

most common causes of an unstable receiver, and is sure to be the case if the whole becomes unstable as the B battery runs down. The reason is obvious as the resistance of the battery increases with age and use, and the more or less powerful electrical impulses from the second stage are thrown back to the first R.F. valve.

Now for the remedy. Insert a 1 mfd. condenser in each screened compartment, one end being to the B + lead and the other end to A—filament terminal. Yet another source of trouble can be traced to a feedback occurring through the filament rheostat, especially if one rheostat is used to control both RF valves. As this resistance is usually wired into the negative lead so as to obtain a small amount of bias, it also provides a resistance for the HF currents travelling to the filament, and actually throws back energy to the first stage through the screening. As a remedy, connect the moving vanes of the variable condensers, and the filament end of the grid coil, direct to the T—terminal.

If this is not convenient through the metal end plates coming in contact with the screening, the rheostat would be better if inserted in the positive filament lead of the valve. Also, it is inadvisable to rely upon the metal end plate of the condenser for a connection to the valve, but to carry a length of wire from the moving vanes to the coil, and to the valve filament. Where no screening is used a cure to persistent oscillation can sometimes be effected by reversing the primary connections on one of the RF transformers.

Points About Valves.

C. T.M., of the King Country, has sent in a letter saying that he has a 3-valve receiver, and uses 201A type valves, which are two years old. The trouble is a persistent rattle in all the speakers he has tried. If a few more details had been given regarding the conditions under which the valves were being used, it would have been easier to give more specific reasons for this jarring.

Assuming that correct B voltages are applied to each stage, that the C battery is of the correct value, and that the various transformers are all in order, the only things to check over are the valves. As our correspondent has had these over two years, they will no doubt have passed their most useful days. It was asked whether a set of Mullard valves would be in order. A suggested set would be PM5 or PM5x for detector, PM5 for first audio and PM256 for second stage. The detector valve would need 22 to 45 volts B. The first audio, about 90 volts B, with 3 volts negative bias, and the final stage 90 to 150 volts B, with grid bias strictly in accordance with the

maker's data. It is not very often that a severe rattle develops in a transformer, and listeners experiencing a rattle in their speaker should look to the last valve and remember that a power valve will handle very little more volume than a general purpose valve, unless supplied with sufficient B and C voltages.

The Screened Grid.

A FEW weeks ago Pentode wrote an article on the application of a screened grid valve to the ordinary broadcast receiver. A very interesting criticism has come to hand from an Auckland enthusiast, who has made a number of experiments with one of these valves in his Browning-Drake. An extract from this letter is given:

"Dealing with 'Pentode's' suggestion of a 1 to 1 ratio transformer, with the primary interwound with the secondary, this idea seems to be wrong. As suggested, I made up the coil, but in my case this gave reduced volume and selectivity, and I suggest the following reasons: (1) With any coil or RF transformer, there is an optimum coupling, tapping or turn ratio, which cannot be exceeded if good volume and selectivity are desired. This is due to the damping effect of the preceding valve upon the tuning of the coil. In fact, a plain tuned anode circuit gives the effect of a coil having twice the losses that it actually does have. The 1 to 1 transformer is virtually the same circuit as the tuned anode as regards losses, tuning, etc.; (2) Although the SG valve is very nearly perfect, there is still a smaller amount of self-capacity, due to the fact that it is impossible to have a perfect screening action. There are also stray capacities in the leads, etc. As the primary is so closely coupled to the secondary, and having the same number of turns as the secondary, the feed back is increased through these stray and residual capacities, and selectivity is again decreased; (3) The step-up effect of the transformer is also lost."

"Pentode" is pleased with this criticism, as it shows that more than a passing interest is being taken in the more technical side of radio. Without desiring in any way to pull our friend's letter to pieces, the writer will indulge in a little criticism of his letter in return.

Dealing with the statements in the order in which they are set down the first refers to the best number of turns for use in the anode of a screened grid valve. Concerning any amplifying valve except the last stage, maximum amplification can only be obtained when the anode impedance is at least twice that of the valve preceding it. This holds good whenever a valve is used for voltage amplification alone, which is the case in all but the final stage.

In each case the impedance of the valve is given, but of the coil data very little information is available for the set builder, and so he has to either copy reliable specifications or experiment with a number of coils until best results are obtained.

Actual measurements of tuned coils show that the average coil on a 3in. diameter former and wound with space wound single wire has an impedance of 100,000 to 120,000 ohms. A coil wound with Litz wire and tuned can have an impedance of 200,000 ohms at any particular frequency. This resistance is only at the special frequency at which the coil may be tuned to and falls to about nothing on either side of this point. A screened grid valve has an impedance of 100,000 ohms and, according to our statement regarding suitable anode impedances, it will need an impedance of at least 200,000 ohms in its anode to obtain maximum efficiency. But this is only obtained with a tuned coil wound with Litz wire. So it is evident that a tuned coil will have to be inserted in the anode of a screened grid valve. The tuned anode method is here indicated. If two coils are very tightly coupled and one is tuned the other behaves as though it, too, was tuned. A one to one ratio transformer with the primary in the anode of the screen grid valve and the tuned secondary as the grid coil of the next valve would then give, as far as the R.F. valve was concerned, greater efficiency. This is dealing with actual amplification and the correspondent is evidently trying to combine this with selectivity. A screened grid valve has no claims for selectivity except when used under the very best conditions. These best conditions need coils to be wound with Litz wire and all condensers, etc., to be of the best quality. The correspondent mentions the effect of the damping of the valve upon the anode coil, which has the effect of decreasing the selectivity. This is true to a certain extent, but small bias batteries incorporated tend to overcome this, and this negative grid bias is recommended in any set using screened grid valves.

Regarding No. 2, "Pentode" believes our criticiser is slightly mistaken in his knowledge of how a feed-back occurs. Certainly there is a very slight amount of capacity inside the valve which cannot be entirely got rid of, but this small amount is insufficient to produce a feed-back through the valve electrodes. The coupling between the anode and grid coils of the first and second valve has no effect upon the feed-back. The place to prevent any intercoil coupling is between the anode and grid coils of the same valve.

The fact that a step up is lost through using a 1—1 transformer is unavoidable, but all the amplification is obtained from the valve, which more than compensates for the loss of the 3 or 4 to 1 step up of the R.F. transformer.

If your accumulator is a new one, keep the terminals in good condition by making a practice of coating them with petroleum jelly, which prevents the acid from attacking them.

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