Beam Power Tube

90 WATTS CW INPUT (ICAS) UP TO 60 Mc
60 WATTS CW INPUT (ICAS) UP TO 175 Mc

GENERAL DATA

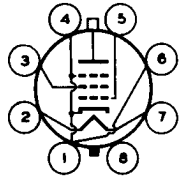
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)[a]	13.5	volts
Current at heater volts = 13.5	0.585	amp
Minimum heating time	60	sec
Transconductance, for plate volts = 200, grid-No.2 volts = 200, and plate ma. = 100	7000	μmhos
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 200, grid-No.2 volts = 200 and plate ma. = 100	4.5	
Direct Interelectrode Capacitances:[b]		
Grid No.1 to plate	0.24 max.	pf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater	13.0	pf
Plate to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater	8.5	pf

Mechanical:

Operating Position	Any
Maximum Overall Length	3-13/16"
Seated Length	3-1/8" ± 1/8"
Maximum Diameter	1-21/32"
Weight (Approx.)	2.3 oz
Bulb	T12
Cap	Small (JEDEC No.C1-1)
Base	Small-Wafer Octal 8-Pin with "770" Sleeve (JEDEC Group 1, No.B8-150)
Basing Designation for BOTTOM VIEW	7CK

Pin 1 - Cathode, Grid No.3, Internal Shield
Pin 2 - Heater
Pin 3 - Grid No.2
Pin 4 - Same as Pin 1



Pin 5 - Grid No.1
Pin 6 - Same as Pin 1
Pin 7 - Heater
Pin 8 - Base Sleeve
P Cap - Plate

AF POWER AMPLIFIER & MODULATOR — Class AB_1[c]

Maximum Ratings, *Absolute-Maximum Values:*

	CCS[d]	ICAS[e]	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[f]	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT[f]	60 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT[f]	3 max.	3 max.	watts
PLATE DISSIPATION[f]	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical CCS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage	400	500	600	volts
DC Grid-No.2 Voltage[g]	190	185	180	volts
DC Grid-No.1 Voltage:				
With fixed-bias source	-40	-40	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage[h]	80	80	90	volts
Zero-Signal DC Plate Current	63	57	26	ma
Max.-Signal DC Plate Current	228	215	200	ma
Zero-Signal DC Grid-No.2 Current	2.5	2	1	ma
Max.-Signal DC Grid-No.2 Current	25	25	23	ma
Effective Load Resistance (Plate to plate)	4000	5500	7000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	55	70	82	watts

Typical ICAS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage	600	750	volts
DC Grid-No.2 Voltage[g]	200	195	volts
DC Grid-No.1 Voltage:			
From fixed-bias source	-50	-50	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage[h]	100	100	volts
Zero-Signal DC Plate Current	28	23	ma
Max.-Signal DC Plate Current	229	220	ma
Zero-Signal DC Grid-No.2 Current	1	1	ma
Max.-Signal DC Grid-No.2 Current	27	26	ma
Effective Load Resistance (Plate to plate)	6000	8000	ohms
Max.-Signal Driving Power (Approx.)	0	0	watts
Max.-Signal Power Output (Approx.)	95	120	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance under any condition:[j]	
With fixed bias	0.1 max. megohm
With cathode bias	Not recommended

AF POWER AMPLIFIER & MODULATOR — Class AB_1

Triode Connection—Grid No.2 Connected to Plate

Maximum Ratings, *Absolute-Maximum Values:*

	CCS	*ICAS*	
DC PLATE VOLTAGE	400 max.	400 max.	volts
MAX.-SIGNAL DC PLATE CURRENT[f]	90 max.	90 max.	ma
MAX.-SIGNAL PLATE INPUT[f]	35 max.	35 max.	watts
PLATE DISSIPATION[f]	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage	250	400	400	volts
DC Grid-No.1 Voltage	-50	-100	-100	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage[h]	100	200	200	volts
Zero-Signal DC Plate Current	120	40	40	ma
Max.-Signal DC Plate Current	125	100	100	ma
Effective Load Resistance (Plate-to-plate)	5000	8000	8000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	watts
Max.-Signal Power Output (Approx.)	10	22	22	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance under any condition:[j]	
With fixed bias	0.1 max. megohm
With cathode bias	0.5 max. megohm

AF POWER AMPLIFIER & MODULATOR — Class AB_2[k]

