

Beam Power Tube

CERMOLOX TYPE

OXIDE-COATED CATHODE
80 WATTS CW POWER OUTPUT
AT 400 MHz

FORCED-AIR COOLED
40 WATTS CW POWER OUTPUT
AT 1215 MHz

For Use in Compact Aircraft, Mobile, and Stationary Equipment

ELECTRICAL

Heater, for Unipotential Cathode⁹

Voltage (AC or DC)	{ 6.3 typ V	V
	{ 6.9 max V	V
Current at heater volts = 6.3.	2.1	A
Minimum heating time	60	s
Mu-Factor, Grid No.2 to Grid No.1.	18	

Direct Interelectrode Capacitances^a

Grid No.1 to plate	0.065 max	pF
Grid No.1 to cathode & heater.	13.0	pF
Plate to cathode & heater.	0.013 max	pF
Grid No.1 to grid No.2	18.0	pF
Grid No.2 to plate	4.8	pF
Grid No.2 to cathode & heater.	0.45 max	pF

MECHANICAL

Operating Position	Any
Overall Length	1.93 max in
Greatest Diameter.	1.265 max in
Weight (Approx.)	2 oz
Radiator	Integral part of tube

For operation up to 400 MHz

Socket including Grid-No.2

Bypass Capacitor Erie^b 2948-000, E.F. Johnson^c

DN124-152-1 Jettron^d 89-001, or equivalent

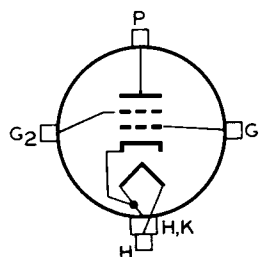
Grid-No.2 Bypass Capacitor Erie^b 2926-000, 2929-001,
or equivalent

For operation at high frequencies

See *Preferred Mounting Arrangement*

TERMINAL DIAGRAM (See *Dimensional Outline*)

- G1 - Grid No.1-Terminal
Contact Surface
- G2 - Grid No.2-Terminal
Contact Surface
- H - Heater-Terminal
Contact Surface
- H, K - Heater- & Cathode-Terminal
Contact Surface
- P - Plate Terminal Contact
Surface



← Indicates a change.



THERMAL

Terminal Temperature (Plate, Grid No.2, Grid No.1, cathode, and heater)	250 max	°C
Plate-Core Temperature	250 max	°C

See Dimensional Outline for temperature-measurement points

Air Flow^h (See Typical Cooling Requirements)

AF POWER AMPLIFIER & MODULATOR—Class AB₁^j

Maximum CCS Ratings, Absolute-Maximum Values

DC plate voltage.	1000	V
DC grid-No.2 (screen-grid) voltage.	300	V
Max.-signal dc plate current.	180	mA
Max.-signal plate input	180	W
Max.-signal grid-No.2 input	4.5	W
Plate dissipation	115	W

Typical CCS Operation

Values are for 2 tubes

DC Plate Voltage.	650	850	V
DC Grid-No.2 Voltage.	300	300	V
DC Grid-No.1 (Control-Grid) Voltage	-15	-15	V
From fixed-bias source			
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . .	30	30	V
Zero-Signal DC Plate Current.	80	80	mA
Max.-Signal DC Plate Current.	200	200	mA
Zero-Signal DC Grid-No.2 Current.	0	0	mA
Max.-Signal DC Grid-No.2 Current.	20	20	mA
Effective Load Resistance	4330	7000	Ω
Plate to plate			
Max.-Signal Driving Power (Approx.)	0	0	W
Max.-Signal Power Output (Approx.). . . .	50	80	W

Maximum Circuit Values

Grid-No.1-Circuit Resistance Under Any Condition		
With fixed-bias.	30000	Ω
With cathode-bias.	Not recommended	

AF POWER AMPLIFIER & MODULATOR — Class AB₂^j

Maximum CCS Ratings, Absolute-Maximum Values

DC plate voltage	1000	V
DC grid-No.2 (screen-grid) voltage	300	V
Max.-signal dc plate current	180	mA
Max.-signal dc grid-No.1 (control grid) current. .	30	mA
Max.-signal plate input.	180	W
Max.-signal grid-No.2 input.	4.5	W
Plate dissipation.	115	W

Typical CCS Operation

Values are for 2 tubes

DC Plate Voltage	650	850	V
DC Grid-No.2 Voltage	300	300	V
DC Grid-No.1 Voltage	-15	-15	V
From fixed-bias source			



Peak AF Grid-No.1-to-Grid-No.1 Voltage . . .	46	46	V
Zero-Signal DC Plate Current	80	80	mA
Max.-Signal DC Plate Current	355	355	mA
Zero-Signal DC Grid-No.2 Current	0	0	mA
Max.-Signal DC Grid-No.2 Current	25	25	mA
Max.-Signal DC Grid-No.1 Current	15	15	mA
Effective Load Resistance.	2450	3960	Ω
Plate to plate			
Max.-Signal Driving Power (Approx.).	0.3	0.3	W
Max.-Signal Power Output (Approx.).	85	140	W

LINEAR RF POWER AMPLIFIER, Class AB₁^j

Single-Sideband Suppressed-Carrier Service

Peak envelope conditions for a signal having a minimum peak-to-average power ratio of 2

Maximum CCS Ratings, Absolute-Maximum Values

Up to 1215 MHz

DC plate voltage	1000	V
DC grid-No.2 voltage	300	V
DC grid-No.1 voltage	100	V
DC plate current at peak of envelope	350 ^e	mA
DC grid-No.1 current	30	mA
Plate input.	180	W
Grid-No.2 Input.	4.5	W
Plate dissipation.	115	W

Typical CCS Operation with "Two-Tone" Modulation

At 30 MHz

DC Plate Voltage	650	850	V
DC Grid-No.2 Voltage	300	300	V
DC Grid-No.1 Voltage	-18.5	-18.5	V
Zero-Signal DC Plate Current	40	40	mA
Effective RF Load Resistance	2200	3500	Ω
DC Plate Current at Peak of Envelope	100	100	mA
Average DC Plate Current	75	75	mA
DC Grid-No.2 Current at Peak of Envelope.	8.2	4.2	mA
Average DC Grid-No.2 Current	3.6	1.7	mA
Peak-Envelope Driver Power Output (Approx.).	0.5	0.5	W
Output-Circuit Efficiency (Approx.).	90	90	%
Distortion Products Level			
Third Order.	35	30	dB
Fifth Order.	40	36	dB
Useful Power Output (Approx.)			
Average.	12.5	20	W
Peak envelope.	25	40	W

Maximum Circuit Values

Grid-No.1-Circuit Resistance

Under Any Condition

With fixed bias. 25000 Ω

With fixed bias (In Class AB₁ operation). 100000 Ω

With cathode bias. Not recommended

Grid-No.2 Circuit Impedance. See Footnote^k

Plate Circuit Impedance. See Footnote^m



PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony^j

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS Ratings, Absolute-Maximum Values

Up to 1215 MHz

DC plate voltage	800	V
DC grid-No.2 (screen-grid) voltage	300	V
DC grid-No.1 (control-grid) voltage.	-100	V
DC plate current	150	mA
DC grid-No.1 current	30	mA
Plate input.	120	W
Grid-No.2 input.	3	W
Plate dissipation.	75	W

Typical CCS Operation

At 400 MHz

DC Plate Voltage.	400	700	V
DC Grid-No.2 Voltage.	200	250	V
DC Grid-No.1 Voltage.	-20	-50	V
DC Plate Current.	100	130	mA
DC Grid-No.2 Current.	5	10	mA
DC Grid-No.1 Current.	5	10	mA
Driver Power Output (Approx.)	2	3	W
Useful Power Output (Approx.)	16	45	W

