



3B28

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# HALF-WAVE GAS RECTIFIER

HOT-CATHODE TYPE

## GENERAL DATA

### Electrical:

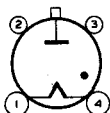
Filament, Coated:

Voltage . . . . .	2.5 ± 5%	ac volts
Current at 2.5 volts. . . . .	5	amp
Minimum Heating Time Before Anode Voltage is Applied . . . . .	10	seconds
Peak Anode Voltage Drop (Approx.) . . . . .	10	volts

### Mechanical:

Mounting Position . . . . .	Any
Overall Length. . . . .	5.87" to 6.15"
Seated Length. . . . .	5.25" to 5.53"
Maximum Diameter. . . . .	2-1/16"
Bulb. . . . .	T-16
Cap . . . . .	Medium (JETEC No. C1-5)
Base. . . . .	Medium-Shell Small 4-Pin, Bayonet (JETEC No. A4-10)
Basing Designation for BOTTOM VIEW. . . . .	4P <sub>1</sub>

- Pin 1 - Filament
- Pin 2 - No Connection
- Pin 3 - No Connection



- Pin 4 - Filament, Cathode Shield
- Cap - Anode

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### Maximum Ratings, Absolute values:

	Rating r	Rating rr	
PEAK INVERSE ANODE VOLTAGE. . . . .	5000 max.	10000 max.	volts
ANODE CURRENT:			
Peak. . . . .	2 max.	1 max.	amp
Average*. . . . .	0.5 max.	0.25 max.	amp
Fault, for duration of 0.1 second max. . . . .	20 max.	20 max.	amp
FREQUENCY OF POWER SUPPLY . . . . .	500 max.	150 max.	cps
AMBIENT TEMPERATURE . . . . .	-75 to +90	-75 to +90	°C

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current. . . . .	1	-	5.40	amp
Critical Anode Voltage. . . . .	2	-	50	volts
Peak Anode Voltage Drop . . . . .	3	-	14	volts

Note 1: with 2.5 volts rms on filament.

Note 2: with 2.38 volts rms on filament.

\* Averaged over any period of 30 seconds maximum.

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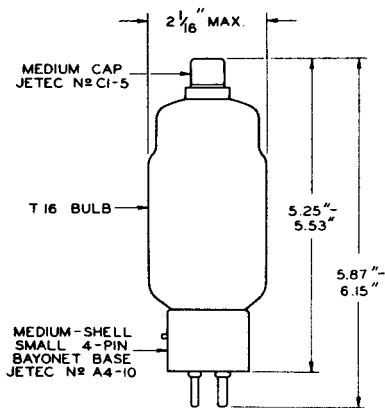
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Note 3: With 2.5 volts rms on filament, peak anode current of 2 amperes provided by half-cycle pulse from a 60-cps sine wave and recurring approximately once a second. Tube drop is measured by an oscilloscope connected between anode and center tap of filament transformer.

## OPERATING NOTES

The filament-supply voltage for the 3B28 may be either in phase or out of phase with the anode voltage. With out-of phase excitation (quadrature operation), improved utilization of the cathode is possible. Although the 3B28 carries no higher anode-current rating for quadrature operation than for in-phase operation, quadrature operation is conducive to appreciably longer tube life. For optimum results, the filament and anode voltages should be 90° out of phase. In practical applications however, nearly, full realization of the advantages of this type of excitation is possible even when the phase difference between the filament and anode supply voltages ranges from the optimum value by as much as ± 30°. In polyphase operation where the anode voltage shifts from one phase to another during the current-conduction period, quadrature operation is obtained when the filament voltage passes through zero at the center of the current-conduction period.



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For Circuit Figures, see Front of this Section

CIRCUIT	MAX. TRANS. SEC. VOLTS (RMS) E	APPROX. DC OUTPUT VOLTS TO FILTER $E_{av}$	MAX. DC OUTPUT AMPERES $i_{av}$	MAX. DC OUTPUT KW TO FILTER $P_{dc}$
<b>Fig. 1</b> Half-Wave Single-Phase In-Phase Operation	7000 <sup>▲</sup> 3500 <sup>●</sup>	3200 1600	0.25 0.5	0.8 0.8
<b>Fig. 2</b> Full-Wave Single-Phase In-Phase Operation	3500 <sup>▲</sup> 1700 <sup>●</sup>	3200 1600	0.5 1.0	1.6 1.6
<b>Fig. 3</b> Series Single-Phase In-Phase Operation	7000 <sup>▲</sup> 3500 <sup>●</sup>	6400 3200	0.5 1.0	3.2 3.2
<b>Fig. 4</b> Half-Wave Three-Phase In-Phase Operation	4000 <sup>▲</sup> 2000 <sup>●</sup>	4800 2400	0.75 1.5	3.6 3.6
<b>Fig. 5</b> Parallel Three-Phase Quadrature Operation	4000 <sup>▲</sup> 2000 <sup>●</sup>	4800 2400	1.5 3.0	7.2 7.2
<b>Fig. 6</b> Series Three-Phase Quadrature Operation	4000 <sup>▲</sup> 2000 <sup>●</sup>	9600 4800	0.75 1.5	7.2 7.2
<b>Fig. 7</b> Half-Wave Four-Phase Quadrature Operation	3500 <sup>▲</sup> 1700 <sup>●</sup>	4500 2250	<i>Resis- tive Load</i> 0.9 <i>Induc- tive Load</i> 1.0	<i>Resis- tive Load</i> 4.0 <i>Induc- tive Load</i> 4.5
<b>Fig. 8</b> Half-Wave Six-Phase Quadrature Operation	3500 <sup>▲</sup> 1700 <sup>●</sup>	4800 2400	<i>Resis- tive Load</i> 0.95 <i>Induc- tive Load</i> 1.0	<i>Resis- tive Load</i> 4.5 <i>Induc- tive Load</i> 4.8
<p>▲ For maximum peak inverse anode voltage of 10000 volts. ● For maximum peak inverse anode voltage of 5000 volts.</p>				

FEB. 1, 1952

TUBE DEPARTMENT

TENTATIVE DATA 2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY