8380

Power Tetrode

NUVISTOR TYPE

Heater Designed to Operate from Battery Supplies Used in Sonobuoy and Other Expendable Equipment

Electrical:

Heater Characteristics and Ratings:

Voltage (DC). . . . .Tubes will be supplied with the heater designed to operate within ±10% of any specified center heater voltage between 6.0 and 8.5 volts to meet specific battery-supply requirements in sonobuoy and other expendable equipment.

Input	1.1	watts
Peak heater-cathode voltage:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts
Direct Interelectrode Capacitances:		
Grid No.1 to plate	0.015 max.	pf
Grid No.1 to cathode, grid No.2, shell, and heater	7.0	pf
Plate to cathode, grid No.2, shell, and heater	1.4	pf
Heater to cathode	1.4	pf

Characteristics, Class A_1 Amplifier:

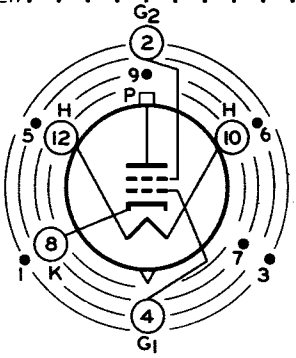
Heater Voltage	Specified center value
Plate Supply Voltage	100 volts
Grid-No.2 Supply Voltage	50 volts
Grid No.1	Connected to negative end of cathode resistor
Cathode Resistor	68 ohms
Transconductance	11000 μmhos
Plate Current	11 ma
Grid-No.2 Current	2.9 ma
Grid-No.1 Voltage (Approx.) for plate μa = 10	-7 volts

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	1.050"
Seated Length	0.790" to 0.840"
Maximum Diameter	0.440"
Weight (Approx.)	2.4 grams
Envelope	Metal Shell MT4 with Ceramic Insulator
Socket and Connector	See *Socket & Connector Information for RCA Nuvistor Tubes* at front of this Section
Cap	Skirted Miniature (JEDEC No.C1-44)
Base	Medium Ceramic-Wafer Twelvar 5-Pin (JEDEC No.E5-65)

Basing Designation for BOTTOM VIEW. 12AS

Pin 1[a] – Do Not Use
Pin 2 – Grid No.2
Pin 3[a] – Do Not Use
Pin 4 – Grid No.1
Pin 5[a] – Do Not Use
Pin 6[a] – Do Not Use
Pin 7[a] – Do Not Use
Pin 8 – Cathode
Pin 9[a] – Do Not Use
Pin 10 – Heater
Pin 12 – Heater
Top Cap – Plate



INDEX = LARGE LUG
● = SHORT PIN; IC – DO NOT USE

AMPLIFIER — Class A

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

Plate Supply Voltage.	300 max.	volts
Plate Voltage	250 max.	volts
Grid-No.2 (Screen-Grid) Supply Voltage. .	300 max.	volts
Grid-No.2 Voltage	100 max.	volts
Grid-No.1 (Control-Grid) Voltage:		
Negative-bias value	55 max.	volts
Positive-bias value	0 max.	volts
Cathode Current	25 max.	ma
Grid-No.2 Input	0.2 max.	watt
Plate Dissipation	1.6 max.	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance:[b]		
For fixed-bias operation.	0.5 max.	megohm
For cathode-bias operation.	1 max.	megohm

COMBINED RF OSCILLATOR and FREQUENCY DOUBLER — Class C

Maximum Ratings, *Absolute-Maximum Values:*

For operation at any altitude

	Up to 80 Mc	
Plate Supply Voltage.	300 max.	volts
Plate Voltage	250 max.	volts
Grid-No.2 (Screen-Grid) Supply Voltage. .	300 max.	volts
Grid-No.2 Voltage	100 max.	volts
Grid-No.1 (Control-Grid) Voltage:		
Negative-bias value	55 max.	volts
Peak-positive value	3 max.	volts
Cathode Current	25 max.	ma
Grid-No.1 Current	3 max.	ma
Grid-No.2 Input	0.5 max.	watt
Plate Dissipation	1.6 max.	watts
Metal-Shell Temperature (Measured in Zone "A" as shown on *Dimensional Outline*) . .	150 max.	°C

