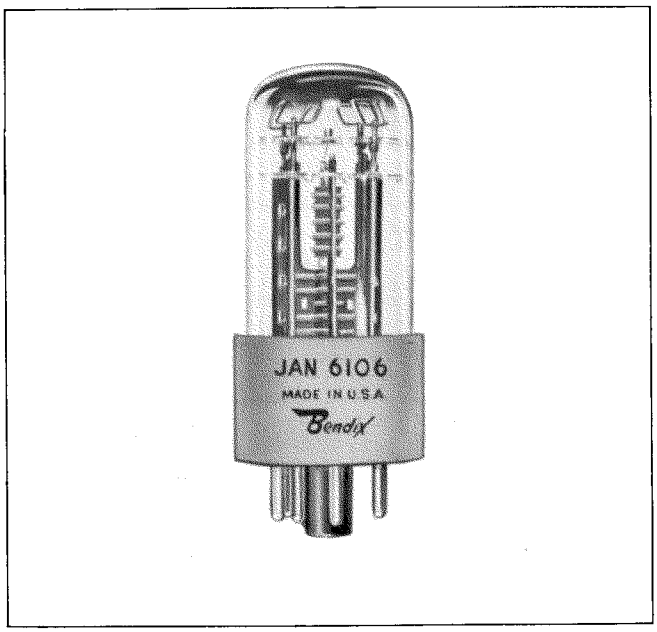
6106
Bendix Type TE-22
(Generic Type 5Y3GT)

FULL-WAVE RECTIFIER



ELECTRICAL RATINGS*

Heater voltage**	5.0 volts
Heater current	1.7 amps.
Peak inverse voltage	1550 volts (max.)
Peak plate current (per plate)	415 mA (max.)
Peak surge current (per plate)	1.4 amps. (max.)
AC plate supply voltage and DC output currents	See Rating Chart I
Cathode warm-up time	45 seconds
Total effective plate supply impedance —per plate	See Rating Chart III

*To obtain greatest life expectancy from tube, avoid designs where the tube is subjected to all maximum ratings simultaneously.

**Voltage should not fluctuate more than ±5%.

TYPICAL OPERATION

Input to Filter

	Capacitor	Choke
Heater voltage (volts)	5.0	5.0
Heater current (amperes)	1.7	1.7
RMS plate supply voltage (volts per plate)	350	500
Input condenser (μf)	4	—
Input choke (henries)	—	10
DC output current (mA)	125	125
DC output voltage (volts)	350	390

DESCRIPTION

This full-wave, high-vacuum rectifier is one of the Bendix Red Bank line of reliable vacuum tubes specifically designed for aircraft, military and industrial applications where freedom from early failures, long service life, and uniform operating characteristics are extremely important. Each tube is given a 45-hour run-in under various overload, vibration, and shock conditions likely to be encountered in service. This run-in serves to reduce early failures by eliminating tubes with any minor defects that might lead to failure under actual operating conditions.

Heavy gauge heater construction together with a pure alumina insulator reduces the likelihood of heater failure. A large area cathode operating at moderate temperatures gives longer service life and freedom from arc-overs. An eight-pillar mount structure and the button-type stem provide a strong assembly that will stand up under extreme conditions of vibration and shock. The tube requires an 8-pin octal socket and can be mounted in any position. Adequate ventilation should be provided.

The tube is designed to replace the 5Y3-GT and similar types in applications where severe environmental conditions are encountered, especially in airborne equipment. The cathode type structure instead of a filament structure insures against filament breakage under shock and vibration. The arc-resistant, compound-filled, melamine base with inter-pin barriers permits operation to an altitude of 80,000 feet. (See Altitude Ratings, Page 3)

PHYSICAL CHARACTERISTICS*

Base	Intermediate shell octal 5-pin (Melamine—with barriers)
Bulb	T-9
Max. overall length	3.375 in.
Max. seated height	2.880 in.
Max. diameter	1.320 in.
Mounting position	Any
Max. altitude***	80,000 ft.
Max. bulb temperature****	200° C.
Life expectancy	10,000 hrs.

