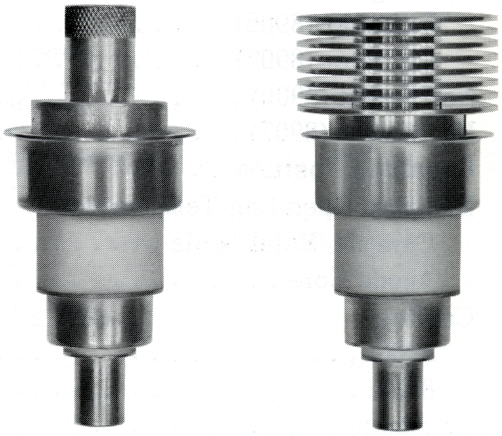
TECHNICAL DATA

8906
8907

PLANAR TRIODES

The EIMAC 8906 (formerly Y-572) and 8907 (formerly Y-581) are rugged ceramic/metal planar triodes designed for use as a CW, grid- or plate-pulsed oscillator or frequency multiplier up to 3 GHz, as well as for pulse modulator or voltage regulator service. The 8906 is supplied with a knob intended for conduction-convection cooling and the 8907 is supplied with radiator (P/N 014224) for forced air cooling. Except for the plate dissipation ratings, the characteristics of both tube types are identical.



8906 8907

An outstanding feature of these tubes is the low heater power requirement for such high current capability. Either type can normally be used in place of the 7815, 7815R and 8745 at the same heater voltage where higher current capability and/or longer life is desired. Replacement of the above tube types with either the 8906 or 8907 is possible in most cases. The tubes can also replace the 7211/7698 (or 7698R) when a 25% lower heater power requirement is desired. In addition, the 8906 and 8907 have the preferred features of the 7815 and 7211 type family: high-Mu, high transconductance, great mechanical strength, low interelectrode capacitance, high current capability and increased grid-to-anode insulator length. The cathode is of the arc resistant extended interface type, well proven in airline type applications, assuring reliable, long-life operation under adverse conditions.

GENERAL CHARACTERISTICS[1]

ELECTRICAL

Cathode: Oxide Coated, Unipotential		
Heater: Voltage	6.0 ± 0.3	V
Current, at 6.0 volts	1.00	A
Transconductance (Average):		
I_b = 160 mA (200 mA/cm^2)	38	mmhos
Amplification Factor (Average)	80	
Direct Interelectrode Capacitances (grounded cathode)[2]		
Grid-Cathode	8.00	pF
Grid-Plate	1.98	pF
Plate-Cathode	0.06	pF
Cut-off Bias[3]	-30	V max.

(Revised 11-1-71) Printed in U.S.A.

MECHANICAL

Maximum Overall Dimensions:	
Length	2.701 in; 68.60 mm
Diameter (8906)	1.195 in; 30.35 mm
Diameter (8907)	1.264 in; 32.11 mm
Net Weight (8906)	1.8 oz; 48 gm
Net Weight (8907)	2.2 oz; 63 gm
Operating Position	Any
Maximum Operating Temperature:	
Ceramic/Metal Seals	250°C
Anode Core	250°C
Cooling:	
8906	Conduction and Convection
8907	Forced Air
Terminals	Coaxial, Special

ENVIRONMENTAL

Shock, 11 ms, non-operating	60 G
Vibration, operating, all axes, 55 to 500 Hz	10 G
Altitude, max (in a suitable designed circuit)	70,000 ft

1. Characteristics and operating values are based upon performance tests. These figures may change without notice as the result of additional data or product refinement. EIMAC Division of Varian should be consulted before using this information for final equipment design.

2. Capacitance values for a cold tube as measured in a special shielded fixture. When the cathode is heated to the proper temperature, the grid-cathode capacitance will increase from the cold value by approximately 1 pF due to thermal expansion of the cathode.

