

Sometimes a small cone with apex facing outwards is secured to the inside of the large cone, its diameter equalling that of the moving coil. This addition will in some cases make an improvement in bass note reproduction.

In order to get good reproduction a baffle-board of some kind should be used. This should be of three-ply or heavy millboard three or four feet square, with a round hole in the centre through which the speaker works.

Merits of the Moving Coil.

THE above details are not given as working instructions, but with a view to giving readers a fairly accurate idea of the construction work involved in a moving-coil speaker.

Its construction allows of liberal movement of the diaphragm without obstruction such as causes "chattering" in ordinary speakers. Coil-driven speakers have far less resonance than ordinary types, and give more even amplification of all frequencies, as the diaphragm correctly follows the voltages applied to the grid of the last valve. The bass note reproduction gives the effect of overall sound intensity, and the higher frequencies give the quality of the transmission. The coil-driven diaphragm is free to be moved through the liberal amplitude necessary to reproduce intensities of volume in proportion to the frequency.

Hints on Soldering

Having a good iron or other suitable means of heating soldered joints is important, but using it efficiently is just as necessary. Many failures of newly-constructed receivers are caused by one or more "rosin" joints in which heat has not been applied for a sufficient time to make a sound joint, with the result that the rosin core has melted and formed an insulating cement that "joins" the wires but allows no electric impulses to pass.

The correct way of using rosin-cored solder is to first apply the iron to the work in order to heat it as a preliminary, then raise the iron a trifle from the work and introduce the rosin cored solder between the working face of the iron and the work itself. Then press the iron against the work and hold it there until you note the solder flowing smoothly and freely about the contact. Then lift the iron and allow the work to cool and you will find that you have executed a perfect joint.

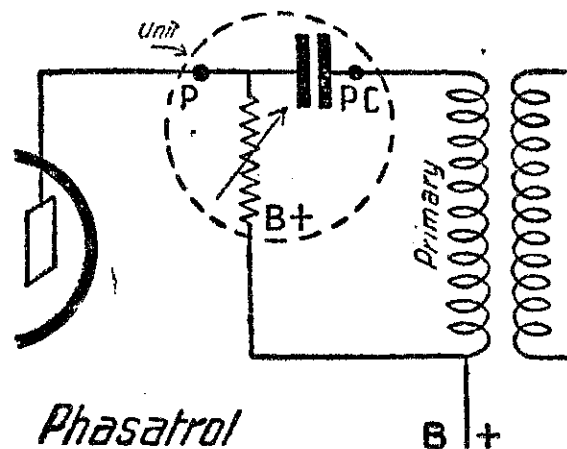
Never attempt to carry your solder and flux to your work on the heated iron point, because it requires skill of a high degree to accomplish a satisfactory operation in this manner. If you melt solder on the upper faces of the iron it forces the flux and solder to run around the iron faces before it can reach the surface which we wish to solder. This allows the abietic acid to volatilise before it has any opportunity to accomplish its purpose. Then you are likely to secure one of those dreaded rosin joints. Those who are in doubt as to their skill in executing a successful soldered joint can adopt no better method than to first "tin" with solder the two surfaces which they intend to join; then bring them in contact and reheat, applying a small amount of the rosin cored solder directly to the union to complete the operation.

The iron must be kept clean and well tinned in order to make sound and satisfactory joints.

The Phasatrol

THE Phasatrol is a device for the prevention of oscillation in tuned radio-frequency amplifiers. It is easy to adjust, and is said to have a more constant gain on all wave-lengths than other neutralising systems. The Phasatrol unit is a variable high resistance combined with fixed condenser of suitable value, their purpose being to shift the phase of the alternating voltages in the plate circuits of the R.F. amplifying tubes, so that over a certain waveband, tube oscillation and excessive regeneration are eliminated.

When the Phasatrol is connected in the plate circuit of an R.F. valve as shown in the diagram, the fixed condenser of the Phasatrol changes the time factor of the feed-back impulses, so that instead of returning to meet the signal impulses "in phase" and building them up into undesired oscillation, they travel through the grid-to-plate capacity of the valve and arrive on the grid just after the signal oscillations have gone. As a result there is no building-up action to cause unwanted oscillation. In theory the phase dif-



ference is never absolute, but the slight regeneration that takes place is negligible.

The function of the variable resistance is principally to feed the direct B current to the plate of the valve. This resistance is non-inductive and non-capacitative and has no effect on the phase displacement.

The unit is adjusted to balance the receiver by turning the set-screw provided slowly backwards in anti-clock direction until maximum signal strength without oscillation is obtained on low wave-lengths. Once the correct adjustment has been obtained, no further attention is required. The Phasatrol is used very successfully for neutralising Browning-Drake R.F. circuits.

The Earth Plate.

A BURIED conductor, or several of them, running in the ground under the aerial, constitutes the best earth, but cannot always be conveniently provided. A good earth is a buried dust-bin, water tank, or sheet of galvanised iron buried a full six feet deep, or where the ground is always moist. It is a good plan to solder on three stout copper wires in different places and join these above ground to the earth lead to receiver. All these underground soldered joints should be protected with paint, tar, or varnish of some kind to prevent possible early disintegration. Adopt a good earth system and use it alone. Do not connect to two separate earths at the same time, as each one will probably require a different tuning.

