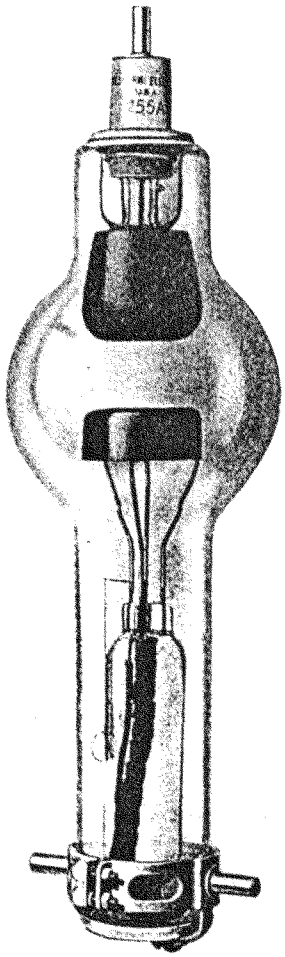
Western Electric

255A Vacuum Tube



Classification—Half-wave, thermionic, mercury vapor rectifier

The 255A vacuum tube is designed to supply direct current for high-voltage equipment.

Dimensions—The dimensions and outline diagrams of the tube are shown in Figure 1.

Mounting—The tube employs a combination filament terminal and mounting at the lower end and an anode terminal and mounting stud at the upper end. The arrangement of electrode connections to the base terminal is shown in Figure 1. The supporting bracket collar on the tube lends itself to a simple method of mounting. Dimensions are given to enable the user to design a mounting suitable for his particular installation.

Since the anode and filament terminals cannot be held in exactly the same plane, rigid mounting connections should not be used for both terminals. The tube should be mounted only in a vertical position with the filament terminal end down. When tubes are mounted in a group, the distance between centers should not be less than 10 inches.

Filament Rating

Filament voltage	5 volts
Nominal filament current	21 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 (5 volts). Operation of the filament at a voltage 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 must always be allowed for the filament temperature to reach its normal operating value before the anode potential is applied. This will require about two minutes when filament transformers with good regulation are used. When the tube has been reinserted in the apparatus after having been removed, a period of 15 minutes should be allowed to condense the mercury in the lower part of the bulb.

Characteristics and Operating Conditions

Approximate anode-cathode drop when conducting	10 volts
Maximum peak anode current	5 amperes
Maximum peak inverse potential	20,000 volts
Safe operating ambient temperature without forced air	15° to 30° C.
Recommended operating temperature with forced air	*30° to 40° C.

*This is the temperature of the mercury condensate and is very nearly the same as the temperature of the forced air stream applied to the lower part of the bulb.

The anode-cathode potential drop is substantially independent of the plate current. The exact value varies from tube to tube and in general increases during the life of a given tube. Within 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 temperature, is shown in Figure 2 for a typical 255A tube when passing the rated space current. The recommended operating temperature range is also shown on this curve. The tube will operate satisfactorily at a mercury condensate temperature of 50° C. when the peak inverse potential is below 10,000 volts. In order to maintain the above operating temperature condition, a forced ventilating system which maintains the mercury condensate temperature at approximately 36° C. should be used. The amount of air required will be approximately 6 cu. ft. per minute but will depend upon the location of the blower and the shielding used to prevent cooler air streams striking the envelope. The circulating air maintained at 36° C. should strike the supporting collar or below it. Increased cathode life and lower arc striking voltages will result with this type of operation.

The maximum permissible peak plate current (5 amperes) is a limitation on the instantaneous value that the tube can carry safely in the direction in which it is designed to pass current and should not be exceeded. The maximum rectified load current is not fixed but will depend upon the wave-form required by the load and filter circuit.

The maximum permissible peak inverse potential (20,000 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 pass current. If it is exceeded, an arc-back may result which may injure the tube. The maximum direct potential available is not fixed but will depend upon the type of circuit used.

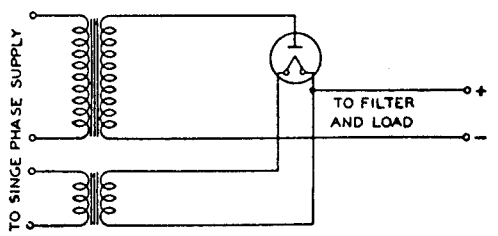
255A vacuum tubes may be operated in parallel if some provision is made to insure a proper division of the load. Current dividing reactors or ballasting resistors in series with each anode may be used for this purpose. The size of the reactors or resistors depends upon the circuit design.

