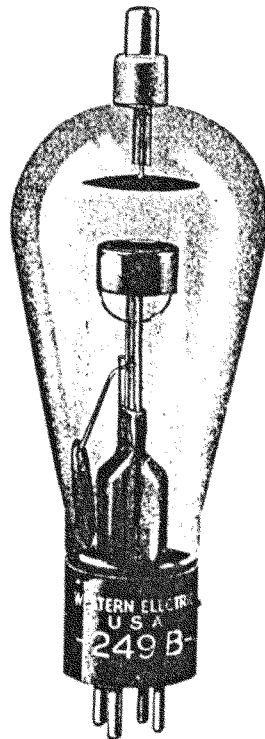


# *Western Electric*

## 249B Vacuum Tube



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

The 249B 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 four-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 four-contact type, such as the Western Electric 143B or similar type. It is to be noted from the arrangement of filament terminals shown in Fig. 2, that the terminals are tied together in parallel. The corresponding socket terminals should also be connected to insure the best contact connections for the filament circuit.

**Mounting Position—**The tube should be mounted only in a vertical position with the base end down. There must 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 249B 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.

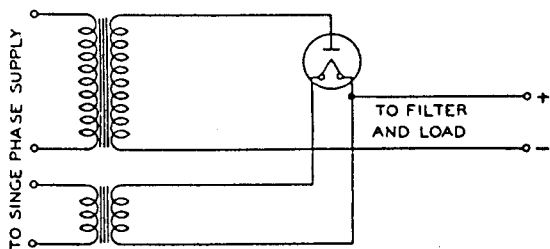
249B vacuum tubes may be operated in parallel if some provision is made to insure a proper division of the load current. Current dividing reactors or ballasting resistors in series with each anode, may be used for this purpose. The size of the reactors or resistors depends upon the circuit design.

In most cases the termination of the useful life of the 249B 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.

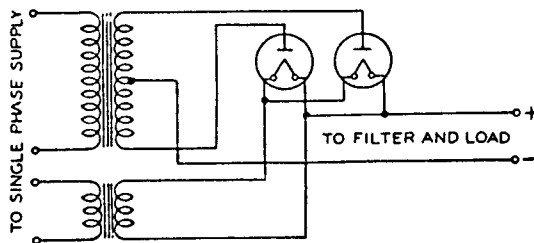
**Typical Rectifier Circuits**—The 249B vacuum tube may be used in any standard high vacuum rectifier circuit subject to its current, voltage and temperature limitations. Typical circuits are shown below. The approximate d-c output current and voltage for each type of rectifier circuit where tubes are 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**

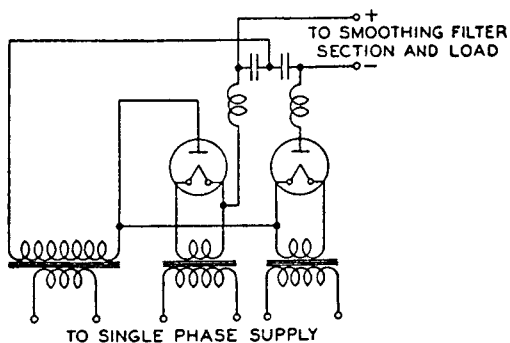
Circuit Designation	Number of Tubes	Load Potential In Volts	Load Current In Amperes
A	1	2300	0.5
B	2	2300	1.0
C	2	5000	0.5
D	4	2300	2.0
E	4	4500	1.0
F	3	3500	1.3
G	6	7000	1.3
H	6	3500	2.6



