

A Useful Grid-Bias Unit

Gives Any Required Voltage

By "MEGOHM"



BECAUSE the grids of the valves are the most sensitive parts of a receiving circuit, the application of a bias potential giving the slightest trace of hum from alternating mains, is not permissible. The earlier the stage in the receiver, the more this applies since subsequent amplification shows up the slightest defect. It is only with grid bias for audio amplifiers that we are particularly concerned, and this article will describe an efficient unit that may be constructed and used to provide two or three bias voltages, each variable from zero to one hundred volts.

The writer feels that this unit will suit many constructors who have an eliminator in use, and wish to obtain a high-bias voltage without in any way altering the "B" eliminator or reducing its voltage, and without introducing any of the difficulties liable to be encountered in obtaining bias from the voltage drop in the eliminator resistance.

Some may question the desirability of having a separate unit with its attendant consumption of current, but as the total current taken from the mains is only from 6 to 10 watts, little consideration is required for this item.

Actually the unit is a half-wave "B" eliminator with certain alterations to adapt it for "C" supply. The difference necessary to make a "B" unit will be described so that any constructors who wish to construct an eliminator for a crystal amplifier may do so. The points common to both units will be first described, the difference, chiefly in the resistance and condenser connections, being dealt with afterwards.

It should be stated here that this unit may be incorporated in a "B" eliminator by anybody about to build one, in which case instead of the separate transformer, there would be an extra filament winding and a bias winding to give 150 volts, provided on the main transformer.

The Transformer.

THE transformer is constructed of either 1in. stalloy strips, or the equivalent stampings that have already been mentioned in these columns. For the stampings, the core is built to 1½in., and for strips to full one inch. The primary winding is of 32's s.w.g. enamelled wire, 1800 turns on the stampings, and 1850 on inch stalloy. A wooden former of the required section is to be made, not less than three inches long, and arranged to turn on a spindle with winding handle. The stampings are built to 1½in. thickness and no spool will be required.

Strips of increased thin brown paper must be cut, bare 2½in. wide. These are used between layers of wire. As a preliminary, a layer of thin card, 2½in. wide, is secured round the former and covered with adhesive tape, the edges overlapping. Now a layer of the brown paper, and the primary winding, occupying 11 layers, may be put on. Leave a space of ½in. at each end of the layer of wire, and be careful to wind the turns evenly without crossing the wires one over another. Cover the primary with a layer of paper, then a layer of tape, and another of paper.

The filament winding, of 24's, d.c.c., comes next, occupying less than one layer. If 22's is used and wound without loss of space, the 46 turns will just go in one layer. Tap at 24th turn for the centre tap—though not the centre, it will be correct for rectifying purposes. Tap at 33 turns for a 4-volt and 40 turns for a 5-volt valve. These taps will give sufficient filament heating for the emission required, and give very long life to the rectifying valve. For a "B" eliminator, add 4 turns, making the total 50, and make each filament tap 2 turns higher. Cover this winding with a layer of tape and then one of paper.

The secondary winding, of 36's, s.w.g., enamelled wire follows, and for the bias unit 1390 turns are required, giving 150 volts, of which 50 volts will be dropped in the rectifying valve and choke. For a "B" eliminator 1850 turns will be required on the secondary, giving about 150 volts when rectified and smoothed.

The clamps of this small transformer may be of wood, 1 by 3-8 on stalloy strips, but may be slightly thicker and narrower on the stampings, and placed on the two ends parallel to the centre core.

The "Listeners' Guide" gives complete details of transformer construction, and will be found handy for reference.

A fuse panel must not be omitted, and may be of fibre or ebonite, measuring about 1½ by 4 inches, supported above the transformer by a shaped piece of sheet brass screwed to the side of the clamps. The fuses for all positions may be strips of tinfoil 1-16 inch wide, or narrower on the secondary negative.

Only one fuse is required for the half-wave secondary. Its function is to save re-winding the secondary coil in case of an accidental short-circuit in that portion of the circuit before the rectifier.

Threaded screws for the clamps will be 2½in. long, or a trifle less. Twenty 3ft. lengths of 1in. stalloy will be used. Shellac the strips well before cutting up. The long piece of stalloy will be 3-3-8in. and the short 1½in. Out 128 of each.

When the winding is removed from the former, the ends are to be filled in with the black composition from the tops of old batteries or elsewhere. Melt the composition in a small seamless tin box or lid and pour on gradually, smoothing with a knife.

Bringing out leads in the most convenient positions, when possible—primaries both at one end, with all filament leads except that from the last turn. At the other end, secondary leads and "out filament." Leads must not be brought out where the core comes against the end of the coil.

The Smoothing Choke.

THE dimensions of the stalloy for the choke core are given in a diagram. With the small current traversing its windings, this choke could be made without a gap for grid-bias purposes, but not for amplifier use. For a choke with gap, there are four sizes of stalloy, one pile of each equal to the thickness of the core, in this case one inch, or 128 pieces of each size. A spool is required, with ends 2in. square, outside length, 1½in. Upon this are wound 2700 turns of 36's s.w.g. enamelled wire. Clamps are provided as for the transformer.

The radio-frequency choke consists of 1000 turns of 36's wound upon a flat spool of two circles of stout cardboard 1½in. in diameter, separated 3-16in. by a short piece sawn off an ebonite lead-in tube, or similar centre sawn from a wooden spool. This choke is shown bolted to a strip of ebonite which in turn is screwed to the ends of the clamps of the choke.

Smoothing Condensers.

FOUR condensers of 2 mfd. each, or two of 4 mfd. each, will be required. For bias purposes these may be of low test, say 250 volts, but for amplifier, 400 test, which will be good in either case.

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