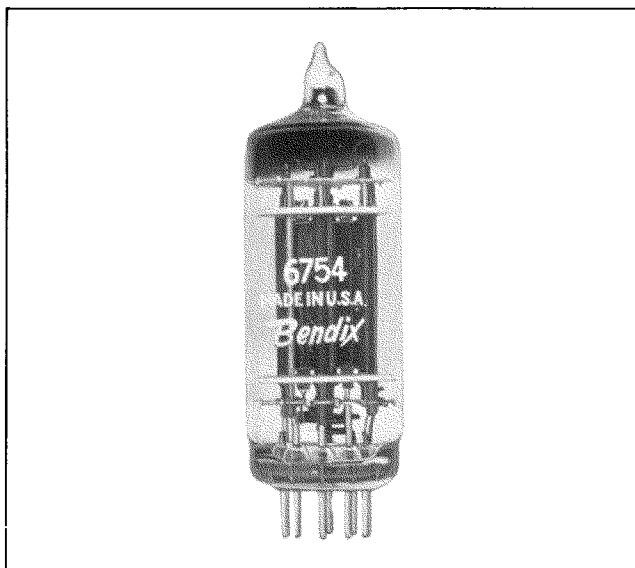


## RELIABLE HARD GLASS MINIATURE FULL-WAVE RECTIFIER



### ELECTRICAL RATINGS\*

|                                                    |                    |
|----------------------------------------------------|--------------------|
| Heater voltage**                                   | 6.3 volts          |
| Heater current                                     | 1.0 amp            |
| Peak inverse voltage                               | 1450 volts         |
| Peak plate current—(per plate)                     | 330 mA             |
| Peak surge current—(per plate)                     | 1.1 amps           |
| DC heater-cathode potential                        | 500 volts (max.)   |
| Cathode heating time                               | 45 sec.            |
| Total effective plate supply impedance—(per plate) | See Rating Chart 3 |

For maximum current and voltage ratings, refer to Rating Chart 1.

\*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  $\pm 5\%$ .

### TYPICAL OPERATION

#### Input to Filter

|                                            | Capacitor | Choke |
|--------------------------------------------|-----------|-------|
| Heater voltage (volts)                     | 6.3       | 6.3   |
| Heater current (amperes)                   | 1.0       | 1.0   |
| RMS plate supply voltage (volts per plate) | 325       | 450   |
| Input capacitor ( $\mu$ f)                 | 4         | —     |
| Input choke (henries)                      | —         | 10    |
| DC output current (mA)                     | 100       | 100   |
| DC output voltage (volts)                  |           |       |
| At half-load current (50 mA)               | 375       | 395   |
| At full-load current (100 mA)              | 325       | 385   |

### DESCRIPTION

This miniature, 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.

In addition, this tube is designed for use in equipment with high ambient temperatures and where high levels of vibration, shock and other accelerations are encountered. Careful exhaust to a high degree of vacuum with thorough outgassing of all elements with electron bombardment is employed to ensure long life expectancy. A hard glass (nonex) bulb and stem with nickel pins are used. These, together with a conservative design center of cathode temperature, permit operation of these tubes up to bulb temperatures of 300°C, in contrast to an average of 175°C for soft glass bulbs. In addition, because of the lower expansion of the tungsten-nonex seal (about one-third that of conventional lime or lead glass), greater resistance to thermal shock is obtained. The nickel pins are gold plated to assure excellent contact resistance throughout life with freedom from corrosion.

This tube employs pressed ceramic spacers, instead of micas, for element separation. Conventional micas are used to snub the tube structure with respect to the bulb. These micas do not touch the hot elements of the tube which avoids deterioration of the mica and consequent loss of emission. Mica in contact with the hot cathode deteriorates even more rapidly under shock and vibration. Ceramic eliminates this problem and, furthermore, reduces damage caused by fatigue failure of parts.

