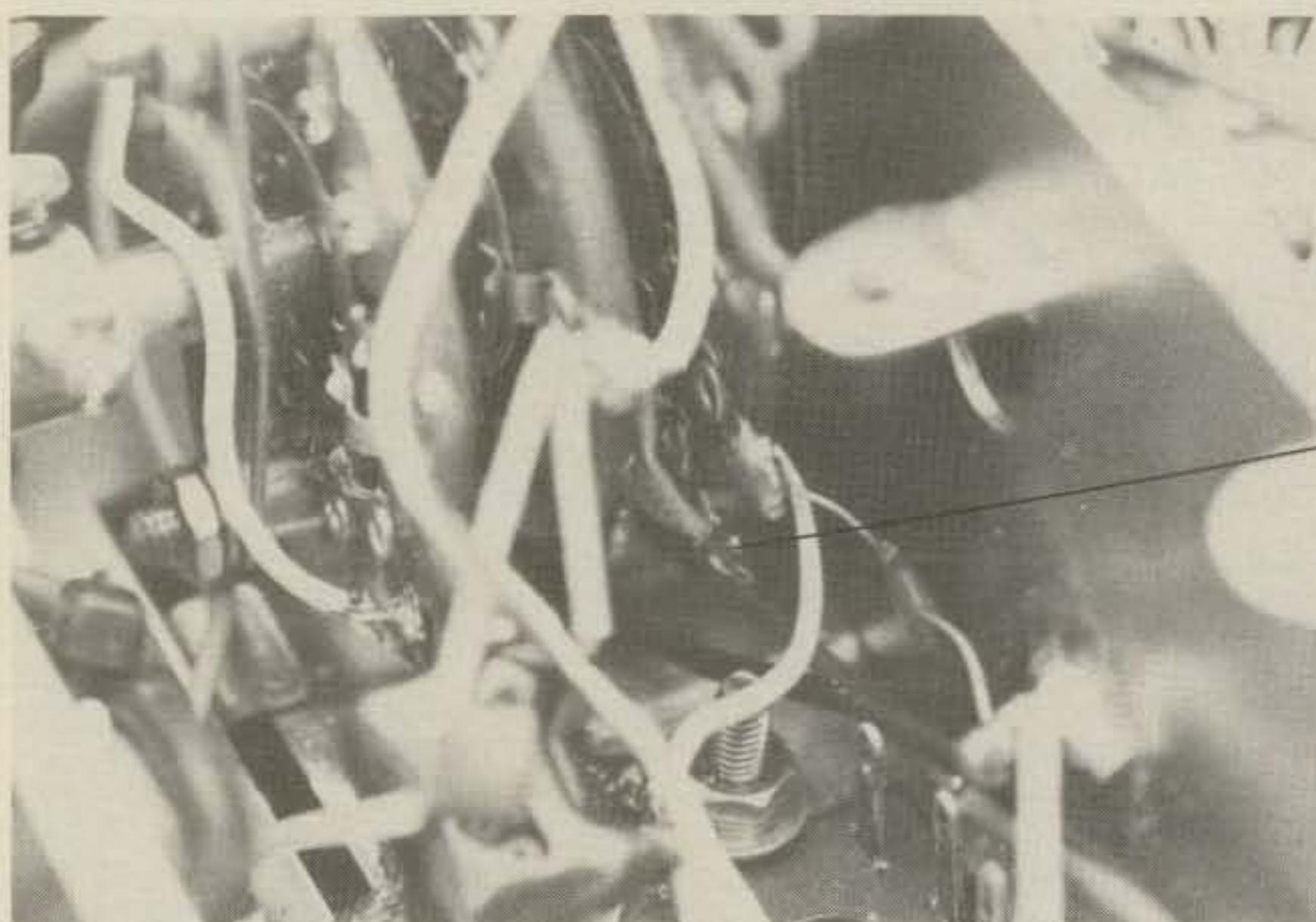
Alignment

Apply power and set the band switch to the Auxiliary position, the **MODE** switch to **USB**, and the **VFO** dial to 10.000 MHz. The frequency display will be flashing, indicating an out-of-lock condition.