Maximum Circuit Values

Grid-No.1-Circuit Resistance		
Under Any Condition	30000	Ω

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy
and

RF POWER AMPLIFIER — Class C FM Telephony^j

Maximum CCS Ratings, Absolute-Maximum Values

Up to 1215 MHz

DC plate voltage.	1000	V
DC grid-No.2 voltage.	300	V
DC grid-No.1 voltage.	-100	V
DC plate current.	180	mA
DC grid-No.1 current.	30 ^f	mA
Plate input	180	W
Grid-No.2 input	4.5	W
Plate dissipation	115	W

Typical CCS Operation

At 400 MHz At 1215 MHz

DC Plate Voltage.	400	900	900	V
DC Grid-No.2 Voltage.	200	300	300	V
DC Grid-No.1 Voltage.	-35	-30	-22	V
DC Plate Current.	150	170	170	mA
DC Grid-No.2 Current.	5	1	1	mA
DC Grid-No.1 Current.	3	10	4	mA
Driver Power Output (Approx.)	3	3	5	W
Useful Power Output (Approx.)	23	80	40	W



Maximum Circuit Value

Grid-No.1-Circuit Resistance

Under Any Condition 30000 Ω

- a Measured with special shield adapter.
 b Erie Technological Products, Inc., 2206 West 15th Street, Erie, Pennsylvania.
 c E. F. Johnson Co., 299 10th Ave., S.W., Waseca, Minn.
 d Jettron Products, Inc., 56 Rt. 10, Hanover, N.J.
 e The maximum rating for a signal having a minimum peak-to-average power ratio less than 2, such as is obtained in "Single-Tone" operation, is 180 mA. During short periods of circuit adjustment under "Single-Tone" conditions, the average plate current may be as high as 250 mA.
 f In applications where the frequency is less than 80 MHz and the bias is less than -50 volts, the maximum value is 40 mA.

The following footnotes apply to the *RCA Transmitting Tube Operating Considerations* given at front of this section.

- g See *Electrical Considerations* — Filament or Heater.
 h See *Cooling Considerations* — Forced-Air Cooling.
 j See *Classes of Service*.
 k See *Electrical Considerations* — Grid-No.2 Voltage Supply.
 m See *Electrical Considerations* — Plate Voltage Supply.

CHARACTERISTICS RANGE VALUES

	Note	Min	Max	
1. Heater Current.	1	1.84	2.26	A
2. Direct Interelectrode Capacitances				
Grid No.1 to plate.	2	-	0.065	pF
Grid No.1 to cathode & heater .	2	11.0	15.0	pF
Plate to cathode & heater . . .	2	-	0.013	pF
Grid No.1 to grid No.2	2	15.0	20.0	pF
Grid No.2 to plate.	2	4.2	5.2	pF
Grid No.2 to cathode & heater .	2	0.20	0.45	pF
3. Grid-No.1 Voltage	1,3	-6	-15	V
4. Grid-No.1 Cutoff Voltage. . . .	1,4	-	-48	V
5. Grid-No.1 Current	1,5	6	-	mA
6. Reverse Grid-No.1 Current . . .	1,3	-	8	μ A
7. Grid-No.2 Current	1,3	-8	+2.0	mA
8. Peak Emission	1,6	-	300	peak
9. Interelectrode Leakage				
Resistance	7	1.0	-	M Ω
10. Useful Power Output	8	80	-	W

Note 1: With 6.3 volts ac or dc on heater.

Note 2: Measured with special shield adapter.

Note 3: With dc plate voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 115 mA.

Note 4: With dc plate voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 1 mA.

Note 5: With plate and grid-No.2 floating and dc grid-No.1 voltage of +2 volts.

Note 6: With grid No.1, grid No.2, and plate tied together; and pulse voltage source connected between plate and cathode. Pulse



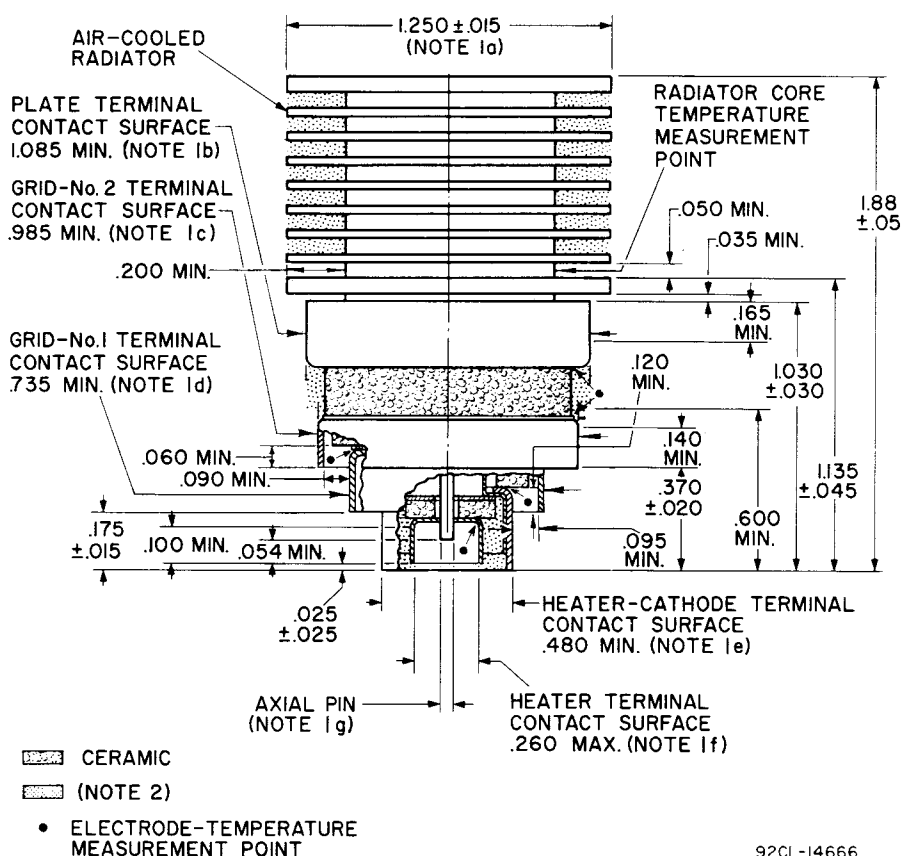
duration is 2 microseconds, pulse repetition frequency is 60 pps, and duty factor is 0.00012. The voltage-pulse amplitude is adjusted until a peak cathode current of 10 amperes is obtained. After 1 minute at this value, the voltage-pulse amplitude will not exceed 300 volts (peak).

Note 7: With tube at 20° to 30° C for at least 30 minutes without any voltages applied to the tube. The minimum resistance between any two adjacent electrodes as measured with a 200-volt Megger-type ohmmeter having an internal impedance of 1.0 megohm, will be 1.0 megohm.

Note 8: In a single-tube, grid-drive coaxial-cavity class C amplifier circuit at 400 MHz and for conditions with 5.7 volts ac or dc on heater, dc plate voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, grid-No.1 resistor adjustable between zero and 10000 ohms, dc plate current of 180 mA maximum, dc grid-No.1 current of 30 mA maximum and driver power output of 3 watts.



