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10-WATT HAM TRANSMITTER!**



THE SCROUNGER...

Being a 2-band ham rig you can lash up for as little as 5 clams!

By HERB FRIEDMAN, W2ZLF

REAL CHALLENGE used to be ham radio's keynote. No one in the early days ever thought of flipping through a catalog, ordering gear galore and then going on the air the same day the stuff arrived. Most everyone rolled his own in those days.

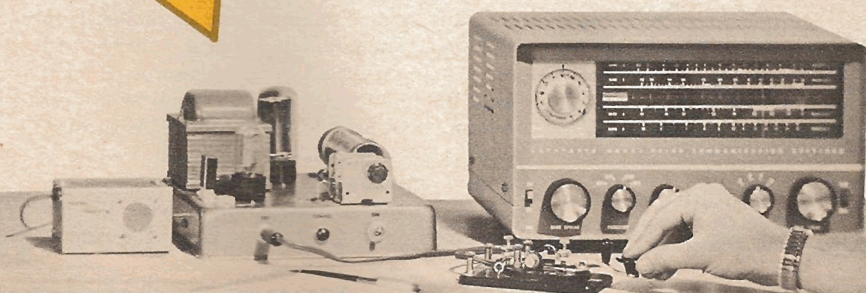
Today, this kind of fun is pretty much gone with the wind. But not quite: build EI's Scrounger, and you're in for all the thrills and satisfactions that can only come from building your own equipment. Whether you're a new General, a Novice or an old timer, the Scrounger can put real enjoyment into amateur-radio construction and operation. And what's the Scrounger? Why, a crystal-controlled 80- and 40-meter CW transmitter with an input power of up to 10 watts—more than enough to enable the sharp operator to paper his walls with QSL's.

It's designed as a junk-box project and most of the parts can be swiped from old TVs, radios or scrapped home-brew projects. If there's an electronic schlock house (surplus dealer) in the neighborhood, you probably can bargain the components for a buck or two. On the chance you don't have a junk box everything can be bought new for less than \$25.

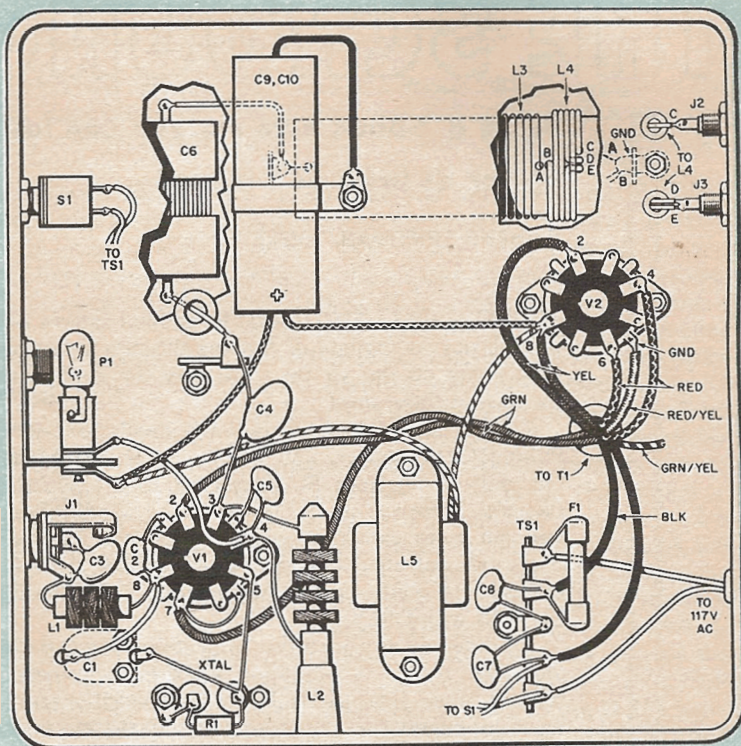
Construction. We built our Scrounger on a 9x9x2-inch cake pan. Power transformer T1 can be just about any type as long as it has a 400- to 600-volt center-tapped secondary that can deliver at least 40 ma. T1 also must have 5- and 6.3-volt secondary windings. Rectifier V2 can be most any 5-volt rectifier you've got around—a 5U4, a 5Y3 or even an old four-pin type 80.