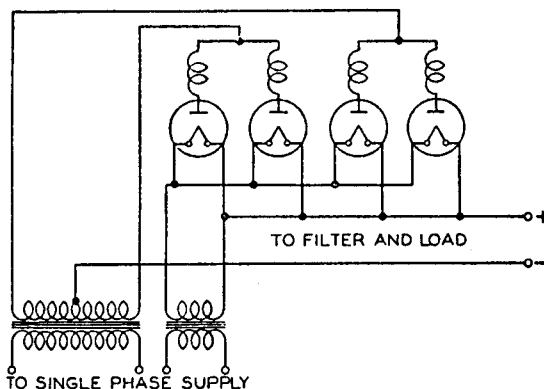
SINGLE PHASE, HALF-WAVE  
CIRCUIT A



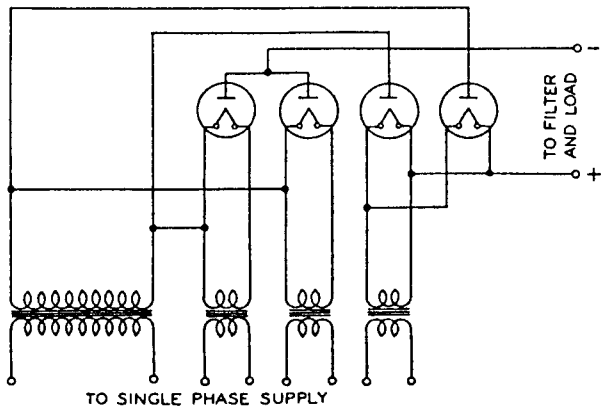
SINGLE PHASE, DOUBLE HALF-WAVE  
CIRCUIT B



SINGLE PHASE, VOLTAGE DOUBLING  
CIRCUIT C



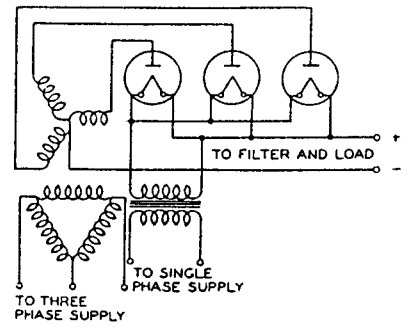
SINGLE PHASE DOUBLE HALF-WAVE IN PARALLEL  
CIRCUIT D



TO SINGLE PHASE SUPPLY

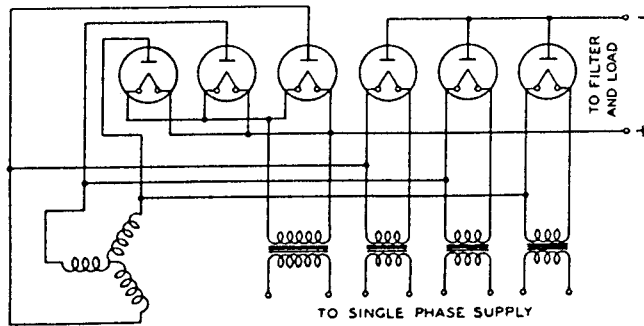
SINGLE PHASE, DOUBLE HALF-WAVE  
4 TUBE SERIES CIRCUIT

CIRCUIT E



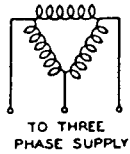