In most cases, the termination of the useful life of the 255A tube is due to the loss of filament activity. This may be predicted by a marked 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 safe-guarded by proper protection to prevent injury to other tubes in the set and to the auxiliary equipment. In most cases this requires a high voltage, quick acting fuse in each anode lead, or a quick acting circuit breaker in the supply.

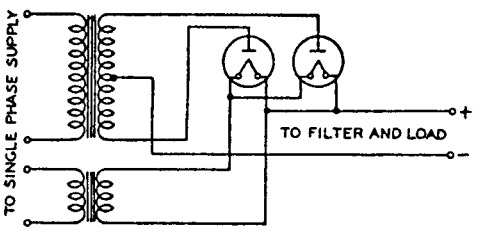
Typical Rectifying Circuits—The 255A vacuum tube may be used in any standard high vacuum rectifying circuit subject to its current, voltage and temperature limitations. Typical circuits are shown below. The approximate direct output current and voltage for each type of rectifying circuit where tubes are operated at maximum permissible plate current and inverse voltage are given in Table 1. The values listed are average values of the pulsating current and voltage for an unfiltered circuit.

Table 1

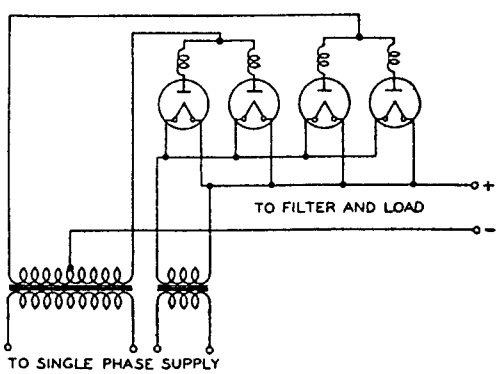
Circuit Designation	Number of Tubes	Load Potential in Volts	Load Current in Amperes
A	1	6000	1.7
B	2	6000	3.4
C	4	6000	6.8
D	4	12000	3.4
E	3	9000	4.2
F	6	18000	4.7
G	6	8000	8.4