DIMENSIONAL OUTLINE



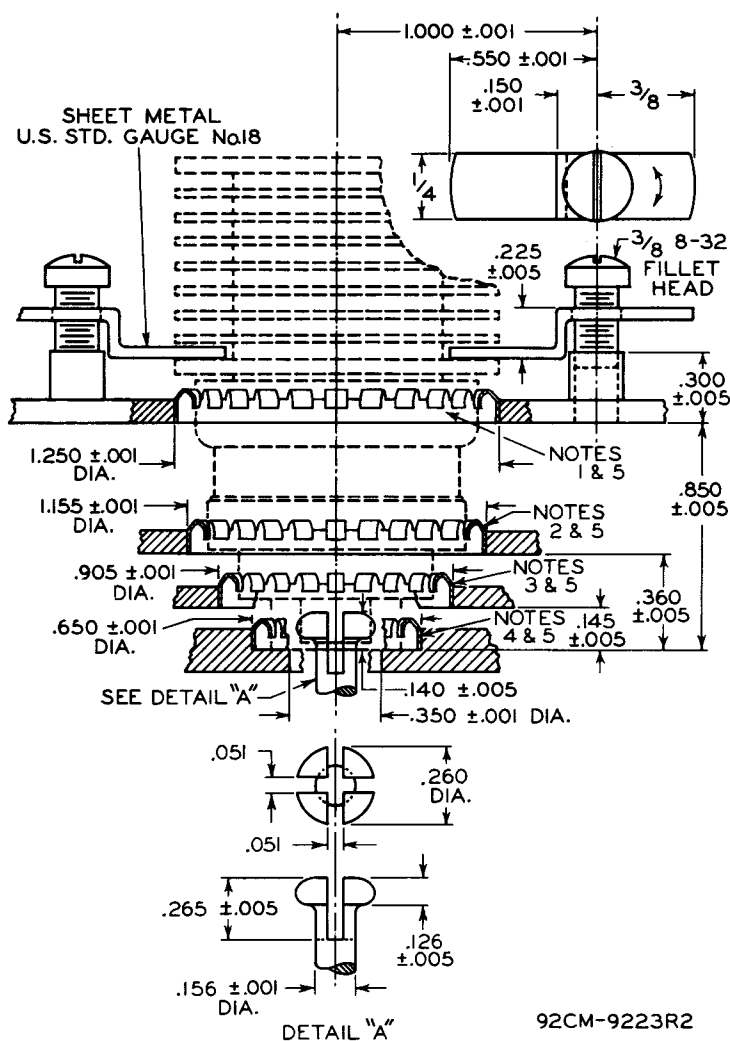
Note 1: The following diametrical space requirements accommodate the concentricity of the cylindrical surfaces of the radiator fins, axial pin, and each electrode terminal:

- a. Radiator Band - 1.316"
- b. Plate Terminal - 1.119"
- c. Grid-No. 2 Terminal - 1.019"
- d. Grid-No. 1 Terminal - 0.764"
- e. Heater-Cathode Terminal - 0.519"
- f. Heater Terminal - 0.240"
- g. Axial Pin - 0.071"

Note 2: Keep all stippled regions clear. Do not allow contacts or circuit components to protrude into these annular volumes.

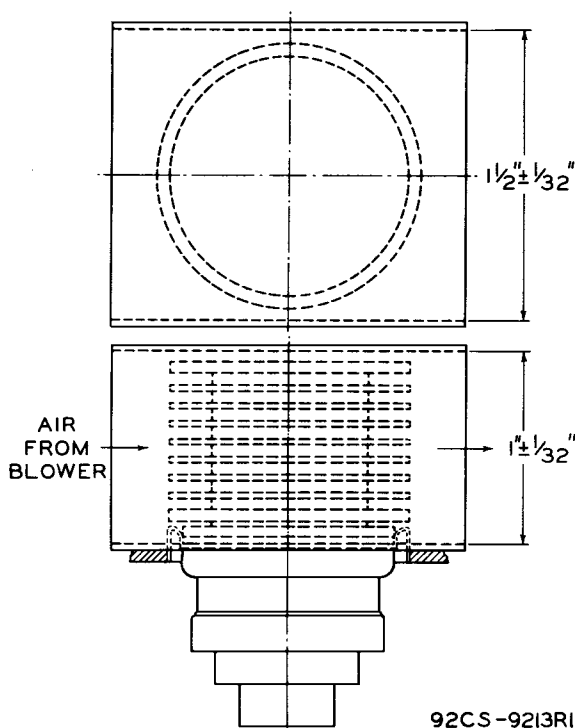


PREFERRED MOUNTING ARRANGEMENT

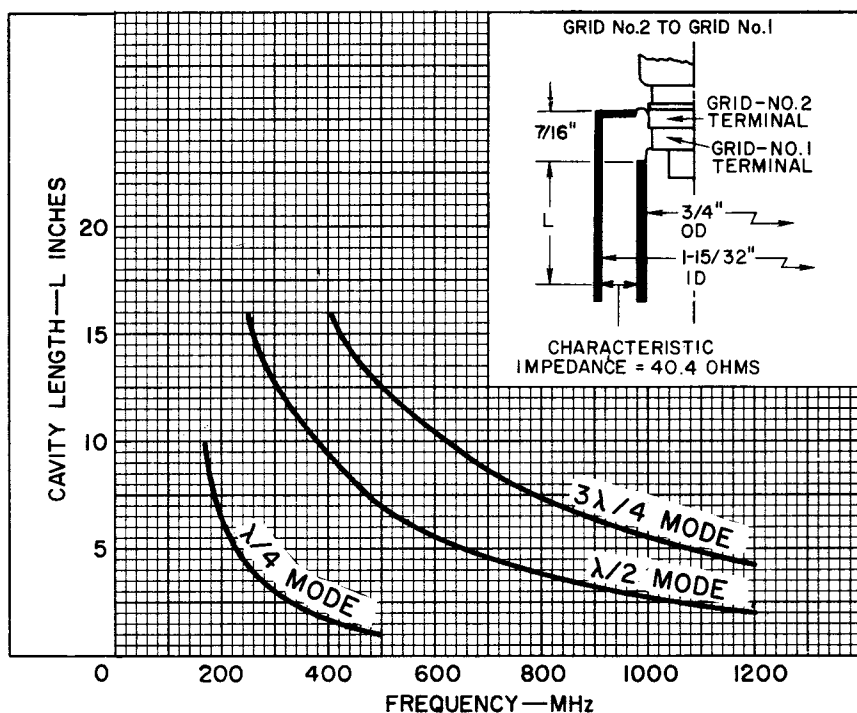


Note 1: Contact ring No.97-252 or finger stock No.97-380.
Note 2: Contact ring No.97-253 or finger stock No.97-380.
Note 3: Contact ring No.97-254 or finger stock No.97-380.
Note 4: Contact ring No.97-255 or finger stock No.97-380.
Note 5: The specified contact ring of preformed finger stock and finger stock No.97-380 provide adequate electrical contact, but the finger stock No.97-380 is less susceptible to breakage than the specified contact ring. Both types are made by Instruments Specialties Co., Little Falls, N.J.