Connect an r.f. probe to pin 16 of the XTAL Unit and adjust T1310 for an output of 150 millivolts.



The PA compartment.



Side view of the band switch showing location of the Auxiliary terminal.

Connect a frequency counter to pin 4 of MJ12 (VCO Unit). Adjust T1208 for a reading of 18.9875 MHz on the counter. The frequency display should no longer be flashing.

Connect the transceiver to a dummy load and tune up the transmitter in the normal manner. The **PRESELECTOR** control will peak between 4 and 5 on the inner scale. The plate tuning control will be near the 20 meter mark. Transmitter output should be at least 100 watts.

Note: The loading control settings on all bands may be different from what has been normal due to increased capacity in the control.

Low Output/Receive Self-Oscillation

Some transceivers with 15 MHz WWV may have low transmitter output and receive self-oscillation on the new band. The problem has not been seen in units with 5 MHz WWV. Should this problem occur, it can be corrected as follows.

On trimmer board B (PB1724) carefully unsolder T2502, TC2507, and the white/violet wire, and remove them from the board. Do not unsolder the white/violet wire from the band switch.

T2502 has five solder lugs on it. The side with three lugs is unused. Prepare T2502 by soldering one of the two lugs to the metal can. Solder an 8 pF capacitor with short leads to the other lug. Solder the can to the shield plate as shown in the photograph. Connect the free end of the white/violet wire to the 8 pF capacitor.

Tune the transmitter up and adjust T2502 for maximum output at 10.125 MHz. Check the 40 meter band for proper operation. Incorrect adjustment of T2502 can cause the same problems there. Re-adjust T2502 if necessary. The transceiver should now be ready for an on-the-air check.

I must give thanks to Ed Kerr at Yaesu for his technical assistance and patience. See you on 30 meters! □

