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**VHF BEAM POWER AMPLIFIER****GENERAL DATA****Electrical:**

Heater, for Unipotential Cathode:

Voltage . . . . . 6.3 ± 10% . . . . . ac or dc volts

Current . . . . . 1.25 . . . . . amp

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:\*

Grid No.1 to Plate . . . . . 0.22 max. . . . . μmf

Input . . . . . 13.5 . . . . . μmf

Output . . . . . 8.5 . . . . . μmf

**Mechanical:**

Mounting Position . . . . . Any

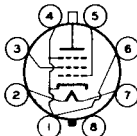
Overall Length . . . . . 3-11/16" ± 1/8"

Seated Length . . . . . 3-1/8" ± 1/8"

Maximum Diameter . . . . . 1-23/32"

Bulb . . . . . T-12

Cap. . . . . Small (JETEC No.C1-1)

Base . . . . . { Large-Wafer Octal 8-Pin Micanol with  
Sleeve No.R-6876 (JETEC No.88-86)**BOTTOM VIEW**Pin 1 - Cathode,  
Grid No.3,  
Internal  
ShieldPin 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

Cap - Plate

Bulb Temperature (At hottest point) . . . . . 220 max. °C

**AF POWER AMPLIFIER & MODULATOR--Class AB<sub>1</sub>†**

Triode Connection--Grid No.2 Connected to Plate

CCS\*

ICAS\*\*

**Maximum Ratings, Absolute Values:**

DC PLATE VOLTAGE . . . . . 400 max. 400 max. volts

MAX.-SIGNAL DC

PLATE CURRENT\*\* . . . . . 90 max. 90 max. ma

MAX.-SIGNAL PLATE INPUT\*\* . . . . . 35 max. 35 max. watts

PLATE DISSIPATION\*\* . . . . . 20 max. 25 max. watts

\* with no external shielding and base sleeve connected to ground.

†, \*\*, \*\*: See next page.

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TUBE DEPARTMENT

TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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## VHF BEAM POWER AMPLIFIER

	CCS <sup>•</sup>	ICAS <sup>••</sup>	
<b>PEAK HEATER-CATHODE VOLTAGE:</b>			
Heater negative with respect to cathode . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . .	135 max.	135 max.	volts

### Typical 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 <sup>o</sup> . . . . .	100	200	200	volts
Zero-Signal DC Plate Current . . . . .	110	80	80	ma
Max.-Signal DC Plate Current . . . . .	144	136	136	ma
Effective Load Resistance (Plate to plate) . . . . .	5000	8000	8000	ohms
Max.-Signal Driving Power (Approx.) . . . . .	0	0	0	watts
Total Harmonic Distortion . . . . .	5	4.6	4.6	%
Max.-Signal Power Output (Approx.) . . . . .	8	19	19	watts

### Maximum Circuit Values (CCS or ICAS Conditions):

<b>Grid-No.1-Circuit Resistance:<sup>oo</sup></b>			
With fixed bias . . . . .		0.1 max.	megohm
With cathode bias . . . . .		0.5 max.	megohm

### AF POWER AMPLIFIER & MODULATOR--Class AB<sub>1</sub><sup>†</sup>

#### Maximum Ratings, Absolute Values:

	CCS <sup>•</sup>	ICAS <sup>••</sup>	
DC PLATE VOLTAGE . . . . .	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE . . . . .	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT** . . . . .	60 max.	85 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT** . . . . .	3 max.	3 max.	watts
PLATE DISSIPATION** . . . . .	20 max.	25 max.	watts

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

o The driver stage should be capable of supplying the No.1 grids of the class AB<sub>1</sub> stage with the specified driving voltage at low distortion.

•, ••, \*\*, oo: See next page.

