PLANAR TRIODE

DESCRIPTION AND RATING

FOR GROUNDED-GRID OSCILLATOR, AMPLIFIER, AND FREQUENCY MULTIPLIER SERVICE

Metal and Ceramic — Pulse Rated
High Transconductance — Shock Resistant
100 Watts Plate Dissipation

The 7289 is a metal-and-ceramic, high-mu triode designed for use as a grounded-grid CW oscillator, amplifier, or frequency multiplier at frequencies as high as 2500 megacycles. In addition, it may be used as a plate-pulsed oscillator or amplifier at frequencies as high as 3000 megacycles.

Features of the 7289 include planar electrode construction, high plate dissipation capability, excellent electrode isolation, low radio-frequency losses, high transconductance, and low interelectrode capacitances.

GENERAL

ELECTRICAL

Cathode—Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC	*	Volts
Heater Current at Ef = 6.0 volts	1.0†	Amperes
Cathode Heating Time, minimum	60	Seconds
Direct Interelectrode Capacitances‡		
Grid to Plate: (g to p)	2.0	pf
Grid to Cathode: (g to k)	6.3	pf
Plate to Cathode: (p to k), maximum	0.035	pf

MECHANICAL

Mounting Position—Any—Only Plate Flange to be Used as a Socket Stop and Clamp

Net Weight, approximate	2.5	Ounces

Cooling

Plate and Plate Seal—Conduction and Forced Air
Grid and Cathode Seals—Conduction and Forced Air
Recommended Air Flow Cowling—157-JAN

Recommended Air Flow on Plate Radiator at Sea Level Incoming Air Temperature 25C, Plate Dissipation 100 Watts	12.5	Cu.Ft.PerMin.

MAXIMUM RATINGS

ABSOLUTE-MAXIMUM VALUES

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY

Key-Down Conditions Per Tube Without Amplitude Modulation§

Heater Voltage*	4.5 to 5.7	Volts
Frequency	2500	Megacycles
DC Plate Voltage	1000	Volts
Negative DC Grid Voltage	150	Volts
Peak Positive RF Grid Voltage	30	Volts
Peak Negative RF Grid Voltage	400	Volts
DC Grid Current	50	Milliamperes
DC Cathode Current	125	Milliamperes
Plate Dissipation	100	Watts
Grid Dissipation	2.0	Watts
Envelope Temperature at Hottest Point	300	C

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEPHONY

Carrier Conditions Per Tube For Use With a Maximum Modulation Factor of 1.0

Heater Voltage*	4.5 to 5.7	Volts
Frequency	2500	Megacycles
DC Plate Voltage¶	600	Volts
Negative DC Grid Voltage	150	Volts
Peak Positive RF Grid Voltage	30	Volts
Peak Negative RF Grid Voltage	400	Volts
DC Grid Current	50	Milliamperes
DC Cathode Current	100	Milliamperes
Plate Dissipation	70	Watts
Grid Dissipation	2.0	Watts
Envelope Temperature at Hottest Point	300	C

PLATE-PULSED OSCILLATOR OR AMPLIFIER

Heater Voltage*	5.7 to 6.0	Volts
Frequency	3000	Megacycles
Peak Positive-Pulse Plate Supply Voltage	3500	Volts
Duty Factor of Plate Pulse ⁂ △	0.0025	
Pulse Duration	3.0	Microseconds
Plate Current Average During Plate Pulse △**	3.0	Amperes
Negative Grid Voltage Average During Plate Pulse††	150	Volts
Grid Current Average During Plate Pulse	1.8	Amperes
Plate Dissipation △	27	Watts
Grid Dissipation △	2.0	Watts
Envelope Temperature at Hottest Point	300	C

GENERAL ELECTRIC

⊕ *Supersedes pages 1 and 2 of D & R sheet for 7289 dated 12-61*

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS

Heater Voltage	6.0	Volts
Plate Voltage	600	Volts
Grid Voltage§§		Volts
Amplification Factor	100	
Transconductance	25000	Micromhos
Plate Current	70	Milliamperes

RADIO-FREQUENCY POWER AMPLIFIER

Frequency	500	Megacycles
DC Plate Voltage	900	Volts
DC Grid Voltage	−40	Volts
DC Plate Current	90	Milliamperes
DC Grid Current, approximate	30	Milliamperes
Driving Power, approximate	6	Watts
Useful Power Output	40	Watts

