ELECTRONIC TUBES
INFORMATION BULLETIN

SPECIAL PRODUCTS DEPARTMENT WESTINGHOUSE LAMP CO., BLOOMFIELD, N. J.
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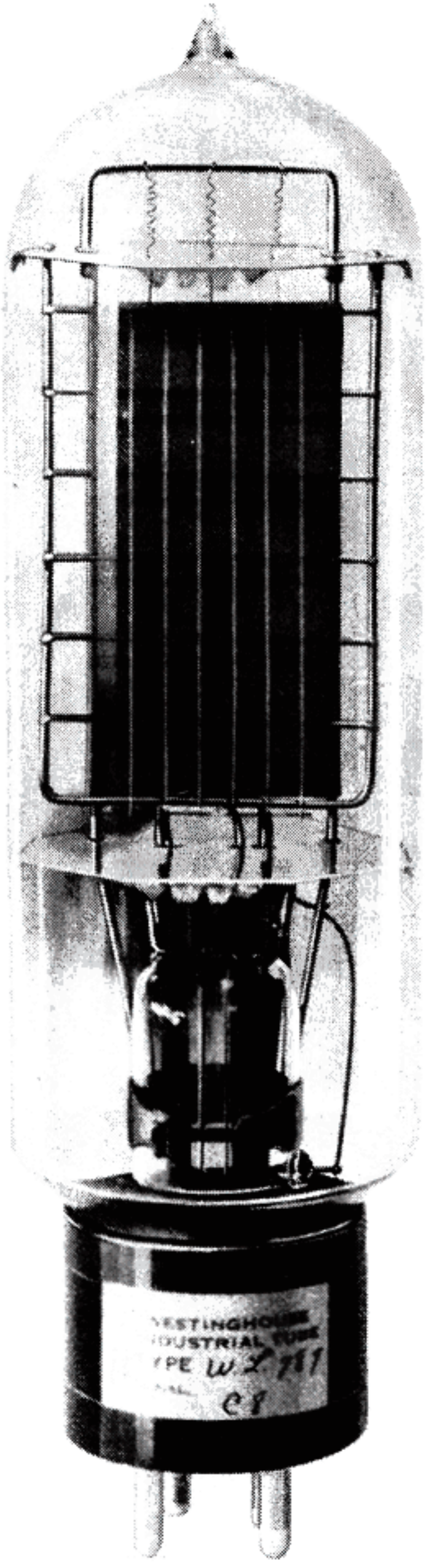
WESTINGHOUSE DEMONSTRATION TRIODE TUBE
TYPE WL-787

USES

The Westinghouse Demonstration Triode Tube, WL-787, shows visually, in a manner impossible to accomplish in any other way, just what takes place when changes are made in the grid and plate voltages of a vacuum tube. In the lecture room it is now convenient to augment the theoretical discussion with a practical and visual demonstration of the operation of a triode.

By varying the grid voltage in steps over a Class A, B, or C excitation cycle, the effect of changing excitation on the electron flow from the filament to the plate and the corresponding correlation of this action with fluorescence on the anode can be readily shown. The description and theory concerning the operation of such a device may be supplemented by a demonstration of just what takes place in a three-electrode tube.

The distortion in an amplifier may be rated by using a large excitation signal or a wide range of grid voltage values, by which it may be seen that the fluorescence line width will not vary to an extent proportional to the grid voltage changes. This is particularly true if the excitation is made so high that it causes the electrons and plate current to go beyond the cut-off values. In this case it will be seen that the fluorescence

