

4CK

### GLOW-DISCHARGE TRIODE

**5823**

INDUSTRIAL  
TYPE

Miniature type, cold-cathode, glow discharge triode for use primarily as a relay control tube in "on-off" low current electrical circuits. Outlines section, 5C; requires miniature 7-contact socket.

**MAXIMUM RATINGS▲** (Absolute-Maximum Values)  
For First-Quadrant Operation Only

Peak Anode and Starter-Electrode Voltage:		
Inverse .....	200	volts
Forward .....	200	volts
Cathode Current:		
Peak .....	100	mA
Average* .....	25	mA
Peak Starter-Electrode Current:		
With starter-electrode voltage positive .....	100	mA
Ambient Temperature .....	-60 to +75	°C

**TYPICAL OPERATING CONDITIONS**  
For Relay Service with 60-Hz Supply

AC Anode Supply Voltage (RMS) .....	117	volts
AC Starter-Electrode Voltage:		
Max. Peak Positive Pre-Firing Voltage .....	70	volts
Min. Peak Positive Triggering Voltage .....	35	volts
Min. Firing Voltage (Sum of In-Phase Instantaneous Pre-Firing Voltage and Instantaneous Triggering Voltage) .....	105	volts

▲ These ratings apply to the 5823 when it is operated from a power supply having a frequency of 60 Hz.

\* Averaged over any interval of 15 seconds max.

Refer to chart at end of section.

**5824**

Refer to chart at end of section.

**5840**

Refer to chart at end of section.

**5840W**

Refer to chart at end of section.

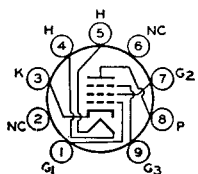
**5842/417A**

Refer to chart at end of section.

**5844**

Refer to chart at end of section.

**5847/404A**



9AD

### SHARP-CUTOFF PENTODE

**5879**

Miniature type used as audio amplifier in the input stages of medium-gain public-address systems, home sound recorders, and audio systems. Outlines section, 6B; requires miniature 9-contact socket. For operation as resistance-coupled amplifier, refer to Resistance-Coupled Amplifier section.

Heater Voltage (ac/dc) .....	6.3	volts
Heater Current .....	0.15	ampere
Peak Heater-Cathode Voltage .....	±100 max	volts
Direct Interelectrode Capacitances:		
Pentode Connection:		
Grid No.1 to Plate .....	0.11 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3 .....	2.7	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3 .....	2.4	pF
Triode Connection*:		
Grid No.1 to Plate .....	1.4	pF
Grid No.1 to Cathode and Heater .....	1.4	pF
Plate to Cathode and Heater .....	0.85	pF

\* Grid No.2 and grid No.3 connected to plate.

**Class A<sub>1</sub> Amplifier**

MAXIMUM RATINGS (Design-Maximum Values)	Triode Connection*	Pentode Connection	
Plate Voltage	275	330	volts
Grid-No.2 (Screen-Grid) Voltage	—	See curve page 300	
Grid-No.2 Supply Voltage	—	330	volts
Grid-No.1 (Control-Grid) Voltage:			
Negative-bias value	55	55	volts
Positive-bias value	0	0	volts
Plate Dissipation	1.7	1.25	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 165 volts	—	0.25	watt
For grid-No.2 voltages between 165 and 300 volts	—	See curve page 300	

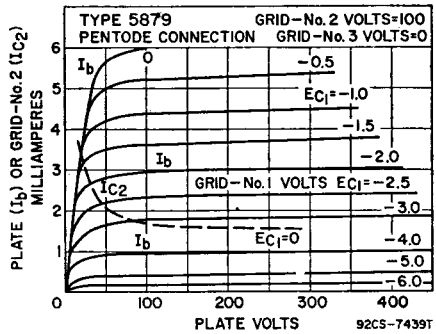
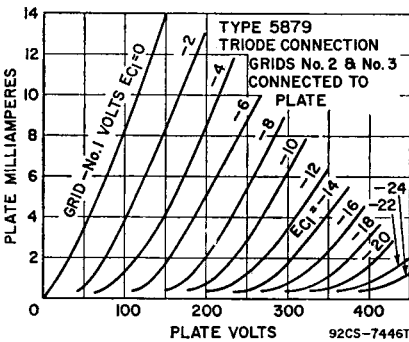
**CHARACTERISTICS**