Typical Operation:[c]

Heater Voltage	Specified center value		
Plate Supply Voltage	80	150	volts
Grid-No.2 Supply Voltage	80	150	volts
Grid-No.2 Resistor	–	12000	ohms
Grid-No.1 Resistor	27000	10000	ohms
Plate Current	7.5	10	ma
Grid-No.2 Current	6	6	ma
Useful Power Output at 80 Mc[d]	260	650	mw

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	0.05 max.	megohm

[a] Pins 1, 3, 5, 6, 7, and 9 are of a length such that their ends do not touch the socket insertion plane.

[b] For operation at metal-shell temperature of 150° C measured in Zone "A" as shown on *Dimensional Outline*. For operation at other metal-shell temperatures, see *Grid-No.1-Circuit-Resistance Rating Chart*.

[c] Cathode, grid No.1, and grid No.2 are operated as a 40-Mc, Colpitts-type, electron-coupled oscillator with grid No.2 functioning as the "plate" of the oscillator, and the plate circuit tuned to 80 Mc.

[d] Measured at load.

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current	1	$0.95\left[\frac{1.1}{E_f(ctr)}\right]$	$1.05\left[\frac{1.1}{E_f(ctr)}\right]$	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.015	pf
Grid No.1 to cathode, grid No.2, shell, and heater	2	6.0	8.0	pf
Plate to cathode, grid No.2, shell, and heater	2	1.2	1.6	pf
Heater to cathode	2	1.1	1.7	pf
Plate Current (1)	1,3	9	13	ma
Plate Current (2)	1,4	–	50	μa
Grid-No.2 Current	1,3	–	4	ma
Transconductance (1)	1,3	9000	13000	μmhos
Transconductance, Grid No.1 to Grid No.2	1,3	2000	–	μmhos
Useful Power Output (1)	1,5	0.550	–	watt
Useful Power Output (2)	5,6	0.500	–	watt
Reverse Grid-No.1 Current	1,7	–	0.3	μa
AC Emission	1,8	15	–	ma
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,9	–	10	μa
Heater positive with respect to cathode	1,9	–	10	μa

	Note	Min.	Max.	
Leakage Resistance:				
Between grid No.1 and all other electrodes tied together	1,10	5000	–	megohms
Between grid No.2 and all other electrodes tied together	1,11	5000	–	megohms
Between plate and all other electrodes tied together	1,12	10000	–	megohms

Note 1: With dc heater volts = specified center value, E_f(ctr).

Note 2: Measured in accordance with EIA Standard RS-191-A.

Note 3: With dc plate supply volts = 100, dc grid-No.2 supply volts = 50, grid No.1 and metal shell connected to negative end of cathode resistor, cathode resistor (ohms) = 68, and cathode-bypass capacitor (μf) = 1000.

Note 4: With dc plate volts = 100, dc grid-No.2 volts = 50, dc grid-No.1 volts = −7, and metal shell connected to ground.

Note 5: Measured at load in 40-Mc oscillator-80-Mc doubler circuit with dc plate supply volts = 150, dc grid-No.2 supply volts = 150, grid-No.2 resistor (ohms) = 12000, and grid-No.1 resistor (ohms) = 10000.

Note 6: With dc heater volts = 0.9 specified center value.

Note 7: With dc plate supply volts = 125, dc grid-No.2 supply volts = 60, dc grid-No.1 supply volts = −1.5, grid-No.1-circuit resistance (megohms) $\leqq$ 1 (the internal resistance of the current meter used for this measurement), and metal shell connected to ground.