***See "Altitude Ratings" Page 3

****Temperature measurement made with "Tempilaq"

THE Bendix CORPORATION
Red Bank DIVISION, EATONTOWN, NEW JERSEY

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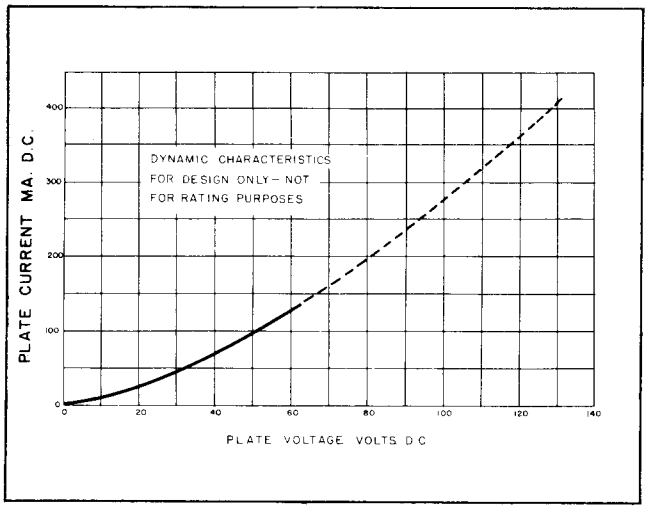
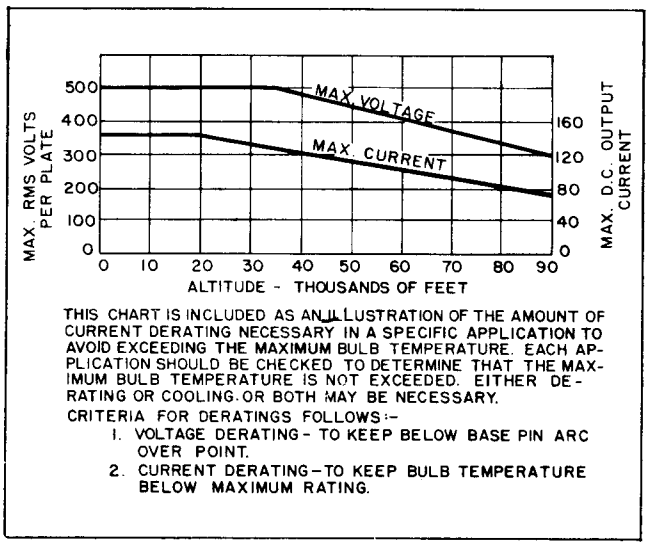


AVERAGE PLATE CHARACTERISTICS



THIS CHART IS INCLUDED AS AN ILLUSTRATION OF THE AMOUNT OF CURRENT DERATING NECESSARY IN A SPECIFIC APPLICATION TO AVOID EXCEEDING THE MAXIMUM BULB TEMPERATURE. EACH APPLICATION SHOULD BE CHECKED TO DETERMINE THAT THE MAXIMUM BULB TEMPERATURE IS NOT EXCEEDED. EITHER DERATING OR COOLING OR BOTH MAY BE NECESSARY.

CRITERIA FOR DERATINGS FOLLOWS:–

1. VOLTAGE DERATING – TO KEEP BELOW BASE PIN ARC OVER POINT.
2. CURRENT DERATING – TO KEEP BULB TEMPERATURE BELOW MAXIMUM RATING.

ALTITUDE RATINGS

APPLICATION NOTES

For reliable operation special consideration should be given to the maximum ratings of the 6106. These ratings are limiting absolute values and if exceeded may seriously impair the reliability of the tube. Therefore, the equipment designer should determine an average design value for each rating so that variations in supply voltages, load, and components do not cause the absolute values to be exceeded. The bulb temperature rating is an extremely important characteristic which should not be exceeded if expected life is to be achieved.

Reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are directly related to the degree that regulation of the heater voltage is maintained at its center rated value.

From Rating Chart I, operating conditions should be selected to insure usage within the area of permissible operation with choke or capacitor inputs.

To insure that the maximum peak plate current is not exceeded a choice of operating values of d-c output current per plate and rectification efficiency should be made such that they fall within the area of permissible operation of Rating Chart II.