3. Measured with one milliampere plate current and a plate voltage of 1 kVdc.

CW RF POWER AMPLIFIER OR OSCILLATOR

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE	2500	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
GRID NEGATIVE TO CATHODE	-400	VOLTS
GRID POSITIVE TO CATHODE	30	VOLTS
DC PLATE CURRENT	150	MILLIAMPERES
DC GRID CURRENT	45	MILLIAMPERES
PLATE DISSIPATION		
8906	10	WATTS
8907	100	WATTS
GRID DISSIPATION	1.5	WATTS
FREQUENCY	2.5	GIGAHERTZ

REPRESENTATIVE OPERATION

Grounded Grid CW r-f Power Amplifier

DC Plate Voltage	630	Vdc
DC Cathode Current	140	mAdc
DC Grid Voltage (Approx.)	-5	Vdc
DC Grid Current	25	mAdc
Drive Power (Approx.)	4	W
Useful CW Power Output	45	W
Heater Voltage	6.0	V
Frequency	700	MHz

Grounded Grid CW r-f Oscillator

DC Plate Voltage	1000	Vdc
DC Plate Current	140	mAdc
DC Grid Voltage (Approx.)	-20	Vdc
DC Grid Current (Approx.)	30	mAdc
Useful CW Power Output	30	W
Heater Voltage	5.0	V
Frequency	2.5	GHz

RF POWER AMPLIFIER OR OSCILLATOR
Grid- or Plate-Pulsed

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE (Grid-Pulsed)	3500	VOLTS
PEAK PULSE PLATE VOLTAGE (Plate-Pulsed)	4500	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
GRID NEGATIVE TO CATHODE	-700	VOLTS
GRID POSITIVE TO CATHODE	200	VOLTS
PULSE PLATE CURRENT	5.0	AMPERES
PULSE GRID CURRENT	2.5	AMPERES
PLATE DISSIPATION		
8906	10	WATTS
8907	100	WATTS
GRID DISSIPATION	1.5	WATTS
FREQUENCY	3.0	GIGAHERTZ
PULSE DURATION [1]	6	μs
DUTY FACTOR [1]	0033	

REPRESENTATIVE OPERATION

Grid-Pulsed r-f Amplifier

DC Plate Voltage	2200	Vdc
Peak Video Plate Current	2.5	a
DC Grid Voltage	-50	Vdc
Peak Video Grid Current	1.0	a
Pulse Drive Power	400	w
Useful Power Output (Approx.)	2500	w
Duty Factor	.002	
Pulse Width	3	μs
Heater Voltage	6.0	V
Frequency	1.1	GHz

Plate-Pulsed r-f Oscillator

Peak Plate Voltage	3500	v
Peak Video Plate Current	4.8	a
Peak Video Grid Current	1.5	a
Useful Power Output	3000	w
Duty Factor	.0025	
Pulse Width	3	μs
Heater Voltage	5.8	V
Frequency	3.0	GHz

PULSE MODULATOR OR PULSE AMPLIFIER SERVICE

ABSOLUTE MAXIMUM RATINGS

DC PLATE VOLTAGE	3500	VOLTS
PEAK PLATE VOLTAGE	4500	VOLTS
DC GRID VOLTAGE	-150	VOLTS
INSTANTANEOUS PEAK GRID-CATHODE VOLTAGE		
GRID NEGATIVE TO CATHODE	-750	VOLTS
GRID POSITIVE TO CATHODE	150	VOLTS
PULSE CATHODE CURRENT	7.5	AMPERES
DC PLATE CURRENT	150	MILLIAMPERES
PLATE DISSIPATION		
8906	10	WATTS
8907	100	WATTS
GRID DISSIPATION	1.5	WATTS
PULSE DURATION	6	μs
DUTY FACTOR [1]	0033	
CUT-OFF MU [1]	60	

1. For application requiring longer pulse duration and/or higher duty cycle consult the nearest Varian Electron Tube and Devices Field Office, or the Product Manager, EIMAC Division of Varian, Salt Lake City, Utah.