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## VHF BEAM POWER AMPLIFIER

	CCS <sup>•</sup>	ICAS <sup>••</sup>	
<b>PEAK HEATER-CATHODE VOLTAGE:</b>			
Heater negative with respect to cathode . . . .	135 max.	135 max.	volts
Heater positive with respect to cathode . . . .	135 max.	135 max.	volts
<b>Typical CCS Operation:</b>			
<i>Values are for 2 tubes</i>			
DC Plate Voltage . . . . .	400	500	600 volts
DC Grid-No.2 Voltage <sup>▲</sup> . . . . .	190	180	190 volts
DC Grid-No.1(Control-Grid)Voltage:			
<i>With fixed-bias source</i> . . . . .	-40	-40	-45 volts
Peak AF Grid-No.1-to-			
Grid-No.1 Voltage. . . . .	80	80	90 volts
Zero-Signal DC Plate Current . . .	86	70	60 ma
Max.-Signal DC Plate Current . . .	228	220	200 ma
Zero-Signal DC Grid-No.2 Current .	2	1.4	1 ma
Max.-Signal DC Grid-No.2 Current .	30	19.5	30.5 ma
Effective Load Resistance			
(Plate to plate) . . . . .	4000	5000	7500 ohms
Max.-Signal Driving			
Power (Approx.) . . . . .	0	0	0 watts
Total Harmonic Distortion. . . . .	8	8	8 %
Max.-Signal Power Output (Approx.) .	55	70	82 watts
<b>Typical ICAS Operation:</b>			
<i>Values are for 2 tubes</i>			
DC Plate Voltage . . . . .	600	750	volts
DC Grid-No.2 Voltage <sup>▲</sup> . . . . .	200	200	volts
DC Grid-No.1 (Control-Grid) Voltage:			
<i>From fixed-bias source</i> . . . . .	-50	-50	volts
Peak AF Grid-No.1-to-			
Grid-No.1 Voltage. . . . .	100	100	volts
Zero-Signal DC Plate Current . . . .	52	57	ma
Max.-Signal DC Plate Current . . . .	239	227	ma
Zero-Signal DC Grid-No.2 Current . .	1.2	1	ma
Max.-Signal DC Grid-No.2 Current . .	25.2	27.5	ma
Effective Load Resistance			
(Plate to plate) . . . . .	5500	8000	ohms
Max.-Signal Driving Power (Approx.) .	0	0	watts
Total Harmonic Distortion. . . . .	7.5	5.7	%
Max.-Signal Power Output (Approx.) . .	94	120	watts
<b>Maximum Circuit Values (CCS or ICAS Conditions):</b>			
Grid-No.1-Circuit Resistance: <sup>••</sup>			
With fixed bias. . . . .		0.1 max.	megohm
With cathode bias. . . . .		Not recommended	

•, ••, •••, ••••, ▲: See next page.

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TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 2



## VHF BEAM POWER AMPLIFIER

### AF POWER AMPLIFIER & MODULATOR--Class AB<sub>2</sub><sup>#</sup>

#### Maximum Ratings, Absolute Values:

	CCS <sup>•</sup>	ICAS <sup>••</sup>	
DC PLATE VOLTAGE . . . . .	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. . . . .	250 max.	250 max.	volts
MAX.-SIGNAL DC PLATE CURRENT** . . . . .	125 max.	135 max.	ma
MAX.-SIGNAL PLATE INPUT** . . . . .	62.5 max.	90 max.	watts
MAX.-SIGNAL 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

#### Typical CCS Operation:

Values are for 2 tubes

DC Plate Voltage . . . . .	400	500	600	volts
DC Grid-No.2 Voltage <sup>▲</sup> . . . . .	175	175	165	volts
DC Grid-No.1 (Control-Grid) Voltage:				
From fixed-bias source . . . . .	-40	-40	-45	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage. . . . .	86	87	99	volts
Zero-Signal DC Plate Current . . . . .	63	64	31	ma
Max.-Signal DC Plate Current . . . . .	232	242	207	ma
Zero-Signal DC Grid-No.2 Current . . . . .	1.5	1.2	0.7	ma
Max.-Signal DC Grid-No.2 Current . . . . .	28	26	31	ma
Max.-Signal DC Grid-No.1 Current . . . . .	0.3	0.3	0.5	ma
Effective Load Resistance (Plate to plate). . . . .	4000	5000	7500	ohms
Max.-Signal Driving Power (Approx.) <sup>◆</sup> . . . . .	0.01	0.01	0.02	watt
Total Harmonic Distortion. . . . .	9.7	9.7	9.7	%
Max.-Signal Power Output (Approx.). . . . .	60	81	90	watts