RADIO-FREQUENCY OSCILLATOR

Frequency	2500	Megacycles
DC Plate Voltage	1000	Volts
DC Grid Voltage, approximate	−22	Volts
DC Plate Current	90	Milliamperes
DC Grid Current	10	Milliamperes
Useful Power Output	17	Watts

PLATE-PULSED OSCILLATOR

Frequency	3000	Megacycles
Heater Voltage	5.8	Volts
Duty Factor	0.0025	
Pulse Duration	3.0	Microseconds
Peak Positive-Pulse Plate-Supply Voltage	3500	Volts
Plate Current Average During Plate Pulse	3.0	Amperes
Grid Current Average During Plate Pulse	1.8	Amperes
Useful Power Output Average During Plate Pulse	1.6	Kilowatts

* The equipment designer should design the equipment so that heater voltage is centered at some value within the range of 4.5 to 5.7 volts for CW operation, or 5.7 to 6.0 volts for pulse operation. Heater voltage variations about the center value should be kept as small as practical and should not, in any case, exceed ±5%. The optimum center value of heater voltage depends on the cathode current and on other parameters of circuit design and operation. For specific recommendations, contact your General Electric tube sales representative.

† Heater current of a bogey tube at Ef = 6.0 volts.

‡ Measured in a special shielded socket.

§ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

¶ For modulation factors less than 1.0, a higher d-c plate voltage may be used if the sum of the peak positive audio voltage and the d-c plate voltage does not exceed 1200 volts.

⁂ Applications with a duty factor greater than 0.0025 should be referred to your General Electric tube sales representative for recommendations.

△ In any 5000-microsecond interval.

** The regulation and/or series plate-supply impedance must be such as to limit the peak current, with the tube considered a short circuit, to a maximum of 30 amperes.

†† The maximum instantaneous value should be within the range of +250 to −750 volts.

§§ Adjusted for Ib = 70 milliamperes.

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

INITIAL CHARACTERISTICS LIMITS

	Min.	Max.	
Heater Current			
Ef = 6.0 volts	0.90	1.05	Amperes
Grid Voltage			
Ef = 6.0 volts, Eb = 1000 volts, Ib = 100 ma	−2.0	−7.0	Volts
Grid Voltage			
Ef = 6.0 volts, Eb = 1000 volts, Ib = 1.0 ma	....	−25	Volts
Negative Grid Current			
Ef = 6.0 volts, Eb = 1000 volts, Ec adjusted for Ib = 100 ma	....	8.0	Microamperes
Interelectrode Leakage Resistance			
Ef = 6.0 volts, Polarity of applied d-c interelectrode voltage is such that no cathode emission results			
Grid to Cathode at 500 volts d-c	50	....	Megohms
Interelectrode Capacitances			
Grid to Plate: (g to p)	1.95	2.15	Picofarads
Grid to Cathode: (g to k)	5.6	7.0	Picofarads
Plate to Cathode: (p to k)	....	0.035	Picofarads

SPECIAL PERFORMANCE TESTS

	Min.	Max.	
Oscillator Power Output			
Tubes are tested for power output as an oscillator under the following conditions: Ef = 5.0 volts; F = 2500 MC, min.; Eb = 1000 volts; Ib = 90 ma	15	....	Watts
Pulsed-Oscillator Power Output			
Tubes are tested for power output as an oscillator under the following conditions: Ef = 5.8 volts; F = 3000 MC, min.; epy = 3500 volts; tp = 3.0 μsec. ±10%; Du = 0.0025 ±5%; Rg adjusted for Ib = 7.5 ma; Ec = −1.5 volts, max.; Ic = 4.5 ma, max.	4.0	....	Watts
Low Pressure Voltage Breakdown Test			
Statistical sample tested for voltage breakdown at a pressure of 54 mm Hg. Tubes shall not give visual evidence of flashover when 1000 volts RMS, 60 cps, is applied between the plate and grid terminals.			

