

The Browning-Drake Shield-Grid Booster

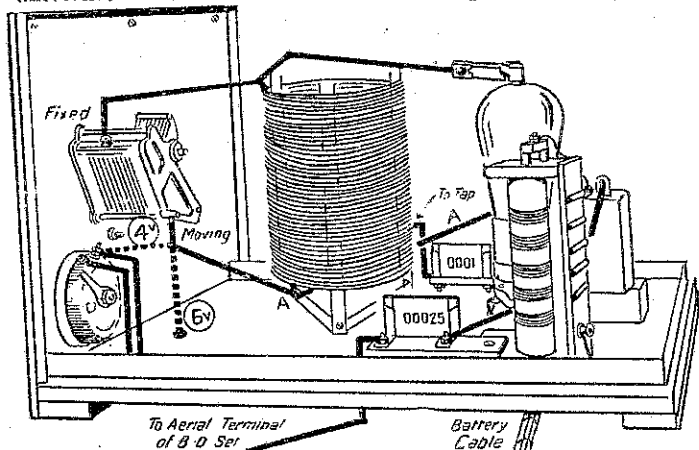
Adds High R. F. Amplification to any Receiver

By "Megohm"



HERE we have a means of adding an extra radio-frequency stage of high amplification to the four-valve Browning-Drake in particular, and in a general way to sets utilising a different type of circuit. This circuit was published in an American magazine, and the general lay-out has been altered by the writer in order to suit it for home construction. The circuit proper is just as designed by Mr. Glenn. H. Browning, with the exception that the aerial is now connected to the usual tap at the filament end of coil instead of to the top, as is usual in America. The original article claims that this unit may be attached to any receiver, the only difference being that where the circuit is not the Browning-Drake type, the connection from the booster is attached to the stator of condenser instead of to the aerial terminal. There may be a few special circuits requiring a slight difference in the mode of at-

The panel of the unit has to be specially provided for, and so long as it is of suitable metal, may be left to the taste of the constructor. In the experimental model the writer used three-ply of good quality, which was given a coat of shellac. Upon the back was attached by means of 1/4 in. brass screws, a piece of the 28's copper with the top and two side edges turned at right angles half an inch so that the end of the cover can fit inside, close the join as much as possible. Ebonite used in place of the three-ply would give a smart appearance, and the copper could be attached to the back by means of countersink headed bolts, the heads being sunk in the ebonite. No view of the front panel is given, as it only contains the rheostat and vernier dial with centre about 5 1/2 in. from lower edge. The dial is centrally placed in relation to the sides of the panel, and at the back the condenser frame is tilted down towards the aerial side, giving room for the rheostat at right of front panel.



tachment, but a little experiment on the part of the constructor will no doubt overcome any such obstacle.

THE unit as described functioned well as soon as attached to a receiver, and belied the supposed difficulties that have been written round the shield-grid valve, at least in connection with other circuits. The circuit could hardly be any simpler, and the only item new to some constructors will be the shielding, which it must be noted, is indispensable.

THE SHIELDING.

THE shielding is of 28's s.w.g. copper sheet, and constructors are referred to the article on the shielded two r.f. unit described on May 18. There they will find dimensions of the screening cover and tray upon which it stands. The cover is 11 in. long, 7 in. high, and 6 in. wide.

The baseboard, of 3-in. rimu, measures 12 by 6 1/2 in., and is clamped underneath with two one-inch strips of the same wood.

A coat of black cycle enamel puts a good finish upon the outside of the shielding. If the copper is tinned on one side, let that be the inside of both cover and tray, as it will keep bright and clean almost indefinitely.

THE CIRCUIT AND WIRING.

