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Transistors and Nuvistors In a Two-Meter Transceiver

By R. M. Mendelson, W2OKO*
RCA Electronic Components and Devices

Part II

In the preceding (Spring, 1965) issue of HAM TIPS, readers were introduced to a unique two-meter transceiver that employs both transistors and nuvistors for the purpose of achieving an effective compromise in all-around economy and operating efficiency. In the first installment, the author covered such basic considerations as design concept, block layout, the schematic, and construction details.

In this issue, Mr. Mendelson concludes his two-part article with a discussion of the alignment, tuning, and adjustment of the receiver and transmitter sections.

Receiver Alignment and Adjustment

Alignment of the receiver section is accomplished by using the "S" meter as the alignment indicator. An up-scale movement of approximately one division (when the AC power is applied to the transceiver) is an indication that the meter circuit is properly balanced. If this movement is more than one division, the value of R_{43} should be changed. The alignment procedure is as follows:

1 — Apply a 1-Mc signal from a signal generator to the base of Q_1 (2N372 mixer stage) and successively tune each of the six IF-transformer windings for a maximum "S"-meter reading. As the tuning progresses, reduce the input signal strength.

2 — Apply an audio frequency to the 1-Mc signal. A good clean tone from the speaker indicates that the audio system is operating properly.

3 — Adjust the tunable receiver oscillator (VFO) as follows:

a) With trimmer C_{32} set to mid-range and the receiver dial of the transceiver at close to full scale, pick up the oscillator signal on a communications receiver that is tuned to 12.7 Mc.
b) Adjust the trimmer so that 12.7 Mc appears at about 90 on the transceiver dial.
c) Search the bottom end of the transceiver dial for a signal of 10.7 megacycles.
d) C_{32} should be adjusted to center the oscillator range of 10.7 to 12.7 megacycles across 80% of the tuning dial.

4 — Apply an 11.7-Mc signal to the grid of V_2 (7587 mixer stage) and adjust the top slug of T_1 for a maximum "S"-meter reading.

5 — The final step is the tuning of the front-end for 144-to-148 Mc operation. Using a grid dip meter, set L_1, L_3, and L_4 to 146 megacycles; L_5 to 45 megacycles; and L_6 to 134 megacycles. Connect the antenna. If all wiring is correct, 2-meter signals should be heard. If no signals are heard, verify operation of the crystal oscillator by removing the

*Commercial Receiving Tube and Semiconductor Division, Somerville, New Jersey

44.76-Mc crystal from its socket. The background noise should fall off. A slight readjustment of L_5 may be necessary to start the oscillation. L_6 should be peaked for maximum oscillator output. Tune in a signal at approximately 145 megacycles and adjust L_3 for a maximum "S"-meter reading. Repeat with a signal at 147 megacycles and tune L_4 for a maximum "S"-meter reading. Remember that the receiver is simultaneously tuning both 145 and 147 megacycles; be sure the signal frequency corresponds to the coil that is being tuned.

The antenna coil, L_1-C_1, should be tuned to approximately 146 megacycles. The top slug of T_1 may be adjusted slightly for equal reception over the whole band.

Neutralization is easily obtained by adjusting L_2 for minimum feedthrough of a strong signal when the plate voltage of V_1 is zero. This adjustment is not too critical. The receiver alignment is then complete except that touch-up of the tuning might be necessary to provide the whole band with equal sensitivity.

NOTES

(1) if hum is objectionable, T5 may have to be moved

(2) all +12V (1) lines may be joined and connected to arm of $S3_A$

(3) all +12V (2) lines may be joined and connected to $S3_A$ - receive

(4) all grounds may be joined to form a common ground

(5) detector D3 (Type IN295) and C46 (120 pf) are mounted at T4 (2nd IF)

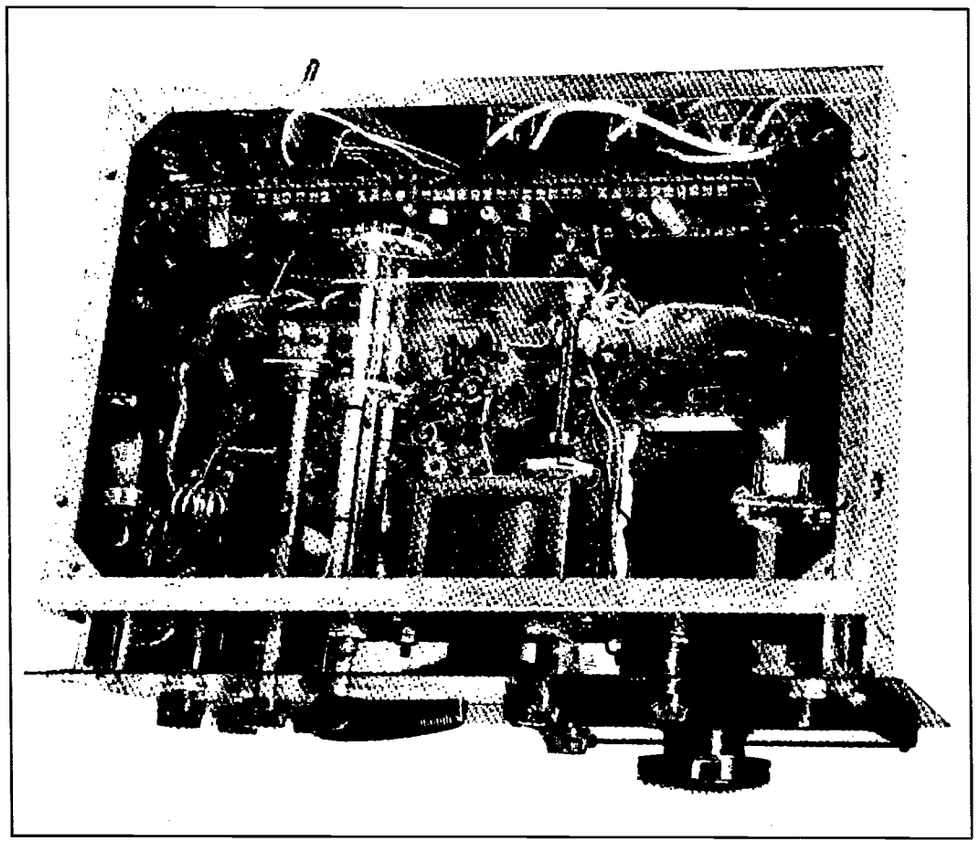

Figure 5: Bottom view of transceiver highlights terminal strip and its mounted components. Also visible in photo are the transmit-receive switch, transmitter crystal switch, crystal filter, and the speech-gain control. Note new location of audio transformer (upper right), which was removed from original position to minimize a hum that was caused by magnetic pickup from the power transformer located on the top side of the chassis.

