

WE are now in a position to figure out the various windings and determine what window space will be needed to accommodate them. A current density of 1200 amperes per sq. in. would be sufficient for the primary in view of the high ratio of copper to insulation; this winding, however, has to carry the magnetising or "wattless" current as well as the equivalent of the secondary load, so that it may be well to reduce the current density to 1000 amperes per sq. in. or less. No. 18 S.W.G. has a sectional area of 0.00181 sq. in., and may therefore be relied on to carry 1.81 amperes; apart from the magnetising current, the primary will carry only a little over an ampere, so that this wire is entirely suitable. No. 18 D.C.C. winds 17 turns per inch, so that 670 turns will require 670

sq. in., or 2.32 sq. inches.

172

Each half of the high-voltage winding carries current only half the time, so that the wire may be smaller than would otherwise be the case. Actually 28 S.W.G. proves sufficient, and it is recommended that either double cotton covered or single cotton enamelled wire be used. Even so, for absolute safety it is desirable to put a layer of good paper (varnished when in position) or oiled silk between each two layers of the winding. At 8 turns per volt, the 1000 volts right across the winding will require 3000 turns which, since 28 D.C.C. winds 39 turns to the inch, will take up approximate 2 square inches. The grid bias winding may be of No. 36 D.C.C. and will take up about .25 of a square inch.

The filaments of the rectifier valves, which may be either one or two Marconi or Osram U8 full-wave rectifiers, or two or four UX 281 half-wave rectifiers, may be fed from 22 turns of No. 14 D.C.C., which will take up another .25 of a square inch. The rectifiers for the grid-bias will no doubt be 5-6 volt 201a type valves, and may have their filaments fed from 16 turns of No. 22 D.C.C. or larger wire.

The power-valve filaments will require, if of the 250 or 210 type, 22

wise to allow .5 of a square inch for these windings.

The total cross-sectional area of the windings is, then, $2.32 + 2 + .25 + .25 + .25 + .5$ square inches, or a total of 5.57 square inches. The winding bobbin, the air-space between it and the core, the insulation between windings and the insulation between the layers of the high-voltage windings, if any is used, will all take up space, and a "window" area of 8 square inches will be none too great. Efficient design de-

Ltd., Auckland) is used, there will be needed 160 pieces 5 1/2 in. by 2 in., 268 pieces 4 in. by 1 1/2 in., and 108 pieces 5 1/2 in. by 1 3/16 in., or, if the suppliers object to the odd size, 5 1/2 in. by 1 1/2 in. If 018 Stalloy (handled by National Electrical and Engineer Co., Wellington) is used, there will be required 126 pieces 5 1/2 in. by 2 in., 212 pieces 4 in. by 1 1/2 in., and 86 pieces 5 1/2 in. by 1 3/16 in., or 1 1/2 in. It must not be forgotten, when assembling the core, that the joints in the laminations must be staggered.

The mean length of the iron path is about 19 inches, and since it takes 10 ampere turns per inch to magnetise Stalloy to a flux density of 60,000 lines per square inch, 190 ampere turns will be called for for magnetising the core. The primary turns are 670 in number, so that the magnetising current is

$$\frac{190}{670} = 0.28 \text{ of an ampere.}$$

Fortunately the 18 s.w.g. used in the primary will carry this "wattless" current in addition to the useful current, so that no increase in wire diameter is called for.

The core contains about 16lb. of iron (1 cubic inch weighs 4oz.) and the loss in Stalloy at the flux density mentioned is 0.7 watts per lb. Thus the iron loss will be about 10 watts.

Assuming that the secondaries are to be wound over the primary, the mean primary turn will be about 9 inches. Thus the primary will need nearly 4 lb. of No. 18 d.c.c., which will have a resistance of 2.2 ohms. The copper or 12 R loss in this winding will be, assuming the primary current to be

A POWER PACK FOR "250" VALVES

FINE ARTICLE COMMENCES NEXT WEEK

IN our next issue "Megohm" will commence a description of a power pack which will deliver 450 volts and ample current for six or seven valves. This power pack has been so described that almost everything can be built by the home constructor. This will be a special issue—do not miss it!

turns of No. 14 D.C.C. taking up .25 of a square inch. For feeding several a.c. valves in the earlier stages No. 12 D.C.C. will be needed, the number of turns depending on the valves employed; if 4 volt a.c. valves are employed 12 turns will be needed. Some constructors would prefer, perhaps wisely, to make provision for all three types of a.c. valves, so that it will be

mands that the "yokes" should be appreciably shorter than the legs on which the windings are mounted, so that suitable dimensions for the window will be 4 inches by 2 inches.

The Iron Required.

A LITTLE figuring shows that the iron required will be as follows: If .014 stalloy (handled by Johns,

Know More About Radio

"The Radio Listeners' Guide"

will Teach You everything!

HOW IT HELPS YOU

The "Radio Listeners' Guide" has been compiled by experts but the content is written in an easy-to-understand style. Every stage of radio is covered so that you can find out how to rectify any trouble without any previous knowledge of radio.

The "Radio Listeners' Guide" shows how to improve sets and how to construct all the new types. Nothing is left to your imagination and there is as much to interest the beginner as there is to help the most experienced amateur.

The 1929 revised edition is now procurable from all booksellers and radio dealers. If you should have any difficulty in obtaining a copy of this 160 page book, fill in the coupon and send 2s. 9d. in stamps to the publishers, Box 1032, G.P.O. Wellington.

Some of the Sections

A general description of radio, receivers, and broadcasting is given so that readers unfamiliar with methods used, may have a full idea of what happens between the times when Mr. Announcer says "Hullo" and when it comes through your speaker.

Multi valve receivers are extensively dealt with, descriptive circuits are given of the most popular types, and full details re construction and tuning. The matter of maintenance is also dealt with in this section.

Perhaps the Glossary of Wireless Terms could be aptly described as one of the most helpful pages in the "Guide." Everything in radio is explained fully, even those wireless terms that have you tricked are dealt with in this section.

For those who desire to "sweep the world" the short wave section will be of undoubted assistance and the circuits and hints will help you to bring in all those stations your friends speak of so often.

(Postal Coupon for Country Readers.)
"N.Z. Radio Listeners' Guide, 1929-30."

"RADIO RECORD,"
P.O. Box 1032, WELLINGTON.

Please post me immediately.....copy [ies] of your 160-page illustrated reference work "The N.Z. Radio Listeners' Guide, 1929-30" at 2/9 per copy posted. I enclose herewith postal notes for..... (Add exchange to cheques.)

Signed.....
(Write address clearly).....