Maximum Ratings, *Absolute-Maximum Values:*

	CCS	*ICAS*	
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts

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	CCS	ICAS	
MAX.-SIGNAL DC PLATE CURRENT[f] . .	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT[f].	62.5 max.	90 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT[f]. . .	3 max.	3 max.	watts
PLATE DISSIPATION[f].	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	135 max.	135 max.	volts
Heater positive with respect to cathode.	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical CCS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage.	400	500	600	volts
DC Grid-No.2 Voltage[g]	175	175	165	volts
DC Grid-No.1 Voltage:				
From fixed-bias source.	-41	-44	-44	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage	95	102	97	volts
Zero-Signal DC Plate Current.	33	27	22	ma
Max.-Signal DC Plate Current.	232	242	207	ma
Zero-Signal DC Grid-No.2 Current. . .	1.1	0.7	0.6	ma
Max.-Signal DC Grid-No.2 Current. . .	18	18	17	ma
Max.-Signal DC Grid-No.1 Current. . .	1.6	1.9	1.1	ma
Effective Load Resistance (Plate to plate).	3700	4600	6800	ohms
Max.-Signal Driving Power (Approx.)[h].	0.2	0.3	0.2	watt
Max.-Signal Power Output (Approx.). .	62	83	90	watts

Typical ICAS Push-Pull Operation:

Values are for 2 tubes

DC Plate Voltage.	600	750	volts
DC Grid-No.2 Voltage[g]	190	165	volts
DC Grid-No.1 Voltage:			
From fixed-bias source.	-48	-46	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . .	109	108	volts
Zero-Signal DC Plate Current.	28	22	ma
Max.-Signal DC Plate Current.	270	240	ma
Zero-Signal DC Grid-No.2 Current.	1.2	0.3	ma
Max.-Signal DC Grid-No.2 Current.	20	20	ma
Max.-Signal DC Grid-No.1 Current.	2	2.6	ma
Effective Load Resistance (Plate to plate). .	5000	7400	ohms
Max.-Signal Driving Power (Approx.)[h]. . . .	0.3	0.4	watt
Max.-Signal Power Output (Approx.).	113	131	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:[n]		
With fixed bias	30000 max.	volts
With cathode bias	Not recommended	

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1 and at frequencies up to 60 Mc

	CCS	ICAS	
Maximum Ratings, *Absolute-Maximum Values:*			
For maximum plate voltage and maximum plate input above 60 Mc, see Rating Chart I			
DC PLATE VOLTAGE	480 max.	600 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	-150 max.	-150 max.	volts
DC PLATE CURRENT	117 max.	125 max.	ma
DC GRID-No.1 CURRENT	3.5 max.	4 max.	ma
PLATE INPUT	45 max.	67.5 max.	watts
GRID-No.2 INPUT	2 max.	2 max.	watts
PLATE DISSIPATION	13.3 max.	16.7 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	135 max.	135 max.	volts
Heater positive with respect to cathode	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface)	220 max.	220 max.	°C

Typical Operation:				
DC Plate Voltage	400	475	600	volts
DC Grid-No.2 Voltage[b]	150	135	150	volts
From a series resistor of	33000	51000	56000	ohms
DC Grid-No.1 Voltage[f]	-87	-77	-87	volts
From a grid resistor of	27000	27000	27000	ohms
Peak RF Grid-No.1 Voltage	107	95	107	volts
DC Plate Current	112	94	112	ma
DC Grid-No.2 Current	7.8	6.4	7.8	ma
DC Grid-No.1 Current (Approx.)	3.4	2.8	3.4	ma
Driving Power (Approx.)	0.4	0.3	0.4	watt
Power Output (Approx.)	32	34	52	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance[g] . . . . . 30000 max. ohms

RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy and RF POWER AMPLIFIER — Class C FM Telephony

	CCS	ICAS	
Maximum Ratings, *Absolute-Maximum Values:*			
At frequencies up to 60 Mc. For maximum plate voltage and maximum plate input above 60 Mc, see Rating Chart II.			
DC PLATE VOLTAGE	600 max.	750 max.	volts
DC GRID-No.2 VOLTAGE	250 max.	250 max.	volts
DC GRID-No.1 VOLTAGE	-150 max.	-150 max.	volts
DC PLATE CURRENT	140 max.	150 max.	ma

