

# A Synchronized Tuned Radio Frequency Receiver Employing Donle Truphonic System of Amplification

IN designing this new six tube receiver there has been kept in mind the following important needs:

1. Absolute faithful reproduction.
2. Good and uniform sensitivity from 200-550 meters.
3. A machine that will never be obsolete through the advent of better tubes, either audio, radio or detector.
4. Economical use of batteries.
5. Simple tuning arrangement with every flexible possibility, relative to ease in tuning.
6. Freedom from extraneous noises and good selectivity at control (shielding).
7. High grade parts and a neat, pleasing appearance.

This year the most cardinal demand will be quality. Every radio periodical, every manufacturer, every engineer has quality

Up to the present there has been very little change in radio frequency amplification; namely, fixed induction between grid and plate with methods of neutralization and suppression of regeneration.

Fans have long realized that in designing primaries for R. F. transformers they were much impressed with the fact that a few turns worked best for low waves and a large number of turns for long waves. When they used large coupling, the receiver was a knockout for 450 up, but below that it squealed like a pig. Or if a few turns were used, it was found that results from 400 up were poor.

This receiver utilizes a split primary mechanically connected to the condensers, in order to give uniform amplification over the broadcast range from 200 to 550 meters. The maximum amplifi-



*Photo A. Front view of completed receiver showing tuning controls*

on his tongue tip. Many claim to have true reproduction and attempt to prove their claim by frequency output curves.

Unfortunately, frequency-output curves show very little of the true value of audio amplification, as distortion can be easily introduced at a single fundamental frequency. The truth is that for true, faithful reproduction not only a constant amplification for varied frequency is necessary, but a straight line increase in amplification must be obtained for increase in load. In other words, the load-amplification curve must be constant at given frequencies.

Donle has combined transformer and total impedance in a single stage, resulting in a division of load and absolute reproduction without loss of amplification.

Distortion may also arise in output tubes, and it is equally essential to use an output tube in the last stage. For ordinary use the UX 171 and UX 112 are ideal.

cation over the complete range of a receiver is obtained if the set is designed to operate just below the point of oscillation. The regeneration should change with the increase in capacity and wavelength, and in order to keep these two factors uniform the coupling should be varied in proportion.

The tendency to burst into oscillation is critical and the engineers have further smoothed out the circuit by using a non-inductive resistance, which chokes the regeneration in the grid circuit. Suppressors are in cartridge form so that varied degrees of sensitivity may be obtained by increasing or decreasing their value.

Shielding is also employed to prevent interstage coupling or outside electro-static or electro-magnetic pickup.

In spite of the perfection of B battery eliminators, it is essential to keep the plate currents as low as possible, as in this manner only can real quality and results be obtained. Proper C bat-

