A Vertical Aerial.

"B.G.B." (Picton) is indeed fortunate. He is situated between two ridges 200 yards apart. Between these he is able to stretch, a steel wire, and with a string of insulators, is able then to secure a vertical aerial of 100ft. which drops directly to his set. He has been told that he is losing efficiency through having all his aerial vertical. This is not the case for the following reasons:—The aerial and the ground form a huge condenser, and above 30ft. the capacity of this condenser increases only slightly as greater height is obtained. Likewise when the length exceeds 100ft. little is to be gained in proportion to the length of wire to be used, but the capacity of a vertical aerial increases directly with its length, so that other things being equal, 100ft. of vertical aerial would be more efficient than a 100ft. horizontal aerial. Care must be taken, however, that it is kept free from all earthed objects, as this would decrease its effective height.

Various Points.

"C.L.F." (Dannevirke), asks the following questions:—

1. What are the latest signs for a transformer marked I.P., O.P.,, I.S., O.S.?

ANSWER:—I.S. is marked either F. (filament), "A"— "C"— or "G.B"— (grid bias). O.S. is marked G. for grid, I.P. marked P. for plate, and O.P. for "B" positive H.T. (high tension).

2. Could you give me the address of the listener who received JOAK, etc., on a one-valve set? It was published in the "Record" about February 15.

ANSWER:—For reasons previously explained, it is quite frequently difficult to track the name and address of a listener who uses a nom de plume, but if this correspondent would write us, we should send the address to our present correspondent.

3. Are self-regenerative batteries an improvement on the ordinary type? Do they cause any noise?

ANSWER:—There is little difference between these and the ordinary type. They are equally as good and no better. Noises will only come from them when they are low in voltage. This can be slightly offset by connecting a fixed condenser of 1 mfd. across the battery terminals.

4. Why can I use only 4 volts on a 6-volt valve? I have taken turns off the tickler, but all I can get is continual oscillation when I increase the voltage greater than 4.

ANSWER:—The set is not neutralized. Information on this point has been given in the "Record," but the subject will be very fully dealt with in a special chapter in the "Radio Listeners' Guide."

5. What is the difference between P.M.5 and P.M.5B?

ANSWER:—P.M.5 has an anode impedance of 19,000 ohms, and is consequently suited to high frequency amplification detector or low frequency amplifier when followed by a transformer coupling. P.M.5B has an anode impedance of 74,000 ohms, and is more suitable for low frequency amplification or detector followed by resistance coupling. The amplification factor of the former is 17.5, compared with that of the latter 37. However, the true test of quality is the mutual conductance, that of the P.M.5 being .94 milliamps per volt, while that of the latter is .5 mA/volt. For general use then, the P.M.5 is the more suitable.

6. Could a first stage low frequency amplifier valve for resistance coupling (amplification factor 37) be used as a first stage low frequency amplifier with a transformer coupled amplifier?

ANSWER:—No, for the reason outlined in the previous answer.

7. When a valve has an amplification factor of 13, is it meant that the strength is raised 13 times?

ANSWER:—No. Theoretically the amplification of a valve is equal to the amplification factor multiplied by the external impedance, the product of these being divided by the plate resistance plus the external impedance. It is difficult to arrive at the exact factor of amplification, but a good valve has always a high mutual conductance, that is approximately or greater than 1 milliamp. per volt.

Questions and Answers

Sulphation is the greatest enemy of the high-tension battery, and the best way of keeping it at bay is to have the battery regularly and fully charged.

8. Would you advise the use of a valve with an amplification factor of 17 as a first stage audio? If not what would you advise, and why?

ANSWER:—The main point to watch in selecting valves for the low frequency side is that their impedance be kept low. This lowers the amplification factor. The low frequency amplifier, when transformer coupled to the next valve, should have an impedance of from 7,000 to about 20,000 ohms, depending upon the transformer and the load. As far as amplification factor is concerned, keep it as high as possible, but if it is too high, overloading of the next stage will result. In the "Listeners' Guide" we are publishing a table showing the optimum valve impedances and magnification factors for the different positions in the set. With regard to the specific question, one cannot say definitely. Probably it would be O.K., but the correspondent should pay attention to the impedance to keep it within the limits described. If this valve is followed by a transformer of a high ratio, saturation will occur and the higher frequencies will be lost, causing distortion. The moral is to use transformers of a good make, having a ratio of not more than about 4 to 1.

Amplification Factor.

WHAT is the amplification factor of a stage of radio frequency.—"Crystal" (Wellington.)

ANSWER:—The correspondent is referred to the answer to "C.L.F." above. In practice, it should work out at something less than the amplification factor of the radio frequency valve and the step up transformer used in the circuit.

Pentode's Home-made Tester.

A CORRESPONDENT from Taranaki, "E.A.M.", wishes to know if a voltmeter with two readings, from 0 to 6 and from 0 to 100, will serve the purpose instead of a milliameter.

