



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 30000 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 ampere
 Mu-Factor, Grid No. 2
 to Grid No. 1 5

Direct Interelectrode Capacitances:
 Grid No. 1 to Plate 0.018 μ f
 Input 7.5 μ f
 Output 1.6 μ f

Mechanical:

Mounting Position Any
 Overall Length 6-1/2" $\pm$ 1/4"
 Sealed Length 6" $\pm$ 1/4"
 Maximum Diameter 1-1/2"
 Cap. Small
 Base Small-Shell Duodecal 7-Pin
 Bulb Temperature (At hottest point) 220 max. $^{\circ}$ C

VOLTAGE-CONTROL SERVICE

Maximum CCS* Ratings, Absolute Values:

DC PLATE VOLTAGE	30000 max.	volts
DC GRID-NO. 3 VOLTAGE	6600 max.	volts
DC GRID-NO. 2 VOLTAGE	450 max.	volts
DC GRID-NO. 1 VOLTAGE:		
Negative bias value	200 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
MAX.-SIGNAL DC PLATE CURRENT	500 max.	μ amp
MAX.-SIGNAL GRID-NO. 3 INPUT	1 max.	watt
MAX.-SIGNAL GRID-NO. 2 INPUT	0.1 max.	watt
PLATE DISSIPATION	10 max.	watts

* Continuous Commercial Service.

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

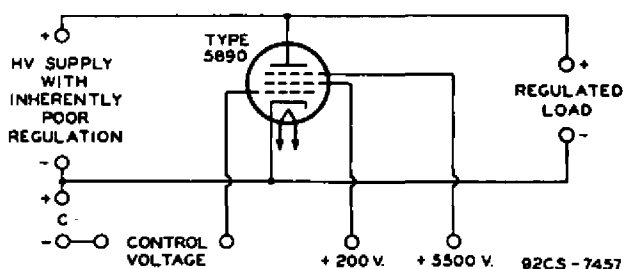
in Accompanying Circuit:

DC Plate voltage	20000	30000	volts
DC Grid-No. 3 Voltage	5500	5500	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	μ amp
Max.-Signal DC Plate Current	500	60	μ amp
Zero-Signal DC Grid-No. 3 Current	0	0	μ amp
Max.-Signal DC Grid-No. 3 Current	0	0	μ amp
Zero-Signal DC Grid-No. 2 Current	0	0	μ amp
Max.-Signal DC Grid-No. 2 Current	0	0	μ amp
Grid-No. 1 Bias (Approx.) for plate current of 10 μ amp	-52	-52	volts
Grid-No. 1-Plate Transconductance	11	3	μ mhos

* Subject to variation of $\pm 40\%$ if grid-No. 1 voltage is desired at indicated value.

** Subject to variation of $\pm 40\%$ if grid-No. 2 voltage is desired at indicated value.

SHUNT VOLTAGE-REGULATOR CIRCUIT



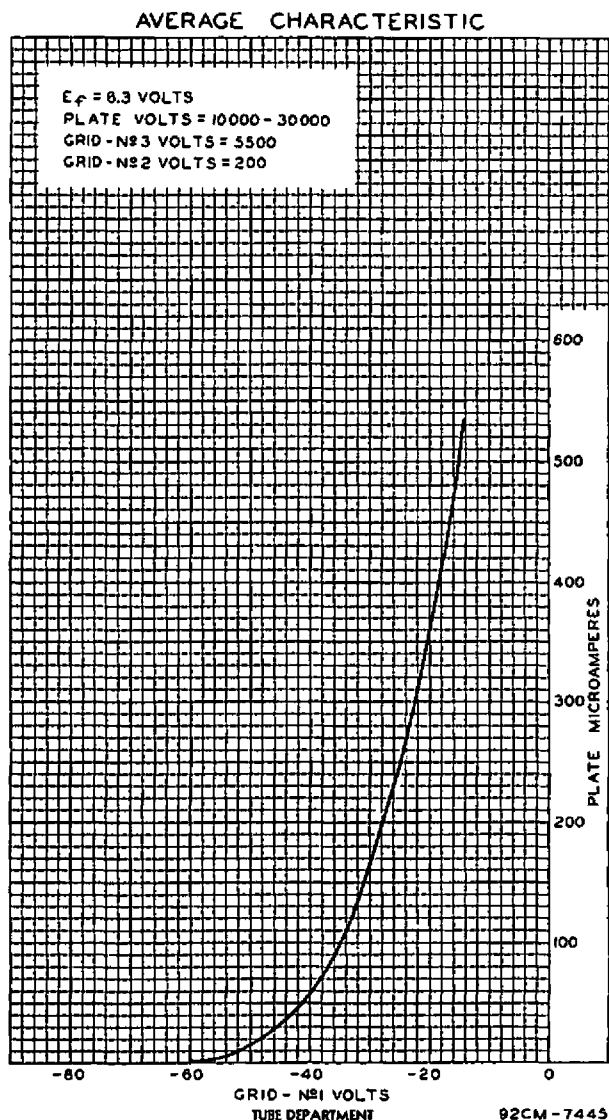
NOTE: THE CONTROL VOLTAGE MAY BE TAKEN FROM THE LOAD CIRCUIT OR FROM A CIRCUIT SUPPLYING SIGNAL TO THE LOAD CIRCUIT, DEPENDING ON THE TYPE OF LOAD INVOLVED.

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 usual 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 dangerous 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 Tempilaq. The latter is made by the Tempil Corporation, 132 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.

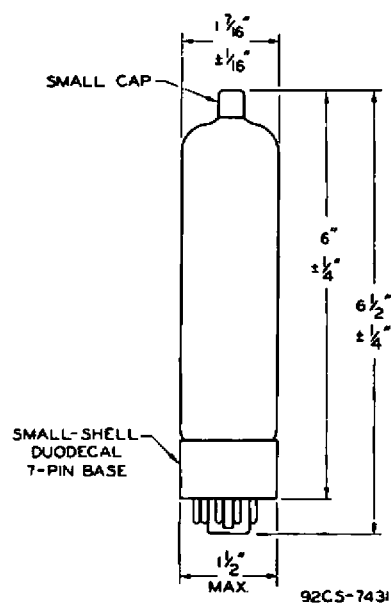
REFERENCES

1. "Medical X-ray Protection Up To Two Million Volts," National Bureau of Standards Handbook H41.
2. "Safety Code for Industrial Use of X-rays," American Standards Association, ASA Code Z54.1-1946.

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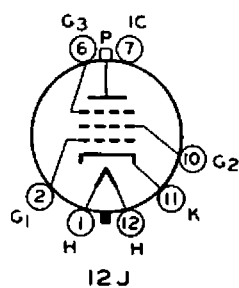


DIMENSIONAL OUTLINE



SOCKET CONNECTIONS

Bottom View



- PIN 1: HEATER
PIN 2: GRID No. 1
PIN 6: GRID No. 3
PIN 7: INTERNAL CONNEC-
TION—DO NOT USE
PIN 10: GRID No. 2
PIN 11: CATHODE
PIN 12: HEATER
CAP: PLATE