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	CCS	ICAS	
DC GRID-No.1 CURRENT.	3.5 max.	4 max.	ma
PLATE INPUT	67.5 max.	90 max.	watts
GRID-No.2 INPUT	3 max.	3 max.	watts
PLATE DISSIPATION	20 max.	25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode.	135 max.	135 max.	volts
Heater positive with respect to cathode.	135 max.	135 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface). . . .	220 max.	220 max.	°C

Typical Operation:

As amplifier up to 60 Mc

DC Plate Voltage.	500	600	600	750	volts
DC Grid-No.2 Voltage[1] . . .	170	150	180	160	volts
From a series resistor of .	36000	51000	43000	56000	ohms
DC Grid-No.1 Voltage[2] . . .	−66	−58	−71	−62	volts
From a grid-No.1 resistor of	27000	20000	24000	20000	ohms
From a cathode resistor of	470	470	430	470	ohms
Peak RF Grid-No.1 Voltage .	84	73	91	79	volts
DC Plate Current.	135	112	150	120	ma
DC Grid-No.2 Current. . . .	9	9	10	11	ma
DC Grid-No.1 Current (Approx.)	2.5	2.8	2.8	3.1	ma
Driving Power (Approx.) . .	0.2	0.2	0.3	0.2	watt
Power Output (Approx.). . .	48	52	66	70	watts

As amplifier at 175 Mc

DC Plate Voltage.	320	400	volts
DC Grid-No.2 Voltage[1]	180	190	volts
From a series resistor of . .	13000	20000	ohms
DC Grid-No.1 Voltage[2]	−51	−54	volts
From a grid resistor of . . .	27000	24000	ohms
From a cathode resistor of . .	330	330	ohms
Peak RF Grid-No.1 Voltage . . .	64	68	volts
DC Plate Current.	140	150	ma
DC Grid-No.2 Current.	10	10.4	ma
DC Grid-No.1 Current (Approx.).	2	2.2	ma
Driving Power (Approx.)	3	3	watts
Power Output (Approx.).	25	35	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance[3]	30000 max.	ohms

[a] Heater voltage fluctuations will cause variations in power output. The 8032 is designed to meet the EIA Standard RS152A.

[b] With no external shield.

[c] Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.

[d] Continuous Commercial Service.

[e] Intermittent Commercial and Amateur Service.

f Averaged over any audio-frequency cycle or sine-wave form.

g Obtained preferably from a separate source or from the plate voltage supply with a voltage divider.

h The driver stage should be capable of supplying the No.1 grids of the class AB_1 stage with the specified driving voltage at low distortion.

j The type of input coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended.

k Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

m Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB_2 stage.

n To minimize distortion, the effective resistance per grid-No.1 circuit of the AB_2 stage should be held at a low value. For this purpose the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 30,000 ohms when the 8032 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100,000 ohms.

p Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

r Obtained from grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

s When grid No.1 is driven positive and the 8032 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30,000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100,000 ohms.

t Obtained preferably from separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 8032 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

u Obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current	1	0.550	0.620	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	–	0.24	pf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater	2	12.0	15.0	pf
Plate to cathode & grid No.3 & internal shield, grid No.2, base sleeve, and heater	2	7.3	9.5	pf
Plate Current	3	46	94	ma
Grid-No.2 Current	3	–	5.5	ma
Dynamic Grid-No.2 Current	4	3	21	ma
Useful Power Output	4	47	–	watts

Note 1: With 13.5 volts ac on heater.

Note 2: With no external shield.

Note 3: With rated ac heater voltage, dc plate voltage of 300 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage of -33 volts.

Note 4: In a single-tube, self-excited oscillator circuit, and with rated ac heater voltage, dc plate voltage of 600 volts, dc grid-No.2 voltage of 180 volts, grid-No.1 resistor of 30,000 ± 10 per cent ohms, dc plate current of 100 to 112 ma., dc grid-No.1 current of 2 to 2.5 ma., and frequency of 15 Mc.