RECOMMENDED COWLING FOR DIRECTING AIR FLOW THROUGH RADIATOR



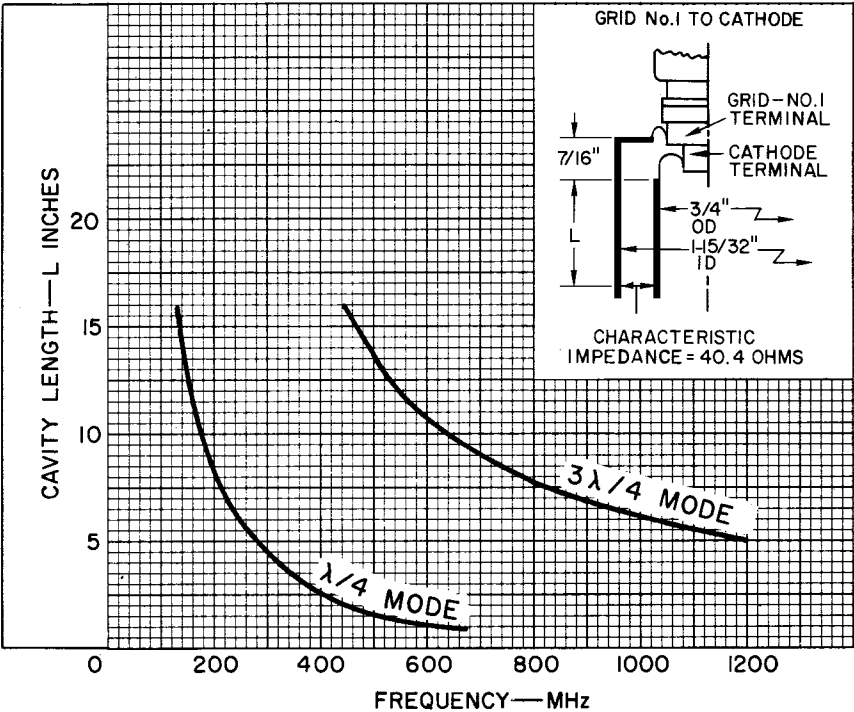
Tuning Characteristics



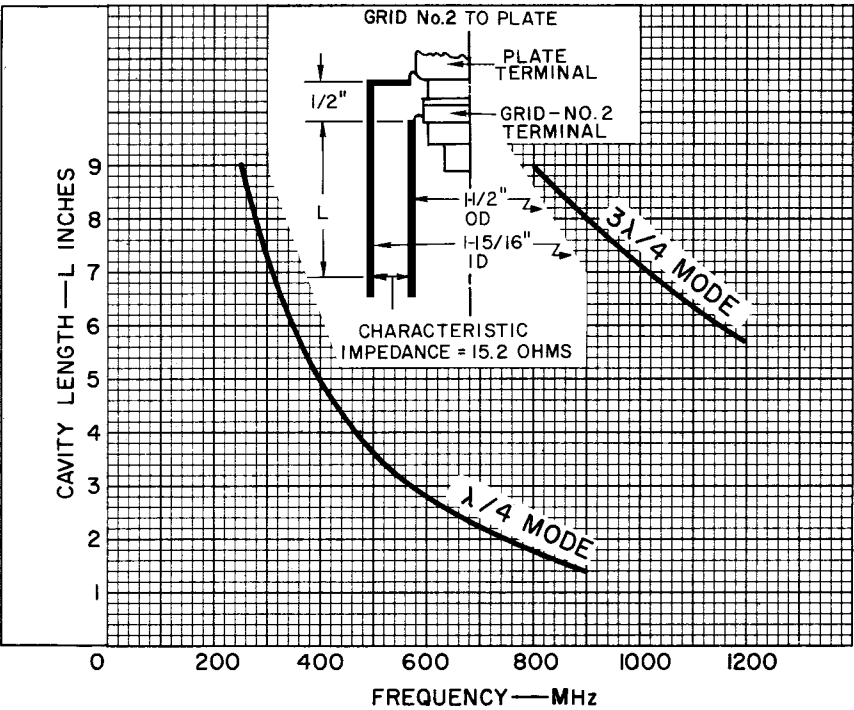
92CS-14614



Tuning Characteristics



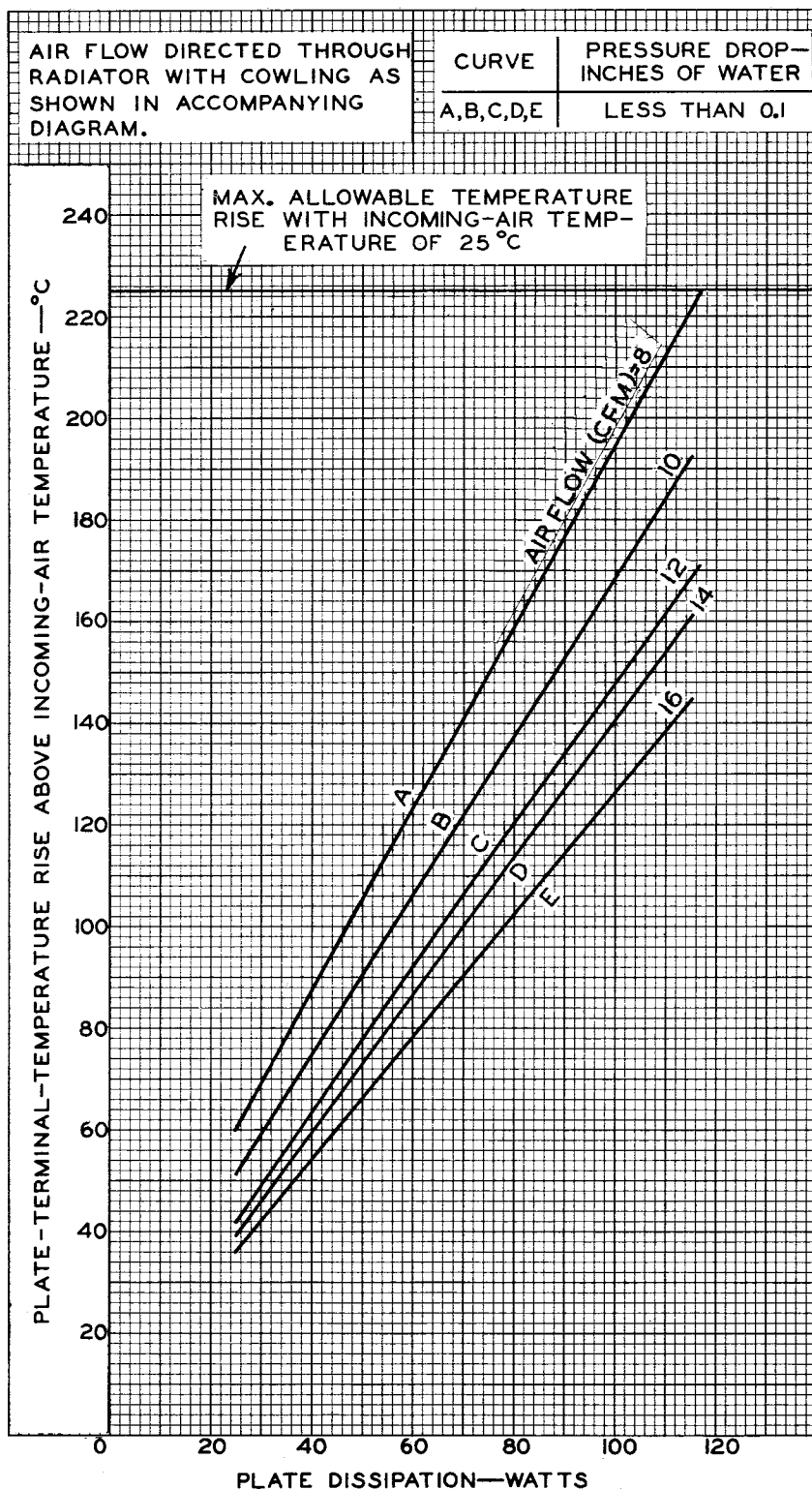
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92CS-14615