### MECHANICAL DATA

|                               |                                                     |
|-------------------------------|-----------------------------------------------------|
| Base                          | 9 Pin Miniature Nonex Glass—<br>Gold Plated Pins    |
| Bulb                          | Nonex Glass—T6 $\frac{1}{2}$                        |
| Max. Overall Length           | 2 $\frac{3}{4}$ "                                   |
| Max. Seated Height            | 2 $\frac{1}{2}$ "                                   |
| Max. Diameter                 | $\frac{7}{8}$ "                                     |
| Mounting Position             | any                                                 |
| Max. Altitude***              | 80,000 feet                                         |
| Max. Bulb Temperature         | 300°C                                               |
| Max. Impact Shock             | 500 G                                               |
| Max. Vibrational Acceleration | 50 G                                                |
|                               | (100 hour shock excited fatigue test, sample basis) |
| Life Expectancy               | 10,000 hrs.                                         |

\*\*\*See altitude chart on page 3.

THE *Bendix* CORPORATION  
*Red Bank* DIVISION, EATONTOWN, NEW JERSEY

## ELECTRICAL CHARACTERISTICS AND TEST DATA

## TEST CONDITIONS AND CHARACTERISTIC LIMITS

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

| CHARACTERISTIC           | TEST CONDITIONS |                   | SYMBOL         | MIN.           | DESIGN CENTER  | MAX.    | UNITS             |                 |
|--------------------------|-----------------|-------------------|----------------|----------------|----------------|---------|-------------------|-----------------|
| PRODUCTION TESTS         |                 |                   |                |                |                |         |                   |                 |
| Heater Current           | A               | I <sub>f</sub>    | .90            | 1.0            | 1.1            | Aac     |                   |                 |
| Heater-Cathode Leakage   | A               | I <sub>hk</sub>   | —              | —              | ± 50           | μ Adc   |                   |                 |
| Operation                | B               | I <sub>o</sub>    | 95             | 100            | —              | mAdc    |                   |                 |
| Emission                 | C               | I <sub>s</sub>    | 75             | —              | —              | mAdc    |                   |                 |
| Short and Continuity     |                 |                   |                |                |                |         |                   |                 |
| DESIGN TESTS             |                 |                   |                |                |                |         |                   |                 |
| Vibration 2.5 G, 25 cps  |                 |                   |                |                |                |         |                   |                 |
| Insulation of Electrodes | D               | R                 | 100            | —              | —              | megohms |                   |                 |
| Heater-Cathode Leakage   | E               | I <sub>hk</sub>   | —              | —              | 100            | μ Adc   |                   |                 |
| TEST CONDITIONS          | E <sub>f</sub>  | E <sub>pp/p</sub> | E <sub>s</sub> | E <sub>p</sub> | R <sub>L</sub> | CL      | Z <sub>pp/p</sub> | E <sub>hk</sub> |
| Units                    | V               | Vac               | Vdc            | Vdc            | ohms           | uf      | ohms              | Vdc             |
| A                        | 6.3             |                   |                |                |                |         |                   | ± 500           |
| B                        | 6.3             | 350               |                |                | 3890           | 4       | Adjust            |                 |
| C                        | 6.3             |                   | 15             |                |                |         |                   |                 |
| D                        | 6.3             |                   |                | 1500           |                |         |                   |                 |
| E                        | 6.3             |                   |                |                |                |         |                   | 1500            |

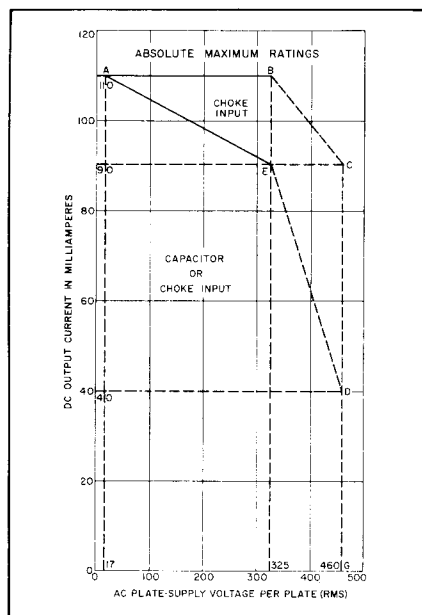
## SPECIAL TESTS

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:

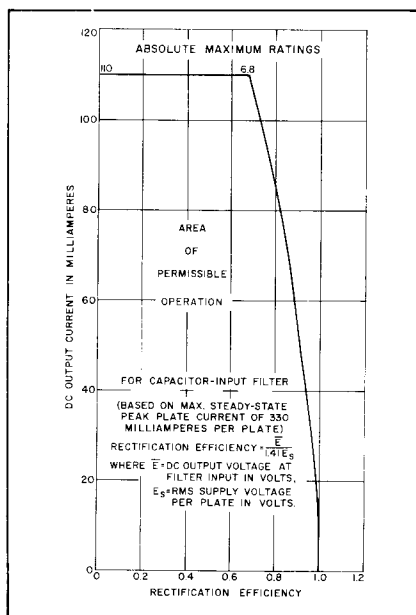
| TEST                     | CONDITION                                                      | DURATION            |
|--------------------------|----------------------------------------------------------------|---------------------|
| Heater Cycling Life Test | On 2½ min.<br>Off 2½ min.<br>E <sub>f</sub> = 7.0 Vac          | 3,000 On-Off cycles |
| Glass Strain Test        | Boiling water to Ice water                                     | 3 minutes in each   |
| High Level Fatigue Test  | 50 G Shock Excitation:<br>18/sec. rep. rate                    | 100 hours           |
| Altitude Test            | 60,000 Feet                                                    | 5 minutes           |
| High Temp. Life Test     | Under "Test Conditions"<br>Bulb Temp. 300°C                    | 1,000 hours         |
| Life Expectancy Test     | Under Test Conditions                                          | 5,000 hours         |
| Mount Inspection         | 100% Test-Microscopic Inspection of 15 possible Trouble Points |                     |

## EFFECT ON LIFE OF INCREASED RATINGS

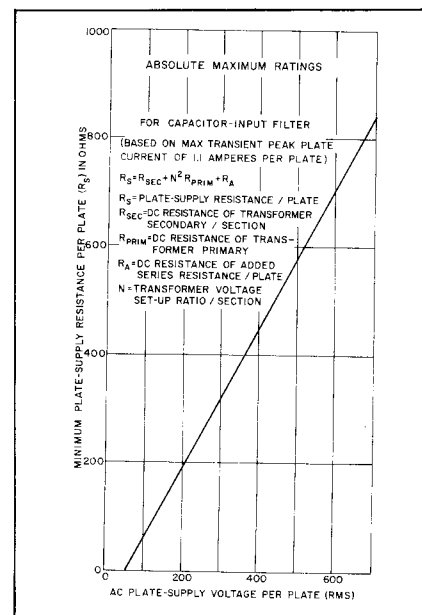
| See also<br>Application Notes  | OPERATING CONDITIONS |            |             |
|--------------------------------|----------------------|------------|-------------|
|                                | CONSERVATIVE         | TYPICAL    | MAXIMUM     |
| RATING OR CHARACTERISTIC       |                      |            |             |
| Heater Voltage                 | 6.3 V ± 2%           | 6.3 V ± 5% | 6.3 V ± 10% |
| H-K Voltage                    | 425 V                | 450 V      | 500 V       |
| Peak Plate Current (per plate) | 225 mA               | 300 mA     | 330 mA      |
| Peak Plate Inverse Voltage     | 1000 V               | 1250 V     | 1450 V      |
| Output Current (per Tube)      | 85 mA                | 90 mA      | 100 mA      |
| Bulb Temperature               | 175°C                | 225°C      | 300°C       |
| Altitude                       | 0-20,000 ft.         | 60,000 ft. | 80,000 ft.  |
| Vibration                      | 2 G                  | 5 G        | 10 G        |
| LIFE EXPECTANCY                | MAXIMUM              | HIGH       | MEDIUM      |



RATING CHART 1



RATING CHART 2



RATING CHART 3

## APPLICATION NOTES

For reliable operation special consideration should be given to the maximum ratings of the 6754. 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 1, 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 2.