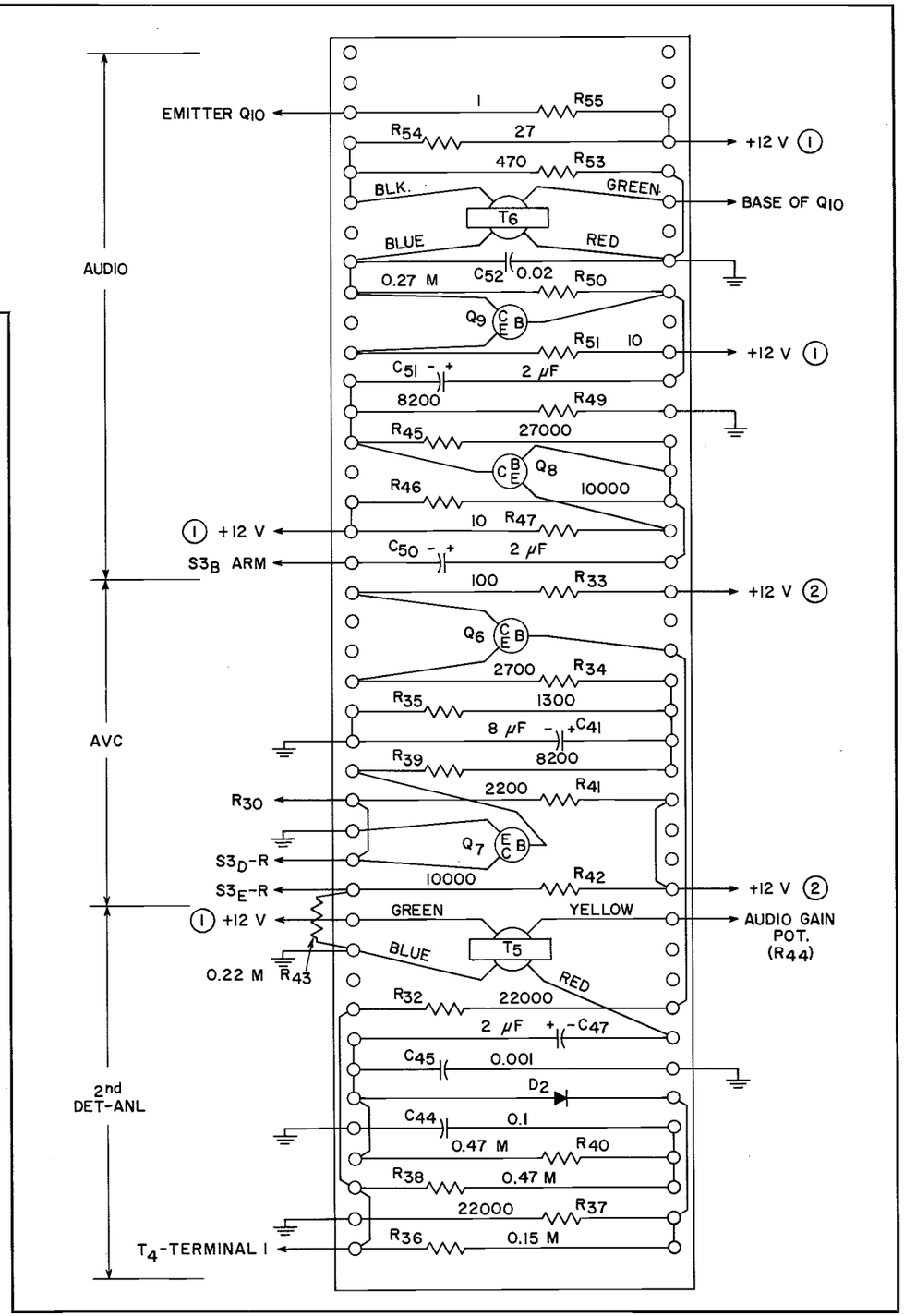

Figure 6: Detail on transceiver's Audio-AVC-ANL terminal board, including pertinent footnotes.

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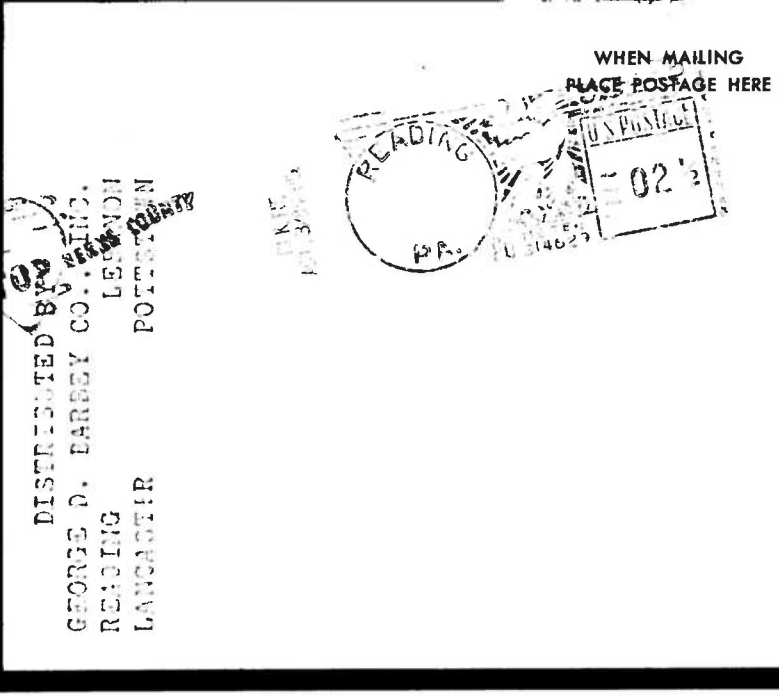

Transmitter Tuning and Adjustment

Tuning the transmitter is easily accomplished as follows:

1 — With power off and all nuvistors in place, tune L_7 to 49 megacycles and L_{12} and L_{17} to 144 megacycles, using the grid dip meter. After this, remove the two 7587 final nuvistors and turn on the power.

2 — Throw the send-receive switch to the transmit position. Connect a high-impedance voltmeter across R_{62} and adjust L_7 for a maximum reading (approximately 10 volts) on the voltmeter for indication that V_3 is oscillating. To insure positive starting of the oscillator, back the slug out to give a slightly higher tuned frequency.

3 — After turning off the main power, disconnect the 240 volts from the plates and screen grids of the final amplifier. Plug in the 7587 final nuvistors, turn on the power, and set the meter switch to TP_1 (final grid current). Tune C_{64} for a maximum meter reading (usually between one and two milliamperes). Rotation of the plate-tuning capacitor, C_{58}, through its entire range should have very little effect on the grid current. Minimize this effect by adjusting C_{59}, the screen-grid bypass capacitor.

4 — Again, disconnect the AC power and reconnect the 240 volts to the final amplifier plates and screen grids. Switch the meter to TP_2 (plate current) and attach the antenna or a dummy load to the transceiver. Turn on the power. After the nuvistors warm up, tune C_{58} (in the final-amplifier plate circuit) for a dip.

5 — Turn the meter switch to TP_3 (power output) and adjust C_{58} and C_{55} for a maximum power-output reading. The capacitor, C_{55}, tunes out feed-line reactance.

Modulation can be introduced through either an external carbon mike or the built-in speaker. Adjust the gain control on the rear of the chassis for 100% modulation with no distortion.

The receiver is now completely tuned. When transmitter frequencies are changed, only the final-amplifier capacitors on the front panel (C_{55} and C_{58}) need be readjusted.

If the DC-to-DC converter and power plug have been wired correctly, the unit can also be portably operated from any negative grounded 12-volt DC supply.

The transceiver will perform very well for long periods with little maintenance and will provide many hours of pleasurable operation.

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