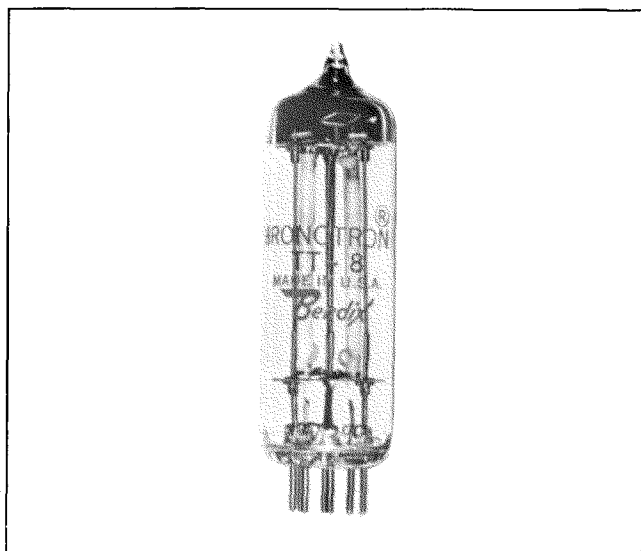


# CHRONOTRONS



## OPERATING CHARACTERISTICS

Since heaters and secondaries are electrically isolated, any type of heater voltage may be used, a-c, d-c, or any wave form. The secondary bridge may also be excited with a voltage of any desired wave form. If heater currents, for example, come from a vacuum tube amplifier and contain undesirable harmonics, the secondary bridge can be excited with a pure sine wave voltage resulting in an output voltage almost free from distortion or undesirable harmonics.

The working parts of the Chronotron have virtually an indefinite life. Enclosed in a sealed envelope they operate at moderate temperatures and have no electron emission.

## PHYSICAL CHARACTERISTICS

|                                |                        |
|--------------------------------|------------------------|
| Base.....                      | 7 pin miniature        |
| Bulb .....                     | T 5½                   |
| Max. overall length.....       | 2⅞ inch                |
| Max. seated height.....        | 2⅜ inch                |
| Max. diameter .....            | ¾ inch                 |
| Ambient temperature limit..... | -40° to +60°C.         |
| Mounting position.....         | vertical or horizontal |

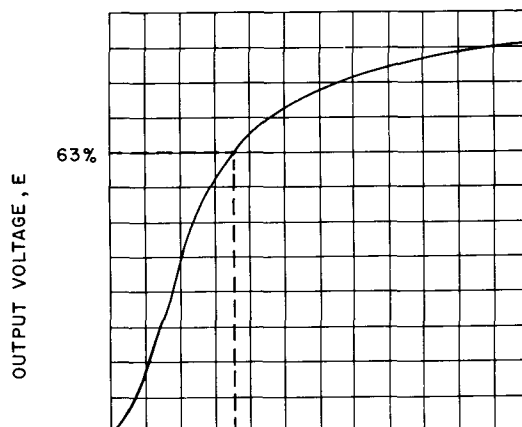
\* Illustrated.

## DESCRIPTION

These tubes are designed for use in electronic control circuits to provide a time delay in a manner similar to an integrating device. They are temperature-resistance devices with two heaters and two secondaries mounted in a miniature-size vacuum tube. The secondaries are resistance windings used in a balanced bridge circuit. A variation in one heater current changes the temperature of the corresponding secondary resistance winding. A temperature change will cause the secondary wire which has a positive temperature coefficient of resistivity to unbalance the secondary bridge giving rise to an output voltage. After a heater is energized, the rate of increase in output voltage is determined by the time constant of the tube, which is the time required for the output voltage to reach 63% of its maximum value.

Time constants contained in the rating chart on the reverse side of this sheet have been compiled using the tube in a static bridge circuit. Other time constant readings may be obtained when using the tube in other types of circuits.

## TYPICAL OUTPUT CHARACTERISTIC



TIME AFTER APPLICATION OF CONSTANT HEATER INPUT

NOTE: TIME CONSTANT OF EXPONENTIAL CURVE VARIES FOR EACH TYPE OF TUBE (SEE TUBE RATING CHART ON REVERSE SIDE)

THE **Bendix** CORPORATION

**Red Bank** DIVISION, EATONTOWN, NEW JERSEY

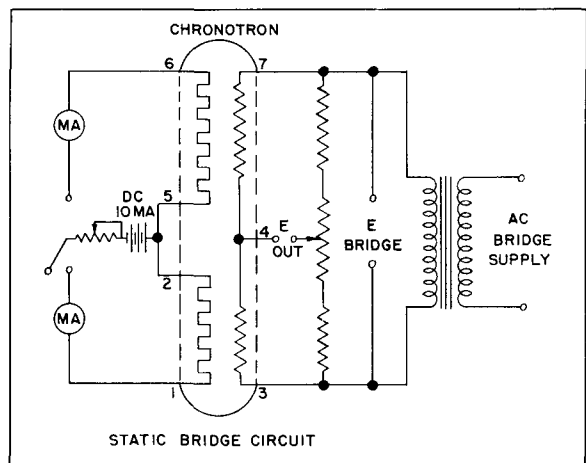
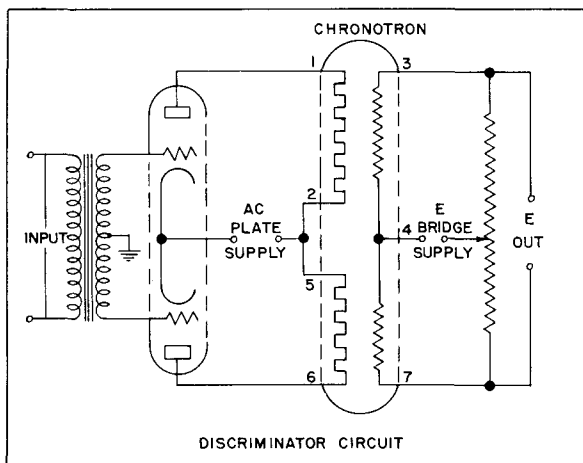
# CHRONOTRONS

