



5693

5693  
SPECIAL RED  
TUBE

# SHARP-CUTOFF PENTODE

Intended for critical industrial applications where 10,000-hour life, extreme uniformity, rigid construction, and exceptional stability are paramount. Within its ratings, the 5693 may be used to replace its receiving-tube counterpart, type 6SJ7.

## GENERAL DATA

### Electrical:

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 ± 5%\* . . . . . ac or dc volts  
Current. . . . . 0.3 . . . . . amp

Direct Interelectrode Capacitances:<sup>0</sup>

	<u>Min.</u>	<u>Average</u>	<u>Max.</u>	
Grid to Plate. . . . .	-	-	0.005	μμf
Input. . . . .	4.8	5.3	5.8	μμf
Output . . . . .	5.6	6.2	6.8	μμf

\* May deviate ± 10% from rated value provided such deviation occurs for less than 2% of the operating time.

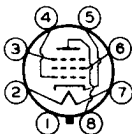
<sup>0</sup> with shell connected to cathode.

### Mechanical:

Mounting Position. . . . . Any  
Maximum Overall Length . . . . . 2-5/8"  
Seated Length. . . . . 1-31/32" ± 3/32"  
Maximum Diameter . . . . . 1-5/16"  
Bulb . . . . . Metal Shell MT-8  
Base . . . . . Small-Wafer Octal 8-Pin,  
Non-Hygroscopic

Basing Designation for BOTTOM VIEW . . . . . 8N

Pin 1 - Shell  
Pin 2 - Heater  
Pin 3 - Grid No. 3  
Pin 4 - Grid No. 1



Pin 5 - Cathode  
Pin 6 - Grid No. 2  
Pin 7 - Heater  
Pin 8 - Plate

## INDUSTRIAL SERVICE

Includes applications such as dc and resistance-coupled amplifiers

### Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . . 300 max. volts  
DC PLATE-SUPPLY VOLTAGE. . . . . 330 max. volts  
DC GRID-No. 3 (SUPPRESSOR) VOLTAGE:  
Negative bias value. . . . . { 0 min. volts  
-100 max. volts  
DC GRID-No. 2 (SCREEN) VOLTAGE<sup>▲</sup> . . . . . 125 max. volts  
DC GRID-No. 2-SUPPLY VOLTAGE. . . . . 330 max. volts

<sup>▲</sup>: See next page.

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## SHARP-CUTOFF PENTODE

## GRID-NO.1 (CONTROL-GRID) VOLTAGE:

Negative bias range. . . . .	-1 <sup>■</sup> min. to -50 max.	volts
Negative peak value. . . . .	-50 max.	volts
DC CATHODE CURRENT . . . . .	10 max.	ma
PLATE DISSIPATION. . . . .	2 max.	watts
GRID-NO.2 DISSIPATION. . . . .	0.3 max.	watt

## PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts
AMBIENT TEMPERATURE RANGE. . . . .	-55 to +90	°C

## Maximum Circuit Value:

See curve on a following page giving maximum values of the grid-No.1 resistor.

## Characteristics and Range Values:

Heater volts, 6.3; Plate Volts, 250; Grid-No.3 Volts, 0;  
Grid-No.2 Volts, 100; Grid-No.1 Volts, -3.

	<u>Min.</u>	<u>Au.</u>	<u>Max.</u>	
Heater Current . . . . .	0.275	0.300	0.325	amp
Heater-Cathode Current with heater-cathode voltage of $\pm 100$ volts . . . . .	-	-	5	$\mu$ amp
Plate Current. . . . .	2.3	3.0	3.7	ma
Plate Current for grid-No.1 voltage of -7.5 volts. . .	2	30	80	$\mu$ amp
Plate Current for grid-No.3 voltage of -70 volts . . .	150	450	750	$\mu$ amp
Grid-No.2 Current. . . . .	0.60	0.85	1.10	ma
Reverse Grid-No.1 Current. .	-	-	0.1	$\mu$ amp
Plate Resistance . . . . .	1.0	-	-	megohm
Transconductance . . . . .	1400	1650	1900	$\mu$ mos

## Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART No.20 at front  
of Receiving Tube Section.