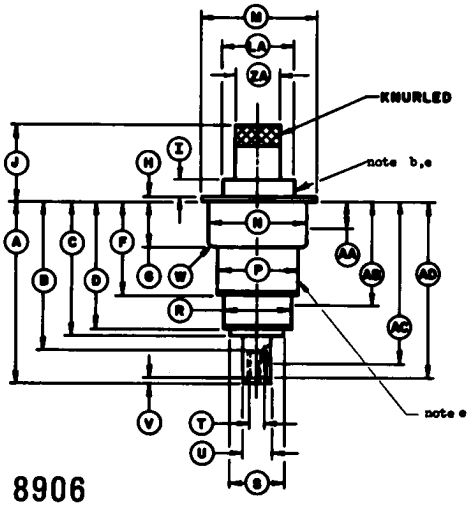
RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.	
Heater: Current at 6.0 volts	0.90	1.05	A
Cathode Heating Time	60	---	sec
Interelectrode Capacitances [1] (grounded cathode connection)			
Grid-Cathode	7.0	9.0	pF
Plate-Cathode	---	0.06	pF
Grid-Plate	1.86	2.10	pF

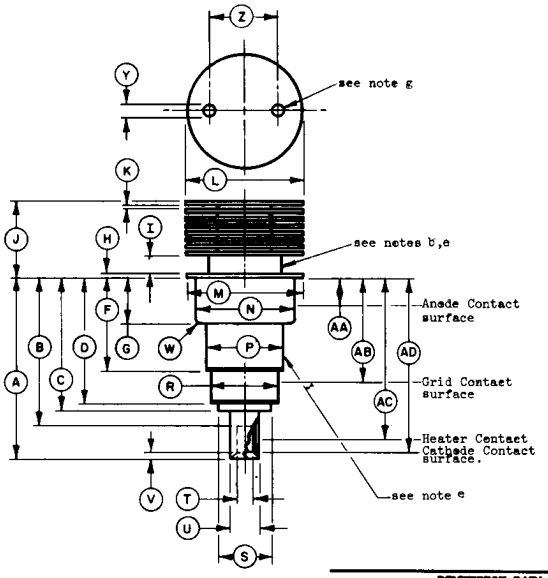
1. Capacitance values for a cold tube as measured in a special shielded fixture. When the cathode is heated to the proper temperature, the grid-cathode capacitance will increase from the cold value by approximately 1 pF due to thermal expansion of the cathode.

APPLICATION

For general application information please refer to the bulletin "Operating Instructions for Planar Triodes". The operating instructions should be consulted prior to the designing of new requirements around the above tube types. Higher plate dissipation of up to 150 watts is possible with the 8906 and 8907 tube type when using radiator P/N 158555. If this is required the tube order should call for the tube type Y-602. For unusual and special application consult the nearest Varian Electron Tube and Device Field Office, or the Product Manager, EIMAC Division of Varian, Salt Lake City, Utah.



8906



8907

DIMENSION DATA (Note a)					
Dim. in Inches		Dim. in Millimeters			
Min.	Max	Dim.	MIN.	MAX.	Notes
1.815	1.875	A	46.10	47.62	
	1.534	B		38.96	
	1.475	C		37.46	
1.289	1.329	D	32.74	33.76	
.970	1.010	F	24.64	25.65	
.462	.477	G	11.73	12.12	
	.040	H		1.02	
.125	.185	I	3.18	4.70	
.766	.826	J	19.46	20.98	
.025	.040	K	.64	1.17	
1.234	1.264	L	31.34	32.11	
1.180	1.195	M	29.97	30.35	
1.025	1.035	N	26.04	26.29	c,d
.752	.792	P	19.20	20.12	
.655	.665	R	16.64	16.89	c,d
	.545	S		13.84	
.213	.223	T	5.41	5.66	c,d
.315	.325	U	8.00	8.26	c,d
	.086	V		2.18	
	.100	W		2.54	
.105	.145	Y	2.67	3.68	
.650	.850	Z	16.51	21.59	

ELECTRODE CONTACT AREA (Note e,f)				
Dim. in Inches			Dim. in Millimeters	
Dim.	Min.	Max.	Min.	Max.
AA	.035	.361	.89	9.17
AB	1.185	1.265	30.10	32.14
AC	1.534	1.728	38.96	43.89
AD	1.475	1.815	37.47	46.10