**Bendix** Types { TT-8\*, TT-9, TT-13  
TT-15, TT-17, TT-18  
TT-20, TT-21, TT-22

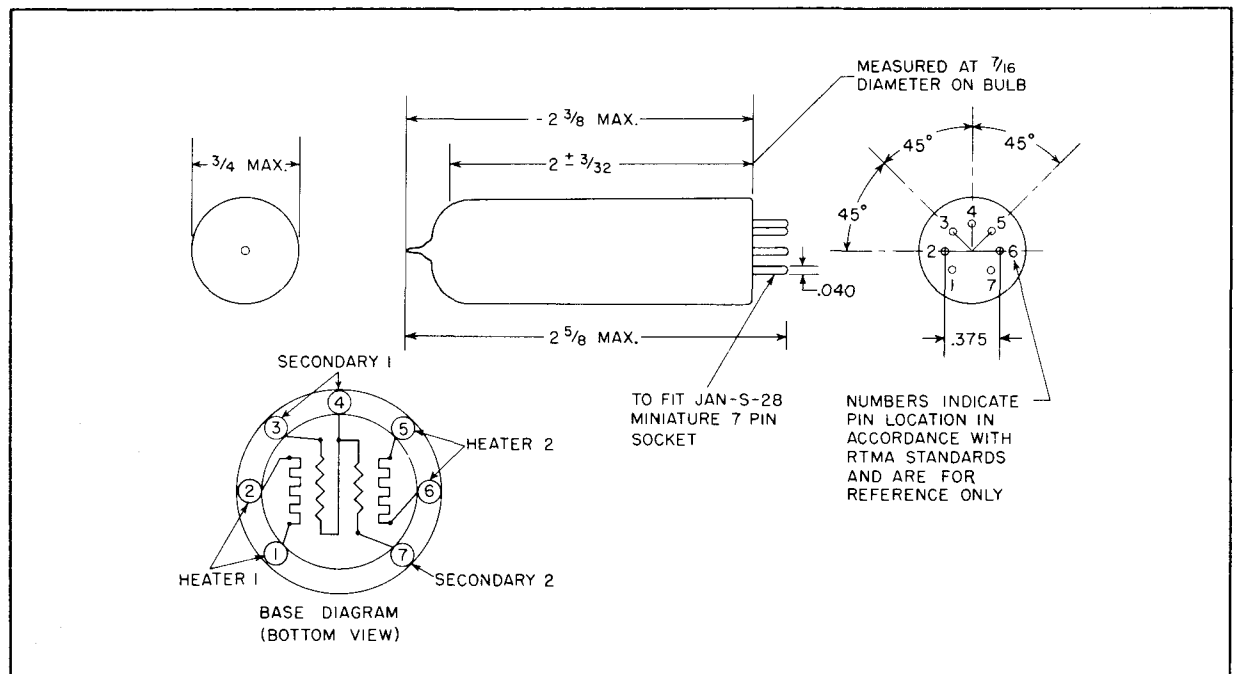
| Red Bank Type Number | Heater Resistance Ohms | Secondary Resistance Ohms | Heater Input Ma. | Bridge Voltage | Bridge Output Volts | Time Constant Sec. |
|----------------------|------------------------|---------------------------|------------------|----------------|---------------------|--------------------|
| TT-8                 | 1000                   | 450                       | 10               | 20             | .080                | 10                 |
| TT-9                 | 300                    | 125                       | 10               | 10             | .150                | 19                 |
| TT-13                | 500                    | 265                       | 10               | 20             | .050                | 15                 |
| TT-15                | 1000                   | 500                       | 10               | 20             | .250                | 130                |
| TT-17                | 2000                   | 500                       | 10               | 20             | .250                | 2                  |
| TT-18                | 1000                   | 500                       | 10               | 20             | .350                | 50                 |
| TT-20                | 2000                   | 500                       | 10               | 20             | .100                | 18                 |
| TT-21                | 1000                   | 500                       | 10               | 20             | .080                | 4                  |
| TT-22                | 1000                   | 500                       | 10               | 20             | .050                | 22                 |

## RATING CHART

Chronotrons having other heater resistances, secondary resistances or time constants can be made on special order.



## TYPICAL CIRCUIT APPLICATIONS



## OUTLINE DRAWING