- ▲ The 5693 may be operated at a grid-no.2 voltage as high as the rated grid-no.2 supply voltage when the grid-no.2 dissipation rating is not exceeded for any signal condition and when a resistor is used in series with grid-no.2 and its supply voltage.
- For resistance-coupled amplifier applications, the grid-no.1 negative bias may be as low as -0.5 volt.

MAR. 15, 1948

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TENTATIVE DATA

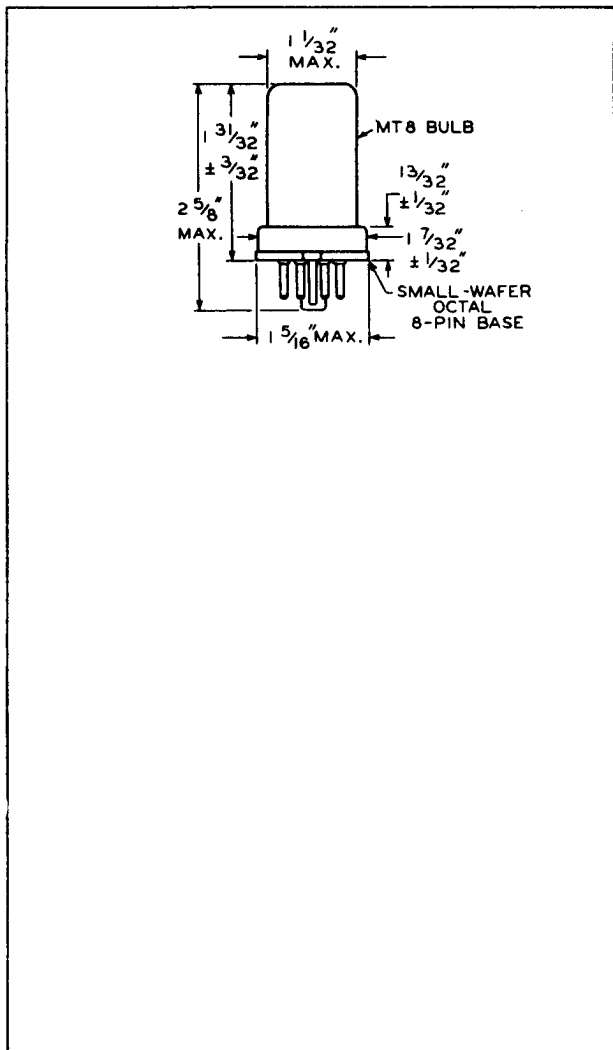
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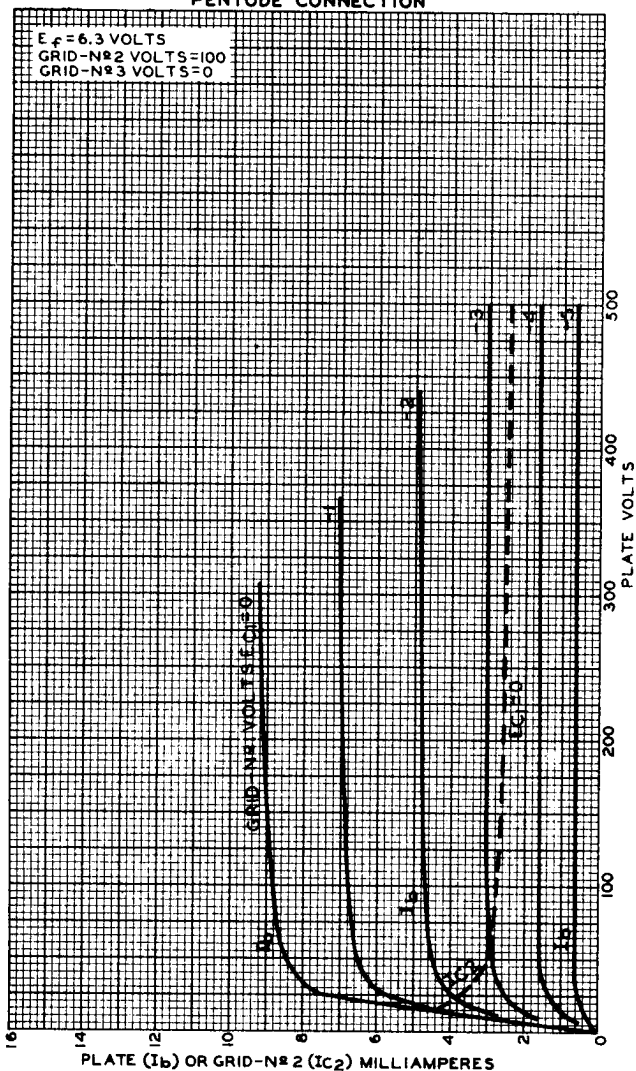
OUTLINE

