



HAM TIPS



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THE WEEKEND SPECIAL

A Complete, Portable 40-Meter CW Station

By Lee Aurick, W2QEX

RCA Electron Tube Division, Harrison, N. J.

For many hams, a weekend jaunt or a vacation trip with the family means being off the air for the duration. The author, to whom such trips meant a sacrifice of practically the only time available for work at the home station, undertook to solve the problem by the design of a portable 40-meter cw station which would fit unobtrusively into the family luggage and yet provide a high degree of operating convenience and efficiency.

In planning the station, the author considered the following features essential:

(1) The entire station should fit in a portable typewriter case.

(2) The transmitter should have a vfo and provision for oscillator "spotting."

(3) To assure freedom from objectionable frequency variations during operation under marginal conditions, the vfo should have a regulated plate-voltage supply.

(4) The final should load properly when connected to a 72-ohm load (pre-cut 40-meter doublet with coaxial feed).

(5) The transmitter should include a single tuning and keying monitor.

(6) Changeover from "transmit" to "receive" should be a one-switch operation.

(7) The receiver should provide good bandspread for the 40-meter band.

(8) The receiver should deliver sufficient af-output power to operate a small built-in speaker.

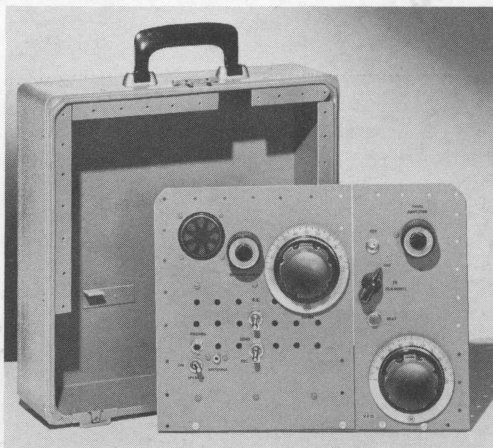
(9) The entire station should use proved circuits and cost less than \$100.

The rig shown in the accompanying photo-

graphs and circuit diagrams fulfills all these design requirements with one minor exception—the 66-foot doublet antenna and its 50-foot 72-ohm feeder, of course, do not fit easily into the portable typewriter case. They have to be carried elsewhere in the family luggage.

Circuit Details

The limitations on the size and cost of the station dictated the use of a two-tube regenerative receiver. The one which seemed to offer the most advantages and best met the other requirements was the "Novice Special" de-



Four brackets made of 3/4-inch aluminum angle are utilized. One supports the power-supply "deck." The others, mounted on three sides of a portable typewriter case, support the front panels of W2QEX's 40-meter cw station.

scribed by Mix in QST for June, 1956. With minor modifications (a slight change in the method of tuning, and the use of a permanently mounted 40-meter coil instead of plug-in coils), this receiver was adopted. The power supply described by Mix for use with the receiver was also adopted, and used for the transmitter as well as the receiver.

As shown in Figure 1, RCA-6AQ5-A's are used in both the detector and af-amplifier stages. The detector provides smooth and stable regeneration, and the tuning arrangement spreads the 40-meter band over 70 divisions (10 to 80) on the tuning dial. The af-amplifier stage delivers sufficient output to operate the built-in speaker on practically every station that can be heard.

L_1 is a 9-turn length of B & W Type 3015 Miniductor, tapped at 2 turns (terminal 2), $4\frac{1}{4}$ turns (terminal 3), and 5 turns (terminal 4). C_3 is the "bandset" capacitor which, with the fixed mica padder capacitor, C_2 , determines the tuning range. C_1 is the "bandspread" capacitor. When C_3 is properly set, C_1 covers a range extending approximately 40 kilocycles beyond each edge of the 40-meter band. R_2 is the regeneration control, and S_1 is the speaker-headphone selector switch.

Transmitter

The transmitter circuit is shown in Figure 2. The variable-frequency-oscillator stage uses an RCA-6AU6 in a Clapp circuit with elec-

tron-coupled output. The oscillator is tuned by the "bandset" capacitors C_{13} and C_{14} , and the "bandspread" capacitor C_{15} . The combination of C_{20} and L_4 in the plate circuit of the 6AU6 is tuned to the center of the cw portion of the 40-meter band, and covers this portion of the band without retuning.