Note 8: With dc plate supply volts = 100, dc grid-No.2 supply volts = 50, dc grid-No.1 supply volts = −6.5, rms 60-cps ac grid-No.1 signal volts = 7.5, dc grid-No.1-circuit resistance (ohms) $\leqq$ 2, plate- and grid-No.1-voltage supplies each bypassed with capacitor (μf) $\geqq$ 500, and metal shell connected to ground. "AC Emission" is measured as the dc component of current in the plate circuit.

Note 9: With dc heater-cathode volts = 100.

Note 10: With grid No.1 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 11: With grid No.2 100 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

Note 12: With plate 300 volts negative with respect to all other electrodes tied together, and metal shell connected to ground.

SPECIAL TESTS

Short-Duration Shock (1):

Peak Impact Acceleration	1000	g

This test is performed on a sample lot of tubes to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and, with tube-electrode voltages applied, are subjected to 20 blows (5 in each position) at the specified Peak Impact Acceleration.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid-No.1 Current, and Heater-Cathode Leakage Current.

Long-Duration Shock (2):

Peak Impact Acceleration . . . . . 50 g

This test is performed, using a half-sine-wave, 11-millisecond, mechanical shock pulse, on a sample lot of tubes from each production run to determine the ability of the tube to withstand the specified Peak Impact Acceleration. Tubes are held rigid in each of two positions in three mutually perpendicular axes on a free-fall table. The longitudinal axis of the tube is coincident with one of the three axes. The table is dropped a total of 18 times to a horizontal surface from a height sufficient to produce the specified Peak Impact Acceleration. The material of the horizontal surface is such that the duration of the half-sine-wave shock pulse is 11 milliseconds. No tube-electrode voltages are applied during this test.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid-No.1 Current, and Heater-Cathode Leakage Current.

Sweep-Frequency Fatigue Vibration:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand the Sweep-Frequency Fatigue Vibration specified below. Tubes are held rigid and operated with dc heater-cathode volts = 100. During operation, the tube is vibrated through the frequency range from 5 to 500 cps and back to 5 cps. One such vibration sweep cycle takes approximately 15 minutes. This cycle is repeated for a period of 3 hours along each of three mutually perpendicular axes for a total of 9 hours. The longitudinal axis of the tube is coincident with one of the three axes. The vibrations are applied as follows:

a. The vibration from 5 to 50 cps is applied with a constant peak amplitude of 0.040 inch (0.080 inch peak-to-peak)

b. The vibration from 50 to 500 cps is applied with a constant acceleration of 10 g.

c. The vibration from 500 to 50 cps and then to 5 cps follows the same procedure, but in reverse.

At the end of this test, tubes are criticized for Continuity and Shorts, Useful Power Output (1), Reverse Grid-No.1 Current, and Heater-Cathode Leakage Current.

Low-Pressure Voltage Breakdown:

This test is performed on a sample lot of tubes from each production run to determine the ability of the tube to withstand high-altitude (low-air-pressure) conditions. Tubes are operated with 250 volts rms (60-cycle, ac) applied between plate and all other electrodes and metal shell connected together. Tubes must not break down or show evidence of corona when subjected to an air pressure (8.0 ± 0.5 mm Hg) corresponding to an altitude of 100,000 feet.

Continuity and Shorts:

This test is performed on a sample lot of tubes from each production run. Tubes are subjected to the Thyratron-Type Shorts Test described in MIL-E-ID, Amendment 5, Paragraph 4. 7.7, except that tapping is done by hand with a soft rubber tapper (Specifications for this tapper will be supplied upon request). The areas of acceptance and rejection for this test are shown in the accompanying *Shorts-Test Acceptance-Limits* graph. In this test, tubes are criticized for permanent or temporary shorts and open circuits.