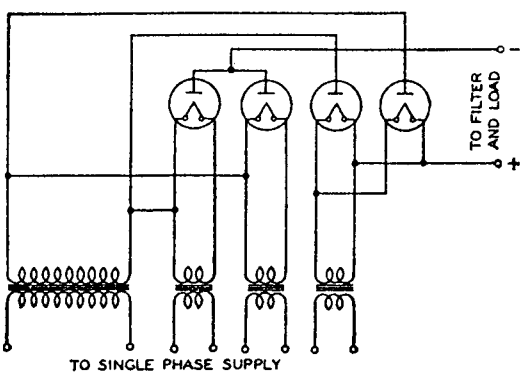
SINGLE PHASE, HALF-WAVE
CIRCUIT A



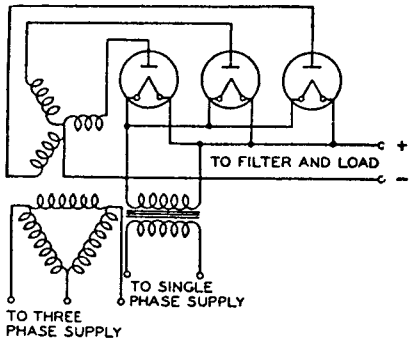
SINGLE PHASE, DOUBLE HALF-WAVE
CIRCUIT B



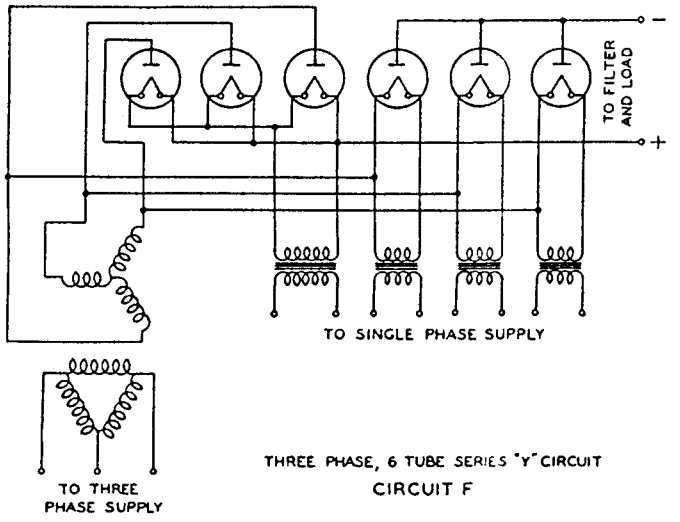
SINGLE PHASE, DOUBLE HALF-WAVE IN PARALLEL
CIRCUIT C



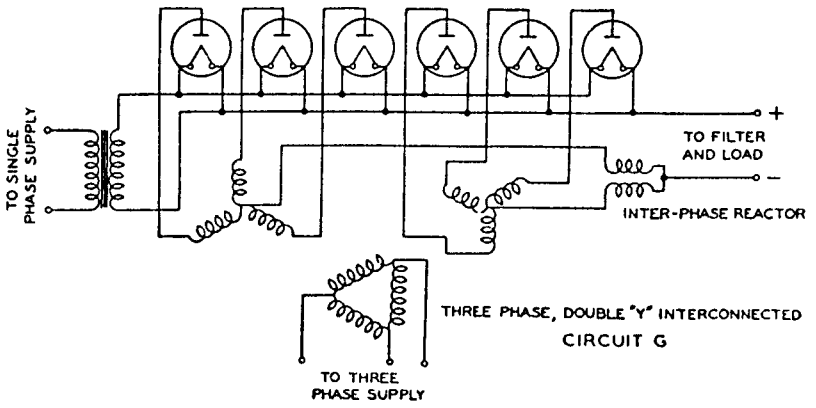
SINGLE PHASE, DOUBLE HALF-WAVE,
4 TUBE SERIES CIRCUIT
CIRCUIT D



THREE PHASE, "Y" CIRCUIT
CIRCUIT E