Rating Chart 3 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  $R_s = R(\text{sec}) + N^2 R(\text{pri}) + R_a$ , where

$R(\text{sec})$  = d-c resistance of each section of transformer secondary,

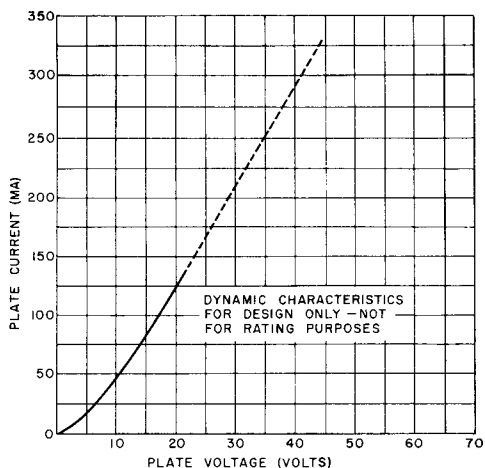
$N$  = Transformer voltage step-up ratio per section,

$R(\text{pri})$  = d-c resistance of transformer primary,

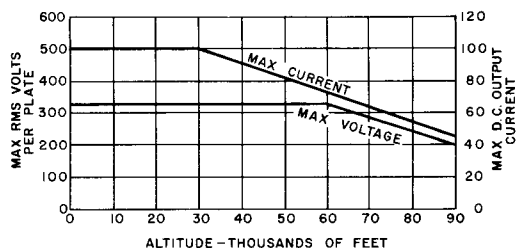
$R_a$  = d-c resistance of added series resistance per plate.

The addition of inductance would allow a reduction of the minimum value specified for  $R_s$  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.



### AVERAGE PLATE CHARACTERISTICS

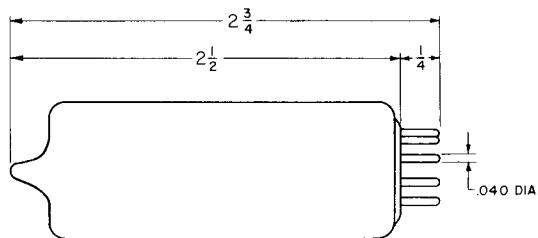
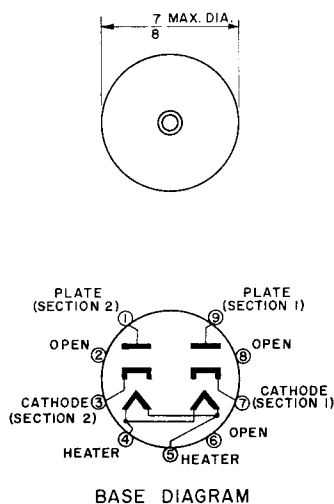


THIS CHART IS INCLUDED AS AN ILLUSTRATION OF THE AMOUNT OF CURRENT DERATING NECESSARY IN A SPECIFIC APPLICATION TO AVOID EXCEEDING THE MAXIMUM BULB TEMPERATURE. EACH APPLICATION SHOULD BE CHECKED TO DETERMINE THAT THE MAXIMUM BULB TEMPERATURE IS NOT EXCEEDED. EITHER DERATING OR COOLING OR BOTH MAY BE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

#### CRITERIA FOR DERATING FOLLOWS:

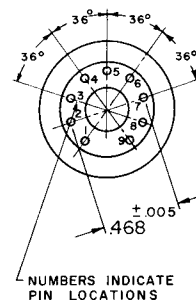
1. VOLTAGE DERATING - TO KEEP BELOW BASE PIN ARC OVER POINT.
2. CURRENT DERATING - TO KEEP BULB TEMPERATURE BELOW MAX RATING.