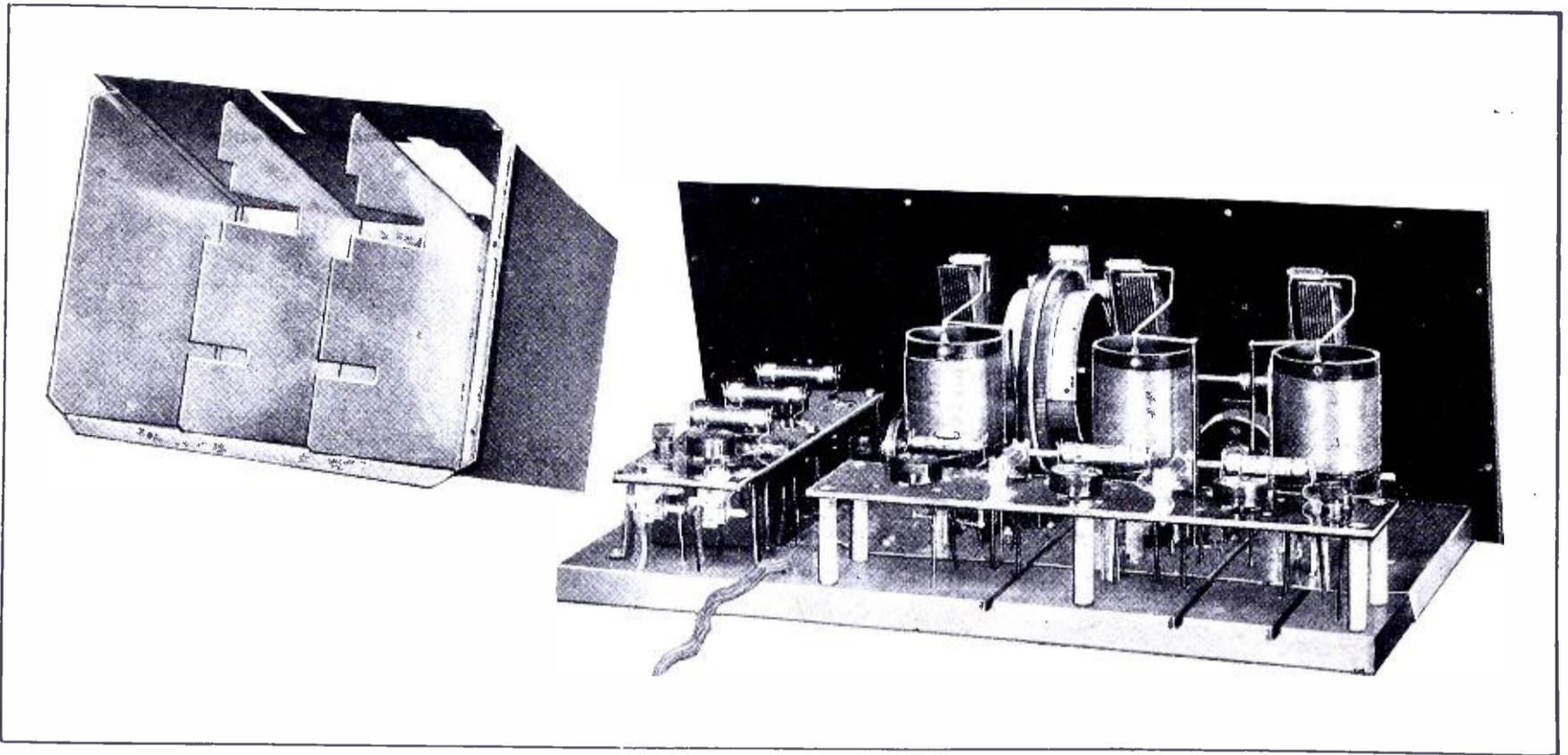


Photo B. Rear view of receiver with shield removed

tery provision and the impossibility of increasing filament emission over normal values does this for the receiver.

The modern receiver must have ease of tuning, the ability to swing from one station to another without delicate adjustments. Yet the reliable receiver must have sufficient controls to have everything at the thumbs' tips. A simple ingenious tuning arrangement is employed permitting the operator to tune as a one, two or three dial set actually at your thumbs' tips. It permits tuning or detuning at will.

Shielding is no longer a fancy, but an actual necessity in real radio receivers. Proper shielding prevents inter-stage coupling, allowing each radio stage to operate at maximum efficiency. Electro-magnetic and electro-static coupling is reduced to practically zero, with the result that the removal of the aerial kills reception immediately. The result is that in congested regions small antennas may be employed with great selectivity. Even in rural territories it is possible with the sensitivity obtained with the UX 200-A and Donle S-7 to receive on indoor and spring aerials, even over long distances. Shielding, too, cuts down local noises and permits easy adaption to A, B and C eliminators.

In localities where there is an abundance of large powerful broadcasting stations the 201-A tube will not be able to handle the output of this receiver. It is advisable to use a power output

tube in the last stage. At the time of publication of these instructions, types R. C. A. 112, 171, and Daven MU 6 tubes have been tested and found satisfactory for output tubes. In inserting these tubes into the machine be sure the proper Equalizer is inserted. Information on this will be found in the instruction book. It is to be remembered that increased C battery will be necessary with these tubes and with a higher voltage.

In rural territories, or in fact wherever long distance reception is desired where the locals are off, a very sensitive detector tube may be employed. The R. C. A. UX 200-A may be ideally employed in the six tube machine, resulting in simplified tuning and increased distance. A slight hiss accompanies the increased amplification, which is not serious.

The ideal arrangement of tubes for a receiving set near large broadcasting stations would be five 201-A tubes and one 112 tube in the output. In rural territories where distance is a prime necessity it is recommended that 201-A tubes be used in the R. F., a 200-A in the detector, a 201-A in the first two audios and a 112 in the last audio.