<sup>••</sup> Averaged over any audio-frequency cycle of sine-wave form.

<sup>••</sup> 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. When grid No.1 is operated in the negative region with fixed bias, the dc grid-No.1-circuit resistance should not exceed the specified value of 0.1 megohm. For higher values of dc grid-No.1-circuit resistance, cathode bias is required. Under no circumstances should the total dc grid-No.1-circuit resistance exceed the specified value of 0.5 megohm.

<sup>#</sup> Subscript 2 indicates that grid-No.1 current flows during some part of the input cycle.

•, ••, ▲, ◆: See next page.



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**VHF BEAM POWER AMPLIFIER****Typical ICAS Operation:***Values are for 2 tubes*

DC Plate Voltage . . . . .	600	750	volts
DC Grid-No.2 Voltage <sup>▲</sup> . . . . .	185	165	volts
DC Grid-No.1 (Control-Grid) Voltage:			
From fixed-bias source . . . . .	-50	-45	volts
Peak AF Grid-No.1-to-			
Grid-No.1 Voltage. . . . .	113	101	volts
Zero-Signal DC Plate Current . . . . .	41	35	ma
Max.-Signal DC Plate Current . . . . .	270	240	ma
Zero-Signal DC Grid-No.2 Current . . . . .	0.9	0.6	ma
Max.-Signal DC Grid-No.2 Current . . . . .	29	21	ma
Max.-Signal DC Grid-No.1 Current . . . . .	0.8	0.7	ma
Effective Load Resistance			
(Plate to plate). . . . .	5500	8000	ohms
Max.-Signal Driving Power (Approx.) <sup>◆</sup> . . . . .	0.04	0.03	watt
Total Harmonic Distortion. . . . .	11	10	%
Max.-Signal Power Output (Approx.) . . . . .	115	130	watts

**Maximum Circuit Values (CCS or ICAS Conditions):**Grid-No.1-Circuit Resistance:<sup>◆</sup>

With fixed bias. . . . .	30000 max.	ohms
With cathode bias. . . . .	Not recommended	

**PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony***Carrier conditions per tube for use with a max. modulation factor of 1.0*CCS<sup>•</sup>                      ICAS<sup>••</sup>**Maximum Ratings, Absolute Values:**

DC PLATE VOLTAGE . . . . .	480 max.	600 max.	volts
DC GRID-No.2 (SCREEN)			
VOLTAGE. . . . .	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-			
GRID) VOLTAGE. . . . .	-150 max.	-150 max.	volts
DC PLATE CURRENT . . . . .	117 max.	125 max.	ma
DC GRID-No.1 CURRENT . . . . .	3.5 max.	4.0 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

<sup>▲</sup> Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.<sup>◆</sup> Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the AB<sub>2</sub> stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the AB<sub>2</sub> 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 30000 ohms when the 6146 is operated at maximum ratings. For operation at less than maximum ratings, the dc grid-No.1-circuit resistance may be as high as 100000 ohms.

•••: See next page.

