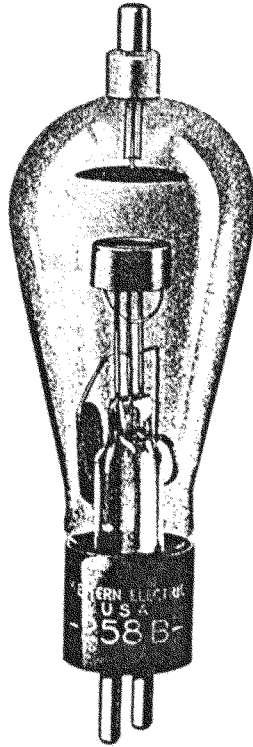


# *Western Electric*

## 258B Vacuum Tube



**Classification—Half wave, thermionic, mercury vapor rectifier.**

The 258B vacuum tube is designed to supply direct current from an alternating-current supply.

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

**Base—**Medium two-pin thrust type, with a small metal cap anode terminal located at the top of the bulb. Base dimensions and the arrangement of electrode connections to the base terminals are shown in Figures 1 and 2.

**Socket—**Standard two-contact type, such as the Western Electric 138B, 139A or similar types.

**Mounting Position—**The tube should be mounted only in a vertical position with the base end down. There should be a free circulation of air around the tube. No object should touch the glass bulb.

### **Filament Rating**

|                          |             |
|--------------------------|-------------|
| Filament Voltage         | 2.5 volts   |
| Nominal Filament Current | 7.5 amperes |

The filament of this tube is designed to operate on a voltage basis from an alternating-current supply. The voltage should be maintained to within 5% of its rated value (2.5 volts). Operation of the filament at a voltage above the upper limit will definitely reduce the life of the tube while a decrease in voltage below the lower limit may cause immediate failure.

Sufficient time must always be allowed for the filament temperature to reach its normal operating value before the anode potential is applied. If filament transformers with good regulation are used, this time is 15 seconds. A period of 10 to 15 minutes should be allowed when the tube is used for the first time or if it has been reinserted in the apparatus after having been removed.

If the tube is operated at ambient temperatures below 15° C., a longer period of time is required for the purpose of bringing the mercury vapor pressure to a satisfactory operating value. For 10° C. ambient temperature, this time is 5 minutes. For 5° C. ambient temperature, the time is 10 minutes and for 0° C. ambient temperature, the necessary time is 15 minutes.

## Characteristics and Operating Conditions

|                                                      |              |
|------------------------------------------------------|--------------|
| Approximate anode-cathode potential drop.....        | 15 volts     |
| Maximum peak plate current.....                      | 1.5 amperes  |
| Maximum peak potential between electrodes.....       | 7500 volts   |
| Maximum operating ambient temperature range.....     | 0 to 50° C.  |
| Recommended operating ambient temperature range..... | 10 to 40° C. |

The anode-cathode potential drop is substantially independent of the plate current. The exact value varies from tube to tube and during the life of a given tube. Within the specified ambient temperature range and plate current range, it may vary from 5 to 25 volts.

The anode-cathode potential drop as a function of the temperature is shown in Fig. 3, for a typical 258B vacuum tube when passing the rated space current. The recommended operating temperature range is also shown.

The maximum permissible peak plate current (1.5 amperes) is a limitation of the instantaneous value that the tube can carry safely in the direction in which it is designed to conduct and should not be exceeded. The maximum d-c load current is not fixed but will depend upon the wave form required by the load and filter circuit.

The maximum permissible peak potential between electrodes (7500 volts) is a limitation on the instantaneous value that the tube can stand safely in the opposite direction to that in which it is designed to conduct. If it is exceeded, an arc-back may result which will injure the tube. The maximum d-c potential available is not fixed but will depend upon the type of circuit used.

