with the valves as they were originally. The make of valve you mention is a standard first-class one, and by using this you cannot go wrong.

R.M. (Grey): I have an a.c. set, the electricity being taken from a light socket. When the power is on at the light and the set off I find that I can get a spark by touching the earth wire to the chassis. Should this be so?

A.: It depends on the situation of the set switch. If it is in the primary lead there should not be a spark. If it is on the secondary it is quite possible. Have you tried turning the plug connecting your set with the lighting system around? In any case, the defect is not serious, and there is no need to worry about it.

C.R.M. (Christchurch): Patent earths are rarely a success. We cannot quite understand your particular installation, but we think, however, that by burying the whole outfit and carrying the lead to the set, you will be doing more or less rightly.

DUPLEX (Auckland): Concerning the Advance receiver in this year's "Guide," the theoretical diagram shows the fixed condenser connected to r.f. C1 as .1. Should this be 1mfd.?

A.: It is really immaterial which is used. When the paper condenser was used the necessary alteration to the diagram was overlooked.

2. The list of parts shows two .5 mfds. condensers, but I can trace one only in the circuit.

A.: Only one .5 condenser is required—probably it was intended to use another where a 1 mfd. has been placed. These small discrepancies occur through drawing diagrams before the finish of experiments in order to save time, but actually the working of the set is not affected.

3. My variable condensers have 23 plates and 11 plates respectively. What are the present values, and what value of fixed condensers is required in series to adapt these to a shortwave set?

A.: You have not told us what make of condenser you are using, nor the size of the plates. The 23 plate condensers will probably be a .00035 and the eleven plates one .00015. In this case the value of series condensers are .00014 and .000075.

C.B. (Auckland): Oscillation in the "Advance" s.w. set will take place only on certain places of the two tuning condensers. One has to strike a combination between the two condensers before the set will oscillate properly. The set has been made exactly to specifications.

A.: Making the set "exactly to specifications" still allows the constructor a considerable margin of difference between his own set and the original, but such differences do not necessarily prevent good results from being obtained. Your trouble with oscillation is unusual in that there are so many patches around the dials. The patches are known as "holes" and are caused chiefly by poor or unsuitable r.f. chokes, so we suggest your making up or purchasing another choke different from the one you are using. This applies particularly to the choke associate with the tickler, which has to be about 80 millihenries. Since

the publication of the "Guide" it is possible to obtain 50,000 wire wound Colvern potentiometers, and you are recommended to use one of these for the detector screen. Fear and Co., of Wellington, stock them in case you have difficulty in obtaining them locally. You can also try connecting the 2 mfd. condenser across the screen potentiometer from the arm to the earth instead of as shown. The reaction plop can be reduced by using a .0001 fixed reaction condenser in place of the .0005, if this has not already been done. This, of course, reduces reaction on all coils. Make sure that all resistances are good, especially 1000 ohms to the tickler and the .5 grid. By a little perseverance you will be rewarded with a very fine receiver. Many constructors have built it, and been highly satisfied.

SIMPLEX (Waikanae): I want to use a crystal set in Waikanae, 37 miles from Wellington. Which circuit of those I enclose would be the most suitable?

A.: We think you will not get a crystal set to work in Waikanae; 25 miles is the very outside range of 2YA. Probably your number 3 circuit would be the best.

2. I intend to use a .00035 variable condenser. How many turns will be needed on the coil?

A.: On a 2in. coil using 26 d.s.c wire, about 80 turns.

3. Will cardboard former do for the coils?

A.: Yes, but Exelon would be better.

S.D. (Auckland): You probably have a loose connection. If you cannot locate it yourself, get in touch with a service man.

AMBITIOUS (Tolaga Bay): I am contemplating constructing the Trinadyne battery set described in the "R.R.," using 230 and 231 valves. Would this receiver give good loudspeaker reception of 2YA at 7 p.m. all the year round?