MAXIMUM RATINGS vs OPERATING FREQUENCY

OPERATING FREQUENCY Mc	MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE & PLATE INPUT			
	TELEPHONY		TELEGRAPHY	
	Class C Plate-Modulated		Class C Unmodulated	
	Voltage	*Input*	*Voltage*	*Input*
60	100	100	100	100
80	84	92	84	92
125	65	78	65	78
150	58	72	58	72
160	56	70	56	70
175	53	67	53	67

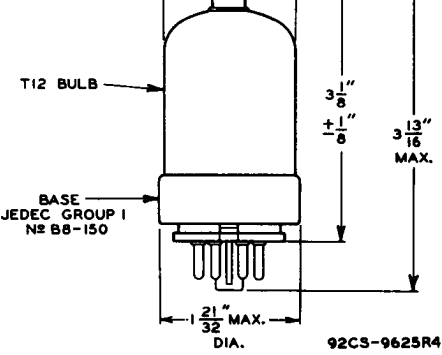
OPERATING CONSIDERATIONS

The maximum bulb temperature is a tube rating and is to be observed in the same manner as other ratings. The temperature may be measured with temperature-sensitive paint, such as Tempilaq. The latter is made by the Tempil Corporation, 132 West 22nd Street, New York 11, New York.

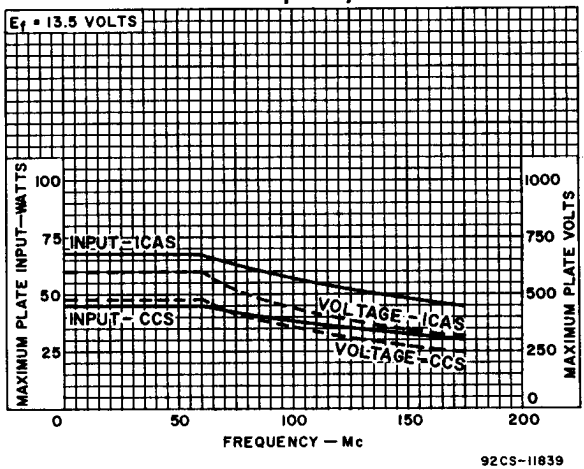
To insure adequate cooling, it is essential that free circulation of air be provided around the tube. In most cases, no additional air is required.

The plate shows no color when the 8032 is operated at full ratings under either CCS or ICAS conditions.

Connections to the plate should be made with a flexible lead to prevent any strain on the seal at the cap.



RATING CHART I
Class C Telephony Service



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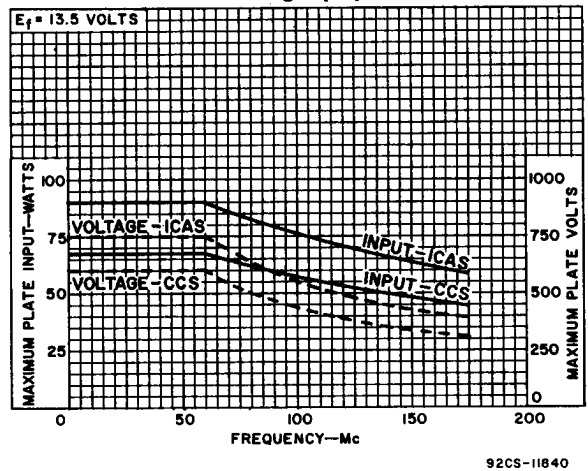
RATING CHART II
Class C Telegraphy Service



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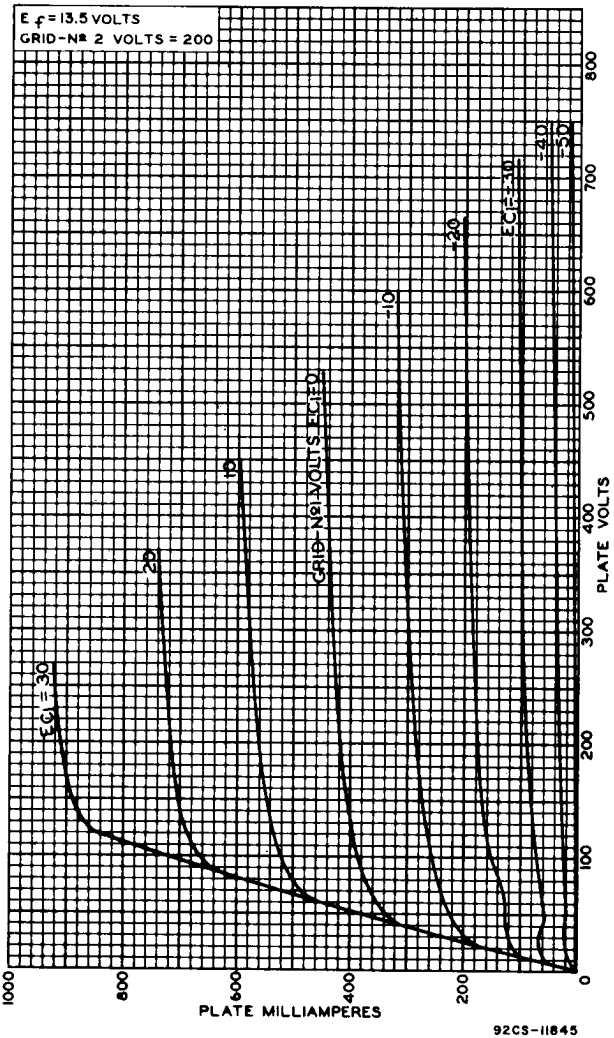
TYPICAL PLATE CHARACTERISTICS