Almost any junk-box choke will work. If you've got an old AC/DC radio, use the output-transformer primary. If there's nothing that resembles a choke, use a 100- to 200-ohm ten-watt resistor for L5. Similarly, C9 and C10 can be anything from 8 mf up (be sure they're rated at at least 450 V).

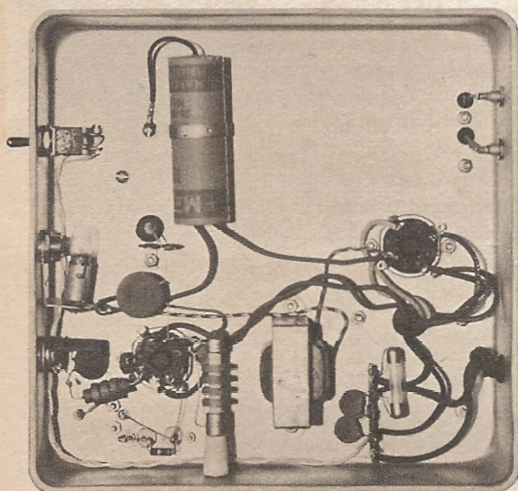
A special RF tube socket isn't needed for V1—simply use any octal socket you have handy. And, while we specify a 6V6 for V1, a 6F6 or a 6K6 also



Use a 9x9x2-inch cake pan and follow our open layout and you won't have any construction problems. Mount the power transformer last to keep it from bending the pan. We've shown the pan cut away under C6 and L3/L4 so you can see the connections. Terminal strips are used at each end of L3/L4 to support the coil about 1/4 inch above the pan and to provide a tie point at the left end and a ground point at the right end. Remember that both lugs on P1's socket are insulated from ground. Mount C1 and the crystal socket above the pan. A keying monitor, described on the last page of this story, plugs into J3 to enable you to hear your own fist when sending.



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There's so little in the Scrounger that you should be able to get it on the air in an evening—even if you spend time rummaging through a junkbox.

will work, though the input power will be lower.

Tuning capacitor C6 is the RF section (the large one) of a scrapped superhet tuning capacitor. Modify it for the transmitter by removing the trimmer screw and the trimmer-capacitor strip. RF chokes L1 and L2 (2.5 mh) can be the same type, though if you purchase these we suggest the miniature type for L1. The value of keying-adjust trimmer capacitor C1 isn't critical as long as its range is at least 7-35 mmf.

The critical parts are L3 and L4, but even here there's some leeway. Their form is a cardboard tube from a roll of bathroom tissue. Place a pencil mark about 1/2 inch from one end and a second mark 3 inches from the first. Then punch a small hole through each mark. For L3 you can use #18, #20 or #22 enameled, hookup or bell wire—just be sure it's insulated. Pull the wire through one hole from inside the form and wind 22 evenly spaced turns between the two holes. Then cement the wire in place with airplane glue or household cement. When the cement

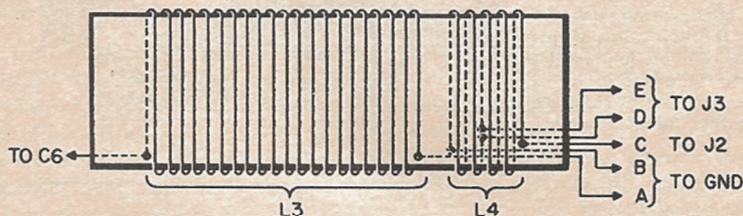
Capacitors:

- C1—7.35 mmf trimmer (Centralab 820-C or equiv.)
 C2—100 mmf, 500 V ceramic disc
 C3—.02 mf, 500 V ceramic disc
 C4—.05 mf, 1600 V ceramic disc
 C5, C7, C8—.005 mf, 500 V ceramic disc
 C6—Superhet variable capacitor (Allied 13 L 529)
 C9, C10—20/20 mf, 450 V electrolytic

PARTS LIST

- F1—1-A pigtail fuse
 J1—Phone jack
 J2, J3—Phono jack
 L1—2.5 mh RF choke (J. W. Miller 6302 or equiv.)
 L2—2.5 mh RF choke (National R-100U or equiv.)
 L3, L4—Coils (see text)
 L5—8.5-hy, 50-ma, 400-ohm choke (Allied 62 G 136 or equiv.)

- P1—40-ma, 28-V pilot lamp (G.E. 1819 or equiv.) and socket
 R1—82,000 ohm, 1/2-watt resistor
 S1—SPST toggle switch
 T1—Power transformer: 480 V c.t. @ 40 ma, 5 V @ 2A, 6.3 V @ 2 A. (Allied 61 G 427 or equiv.)
 V1—6V6GT tube V2—5U4G tube
 Misc.—80-meter crystal (Texas Crystals, Inc.)



Coil construction. All leads come through bottom of form. Leads marked A through E connect to J2, J3 and ground lug as shown in pictorial at left. We wound L4 in two steps: from ground lug to J3 (E); from J3 (D) to J2 (C).

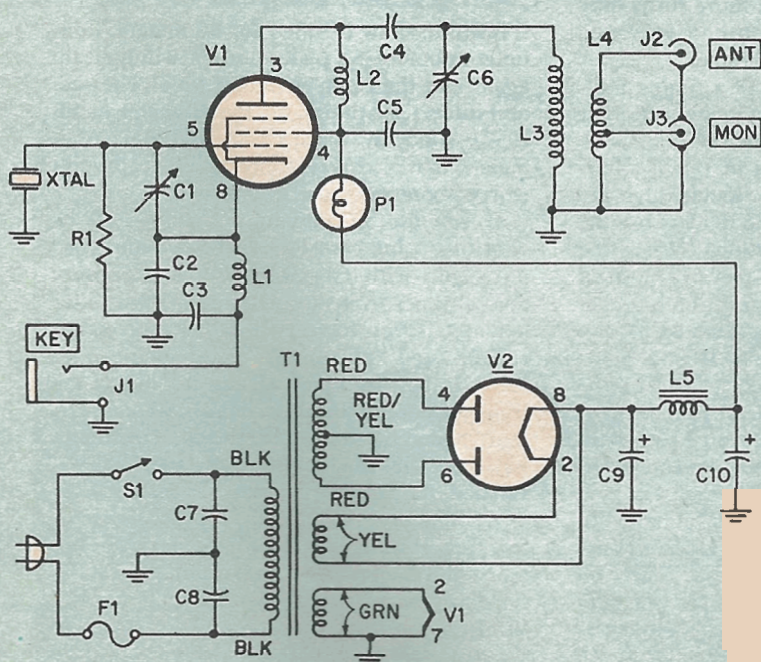
dries, you're ready for antenna coil L4.

L4's construction and location depend on how you plan to feed the Scrounger to the antenna system. If you use an antenna coupler (see 250-WATT ANTENNA TUNER, Sept. '63 EI), which we recommend, L4 should be five turns of #22 plastic insulated

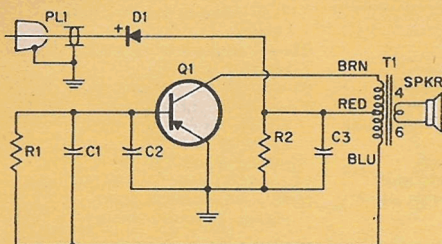
hookup wire wound *adjacent* to L3 as shown in the coil diagram.

To provide an RF sample for our keying monitor (described on the last page of this story), tap L4 at the second turn from the ground end.

