

from B+ amplifier through a resistance to the new tapping. This is connected through a condenser to B—. A condenser of 2 mids. with a high-voltage test is essential. The resistance should range between a 25,000 and 50,000 ohm wire wound or carborundum. If a variable resistance is inserted here the voltage may be adjusted. In addition, biasing the radio frequency valves with, say, 1½ volts, would further cut down the current, making still more available for the moving coil.

The correspondent states that he is using 605 and 608 valves in the first audio and power sockets respectively. This is a wrong combination—605 is a power-valve and being used in the first audio, is consuming far too much current and thus depriving the last valve. Replace it with a higher impedance valve, say 609.

He goes on to state that he constructed the moving coil described by "Pentode," but finished it before the article on the matching of impedances appeared. He now uses 605 with 105 turns, and asks if this is correct?

A.: With 605 the impedance of which is 2800, 50 turns are required with a step-down transformer, but 608 would be the better valve to use with such a speaker. It will slightly lessen volume but will make up in tone. Using this valve, 30 turns on the moving coil are sufficient. It would pay our correspondent to dismantle his speaker and take off some turns to give the number specified.

Oscillation Troubles.

"SHIELD" (Waitara) inquires regarding his super-hetrodyne, which uses

three UX222 valves. He has observed that he cannot increase the filament voltage beyond 2.8 without the set bursting into oscillation. As the normal current is 3.3 volts, he presumes he is not getting the maximum from his set.

A.: So long as the set is oscillating he is getting the maximum, though in this case, he should try reduction of the plate voltages. This should bring the oscillation point lower, and allow a higher voltage to be applied on the filament.

"Round the World Two."

REGARDING this popular receiver, "W.I." (Lower Hutt) asks the following questions:—

1. Would a glass tube of half an inch diameter be suitable on which to wind the choke.

A.: Yes, if by half-inch the inside diameter is understood.

2. Would a fixed condenser .0005 replace .0002. I cannot purchase the latter?—Yes.

3. Would a midget condenser be suitable for aerial coupling?—Yes.

4. What wavelengths could my five coils cover? Do I use the same coil for reaction all the time?

A.: Regarding the coils: Before the wavelengths these will cover can be calculated the following data is essential. The distance between the first and the last turn, the number of turns, the size of the wire, the size of the former, and capacity of the tuning condenser. The tickler has to be altered for each coil.

The correspondent states: A friend has constructed one, but when tuning with the reaction plates all in, all he can get is a very loud squeal all round his dials. What is the cause?

A.: Too much reaction. Don't use the plates all in if this is the case, and try reducing the "B" voltage.

"Megohm's" Speakers.

COULD you please tell me which speaker will give the best results on the high and low notes, writes "G.F." (Dunedin). The one described in the "Radio Record" of May 3 or the 2ft. cone described in the "Radio Listeners' Guide"?

A.: There is very little difference between them. The one described in the "Record" gives a slightly better overall amplification, but the difference is very small.

2. Will any four pole balanced armature type of speaker unit do for either speaker?—Yes.

Coils for the Browning-Drake.

"RHEOSTAT" (Alexandra) has done some experimenting with the 2R.F. Browning-Drake and has found that replacing his 3in. coils by those wound on a 2in. former has made a great improvement in the layout. The particulars of these coils are: Aerial coil used in series with a .0001 fixed condenser tuned with a .0005 variable condenser, 65 turns wound 32 turns to the inch, regenerator tuned with a .00025 condenser 122 turns wound 32 turns to the inch. To neutralise a tapping has been made on the twenty-second turn of the regenerator. He asks if this is correct.

A.: It is rarely necessary to shift the tapping past the eighteenth turn, although the twenty-second turn should give quite good results.

Could you give me the correct number of primary turns to suit the following valves, the regenerator being wound on a 2in. former:—

A609 impedance 6,000 ohms, turns 16
PM3 impedance 16,000 ohms, turns 20
PM5 impedance 18,000 ohms, turns 22
A630 impedance 20,000 ohms, turns 28
A425 impedance 21,000 ohms, turns 30

The correspondent has noticed a peculiar phenomenon. With the set switched on, but with the speaker not connected to the jack, reception may be heard, although it is sometimes of a "buzzy" nature. At times it reaches such volume and intensity that speech may be followed.

A Corner for Beginners

Power for Dynamic Speakers.

DYNAMIC cone speakers are now becoming very popular, and with their popularity problems concerning them arise. The power required by these speakers to excite the field magnet ranges usually from half an amp to an ampere or more. This places a fairly heavy drain upon the 6-volt accumulator, and so some provision has to be made in order to keep the "A" battery up to scratch. There are two methods: 1. The provision of a charger with a charging rate of about 3 amps, to recharge the "A" battery as soon as it is finished with, and (2) keeping a trickle charger either on the battery when this is connected with the speaker or by connecting the battery charger directly to the speaker winding. Where a battery charger having an output of half an amp. upward is obtainable it can be quite well connected between the electric light mains and the speaker. The only difficulty here is that if the charging rate is not high enough the field magnet will not be saturated and hum will result, although this is not very distracting providing the field can be relatively well provided with current.

