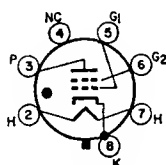


2050**INDUSTRIAL
TYPE**

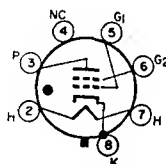
Glass octal type gas tetrode thyatron for use in relay and grid-controlled-rectifier service. Outlines section, 22; requires octal socket. For maximum ratings and typical operating conditions refer to type 2050A.

GAS THYRATRON**6BS**

Heater Voltage (ac/dc)	Min. 5.7	Av. 6.3	Max. 6.9	volts
Heater Current	0.54	0.60	0.66	ampere
Cathode:				
Heating Time, prior to tube conduction	10	—	—	sec
Direct Interelectrode Capacitances (Approx.):				
Grid No. 1 to Anode			0.26	pF
Input			4.2	pF
Output			3.6	pF

2050A**INDUSTRIAL
TYPE**

Glass octal type gas tetrode thyatron for use in relay and grid-controlled-rectifier service. Outlines section, 13C; requires octal socket.

GAS THYRATRON**6BS**

Heater Voltage (ac/dc)	6.3 ±10%	volts
Heater Current	0.6	ampere
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	100 max	volts
Heater positive with respect to cathode	25 max	volts
Cathode:		
Minimum heating time prior to tube conduction	10	seconds
Direct Interelectrode Capacitances (Approx.):		
Grid No. 1 to anode	0.15	pF
Grid No. 1 to cathode and grid No. 2	2.2	pF
Ionization Time (Approx.):		
For dc anode volts = 100, grid-No. 1 volts (square-wave pulse) = 50, peak anode amperes during conduction = 1	0.5	μs
Deionization Time (Approx.):		
With dc anode volts = 125, grid-No. 1 volts = -250, grid-No. 1 resistor (ohms) = 1000, dc anode amperes = 0.1	50	μs
With dc anode volts = 125, grid-No. 1 volts = -10, grid-No. 1 resistor (ohms) = 1000, dc anode amperes = 0.1	100	μs
Maximum Critical Grid-No. 1 Current for dc anode supply volts (rms) = 460, average anode amperes = 0.1	0.5	μA
Anode Voltage Drop (Approx.)	8	volts
Grid-No. 1 Control Ratio (Approx.) for grid-No. 1 resistor (ohms) = 0, grid No. 2 connected to cathode at socket	250	
Grid-No. 2 Control Ratio (Approx.) for grid-No. 1 resistor (ohms) = 0, grid-No. 2 resistor (ohms) = 0, grid No. 1 connected to cathode at socket	800	

Relay and Grid-Controlled Rectifier Service

For anode supply frequency of 60 Hz

MAXIMUM RATINGS (Absolute-Maximum Values)

Peak Anode Voltage:			
Forward	180	650	volts
Inverse	360	1300	volts
Grid-No. 2 (Shield-Grid) Voltage:			
Peak, before tube conduction	-100	-100	volts
Average*, during tube conduction	-10	-10	volts
Grid-No. 1 (Control-Grid) Voltage:			
Peak, before tube conduction	-250	-250	volts
Average*, during tube conduction	-10	-10	volts
Cathode Current:			
Peak	1	1	ampere
Average*	0.2	0.1	ampere
Fault, for duration of 0.1 second maximum	10	10	amperes

Grid-No. 2 Current:			
Average*	+0.01	+0.01	ampere
Grid-No. 1 Current:			
Average*	+0.01	+0.01	ampere
Ambient-Temperature Range	-75 to +90	-75 to +90	°C

TYPICAL OPERATION FOR RELAY SERVICE

RMS Anode Voltage	117	400	volts
Grid No. 2	Connected to cathode at socket		
RMS Grid-No. 1 Bias Voltage [▲]	5	—	volts
DC Grid-No. 1 Voltage	—	-6	volts
Peak Grid-No. 1 Signal Voltage	5	6	volts
Grid-No. 1 Circuit Resistance	1	1	megohm
Anode-Circuit Resistance†	1200	2000	ohms

MAXIMUM CIRCUIT VALUES

Grid-No. 1-Circuit Resistance:		
For average anode current below 0.1 ampere	10	megohms
For average anode current above 0.1 ampere	2	megohms

* Averaged over any interval of 30 seconds maximum.