An RCA-OA2 voltage-regulator tube is used to provide constant voltage for grid No. 2 of the 6AU6, which is the "plate" of the oscillator.

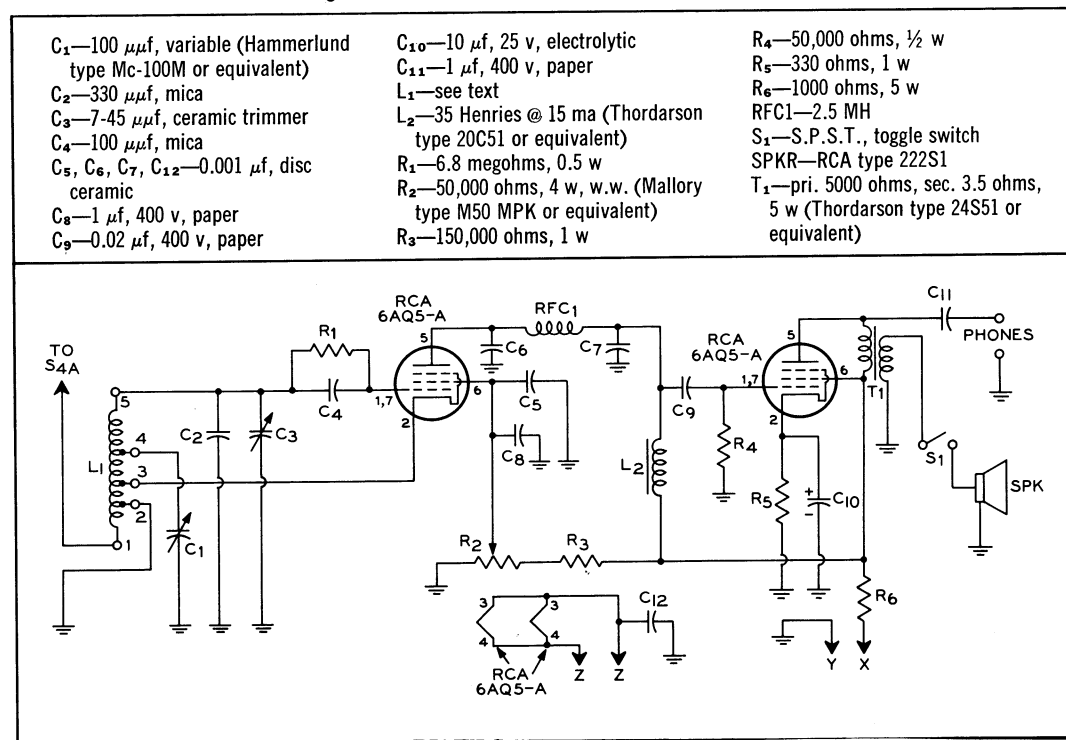
Because the RCA-5763 is a single-ended type and is operated as a "straight-through" rf amplifier, the output stage is neutralized to minimize any tendency to self-oscillation. The neutralizing circuit is extremely simple and requires no adjustments. All that is necessary is the connection shown in Figure 2 between the bottom of L_4 and pin 2 of the 5763 socket. The capacitance between pin 2, which has no internal connection, and the plate pin (pin 1) provides a feedback voltage of the proper phase and amplitude for neutralization.

The output-tank circuit of the amplifier (C_{24} , L_5 , and C_{25}) is a simplified pi network designed to provide proper loading for the 5763 when connected to the 72-ohm feeder for the 40-meter doublet antenna.

Switch S_3 is a momentary-contact push-button type which, when depressed, applies plate and screen-grid voltage to the 6AU6, permitting the oscillator to be "spotted" to the received frequency.

An NE-2, 1/25-watt neon lamp, is used as

Figure 1: Circuit of the two-tube regenerative receiver.



