

October

# SHORT WAVE CRAFT

Edited by  
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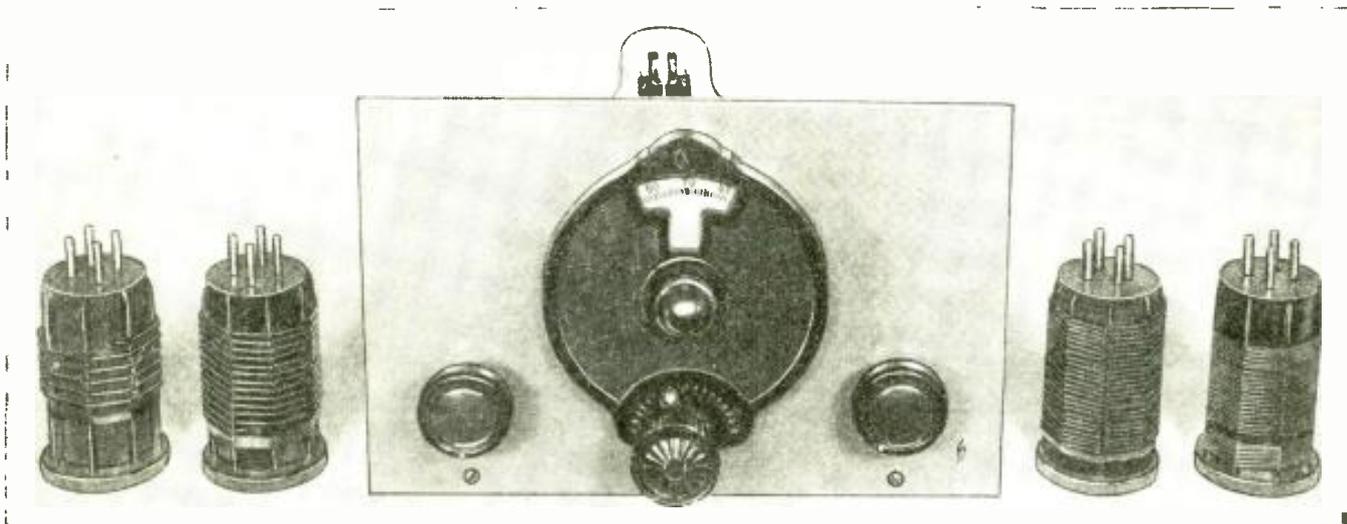
The 1 Tube  
**MINIDYNE**  
SUPER-REGENERATOR

See Page 338

*No Aerial!*  
*No Ground!*



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Here we have a front view of the 1-tube "Twinplex" receiver developed by Mr. Worcester. 1 tube does the work of 2!

# The "53" 1-Tube TWINPLEX

\$20.00 July Prize Winner

By J. A. WORCESTER, Jr.

Here's a 1-tube receiver that actually works like a 2-tube receiver, and as Mr. Worcester points out probably the most popular short-wave receiver for phone reception is the "2-tuber"—comprising a regenerative detector and a single audio amplifier stage. By taking advantage of the new type "53" tube, which really comprises 2 tubes in one, the author was enabled to evolve the "Twinplex" circuit, so that a single tube is made to operate jointly as a detector and also as an A.F. amplifier! Both CW and phone reception are afforded.



pentode without the latter's disadvantages of wiring complications and heavy plate current drain, which makes the use of an output coupling device practically a necessity if possible damage to the headphones is to be avoided. The heater-cathode construction effectively reduces hum and obviates the necessity of employing a center-tapped resistor with its consequent wiring complications.

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● IT can be stated, without possible fear of contradiction, that the most popular short-wave receiver from the constructor's standpoint, at the present time, is a two tube affair consisting of a regenerative detector and one-stage audio amplifier. It is, of course, true that many home built receivers also include a stage of radio frequency amplification, either of the tuned or aperiodic variety, and possibly an additional stage of audio frequency amplification, as well; to provide sufficient volume for loudspeaker operation under favorable conditions. However, those fortunate enough to afford these more complicated receivers generally prefer to purchase one of the many excellent commercial receivers employing such circuits rather than to undertake the construction themselves; as the savings that can be effected thereby are generally not sufficient to justify such a procedure.

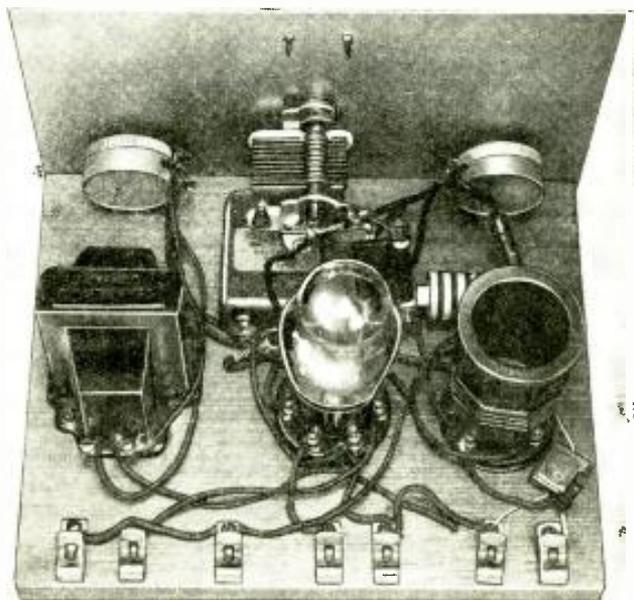
The average prospective constructors, becoming interested in short wave reception for the first time prefers as simple a receiver as possible consistent with satisfactory results. A one tube receiver is undoubtedly the ideal solution but unfortunately such a receiver of the conventional regenerative variety will not produce sufficient volume for satisfactory headphone reception. The writer has been interested for some time in designing a one tube receiver which would retain all the essential features of the conventional two tube

receiver and at the same time produce the simplification in wiring and apparatus effected by the single tube construction.

