Quality Improved by a Filter Choke

Details of Constructing and Using

A CORRESPONDENT writes: An output filter is a useful device and is a great aid towards stability in a low-frequency amplifier. In certain types of receivers it is practically essential, for reasons that will be given later.

Most readers know that it is the usual practice to choose a power valve of some kind for the last socket—the output stage—of a set designed for loudspeaker work.

Now in many of the designs published in the periodicals a choke-filter output is included as part of the set. In others there is no filter device. Whether or not such an arrangement should be included depends largely upon the purpose for which the set is intended.

It really reduces itself to a question of D.C. resistance. The average power valve takes a fairly heavy current. Readers may not be quite clear as to why a power valve is necessary.

Power Valves.

WE know that if we wish to work a loudspeaker we must amplify the signals so that the volume is adequate for our particular requirements.

If the signal will only work a pair of 'phones at fair strength, it is no good expecting the speaker to give you anything more than 'phone volume. The actual signals which the speaker receives must be many times greater than this. When so much energy is being handled, the last valve must have a characteristic which will permit sufficient grid bias to be applied, in order to avoid distortion.

This necessitates a valve having what is termed a low impedance, or in other words a power valve.

These valves take a fairly high anode current because of their comparatively low impedance or resistance. I have explained this, because it is all connected with output filters.

Large Volumes.

WITH small sets, such as two or three-valvers, it is scarcely possible for the volume to be large enough to overload a small power valve with, say, 120 volts H.T. and 9 volts grid bias.

This applies in particular to the former class of receiver. The exception might be if the set were employed within the "shadow" of the local station; but even so, one would expect the detector valve to be overloaded first in the case of a two-valve set.

A small power valve can be used fairly safely directly in circuit with a loudspeaker winding, because the current is not so great as to cause damage to the windings (assuming the instrument to be of high quality) and because the drop in volts across the windings is not large.

When, however, we come to the question of four and five-valve sets, the use of an output filter becomes very necessary. Such sets are quite capable of delivering sufficient signal volume to overload a small power valve on the local station. A super-power valve, that is, one designed to handle a greater volume, then becomes essential.

Now a super-power valve may easily take twice the anode current required by a small power valve, and in consequence it is not wise to connect the delicate windings of a loudspeaker in series with it. It is not solely a question of current, since one has also to consider the mechanical stresses on the windings produced by the greater power which is being handled.

Preventing L.F. Oscillation.

THEN, again, the heavier current increases the volts dropped, or in other words the volts lost across the loudspeaker windings. This drop is equivalent to so many volts less H.T. at the anode of the valve, and it may be serious with one of the super-power type—in extreme cases producing distortion.

Thus it is an advantage to pass these heavy anode currents through the robust low-resistance windings of a suitable filter choke, feeding the speech or music impulses to the speaker via a condenser, in this way isolating the loudspeaker from everything except the fluctuating currents. In a large set, which is capable of handling a considerable intensity, there is always a danger of low-frequency oscillation commencing. By separating the steady anode current from the music impulses with a choke-filter circuit it is frequently possible to stabilise an otherwise troublesome set.

So much then for the value and use of a choke. Following are constructional details as described by "Megohm" some time ago. These should interest those who, having their holidays, wish to construct something that will improve their reception.

Winding the Coil.

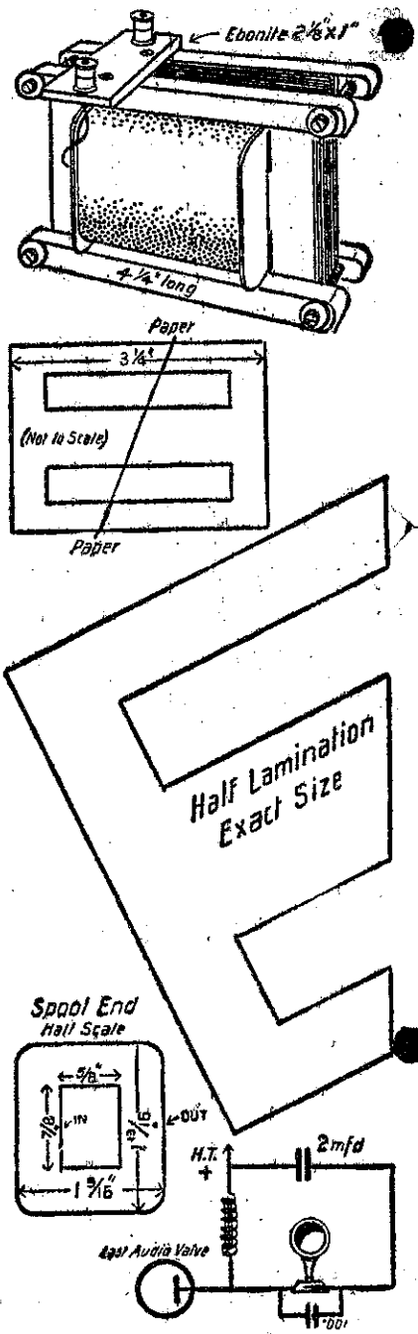
THE spool is made on a wooden former 7-8in. by 3-8in. by 2 3-16in. long. This is covered with one or two thicknesses of manila paper and ends of thin fibre or stout millboard fitted on and glued. The winding should be done in a jig and the spool ends supported in some way by cheeks fastened to the winding spindle, in order to prevent them being forced outwards by the wire during the process of winding, or it can be glued firmly to the manila paper. The beginning and end of the winding, which should be of thicker wire, are passed through holes in the spool ends. The spool is to be filled with 36's enamelled wire, over half a pound being required, which gives about 8000 turns.

The wire is run in irregularly in patches, piling up a certain thickness, say 1-16in., and then passing along to another pile until the other end of the spool is reached. Then a strip of writing paper is put round, care being taken that it closes up to the ends, as although the wire is being put on irregularly, one layer must not be allowed to come in contact with another by wires sinking down at the ends. This easily happens, especially if the spool ends are not well supported. When the spool has been filled and the lead-out wire soldered on and passed through the hole in the end, a covering of stout paper and then a piece of empire cloth are put on to protect the winding.

The Laminated Core.

THE core is built up of laminations of ordinary tin-plate, 28 gauge, in full size, eighty pieces being required. The tin has the advantage of being thinner than black iron can be obtained, and thus serves to more efficiently suppress eddy currents in the core. Stalloy can be used, but it is not always procurable. One sheet of tin 28 by 20 inches will be more than sufficient for the laminations. The tin should be marked out into 80 squares 3¼ by 2¼ inches, these squares being cut out, after which a cardboard template is made of a complete lamination in one piece, to be laid on each piece in turn and scratched round the two "windows" to mark their position.

Now a piece of card is taken the size and shape of half lamination, but without the windows. This is used as a guide to scratch the diagonal line



across each. Then cut each square right through on the diagonal line, afterwards cutting out the "window" pieces, bending the metal where necessary, afterward straightening out by stroking on the bench with the back edge of a flatiron, the point being held up in the air. This method of straightening the cut plates is easy and effective.