Plate Voltage	100	250	250	volts
Grid No.3	—	—	Connected to cathode at socket	
Grid-No.2 Voltage	—	—	100	volts
Grid-No.1 Voltage	-3	-8	-3	volts
Amplification Factor	21	21	—	
Plate Resistance (Approx.)	0.017	0.0137	2	megohms
Transconductance	1240	1530	1000	μmhos
Plate Current	2.2	5.5	1.8	mA
Grid-No.2 Current	—	—	0.4	mA
Grid-No.1 Voltage (Approx.) for plate current of 10 μA	—	—	-8	volts

**MAXIMUM CIRCUIT VALUE**

Grid-No.1-Circuit Resistance	2.2	megohms
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\* Grid No.2 and grid No.3 connected to plate.



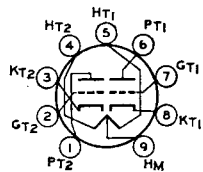
- 5881** Refer to chart at end of section.
- 5896** Refer to chart at end of section.
- 5899** Refer to chart at end of section.
- 5902** Refer to chart at end of section.
- 5915** Refer to chart at end of section.

**5963**

INDUSTRIAL TYPE

**MEDIUM-MU TWIN TRIODE**

Miniature type medium-mu twin triode used for "on-off" control applications involving long periods of operation under cutoff conditions. Outlines section, 6B; requires miniature 9-contact socket.



9A

Heater Arrangement	<b>Series</b>	<b>Parallel</b>	
Heater Voltage (ac/dc)	12.6 ±10%	6.3 ±10%	volts
Heater Current	0.15	0.30	ampere
Heater-Cathode Voltage:			
Peak value	±90 max.	±90 max.	volts
Direct Interelectrode Capacitances (Approx.):	<b>Unit No. 1    Unit No. 2</b>		
Grid to Plate	1.5	1.5	pF
Grid to Cathode and Heater	1.9	1.9	pF
Plate to Cathode and Heater	0.5	0.35	pF
Grid of Unit No.1 to grid of Unit No.2		0.1 max.	pF

**Frequency Divider in Computer Service  
and "On-Off" Control Service**  
Values are for Each Unit

**MAXIMUM RATINGS** (Absolute-Maximum Values)

Plate Voltage	250	volts
Grid Voltage:		
Negative bias value	100	volts
Positive bias value	0	volt
Peak negative value	200	volts
Plate Dissipation	2.5	watts
Grid Input	0.5	watt
Cathode Current:		
Peak	100	mA
DC	±90 max.	volts
Bulb Temperature (At hottest point on bulb surface)	120	°C

**TYPICAL OPERATION AS FREQUENCY HALFER**

	<b>Cutoff Condition</b>	<b>Zero-Bias Condition</b>	
Plate-Supply Voltage	150	150	volts
Grid Voltage	-15	0	volts
Plate-Circuit Resistance	20000	20000	ohms
Grid-Circuit Resistance	47000	47000	ohms
Plate Current	0	6.1	mA

**MAXIMUM CIRCUIT VALUES**

Grid-Circuit Resistance:		
For fixed-bias operation	0.5	megohm
For cathode-bias operation	1	megohm

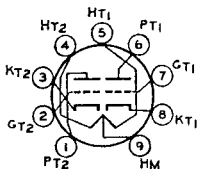
**Class A<sub>1</sub> Amplifier (Each Unit)**

**CHARACTERISTICS**

Plate Voltage	67.5	volts
Grid Voltage	0	volts
Amplification Factor	21	
Plate Resistance (Approx.)	6600	ohms
Transconductance	3200	μmhos
Plate Current	8.5	mA

Refer to chart at end of section.

