

# A Screen-Grid Booster for the Short-Wave Receiver

## Easy Construction—Effective Results



HERE we have the booster unit adapted for attachment to the "Record" short-wave three-valve receiver or the "converter" only. It may also be used to precede any other short-wave set or adapter employing the same circuit, which is a standard one.

Roughly speaking, the booster will bring up signals to about three times their ordinary unaided volume, and thus puts a good "kick" into faint loud-speaker signals. Good performance may be expected from the booster, for it is actually a full R.F. stage, and on this account slight alterations are made in the connections in the detector stage of the receiver or converter. Quiet background is a feature of reception with the new valve, and a much greater selectivity, or sharpness of tuning will be noticed, and for this reason a high ratio Verrier dial should be employed on the R.F. stage. Get a dial that runs the same way as the condenser, and see that it is a correct fit for the condenser spindle.

The actual circuit was published on March 16, showing the R.F. and detector stages as one unit. Although the original article stated that a separate B battery should be used for the detector to avoid feed-back, this has not been found necessary on actual trial, but a 1 or 2 mfd. condenser should be placed across both the full B battery and the detector voltage if this has not already been done.

### UX222 OR S625.

WHETHER the UX222 or S625 valve is to be used, is left to the choice of the constructor, but this point should be decided at the outset, as slight differences have to be provided for, both on account of different filament voltage, and also difference of construction and arrangement of side connections. The UX222 requires a maximum voltage of 3.5 the filament, and the S625 up to 6 volts; the former takes .132 amps. and the latter .25 amps.

In the matter of B voltages, either valve works well with 90 volts on the plate and 45 on the screen grid, but the plate voltage of either may be increased to 135, though excess is well avoided for short-wave reception.

### GENERAL CONSTRUCTION.

THE construction of the baseboard, panel, and shielding is exactly as already described for the broadcast booster on June 1. The shielding is constructed of 28-gauge sheet copper, which may be tinned on one side, in which case the tinned side will be made the inside, and the outside of the cover and

tray sides finished with black cycle enamel. The panel may be either zinc or aluminium of 14's gauge, or good quality three-ply shellacked and backed by a sheet of copper with edges turned back to close the joints, exactly as is done with the tray covering the baseboard. This is attached to the three-ply with 4-in. brass screws. In the case of using ebonite, the copper back would be secured by 1-8 inch brass bolts, the countersunk heads flush with the front surface.

IN the matter of the variable condenser and coils, the constructor may exercise his own choice and discretion, a good plan being to duplicate those already in use in the receiver. The aerial or primary coil may be taken from the receiver for use, if so desired, as it is not required whilst the booster is in use. The variable coupling of the primary coil may be arranged in any convenient way, but somewhat on the lines shown will be found best, with flexible leads.

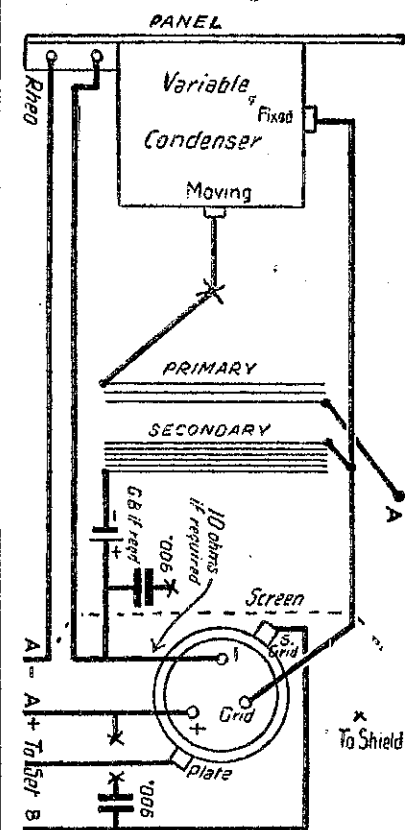
A small internal screen of copper is fitted close to the valve to reduce any possible interaction from the secondary coil. The position of the valve should be well back, about one inch from the shield, and the holder must be raised on a 1 inch block of wood. Valve holders should never be fastened down direct upon shielding without at least a sheet of mica intervening, because in some patterns the valve prongs may touch the shielding, causing a "short," and burning out the valve filament.