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# AVERAGE PLATE CHARACTERISTICS PENTODE CONNECTION



OCT. 16, 1947

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## OPERATION CHARACTERISTICS

 $E_f = 6.3$  VOLTS PLATE VOLTS = 300 GRID-N $\#$  3 VOLTS = 0

CURVE	GRID-N $\#$ 2 RESISTOR	GRID-N $\#$ 2 SUPPLY VOLTS
1	0 MEG.	100
2	0.25 MEG.	300
3	0.5 MEG.	300
4	0.75 MEG.	300

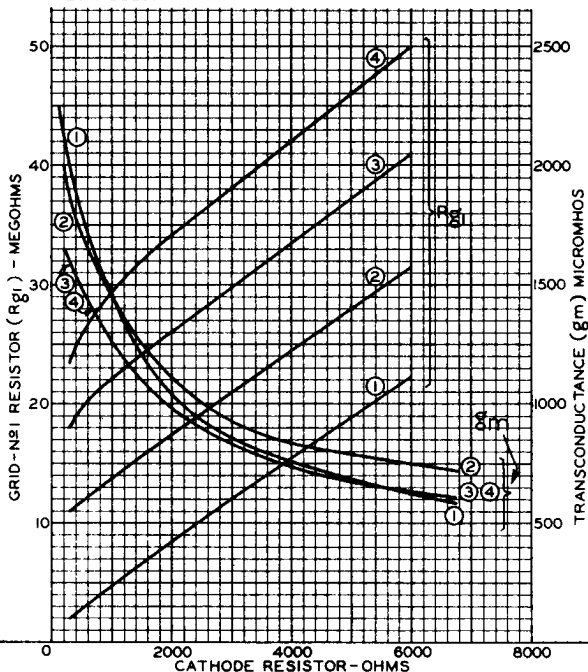
THESE CURVES ARE BASED ON THE FOLLOWING VALUES:  
 $\Delta I_k = 300 \mu\text{AMP}$ ,  $\Delta I_{g1} = 0.1 \mu\text{AMP}$

EXPRESSING THESE VALUES AS A RATIO, WE HAVE:

$$\frac{\Delta I_k}{\Delta I_{g1}} = \frac{300}{0.1} \text{ OR } 3000$$

FOR THOSE APPLICATIONS PERMITTING OTHER VALUES OF  $\Delta I_k$ , A NEW RATIO OF  $\Delta I_k / \Delta I_{g1}$  CAN BE CALCULATED. THE VALUES OF  $R_{g1}$  AS READ FROM THE CURVE MUST BE MULTIPLIED BY A FACTOR WHICH IS THE QUOTIENT OF THE NEW RATIO DIVIDED BY THE OLD RATIO. FOR EXAMPLE, IF THE NEW RATIO IS 6000 THE MULTIPLYING FACTOR IS  $6000/3000$ , OR 2, AND VALUES OF  $R_{g1}$  AS READ FROM THE CURVE ARE THEREFORE MULTIPLIED BY 2.

NOTE: TRANSCONDUCTANCE CURVES WERE OBTAINED WITH GRID-N $\#$  2 RESISTOR AND CATHODE RESISTOR SUITABLY BYPASSED.