Reliability Life (20 Hours):

This test is performed on a sample size (minimum of 80 tubes/lot for a 5-lot sampling plan or a minimum of 400 tubes for a single-lot sampling plan) designed to assure a process average AFR (Acceptable Failure Rate) of 0.5 per cent for Inoperatives and 2.1 per cent for Total Defectives and a process average RFR (Rejectable Failure Rate) of 2.0 per cent for Inoperatives and 4.7 per cent for Total Defectives.

During this test, tubes are operated at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Useful Power Output (2), Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.200 watt.

Heater-Cycling Life (100 Hours):

Intermittent Operation . . . . . 2000 cycles

This test is performed on a sample lot of tubes from each production run with heater volts = 1.35x specified center value cycled 1 minute ON and 2 minutes OFF, dc heater-cathode volts = -100, all other tube electrodes and metal shell connected to ground.

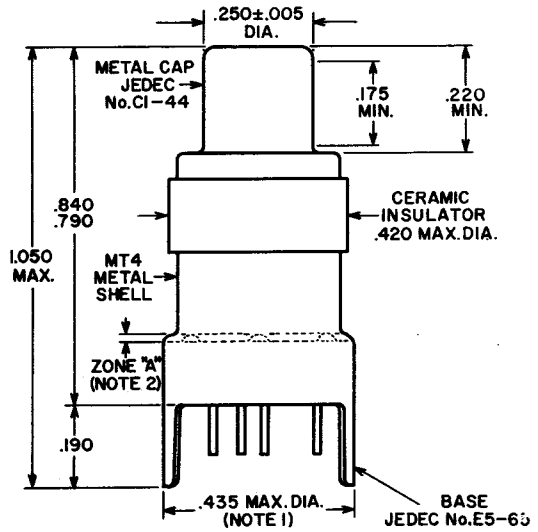
At the end of this test, tubes are criticized for Heater-Cathode Leakage Current, Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

Combined Oscillator-Doubler Life (100 Hours):

This test is performed on a sample lot of tubes from each production run.

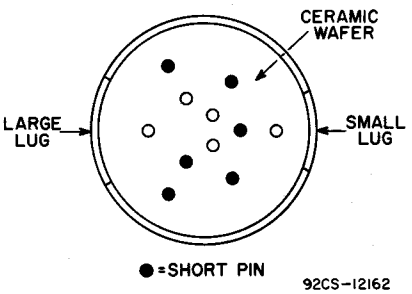
During this test, tubes are operated as a combined oscillator and frequency doubler at maximum-rated plate dissipation.

At the end of this test, tubes are criticized for Useful Power Output (2), Reverse Grid-No.1 Current, Inoperatives, and Total Defectives. A tube is considered Inoperative if Useful Power Output (2) is less than 0.200 watt.

