



*Excellence in Electronics*

**TYPE  
1R5WA**

The 1R5WA is a filament type heptode converter of miniature construction designed for use as a combined oscillator and mixer in battery operated equipment. Its principal application is as a mixer in oscillator sections of portable receivers. It is intended for service where extreme conditions of mechanical shock or vibration are encountered. It is particularly useful in circuits where its low microphonic noise and vibration output are essential for specialized military electronic equipment.

**MECHANICAL DATA**

ENVELOPE: T-5 1/2 Glass

BASE: Miniature Button 7-Pin

TERMINAL CONNECTIONS:

- Pin 1 Filament, Negative, Grid #5
- Pin 2 Plate
- Pin 3 Grid #2, Grid #4
- Pin 4 Grid #1
- Pin 5 Filament, Negative, Grid #5
- Pin 6 Grid #3
- Pin 7 Filament, Positive

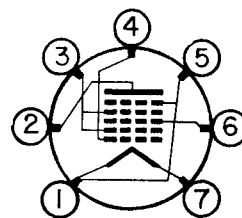
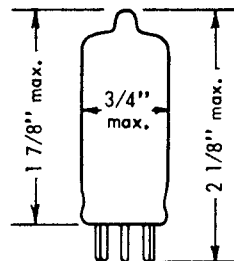
MECHANICAL RATINGS:

- Maximum Impact Acceleration (Shock Test—Note 2) 450 G
- Maximum Vibrational Acceleration (96 Hour Fatigue Test—Note 3) 2.5 G

MOUNTING POSITION: Any

**ELECTRICAL DATA**

CAUTION----- To Electron Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if maximum ratings are exceeded. Both reliability and Performance will be jeopardized if filament voltage ratings are exceeded. Life and Reliability of Performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.



BOTTOM VIEW

7AT

RATINGS AND NORMAL OPERATION:	MIL - E - 1 SYMBOL	DESIGN MINIMUM	NORMAL TEST CONDITIONS (Note 5)	NORMAL OPERATION (Note 4)	DESIGN MAXIMUM	MIL - E - 1 UNITS
Heater Voltage (Note 6)	Ef:	1.00	1.25	1.25	1.50	Vdc
Plate Voltage (Note 7)	Eb:	----	90	90	100	Vdc
Grid Voltage	Ec1:	----	0	0	----	Vdc
Grid Voltage #2 (Note 7)	Ec2:	----	45	45	75	Vdc
Plate Dissipation	Pp:	----	----	----	0.1	Watts
Grid #2 Dissipation	Pg(2, 4):	----	----	----	0.19	Watts
Grid Resistance	Rg(1):	----	0.1	0.1	----	Meg
Conversion Transconductance	Sc:	----	----	235	----	μmhos
Plate Current	Ib1:	----	----	0.90	----	mAdc
Grid Voltage #3	Ec3:	----	0	0	0	Vdc
Cathode Current	Ik:	----	----	----	6.5	mAdc

Tentative Data

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PENTAGRID CONVERTER

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL (Note 1)