Rating Chart III graphically represents the relationship between the maximum a-c plate supply voltage per plate and the minimum plate supply resistance per plate to prevent maximum transient currents from exceeding the peak surge current rating of the tube. The plate supply resistance $Rs = R(sec) + N^2R(pri) + Ra$, where

R(sec) = d-c resistance of each section of transformer secondary,

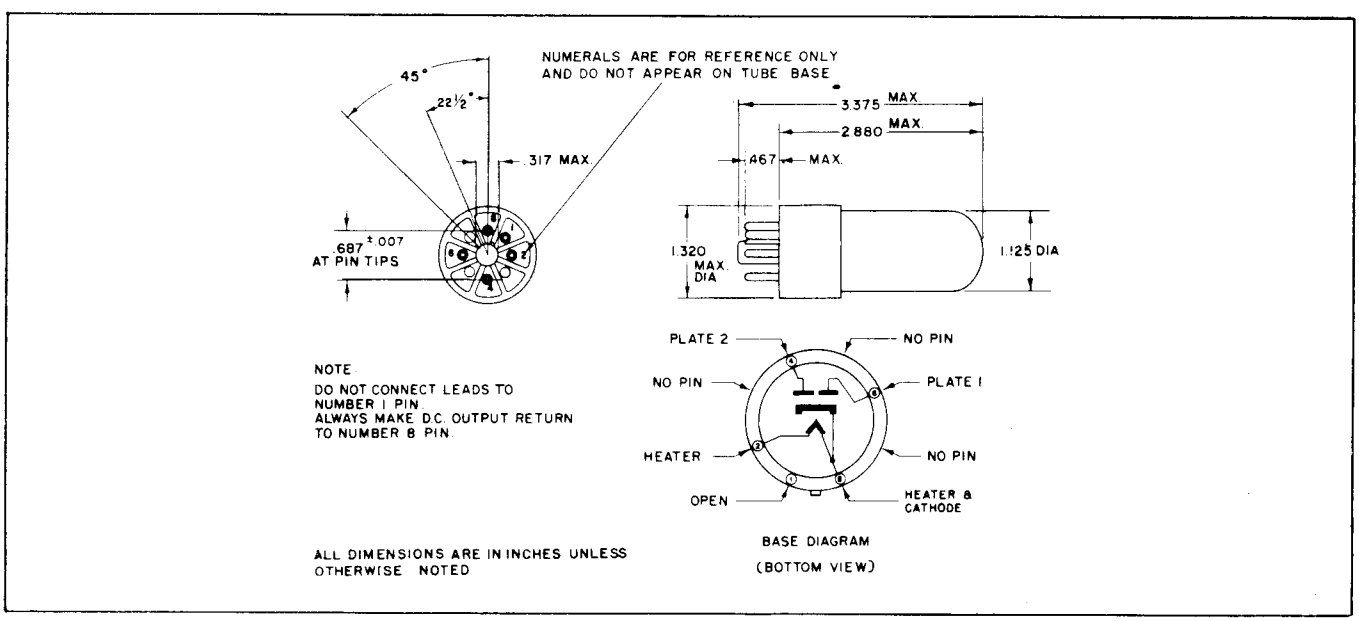
N = Transformer voltage step-up ratio per section,

R(pri) = d-c resistance of transformer primary,

Ra = d-c resistance of added series resistance per plate.

The addition of inductance would allow a reduction of the minimum value specified for Rs provided the reactance added is not too small as to cause the maximum peak surge plate current and maximum steady-state peak plate current ratings to be exceeded.

The increased rating chart is presented to emphasize the dangers of operating simultaneously at or near all maxima. In general, the effect on life of operation at increased ratings is additive and cumulative. Interpolation within this chart will give the designer a general idea of the life expectancy and reliability of his application. Each proposed application should be life tested under maximum environmental conditions in order to check that the design gives the desired reliability. When conservatively used this tube has a life expectancy of 10,000 hours.



OUTLINE DRAWING

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ELECTRICAL CHARACTERISTICS AND TEST DATA

TEST CONDITIONS AND CHARACTERISTIC LIMITS

All Tubes are Stabilized for 45 hours under Test Conditions and 2G Vibration at 30 cps prior to 100% Testing.

CHARACTERISTICS	TEST CONDITIONS	SYMBOL	MIN.	DESIGN CENTER	MAX.	UNITS	
PRODUCTION TESTS							
Heater Current	A	If	1.6	1.7	1.8	Aac	
Operation	B	Io	130	140	—	mAdc	
Emission (1)	C	Ils	145	—	—	mAdc	
Emission (2)	C	I2s	145	—	—	mAdc	
Short and Continuity							
DESIGN TESTS							
Vibration: 2.5 G, 25 cps							
Insulation of Electrodes	D	R	100	—	—	megohms	
TEST CONDITIONS	Ef	Epp/p	Es	Ep	RL	CL	Zpp/p
Units	Vdc	Vac	Vdc	Vdc	ohms	uf	ohms
A	5.0						
B	5.0	400			2750	4	*
C	5.0		75				
D	5.0			1500			