DIAGRAMS make the wiring and general circuit arrangements fairly clear. The radio-frequency choke shown is an experimental one, that was described in this column some time ago, the full 1000 turns being utilised. This choke consists of five sections of 40's enamelled wire of 200 turns in each section. It is quite unnecessary to construct the choke on

the lines described, and for simplicity the turns could be wound in groups of 200 on a glass test-tube, 1/4 in. in diameter, continuing the wire without a break from one group to the next. Suitable R.F. chokes can be purchased ready-made, but see that it is one suitable for broadcast wave-length, and not short-wave.

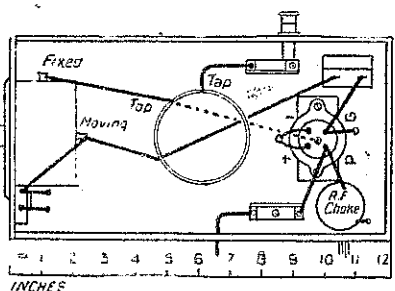
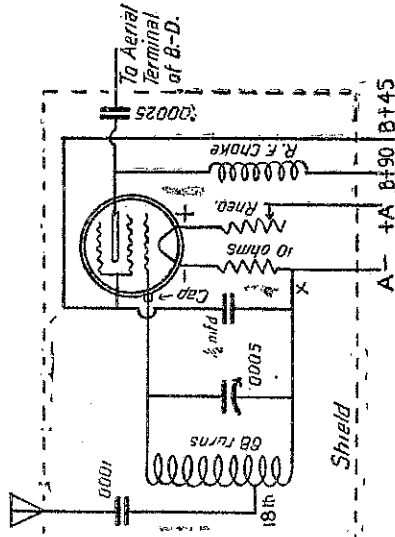
One end of the .00025 fixed condenser is connected to the plate of the valve, the other to a covered wire passing down through a hole in the base, and out to connect to the aerial terminal of the Browning-Drake receiver. This is the only connection to the receiver, the earth connection being left attached to its usual terminal. This condenser is shown as a home-built one, supported on a strip of ebonite, screwed to the base of choke, but a bought condenser can be used and supported in any convenient way.

The arrangement for the .0001 fixed condenser between the aerial terminal and tap at the 18th turn of the coil is exactly the same as used in the Browning-Drake receiver. The condenser is supported by a stiff connecting wire or strip of brass, bolted to the back of the aerial terminal, and to the strip of ebonite supporting the condenser.

The half-microfarad by-pass condenser is raised from the tray about an inch, supported on a small block of wood secured to the base by a screw. The condenser is secured to the block by bending the prongs at right angles, and holding down by means of small screws in the slots.

The ordinary control grid of the valve connects to the metal cap at the top of the bulb. This is connected to the top of the tuning coil, and stator of condenser by a wire, terminating in a small-sized battery clip, which grips the cap, making a firm connection.

THE battery leads are four in number, and should be "cabled" by binding together the wires as they



leave the unit, the A and B leads being bound together separately, where they have to divide to run to the respective batteries. Wires with different colours of covering are useful for this, otherwise each lead should be labelled at the ends.

The wires under the baseboard all run to a point under the choke coil, and from there they are bound together in cable form, outfitting the wire that connects to the receiver.

Solder all connections possible, and let wires run fairly direct from point to point, at the same time keeping a reasonable distance from other parts of the circuit.

The valve socket, UX type, may be either a Benjamin spring pattern or a solid build, and should be mounted on a small block of wood an inch high.

One side of the R.F. choke connects to plate of valve, the other goes through a hole in baseboard and joins the cable as B positive, 90 volts.

In the pictorial side view, note the wire coming from moving plates of condenser. With a six-volt A battery this connects to the end of a 10-ohm resistance away from filament, and to negative A in cable. To effect this it passes through a hole in baseboard.