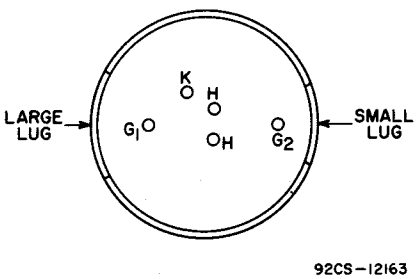


Dimensions in Inches

BOTTOM VIEW
Showing Arrangement of All 11 Base Pins



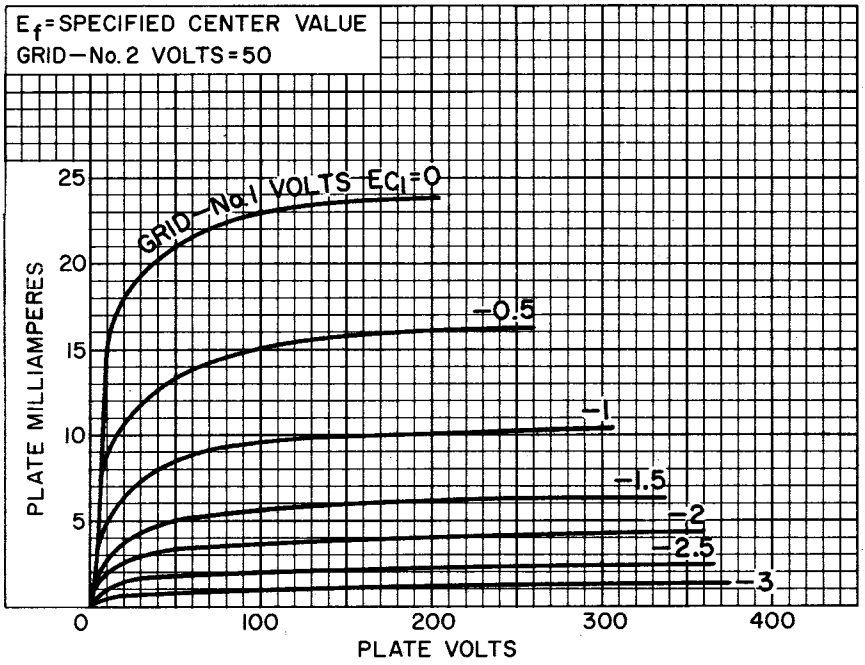
MODIFIED BOTTOM VIEW
With Element Connections Indicated
and Short Pins Not Shown



NOTE 1: MAXIMUM OUTSIDE DIAMETER OF 0.440" IS PERMITTED ALONG 0.190" LUG LENGTH.

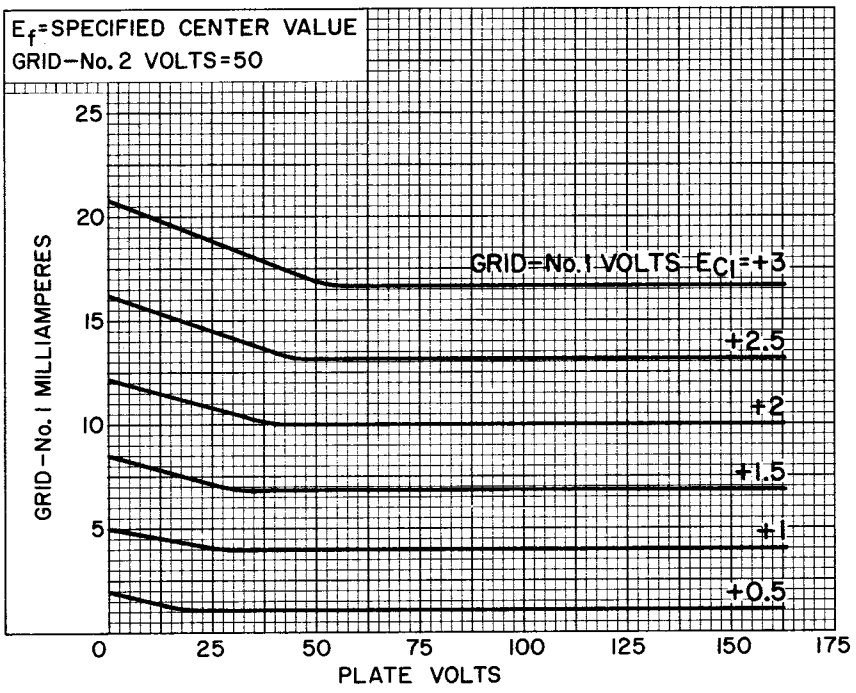
NOTE 2: METAL-SHELL TEMPERATURE SHOULD BE MEASURED IN ZONE "A".