TEST	CONDITIONS	AQL %	MIL - E - 1 SYMBOL	MIN	LAL	BOGIE	UAL	MAX	ALD	MIL - E - 1 UNITS
<b>MEASUREMENTS ACCEPTANCE TESTS, PART 1</b>										
Combined AQL = 1.0 % excluding Mechanical and Inoperatives										
Grid Current (1):	Ec3 = -1 Vdc Eg1 = 15 Vac (Note 9)	0.65	1c3:	0	----	----	----	-0.6	----	μAdc
Plate Current (1):	Eg1 = 15 Vac; (Note 9)	0.65	1b:	0.55	----	----	----	1.25	----	mAdc
Cathode Current:	Eg1 = 15 Vac; (Note 9)	0.65	1k:	2.25	----	----	----	4.75	----	mAdc
Conversion Transconductance (1):	Eg1 = 15 Vac; Ef = 1.0 Vdc (Note 9)	0.65	Sc:	130	----	----	----	340	----	μmhos
Oscillator Grid Current:	Ef = 1.0 Vdc; Plate Floating (Note 10)	0.65	1c1:	125	----	----	----	----	----	μAdc
Noise and Microphonics:	Ebb = Ecc2 & 4 = Ecc3 = 135 Vdc; Ecal = 10.0 mVac; Rp = 2.2 Meg; Rg 2 & 4 = 4 Meg; Cg 2 & 4 = 0.01 μf to F-; Rg3 = 8 Meg.	0.65	Eb:		----	----	----	17	----	VU
Continuity and Shorts: (Inoperatives)		0.4	----	----	----	----	----	----	----	----
Mechanical:	Envelope Outline (6-2)	----	----	----	----	----	----	----	----	----
<b>MEASUREMENTS ACCEPTANCE TESTS, PART 2</b>										
Insulation of Electrodes:	g1 - all } p - all } g3 - all }	4.0	{ Rg - all : Rp - all : Rg3 - all :	100 100 100	----	----	----	----	----	Meg. Meg. Meg.
Conversion Transconductance (2):	Eg1 = 15 Vac (Note 9)	6.5	Sc:	160	----	----	----	340	----	μmhos
Filament Current:		6.5	If:	44	----	----	----	56	----	mA
Capacitance:	Without Shield } Without Shield } Without Shield }	6.5	{ Cg3 - all : Cp - all : Cg3 - p :	4.7 5.0 ----	----	----	----	6.9 7.5 0.45	----	μf μf μf
Vibration (1):	Rp = 10,000 ohms; Ec1 = -5 Vdc; 40 cps; 15g; Rg1 = 0	6.5	Ep (1):	----	----	----	----	10	----	mVac
Vibration (2):	F = 50 cps - 3500 cps; Rp = 10,000 ohms; Ec1 = -5 Vdc; Rg1 = 0; (Note 8)	6.5	Ep (1):	----	----	----	----	25	----	mVac
<b>DEGRADATION RATE ACCEPTANCE TESTS</b>										
Shock:	Hammer Angle = 30°	----	----	----	----	----	----	----	----	----
Fatigue:	G = 2.5; F = 25 min; 60 max; Fixed Frequency	6.5	----	----	----	----	----	----	----	----
Post Shock and Fatigue Test End Points:										
Conversion Transconductance (2):		----	Sc:	125	----	----	----	----	----	μmhos
Vibration (1):		----	Ep:	----	----	----	----	15	----	mVac
Miniature Tube Base Strain:		----	----	----	----	----	----	----	----	----
Glass Strain:		2.5	----	----	----	----	----	----	----	----

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ELECTRICAL DATA (Cont'd)

TEST	CHARACTERISTICS AND QUALITY CONTROL Note 1 (cont'd)						Allowable Defects per Characteristics 1st Sample	Combined Samples
	CONDITIONS	AQL %	MIL - E - 1 SYMBOL	LIMITS MIN	LIMITS MAX	MIL - E - 1 UNITS		
<b>ACCEPTANCE LIFE TESTS</b>								
Intermittent Life Test:	Ef= 1.25 Vdc; or Vac with Equivalent Bias; Group A; Ecal = -16.0 Vdc; Esig = 17.5 Vdc; Ec 2 & 4 = 67.5 Vdc; (Note 12)	----	t:	500	----	Hours	----	----
Intermittent Life Test End Points:								
Conversion Transconductance (2):		----	Sc:	125	----	μmhos	----	----
Oscillator Grid Current		----	Ic1:	100	----	μAdc	----	----

NOTES:

- Note 1: Characteristics, Quality Control Procedures, and Inspection Levels are made according to the appropriate paragraph of MIL - E - 1, and MIL - STD - 105A.
- Note 2: Test Conditions and Acceptance Criteria per Shock Test procedures of MIL - E - 1 basic specifications.
- Note 3: Test Conditions and Acceptance Criteria per Fatigue Test procedures of MIL - E - 1 basic specifications.
- Note 4: These normal values represent conditions at which control of reliability may be expected.
- Note 5: These normal test conditions are used for all characteristics unless otherwise stated under the individual test item.
- Note 6: For most applications the performance will not be adversely affected by ± 10% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.
- Note 7: Plate and Screen Voltages should not exceed these values under any circumstances.
- Note 8: The tube under test shall be rigidly mounted on a vibration table vibrating with simple harmonic motion. The test conditions of paragraph 4.9.19.1 of MIL - E - 1 shall be applied and Ep monitored while the frequency of vibration is continuously swept from 50-3500 cps and the peak acceleration controlled constant at 2G. A low pass filter which follows the load resistor of the tube under test shall have a cut-off frequency of 3500 cps. The total time of sweep shall not be less than one (1) minute.
- Note 9: For rapid testing use equipment which correlates with MIL - E - 1 paragraph 4.10.12.
- Note 10: With converter Oscillator Test Set (Drawing 195-Jan) having Rg1= 50,000 ohms and with grid to filament resonant impedance adjusted to 9500 ohms.
- Note 11: Tubes shall be so shielded that operator proximity or movement will not affect output readings.
- Note 12: Bias of grid #1 may be obtained from a dc source of self bias.

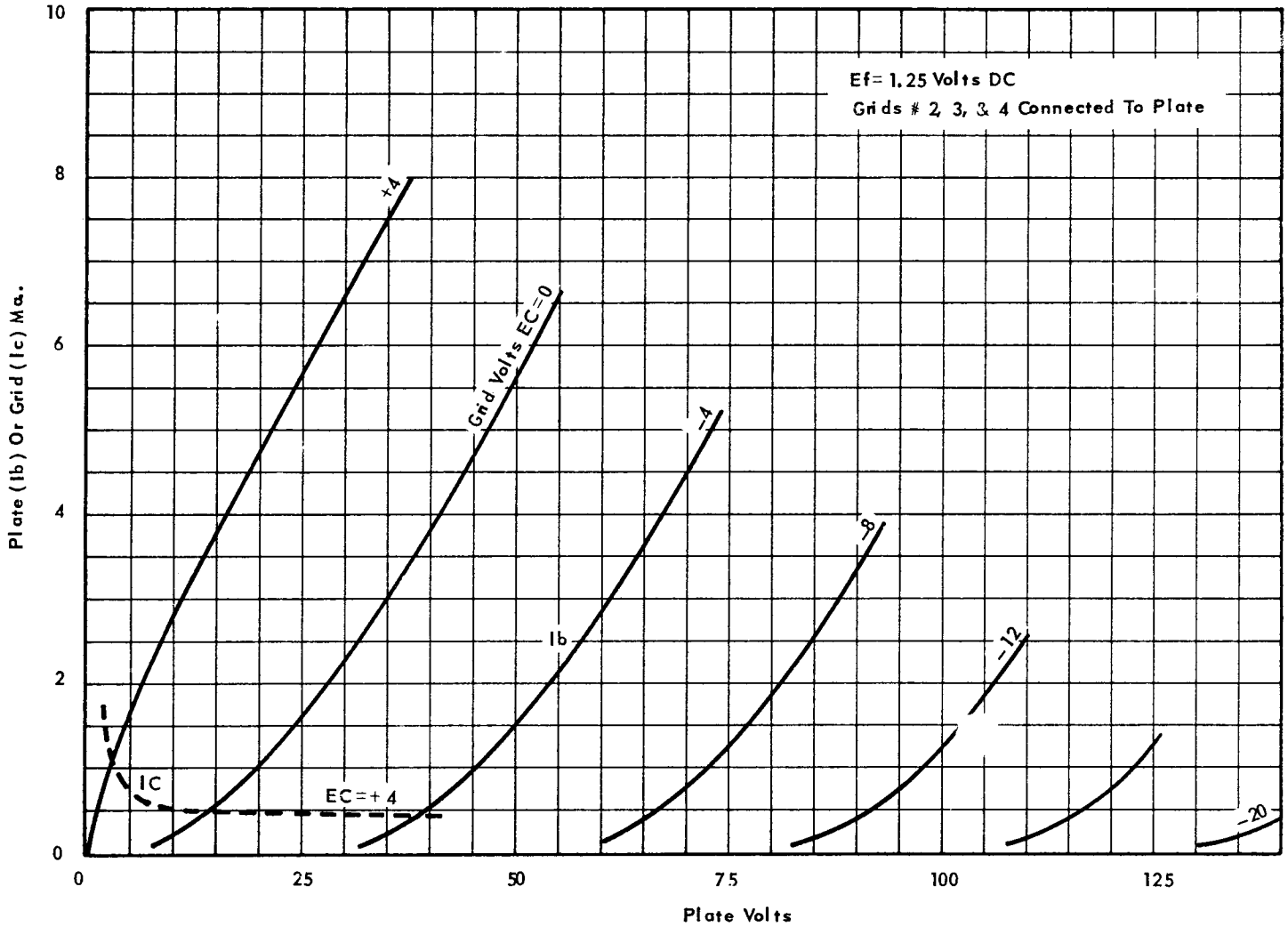
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PENTAGRID CONVERTER