Methods of Volume Control

LISTENERS who are situated only a comparatively short distance from a broadcast station are particularly interested in the subject of volume control, but it is also of interest to any possessor of a good receiver.

R.F. Stages.

THERE are several ways of controlling volume, a good method being the placing of a variable high resistance either in series with the aerial lead, or across the aerial and earth terminals. In either case the resistance must vary from zero to a very high figure, not less than 200,000 ohms in the first case, and several megohms in the second.

If the energy is not controlled at the entrance to the receiver as above, then a variable high resistance with a maximum of about 400 ohms may be placed in series between secondary coil and R.F. transformer and filament. This method, however, decreases selectivity.

Another method is to place a 200,000 ohm maximum variable resistance in the B positive lead to the R.F. valves. There should always be provided a bypass condenser of not less than .005 capacity, placed on the side of the resistance nearest the primary coil, the other end of the condenser being connected to the earthed filament lead. This method is very satisfactory with most receivers, and is really a way of reducing amplification, or oscillation control.

The filament rheostat control is very popular, and very satisfactory when wisely used. This method functions by limiting the emission current, which increases the impedance of the valve, and if the current is unduly cut down, distortion is possible, so that care is required to see that the reduction is kept within reasonable limits.

The Detector.

CONTROLLING volume in the early stages is a good scheme, but in a set employing regeneration it is understood that reaction should be suitably reduced before other controls are used, and very often will be sufficient, leaving other controls set at the point of maximum efficiency. Sometimes a variable high resistance of the non-inductive type is shunted across the tickler, and though this system is used in many circuits, especially those for short-wave reception, is not always the most satisfactory, and moving coil or condenser control are more popular.

If control is left until after the detector stage, it is not so satisfactory as control in R.F. stages, because the detector may then be overloaded with strong signals, causing distortion that cannot be eliminated by any subsequent system of volume control or reduction.

Audio Control.

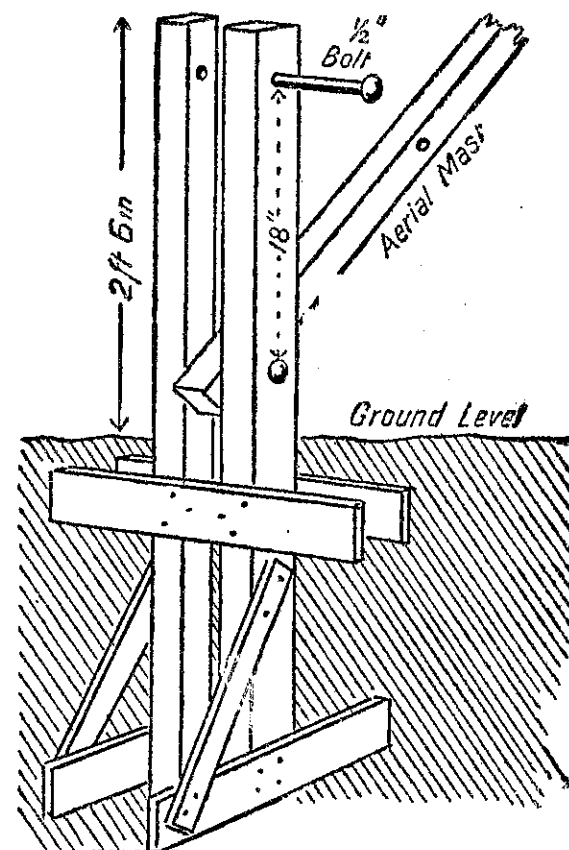
AUDIO control may consist of a variable high resistance across primary or secondary of transformers, maximum 100,000 and 500,000 ohms respectively, or across the output, that is, across the speaker leads, in which case a resistance with a maximum between 25,000 and 50,000 ohms will suit.

Volume control by detuning the aerial circuit is bad when the detun-

A Trouble-Free Aerial Pole

THERE is a method of mounting an aerial pole which is not a new idea, but which is not utilised as much as it should be, when the great convenience is considered. This system makes erection of the pole easy, and also allows of every access to the top at any time by simply withdrawing a bolt, releasing the backstay, and lowering the pole, hinged at its lower extremity. Reference to the diagram shows the arrangement in a way that requires little explanation.

Two uprights of 3 x 2 timber are connected on their lower halves by suitable strips of timber, braced as shown. The space between the two uprights is the width of the pole, 2 1/2



inches square being a suitable dimension for a 30 or 40ft. pole. Near the lower end of the pole a 1/2-inch hole is drilled, and corresponding holes in the uprights take a long half-inch bolt to act as a hinge. When the pole has been raised, it is held in place by a bolt passed through a hole drilled in each upright, and the pole, eighteen inches above the lower bolt.

The usual stays are provided to steady the pole, which may easily be lowered at any time by two persons, only the backstay being released. The pole should, of course, be placed so that when lowered its length is clear of fences, and can lay along clear ground if possible. With such an arrangement the breaking of a halyard or pulley fastening will cause little concern to the owner.

ing only amounts to a few kilocycles, and can cause bad distortion in a selective receiver. In an unselective receiver detuning will usually have no ill effects. In a selective receiver detuning is only permissible if through a good many degrees on the dial, which is an amount that would cut reception out altogether.

If the receiver is unshielded there will always be a certain amount of pick-up by the coils.

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