TYPICAL COOLING REQUIREMENTS With Cowling



92CM-9219RI

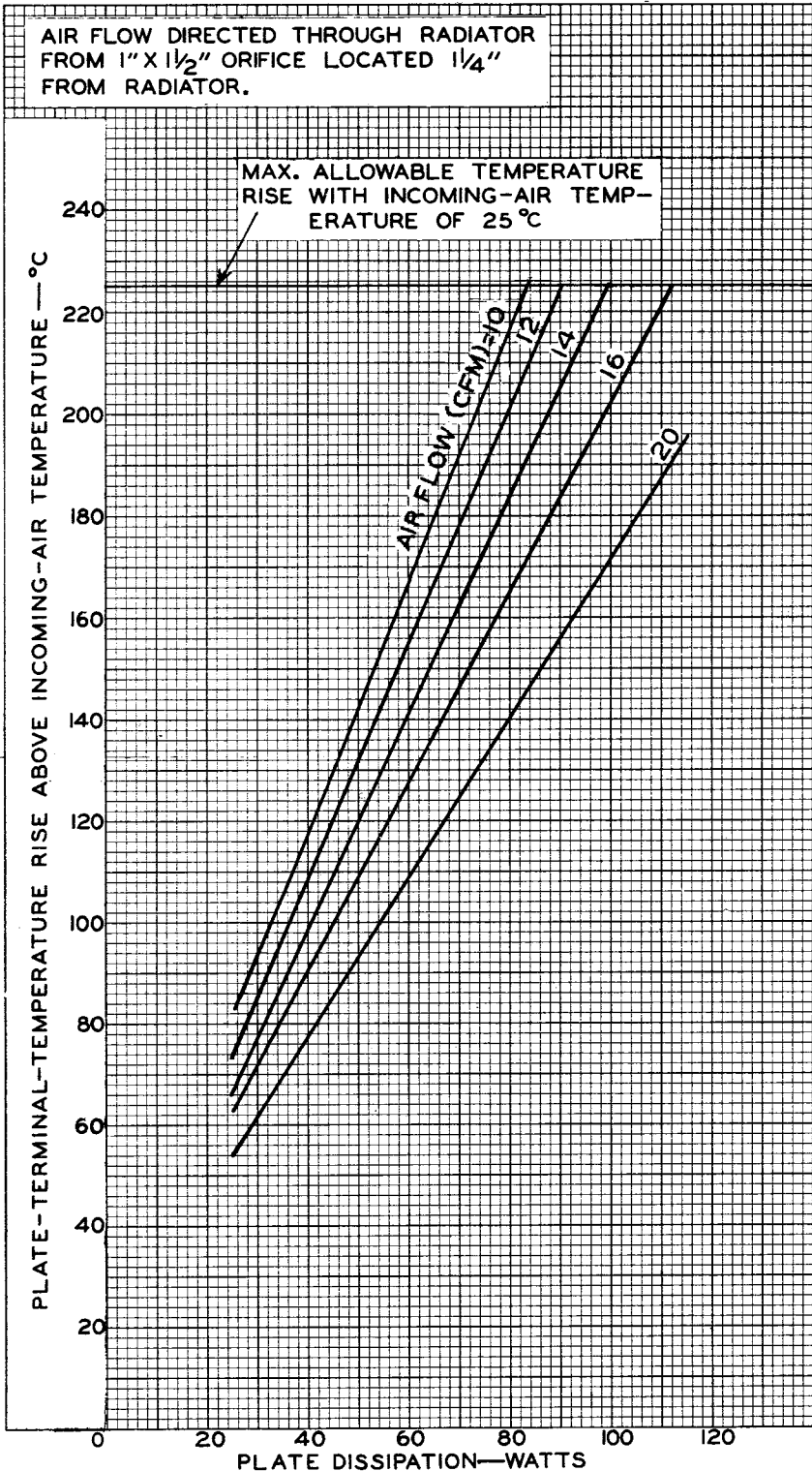


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DATA 6
9-62

TYPICAL COOLING REQUIREMENTS Without Cowling

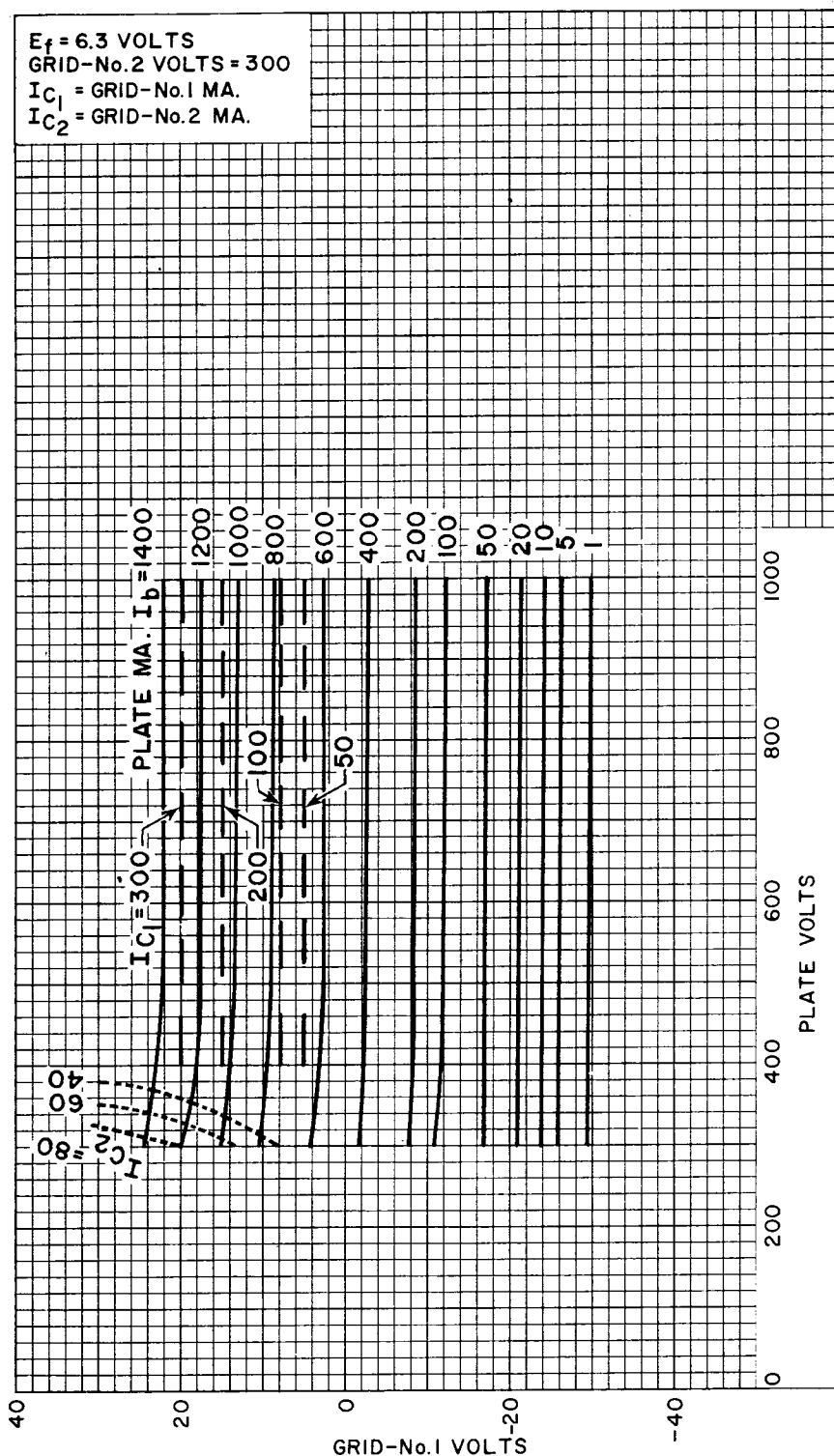