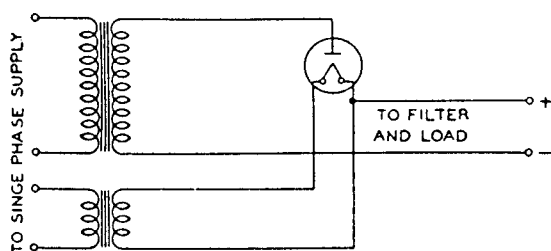
258B vacuum tubes may be operated in parallel if some provision is made to insure a proper division of the load current. Current dividing reactors or ballasting resistors in series with each anode, may be used for this purpose. The size of the reactors or resistors depends upon the circuit design.

In most cases the termination of the useful life of the 258B vacuum tube is due to the loss of filament activity. This may be predicted by an increase in the anode-cathode potential drop. If not removed such tubes may fail by arcing back under the applied inverse potential. Failures of this kind should be safeguarded by proper fuse protection to prevent injury to other tubes in the set and to the auxiliary equipment. In most circuits this requires a high-voltage, quick-acting fuse in each anode lead.

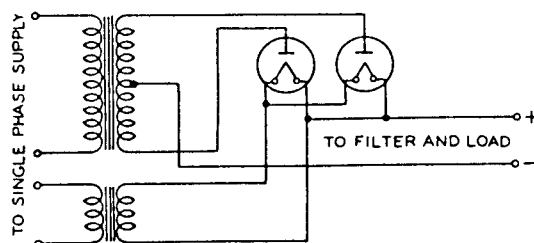
**Typical Rectifier Circuits**—The 258B vacuum tube may be used in any standard high vacuum rectifier circuit subject to its current, voltage and temperature limitations. Typical circuits are shown below. The approximate d-c output current and voltage for each type of rectifier circuit where tubes are operated at maximum permissible plate current and inverse voltage are given in Table 1. The values listed below are average values of the pulsating current and voltage for an unfiltered circuit except for circuit C which is inoperative without a filter.

**TABLE 1**

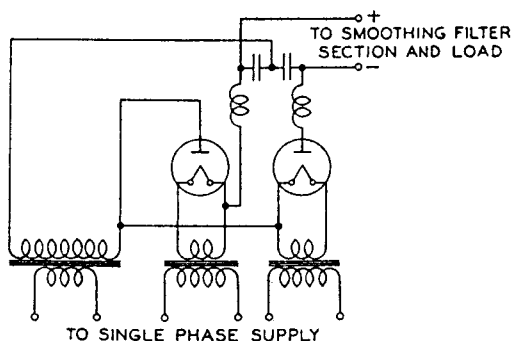
| Circuit Designation | Number of Tubes | Load Potential In Volts | Load Current In Amperes |
|---------------------|-----------------|-------------------------|-------------------------|
| A                   | 1               | 2300                    | 0.5                     |
| B                   | 2               | 2300                    | 1.0                     |
| C                   | 2               | 5000                    | 0.5                     |
| D                   | 4               | 2300                    | 2.0                     |
| E                   | 4               | 4500                    | 1.0                     |
| F                   | 3               | 3500                    | 1.3                     |
| G                   | 6               | 7000                    | 1.3                     |
| H                   | 6               | 3500                    | 2.6                     |



