

# OA2

INDUSTRIAL  
TYPE

## VOLTAGE REGULATOR

Miniature type cold-cathode, glow-discharge tube used in voltage regulator applications. Outlines section, 5D; requires miniature 7-contact socket.

### MAXIMUM RATINGS (Absolute-Maximum Values)

Average Starting Current♦	75	mA
DC Cathode Current	30	mA
Frequency	5 min	mA
Ambient-Temperature Range	0	Hz
	-55 to +90	°C

### MAXIMUM CIRCUIT VALUES

Shunt Capacitor	0.1	μF
Series Resistor	See Operating Considerations	

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Av.	Max.	
DC Anode-Supply Voltage	185 <sup>M</sup>	—	—	volts
Anode Breakdown Voltage	—	156	185*	volts
Anode Voltage Drop	140 <sup>●</sup>	151	168*	volts
Regulation (5 to 30 mA)	—	2	6*	volts

♦ Averaged over starting period not exceeding 10 seconds. This starting period must be followed by a steady-state operating condition of at least 20 minutes, or tube performance will be impaired.

■ Not less than indicated supply voltage should be provided to insure "starting" throughout tube life.

\* Maximum individual tube value during useful life.

● Minimum individual tube value during useful life.

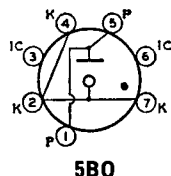
### Operating Considerations

Sufficient resistance must always be used in series with the tube to limit the current through the tube. The value for the series resistor is dependent on the maximum anode-supply voltage and the ratio of the current through the load to the operating current of the tube, and should be chosen to limit the operating current through the tube to the maximum rated value at all times after the starting period.

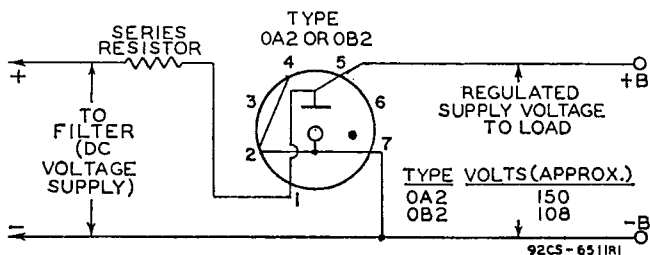
The maximum load current that can be regulated by the tube is determined by the minimum and maximum values of the supply voltage. After the value of series resistor for the maximum supply voltage has been calculated as indicated above, it is then in order to determine if this value will permit adequate starting voltage when the supply voltage falls to its minimum value. If adequate starting voltage is not obtained, a new load current of lower value must be used and the calculations repeated. It will be apparent from such calculations that the higher the minimum supply voltage and the smaller the difference between its minimum and maximum values, the higher will be the load current that can be regulated.

When equipment utilizing the tube is "turned on", a starting current in excess of the average operating current is permissible as indicated under Maximum Ratings. When the tube is subjected to such high starting currents, the regulated voltage may require up to 20 minutes to drop to its normal operating value. This performance is characteristic of voltage-regulator tubes of the glow-discharge type. Similarly, the regulation is affected by changes in current within the operating current range.

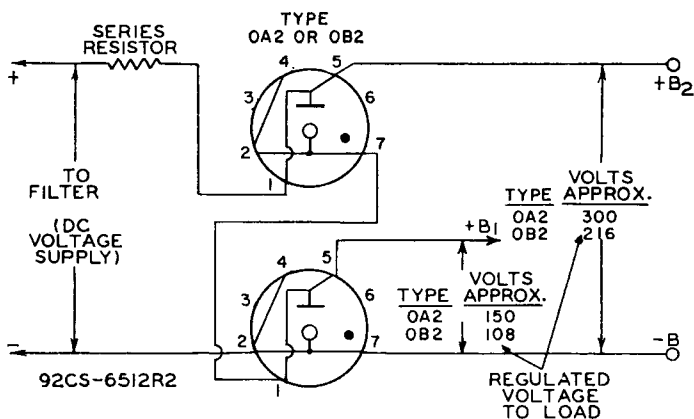
In order to handle more load current, two or more tubes may be operated in parallel, but such parallel operation requires that a resistance of approximately 100 ohms be used in series with each tube in order to equalize division of the current between the paralleled tubes. The disadvantage of this method, of course, is that the use of resistors impairs the regulation which can be obtained.



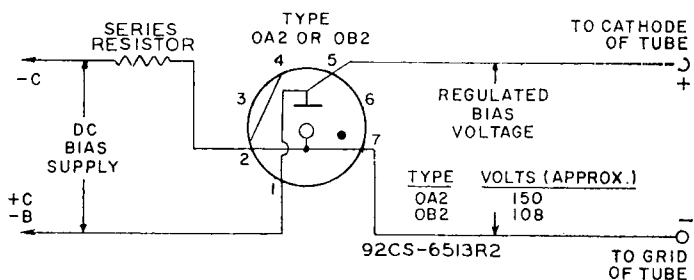
If the associated circuit has a capacitor in shunt with the tube, the capacitor should be limited in value to 0.1  $\mu$ F. A larger value may cause the tube to oscillate and thus give unstable regulation performance.



Typical circuit to provide regulated supply voltage of approximately 150 or 108 volts to load. Removal of tube from socket removes voltage from load.



Typical circuit using two OA2's or two OB2's to provide regulated supply voltages of approximately 300 or 216 volts and 150 or 108 volts to load. Socket connections are so made that voltage on load is removed when either tube is taken from its socket.



Typical circuit for bias-supply regulation. Removal of tube from socket opens B-supply circuit of regulated tubes.