IT should be noted that to connect up coils so that they will work correctly without altering the leads, the end of the aerial coil that finishes towards the secondary is to be connected to the aerial, and the other end to the shield. The end of the secondary coil that is nearest to the aerial coil is connected to the grid of the valve and stator of variable condenser.

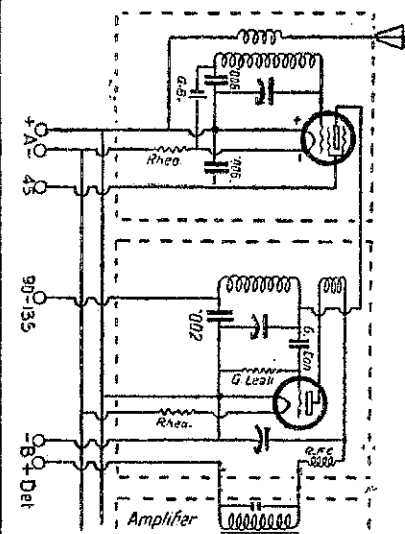
A space of at least 5½ inches will be available for the coils, dependent upon the space occupied by the variable condenser. The secondary coil should be 1½ inches from the internal screen if possible. If the constructor is making his own coils, he should arrange the plug-in connections so that leads will be in the position shown, doing away with the necessity for connection crossing to opposite sides. If the aerial coil is wound in the usual aerial direction on the former, and turned down for connecting, as shown, the best arrangement will be secured. The wire to use for coils is 18's tinned, spaced about its own thickness and secured with strips of celluloid and cement. Three or four turns for the

primary, which is permanent, and for the secondary, play-in coils according to the wavelength to be received, a set of 3, 6, 11, and 20 turns ranging from 15 to 110 metres with good overlap, tuning with a .00015 condenser.

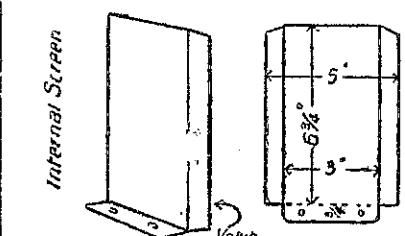
WE are using coils three inches in diameter, and the position of these must be arranged to be equidistant from the shielding in both direc-



Wiring Diagram



R.F. and Detector Stages



tions, so as the shield is 7 inches high, the coils will be two inches from both the top and baseboard, and must be centrally placed in the sideways direction.

The A battery wires can run to the receiver and be attached at any convenient point to respective leads. The negative may be connected to the corner of side of the A switch so that it is controlled thereby.

### FILAMENT VOLTAGES.

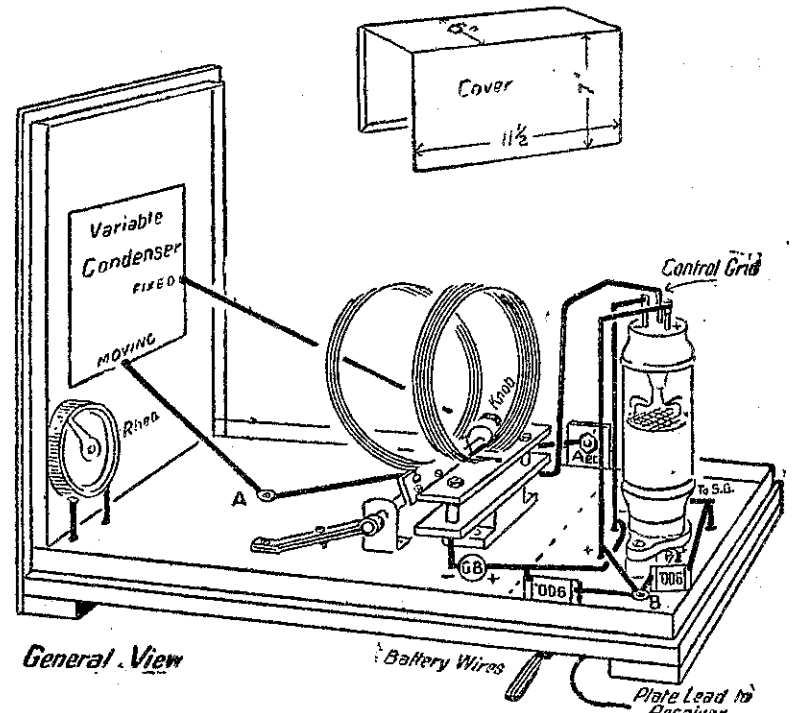
THE difference in voltage between the two types of valve is provided for in the case of working off a 6-volt battery, which is essential for the S625, by providing a 12-volt dry cell to give grid-bias on the control or ordinary grid. In the case of the UX222 a 10-ohm resistance is inserted in the negative filament lead close to the valve under the board, and as the 30-ohm rheostat is to be placed in the positive lead, the latter should run to one side of the rheostat, the other side being connected to the filament positive of valve and to the shield on baseboard. This arrangement provides grid-bias. When working off a 4-volt battery with the 222, sufficient bias will be provided by including the rheostat in the negative filament lead as shown for the S625 on six volts, omitting both grid-bias battery and 10-ohm resistance.