DIMENSION DATA (Note a)					
DIM. IN INCHES		DIM. IN MILLIMETERS			
MIN.	MAX.	DIM.	MIN.	MAX.	NOTES
1.815	1.875	A	46.10	47.62	
	1.534	B		38.96	
	1.475	C		37.46	
1.289	1.329	D	32.74	33.76	
.970	1.010	F	24.64	25.65	
.462	.477	G	11.73	12.12	
	.040	H		1.02	
	.185	I		4.70	
.766	.826	J	19.46	20.98	
1.180	1.195	M	29.97	30.35	
1.025	1.035	N	26.04	26.29	d
.752	.792	P	19.10	20.12	
.655	.665	R	16.64	16.89	d
	.545	S		13.84	
.213	.223	T	5.41	5.66	d
.315	.325	U	8.00	8.26	d
	.086	V		2.18	
	.100	W		2.54	
.840	.860	LA	21.34	21.84	
.427	.447	ZA	10.85	11.35	

NOTES:

a. Metric equivalents, to the nearest .01 mm, are given for general information only & are based on 1 inch = 25.4 mm.

b. This surface shall be used to measure Anode Shank temperature.

c. Eccentricity of contact surfaces shall be gaged from center line of reference & shall be as follows; note 2 shall apply:

Contact Surface	TIR Max.	Reference
Anode	.020	Cathode
Grid	.020	Cathode
Heater	.012	Cathode

d. Dias. N,R,T,U shall apply throughout entire contact area as defined by dims. AA,AB, AC,AD respectively.

e. This surface shall not be used for clamping or locating.

f. Electrode Contact Dims. are given for socket design purposes & are not intended for inspection purposes.

Notes:

a. Metric equivalents to the nearest .01 mm, are given for general information only & are based on 1 inch= 25.4 mm.

b. This surface shall be used to measure anode shank temp.

c. Eccentricity of contact surfaces shall be gaged from center line of reference & shall be as follows:

Contact Surface	TIR Max.	Reference
Anode	.020	Cathode
Grid	.020	Cathode
Heater	.012	Cathode

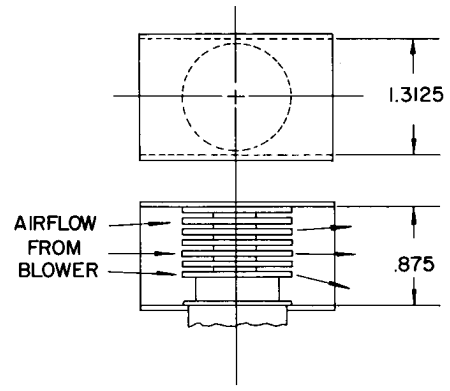
d. Dias. N,R,T & U shall apply throughout entire lenght as defined be dims. AA,AB,AC & AD respectively.

e. This surface shall not be used for clamping or locating.

f. Electrode Contact dims. are given for socket design purposes & are not intended for inspection purposes.

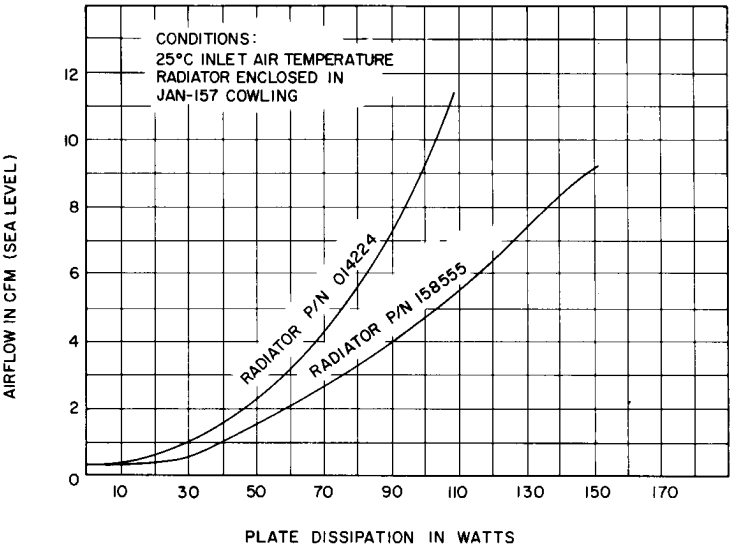
g. Holes for Tube Extractor thru top fin only.