There are available various types of R. F. and intermediate tubes which may be employed in the six tube ElKay, provided the proper Equalizer is inserted and the proper voltages adjusted. Experimenters should only use these at their own risk and with

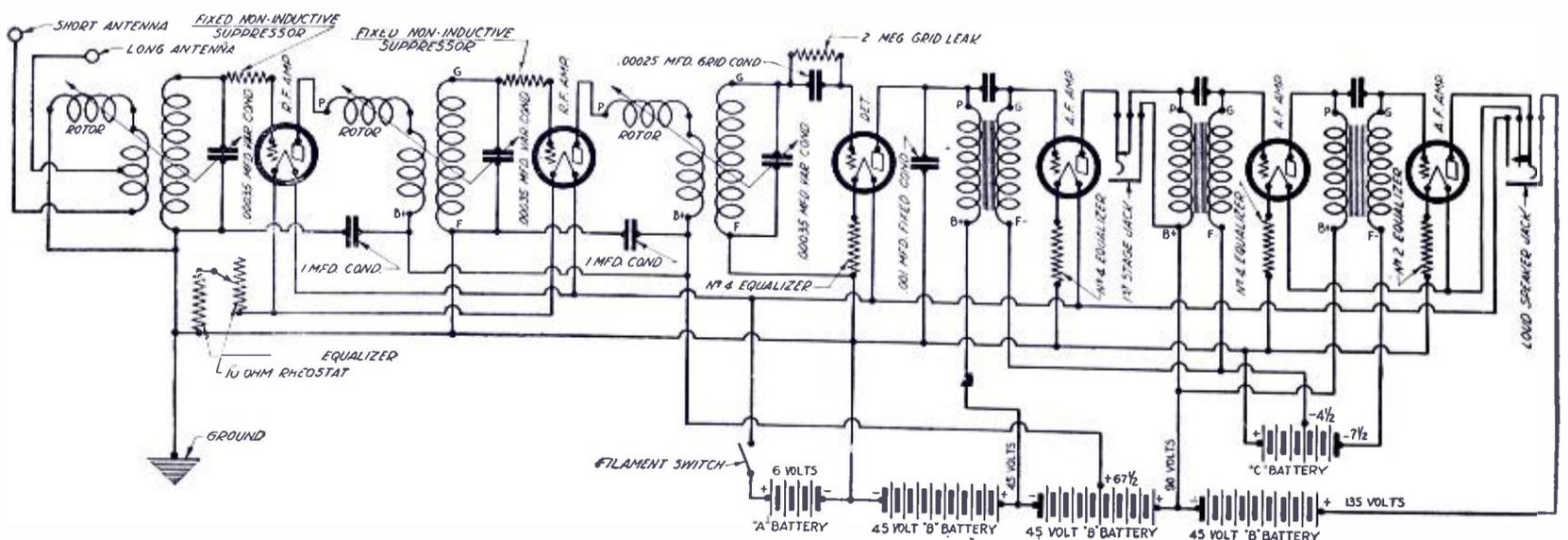


Figure 1. Schematic wiring diagram of receiver

results depending upon their ability to adjust tubes to their local condition.

Long aerials may be employed in the Super-Selector and lengths up to 150 feet may be used with increased results, provided it does not materially affect selectivity. Bear in mind that a large aerial always tends to decrease the selectivity or the ability to separate stations, but at the same time increase the volume and the ease of reception.

The machine is provided with two aerials, one marked "Short Antenna" and the other "Long Antenna." When first installing always connect the short antenna unless it is found that selectivity is lacking. Then a long antenna should be used.

In localities like New York, Chicago, Philadelphia and Boston, where there are quite a number of powerful broadcasting stations, it is desirable to keep the length of the antenna down. One of 80 feet is desirable in such congested territories.

In dealing with the aerial and ground due consideration must be given and it should be realized that the success of the six tube receiver, or in fact any receiver, rests in the proper erection of these two necessities.

The aerial and ground constitute the energy pickup system delivering the weak signals to your receiver. Unless they are carefully erected, doubtful results will always be obtained.

The standard aerial is one of 100 feet long, excluding the lead-in. It should be as high and as clear from surrounding objects as is possible to erect it. The lead-in should be brought as direct to the receiver as is possible. Always tap the aerial away from conducting or interfering objects. Lead it direct through the wall or window to the machine. Bear in mind that all connections should be soldered, for unless a good connection can be made by slipping them into clips, eventually the joint will become corroded and useless.