### New 53 Tube Employed

The schematic wiring diagram of such a receiver is shown in Fig. 1. The tube employed is the new 53 which really consists of two tubes in one. This tube was designed as a Class B Twin amplifier but due to the comparatively large static plate current drawn, it can be readily adapted to detection and Class A amplification.

As an audio frequency amplifier this tube is very effective since its amplification factor is about 35. This permits an amplification approximating that of a



Looking at the back of the 1-tube "Twinplex," in which a single 53 type tube performs as both detector and A.F. amplifier.



## The "53" 1-Tube Twinplex

(Continued from page 332)

### Detector Action Strong

The use of this tube as a detector results in a substantially greater output than is possible from the usual low- $\mu$  triode, while maintaining the desirable characteristics of this type of regenerative detector; namely stable and foolproof operation and simplified construction. As is well known, a screen-grid detector is often rather tricky in operation, especially when regeneration is controlled by screen-grid voltage variation, which often proves somewhat confusing to a beginner.

Regeneration is controlled by varying the plate voltage by means of a 25,000 ohm potentiometer. Independent volume control is provided by a 200,000 ohm potentiometer across the audio frequency transformer secondary as the volume often becomes too great for comfortable headphone reception particularly on strong amateur and 49 meter broadcasting stations.

The tuning condenser has a capacity of 140 mmf. and is employed in conjunction with a set of short wave octo coils.

### Plate Supply from Batteries or "B" Eliminator

It will be noted that a plate potential of 180 volts is required and this may be obtained either from dry batteries or a well filtered "B" supply. The heaters require 2½ volts A.C. which may be obtained from a suitable step down transformer.

The general layout of the various parts can be noted from the photographs. It will be seen that an aluminum panel is employed in conjunction with a wood baseboard. The panel is 6"x9"x1/16" and the baseboard 7"x9"x¼". The variable condenser along with the two potentiometers are mounted on the front panel while the remaining apparatus is mounted to the baseboard. External connections are made by means of Fahnestock clips mounted at the rear of the baseboard.

The antenna compensating condenser is made by connecting a piece of bus-bar wire to the antenna clip and bending upright as shown. The other electrode consists of about 15 turns of hook-up wire coiled around the bus bar. Adjustment is effected by moving the coil off of the wire until the desired coupling is obtained. For this reason, it is desirable not to wind the hook-up wire too tightly around the bus-bar or it will not be possible to slide the coil conveniently. The adjustment of this condenser is not critical and for normal operation can be left "all in." When "dead spots" produced by antenna absorption are encountered the coil can be moved off the busbar until the dead area is reduced to one or two dial divisions. As this results in decreased input it is advisable to increase this capacity when the "dead spot" area has been passed.

When wiring the set it is absolutely essential to ground one of the heater lines, as shown, if satisfactory operation is to be obtained.

### Operation and Results Obtained

In operation, the set is exactly the same as the conventional two tube regenerative receiver and consequently it will not be necessary to go into detail regarding same. The results obtained during a week of testing have been exceedingly good. The foreign stations received during this period include EAQ, GSB, GSA, DJC, HKD and OXY. No listening was done during the daytime which accounts for the absence of 25 meter stations. The receiver is also very satisfactory for C.W. reception.

### Parts Required

- C<sub>1</sub>—See text
- C<sub>2</sub>—Hammarlund "Midline" midget variable condenser—140 mmf., Type MC-140-M.
- C<sub>3</sub>—Molded mica condenser—.0001 mf.
- C<sub>4</sub>, C<sub>5</sub>—5-.5 mf. dual by-pass condenser.
- C<sub>6</sub>—.0005 mf. Molded mica condenser.
- L<sub>1</sub>, L<sub>2</sub>—Set of short-wave Octo-Coils 16-200 meter.

# THOROUGHbred

## ... the FB-7

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## NATIONAL FB-7 SHORT-WAVE RECEIVER



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## Aligning S-W Coils

(Continued from page 347)

- RFC—Hammarlund isolantite R.F. choke, 8 millihenrys, Type CH-8.
- R<sub>1</sub>—3 meg. grid-leak; Lynch (International).
- R<sub>2</sub>—400 ohm wire-wound Resistor.
- R<sub>3</sub>—200,000 ohm potentiometer (Acratest)
- R<sub>4</sub>—25,000 ohm potentiometer (Acratest)
- R<sub>5</sub>—50,000 ohm resistor, Lynch (International).
- T<sub>1</sub>—Audio frequency transformer.
- 1—Alden 4 prong socket, type 481X.
- 1—Alden 7 prong socket, Type 487.
- 7—Fahnestock clips.
- 1—Type 53 Tube.
- 1—Roll hook-up wire.
- 1—National Type "B" Velvet-Vernier dial (0-100-0).
- 1—Aluminum panel 6"x9"x1/16".
- 1—Baseboard 9"x7"x¼".
- 1—Type 53 tube; Gold Seal, Arco, Van Dyke.

Unwinding turns is not feasible as the coils do not ordinarily vary sufficiently to necessitate this, and it is difficult to remove just enough wire. To unwind half a turn or even less is not practical, because that would mean drilling new holes through which to lead the wires.

The problem is solved by moving the turns of wire on the coils, which serves the same purpose as bending the plates of the tuning condensers. The illustration shows how two turns of a coil are being slid away, so that the self-induction can be reduced by increasing the spacing between turns. The spaced turns can then be held in place by paraffin or sealing wax.