SECTION AB46.338A
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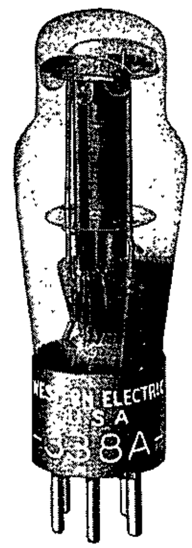
Western Electric

338A Vacuum Tube



Classification—Three element, argon filled, thyratron, with an indirectly heated cathode

It is primarily a rectifier of low internal impedance whose conduction cycle is determined by the relative instantaneous grid and anode potentials. It is intended for use in special circuits as a relay or trigger-action device. A few of its other possible uses are: as a controlled-frequency oscillator giving a square wave-form, as a voltmeter or volume level-indicator, as a source of sweep-voltage for a linear time axis, or as a variable-voltage rectifier.

Dimensions—The dimensions and outline diagrams are given in Figures 1 and 2. The overall dimensions are:

Maximum length . . . . $4\frac{7}{16}''$

Diameter . . . . $1\frac{9}{16}''$

Mounting—This vacuum tube employs a standard five-pin thrust type base suitable for use in a Western Electric 141A or similar socket. The arrangement of electrode connections to the base terminals is shown in Figure 2.

It may be mounted in either a vertical or horizontal position, although the vertical position is preferable.

FILE: THYRATRON SECTION

Heater Rating

Heater potential	10.0 volts
Nominal heater current	0.5 ampere
Required heating time	60 seconds

The heater element of this tube is designed to operate on a voltage basis from a direct or alternating current supply. The voltage should be maintained to within 5% of its rated value (10 volts). Operation of the heater element above the upper limit will definitely reduce the life of the tube, while a decrease below the lower limit may cause immediate failure.

Sufficient time should always be allowed for the cathode temperature to reach its normal operating value before anode current is drawn. Failure to allow sufficient time may result in immediate failure.

Operating Conditions

Approximate tube voltage drop	15 volts
Max. peak voltage between anode and grid	325 volts
Max. instantaneous anode current	0.600 ampere
Max. average anode current	0.100 ampere
Max. time of averaging anode current	5 seconds
Max. instantaneous grid current	0.010 ampere
Max. voltage between heater and cathode	50 volts
Operating ambient temperature range	−20° to +50°C.
Normal deionization time	1000 microseconds

The characteristics of the 338A tube are such that, for any given anode potential, there is a critical grid potential. If the grid is held more negative than this value and the tube is non-conducting, the anode current will remain zero. If it is made less negative, the current will assume a value determined by the applied potential and the resistance in the anode circuit. To extinguish the discharge and return the current to zero, the positive anode potential must be removed. When current is flowing a visible discharge occurs in the tube. Under this condition, the tube voltage drop is practically independent of the value of both the anode current and the grid potential. A protective resistance should always be included in the circuit to limit the anode current to the rated values. A typical curve relating the critical grid potential to the anode potential is shown in Figure 3. This charactersitic may vary from tube to tube and during the life of a given tube.

Sufficient resistance must always be included in the grid circuit to limit the negative grid potential to 10 volts when anode current is flowing. Failure to observe this precaution will result in short tube life.

Typical Circuits

The tube may be used in a variety of circuits adapted to the application of thyratrons. Two general types are common. One use of the tube is to produce a saw-toothed, current wave. The circuit for this application is shown in Figure 4. The resistance R should, ordinarily, be at least 100,000 ohms, and the product RC (C in farads) approximately equal to the desired fundamental period.

The second general use for the tube is as a relay device. In this application the anode may be supplied from either alternating or direct current. When supplied from direct current, the circuit, Figure 5, possesses a "lock-in" feature, since the anode potential must be removed momentarily in order to restore the tube to the non-conducting condition. When supplied from alternating current, the circuit possesses no "lock-in" feature, but the average anode current may be controlled by the relative phase of grid and anode potentials. The schematic circuit for this application is shown in Figure 6. Figure 7 is a simplified circuit employing a photoelectric cell in place of the resistance, R, used in the phase shifting device in Figure 6. The photoelectric cell, however, is equivalent to a variable resistance in the sense that the current passed will depend upon the amount of light falling upon it.

