THREE-VALVE (Wanganui).—I intend to convert my present set into the "Kestrel Three," and wish to use .0005 variable condensers instead of .00035. What are the coil specifications?

A.: Secondary, 85 turns of 34 gauge d.s.c. wire, tickler 48 turns of 38 gauge. You need not worry about the short-wave coils.

AUDIO (Blenheim).—I am greatly troubled with hum in an a.c. set. Electricians have looked it over and seem to think it is all right. It appears not to be present in the first audio stage.

A.: An article was recently published in the "Radio Record" outlining the steps to be taken to prevent hum. It might be advantageous to you to look it up. Hum is sometimes caused by one or more microphonic valves. To locate such a valve, operate the set so that the hum comes in very loudly. Then place your hand firmly on each of the valves in turn. When you come to the offending valve the hum will decrease in strength or disappear altogether. You should either replace it with a new valve, or use one of the lead caps made for the purpose. The rectifier is often an offender as far as hum is concerned. Extra by-pass condensers from the plate lead of the audio stages may cut out some of the noise, but the elimination of hum in a commercial receiver is really a job for a radio technician.

2. I have made a wavetrap, using the circuit described in a back issue of the "R.R.," and have not had success. I used a .00035 instead of a .0005 variable condenser and 100 turns of either 16 or 18 wire on a 3in. former. Are the specifications correct?

A.: Yes, but a more efficient coil could have been made by winding 60 turns of 36 gauge enamelled wire on the coil and tuning it with a .00035 condenser. We cannot explain why your wavetrap will not work. All we can say is that it should.

CONSTANT READER (Gisborne): Can you give me some information concerning tungar bulbs? I am anxious to build one into a five amp. charger.

A.: Owing to the high filament current taken by the tungar bulbs they have rapidly gone out of date, being replaced by more economical rectifiers. A five amp. charger has a filament which requires 20
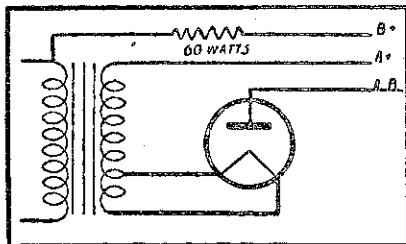
amps. of current 2. volts. The secondary would have to be wound to deliver 20 volts, and this would allow for the 14 volts drop through the bulbs. To make a "B" charger, wind on sufficient turns to give 90 to 100 volts with wire sufficiently heavy to take current at a tenth of an amp. It is unlikely, however, that you could get an efficient tungar charger from 1½in. stalloy. Twenty amps. is a big hurdle, isn't it?

2. The gauge of wire sent in is 36 d.s.c.
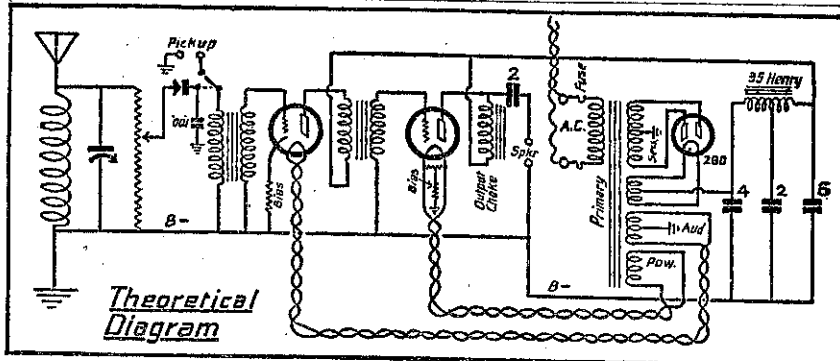
A crystal set and a.c. amplifier.

N Z. 107W (Wellington): Would you supply the correct number of turns for .0005 condensers with .0002 differential condensers, to be wound on a valve base?

A.: Secondary, use 30 d.s.c. and wind on 90 turns, or 28 d.s.c. with 100. Tickler, 40 and 50 respectively, with 32 or 34 d.s.c. wire. Primaries, 30 and 42 respectively, same wire as tickler.