Connecting a trickle charger to the battery and the battery to the moving coil loudspeaker as well as to the set has a slight disadvantage in that it is liable to cause the set to hum, but this again very much depends on the particular conditions in which the set and the speaker work.

It is sometimes stated that this type of speaker requires very high plate voltage on the last valve and is less sensitive than an ordinary cone speaker. This is not necessarily the case. It is sometimes, and the intending purchaser should ascertain the sensitivity of the speaker he intends purchasing. Recently, the writer tested a good moving coil speaker comparing it with a cone type speaker for both sensitivity, tone and quality. It was found on all these three points that the dynamic cone was far superior, it being quite as sensitive as an ordinary speaker even on distant stations and with only 150 volts on the plate of the last valve. When operating on the local station, it was found that the voltage on this valve could be reduced to 100 without a great deal of loss without quality.

The Care of Wet Batteries.

IF the set is to function well it is essential that the wet batteries, whether "A" or "B," are carefully attended to. The principal points in the care of the batteries are as follow: (1) Keep it fully charged, (2) keep the liquid at least ½ in. above the plates (3) handle it carefully.

When the battery is being charged the sulphuric acid which has passed from the electrolyte into the plates is driven out, thus raising the specific gravity of the electrolyte, and one recognises the condition of a full battery. This is the explanation of the hydrometer testing apparatus, whereby various specific gravities are tested. As a battery slowly discharges, sulphuric acid passes from the electrolyte (the solution) into the plates, and unless this is thoroughly driven out by regular recharging the plates become loaded with sulphuric acid, and sulphation takes place. Acid should never be added. If the battery becomes weak, and the full specific gravity cannot be real-

A.: One of the transformers is slightly defective, resulting in one of the laminations vibrating in sympathy with the varying density of the magnetic field resulting in a conversion of electro-magnetic impulses into sound waves acting on the same principle as does a speaker unit.

ised, it should be charged as fully as possible, and the electrolyte drained off and fresh solution of the specific gravity of 1.3 (1300) added.

It is important that the solution be kept covering the plates. This is a point very liable to be overlooked. A case was noted by the writer recently where a listener complained that his battery would not come up to the right charge, and dropped very rapidly. On examination it proved that the solution was not covering the plates. In fact, two inches were uncovered. This is liable to permanently ruin a battery, for in discharging sulphuric acid enters the plates, the electrolyte evaporates slightly, and on recharging the sulphuric acid cannot be driven out, because there is nothing to drive into, hence in time the plates become ruined. Distilled or rain water collected in a earthenware vessel can be used.

Correspondents quite frequently complain that in spite of regular charging and keeping the electrolyte to its proper level the battery rapidly runs down, indicating a short circuit. Presuming this is within the accumulator (which can be tested by isolating the accumulator from the set, and leaving it for some time, and testing), it is caused probably by parts of the plates becoming dislodged, falling to the bottom, and short circuiting. This is the outcome of either age or rough handling. In addition, rough handling causes leakage.

Concerning Audio Transformers.

THE general advice regarding these is to avoid small transformers, the reason being that unless special material is used in the core and in the wire of the windings, various faults will arise. Particularly is this the case when more than one transformer has to be used.

Probably the most common fault in the audio amplifier is audio frequency oscillation—a high-pitched squeal that altogether spoils reception. This is sometimes very difficult to eliminate, and the writer had a quite interesting experience recently. An amplifier using high voltages was employed, but it was found that whenever a high voltage was applied to the plate of the last valve a high-pitched howl, which developed into a roar, drowned reception. It was caused probably through interaction between the transformers, an over-saturation of the last valve or grid plate interaction.

There are several cures for this type of audio oscillation, and from time to time, we have recommended them to correspondents through "Questions and Answers." The usual practice is to reverse the primary leads to the transformer, or to place a resistance in shunt, that is across the terminals of the secondary of the last transformer (G to GB or C minus). This resistance may be a grid leak, and the most appropriate resistance is found to be usually half a megohm. If the whistle persists, resistance may be lowered. Such a resistance may be placed across the secondary of the first transformer. This will reduce volume, but considerably increase tone. By placing the grid leak in series with the grid, a preventative is assured. Short grid and plate wires well clear of one another should be employed. Transformers should be at right angles to one another, and it is sometimes necessary to earth the cores. When this howling is noticed with a crystal and amplifier, A minus should be connected to earth.

NO matter what kind of set or how much high-frequency amplification used, a good aerial and a good earth are always well worth while.

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