AVERAGE PLATE CHARACTERISTICS  
TRIODE CONNECTION



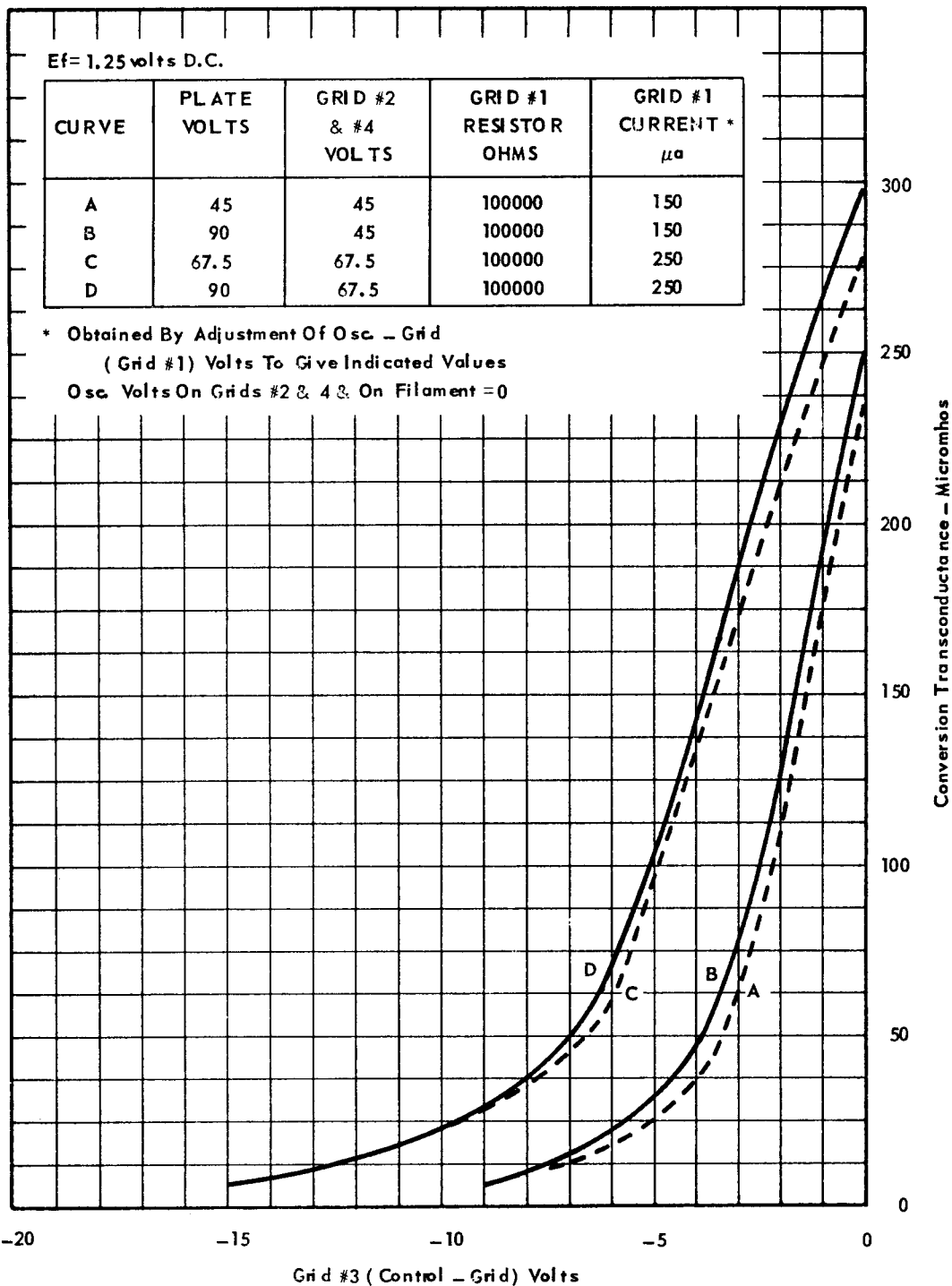
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PENTAGRID CONVERTER