92CM-9220RI



Typical Constant-Current Characteristics

With Grid-No.2 Volts = 300

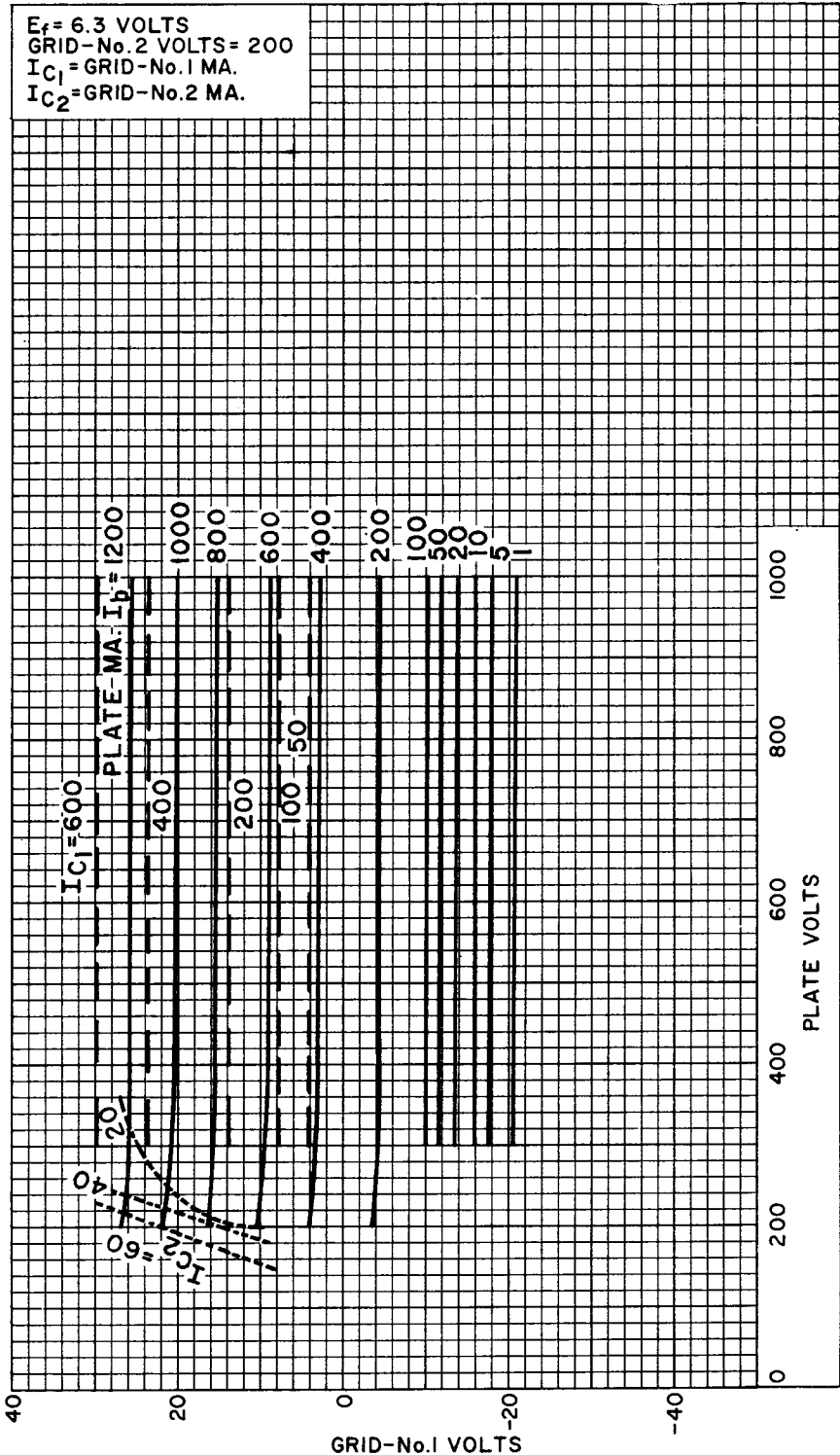


92CM-11749



Typical Constant-Current Characteristics

With Grid-No.2 Volts = 200

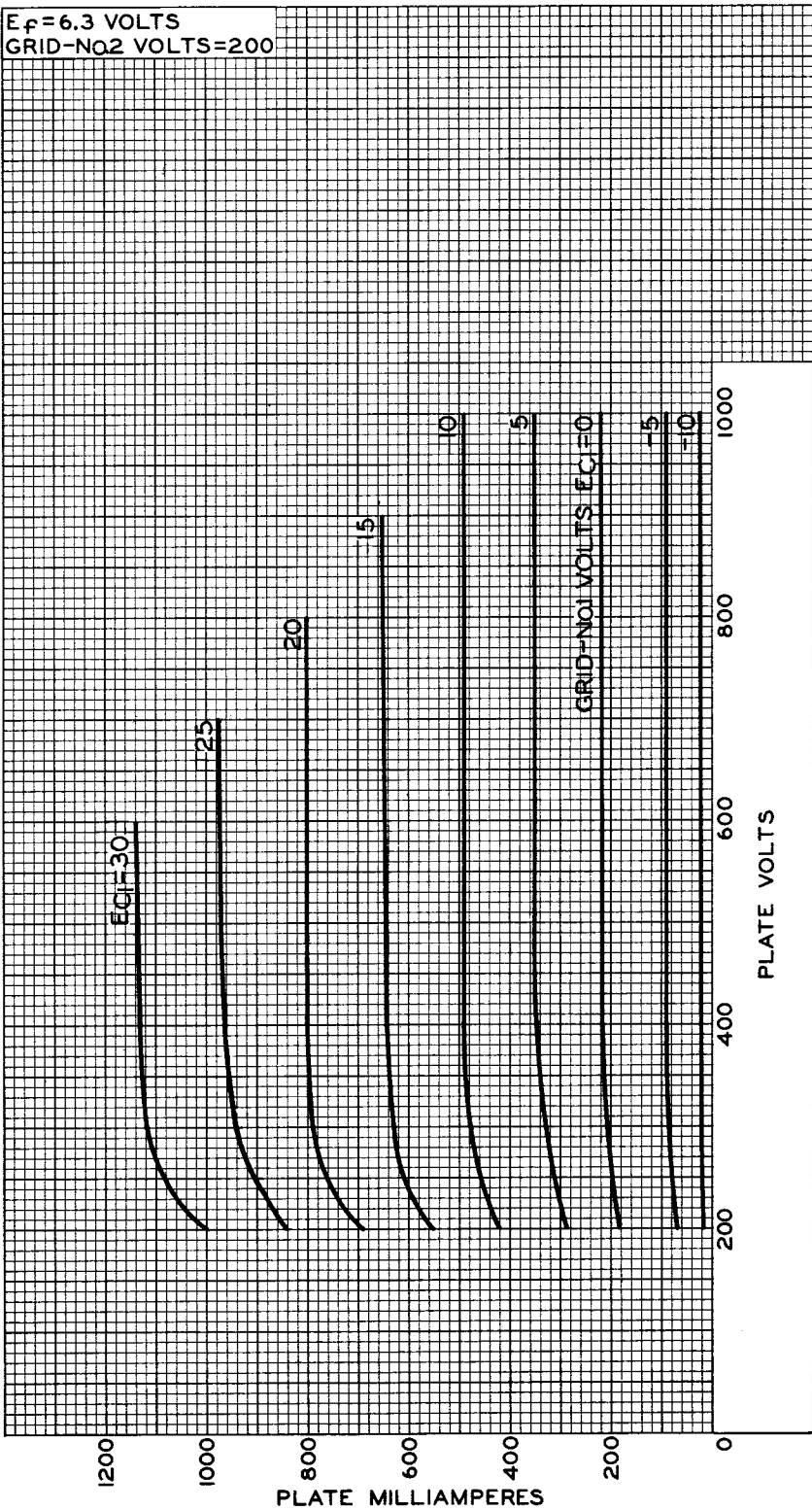


92CM-11745