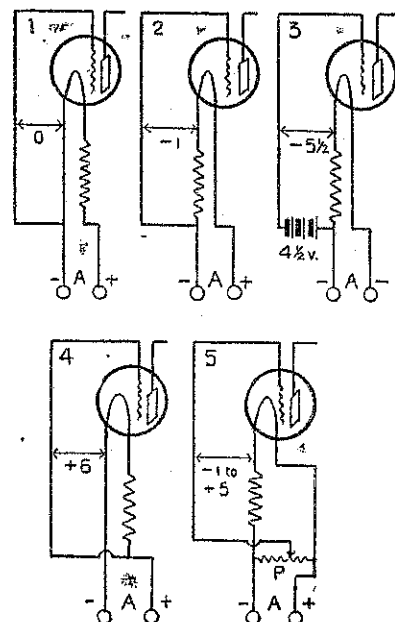
WITH a four-volt A battery the moving plates connect to the end of the rheostat away from the filament negative. These two connections are shown dotted, with the voltage, 4 or 6 marked in a circle.

The moving plates are also connected to the lower end of coil at A and the wire continues under the coil to another a, and to one side of the half-microfarad by-pass condenser.

The connection from top of coil to grid cap of valve is shown dotted on the plan.

GRID BIAS.

THE correct grid-bias for the control grid is provided without the use of a separate battery by inserting in the negative filament lead a fixed resistance of 10 ohms. This must be placed next to the negative connection to the valve socket, and may be either the wire element of a 10 ohm rheostat, or the correct amount of micromere

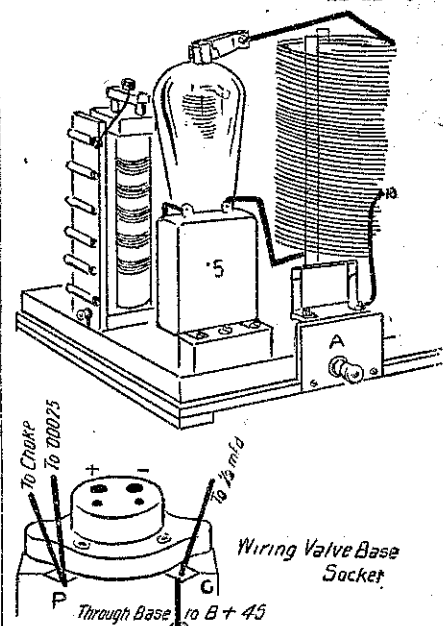


triangle of wood to act as a base. This is secured to the baseboard by a screw through the centre. Where screws have to pass through the copper tray it should be drilled through as a preliminary.

PARTS AND MATERIALS REQUIRED.

THE following is a list of requisites, not including the valve, which costs £2 2s.

Variable condenser, .0005	12	0
Vernier dial at least 10 to 1	6	6
R.F. choke	10	0
.5 m.f.d. by-pass condenser	4	6
.0001, .00025 fixed condensers	4	6
Rheostat, 30 ohms	3	0
Valve socket	2	3
Copper sheet	6	0
Clip, screws, terminal, wire, etc.	2	6
	£2	11 9



TIPS AND JOTTINGS.

VERY small values of capacity across the secondaries seriously reduce the voltage of the higher frequencies. Condensers shunted across audio transformer secondaries are almost fatal to high-quality reproduction, though they often cause the production of unnatural musical effects which are quite pleasing to many listeners.

Moving-coil Loudspeaker.

THIS type of speaker is gradually coming into use in other countries, and gives very fine reproduction. A disadvantage is that this type generally requires a much greater input than other types, and it is found necessary usually to employ either parallel valves or push-pull amplification in the output stage. The latter is considered more efficient, as it enables a big output to be obtained with a limited value of high tension.

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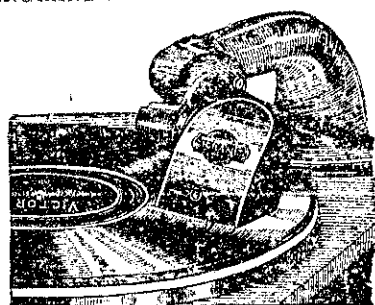
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