DEGRADATION RATE TESTS

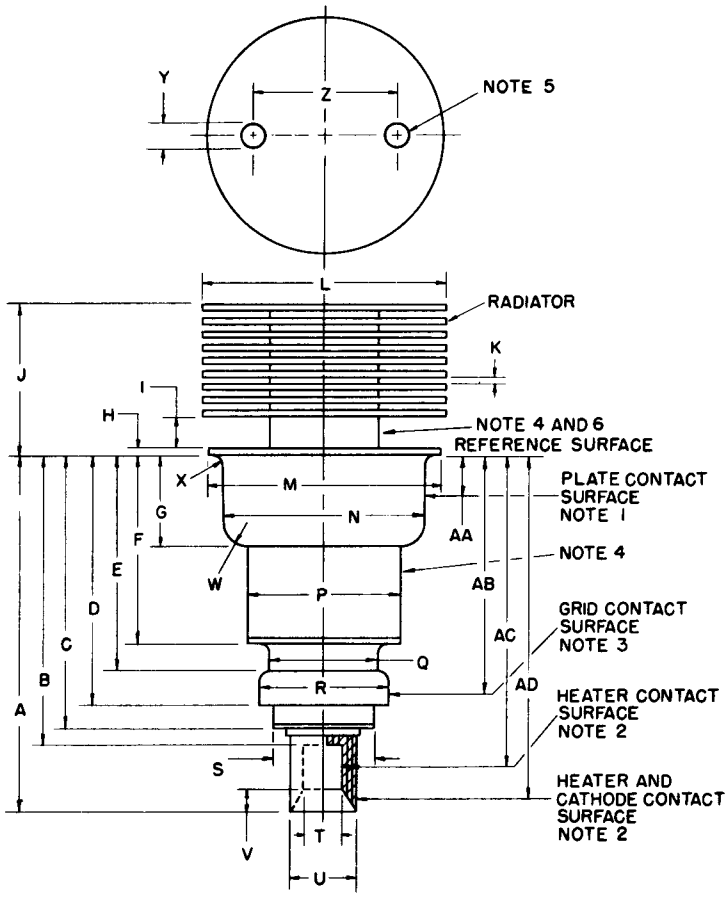
Shock

Statistical sample subjected to 5 impact accelerations of approximately 400 G and 0.5 milliseconds duration in each of three positions. The accelerating forces are applied by the Navy-type, High Impact (flyweight) Shock Machine.

500-Hour Life Test

Statistical sample operated for 500 hours as an oscillator to evaluate changes in power output with life.

PHYSICAL DIMENSIONS



DIMENSIONS FOR OUTLINE (INCHES)

Ref.	Minimum	Maximum
A	1.815	1.875
B	....	1.534
C	....	1.475
D	1.289	1.329
E	1.085	1.135
F	.880	.920
G	.462	.477
H	....	.040
I	.125	.185
J	.766	.826
K	.025	.046
L	1.234	1.264
M	1.180	1.195
N	1.025	1.035
P	.772	.792
Q	.541	.561
R	.655	.665
S	....	.545
T	.213	.223
U	.315	.325
V	....	.086
W	....	.100
X	....	.035
Y	.105	.145
Z	.650	.850

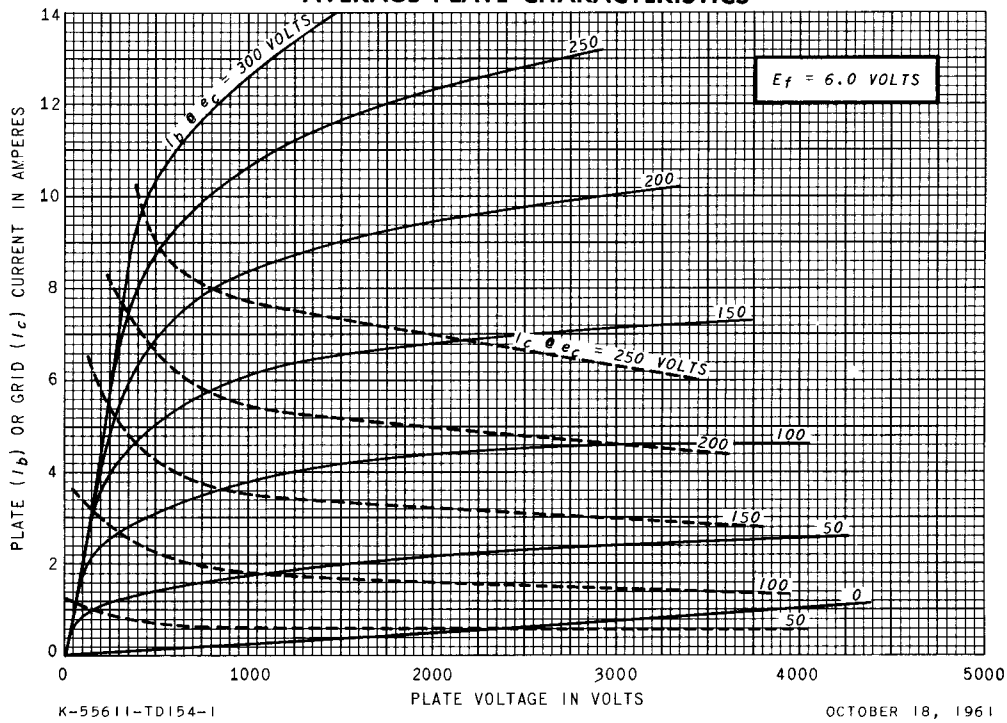
DIMENSIONS FOR ELECTRODE CONTACT AREA (INCHES)