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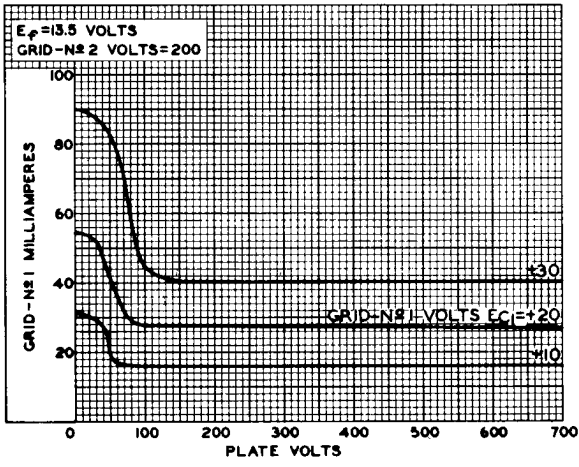
TYPICAL CHARACTERISTICS



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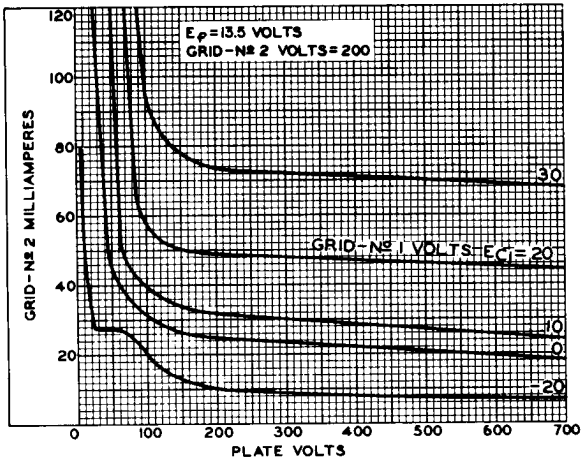

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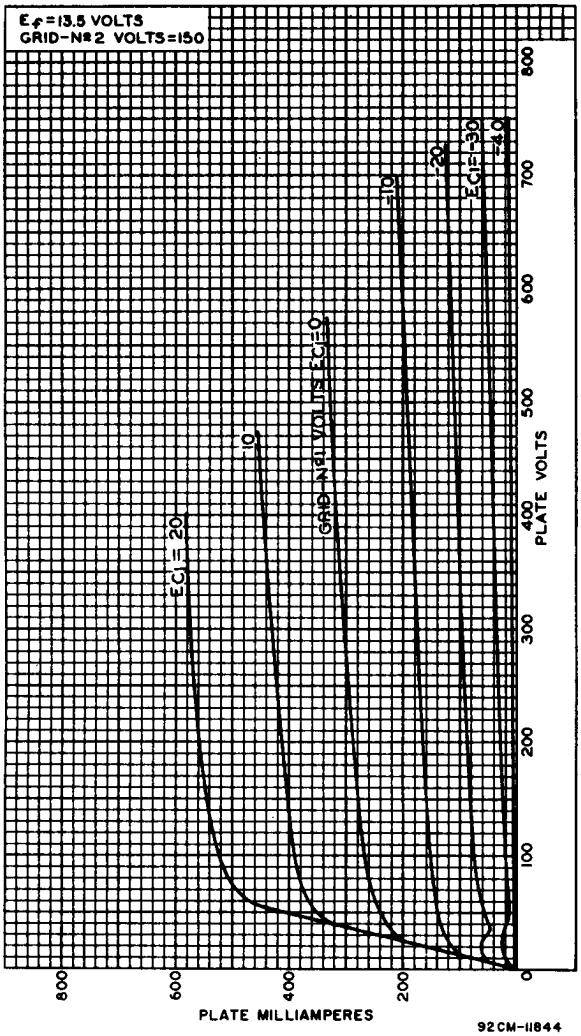
TYPICAL PLATE CHARACTERISTICS