### CHANGES IN THE RECEIVER.

THE changes to be made in connections in the receiver are firstly, instead of the grid leak being across the grid condenser, it is removed and by a pair of clips on a strip of ebonite or other means is connected between the detector grid and detector filament positive. Secondly, a .002 fixed condenser is placed between the

earth potential end of the secondary coil and the moving plates (rotor) of the variable condenser. Thirdly, a lead is taken from the earth potential end of the secondary coil to the B battery, 90 to 135 volt tap to supply voltage to the plate of the R.F. valve. Lastly, the aerial coil is disconnected from the aerial terminal and in its place a wire is run from the aerial terminal to the grid end of secondary coil or condenser stator. This allows the plate wire from the booster to be connected to what was the aerial terminal of the receiver or adapter. These alterations look more formidable on paper than they are in actual prac-

coil are secured. A similar piece of ebonite holds two sockets, and is secured to a block of wood of such a height as to allow the lower portion of coil to be just two inches above the baseboard. Coil connections are led away from the socket fastenings. The coil is secured to the mount by celluloid cement applied to the celluloid strips holding the lower portion of the turns. If space allows, the back end of the strips may be secured to the ebonite by a 1-8 in. brass bolt. Coils should all be mounted flush with one edge of the ebonite, and can be used either way round, according to the amount of coupling required.



General View

Battery Wires

Plate Lead to Receiver

tice. The receiver can be used without the booster, still keeping the grid leak in its new position. The aerial terminal could be connected to a short flex and pin, to plug into sockets to stator and aerial coil at will. These sockets could be mounted 2 inches apart on a strip of ebonite held on a small block of wood.

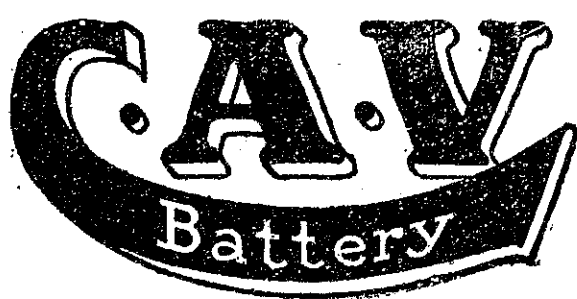
### SECONDARY COILS.

THE secondary coils are mounted upon a strip of 3-16ths ebonite 3 inches long and 1 inch wide. Holes are drilled 2 3/16 in. apart for pins, under the nuts of which the two ends of the

### THE DIAGRAMS.

A GENERAL view, not in strict proportion, for the sake of clearness, is given. From this the arrangement for varying the coil coupling will be seen. A dowel or ebonite rod is used as a spindle, bearing in brackets of brass or blocks of wood. To this spindle is screwed a piece of ebonite 2 by 1 5-8 in., and to this are bolted the two ends of the primary coil, care being taken that it is firm, and not inclined to "shiver," which remark also applies to the secondary coils. Useful particu-

(Continued Next Page.)



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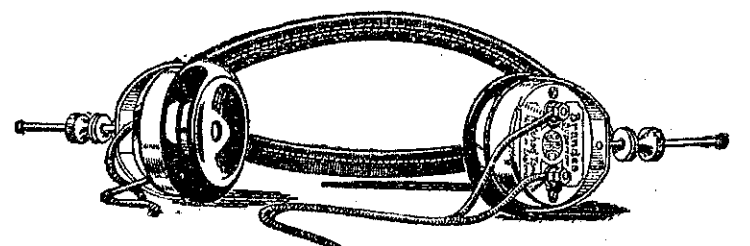
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