Ref.	Dimension	Contact
AA	.198 ± .163	Plate
AB	1.225 ± .040	Grid
AC	1.631 ± .097	Heater
AD	1.645 ± .170	Cathode

NOTES

1. The total indicated runout of the plate contact surface with respect to the cathode contact surfaces will not exceed .020 inch.
2. The total indicated runout of the cathode contact surface with respect to the heater contact surfaces will not exceed .012 inch.
3. The total indicated runout of the grid contact surface with respect to the cathode contact surface will not exceed .020 inch.
4. Do not clamp or locate on this surface.
5. Hole provided for tube extractor through the top fin only.
6. Measure plate shank temperature on this surface.

AVERAGE PLATE CHARACTERISTICS



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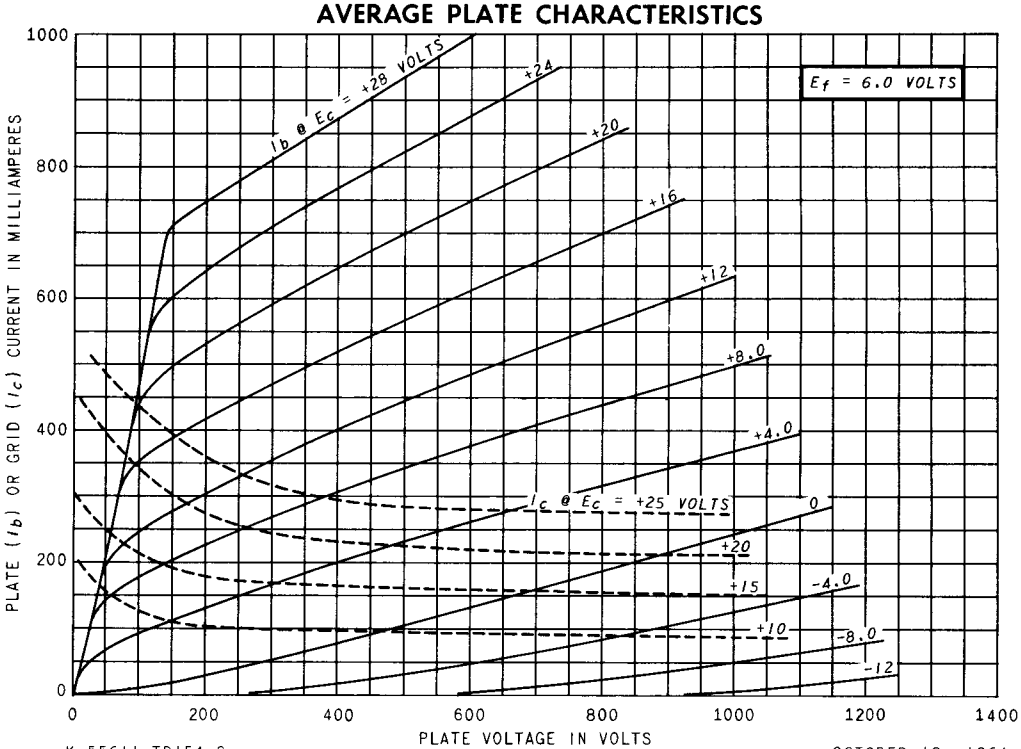
AVERAGE PLATE CHARACTERISTICS



