from JETEC release
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# AMPEREX THYRATRON TYPE 6786

## TENTATIVE DATA

The type 6786 is a mercury vapor thyratron with a peak inverse rating of 15 KV and an average plate current of 10 amperes. For intermittent operation, a maximum plate current of 15 amperes may be used.

The 6786 is designed for high current power supplies in industrial R.F. generators and radio transmitters.

Under normal ambient temperature conditions, no forced air cooling is required or necessary. In addition to the unusual high current characteristics which make this tube unique in its class, the grid control offers the following advantages:

## IN INDUSTRIAL R.F. GENERATORS

1. The grid control is a special advantage for the rapid protection of the equipment in case of load arc-overs or short circuits.
2. The tube can be used where accurate stabilization of the R.F. current is required. The grid control features make it unusally suitable for accurate control of R.F. output by phase shifting the grid voltage.
3. For intermittent industrial applications, the 6786 allows for electronic control of the time of "on" and "off" cycles without the need for any mechanical components and associated relays.

## IN RADIO TRANSMITTERS

4. The use of this tube allows the plate voltage to be brought up slowly, thus increasing the life of the associated equipment and R.F. power tubes. In addition the grid control may be used to stabilize or adjust the plate voltage of the transmitter.
5. The grid control may be used as a protection device for the equipment. It allows for ultra rapid switching-off of the high voltage and subsequently, a rapid "come-back" with minimun "off-the-air" time.

The tube has a convenient "plate" type mounting support base and ceramic insulated flexible leads which make installation in equipment rapid and simple.

## GENERAL CHARACTERISTICS

| | |
|---|---|
| ELECTRICAL | |
| Cathode | indirectly heated, oxide coated |
| Heater Voltage | 5 volts |
| Heater Current | 20 amperes max. |
| Heating Time, minimum [1] | 10 minutes |
| Tube Voltage Drop [2] | 12 volts |
| Equilibrium condensed mercury temperature rise over ambient | |
| No Load | 27° C |
| Full Load | 30° C |
| Direct Interelectrode Capacitances | |
| Grid to Plate | 8 μμf |
| Grid to Cathode | 35 μμf |
| MECHANICAL | |
| Mounting Position | vertical, anode terminal up |
| Max. Overall Length (without leads) | 15 1/4 inches |
| Max. Diameter | 4 5/8 inches |
| Net Weight (approx.) | 2 lbs, 9 ozs. |

[1] For average conditions; temperature within limits and proper distribution of mercury. After transportation and also long interruption of service, a longer heating time is required before the anode voltage is applied, to insure proper distribution of the mercury. In general, a period of 45 minutes is sufficient. In addition 10 minutes after the heater voltage is applied, preheating of the anode must be started by connecting the anode to a supply voltage of max. 500 volts via a resistor limiting the anode current to 6 amperes.

[2] Measured at an average current of 15 amperes.

# 6786

## MAXIMUM RATINGS

| | |
|---|---|
| Peak Inverse Anode Voltage [3] | 15 KV max. |
| Peak Forward Anode Voltage | 15 KV max. |
| Average Anode Current [4] | |
| Continuous Operation | 10 amps. max. |
| Intermittent Operation | 15 amps. max. |
| Peak Anode Current | 45 amps. max. |
| Surge Anode Current (max. 0.1 sec.) | 600 amps. max. |
| Peak Grid Voltage | 600 volts max. |
| Grid Resistance | 20,000 ohms max. |

### Relation Between Condensed Mercury Temperature, Ambient Temperature and Peak Inverse Voltage [6]

| | | |
|---|---|---|
| Peak Inverse Anode Voltage | 15 | 10 KV |
| Condensed Mercury Temp. | 25-60 | 25-65 °C |
| Ambient Temp. [6] | 10-30 | 10-35 °C |

## MAXIMUM OPERATING CONDITIONS
## PEAK INVERSE ANODE VOLTAGE = 15 KV

(Transformer regulation and tube voltage drop are not included)

| Circuit Diagram | Type of Circuit | Max transformer sec. rms voltage (Vtr) KV | DC output voltage to filter (Vo) KV | Max DC output current to filter (Io) Amps | Max DC output to filter (Wo) KW |
|---|---|---|---|---|---|
| a. | Single-phase, full-wave, 2 tubes | 5.3 | 4.8 | 20 | 96 |
| b. | Single-phase, full-wave, 4 tubes | 10.6 | 9.6 | 20 | 192 |
| c. | Three-phase, half-wave, 3 tubes | 6.1 | 7.2 | 30 | 216 |
| d. | Three-phase, full-wave, 6 tubes | 10.6 | 14.4 | 30 | 432 |
| e. | Three-phase, double Y, 6 tubes parallel | 5.3 | 6.2 | 60 | 372 |
| f. | Four-phase, half-wave, 4 tubes | 5.3 | 6.7 | 40 | 268 |
| g. | Four-phase, full-wave, 8 tubes | 10.6 | 13.5 | 40 | 540 |

[3] For frequencies up to 150 cps.

[4] Averaged over 10 second interval.

[5] If the equipment is started at most twice daily, it is permissible to apply high voltage at a condensed mercury temperature of 20° C.

[6] With natural cooling, approximate values. The tube may be operated at higher ambient temperatures than the maximum values given when the difference between the ambient and condensed mercury temperature (28° C with natural cooling) is reduced by an air flow directed on the bulb just above the base. A reduction to less than 10° C can easily be obtained with a simple air jet.

When a tube must be operated instantly, a reduction is recommended in heater voltage to 60-80% of the given nominal value for stand-by periods of more than 30 minutes.

TYPICAL OPERATING CONDITIONS
PEAK INVERSE VOLTAGE = MAX. 15 KV [7]

| Circuit Diagram | Type of Circuit | No load transformer sec. rms voltage (Vtr) KV | DC output voltage to load [8] ($Vo_1$) KV | Max DC output current (Io) Amps | DC output to load ($Wo_1$) KW |
|---|---|---|---|---|---|
| a. | Single-phase, full-wave, 2 tubes | 4.80 | 4.0 | 20 | 80 |
| b. | Single-phase, full-wave, 4 tubes | 9.60 | 8.0 | 20 | 160 |
| c. | Three-phase, half-wave, 3 tubes | 5.55 | 6.0 | 30 | 180 |
| d. | Three-phase, full-wave, 6 tubes | 9.60 | 12.0 | 30 | 360 |
| e. | Three-phase, double Y, 6 tubes | 4.80 | 5.15 | 60 | 309 |
| f. | Four-phase, half-wave, 4 tubes | 4.80 | 5.6 | 40 | 224 |
| g. | Four-phase, full-wave, 8 tubes | 9.60 | 11.2 | 40 | 448 |

[7] This value corresponds to a nominal peak inverse anode voltage of 13.6 KV, allowing a line fluctuation of ± 10%.

[8] Tube voltage drop and losses in transformer, filter, ammeter, etc. amounting to 8% of $Vo_1$ have already been deducted.

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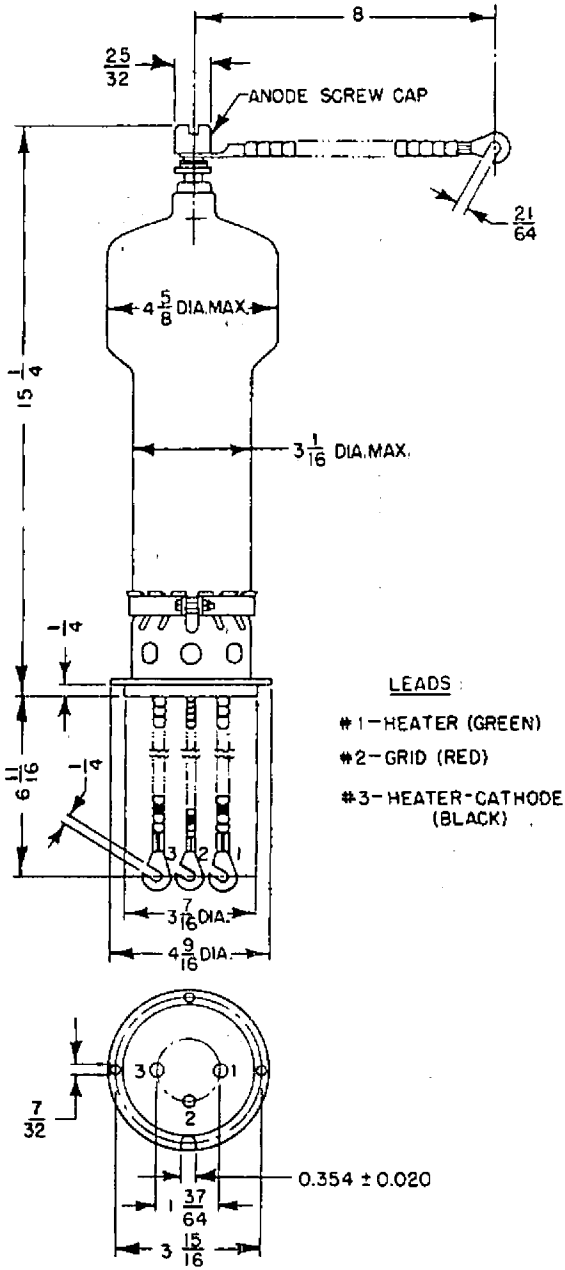
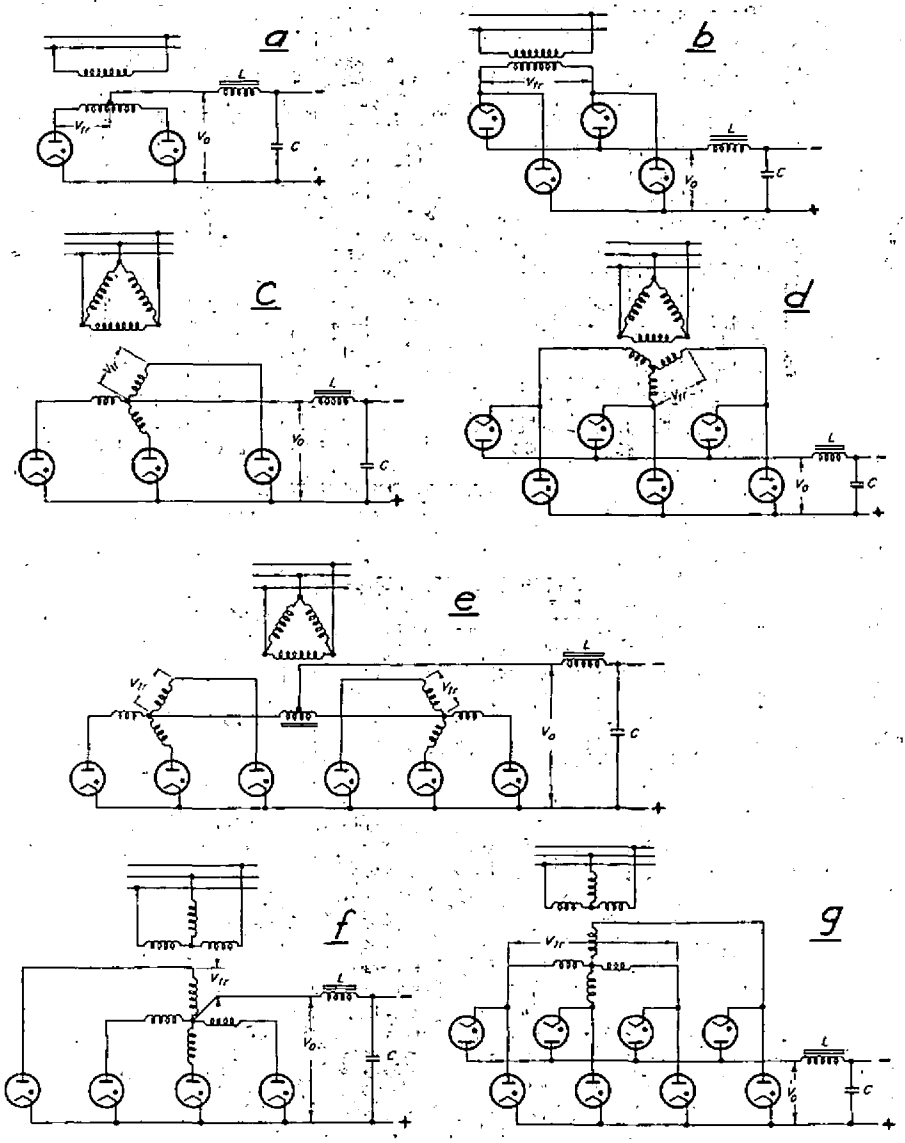

8
25/32
ANODE SCREW CAP
21/64
4 5/8 DIA.MAX.
15 1/4
3 1/16 DIA.MAX.
1/4
6 11/16
1/4
3
2
1
3 7/16 DIA.
4 9/16 DIA.
LEADS:
#1-HEATER (GREEN)
#2-GRID (RED)
#3-HEATER-CATHODE (BLACK)
7/32
3
1
2
0.354 ± 0.020
1 37/64
3 15/16


a
b
c
d
e
f
g
L
C
$V_{1r}$
$V_0$

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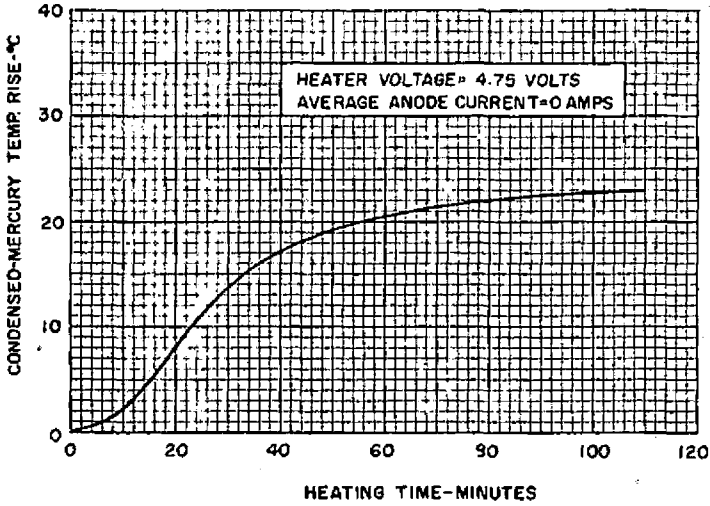
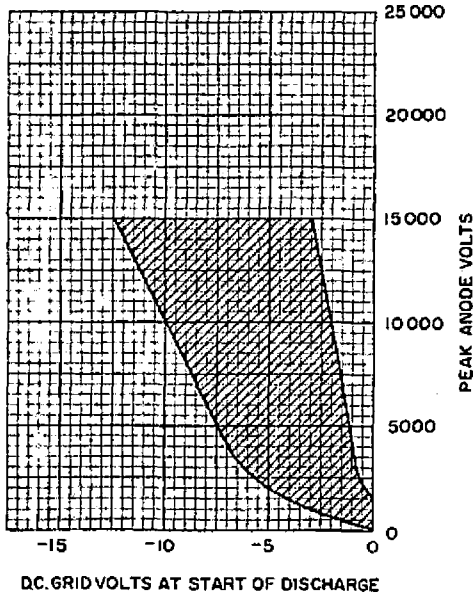
RATE OF RISE OF CONDENSED-MERCURY TEMPERATURE




CONTROL CHARACTERISTIC