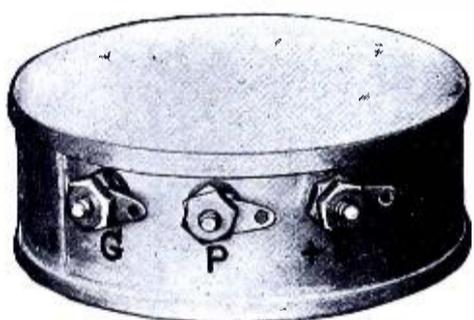
A good ground is as valuable as a good aerial. Ordinarily a water pipe or radiator which leads directly to the water system is recommended. Be sure a good ground clamp is used and that

the pipe is carefully scraped before application. A good outside ground may be also used by driving a good clean pipe into moist ground. This is to be used as a second resort.

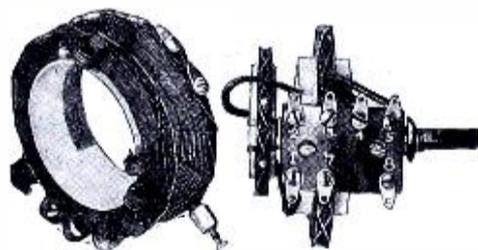
Short ground and aerial lead-ins are advocated, as these particular parts actually add resistance to the signal without material pickup.

**List of Parts**

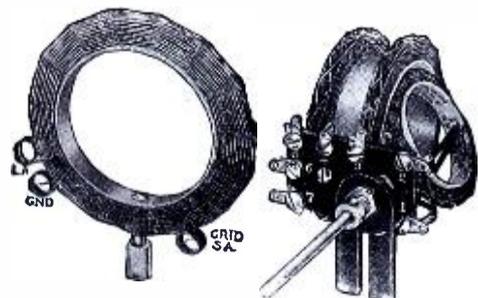
- These parts or their equivalent will give satisfactory results:
- 1—Elkay baseboard—drilled and slotted.
  - 1—Elkay special 3-compartment copper interstage shield—two pieces.
  - 1—Elkay three gange condenser and dial unit—fingertip control—complete.
  - 1—Set Elkay Syn-Auto coils (three) with shafts and pulleys.
  - 2—½ mfd. 1000 volt by-pass condensers—Dubilier.
  - 1—Elkay radio frequency unit with three spring sockets. Equalizer, suppressor and grid leak clips—mounted.
  - 1—Micamold .00025 grid condenser.
  - 1—Three stage Tru-Phonic Audio amplifier unit enbloc—Alden.
  - 1—Audio amplifier panel with three spring sockets; Equalizer clips.
  - 1—.002 by-pass mica condenser.
  - 1—No. 955 Frost gem jack—filament control.
  - 1—No. 954 Frost gem jack—closed circuit.
  - 1—Pacent rheostat, 6 ohm.
  - 1—Elkay Resistance.
  - 1—Six wire six-foot Battery cable—American Braid.
  - 5—Eby binding posts.
  - 5—Elkay Equalizers.
  - 2—Elkay Suppressors No. 700.
  - 1—Lynch three meg. grid leak—Gastor.
  - 1—Yaxley No. 20 switch.
  - 2—K. K. No. 17¼ knobs.
  - 1—Elkay panel and cabinet (optional).



No. 30 Shielded Tuned Radio Frequency Transformer .....\$2.00



No. 18A Roberts Circuit.....\$8.00 set



No. 24 Browning-Drake.....\$7.50 set

# DIAMOND-WEAVE SICKLES COILS

(TRADE-MARK REGISTERED Aug. 4, 1925)

(Patented Aug. 21, 1923)

Our No. 30 Shielded Tuned Radio Frequency Transformer is designed on entirely new scientific principle. It will tune sharply to wave lengths from 200 to 550 meters with a .00035 variable condenser. The shielding prevents intercoupling between coils, and local interference. Outside dimension of shield 3 in. diameter, 1 1/8 in. high.

Our No. 18A Coils are designed for use in all Roberts Circuits with or without reflex. They are equipped with the new center-tap NP Coil, and are provided with one whole panel mounting.

Our No. 24 Coils are carefully designed to meet all specifications of the Brown & Drake Circuit. The windings in the regenerative unit are designed to attain maximum magnetic and minimum capacity coupling.

Special Coils will be made for other circuits if desired.

**OTHER COIL PRICES**

	Set
No. 20 Craig Circuit.....	\$ 4.50
No. 19 Acme Reflex.....	4.50
No. 8 Knockout Reflex.....	4.00
No. 21 Hoyt Circuit.....	10.00
No. 25 "Aristocrat" Circuit....	8.00

Send for descriptive catalog

## THE F. W. SICKLES CO.

144 Union Street

Springfield, Mass.

Tell 'Em You Saw It in the Citizens Radio Call Book