*Adjust with tube having Etd = 60 Vdc @ 125 mA dc per plate to give Io = 140 mA

SPECIAL TESTS*

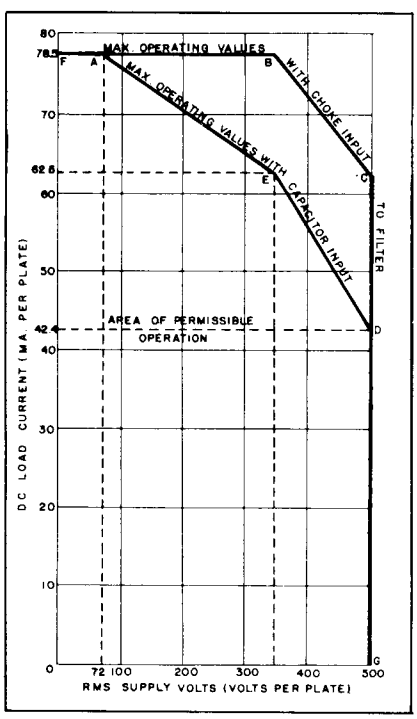
In addition to the production and design tests shown under "Electrical Characteristics and Test Data", other tests are performed on a sampling basis to assure a high out-going quality level. See below:

TEST	CONDITION	DURATION
Heater Cycling Life Test	On 2½ min. Off 2½ min. Ef = 5.5 Vac	3,000 On-Off cycles
Glass Strain Test	Boiling water to Ice water	3 minutes in each
Life Test	Under Test Conditions	1,000 hours
High Level Fatigue Test	50 g Shock Excitation: 18/sec. rep. rate	100 hours
Altitude Test	60,000 Feet	5 minutes
Life Expectancy Test	Under Test Conditions	5,000 hours
Mount Inspection	100% Test-Microscopic Inspection of 15 possible Trouble Points	

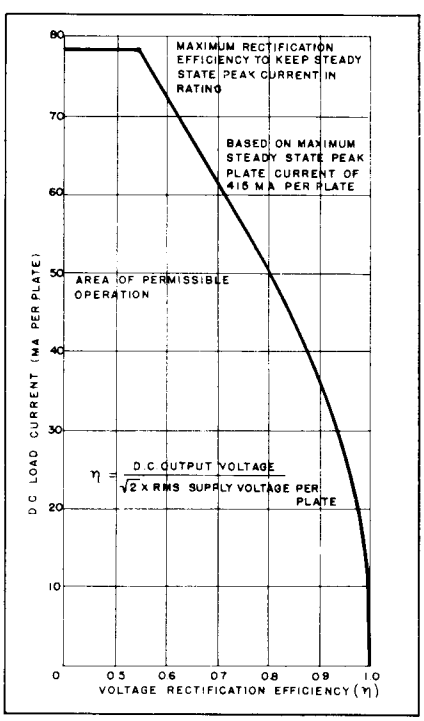
*For additional specifications consult MIL-E-1/203 specification for the 6106.

EFFECT ON LIFE OF INCREASED RATINGS

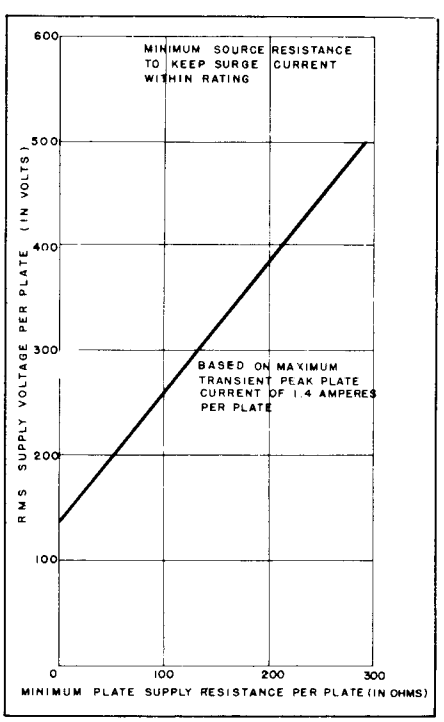
See also Application Notes	OPERATING CONDITIONS		
RATING OR CHARACTERISTIC	CONSERVATIVE	TYPICAL	MAXIMUM
Heater Voltage	5.0 V ± 2%	5.0 V ± 5%	5.0 V ± 10%
Plate Supply Voltage	300 Vac	350 Vac	450 Vac
Peak Plate Current	300 mA	350 mA	415 mA
D-C Output Current	110 mA	125 mA	150 mA
Bulb Temperature	150° C	175° C	200° C
Altitude	0-20,000′	60,000′	80,000′
Vibration	1 G	2½ G	5 G
LIFE EXPECTANCY	MAXIMUM	HIGH	MEDIUM