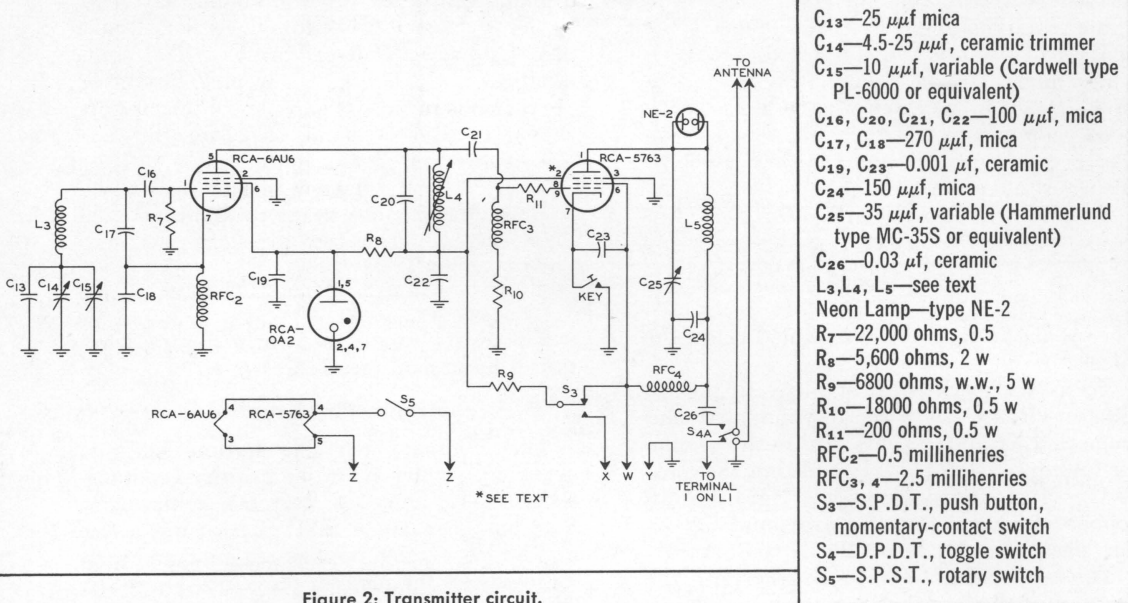


Figure 2: Transmitter circuit.

- C₁₃—25 μf mica
 C₁₄—4.5-25 μf , ceramic trimmer
 C₁₅—10 μf , variable (Cardwell type PL-6000 or equivalent)
 C₁₆, C₂₀, C₂₁, C₂₂—100 μf , mica
 C₁₇, C₁₈—270 μf , mica
 C₁₉, C₂₃—0.001 μf , ceramic
 C₂₄—150 μf , mica
 C₂₅—35 μf , variable (Hammerlund type MC-35S or equivalent)
 C₂₆—0.03 μf , ceramic
 L₃, L₄, L₅—see text
 Neon Lamp—type NE-2
 R₇—22,000 ohms, 0.5
 R₈—5,600 ohms, 2 w
 R₉—6800 ohms, w.w., 5 w
 R₁₀—18000 ohms, 0.5 w
 R₁₁—200 ohms, 0.5 w
 RFC₂—0.5 millihenries
 RFC₃, 4—2.5 millihenries
 S₃—S.P.D.T., push button, momentary-contact switch
 S₄—D.P.D.T., toggle switch
 S₅—S.P.S.T., rotary switch

a tuning and keying monitor. The leads of this lamp are soldered to the stator of C₂₅. The lamp is mounted so that its tip protrudes through a small hole in the front panel directly below the tuning knob for C₂₅.

The oscillator tank coil L₃ is a 37-turn length of B & W type 3012 Miniductor. L₄ is 23 turns of No. 20 enameled wire wound on a CTC type (LS-4) 1/2-inch diameter iron-core form. L₅ is 28 turns of No. 20 enameled wire, 1 1/4 inches in diameter and 1 1/2 inches long. L₅ may also be a B & W type MC, 40-meter coil with the link winding and 5-prong plug-in base removed, mounted on feed-through insulators.

Switch S₄ is the transmit-receive switch, and applies high voltage and the antenna lead-in to either the transmitter or receiver.

Switch S₅ is used to remove heater voltage from the transmitter tubes during long stand-by periods.

Assembling the Complete Station

The entire station was installed in a portable typewriter case approximately 12 3/4 inches square and 4 1/4 inches deep.