OPERATION CHARACTERISTICS



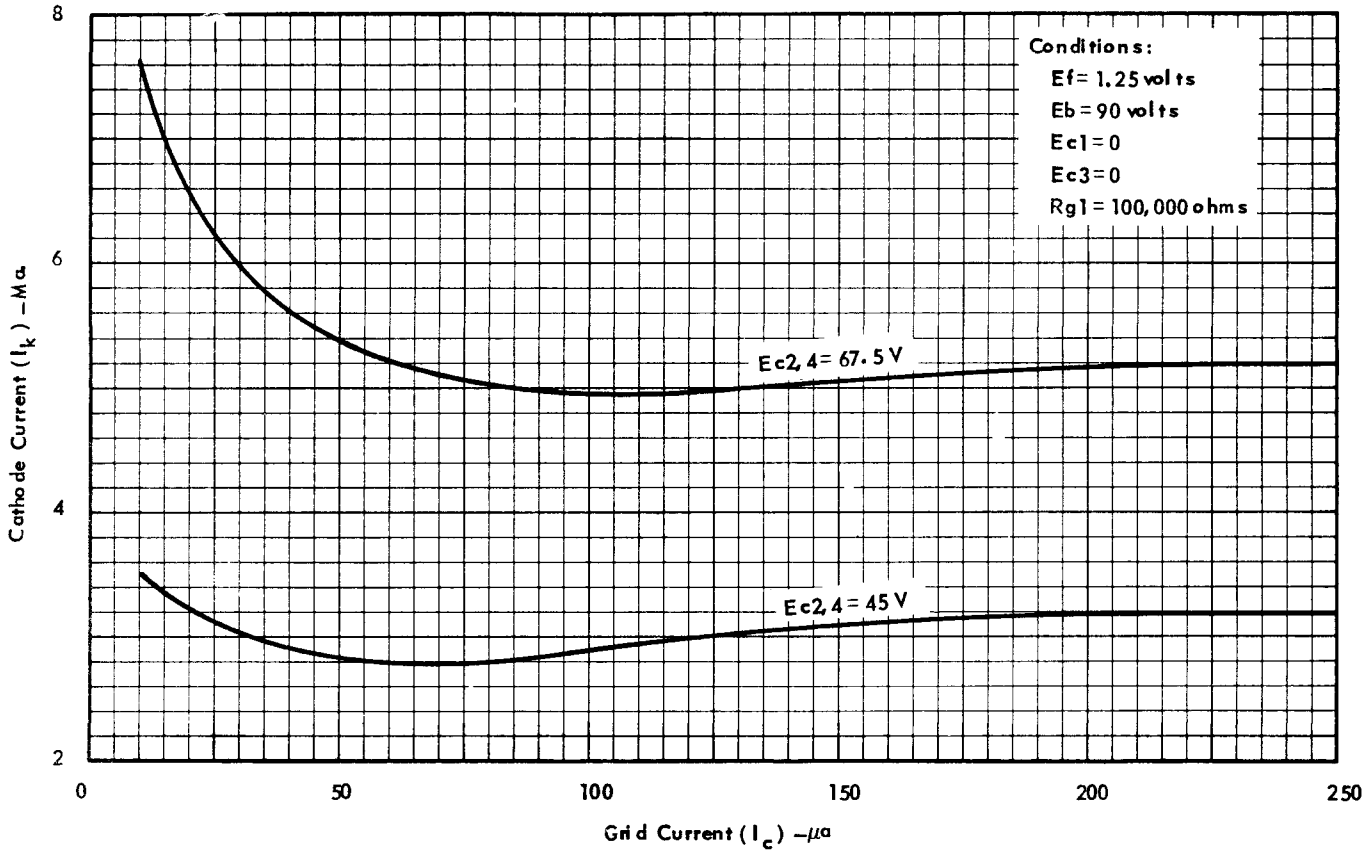
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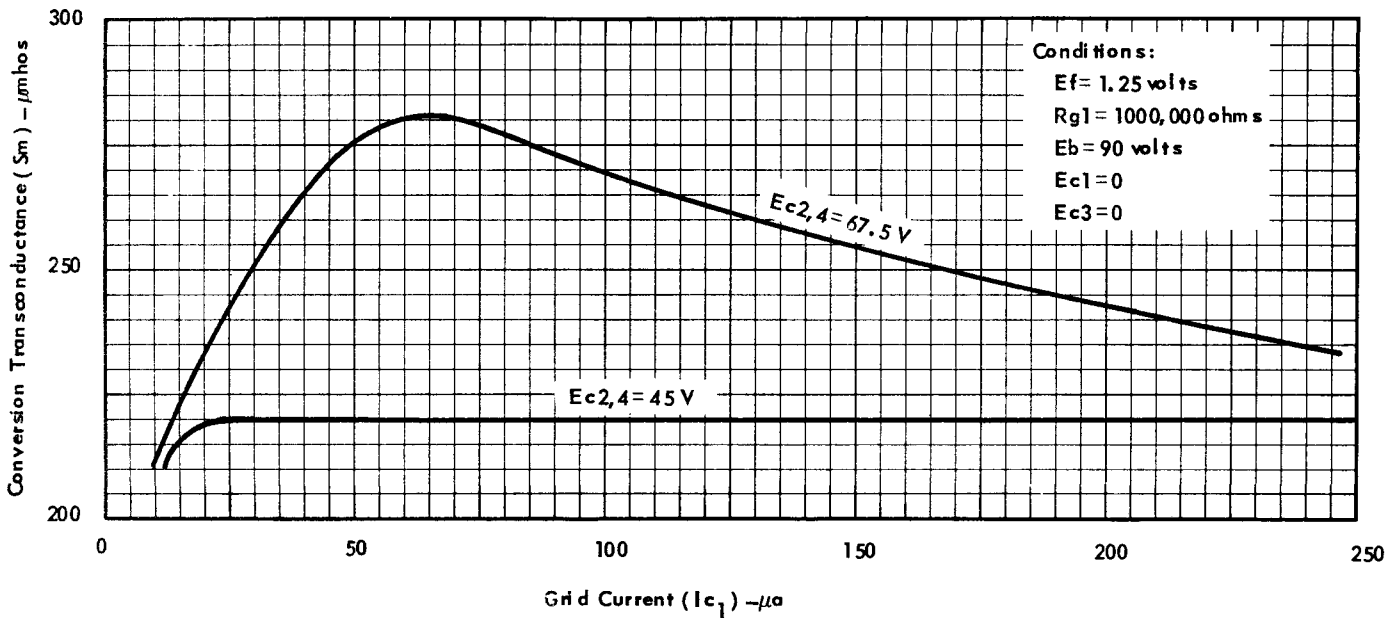


PENTAGRID CONVERTER

OPERATION CHARACTERISTICS



OPERATION CHARACTERISTICS



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