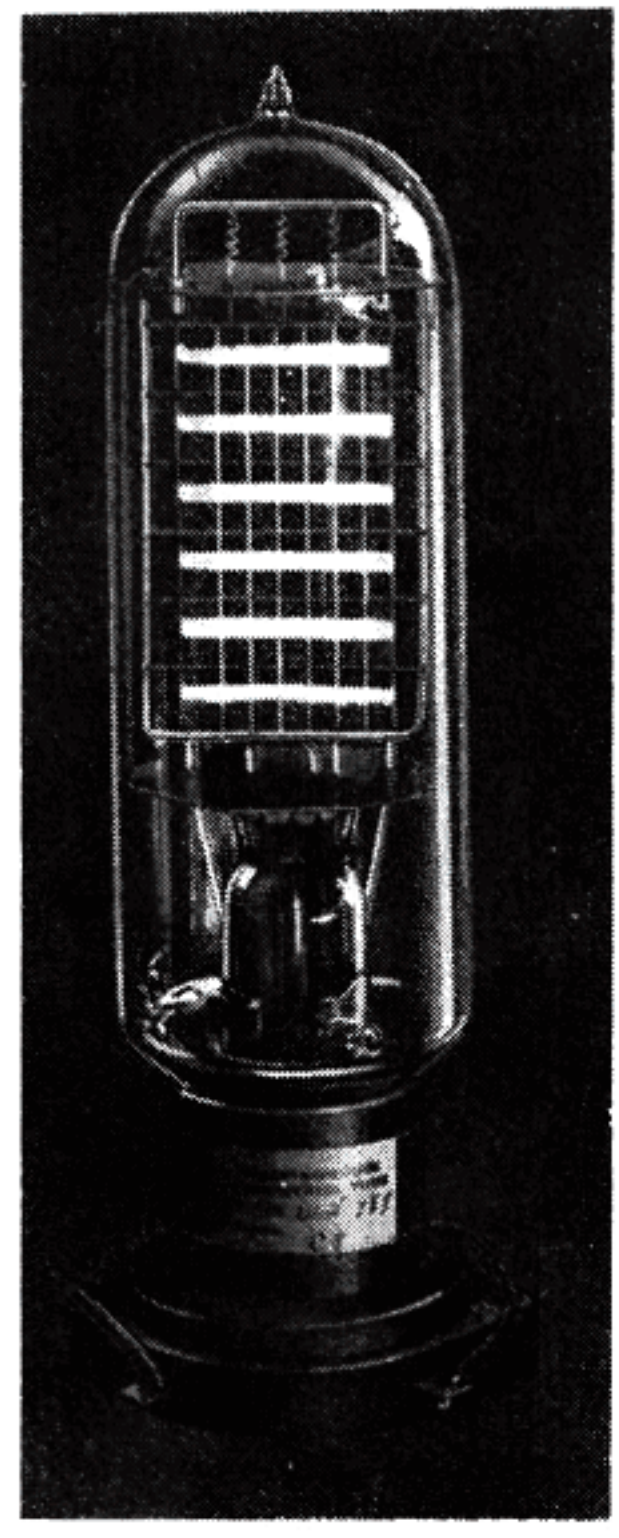


band width does not accurately follow the excitation voltage values, which corresponds with operation when distortion is experienced.

The amplification factor effect of the tube may be shown by noting the grid and plate voltages for a certain amount of fluorescence on the plate, after which the grid bias voltage may be changed by a few volts, say 10, and it will be found that the plate voltage must be changed by a much greater amount to restore the original width to the bands of fluorescence. The ratio between the number of volts change in the plate circuit which compensated for the grid change to the grid voltage change is a direct measure of, and is the actual amplification factor of the tube.

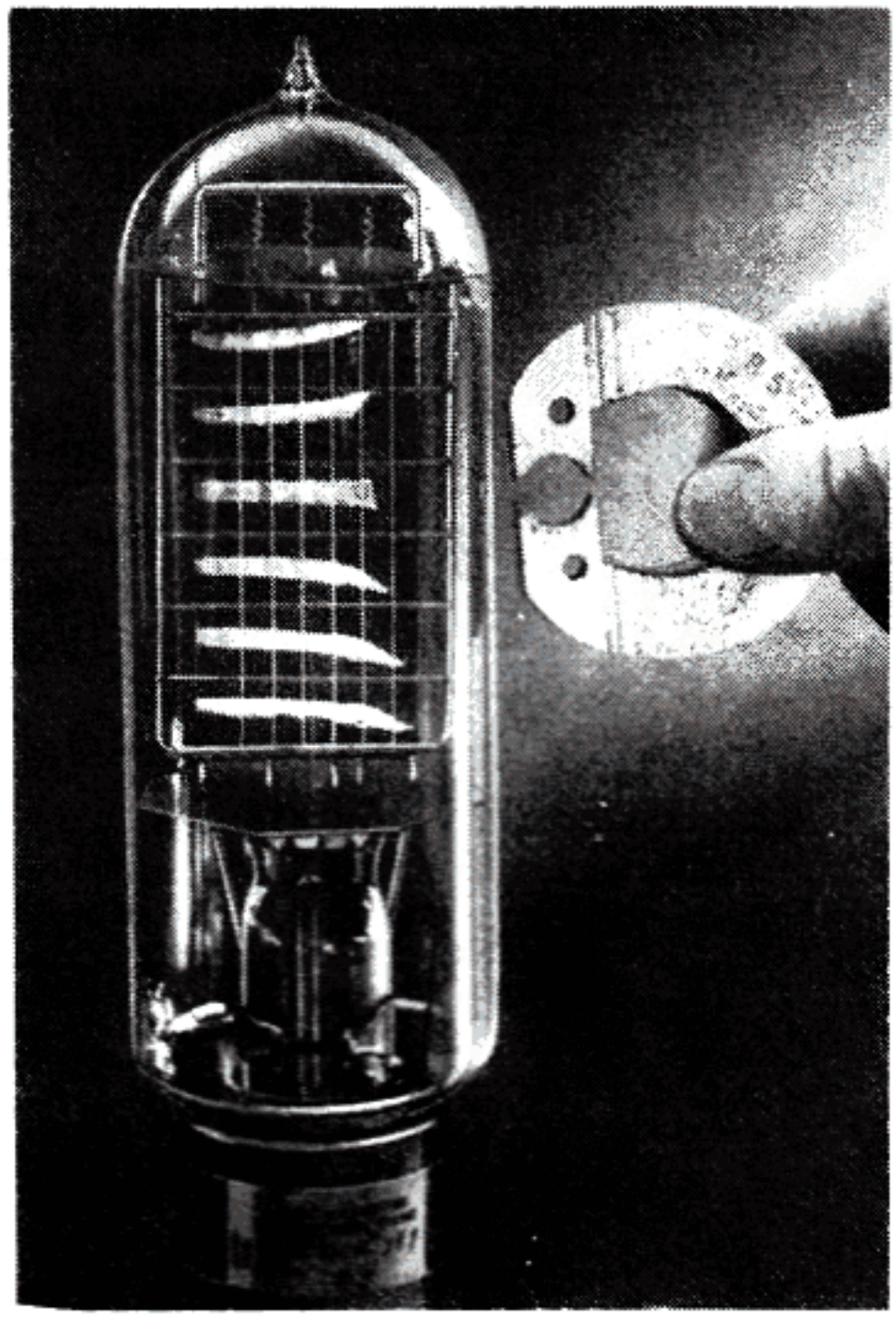
Another interesting demonstration can be made by holding a strong magnet near the side of the plate. In addition to showing the visual effect of the magnetic field on the electrons and their distribution, it is possible to obtain a representation of the lines of magnetic force under favorable conditions.