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



THREE PHASE, DOUBLE "Y" INTERCONNECTED
CIRCUIT G

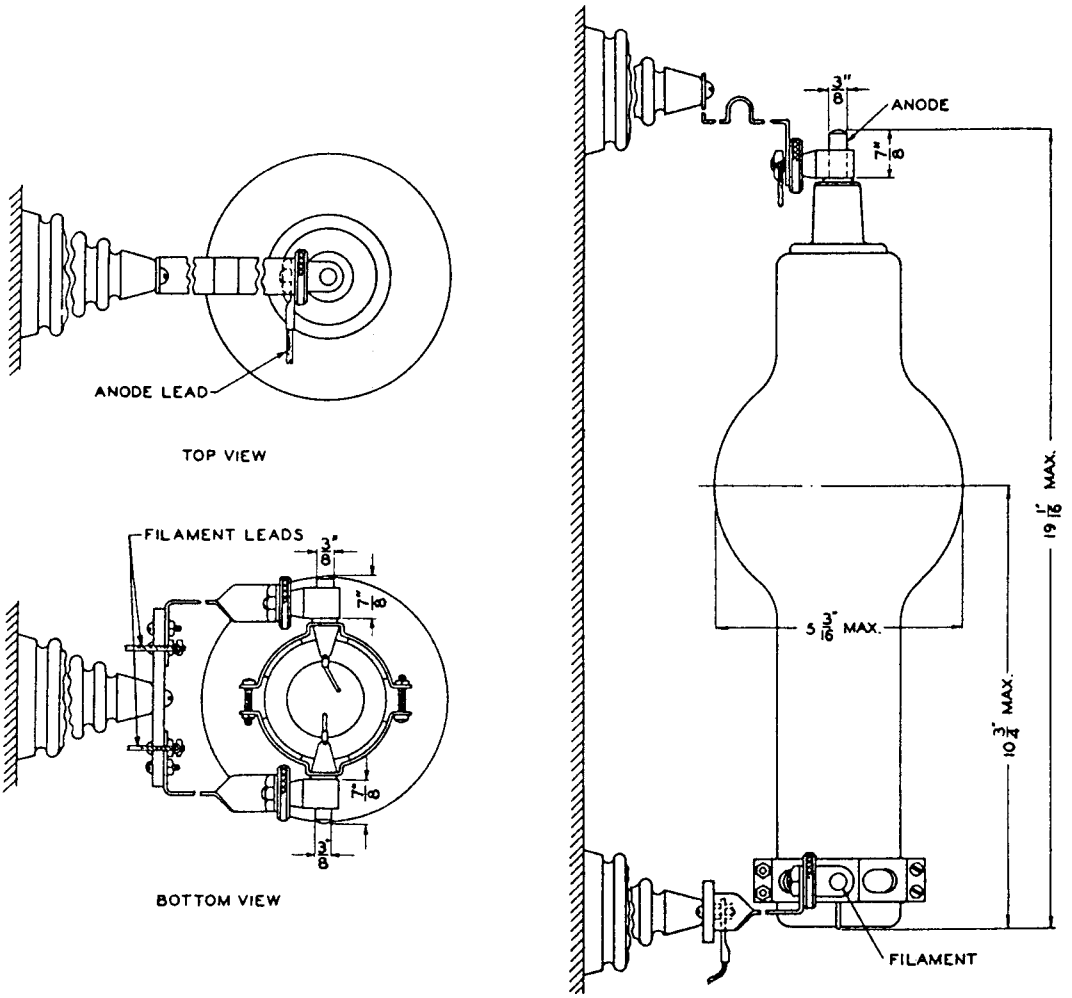

ANODE LEAD
TOP VIEW
FILAMENT LEADS
3/8"
7/8"
7/8"
3/8"
BOTTOM VIEW
3/8"
ANODE
7/8"
5 3/16" MAX.
10 3/4" MAX.
19 1/16" MAX.
FILAMENT

FIG. 1

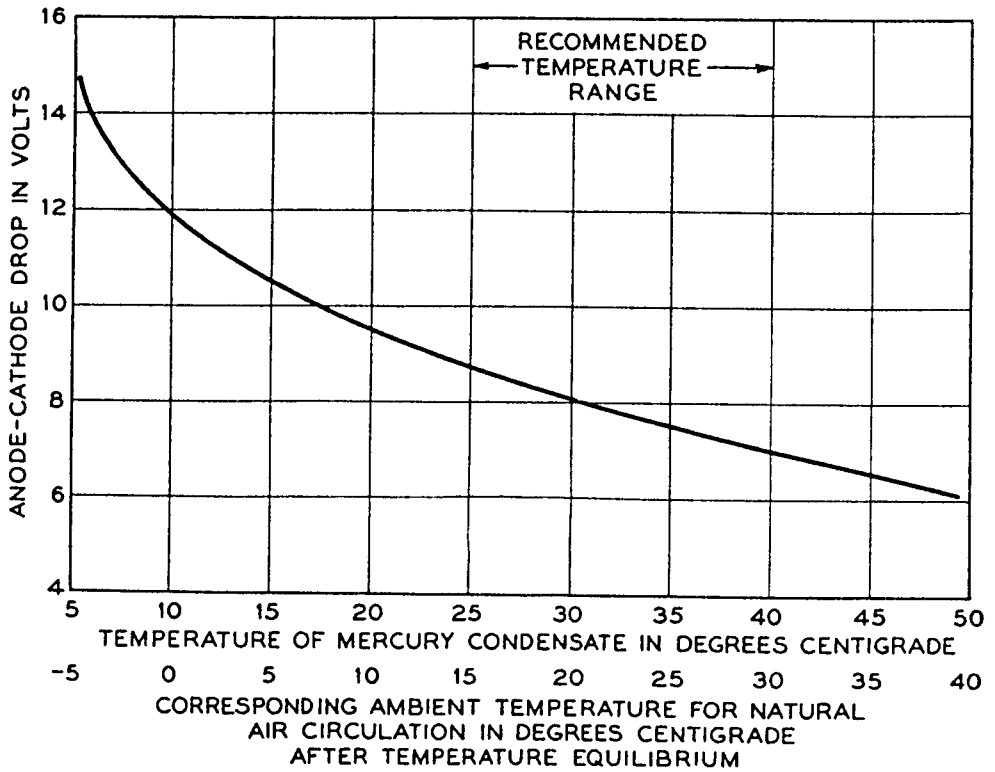


FIG. 2

1-C-36-53C
PRINTED IN U.S.A.

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

V. T. DATA SHEET 255A
ISSUE 1