

New Type Metal-Shell Receiving Tubes Announced for Summer Appearance

A NEW line of metal-shell radio receiving tubes which tests indicate to be of greater continued efficiency of operation than the glass-envelope types now in use, developed by General Electric and announced for appearance on the market within the next few months, are not only much smaller and more sturdy but also offer many improved electrical characteristics over the conventional tubes of today. They provide their own shielding, of course, and the metal shell is a better heat conductor and radiator than glass. They are especially advantageous in the field of short-wave reception, which makes them of particular interest to amateurs. The short leads of the tubes permit greater amplification at the higher frequencies and the more effective shielding insures greater stability.

These new tubes, having an entirely different pin arrangement, are not interchangeable with glass tubes in the present type radio receivers and will make their first appearance in the new fall line of General Electric sets.

A NEW CONSTRUCTION

The metal tubes are cylindrical in form, some in reduced diameter at the top. Others, such as a radio-frequency amplifier, have a terminal at the top extremity. Each lead-in wire passes through a tiny bead of special glass that is fused securely within an alloy eyelet, which in turn is welded to the metal container, thus assuring a long-life vacuum. This alloy, having substantially the same coefficient of expansion as glass, is known as Fernico and is a combination of iron, nickel and cobalt. It was developed expressly for this purpose of a perfect seal on the new tubes.

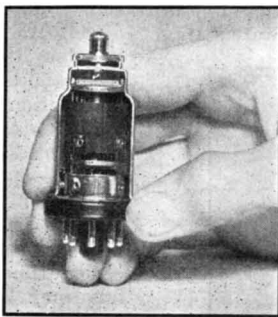
The inner parts of the tube are first assembled on the steel end plate or header, and then the shell is placed over the assembly and welded to the header at its circumference. In the main, the new tubes are less than half the size of the familiar glass tubes of corresponding rating. The metal shells are, of course, much stronger than glass bulbs and not subject to breakage, while the use of short, stiff supports in the new tubes results in less mechanical vibration of the internal elements. Elimination of the glass "pinch seal," in which leads and supports are concentrated in the bottom of the present glass tubes, allows the leads to enter the header of the new tube at the proper

points for short, direct paths. Also, the new design permits a logical arrangement of base connections and supports between base pins and electrode structure.

The familiar metal shield which is necessary with the glass tube in radio-frequency portions of a circuit is no longer required with the new tube. The metal envelope itself serves as a shield. And, since closer proximity of shield to elements can be realized, the shielding is more effective.

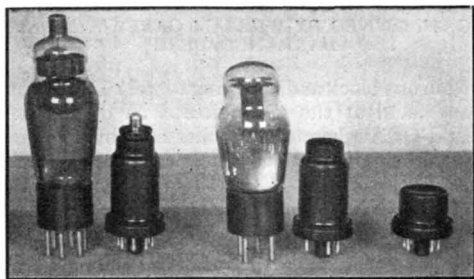
Whereas in certain types of glass enclosed screen-grid tubes the anode is shielded first by an internal structure, next by a coating on the inside of the glass bulb, and finally, when in use, by an external "can," in the new metal tube all these functions are performed by the shell. A further favorable feature of the metal shell engineers believe, is that it aids residual gas cleanup, thus promoting continued efficiency of operation.

The new tubes have one more base pin than comparable glass tubes, since the metal envelope has become the shield, and provision must therefore be made to ground this envelope. In the base of the new tube, all the pins are of the



CUT-AWAY VIEW OF A PENTODE-TYPE R.F. AMPLIFIER SHOWING THE INTERNAL CONSTRUCTION

A hack-saw is the instrument for such an operation.



STANDARD METAL-SHELL TUBES COMPARED WITH EQUIVALENT GLASS TYPES

They are, left to right, a screen-grid r.f. amplifier, a small triode and a duo-diode, the latter an entirely new basic type.

same diameter, and in the center is a longer insulated keyed pin. By placing this insulated pin in a hole centrally located in the socket, and rotating the tube until the key slips into its groove, the tube is quickly and easily inserted.

The metal construction has been applied both to existing standard types having indirectly heated cathodes, and to newly developed basic types, including a duodiode, and a hexode pentagrid converter for superhets.