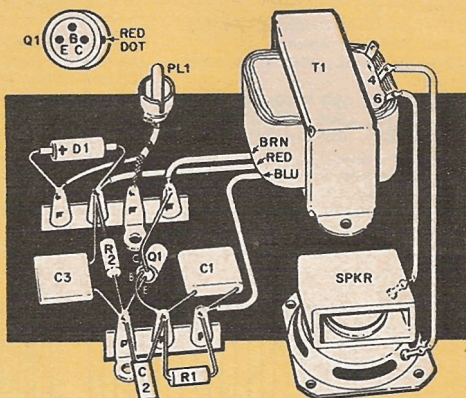
We do not recommend that the Scrounger's



V1 is a combined crystal-controlled oscillator and RF amplifier whose cathode, control grid and screen grid (the oscillator plate) function as the oscillator. Since the screen is at electrical ground it effectively shields the oscillator from the plate circuit and antenna loading effects. We recommend an antenna coupler for long-wire or random-length antennas. A dipole can be connected directly to J2 but you will have to experiment with L4 to obtain maximum loading. For 72-ohm feedlines, L4 should be five to eight turns. For 300-ohm feedlines, L4 should be anywhere from eight to twelve turns. Remember, if you use an antenna coupler, wind L4 adjacent to L3 as shown in the diagram above.



This keying monitor will let you hear your fist. It fits in a 2¼x2¼x4-inch Minibox and is shown next to the Scrounger on the first page of this story. Transmitter must be loaded for monitor to work properly. If tone is garbled, try a .1 or .05 mf capacitor for C3. If tone is shrill, parallel C3 with another .25 mf capacitor.



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output at J2 be fed into an antenna directly, since the overall efficiency will be low. If you don't have or don't want to build an antenna coupler, close-wind L4 (five turns of #22 plastic-insulated hookup wire) over L3, starting at L3's grounded end. L4's ground connection must be the end closer to the center of L3. If the transmitter doesn't load properly, increase the number of L4's turns—anywhere from two to eight more turns may be required. However, if you find you need as many as 12 turns, use a coupler.

P1 is both a pilot light and a tuning indicator so don't change its circuit connection or substitute a different bulb for the one specified. Since P1 is connected in the B+ circuit, make certain both its socket lugs are insulated from ground (some holders use the frame for a ground connection). When the wiring is completed, double-check for a short by measuring the resistance from both socket lugs to ground. The resistance should be several hundred thousand ohms. If you get a reading of only a few ohms, get rid of the short before you turn the power on.

Tune-up. Whether or not you use an antenna coupler, an antenna must be connected during tune-up.

An 80-meter crystal is used for both 80- and 40-meter operation. Plug in the crystal and set C6's plates to full-mesh. Turn on power and allow a minute or so for warmup. P1 lights when the key is closed. Hold the key down, and slowly open C6's plates until P1 dims, indicating plate current dip. The

KEYING MONITOR PARTS LIST

- C1, C3—.25 mf, 15 V or higher, capacitor
- C2—.005 mf, 15 V or higher capacitor
- D1—1N34 or 1N54 diode
- PL1—Phono plug
- R1—22,000-ohm, ½-watt resistor
- R2—27,000-ohm, ½-watt resistor
- SPKR.—1½-inch, 10-ohm speaker (Lafayette SK-61)
- T1—Universal output transformer, Lafayette TR-12 (do not substitute).
- Misc.—2¼x2¼x4-inch Minibox, terminal strips, RG58/U coaxial cable

transmitter now is tuned for 80 meters. Continue to open C5's plates and P1 will light up again and then dim a second time. The second dip is C6's tuning for the 40-meter band. If P1 suddenly flashes as you tune C6, it means that C1 is not set correctly—don't worry about this now.

If you use an antenna coupler adjust its controls to increase P1's brilliance and then dip again with C6. Repeat this procedure several times to insure maximum transmitter loading. If you have an 0-100 ma. meter it can be used as a more precise tuning indicator. Plug it into jack J1 and it will key the transmitter and indicate V1's cathode current. Tuned but unloaded, the current should be about 33 ma. (with a B+ of 250V). Loaded, the current is nearly 40 ma.