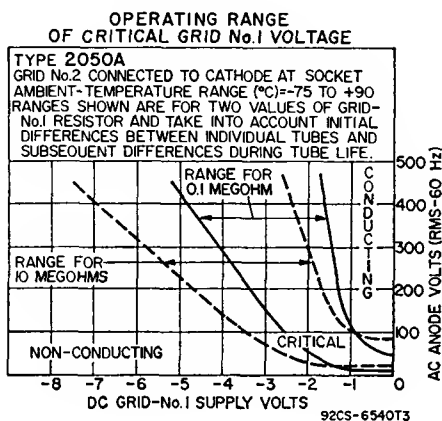
[▲] Approximately 180° out of phase with the anode voltage.

† Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.

Operating Considerations

The heater is designed to operate on either ac or dc at 6.3 volts. Regardless of the heater-voltage supply used the heater voltage must never be allowed to deviate from its rated range. Heater operation outside of this voltage range will impair tube performance and may cause tube failure. Low heater voltage causes low cathode temperature with resultant cathode sputtering and consequent destruction of the cathode; high heater voltage causes high cathode temperature with resultant heating of the grid and consequent grid emission which produces unpredictable shifts in the critical grid-No. 1 voltage for conduction.

The cathode should be allowed to reach normal operating temperature before anode current is drawn. The delay period should not be less than 10 seconds after application of heater voltage. Unless this recommendation is followed, the cathode will be damaged.



The shield grid (grid No. 2) is normally connected to the cathode at socket. It may, however, be used as a control electrode because the control characteristic of grid No. 1 may be shifted by varying the potential of grid

No. 2. As grid No. 2 is made negative, the grid-No. 1 characteristic is shifted in the positive direction. The use of grid No. 2 as the control electrode (with grid No. 1 connected to cathode at socket) has the advantage of increased sensitivity but consideration must be given to the higher pre-conduction current, higher capacitance to anode, and less stability of operation.

A grid-No. 1 resistor having a value as high as 10 megohms to give circuit sensitivity can be used with the 2050-A because its control-grid current is very low. However, when a high value of grid resistor is used, care should be taken to keep the tube base and socket clean and dry in order to make the effect of leakage currents between the control-grid base pin and anode base pin very small.

Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.

2076/5R4GB

Refer to chart at end of section.

2076/5R4GYB

For replacement use type 2076/5R4GB.

2081/6AW8A

Refer to chart at end of section.

2082/12AY7

Refer to chart at end of section.

5636

Refer to chart at end of section.

5639

Refer to chart at end of section.

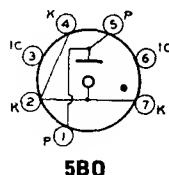
5642

Refer to chart at end of section.

5651A INDUSTRIAL TYPE

VOLTAGE-REFERENCE TUBE

Miniature type cold-cathode, glow-discharge voltage-reference tube for use in dc power supplies. Outlines section, 5C; requires miniature 7-contact socket.



MAXIMUM RATINGS (Absolute-Maximum Values)

DC Operating Current (Continuous)	3.5	mA
DC Operating Current (Continuous)	1.5	mA
Ambient Temperature Range	-55 to 90	°C

CHARACTERISTICS AND OPERATION RANGE VALUES

	Min.	Av.	Max.	
DC Starting Voltage	—	107	115*	volts
DC Operating Voltage (Variation from tube to tube):				
At 1.5 mA	83	85	87	volts
At 2.5 mA	83.5	85.5	87.5	volts
At 3.5 mA	84.5	86.5	88.5	volts
Regulation (1.5 mA to 3.5 mA)	—	—	3	volts
Temperature coefficient of Operating Voltage (over ambient temperature range of -55 to 90°C)	—	-4	—	mV/°C
Percentage Variation of Operating Voltage:				
During first 300 hours of life	—	—	0.1	per cent
During subsequent 1000 hours of life	—	—	0.1	per cent
Short-term (100 hours)				
Variation of Operating Voltage after first 300 hours of life	—	—	0.05	per cent
Instantaneous Voltage				
Fluctuation (Voltage jump)†	—	—	0.1	volt

CIRCUIT VALUES

Shunt Capacitor	—	—	0.02	μF
Series Resistor	—	—	‡	