**5964**



**9A**

**MEDIUM-MU TWIN TRIODE**

**5965**

INDUSTRIAL  
TYPE

Miniature type medium-mu twin triode used for "on-off" control applications involving long periods of operation under cutoff conditions. Outlines section, 6B; requires miniature 9-contact socket.

Heater Arrangement	<b>Series</b>	<b>Parallel</b>	
Heater Voltage (ac/dc)	12.6 ±10%	6.3 ±10%	volts
Heater Current	0.225	0.45	ampere
Heater-Cathode Voltage:			
Peak value	±200 max.	±200 max.	volts
Average value	±100 max.	±100 max.	volts

Direct Interelectrode Capacitances (Approx.)	Unit No. 1	Unit No. 2	
Grid to Plate	3.0	3.0	pF
Grid to Cathode and Heater	3.8	3.8	pF
Plate to Cathode and Heater	0.5	0.38	pF
Plate of Unit No.1 to plate of Unit No.2	0.5		pF

### Frequency Divider in Computer Service and "On-Off" Control Service

Values are for Each Unit

#### MAXIMUM RATINGS (Absolute-Maximum Values)

Plate Voltage	330	volts
Grid Voltage:		
Negative bias value	150	volts
Plate Dissipation	2.4	watts
Total for both units	4.4	watts
DC Cathode Current	16.5	mA
Bulb Temperature (At hottest point on bulb surface)	165	°C

#### TYPICAL OPERATION IN COMPUTER SERVICE

	Cutoff Condition	Conduction Condition	
Plate Supply Voltage	150	150	volts
Plate Load Resistor	7200	7200	ohms
Plate Current	—	10.5	mA
Grid Voltage (Approx.) for grid current of 140 $\mu$ A	—	less than 1	volt
Grid Voltage (Approx.) for plate current of 150 $\mu$ A	-5.5	—	volts
Difference in Grid Voltage Between Units (For plate current of 150 $\mu$ A per unit)	1.5	—	volts

#### MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance:		
For fixed-bias operation	0.1	megohm
For cathode-bias operation	0.5	megohm

### Class A<sub>1</sub> Amplifier (Each Unit)

#### CHARACTERISTICS

Plate Supply Voltage	150	volts
Cathode-Bias Resistor	220	ohms
Amplification Factor	47	
Plate Resistance	7250	ohms
Transconductance	6500	$\mu$ mhos
Plate Current	8.2	mA
Grid Voltage (Approx.) for plate current of 150 $\mu$ A	-5.5	volts

**6005**

Refer to chart at end of section.

**6005/6AQ5W**

Refer to chart at end of section.

**6005/6AQ5W/  
6095**

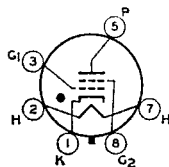
Refer to chart at end of section.

**6012**

INDUSTRIAL  
TYPE

### GAS THYRATRON

Glass octal negative-control gas-tetrode thyatron for use in relay and grid-controlled rectifier applications. Outlines section, 36; requires octal socket.



**600**

	Min.	Av.	Max.	
Heater Voltage (ac/dc)	5.7	6.3	6.9	volts
Heater Current	—	2.6	2.85	amperes
Heater-Cathode Voltage:				
Peak		+25,	-100 max.	volts
Cathode:				
Minimum heating time prior to tube conduction		30		seconds
Maximum outage time without reheating		5		seconds
Direct Interelectrode Capacitances (Approx.):				
Grid No.1 to Anode		0.23		pF
Grid No.1 to Cathode, Grid No.2, and Heater		5.8		pF
Anode to Cathode, Grid No.2, and Heater		3.9		pF

**Ionization Time (Approx.):**

For conditions: dc anode volts = 100, grid-No.2 volts = 0, grid-No.1 square-pulse volts = +50, and peak anode amperes during conduction = 5 ..... 0.5