TO THREE PHASE SUPPLY

THREE PHASE, "Y" CIRCUIT  
CIRCUIT F

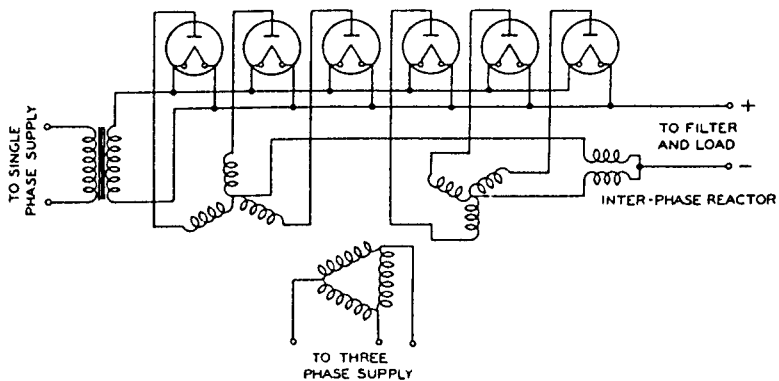


TO SINGLE PHASE SUPPLY

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



TO THREE PHASE SUPPLY



TO SINGLE PHASE SUPPLY

TO FILTER AND LOAD

INTER-PHASE REACTOR

TO THREE PHASE SUPPLY

THREE PHASE, DOUBLE "Y" INTERCONNECTED  
CIRCUIT H

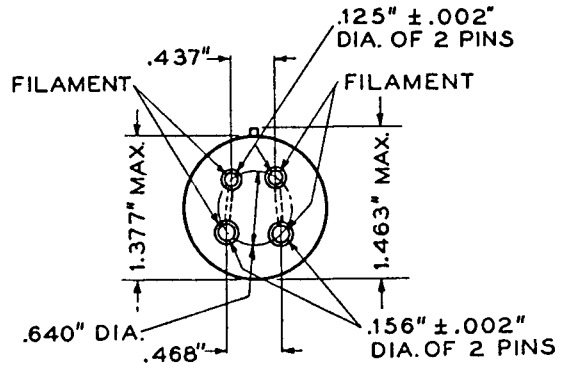
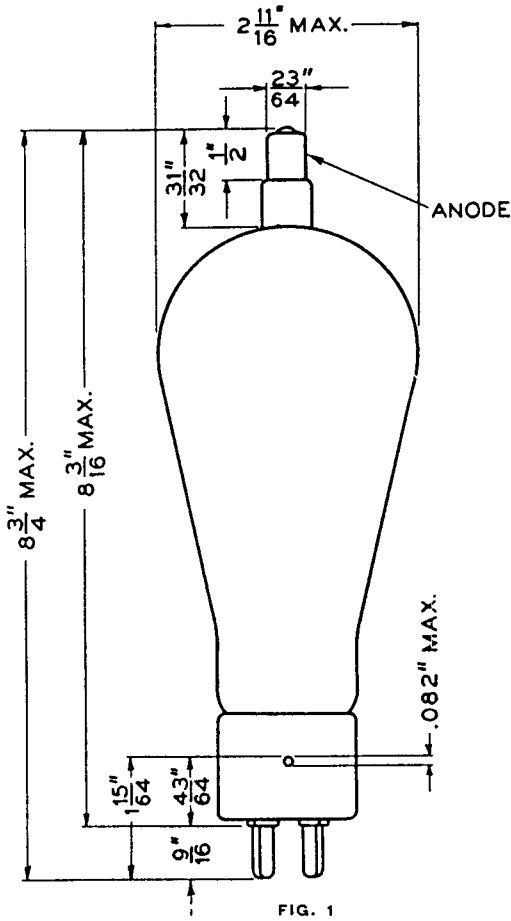


FIG. 2

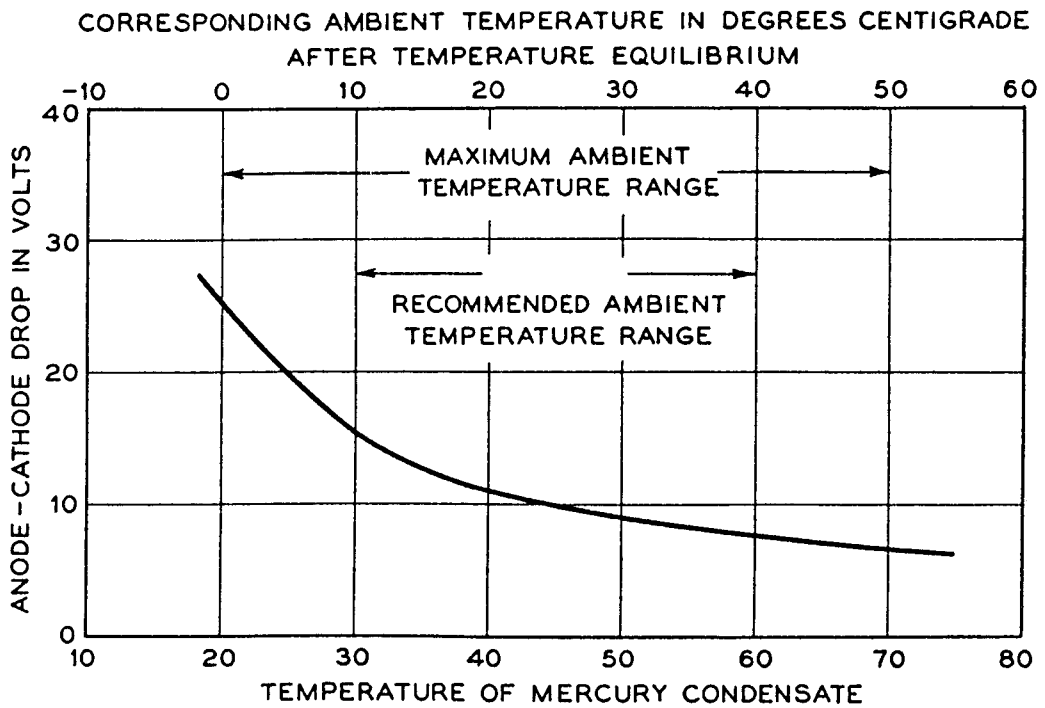


FIG. 3