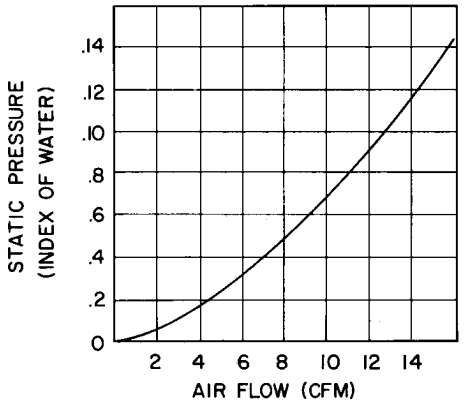
AIRFLOW vs STATIC PRESSURE WITH
STANDARD COWLING JAN-157



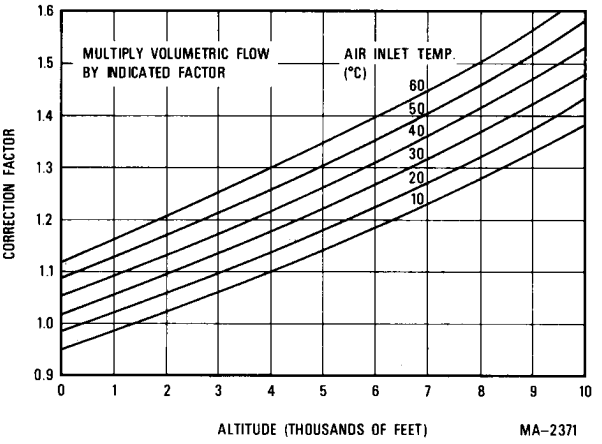
-STANDARD COWLING-

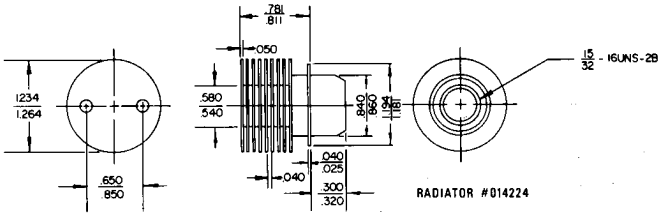
MAXIMUM PLATE DISSIPATION vs COOLING AIRFLOW



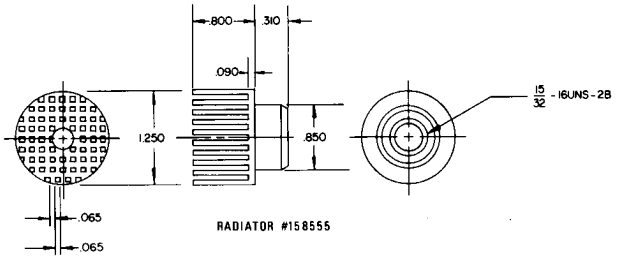


COMBINED CORRECTION FACTORS FOR INLET AIR TEMPERATURE
AND ALTITUDE
(RELATIVE TO 25°C AND SEA LEVEL)