Another way to tune up the Scrounger is to place a field strength meter near the antenna and then tune for maximum indication. C1 must be adjusted now for best keying. While monitoring the Scrounger's signal in your receiver, adjust C1 for a clean and sharp

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Calibrated Bandsread for CB

Continued from page 30

corresponds to CB channel 23. Similarly, plug in other crystals to calibrate the bandsread dial for all CB channels. Make another adjustment to C11 while receiving a station in the middle of the Citizens Band—channels 9 through 12.

To listen to CB after the receiver has been used to tune other bands, merely set the receiver's main-tuning pointer to the point jotted down previously. Zero on the bandsread dial again will correspond to channel 1. After tuning in a CB station, peak the signal with C1. Any station that sounds strong but distorted probably is overloading the SW receiver. This is cured through reducing the gain by backing off R1.

Troubleshooting. If wiring is correct but the preamp doesn't work, the problem may be caused by small differences in wiring layout which may have affected the tuned circuits. If adjustment of C1 does not help matters, try reducing the number of turns on L2. To do this solder a short piece of bare wire to one end of L2 and wedge it between successive turns, shorting out one turn at a time. Adjust C1 throughout its range during each trial until the preamp works.

The same technique should be used for coil L4 if the oscillator fails to operate. Coil L3 is adjusted the same way.

CB Corner

Continued from page 64

this is the width of just one sideband. Conventional rigs create two identical sidebands, and a 2-kc tone doubles out to 4 kc in transmission.

Just how much bandwidth you can occupy is stated in FCC rules; they allow an 8-kc spread (4 kc above and below the carrier). Say a word like "sassafras" and those "s" sounds may hit close to 4 kc, then fatten out nearly to the 8-kc limit.

Now run a single-sideband rig onto the channel. Since it rams everything into one sideband, a gaping hole some 4-kc wide exists on the channel. Another sideband station can slide into that unused pocket and jabber away with no interference. **Result:** two SSB rigs can share, say Channel 7, at the same time.

Such split-channel operation requires that

one transmitter be on upper sideband, the other on lower. Happily, the new Mark rig provides a sideband selector switch to give the operator a choice. Equipped with five transmit crystals, the rig therefore can work ten of the split-level channels.

This kind of wizardry comes at a price, of course. The SSB-27 hits you for just under \$300 and contains circuits considerably more complex than usual gear. Some 17 tubes, nine diodes, crystals inside ovens and special filters make the unit an elaborate (yet surprisingly compact) package. But with it, the CBer enters the other-world of SSB—replete with socko signals and twice as many channels.

The Scrounger

Continued from page 54

tone, not a wheep-wheep. It's best to use your receiver, rather than the keying monitor, for C1's adjustment. And speaking of the keying monitor, since it was designed specifically for the Scrounger, don't try to use it with another transmitter.

If you don't want to use an antenna coupler, a simple 80-meter dipole (that can be plugged directly into J2) can be made by connecting two 62½-ft. long pieces of wire from each side of a glass insulator to two supports (use insulators at each end). The feedline to the transmitter from the center insulator should be 72-ohm twinlead.

Stereo FM Receiver

Continued from page 71

This causes diode action in the multiplex adaptor's input tube, which loaded down the ratio detector (to which the multiplex adaptor is always connected). This was the cause of the high distortion. EICO has prepared an addenda sheet modifying the circuit to keep the B+ on when the mode switch is in the mono FM mode. We suggest you obtain a copy of this correction sheet before starting your kit, or to modify earlier models. After these changes were incorporated in our unit, performance improved significantly and the 2536 met or exceeded the claimed specs. Performance of the amplifier section of the 2536 is quite good and essentially the same as EICO claims. Specs appear in the table.

With all corrections incorporated, you'll find the 2536 a good performer.