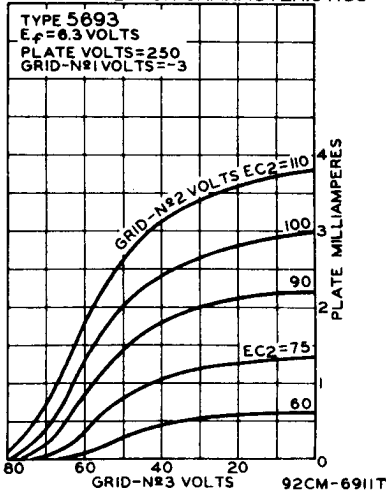
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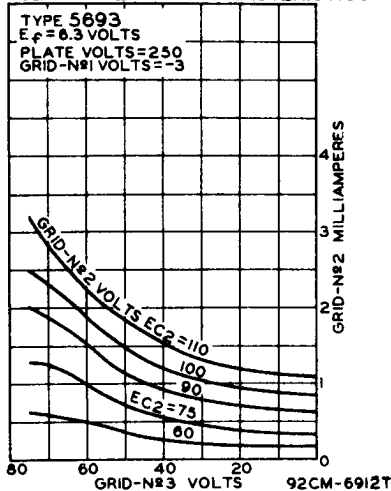
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# SHARP-CUTOFF PENTODE

AVERAGE SUPPRESSOR CHARACTERISTICS



AVERAGE SUPPRESSOR CHARACTERISTICS





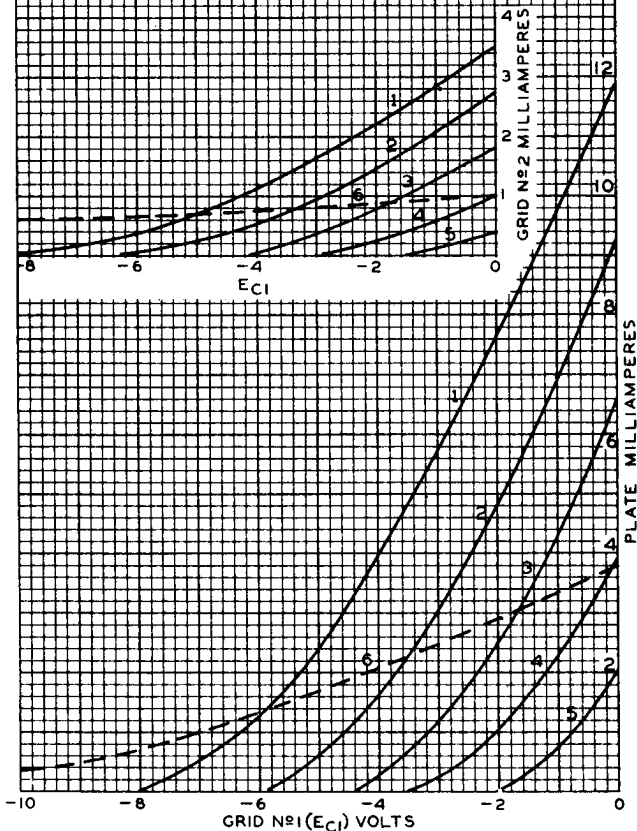
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### AVERAGE CHARACTERISTICS PENTODE CONNECTION

$E_f = 6.3$  VOLTS    PLATE VOLTS = 300    GRID-N<sup>o</sup>3 VOLTS = 0

CURVE	GRID-N <sup>o</sup> 2-SUPPLY VOLTS	SERIES GRID-N <sup>o</sup> 2 RESISTOR-OHMS
1	125	—
2	100	—
3	75	—
4	50	—
5	25	—
6	300	250000