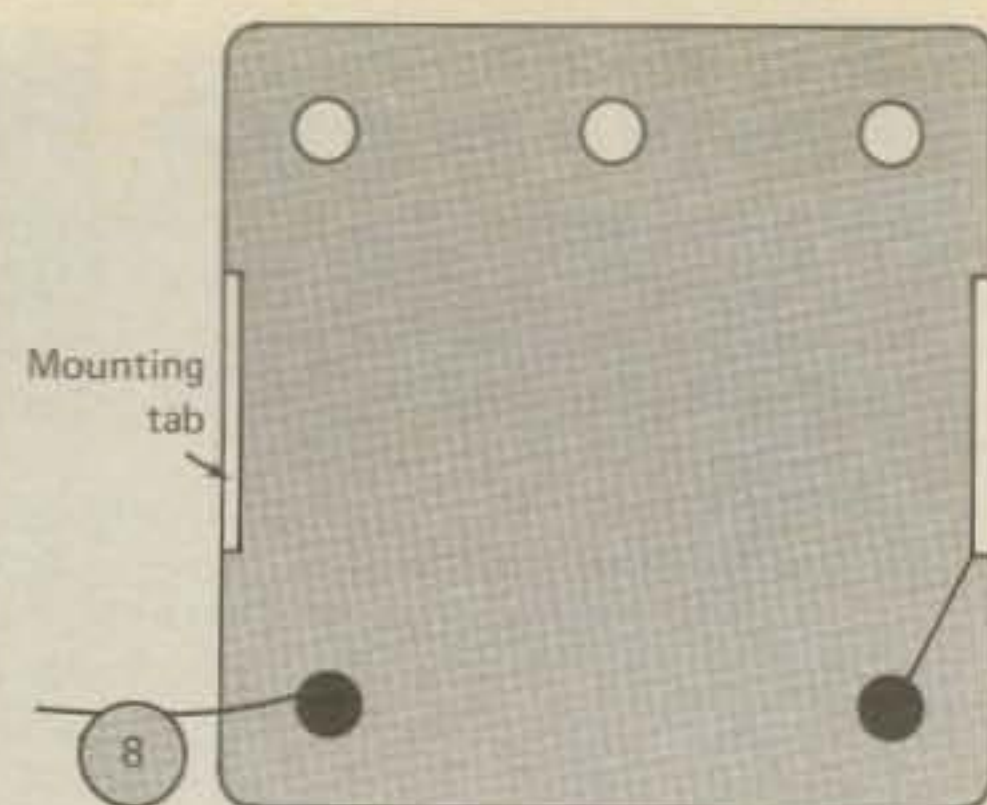


Fig. 3- T2502 bottom view. One solder lug is connected to the metal can and the other has an 8 pF capacitor with short leads attached to it.

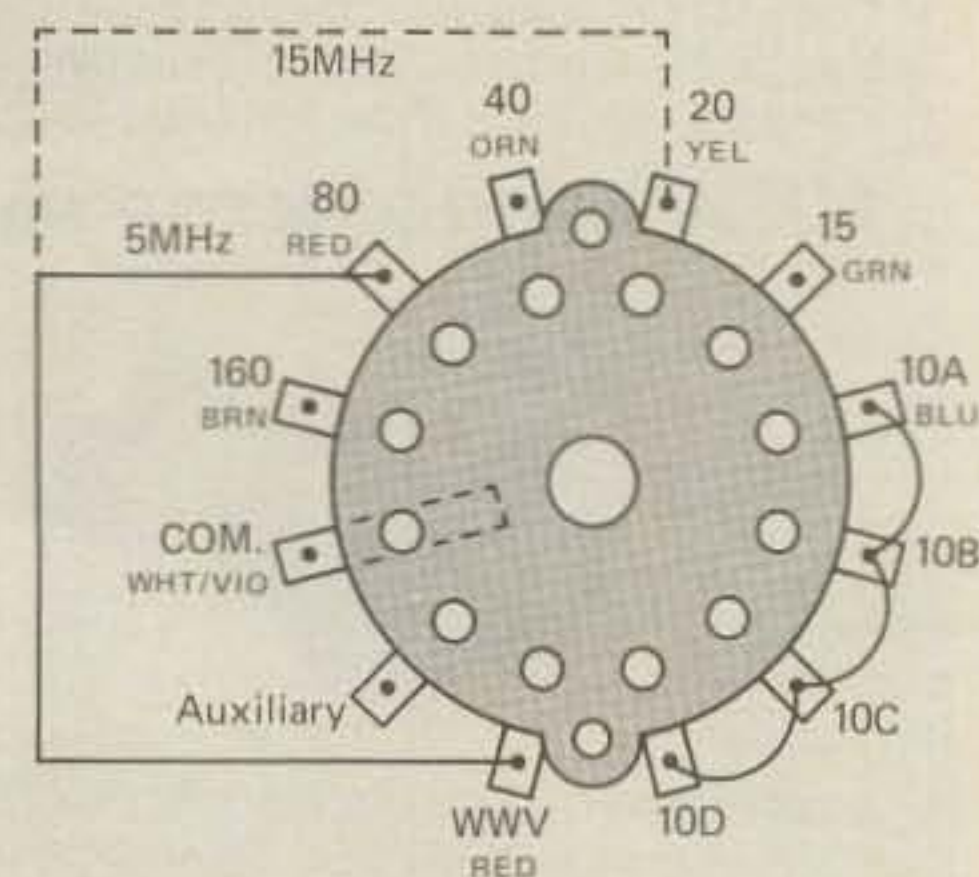


Fig. 4- Wiring diagram of band switch S1 sections A through K.