**Deionization Time (Approx.)** ..... See Table I

**Maximum Critical Grid-No.1 Current:**

For conditions: ac anode-supply volts = 460 (rms), and average anode amperes = 0.5 ..... 3  $\mu$ A

**Anode Voltage Drop (Approx.)** ..... 10 volts

**Grid-No.1 Control Ratio (Approx.):**

For conditions: grid-No.1 resistor (megohms) = 0, grid-No.2 resistor (megohms) = 0, and grid-No.2 volts = 0 ..... 150

**Grid-No.2 Control Ratio (Approx.):**

For conditions: grid-No.1 resistor (megohms) = 0, grid-No.2 resistor (megohms) = 0, and grid-No. volts = 0 ..... 650

**Relay and Grid-Controlled Rectifier Service**

For Anode-Supply Frequency of 60 Hz

**MAXIMUM RATINGS (Absolute-Maximum Values)**

**Peak Anode Voltage:**

Forward ..... 650 volts

Inverse ..... 1300 volts

**Grid-No.2 (Shield-Grid) Voltage:**

Peak, before tube conduction ..... -100 volts

Average#, during tube conduction ..... -10 volts

**Grid-No.1 (Control-Grid) Voltage:**

Peak, before tube conduction ..... -200 volts

Average#, during tube conduction ..... -10 volts

**Cathode Current:**

Peak ..... 5 amperes

Average# ..... 0.5 ampere

Fault, for duration of 0.1 second max. .... 20 amperes

**Average Grid-No.2 Current#** ..... +0.05 ampere

**Average Grid-No.1 Current#** ..... +0.05 ampere

**Ambient-Temperature Range** ..... -75 to +90 °C

**MAXIMUM CIRCUIT VALUE**

Grid-No.1-Circuit Resistance ..... 2 megohms

# Averaged over any interval of 30 seconds maximum.

**OPERATIONAL RANGE OF CRITICAL GRID-No.1 VOLTAGE**

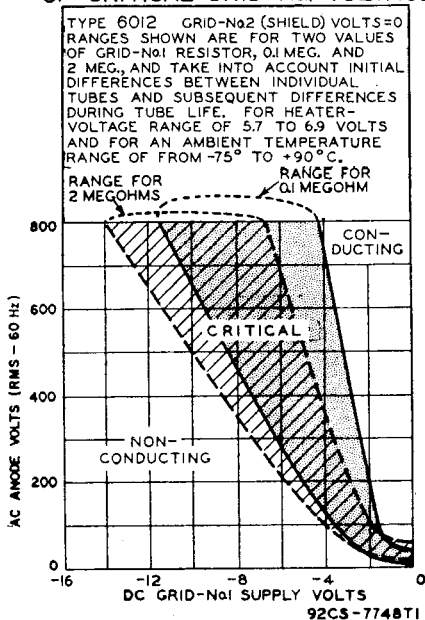


Table 1

DC Anode Volts	125		250		$R_{K1}$ M $\Omega$	$E_{CC1}$ volts	$R_{K2}$ * ohms	$E_{CC2}$ volts
	DC Anode Amperes	0.5	1.0	0.5				
DEIONIZATION TIME		175	225	250	275	0.001		
		350	375	450	475	0.1	-13	1000 0
		650	700	1100	1200	2		
$\mu$ S (Approx.)		100	125	100	125	0.001		
		125	150	150	175	0.1	-100	1000 0
		250	275	275	300	2		

\* Series resistor between grid No.2 and cathode.

<b>6021</b>	Refer to chart at end of section.
<b>6072</b>	Refer to chart at end of section.
<b>6072A</b>	Refer to chart at end of section.
<b>6073</b>	Refer to chart at end of section.
<b>6073/OA2</b>	Refer to chart at end of section.
<b>6074</b>	Refer to chart at end of section.
<b>6074/OB2</b>	Refer to chart at end of section.

## 6080

INDUSTRIAL  
TYPE

## LOW-MU TWIN POWER TRIODE

Glass octal type used as a regulator tube in dc power supply units and in projection television booster scanning applications. Outlines section, 36; requires octal socket.