ANSWER:—The instrument described changed a milliameter into a voltmeter. Sometimes a volt meter can be turned into a milliameter by taking out the resistance, but the calibration has to be done over again. The correspondent would be well advised, unless he has had a wide experience, to follow the directions given by "Pentode."

A Constructor in Trouble.

"A.R.P.", of Dannevirke, is contemplating building a 4-valve receiver, and wishes to depart somewhat from the usual tracks, and wishes to know:—

1. Please enlighten me on the various advantages of each of the systems, tuned anode and transformer coupling for the screen grid radio frequency of the Browning-Drake.

ANSWER: The tuned anode system is the most simple for the use with the screen grid, but the difficulty is flatness of tuning. The transformer coupling is claimed to sharpen tuning and to give improved results. At the present time, we cannot give details of the transformer coupling for the screen grid as they are only being experimented with. We hope to be able to publish them in our "Listeners' Guide."

2. Is it wise to use a .00025 variable condenser in the aerial coupling?

ANSWER: Yes. If 85 turns are used on the grid coil, but it would be impossible to tune across a wide range with a transformer of this capacity; .0005 would be more suitable.

3. I would like to know where to incorporate a rheostat as a volume control.

ANSWER: If a rheostat is to be used as a volume control, it should be inserted in the filament leads to the radio frequency valve, but this is by no means the best method of controlling volume. It has the disadvantage of causing distortion. The question of controlling volume was fully discussed in Vol. 1, No. 13 (October 12). The correct place to control volume is before the signal enters the receiver, and this is best brought about by a variable resistance between the antenna and the ground terminals. The resistance should be about 10,000 ohms.

4. I intend to wind solenoid coils on a former of 2½ inches diameter, with 24 s.w.g. enamelled wire. What is the correct number of turns for the following positions:—

(a) The ordinary Browning Drake aerial coil tapped at the 18th, and tuned with a .0005 condenser—put on 50 turns space wound.

(b) A transformer coupled antenna circuit—18 on the aerial and 50—60 on the grid coil.

5. Is that astatic coil worth while in a screen grid set?

ANSWER: This would need trying out, but there is no reason why it should not be O.K., if not an improvement on the plain solenoid. Put on 25 turns in each direction, that is, on each half of the former.

6. What is the advantage of a .0001 condenser in series with the aerial?

ANSWER: A condenser smaller than .0005 connected between the antenna lead in and the antenna terminal of the set has the effect of enabling the lower wavelengths to be tuned in. At the same time, it decreases damping when a long aerial is used.

7. Would it matter if the condenser between the shield grid of the s.g. valve and the shielding was 1 mfd. instead of .5 mfd?

ANSWER: Not at all.

Details of an "All-Electric" Gramophone.

I AM contemplating building an "all-electric" gramophone, and desire a complete wiring of same, writes "W.P.J." (Christchurch). I contemplate making the dynamic cone speaker described in your issues, March 1 and March 8, and the eliminator described between October 14 and November 18, 1927. I wish to supply the filament current for the valves from a transformer. Could you give me information on this point?

ANSWER: The question of power transformers and eliminators has been brought right up to date in our 1929-30 edition of the "Radio Listeners' Guide." and the correspondent will find in its pages the information for which he is asking.

"I believe in the electric gramophone there is used a scratch filter. Of what does this consist?

ANSWER: Connect a fixed condenser across the secondary of the first audio transformer, or better still, connect in series from the plate of the second to last audio valve and ground or B—a .002 to .660 mfd. condenser, and a half-henry choke in series. The question of constructing iron cored choke coils was discussed by "Megohm" in our issue of November 23, 1928. A ½ henry choke can be made by winding 1600 turns on a 1 inch, a stallory core, gap 1-64 inch.

A Short Wave Adaptor.

IS it possible to use a short wave adapter with any circuit?—"N.M.S" (Christchurch). The short wave adapter, in essence, is a device to replace the high frequency amplifier and the detector of the broadcast receiver with a special short wave adaptation. Any good audio amplifier will be sufficient to strengthen the output of this unit. So that it may be plugged into any set with a good audio amplification system.

Amplification at high frequency means that the currents magnified are those which are flowing in the aerial or the tuned circuits, before the detector.

Buzzing Sound From Set.

WHEN I switch on my set, there is a buzzing sound in my speaker, and when I turn the wavelength or reaction condenser it gradually goes into a high-pitched whistle, and I cannot perceive anything, but as soon as I put my hand on the primary and secondary of the coil it stops. I can take my hand away, and the stations will come in better than when I first made the set.—VALVE (Masterton).

ANSWER: It appears that there is a defective component. The most likely suspects are the low frequency transformer, the valves, or perhaps the coil. Test these by the 'phones and cell method. Connect a small battery to one tag of a pair of telephones, connect the free tag to a piece of flexible wire. The remaining terminal of the battery should likewise be connected to a separate piece of wire. If the two free ends are touched together a click will be heard in the 'phones and another click when they are taken apart. This indicates a "closed circuit." Remove the coil from its socket, and attach one of the leads to point No. 4. Place the other end on No. 2. A distinct click should be heard.