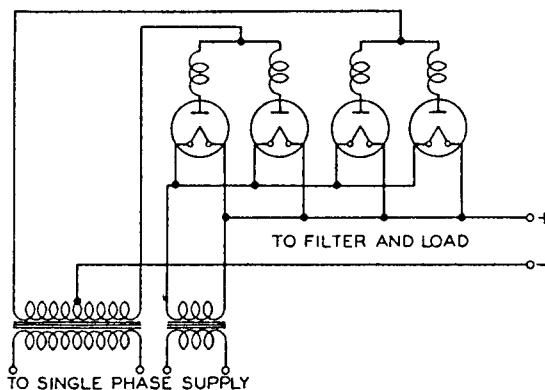
SINGLE PHASE, HALF - WAVE  
CIRCUIT A



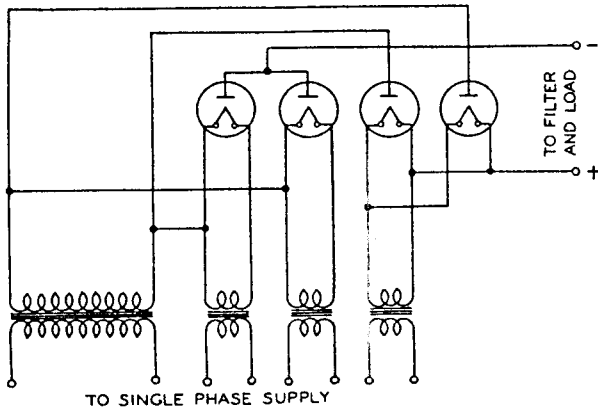
SINGLE PHASE, DOUBLE HALF - WAVE  
CIRCUIT B



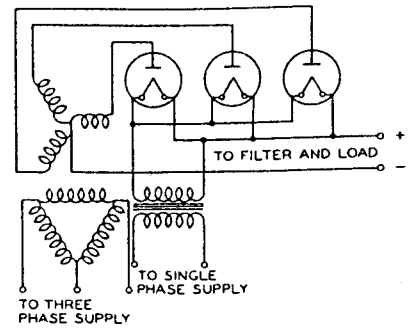
SINGLE PHASE, VOLTAGE DOUBLING CIRCUIT  
CIRCUIT C



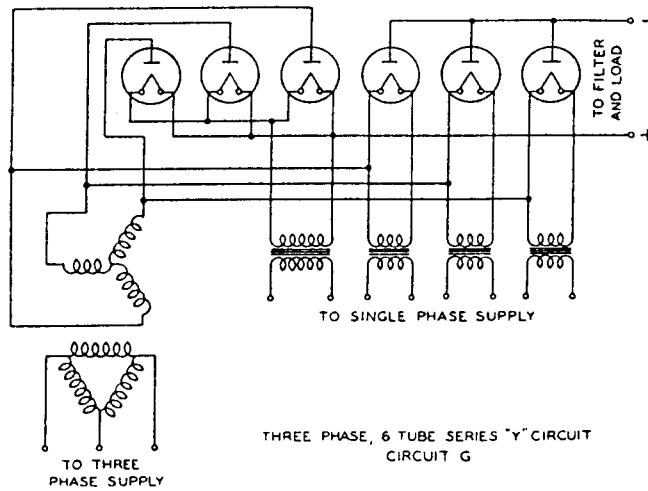
SINGLE PHASE DOUBLE HALF - WAVE IN PARALLEL  
CIRCUIT D



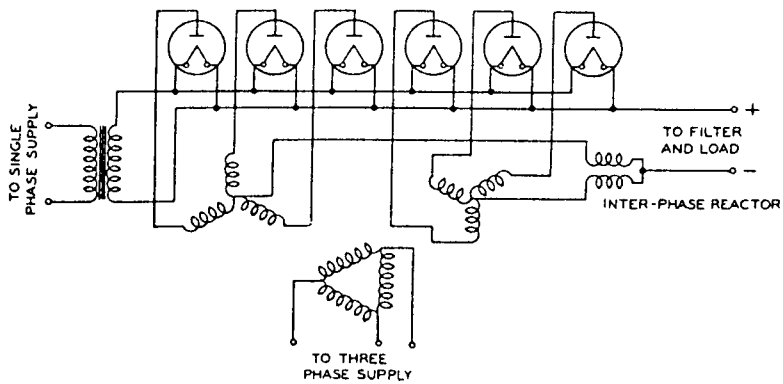
SINGLE PHASE, DOUBLE HALF-WAVE,  
4 TUBE SERIES CIRCUIT  
CIRCUIT E