AVERAGE PLATE CHARACTERISTICS



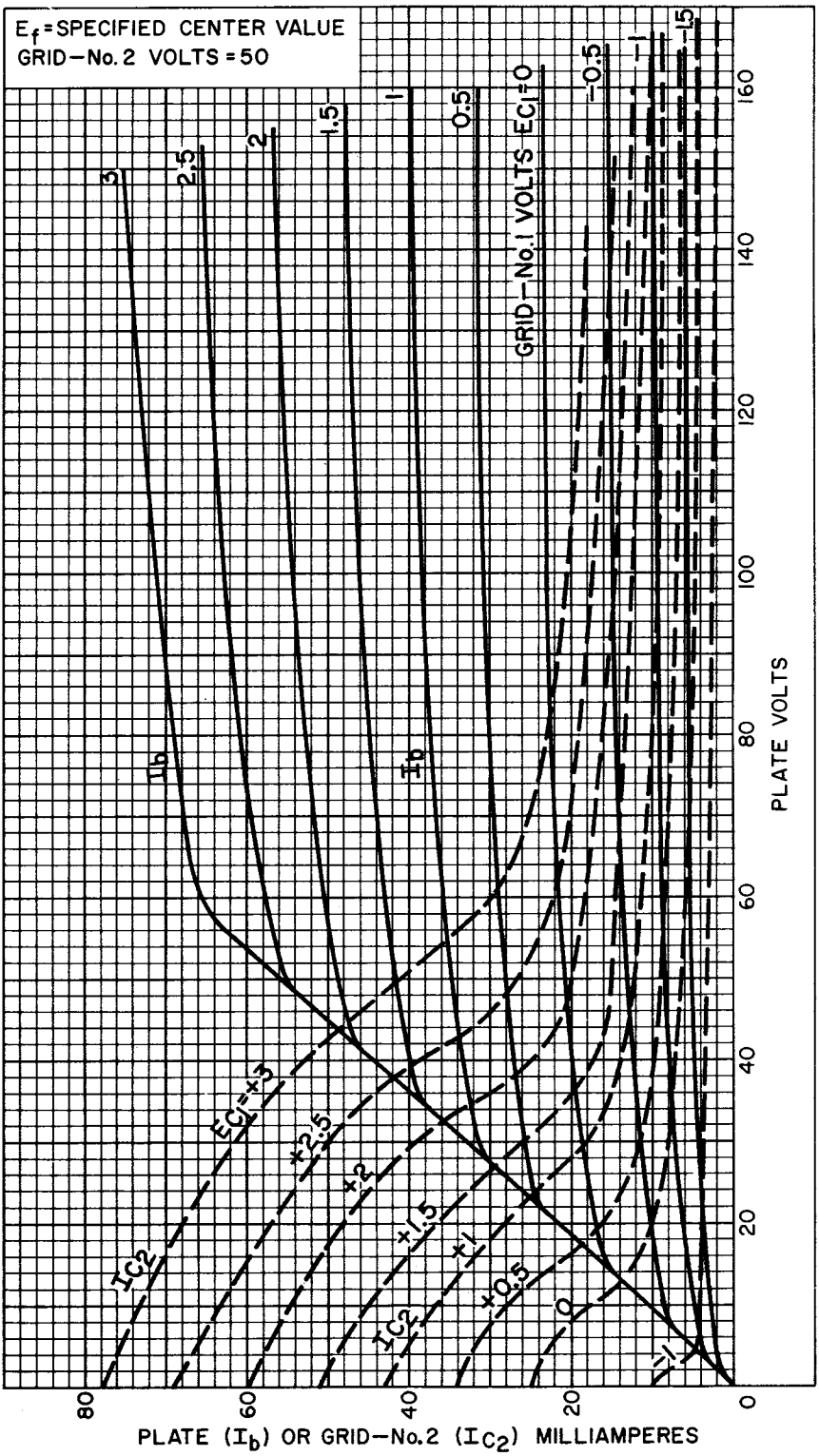
92CS-12173

AVERAGE CHARACTERISTICS



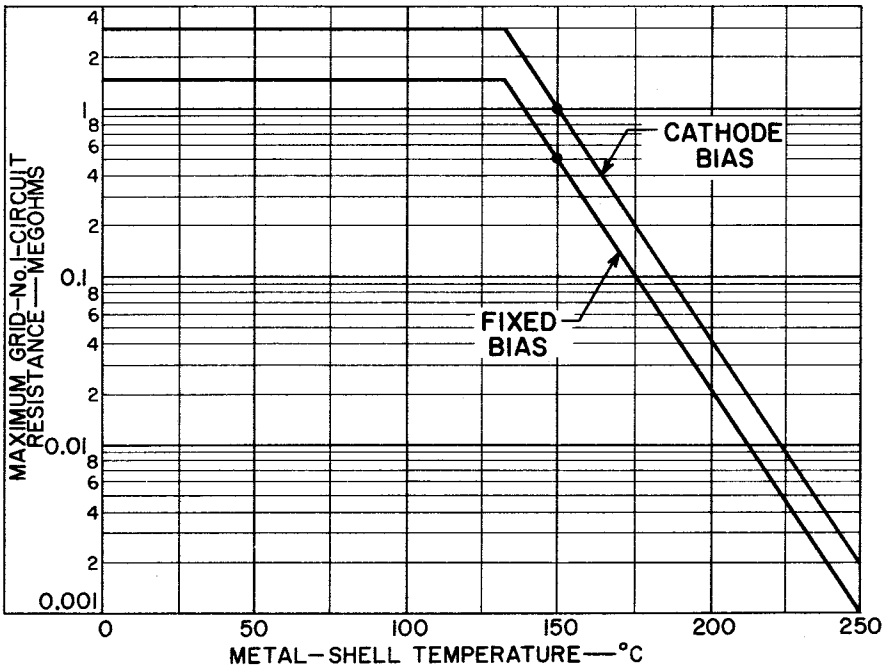
92CS-12172

AVERAGE CHARACTERISTICS