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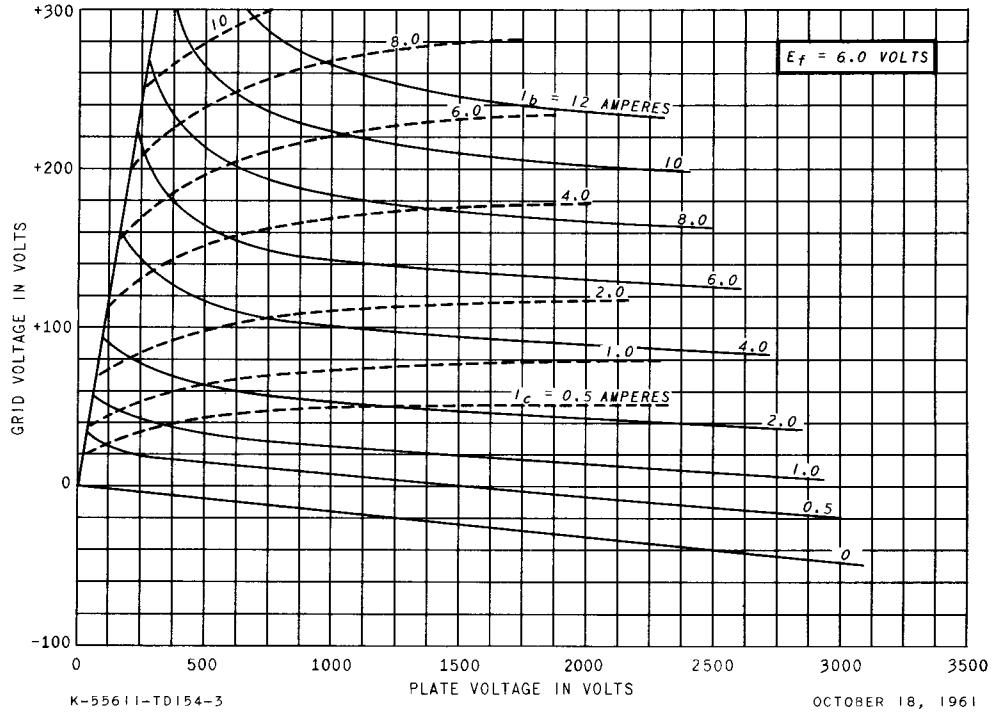
AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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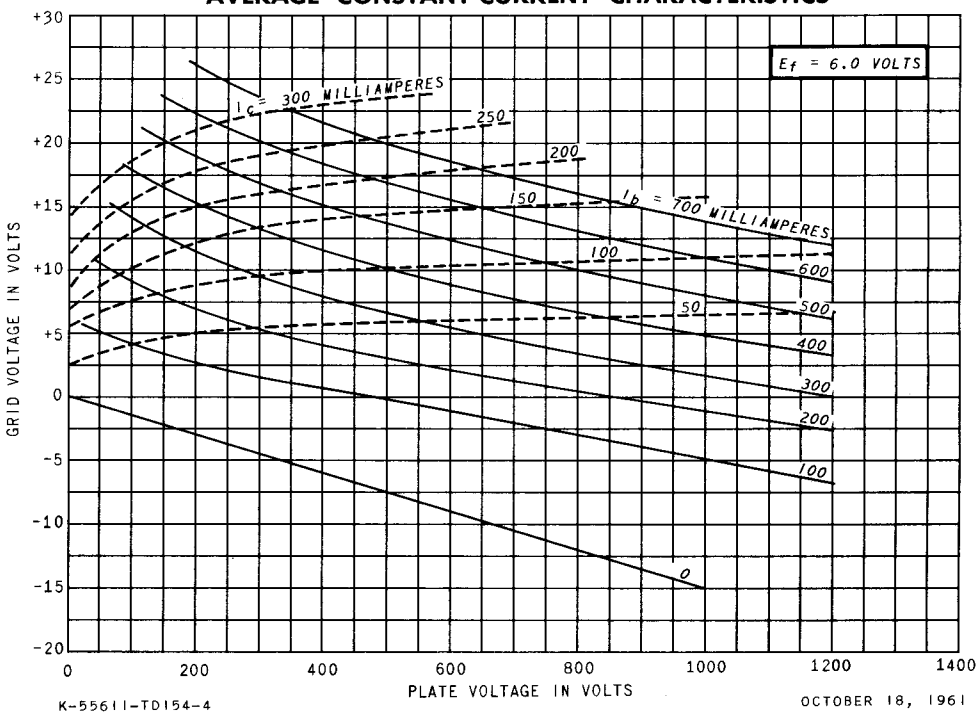
OCTOBER 18, 1961

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



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RECEIVING TUBE DEPARTMENT

GENERAL ELECTRIC

Owensboro, Kentucky