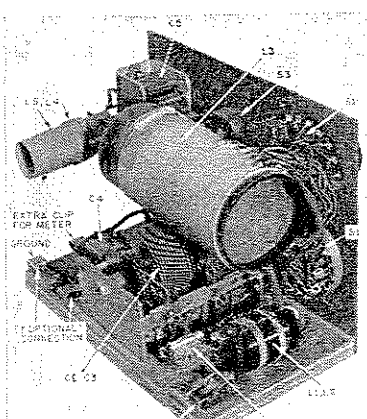
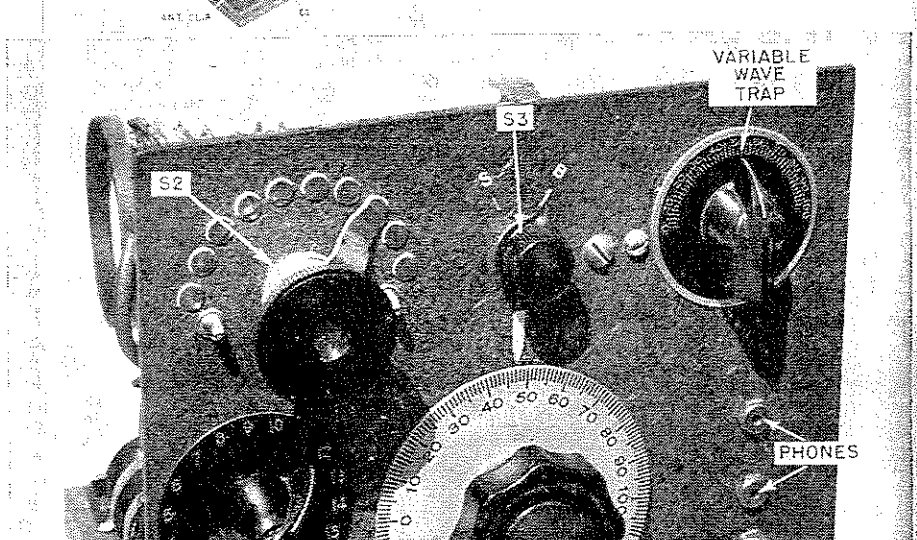
DX CRYSTAL RADIO RECEIVER



By JOSEPH AMAROSE



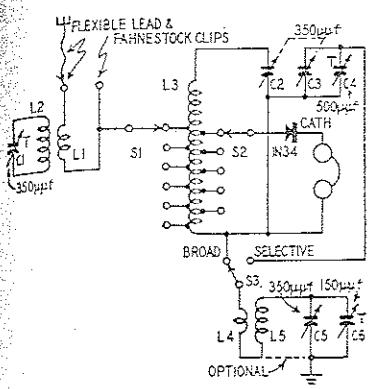
CRYSTAL radio fans follow a pattern. They search everlastingly for a newer, better circuit that will excel their previous best effort. They want better volume, greater selectivity, higher sensitivity. Everlastingly, too, they must compromise, for no such optimum state can be achieved. Occasionally, an experimenter does find a circuit that is outstanding. Such is the hookup shown. No novelty is claimed, however; basically the circuit is old—only a few embellishments have been added. Nor must the reader expect that this receiver combines all the desired characteristics. What the writer (who has spent some 30 years testing and building the latest crystal "super-doopers") does promise is an unusual, versatile receiver that has consistently given fine results.

All last winter (in Virginia) this receiver tuned in stations from Canada to Cuba and from the Atlantic to the state of Utah, sometimes as early as 8 pm. Transmitters in Atlanta, Louisville, Chicago, Detroit, New York, New Orleans and Cleveland were most frequently logged. Even on the hottest summer nights, dx came in with impressive regularity.

No less impressive is the selectivity of this rig. All six of the Richmond locals are received clearly with no annoying hash or cross-talk. And three of these stations are only 40 kc apart! Worse still, one is a weak sister between two strong ones. Yet this set gets all with ease. With proper co-ordination of controls all locals (from 910 to 1480 kc) can be tuned in with just the one main tuning dial. Tested in Baltimore by M. M. Schuman, another old-timer (who built this set), the receiver tuned in all eight locals clearly there, plus the more distant WTOP in Washington, D. C.

Volume on the locals is high. Richmond's WRNL, 5,000-watt transmitter, *five miles away, operates a magnetic speaker loud enough to be heard clearly 15 feet from the reproducer.* It doesn't shake the rafters but every word of speech is intelligible at that distance.