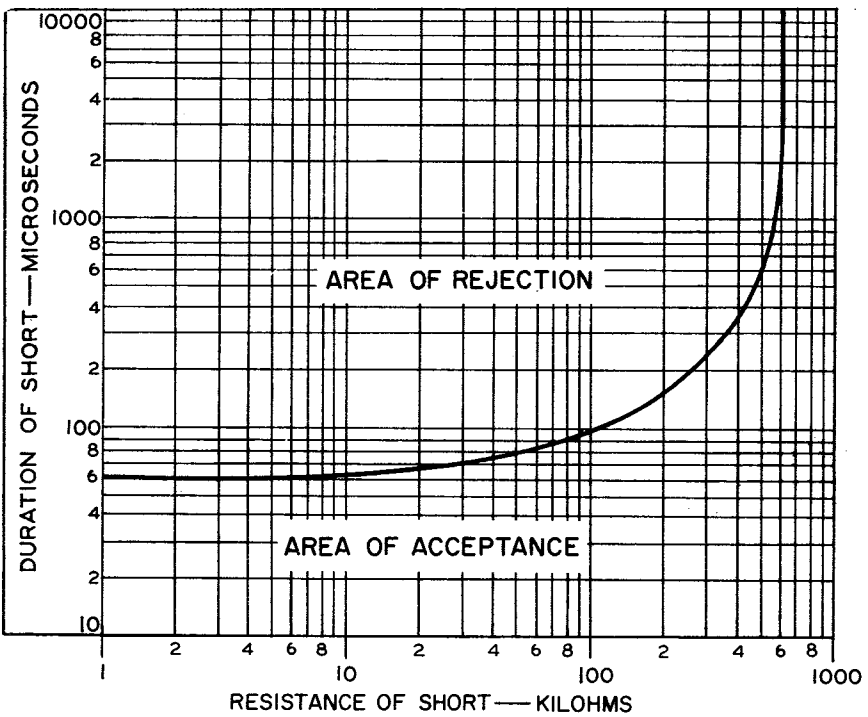
92CM—12175

GRID-No.1-CIRCUIT-RESISTANCE RATING CHART
Class A Amplifier



92CS-11896

SHORTS-TEST ACCEPTANCE LIMITS



92CS-10465RI