cases a suitable gauge of wire can be used with this object, so that previous remarks regarding gauges heavier than 30's need not apply here.

The method of using wooden clamps on these stampings requires some mention. The clamps are best put on parallel to the centre core, the laminations of which are packed tight by means of narrow strips cut off spare laminations and forced in on the outside of both sides of the core. Subsequent strips must have the entering corners sloped off for safety and must be pushed in between the first extra strip and the core. Clamps are ½in. thick by ½in. wide, if the winding is a full one, and will be 4½in. long, drilled 3½in. centres. Threaded brass rods, 2½in. each.

Where a low d.c. resistance 20-henry choke is desired, 4700 turns of 28's enamelled may be used, having a resistance of 132 ohms. Gap .03in.

Some of the good makes of eliminators are now provided with 30-henry smoothing chokes, and some constructors might like the idea of putting in one if not both, of this value. If one only, it should be the one nearest to the rectifier. A suitable choke can be selected from the table. If the stampings are to be used, 7400 turns of 32's or 5700 turns of 30's can be put on, with d.c. resistance 385 and 227 ohms. respectively. The average turn of a full winding is 0.6 feet, and this multiplied by the number of turns gives the feet of wire used, from which the resistance can easily be calculated, by reference to a wire table giving ohms per 1000 feet.

It may be mentioned here that some factory-made chokes sold for "B" eliminator work have a d.c. resistance as high as 500 ohms, which looks rather a high figure, though the drop will only amount to a half volt per mil.

Choke-Coupled Amplifiers.

INSTEAD of the popular transformer or resistance amplifier coupling, choke coupling may be employed. It really consists in replacing the plate resistance of a resistance coupling by an impedance or choke of about 100 henrys, or sometimes as much as 150. This system gives good reproduction, and avoids the great drop in plate voltage which is inevitable with resistance-coupling.

In dual-impedance amplifiers the grid-leak of the resistance-coupling is replaced by a choke of 200 to 250 henrys, and this is known as the grid impedance. The merits of the system will not be discussed here. In practice, a 100-henry choke gives good results in a plate impedance, and may be wound with 38's or 40's wire, 13,400 turns on a ¾ core, gap .03, or 10,400 turns on a 1in. core, as shown in the table.

Home constructors will find it very convenient to use the secondary of any old audio transformer as a grid impedance. A transformer with a broken-down primary will answer well.

Chokes for Plate Leads.

A CHOKE of 15 to 20 henrys answers well in plate leads to prevent "motor boating." Very often the core of an old audio transformer may be turned to good account for this purpose. In the detector plate lead, high d.c. resistance is of little consequence, so that the wire may be of very thin gauge, 38's or 40s.

Low Voltage Chokes.

EXPERIMENTERS may require chokes suitable for "A" eliminators or other low-voltage smoothing, so specifications are included. Values from 0.5 to 0.1 henry are used for this purpose. To pass 2 amperes continuously not less than 20's wire should be used; but 18's is better, as the d.c. resistance must be kept as low as possible for low voltages, as appreciable drop is not permissible.

Utilising the stalloy stampings, 400 turns of 18's d.c.c. would give a value of over 0.1 henry, with a .05 gap. To pass not more than one ampere, 800 turns of 22's d.c.c. will give 0.5 henry with a gap of 1-64in. Other heavy duty chokes are given in a table.

The heavy duty chokes are wound with enamelled wire, preferably in layers with paper between, and of gauge to carry the current—20's for 1.5 amp., 22's for .7, 24's for .4, 26's for .3, 28's for .2. The chokes with the larger gaps are to be preferred.

Volts Dropped in Chokes.

THE voltage of direct current passing through a choke is always reduced by the resistance of the wire. The thinner the wire and the greater the number of turns, so does the resistance increase. To find the voltage that is to be dropped we must first find the d.c. resistance of the wire comprising the choke. This is obtained by first measuring the "average turn," which is actually the length of the centre turns of the coil, reckoning from core to last layer. This measurement multiplied by the number of turns gives the total length of wire, and by finding the resistance of 1000 feet in a table, such as appears in the "Listeners' Guide" the resistance of the coil can be calculated. Multiply the mils. passed (expressed as amperes) by the resistance, and the result gives the volts dropped. Note particularly that the more current passed the greater the loss of voltage.

Every mil. passing through 1000 ohms drops one volt, so 50 mils. drops 50 volts. Every mil. passing through 500 ohms drops ½-volt, so 50 mils. will drop 25 volts; 50 mils. through 200 ohms drops 10 volts; 30 mils. through 300 ohms drops 9 volts; 100 mils. passing through 150 ohms drops 15 volts, and through 250 ohms drops 25 volts.

The foregoing figures give a good idea of the voltage drop across the average choke, which in "B" eliminators with two chokes, will be doubled.

General Points.

IF there is hum in an eliminator it may be due to saturation of the chokes if not insufficient capacity of smoothing condensers. In such a case it will pay to increase the gap in the chokes and note the effect. The given dimensions of gaps cannot be more than approximate, as several other factors affect the general performance.

The chokes given in the tables are worked out on a basis of a flux density of not more than 35,000 lines per inch, which gives a good margin to meet the case of rectified alternating current with little or no smoothing being applied to the choke.

THE action of a choke coil takes place between the turns of wire and the magnetic lines of force of the field of the coil. The intersections between the lines of force and the turns produce within the coil a "back electromotive force," so called because it always opposes the alternating current applied to the coil, and which is producing the "back e.m.f." The presence of an iron core increases the back e.m.f., which therefore causes the coil to offer greater resistance to any change (alternation) of current, so causing the maximum "choking" effect to take place. That is to say, the choke will freely pass direct current, but offers a very high impedance to alternating current.

Always make sure that laminations of cores are packed tightly, and free from any chance of rattle, which if present in an output filter choke will spoil quality. All gauges of wire given in this article are s.w.g.

Machine-cut stalloy makes a more compact core than the average hand-cut and flattened material.

All choke specifications here given are calculated upon a flux density of 35,000 lines to the inch, which gives a very liberal margin below saturation point. Stalloy permits of working up to 55,000 lines without saturation, so that chokes given in the tables may be made to carry a reasonable overload if necessary, though it is not recommended..

When a choke of high inductance is required to carry heavy current, this can only be done by a large increase in both the number of turns and the width of the gap, the latter sometimes being as much as ¼ inch in a 100-henry choke on a 1 x 1 core, which is thus enabled to carry 50 mils. with 18,000 turns of 36's wire, but with a drop of 114 volts.

In the table given for ordinary chokes, the gaps have not been increased for the higher inductances, because as a rule these are not required for purposes using heavy current. The heavy duty chokes will carry as much current as the average constructor or experimenter is likely to require.

When the length of window exceeds 1½in., the larger gap given should be used.

It has been decided that for the meantime the particulars of chokes without gaps will be held over, as data on hand appears to be insufficient to enable a useful table to be compiled. In any case, the use of such chokes is somewhat limited, owing to the comparatively small current allowable, but where this factor is not of consequence, a good reduction in bulk is often possible, on account of the shortened winding required when no gap is used.

This article has been written in an endeavour to clear up the difficulties confronting constructors owing to the general lack of information on the subject, and the writer trusts that his efforts will fulfil the desired object.

For Sale or Exchange.

See page 32 for column of casual advertisements.