COMPLETE SPECIFICATION

An Improved Method and Apparatus for Testing Radio Valves

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This invention relates to the testing of radio valves.

By common consent the static mutual conductance value has been chosen as the standard of merit or "goodness" of a valve. The mutual conductance value is usually stated on the valve maker's data sheets and a valve which gives a satisfactory mutual conductance figure, i.e., a figure approaching that given by the manufacturer, can be relied upon to operate satisfactorily and conversely.

Mutual conductance of a valve is interpreted as the change in anode current which occurs when the grid voltage is changed by one volt, under the correct conditions of anode voltage, screen voltage, and the like, applicable to the valve. The one volt change in grid voltage is usually obtained by changing the grid voltage ± ½ volt about zero—i.e., from—½ volt to + ½ volt—by connecting the terminals of a battery alternately to the grid. Thus, if with the correct D.C. anode voltage (and, if necessary, screen voltage) the anode current obtained is "A" milliamps (shown on a suitable ammeter) with −½ volt on the grid, and rises to "B" milliamps when the grid voltages is changed to + ½ volt, then the change in current B—A milliamps represents the mutual conductance of the valve and can be compared with the maker's figure. If the D.C. voltages for anode and screen are to be obtained from A.C. mains through a suitable transformer and rectifier, the bad regulation that is inherent in the rectifier will prevent the applied voltages being constant in all conditions unless a voltage control and voltmeter are supplied by which the voltage can be constantly checked. To satisfy these conditions, the valve testing apparatus would necessarily be complicated as well as cumbersome and costly, as it would require a number of meters and various regulating devices. Alternating current has, however, been used for testing the total emission of valves, the plate and grid being connected together, but this is apt to be harmful to the valve and does not give a reliable indication of valve "goodness." It has also been suggested to apply alternating current voltages on the grid for obtaining mutual conductance figures, by connecting the filament circuit to the grid and providing means whereby the voltage applied to the grid may be put in phase and then in phase opposition with the anode voltage, the mutual conductance figures being obtained from a meter in the anode circuit. However, since no special values were selected for the alternating voltages applied to the various valve electrodes, the D.C. change in anode current had no special relation to the mutual conductance of the valve when expressed in its correct units. The test figure so obtained for any given valve will not be the same as the manufacturer's mutual conductance figure for a valve of equivalent "goodness" and accordingly it is not easy to ascertain what relation to mutual conductance the test figure is supposed to indicate. Moreover, variation of the current in the filament circuit involves variation of the potentials applied to the grid accompanied by further disturbance of the indicated mutual conductance figures.

If some attempt is made to co-relate the method of testing with the valve manufacturer's D.C. test figures, then the reasonable assumption is to apply A.C. voltages to the anode, grid, etc., the R.M.S. values of which are numerically equal to the manufacturer's D.C. test voltages.

For instance, if a triode mutual conductance was obtained with 100 v. D.C. on the anode and a grid change of ± ½ volt D.C. (following the maker's figures) then it would seem reasonable to apply 100 volts R.M.S. A.C. to the anode of the valve and change the grid potential from ½ volt A.C. R.M.S. out of phase to ½ volt A.C. R.M.S. in phase. Were this done it would be found that the mA/V figure obtained would be less than half the correct figure for the valve in question.

The main object of the present invention is to utilise alternating current for the anode circuit whilst enabling meter readings to be obtained which indicate proportions of the actual published mutual conductance figures.

We have ascertained that if the R.M.S. of the anode alternating voltage is made 1.4 times the rated D.C. voltage and the