### ALTITUDE RATINGS

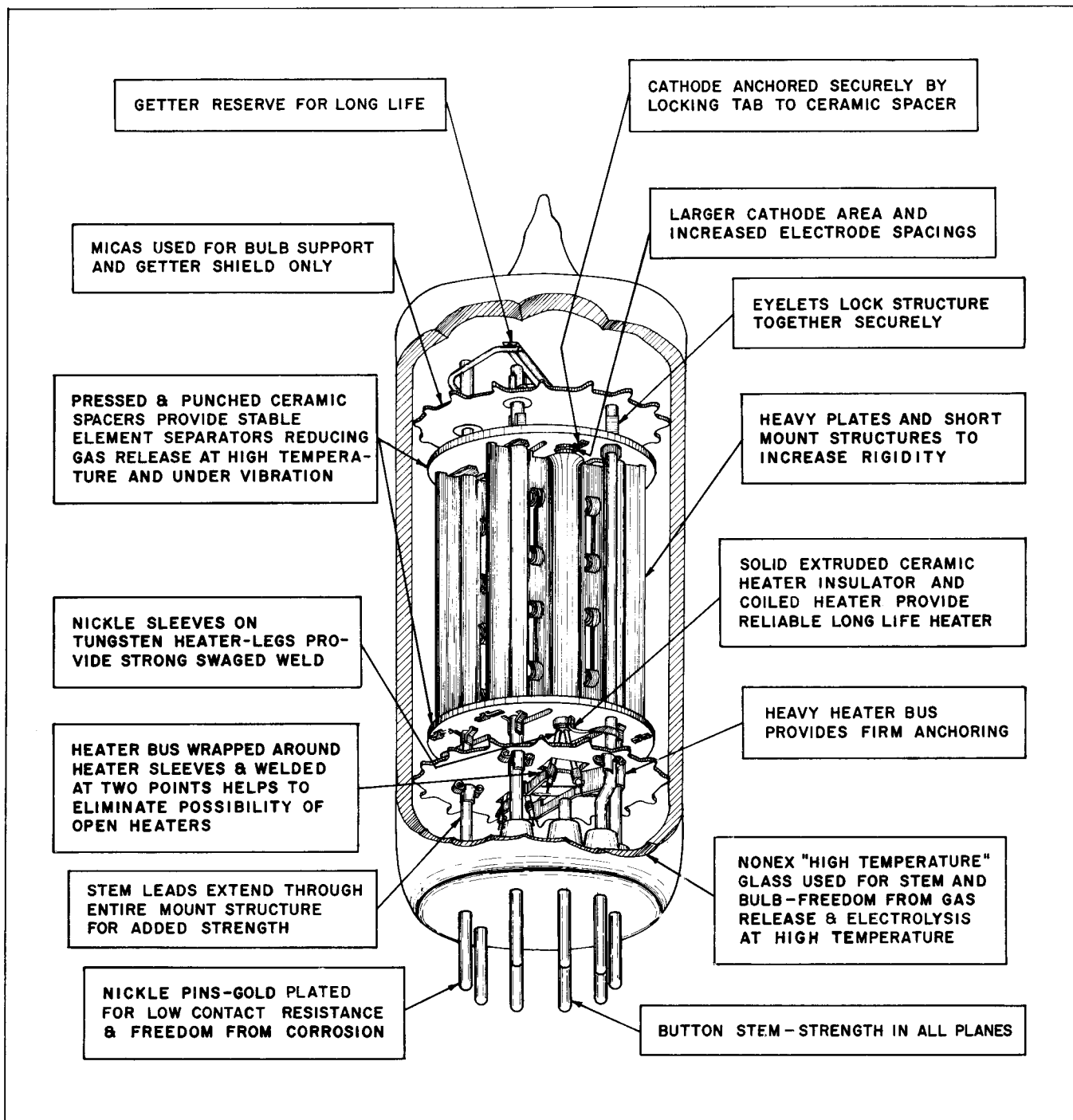


ALL DIMENSIONS ARE IN  
INCHES UNLESS OTHERWISE  
SPECIFIED

### OUTLINE DRAWING



### OUTLINE DRAWING



**STRUCTURAL FEATURES OF 6754 PROVIDE HIGH RELIABILITY AND LONG LIFE**

**THE *Bendix* CORPORATION**

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