A. B. (Napier).—Write International Radio, Blair Street, Wellington.

G. M. (Christchurch).—We are working on a three-valve receiver, incorporating multi-mu valve, 224 and pentode, in a Loftin White hookup. Watch our constructional columns for further announcements. Your step-down transformer would not be likely to suit the pentode valve. However, try it.

B. S.D. (Wanganui).—I have constructed the Advance a.c. receiver, and although I have had good results on certain bands, have had difficulty with oscillation on others.

A.: Try the effect of a smaller reaction condenser, say, .0002. Check the voltage on the detector valve, and if necessary reduce this slightly. Reduce the numbers of turns on the coils which do not oscillate as they should.

2. What do you think of the idea of .0005 condensers for broadcast? What would be the correct numbers of turns for 2in. coils?

A.: For the secondaries use 72 turns of 28 d.s.c. wire, and for the tickler 25 turns of 26-30 gauge d.s.c. wire. .0005 condensers are perfectly satisfactory.

W. U. (Bay of Islands).—Is it possible to attach an r.c.c. amplifier to get more volume for special occasions? I am using a five-valve set.

A.: No; you would get howls and other forms of audio instability.

2. What is the usual value of audio chokes?

A.: Anything from 15 to 50 henries.

X TAL (Auckland).—What valves would you recommend for the "Crystal Set with an A.C. Amplifier," described in "All About the All-Electric," Osram or Philips preferred?

A.: Philips E409, in the first stage, B405 output. Osram, M.H.4 and M.L.4.

2. Could a s.g. valve be added in front of a crystal detector to get distance?—No.

3. Could you supply fig. 5 mentioned in the text of "Use of Cathode Type of Valves"?

A.: We are publishing here a circuit of a crystal set with an a.c. amplifier, using the cathode type of valve. Full constructional details have been given in the 1931 "Radio Guide."

L IP (Auckland): How can the maximum voltage be applied and the maximum current delivered by a triode used in a half-wave rectifier be computed ?

A.: The maximum amperage delivered is that shown by the valve curve, or maximum plate voltage without bias. It will not, however, deliver this for very long, and it will soon drop. The maximum voltage to be applied is that recommended by the manufacturers. It can be exceeded slightly.

2. What is meant by saying "this resistance is 75 watt rating?"

A.: That it will dissipate 75 watts of energy. A watt is equal to a volt multiplied by an amp. or W equals IE. Eliminating E by the formula E = IR (R is the resistance) we get $W = I^2 R$. We now have two constants that can be supplied. We know the watts dissipation and also its resistance. Let us see how much current our resistance will pass. We will transpose the equation to make it read:

$$I^2 = \frac{W}{R} \quad \text{or} \quad I = \sqrt{\frac{W}{R}}$$

Let us take an example. We have a 4000 ohms. resistance, 75 watts dissipation. How much current will it pass?

$$I = \sqrt{\frac{W}{R}}$$
$$= \sqrt{\frac{75}{4000}} \text{ amps.}$$
$$= 1/7 \text{ amp. approx.} = 143 \text{ mills.}$$

We now know that our resistance will pass a maximum current of 143 mills and that this current will breakdown 572 volts. This, multiplied by the milliamps passing (143) will bring us back to our 75 watts.

WHAT is the best combination of valves for my six-valve American set?

A.: Use 224's in all stages except the last. There you may use any type of power valve; C603 will be quite suitable. You would have to make no other alteration to use the 224 valve instead of the 201A.

2. I am using an output transformer, but there is yet distortion in the set, even with the volume control well down.

A.: This may be due to the last valve being inadequately biased, or possibly to your valves being almost done.

C. G. (Auckland).—I am using a five-valve three screen-grid midget set. Can I, without interfering with the set, improve selectivity?