RATING CHART 1



RATING CHART 2



RATING CHART 3

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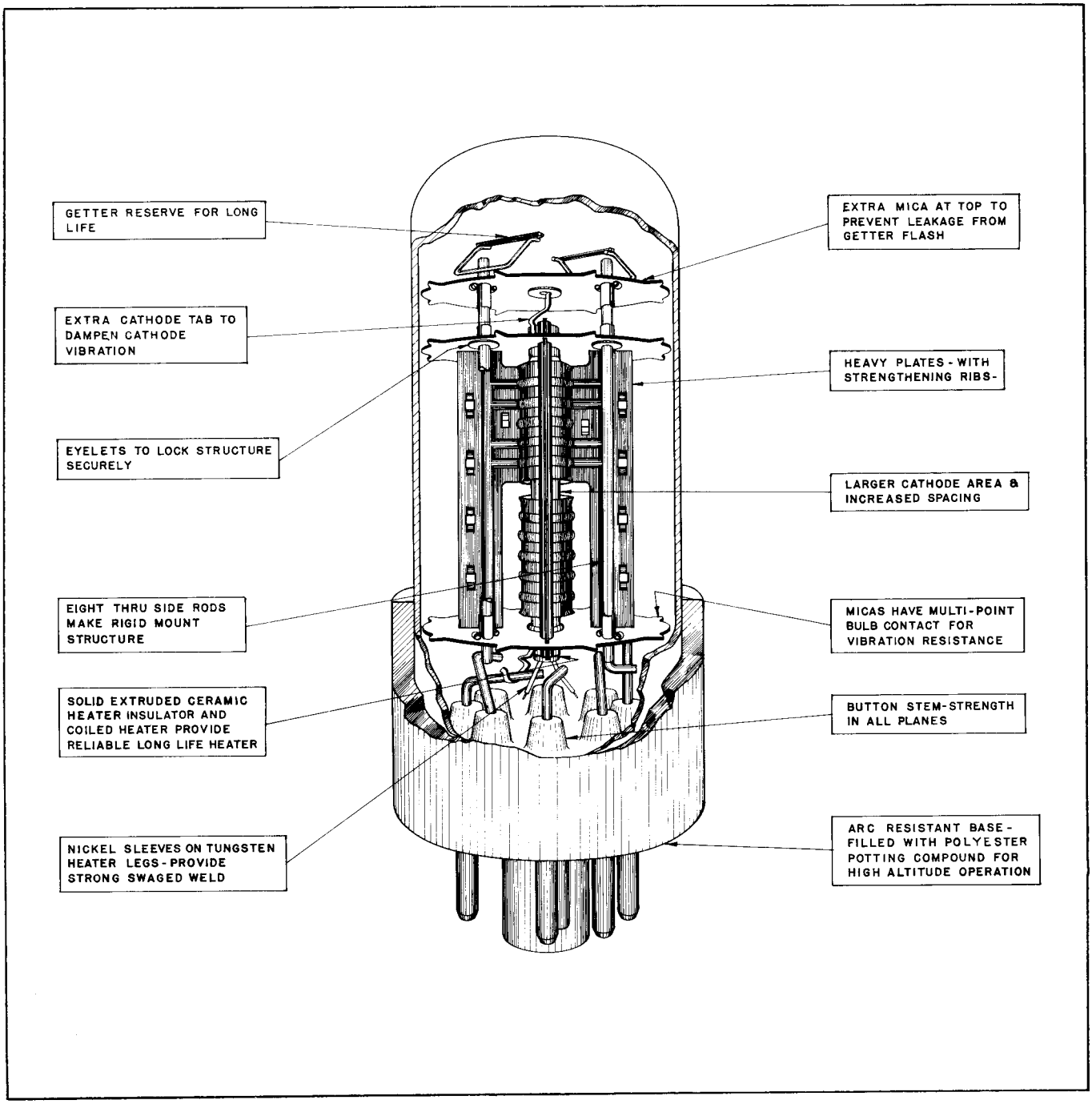

STRUCTURAL FEATURES OF 6106 PROVIDE HIGH RELIABILITY AND LONG LIFE

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