5890
REMOTE-CUTOFF BEAM PENTODE
High-Voltage, Low-Current, Regulator Type
TENTATIVE DATA

RCA-5890 is a low-current beam pentode of the remote-cutoff type intended particularly for the voltage regulation of high-voltage dc power supplies. It has a maximum dc plate-voltage rating of 30,000 volts, a maximum dc plate-current rating of 500 microamperes, and a maximum plate-dissipation rating of 10 watts.

The high-voltage insulation required in the 5890 for its intended service is obtained by the use of a double-ended structure utilizing a suitably designed electron gun which consists of a thermionic cathode and three grids. The plate connection is made to a small cap at the end of the bulb.

GENERAL DATA

Electrical:
Heater, for unipotential cathode:
Voltage (ac or dc)............ 6.3 volts
Current.................... 0.6 amperes
Mu-factor, Grid No. 2 to Grid No. 1........... 5
Direct interelectrode Capacitances:
Grid No. 1 to Plate........... 0.018 μF
Input..................... 7.5 μF
Output.................... 1.8 μF

Mechanical:
Mounting Position.................. Any
Overall Length................... 6 1/2 ± 1/8
Seated Length................... 6 ± 1/8
Maximum Diameter................ 1 ± 1/2
Cap................... Small
Base..................... Small, shell-type 7-pin
Bulb Temperature (at hottest point)........... 220 max. 7°C

VOLTAGE-CONTROL SERVICE

Maximum CCS Ratings, Absolute Values:
DC PLATE VOLTAGE.............. 30,000 max. volts
DC GRID-No. 3 VOLTAGE........ 6,000 max. volts
DC GRID-No. 2 VOLTAGE........ 4,000 max. volts
DC GRID-No. 1 VOLTAGE:
Negative bias voltage........ 200 max. volts
Positive peak value........ 2 max. volts
MAX.-SIGNAL DC PLATE CURRENT........ 500 max. mA
MAX.-SIGNAL GRID-No. 3 INPUT........ 1 max. watt
MAX.-SIGNAL GRID-No. 2 INPUT........ 0.1 max. watt
PLATE DISSIPATION........ 10 max. watts

PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode:
During equipment warm-up period not exceeding 15 seconds........... 450 max. volts
After equipment warm-up period........... 165 max. volts
Heater positive with respect to cathode........... 165 max. volts

Typical Operation As Shunt Voltage-Regulator Tube in Accompanying Circuit:

DC Plate voltage........... 20,000 30,000 volts
DC Grid-No. 3 Voltage........ 5,000 5,000 volts
DC Grid-No. 2 Voltage........ 200 200 volts
DC Grid-No. 1 Voltage........ 60 60 volts
Peak Grid-No. 1 Voltage........ 45 20 volts
Zero-Signal DC Plate Current........ 0 0 mA
Zero-Signal DC Grid-No. 3 Current........ 0 0 mA
Zero-Signal DC Grid-No. 2 Current........ 0 0 mA
Max.-Signal DC Grid-No. 1 Current........ 0 0 mA
Grid-No. 1 Bias (Approx.) for plate current of 10 mA........... 52 52 volts
Grid-No. 3-Plate Transconductance........ 11 3 μhos

* Subject to variation of ± 40% if grid-no. 1 voltage is desired at indicated value.
** Subject to variation of ± 40% if grid-no. 2 voltage is desired at indicated value.

SHUNT VOLTAGE-REGULATOR CIRCUIT

NOTE: The control voltage may be taken from the load circuit or from a circuit supplying signal to the load circuit, depending on the type of load involved.

OPERATING NOTES

The maximum ratings in the tabulated data for the 5890 are limiting values above which the serviceability of the 5890 may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer has the responsibility of determining an average design.
value for each rating below the absolute value of that rating by an amount such that the absolute values will never be exceeded under any normal condition of supply-voltage variation, load variation, or manufacturing variation in the equipment itself.

The high dc voltages at which the 5890 is operated may be extremely hazardous to the user. Great care should be taken during the adjustment of circuits. The tube and its associated apparatus, especially all parts which may be at high potential above ground, should be housed in a protective enclosure. The protective housing should be designed with interlocks so that personnel cannot possibly come in contact with any high-potential point in the electrical system. The interlock devices should function to break the primary circuit of the high-voltage supply when any gate or door on the protective housing is opened, and should prevent the closing of this primary circuit until the door is again locked.

It should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or to incorrect circuit connections. Therefore, before any part of the circuit is touched, the power-supply switch should be turned off and both terminals of any capacitors should be grounded.

The temperature of the bulb may be measured either with a thermocouple or with temperature-sensitive paint, such as Tempilag. The latter is made by the Tempil Corporation, 83 West 22nd Street, New York 11, N.Y., in the form of liquid and stick, and is stated by the manufacturer to have an accuracy of 1 per cent.

Operation of the 5890 with a plate voltage above approximately 16000 volts results in the production of soft x-rays which can constitute a health hazard on prolonged exposure unless the tube is adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equipment design (see References 1 and 2).

Under normal operating conditions, the 5890 may exhibit a blue glow on the upper half of the inner surface of the bulb wall and a red or orange glow on the plate. These effects are caused by fluorescence and are not to be mistaken for gas and overheating of the plate.

REFERENCES


Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.
DIMENSIONAL OUTLINE

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