There will be a certain fluorescent pattern on the plate formed by the control effect of the grid on the electrons passing to the plate. As the grid is made more and more negative in voltage, the individual strips of fluorescence opposite each opening in the grid will become more and more narrow until finally they disappear altogether. The point at which the lines disappear will correspond with the grid bias value at which plate current cut-off occurs, and under



which condition there will be no electrons reaching the plate. The grid may be made still more negative, in which case there will be no apparent change in the tube, which voltage value corresponds with the conditions existing in an actual triode when the net voltage on the grid is greater than that required to produce plate current cut-off.

As the grid voltage is made less negative from the point at which plate current out-off is obtained, the fluorescence will reappear and the width of the strips will increase as the net voltage on the grid is decreased. As in a triode, the changes in fluorescence will be proportional to the number of electrons reaching the plate which is, naturally, a measure of the plate current. As the grid becomes positive with respect to the filament, the fluorescent lines become still wider until a positive grid voltage is obtained at which fluorescence covers the entire plate with a quite uniform intensity.



DESCRIPTION

The filament consists of several parallel oxide-coated wires, all of which are located in one plane so that the plate current will be uniformly distributed. The anode is the fundamental flat plate mounted parallel with the plane of the filament. The grid comprises a fairly open and conventional structure mounted between the filament and plate. The side of the anode next to the grid and filament is coated with Willemite which shows a bright greenish fluorescence when bombarded with the electrons which form the plate current. A pronounced and clearly visible glow shows at all points where the electrons strike, resulting in a definite pattern of the grid on the plate. The size and arrangements of all parts have been made so as to make the tube useful in illustrating the action of the grid in a three-electrode tube. All parts have been securely mounted and welded according to good current tube assembly practice. The plate size is such that the action will be visible to everyone in a lecture or class room of reasonable size. A slight amount of experimentation will show how the tube may be handled to demonstrate the desired effects. The tube is practically fool-proof in operation and will stand a wide variety of operating conditions. Either alternating current or direct current power may be used to heat the filament and to supply voltages for the grid and plate. A tube socket and the adjustable voltage sources are all that are needed to permit the operation of the tube, although some meters will be of convenience in making adjustments and readings.

TYPE WL-787 DATA AND RATINGS

Filament Potential	6 volts
Filament Current	1.6 ampere
Filament Type	Oxide Coated
Maximum Filament Potential	6.3 volts
Maximum Plate Potential	400 volts
Maximum Plate Current	.100 ampere
Maximum Grid Potential	200 volts
Maximum Grid Current	.050 ampere
Approx. Amplification Factor	2
Plate Length (approx.)	5 inches
Plate Width	1-½ inches
Maximum Overall Length	10 inches
Maximum Diameter	2-5/8 inches
Base Type	4 pin Industrial
Socket	S #793202

For prices and further information write to Special Products Sales Department, Westinghouse Lamp Company, Bloomfield, New Jersey.