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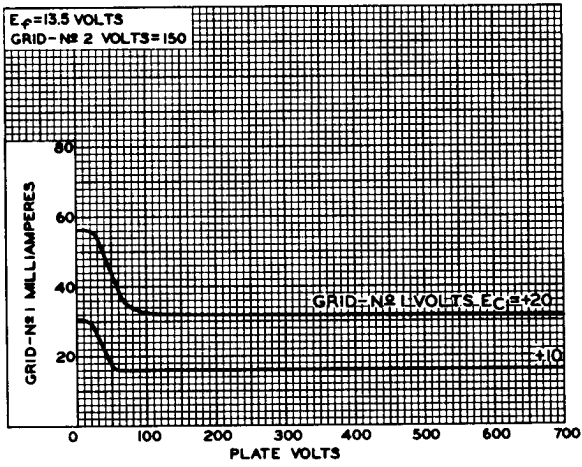
TYPICAL CHARACTERISTICS



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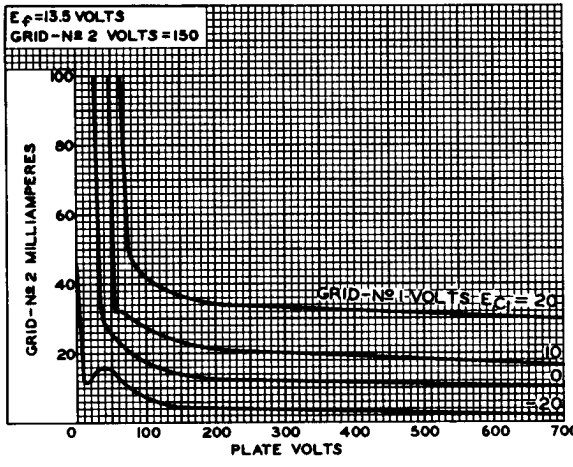

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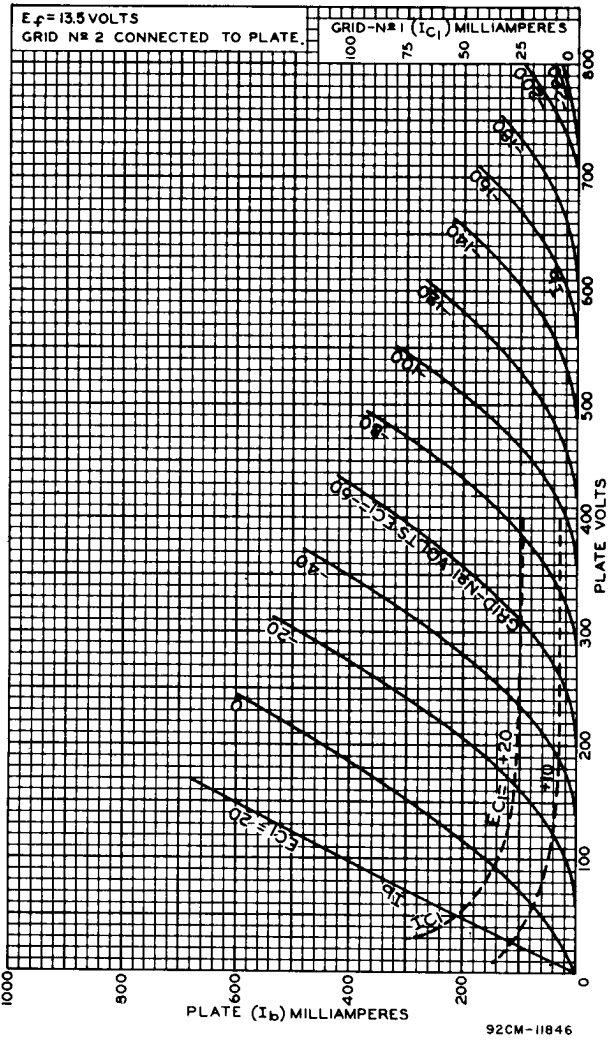
TYPICAL CHARACTERISTICS
Triode Connection



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