20-Meter Vacation Converter

By P. F. EGERTON JR.

EACH year, the writer and a friend like to take a week's bachelor holiday. Two years ago, according to custom, we seized some canned goods and a battery portable, and retreated to a cabin in the Northern Woods.

We both like to listen to 20-meter dx over hot coffee in the small hours, and the battery portable just wasn't up to it. So we had an "engineering session" to design a converter with a minimum of batteries and a maximum of performance.

The results obtained with the 20-meter converter we built were so gratifying that we felt it would interest other readers of RADIO-ELECTRONICS.

Two miniature tubes are used. A 1R5 serves as regenerative mixer, while a 1U5 functions as the local oscillator. These tubes work well on a single 45-volt B-battery.

The converter output is at 1500-1600-kc, which, with the controlled regeneration, makes images almost nonexistent.

Most of the credit for successful operation of this circuit goes to the output coil L5 and its padding capacitor C1. This coil determines the output frequency of the converter. C1 is a dual trimmer from an old i.f. transformer; the two sections in parallel total 440 μf. This combination makes a high-C circuit which keeps the converter stable.

The layout of parts may be seen in the photos. The extra-deep chassis (5x7x3½ inches) serves two purposes. It allows a symmetrical control arrangement on the front panel, and also keeps the batteries in place when the whole outfit is in the cabinet.

Short leads are essential, especially on grids and plates. Do not trust the chassis as a ground. Join ground points with bare hookup wire, treating the chassis as though it were made of a nonconductor.

When wiring is completed, check carefully. Connect batteries, antenna, and the output cable, which should be attached to the aerial and ground posts of any receiver tuning the 1500-1600-kc range.

Rotate the mixer capacitor C2 with the regeneration control full on, and tune the broadcast receiver to find the converter output frequency. The converter output will appear as a series of "plops" or a hissing sound.

Adjust C1 so that the "plops" come in at some clear spot between 1500 and 1600 kc.

All tuning is now done with the converter controls. Back off the regeneration control until the mixer stops oscillating. If this does not occur at half scale, two adjustments are provided. The antenna capacitor may be varied, or the number of turns varied on L2. However, the latter should not be necessary. Best results will probably be obtained with C3 set at maximum.

The regeneration control does not have to be touched for locals. It is, however, very useful when fishing for weak stations or separating signals on crowded bands.

The rest of the controls are used as in any shortwave superhet.

The converter was tried in our cabin, which is surrounded by tall trees. The aerial was 20 feet of wire up in the rafters. A four-tube battery superheterodyne completed the setup. Amateurs on 20 meters in Hawaii, England, and Australia, just to mention a few, were heard at speaker volume.

We don't want to brag—but we have used the outfit at home too, and the batteries are dying of shelf life!

The writer would like to acknowledge the assistance of E. L. Houston, Jr., who was the "associate engineer," and the photography contributed by Don Mowat.

20-METER COIL TABLE

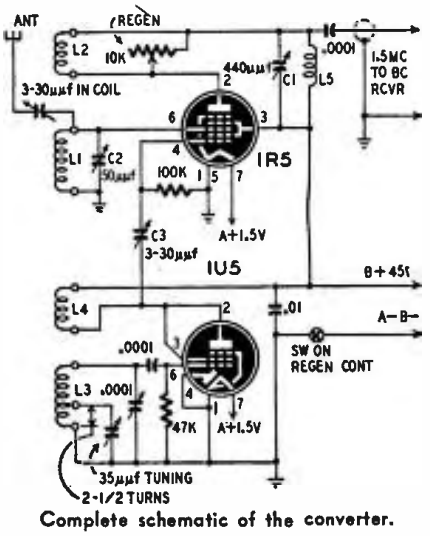
Coil	*Turns*	*Wire (AWG)*	*Spacing*
L1	5	24 enam.	close
L2	4	24 enam.	close
L3	7	18 bare	1 inch
L4	4	24 enam.	close
L5	80	30 enam.	close

L2 wound ⅛ inch below L1, with 3-30-μμf trimmer inside form. L3 tapped 2½ turns from ground end. L4 wound ¼ inch below L3. All coils on 1½-inch-diameter plug-in forms except L5, which is wound on ½-inch-diameter polystyrene rod.

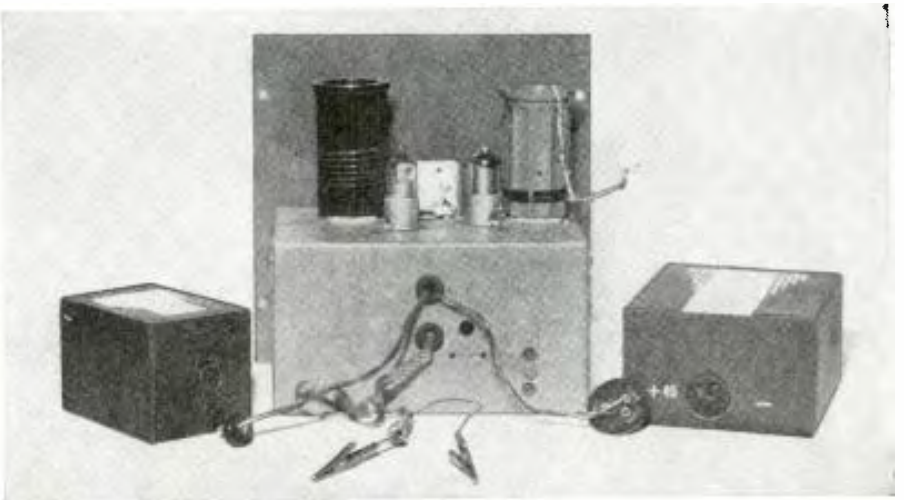
The batteries fit into the converter's case.

MATERIALS FOR CONVERTER

Resistors: 1—47,000, 1—100,000 ohms, ½ watt; 1—10,000-ohm linear potentiometer with switch.
Capacitors: 1—100 μμf, mica; 1—.01 μf, 200 volts, paper; 2—3-30-μμf mica trimmer; 2—220-μμf trimmers from old i.f. transformer; 1—35, 1—50, 1—100 μμf, air variable.
Tubes: 1—1R5, 1—1U5.
Batteries: 1—1.5-volt A, 1—45-volt B.
Miscellaneous: 2—7-prong miniature tube sockets; 2—1½-inch coil forms (plug-in) and sockets; 1—5 x 7 x 3½-inch chassis and cabinet; necessary knobs, dials, and hardware



Complete schematic of the converter.



Extra-deep chassis allows symmetrical control placement and keeps the batteries in place.