A.: The easiest way to improve your selectivity is to use a midget condenser in series with the aerial. This will knock the volume back a little, but with unselective sets, it cannot be helped. The capacity of the condenser should be about .0001 to .0003.

When tuned in to a low-powered Australian "B" or New Zealand "B," the set sets up a violent hum when the volume control is turned up?

A.: Your set is not properly neutralised or balanced. It may improve matters if you used a better earth. If these things fail we should advise you to consult with the dealer who sold you the set.

SWITCH (Tolaga Bay): Can two .0005 condensers be used for the "Kestrel Three"? If so, what should be the number of turns?

A.: You could use a .0005 by winding ten turns less on the secondary coil. The tickler will remain the same.

2. Could 2in. wooden coil formers be screwed to the baseboard instead of valve base and socket?—Yes.

3. Would the .00025 differential condenser have to be changed?—No.

HOOK-UP (Matamata): We cannot see the reason for B4. B3, of course, goes to the audio transformer or resistance-coupled unit which, by the way, would be the better. Try it without B4. It is rather difficult for us to criticise a sketch when it is divorced from the remaining part of the circuit.

2. In some audio amplifiers I notice that bias is obtained through a resistance connected between the transformer and earth, while in others the bias terminal on the transformer is connected directly to earth. Why is this?

A.: Bias is usually obtained through the filament drop and the bias terminal connected to earth. The other system, by inserting a resistance in the return from the bias, achieves the same end, but differently. The former is the more usual practice.

3. Where is the best position to connect a pick-up to a set using a screen-grid detector and r.c.c. in the first audio?

A.: Arrange a jack so that the grid lead between the first audio valve and the r.c.c. unit is broken. The valve of the grid lead and a return to ear are used for pick-up terminals. We note your request for information regarding the multi-mu valves; we devoted an article to this subject a short time back, but we shall probably have more to say about them in the near future.

TOM (Otahuhu): I have acquired a pair of telephones, resistance 6000 ohms, and am using a "B" and "C" eliminator with B406 in the last stage. Would I injure the phones if I used them on my set without any alteration?

A.: With very sensitive phones such as you are using, it would be advisable to use an output filter in the last stage. Such a filter is illustrated in a sketch accompanying your query.

2. Would the eliminator be suitable for
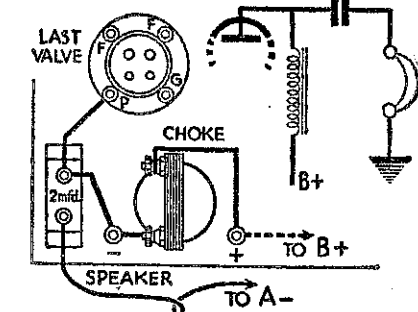
use with the "Sparrow Hawk" one on shortwave?

A.: Yes; you might have to use an extra choking condenser in the detector plate lead, but it may not be necessary.

3. Using a .0005 condenser could I use 28 d.s.c. wire for L1 and L3 for the broadcast coil? What will be the number of turns?

A.: Yes; wind on the number of turns specified.

SPARKS (Christchurch): Where could I obtain an inexpensive one valve shortwave circuit and the approximate cost of building it up?

A.: The "Sparrow Hawk" one, described in the "Radio Guide," is an excellent one. Use a .0001 condenser instead of the .00035 and shorting condenser. The total cost would be between £3 and £4.

2. What is the procedure for making honeycomb coils?

A.: To give a description of this is quite beyond the scope of Q. and A. In any case, honeycomb coils are well out of date.

3. Have all detector valves five prongs.

A.: A.c. detectors.—Yes.

KAUSPANKA (Hawke's Bay).—We do not think your set would be a worthwhile improvement on the Browning Drake. If you want to build a small super-heterodyne receiver, watch for an excellent one we shall be describing within the course of a few weeks.

FAD (Wanganui).—I have a commercial battery set which I want to convert to a.c. What Philips' valves do you recommend?

A.: None. We do not advise you to convert a five-valve battery set to an a.c. one. Conversions are rarely satisfactory.