AMPEREX TUBE TYPE OE3/85A1

The OE3/85A1 is a lock-in voltage reference tube of the cold cathode glow discharge type designed for extremely constant voltage stability. It maintains a D.C. operating voltage of 85 volts; the operating current ranges from 1 to 8 milliamperes and its operating characteristic is independent of ambient temperature.

The OE3/85A1 is particularly distinguished from other types of regulator tubes by the small change in the operating voltage during the life of the tube. Furthermore there is very little difference in the tolerance of the operating voltage as between one tube and another. Due to these properties, the tube is particularly suitable for applications where a constant regulated voltage is required.

This excellent performance is the result of a judicious choice ot the materials used and a special manufacturing process. The cathode is made of molybdenum. Changes in the surface of the cathode due to gas from impurities in the glass bulb have been avoided by coating the inner side of the bulb with a layer of molybdenum. In addition, this layer acts as a screen for outer influences while it also acts as a getter.

Because of its extreme stability throughout life time, the OE3/85A1 is especially useful as a voltage reference tube in the D.C. supply voltage source of electronic tubes and in measuring circuits.

DATA

GENERAL

Cathode	cold
Maximum overall length	3-11/16"
Maximum seated height	2-1/2"
Maximum diameter	1-1/8"
Bulb	tubular
Base	lock-in, 3-pin
Mounting position	any

MAXIMUM RATINGS (absolute values)

D.C. operating current (continuous)	8 ma. max.
Ambient temperature range	−55 to + 90 °C

CHARACTERISTICS AND OPERATING RANGE VALUES

	Min.	Average	Max.	
D.C. starting voltage	-	110	120 [1]	volts
D.C. operating voltage	83	85	87	volts
D.C. operating current	1	4	8	ma
Regulation (1 ma to 8 ma)	-	-	3.15	volts
Stability	-	0.1	0.85 [2]	volt

INSTALLATION AND APPLICATION

The base of the OE3/85A1 fits the loctal 8-pin socket. The socket may be mounted to hold the tube in any position.

A warm-up period of 3 minutes should be allowed each time the equipment is turned on in order to insure minimum voltage drift of the tube.

NOTES

[1] Not less than this value should be provided to insure ignition throughout tube life.

[2] Defined as the maximum voltage fluctuation in the operating voltage throughout 5000 hours.

OE3/85A1

APPLICATION INFORMATION

A minimum D.C. anode supply voltage of 120 volts should always be provided in the equipment design to insure ignition throughout tube life.

A series resistor must always be used with the OE3/85A1. The resistance value must be s chosen that the maximum current ranting (8 ma) of the OE3/85A1 is not exceeded at the highes anode supply voltage applied, so that the minimum current rating (1 ma) is always exceeded at the lowest anode-supply voltage.

Shielding of the OE3/85A1 to insure maximum stability should be utilized when the tube is operated in the presence of strong R.F. or magnetic fields.

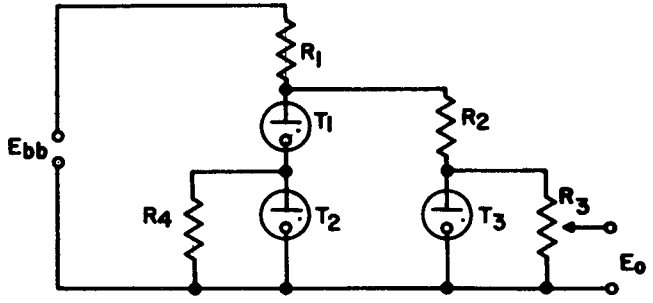
To retain the maximum constancy of the operating voltage it is desirable to mount the tube where it does not get heated too much by other tubes, resistors, etc.

The nature of a gas discharge always gives rise to noise. With a current of 4 ma flowing through the tube and a series resistor of 10,000 ohms the R.M.S. value of the noise voltage in the frequency range 30 - 10,000 c/s amounts to 80 microvolts. This noise voltage increases according to the square root of the series resistance and also increases slightly as the current is reduced. The noise energy is distributed fairly uniformly over the above mentioned-frequency range.

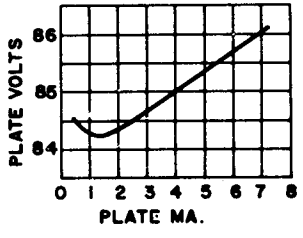
For carrying out accurate electric measurements it is often necessary to have available an extremely constant reference voltage, particularly if relatively small voltage variations are to be measured.

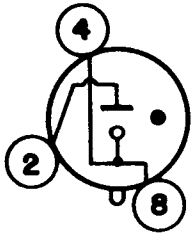
Such a constant voltage supply using the OE3/85A1 as a voltage reference is given in fig. 1. The tubes T_1, T_2 and T_3 are OE3/85A1 tubes. The current flowing through T_3 is stabilized by the tubes T_1 and T_2, as shown in the circuit.

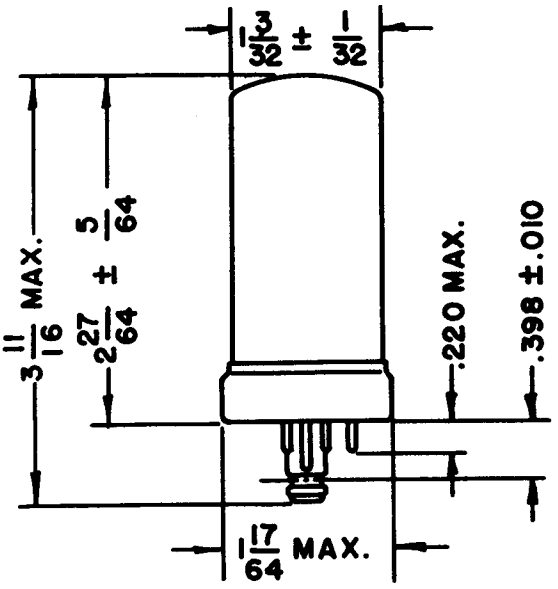
With supply voltage variations from - 10% to + 10% (Ebb = 275 volts) the maximum voltage fluctuation across T_3 does not exceed 40 millivolts (0.05%) whereas the average fluctuation is approx. 15 millivolts.



In this circuit a reference voltage is produced across R_3. This is obtained by stabilizing the current through T_3 by means of two other tubes 85A1 (T_1 and T_2). In this circuit R_1 = 0.1 megohm; R_4 = 1 megohm; Ebb = 275 volts.







CAUTION

Should the OE3/85A1 tube be run with reverse polarity for even a few seconds, its stability will be seriously impaired and it may require some hundreds of hours of operation running in the normal direction before the tube returns to its original performance. Care should be taken, therefore, to test the circuit polarity before the tube is inserted in the socket. This is particularly important in the mass production of equipment where a wiring fault may rapidly ruin a large number of tubes before the effect is noted.