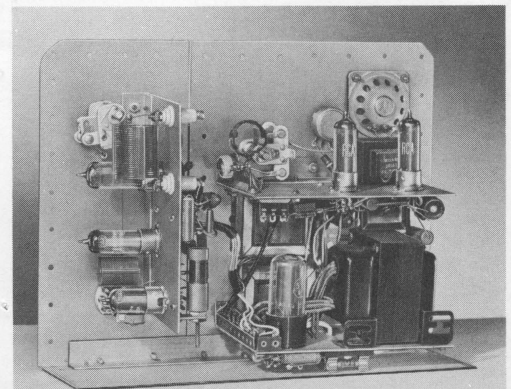
To simplify construction and maintenance, the transmitter, receiver, and common power supply were built on separate "decks" and the front panel was divided into two "operating areas," which can be individually removed. The left-hand area contains the power supply (the heaviest item) and the receiver; the right-hand area the transmitter. The panels and "decks" occupy a space about 9 1/4 inches

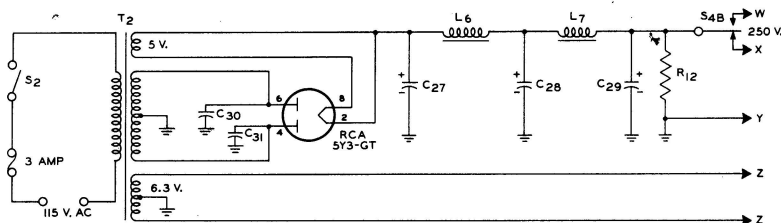
high. The 3 1/4-inch-high compartment at the bottom of the case is used to store the line-cord, key, and station log.

The front panels are supported by brackets made of 3/4-inch aluminum angle mounted on three sides of the case. These brackets are recessed about 1/8 inch so that the front panels are flush with the edges of the case. For additional rigidity, the three "decks" were made 4 1/8 inches deep so that their rear edges rest against the rear of the case. The "decks" containing the receiver and power supply are 6 3/8 inches wide, and the transmitter "deck" is 6 5/8 inches wide. A small bracket supports the power-supply "deck."

To minimize coupling between the oscillator-grid and amplifier-plate coils, these coils are mounted at opposite ends of the transmitter "deck," with their axes at right angles.

The oscillator-grid and amplifier-plate coils are mounted at opposite ends of the transmitter "deck" with their axes at right angles. The oscillator-plate coil is mounted below the "deck."





C_{27}, C_{28}, C_{29} —16 μ f, 450 v, electrolytic
 C_{30}, C_{31} —0.001 μ f, disc ceramic
 L_6, L_7 —16 Henries @ 50 ma (Stancor type C-1003 or equivalent)
 R_{12} —50,000 ohms, 5 w
 S_2 —S.P.S.T., toggle switch
 T_2 —500 v C.T. @ 70 ma., 5.0 v @ 2.0 amp, 6.3 v @ 2.5 amp (Stancor type PM-8403 or equivalent)
 Fuse—3 amp

Figure 3: Power-supply circuit.

The oscillator-plate coil is mounted below the "deck."

To assure mechanical stability in the oscillator circuit, L_3 is rigidly mounted and connected by a very short lead to the oscillator-tuning capacitor C_{15} . In addition, the rotor of C_{15} is grounded through a rigid No. 10 copper-wire connection to a ground lug on the "deck" directly below the capacitor.

The only critical point in the receiver is the position of the feedback tap (terminal 2) on L_1 . If the receiver does not regenerate smoothly, try moving this tap $\frac{1}{4}$ inch at a time. It will be found easier to solder connections to this coil if the turns on both sides of the tap points are first depressed.

The power supply, shown in Figure 3, requires no special mention.

Station Performance

This 40-meter portable station has met every one of the operating requirements initially established. The best DX achieved to date has been about 500 miles, using a low and hastily erected doublet antenna, and with 225 volts on the plate of the 5763. Thorough workouts, under a variety of operating conditions during the 1958 ARRL Field Day, summer vacations in the country, and several weekend trips, have convinced one ham family that amateur radio and family travel are not necessarily incompatible.

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.



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Harvey Slovik, Editor

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