MARCH 5, 1948

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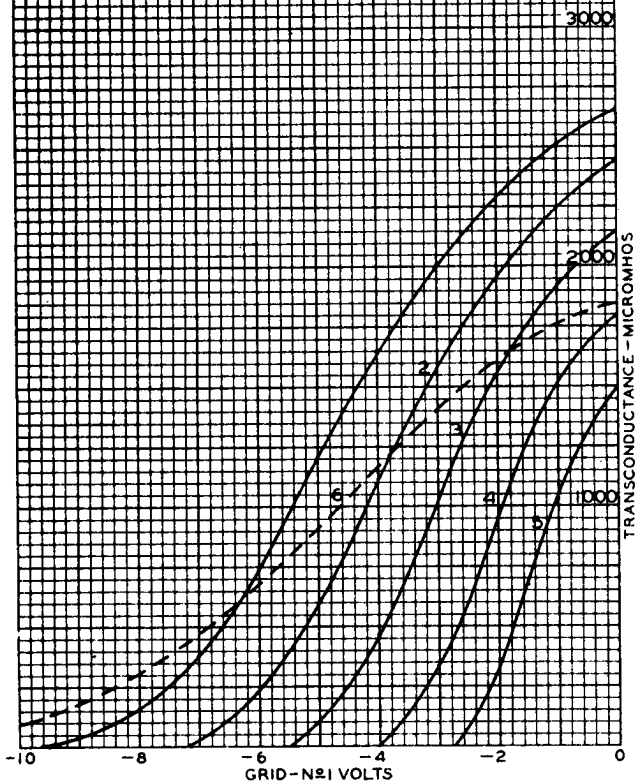


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### AVERAGE CHARACTERISTICS PENTODE CONNECTION

$E_f = 6.3$  VOLTS    PLATE VOLTS = 300    GRID-N $\#$  3 VOLTS = 0

CURVE	GRID-N $\#$ 2-SUPPLY VOLTS	SERIES GRID-N $\#$ 2 RESISTOR-OHMS
1	125	—
2	100	—
3	75	—
4	50	—
5	25	—
6	300	250000



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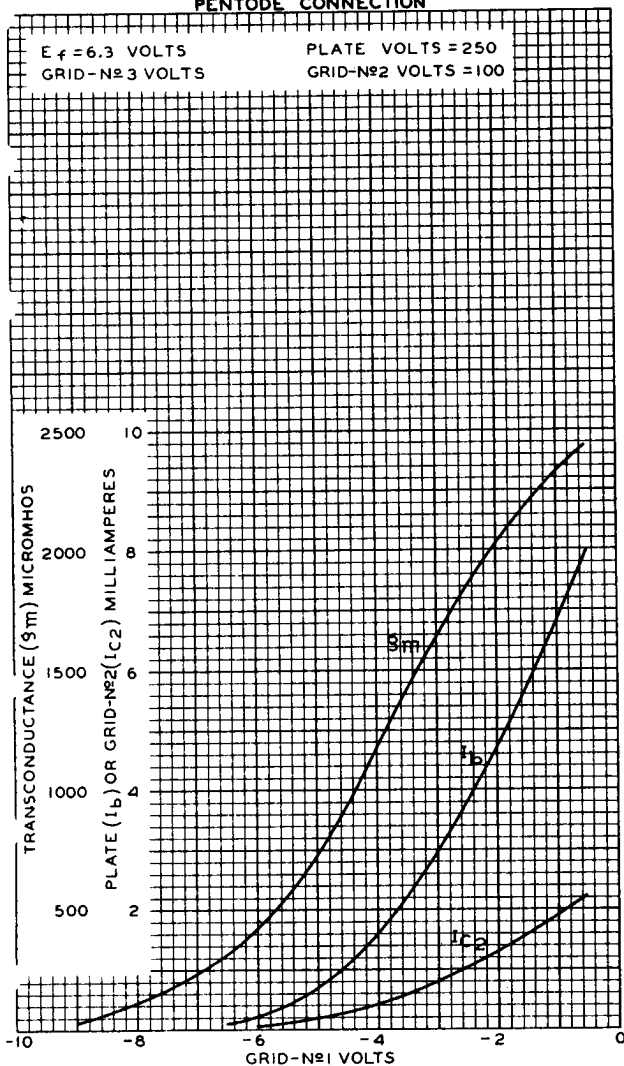
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### AVERAGE CHARACTERISTICS PENTODE CONNECTION

$E_f = 6.3$  VOLTS  
GRID-№3 VOLTS

PLATE VOLTS = 250  
GRID-№2 VOLTS = 100



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