How are these results achieved? First and foremost, for good dx, the antenna system should be of the best. A 125-foot aerial was used, 31 feet high, with the lead-in taken from the far end; this proved better than the usual "L" type. Total antenna wire to the set was 260 feet. Shorter aerials are O.K., *if high.* The fixed antenna wave trap, L1, L2 and C1, is to be used only when two strong stations interfere. Set C1 so it confines the most troublesome station. For dx work, eliminate this trap entirely! Sensitivity is higher.



PARTS LIST

C1—350-μμf trimmer.
C2, C3—2-gang 350-μμf variable capacitors.
C4—500-μμf trimmer.
C5—350-μμf variable capacitor.
C6—150-μμf trimmer.
S1—17-point switch.
S2—10-point switch, or 10 switch points and lever.
S3—S.p.d.t. panel switch.
Other materials needed are coils as given in the table, a crystal, a pair of sensitive phones and the necessary panel, breadboard, hardware, etc.

The main tuning coil, L3, is an MRL (Modern Radio Laboratories, 1131 Valota Drive, Redwood City, Calif.) "low-loss" type. The constructor can make his own by winding 90 turns of No. 22 double-cotton-covered wire on a 2-inch plastic coil form 4 inches long (actual winding is 3 inches). Brush on a layer of very thin coil cement to make it stick to the coil and tap both antenna and secondary sides. Tap the antenna side every three turns from the 3rd to the 51st, and tap the secondary every five turns from the 5th to the 50th. Lift the turns with an ice pick to solder.

A standard 2-gang capacitor is used for C2 and C3, with a 500-μμf trimmer across the second section, for band-spreading on high frequency end. Adjust this trimmer, C4, for best volume on a 1000 kc station.

Switch 1 selects the proper antenna primary-coil tap. Switch 2 is used to match the impedance of the crystal. Tune in all locals, select the setting that gives best selectivity with good volume, and *leave set.* From ground end switch 3 provides a choice between peak sensitivity and high selectivity.

In the variable trap, L4, L5 and C5, a Carron S-645 coil is used. The primary, secondary and variable capacitor are series hooked. An "optional connection" is shown. If used, it makes a conventional wave trap of the section. Not used, another tunable circuit is provided, acting like a series-tuned loading coil and capacitor. With this arrangement, tuning is better.

The ground for this set was the pipe in a well. This makes the best possible ground connection; a signal meter showed almost twice as much signal strength as with other grounds. The urban dweller should use *cold water* pipes, with the wire attached close to the earth. Additional grounds also boost signal strength and are recommended.

Operating the set

The settings obviously will differ in each locality, depending upon the frequencies employed by the local transmitters. Individual experiment is necessary to determine optimum settings of controls. Generally, for dx work, eliminate the antenna wave trap, throw S3 to the BROAD position, and do not make the "optional connection." For best selectivity, use the antenna wave trap, move S3 to the SELECTIVE position, and hook up the OPTIONAL CONNECTION. With the connection closed, tune the trimmer C6 to loudest volume on a 1000-kc station. This completes all adjustments on this set.

In constructing the receiver, it is important to position both wave-trap coils as far as possible from the main tuning coil. The selectivity will be poor if their magnetic fields are allowed to affect each other.

A word about "signal meters." The serious dx fan will do well to consider using a sensitive microammeter across the phone posts, to determine peak signal strength. All the unusual results achieved by this receiver are due to the use of such a meter. Many months were spent making changes until the present circuit arrangement was arrived at; more time was spent in determining the best aerial and ground arrangements. All the optimum conditions were quickly revealed by the meter readings. By the cut-and-try aural method usually used, optimum conditions could not be very readily determined. These meters are still available at prices under $10 in surplus houses. A 200-microampere instrument is ideal. Especially useful is this device in picking out the most sensitive detector; some crystals give twice as much output as others, and a meter can spot your best one in an instant. For weak stations and dx work, this is most important. The value of such an instrument in helping to get distance cannot be overemphasized.

Finally, super-efficient as the aforementioned receiver might be, no extravagant claim is made for it. All the writer can say is, that, of the large crop of radios tested through the years, this one stands head and shoulders above the crowd. Made according to specifications, it should provide the hobbyist with no end of pleasure and entertainment.

COIL TABLE

L1—25 turns No. 30 enameled wire wound over L2.
L2—125 turns No. 30 enameled wire on 1-inch form.
(A low-impedance antenna coil will work well here. The constructor used a Carron S-645.)
L3—90 turns double-cotton-covered wire close-wound on 2-inch coil form.
L4—Low impedance primary of Carron S-645