THREE PHASE, "Y" CIRCUIT  
CIRCUIT F



THREE PHASE, 6 TUBE SERIES "Y" CIRCUIT  
CIRCUIT G



THREE PHASE, DOUBLE "Y" INTERCONNECTED  
CIRCUIT H

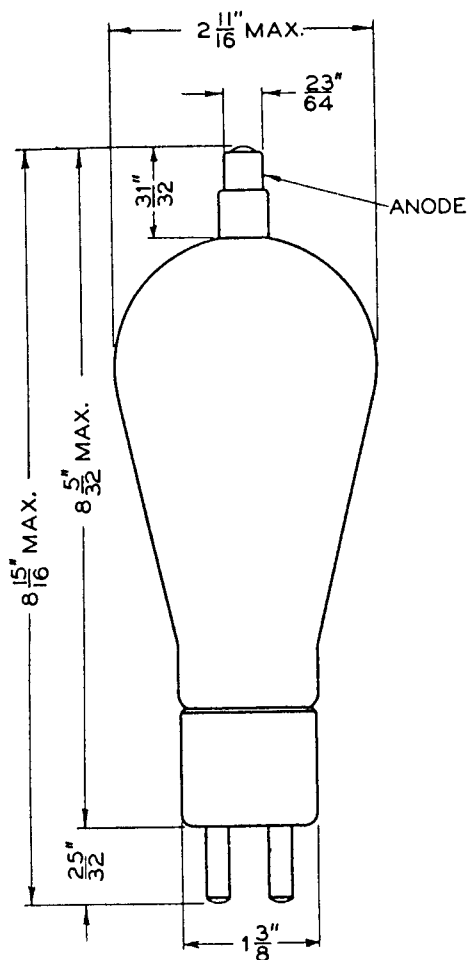


FIG. 1

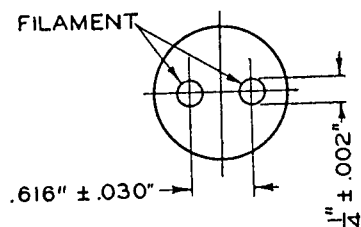


FIG. 2

CORRESPONDING AMBIENT TEMPERATURE IN DEGREES CENTIGRADE  
AFTER TEMPERATURE EQUILIBRIUM

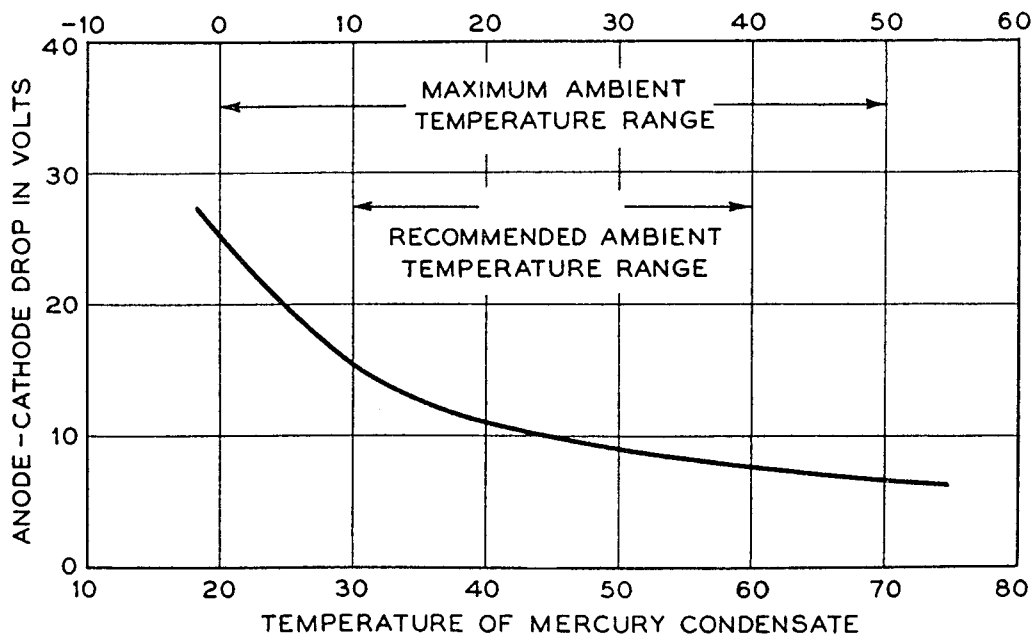


FIG. 3

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

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ISSUE 1