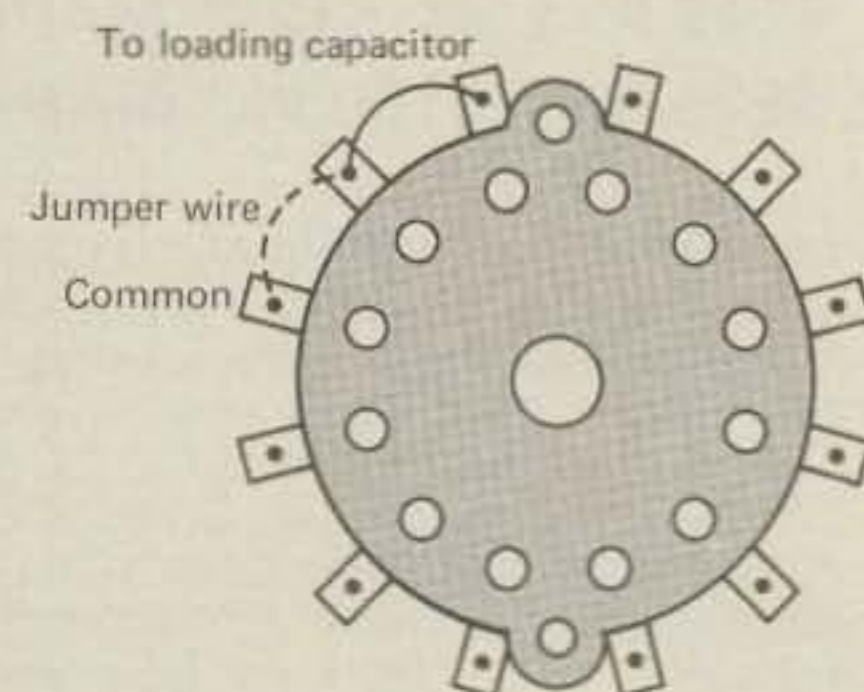


Fig. 5- Wiring diagram of band-switch section N. Terminals are on the rear side of the wafer.

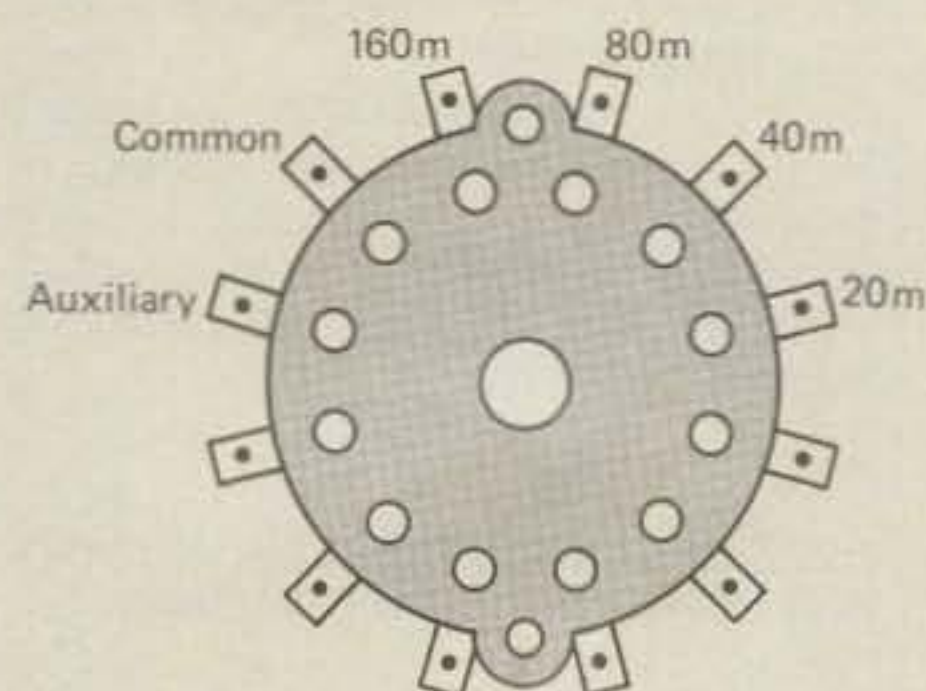


Fig. 6- Wiring diagram of band-switch section O.