TYPICAL PLATE CHARACTERISTICS

$E_f = 6.3$ VOLTS
GRID-NO2 VOLTS = 200



92CM-9228R2

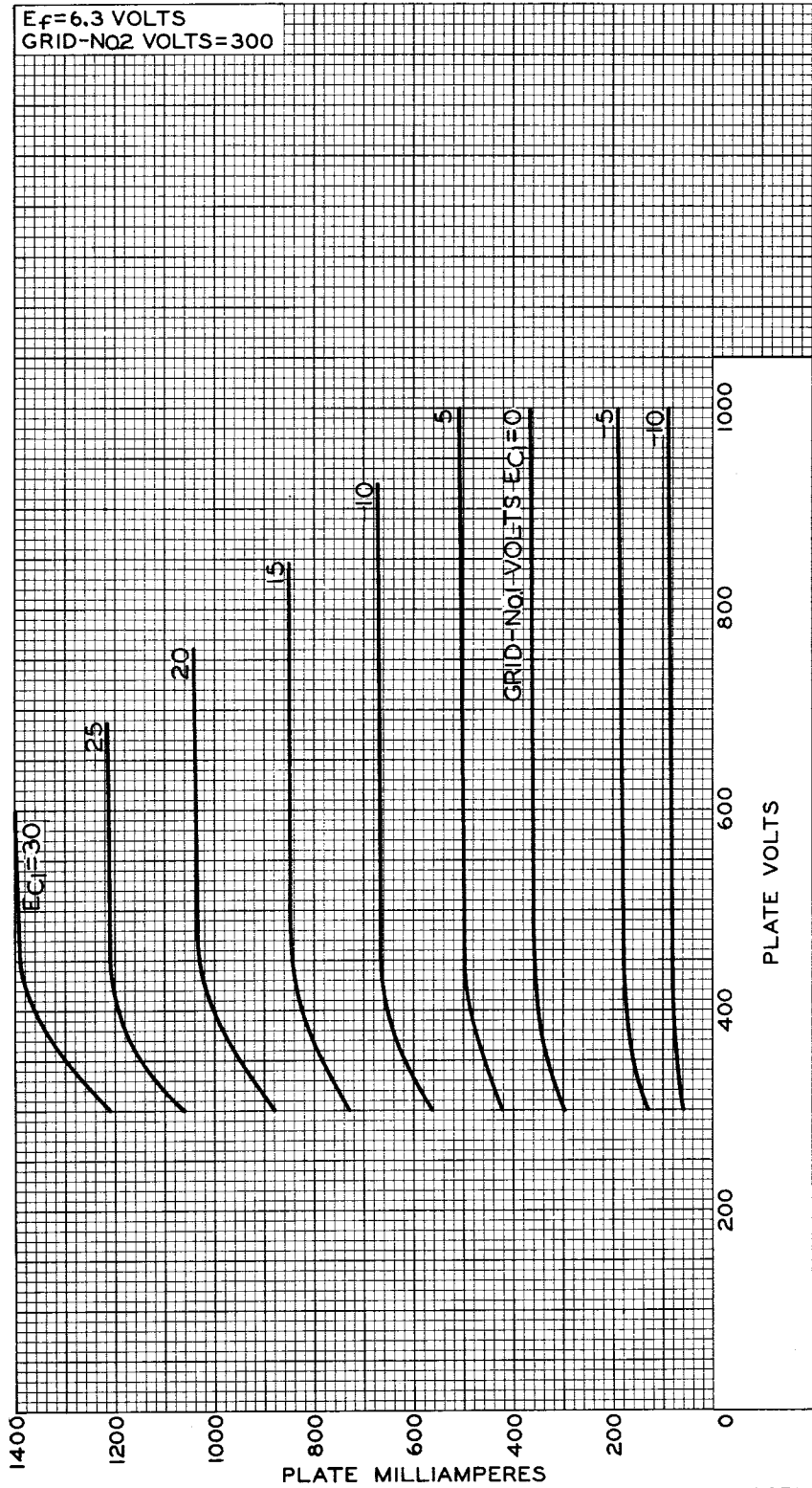


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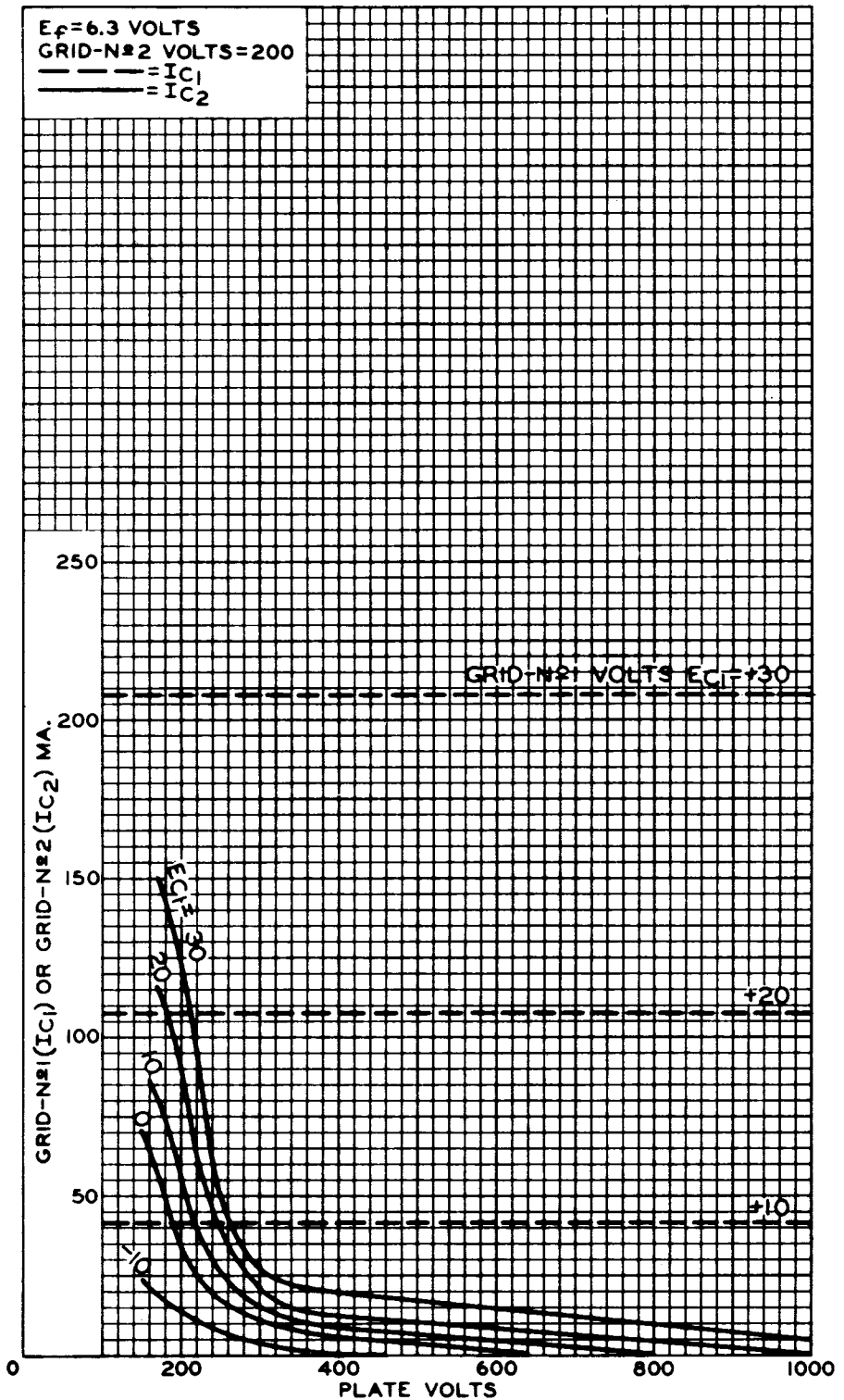
TYPICAL PLATE CHARACTERISTICS