A.: We are doubtful. The particular circuit may not be suitable for your requirements. Why not stretch a point and make up a set such as the "Kestrel Three"? Under these circumstances you would get good results. You could use 230 and 231 types of valves in this circuit.

2. I intend using the resistor method of obtaining bias. What should the value of the resistances be?

A.: Don't; with batteries it is uneconomical. You are dissipating valuable energy through resistances. Use a "C" battery; it is cheaper.

3. How long should a set of standard upright "B" batteries and an air cell last with an average use of, say, three hours nightly?

A.: The "B" batteries should last approximately 7 months, and the air cell, we believe, about two years.

3. Could you explain super-regeneration?

A.: Super-regeneratives have the advantage of the abnormal sensitivity, which most users of regenerative detectors will have noticed to exist, at the moment when the detector valve goes into, or emerges from, oscillation. It is, of course, impossible to maintain the required condition by moving the reaction control backward and forward by hand, so the result is achieved automatically by varying the grid potential. If the variations were made at an audible frequency, the commencement and cessation of oscillation would be audible as a note of a frequency determined by the rapidity of the variation. By choosing suitable circuit constants, however, the variation may be made at a frequency higher than 10 k.c., which is about the upper limit of audibility. As a matter of fact, super-regenerative receivers used on the broadcast reception, apart from the fact that their use on an ordinary aerial is prohibited, suffer somewhat from the use of the super-audible oscillation, but in the reception of extremely shortwave lengths, this receiver is most successful.

4. What is the equivalent in the nearest s.w.g. wire of 60, 25 and 9 turns of 30 d.c.c. b. and s. wire on a 1in. former?

A.: The equivalent of 30 B. and S. is 33 s.w.g. The number of turns can remain the same and also you can use number 32 s.w.g. wire instead of 33 without any ill-effect.

5. Could you inform me how the r.f. current is introduced or coupled to the transmission line of a wired wireless telephone?

A.: Modulated r.f. currents are usually introduced into wired wireless systems by tuned r.f. transformer. Although the writer is not familiar with such systems, it is understood that it is the usual thing to tune both primary and secondary of the transformer, although in some instances only the secondary is tuned. The rest of the line is, of course, simply in series with the secondary.

THIRD GRID (Greymouth).—What effect has (a) the plate current of (1) the oscillator, (2) the modulator, (b) the mu of the (1) oscillator, (2) modulator, (c) the impedence of (1) the oscillator to the modulator, have on (A) the output, (B) the percentage of modulation in a Hartley transmitter with Heising modulation?

A.: You make our head swim with those A's, B's, 1's and 2's. Still, let us see if we can get them right without getting them mixed up.

A.: (A1) The greater the plate current of the oscillator, provided adequate excitation is present, means increased output. Unless this is balanced by corresponding increase in the capacity of the modulator it is also likely to result in a reduction of the modulation percentage. (A2) The plate current of the modulator has in itself little effect on operation. A greater variation in plate current, however (i.e., from maximum to minimum of an audio cycle) will increase either the percentage of modulation or the size of the oscillator valve which can be effectively modulated. Obviously a greater variation in current will in certain cases only be possible with a greater average current, so that the average current may be of importance indirectly.

(B1) The mu or amplification factor of the oscillator is, within limits, not of very great importance. Generally speaking, a low mu valve requires a greater grid excitation than one having a higher amplification constant. On the other hand, however, it is probable that, for a given plate voltage, a higher output can be obtained from a low mu valve if sufficient excitation is provided. Extremely low mu valves usually require too much excitation to make good oscillators.

(B2) See C2 below.

(C1) The impedance of the oscillator in relation to its amplification constant is some indication of the overall efficiency of the valve. A valve of high impedance, the mu of which is not correspondingly high, is likely to require too much excitation (and grid current) in comparison with its output to be a satisfactory proposition.

(C2) The impedance of the modulator is of importance as a guide to the plate current variations which can be expected, since these variations determine the percentage of modulation as explained above.

(Continued on page 29.)