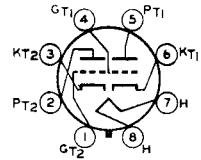
Heater Voltage .....	6.3 $\pm$ 10%	volts
Heater Current .....	2.5	amperes
Heater-Cathode Voltage:# Peak .....	$\pm$ 300 max.	volts
Direct Interelectrode Capacitances (Approx.)		
Grid to Plate (each unit) .....	8	pF
Input (each unit) .....	6	pF
Output (each unit) .....	2.2	pF
Heater to Cathode (each unit) .....	11	pF
Grid of Unit No.1 to Grid of Unit No.2 .....	0.5	pF
Plate of Unit No.1 to Plate of Unit No.2 .....	2	pF

### Class A<sub>1</sub> Amplifier (Each Unit)

<b>CHARACTERISTICS</b>		
Plate-Supply Voltage .....	135	volts
Cathode-Bias Resistor .....	250	ohms
Amplification Factor .....	2	
Plate Resistance .....	280	ohms
Transconductance .....	7000	$\mu$ mhos
Plate Current .....	125	mA

### DC Amplifier (Each Unit)

<b>MAXIMUM RATINGS</b> (Absolute-Maximum Values)		
Plate Voltage .....	250	volts
Plate Current .....	125	mA
Plate Dissipation .....	13	watts
Bulb Temperature (At hottest point on bulb surface) .....	200	$^{\circ}$ C



8BD

**MAXIMUM CIRCUIT VALUES**

Grid-Circuit Resistance:		
For cathode-bias operation .....	1	megohm
For fixed-bias operation <sup>□</sup> .....	0.1	megohm
For combined fixed and cathode-bias operation* .....	0.1	megohm

**Booster Scanning Service (Each Unit)**

**MAXIMUM RATINGS (Absolute-Maximum Values)**

For operation in a 525-line, 30-frame system

Peak Negative-Pulse Plate Voltage <sup>●</sup> .....	3000	volts
Peak Negative-Pulse Grid Voltage .....	2300	volts
DC Plate Current .....	125	mA
Plate Dissipation .....	13	watts

**MAXIMUM CIRCUIT VALUES (For maximum rated conditions)**

Grid-Circuit Resistance:		
For cathode-bias operation .....	1	megohm
For fixed-bias operation .....	not recommended	

<sup>□</sup> When fixed bias is used, the plate circuit should contain a protective resistance to provide a minimum drop of 15 volts dc at the normal operating conditions.

\* When combined fixed- and cathode-bias is used, the cathode-bias portion should have a minimum value of 7.5 volts dc at the normal operating conditions.

<sup>●</sup> Pulse duration must not exceed 15 per cent of one horizontal scanning cycle (10 microseconds).

# Operation of this tube is not recommended with a damper pulse between heater and cathode.

**Special Ratings & Performance Data**

**SHOCK RATING**

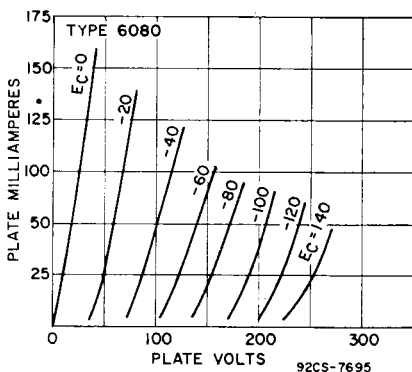
Impact Acceleration .....	450 max.	g
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**FATIGUE RATING**

Vibrational Acceleration .....	2.5 max.	g
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**LOW-FREQUENCY VIBRATION PERFORMANCE**

RMS Output Voltage .....	200 max.	mV
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Refer to chart at end of section.

**6080WA**

Refer to chart at end of section.

**6082**

Refer to chart at end of section.

**6101**

Refer to chart at end of section.

**6101/6J6WA**

Refer to chart at end of section.

**6111**