92CM-9222R1



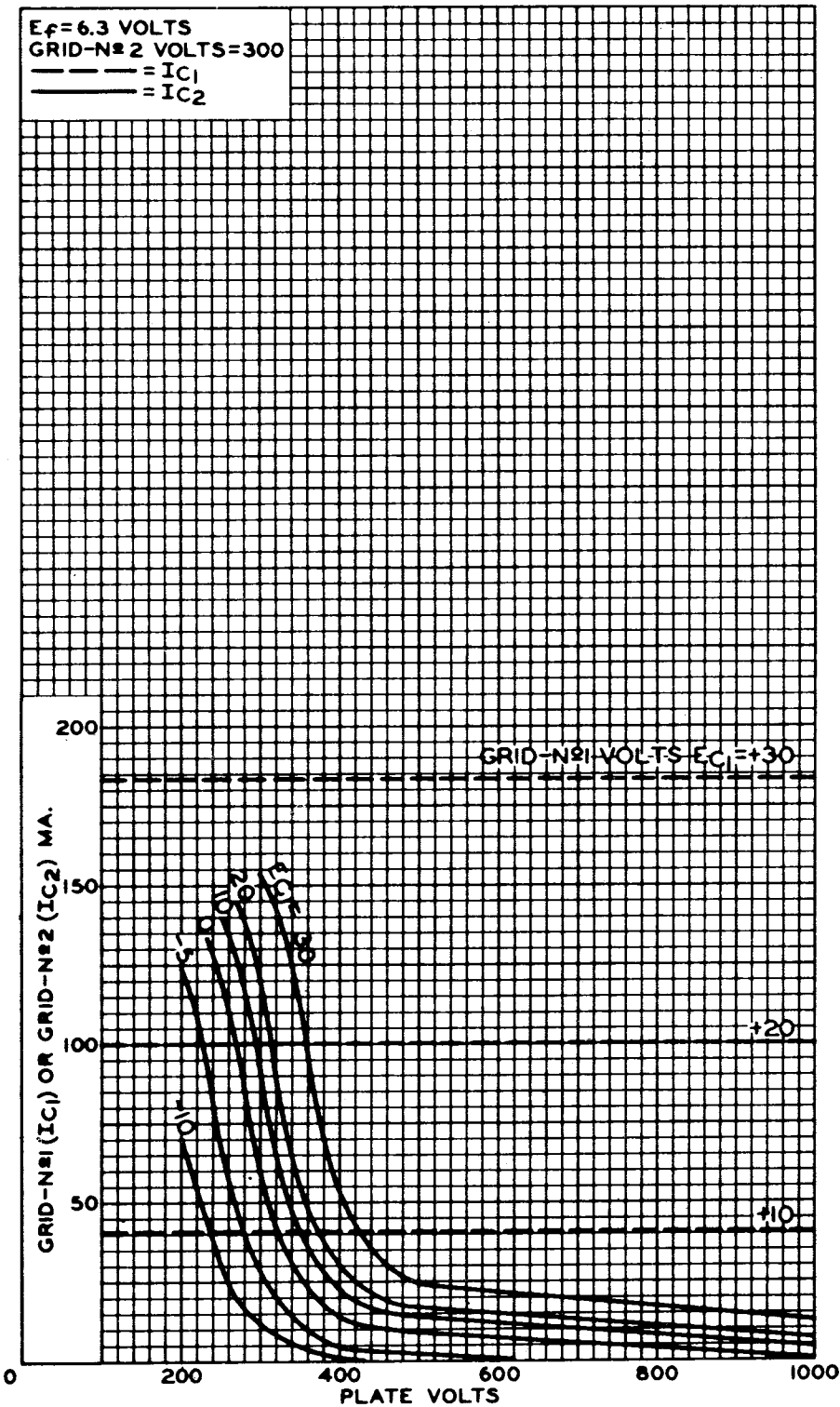
TYPICAL CHARACTERISTICS



92CM-9224R1



TYPICAL CHARACTERISTICS



92CM-9225R2



TYPICAL PERFORMANCE CHARACTERISTICS In Class C Telegraphy or Class C FM Telephony Amplifier Service

E_f = ADJUSTED TO SIMULATE NORMAL OPERATING
CONDITIONS OF HEATER IN UHF SERVICE

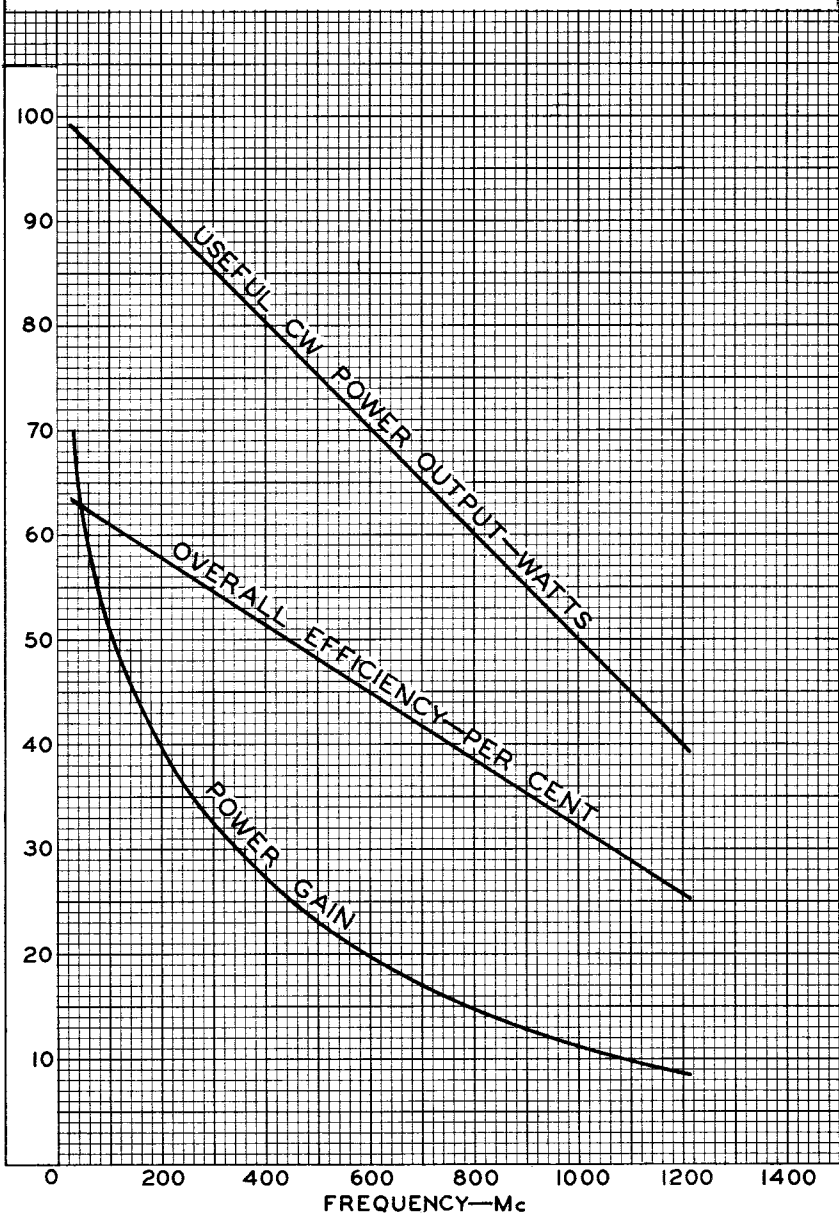
PLATE VOLTS = 900

GRID-N₂ VOLTS = 300

PLATE AMPERES = 0.170

OVERALL EFFICIENCY = USEFUL POWER OUTPUT IN LOAD
DIVIDED BY DC PLATE INPUT

POWER GAIN = USEFUL POWER OUTPUT IN LOAD
DIVIDED BY DRIVER POWER OUTPUT



92CM-9221



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