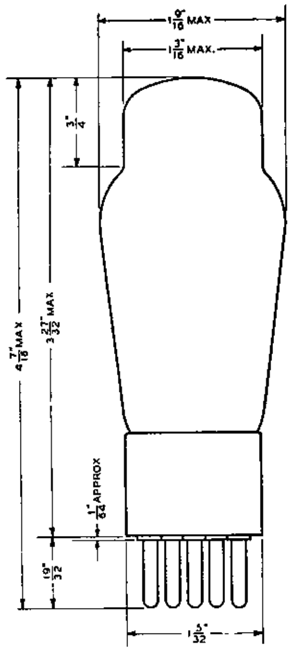


FIG. 1

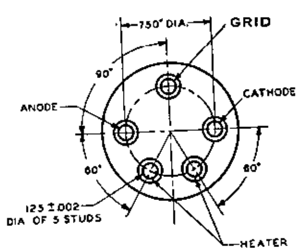


FIG. 2

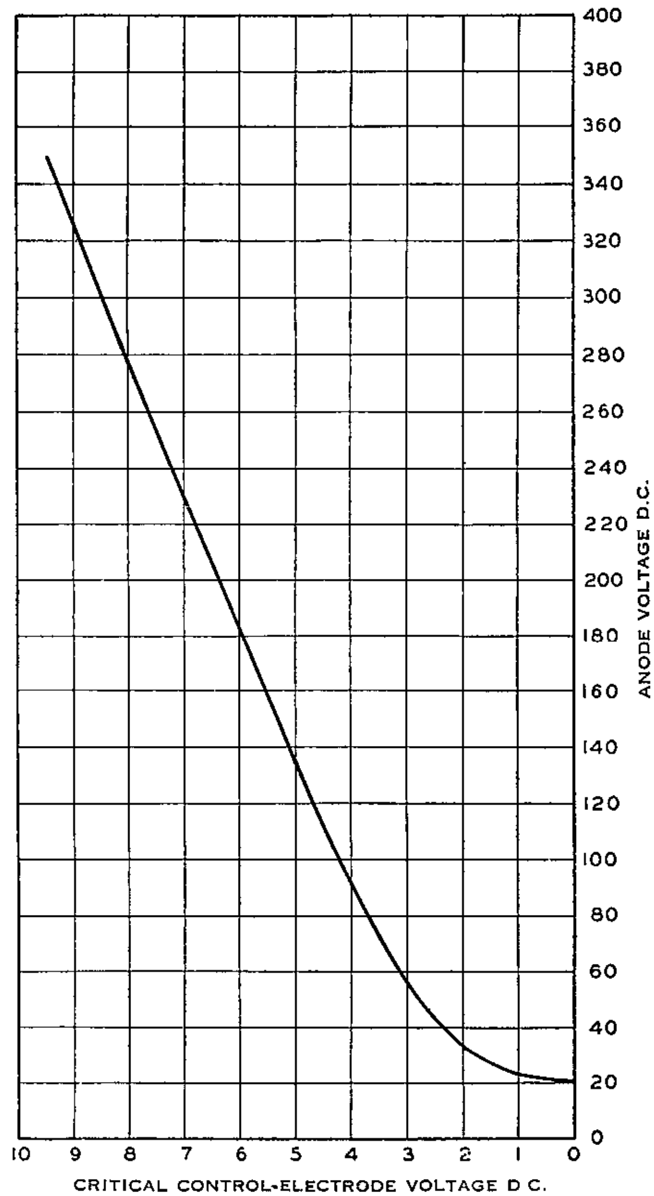


FIG. 3

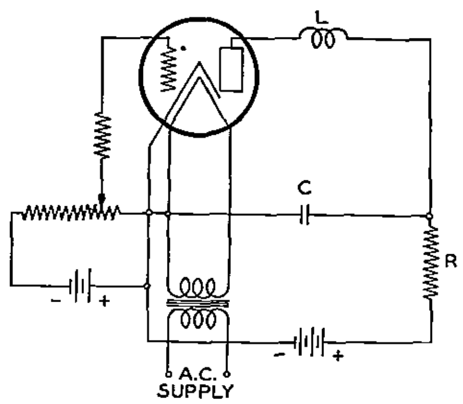


FIG. 4

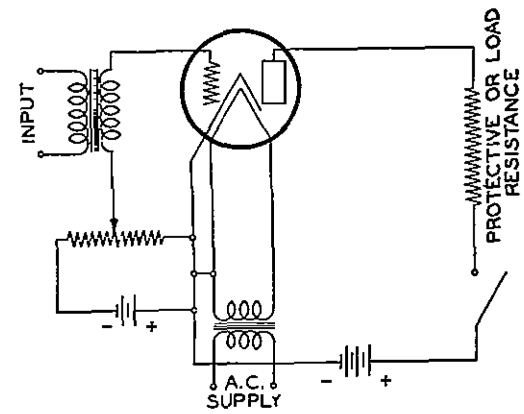


FIG. 5

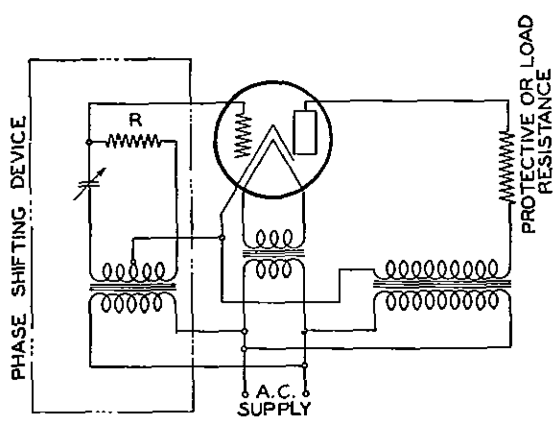


FIG. 6

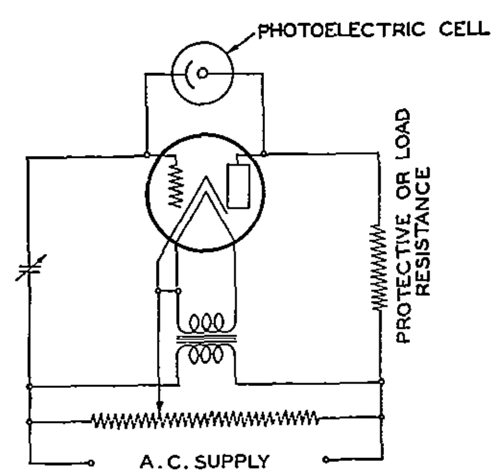


FIG. 7

A development of Bell Telephone Laboratories, Incorporated, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company