Useful Constructional Hints

A Helpful Article Dealing with a Few Practical Difficulties

By "PENTODE"

JUDGING by the ever-increasing number of questions dealing with technical and practical difficulties sent in by correspondents to this journal, it surely indicates that there is an insufficiency of literature available on the difficulties that the amateur builder and set owner is likely to encounter. Unlike most other hobbies there are countless pitholes for the inexperienced to fall into, and, sad to relate, even the most experienced trip over trivials now and then.

Quite a large amount of space is devoted to these questions and their answers, and this is done because often a correspondent gives voice to trouble experienced by others, and the answer, although short, sometimes gives a wealth of information.

This week several letters have come to hand from readers, and the queries are typical of a few of the most likely sources of trouble met by most amateur set builders.

The first letter opened comes from Wellington. This listener, who uses a crystal set coupled to a two-valve amplifier, is troubled with motor-boating when used in conjunction with a home-built battery eliminator. The only way in which to stop this is by dimming the valve filaments, so our correspondent writes.

To begin with, two PM2 valves should not be used for first and second stage unless a high ratio transformer is used with the primary in the anode of the first PM2 valve. The use of a semi-power valve in the first stage has no advantage in its favour. Here are a few hints on how to begin to cure the trouble. Use a general purpose valve in the first stage, biased about 2 or 3 volts on the grid and no more than 90 volts on the plate. The last valve should be run according to the specifications given by the maker. Negative grid bias must be given when using battery eliminators, and although the correspondent has not stated this it is assumed that he is using a C battery. Unless used with care, grid bias worked from the bottom end of the B supply is not recommended.

If these simple remedies do not prove effective, then a choke and condenser must be used for the supply of the first valve. This is done by connecting a low frequency choke in series with the B battery lead to the first valve, and incorporating a 1 or 2 m.f.d. condenser between the terminal B plus on the first audio transformer and the A minus terminal. This prevents all back coupling, which is the cause of motor-boating.

A.M.K., of Wellington, has sent in a letter for advice on the power transformer of a battery eliminator he is building. The specifications are taken from a previous edition of the "Radio Record" on the construction of a battery eliminator. Having built the transformer he has applied a few tests and desires to know if everything is OK before building into the instrument.

The primary, wound for the 230-volt supply, is centre tapped for the 110 mains. The secondary is centre tapped for use as a double wave rectifier. The primary was connected to the 110 mains and a 230 v. 60 watt lamp put across one side of the secondary winding to the centre tapping of the secondary. To our reader's way of thinking, this lamp did not burn brightly enough, and when left for some time the transformer became warm.

Here is the information our reader desires. When designing transformers, the most important feature to bear in mind is the current that is expected to be delivered. The more current or amperage, the thicker will be the wire in order to carry this current. When a transformer is designed for a small drain, such as that needed by a battery eliminator, the guage of the wire on both primary and secondary can be kept down fairly small. If, however, a greater load is imposed on it, the transformer will heat up. An eliminator usually needs a current of 20 to 40 milliamperes, or about 1-33 of an ampere, and when the rectifier is of the full-wave variety, only half of this current will be drawn from each half of the centre tap.

Now, a 230-volt 60-watt lamp takes 60-230 eq. ¼ amp. approximately. The windings cannot be expected to stand this for long, and this accounts for the heating experienced. Also the resistance of the fine wire will be in series with the lamp, and with this current flowing will cut down the voltage considerably. So this shows that a lamp is not a reliable way to test a transformer. The only way is to use a high resistance A.C. voltmeter. Failing this, a rough indication can be obtained by determining the ratio of the primary and secondary windings, and calculating mathematically.

If a transformer with no load on the secondary heats up when connecting to the mains, the trouble is usually rather serious, and it will probably need rewinding. It usually indicates that the insulation has broken down, and that part of the primary or secondary is short circuiting. Even one short circuited turn is fatal, and results in a burnt-out transformer.

Learning by Experience.

WHILE on the subject of transformers, the writer had a peculiar experience, and the information learned may be helpful to others who are building large transformers. The one under discussion was wound to deliver 650 volts on each side of a centre tapping, and the secondary was wound with No. 30 DCC wire. Each layer was separated with paper, and liberal applications of shellac varnish applied. A particularly neat job was made, which seemed to be its only good feature, for when connected to the mains the coils were soon smoking. This was with no load at all.

To the tune of much unparliamentary language the transformer was dismantled and the coils unwound. Each moment it was expected to come across an insulation breakdown, but right to the last turn the windings were intact, with no sign of charring. More wire was bought, and the job started again. Thicker paper between the layers and larger applications of shellac were used, with the result that the transformers didn't possess the good looks it had before. Again it was connected to the power, and once again smoke began to show signs of appearing. Not being possessed with unlimited patience, the only revenge that could be thought of was to let the thing do its worst. So, with a fire extinguisher handy, the onlookers stood well back to watch events. It seemed that we were unlucky, because after about 20 minutes of patient waiting, the smoke ceased, and it apparently was cooling off.

Then it dawned on the whole party that the whole trouble was due to moisture in the windings, and that a large leakage was taking place from layer to layer, until all the moisture had been driven off. Apparently the leakage was sufficient to cause the windings to heat up, and the first winding need never have been undone. When building a transformer always let each layer of shellac dry off before starting the next, and when completed bake the whole in the oven until all moisture has been driven off.

The Neutralising Problem.

A READER has built a neutrodyne receiver, and has taken special precautions to thoroughly screen each stage separately, and yet the high frequency valves refuse to neutralise. How many constructors have been unable to neutralise their sets and spend hours unwinding and rewinding their coils? It is comparatively easy to neutralise a valve, providing the feed back is only taking place through the valve electrodes. This is the reason that screening is used, to avoid the coupling between the different coils. There are other points that have to be watched to prevent the feed back and the average amateur is apt to overlook these. First consider the different B battery leads to each compartment in a screened set. Here is one of the