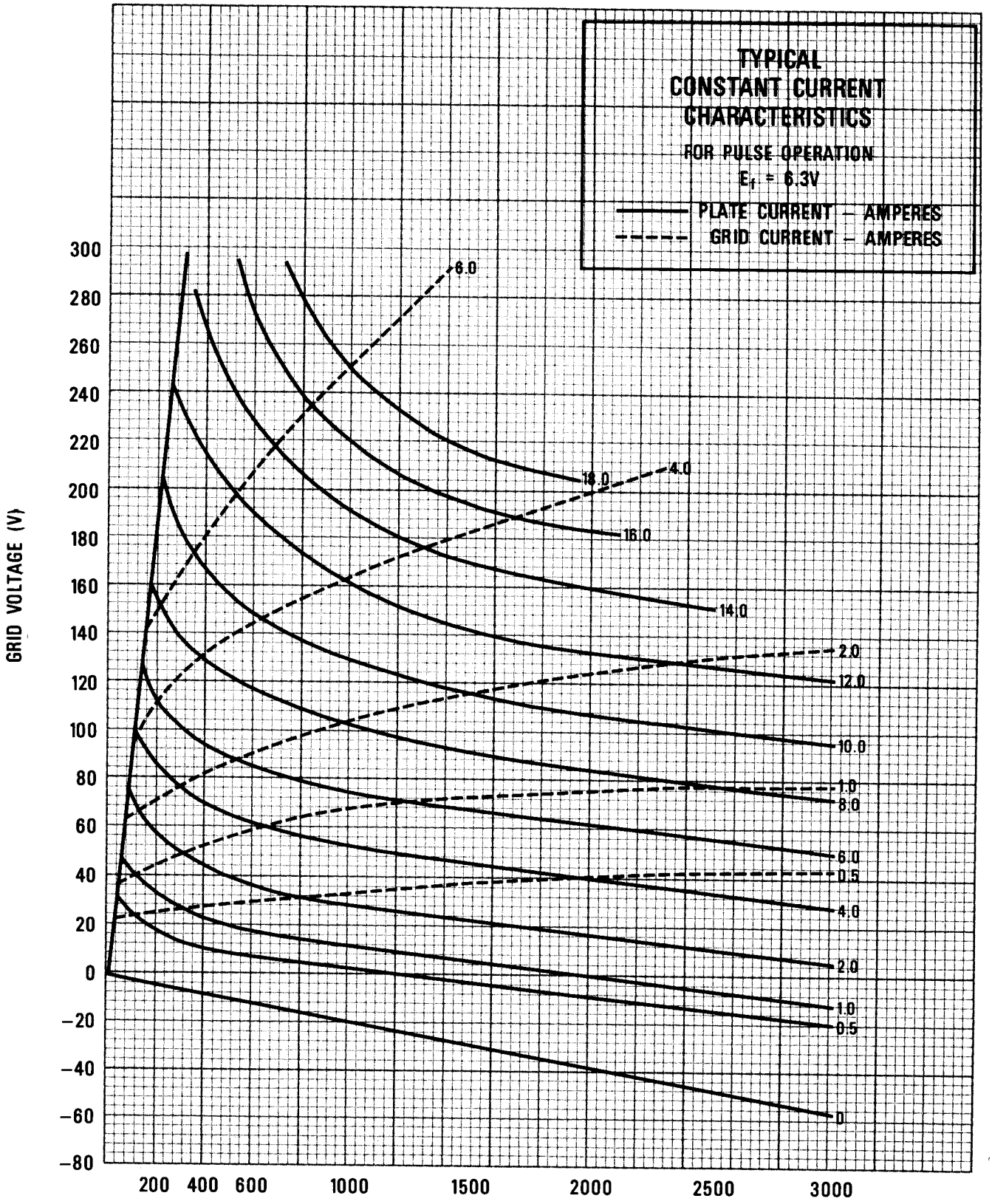




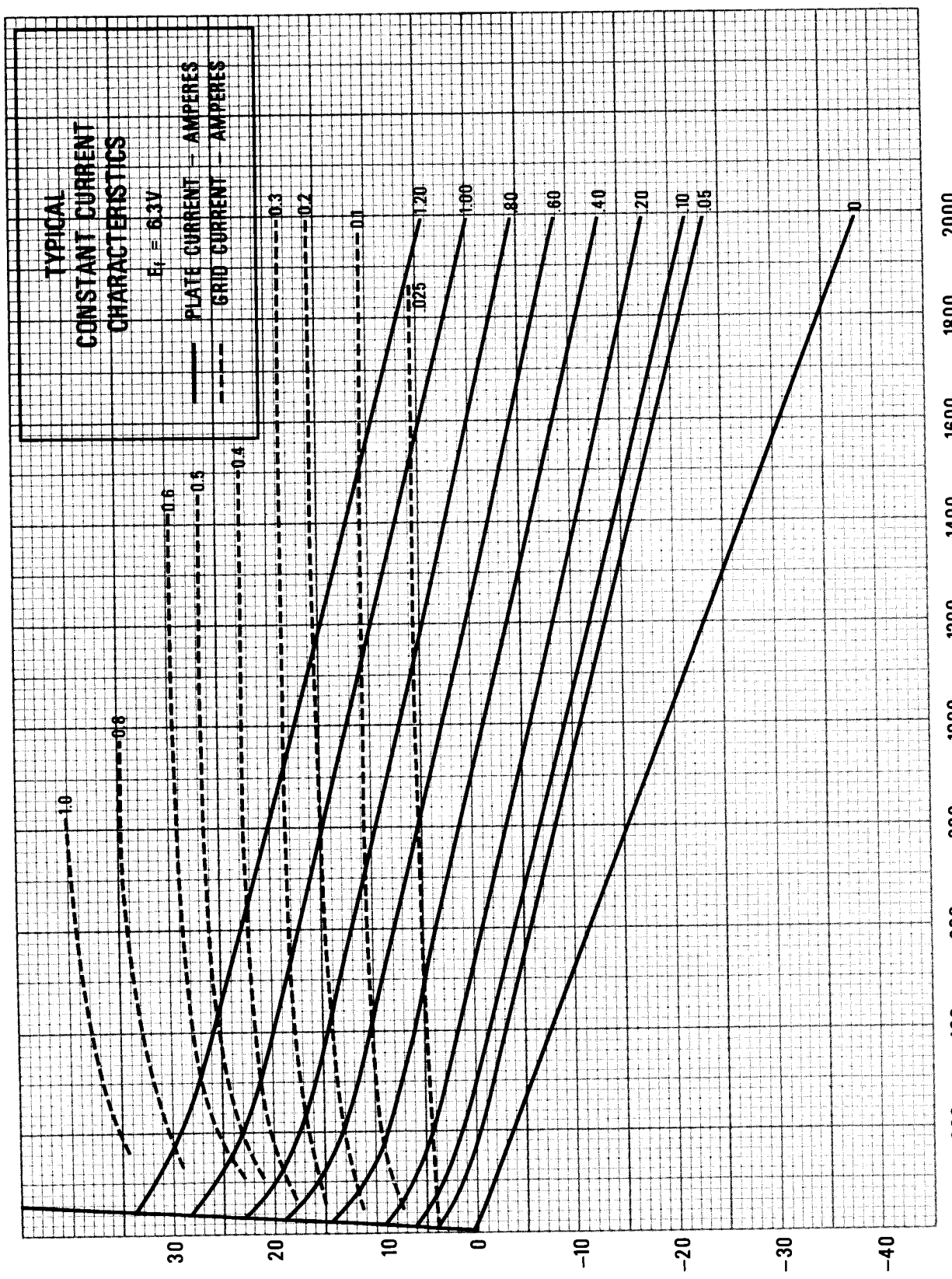
RADIATOR #014224



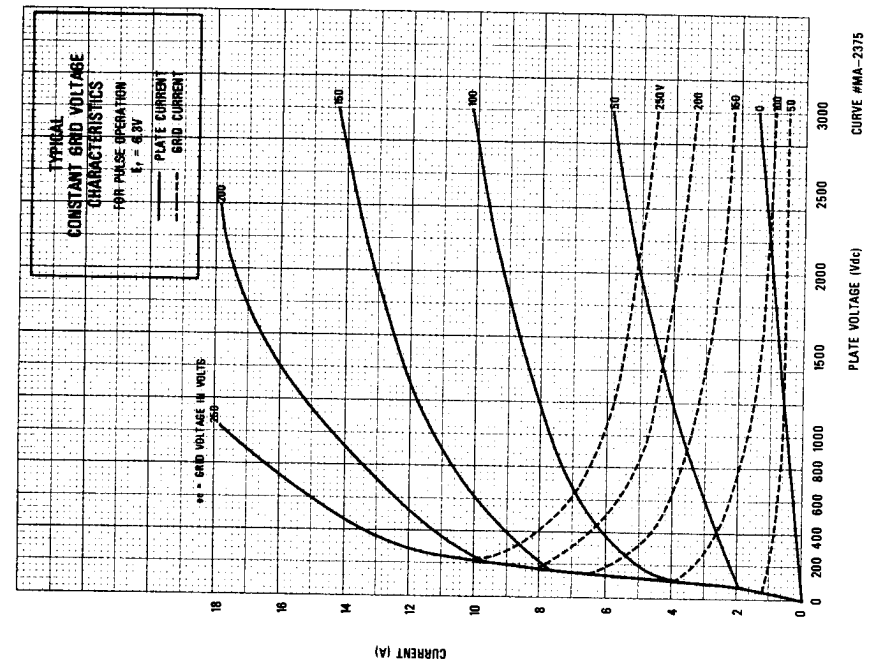
RADIATOR #158555

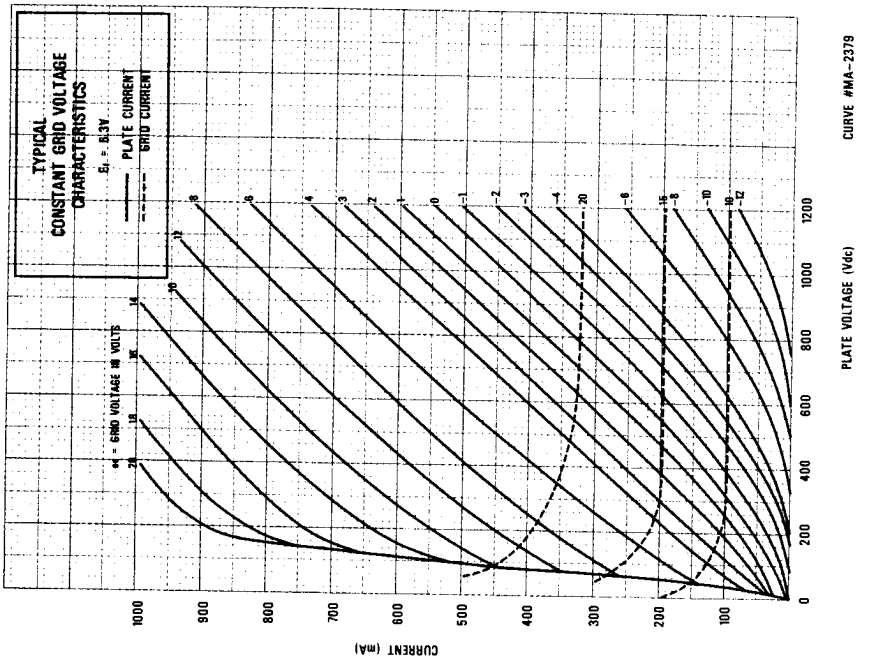


CURVE #MA–2374



CURVE #MA–2380


TYPICAL
CONSTANT GRID VOLTAGE
CHARACTERISTICS
FOR PULSE OPERATION
Ef = 6.3V
PLATE CURRENT
GRID CURRENT
eg - GRID VOLTAGE IN VOLTS
250
200
150
100
50
0
-50
-100
250V
200
150
100
50
0
CURRENT (A)
PLATE VOLTAGE (Vdc)
CURVE #MA-2375


TYPICAL
CONSTANT GRID VOLTAGE
CHARACTERISTICS
Ef = 6.3V
PLATE CURRENT
GRID CURRENT
eg - GRID VOLTAGE IN VOLTS
24
18
16
14
12
10
8
6
4
3
2
1
0
-1
-2
-3
-4
-20
-8
-15
-6
-10
-12
CURRENT (mA)
PLATE VOLTAGE (Vdc)
CURVE #MA-2379