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TUBE DEPARTMENT

TENTATIVE DATA 3

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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## VHF BEAM POWER AMPLIFIER

CCS\*

ICAS\*\*

### 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

### Typical Operation:

DC Plate Voltage . . . . .	400	475	600	volts
DC Grid-No.2 Voltage <sup>‡</sup> . . . . .	150	135	150	volts
From a series resistor of . . . . .	21500	26500	37500	ohms
DC Grid-No.1 Voltage <sup>‡</sup> . . . . .	-85	-85	-85	volts
From a grid resistor of . . . . .	28300	28300	28300	ohms
Peak RF Grid-No.1 Voltage . . . . .	100	99	100	volts
DC Plate Current . . . . .	112	94	113	ma
DC Grid-No.2 Current . . . . .	11.6	12.8	12	ma
DC Grid-No.1 Current (Approx.) . . . . .	3	3	3	ma
Driving Power (Approx.) . . . . .	0.3	0.3	0.3	watt
Power Output (Approx.) . . . . .	34	33	52	watts

### Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance <sup>‡</sup> . . . . .	30000 max.	ohms
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### RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy<sup>□</sup> and RF POWER AMPLIFIER--Class C FM Telephony

CCS\*

ICAS\*\*

### Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . .	600 max.	750 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE . . . . .	250 max.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . . . .	-150 max.	-150 max.	volts
DC PLATE CURRENT . . . . .	140 max.	150 max.	ma
DC GRID-No.1 CURRENT . . . . .	3.5 max.	4.0 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

<sup>‡</sup> Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through a series resistor.

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

□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

\*, \*\*, ‡: See next page.

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## VHF BEAM POWER AMPLIFIER

	CCS*		ICAS**		
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
<b>Typical Operation as Amplifier up to 60 Mc:</b>					
DC Plate Voltage . . . . .	500	600	600	750	volts
DC Grid-No.2 Voltage** . . . . .	170	150	180	160	volts
<i>From a series resistor of . . . . .</i>					
	29200	40200	28000	40100	ohms
DC Grid-No.1 Voltage <sup>■</sup> . . . . .	-85	-85	-85	-85	volts
<i>From a grid-No.1 resistor of . . . . .</i>					
	28300	28300	28300	28300	ohms
<i>From a cathode resistor of . . . . .</i>					
	570	670	510	620	ohms
Peak RF Grid-No.1 Voltage . . . . .	99	100	102	100	volts
DC Plate Current . . . . .	135	113	150	120	ma
DC Grid-No.2 Current . . . . .	11.3	11.2	15	14.7	ma
DC Grid-No.1 Current (Approx.) . . . . .	3	3	3	3	ma
Driving Power (Approx.) . . . . .	0.3	0.3	0.3	0.3	watt
Power Output (Approx.) . . . . .	50	52	69	69	watts

**Typical Operation as Amplifier at 175 Mc:**

DC Plate Voltage . . . . .	320		400		volts
DC Grid-No.2 Voltage** . . . . .	180		200		volts
<i>From a series resistor of . . . . .</i>					
	15500		22200		ohms
DC Grid-No.1 Voltage <sup>■</sup> . . . . .	-54		-54		volts
<i>From a grid resistor of . . . . .</i>					
	30000		30000		ohms
<i>From a cathode resistor of . . . . .</i>					
	360		335		ohms
Peak RF Grid-No.1 Voltage . . . . .	70		70		volts
DC Plate Current . . . . .	140		150		ma
DC Grid-No.2 Current . . . . .	9		9		ma
DC Grid-No.1 Current (Approx.) . . . . .	1.8		1.8		ma
Driving Power (Approx.) . . . . .	2		3		watts
Power Output (Approx.) . . . . .	25		35		watts

\* Continuous Commercial Service.

\*\* Intermittent Commercial and Amateur Service.

\*\* Obtained preferably from a 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 6146 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 400 volts under key-up conditions.

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

‡: See next page.

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TENTATIVE DATA 4

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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## VHF BEAM POWER AMPLIFIER

### Maximum Circuit Values (CCS or ICAS Conditions):

Grid-No.1-Circuit Resistance<sup>†</sup> . . . . . 30000 max. ohms

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

(Preliminary)

	Note	Min.	Max.	
Heater Current . . . . .	1	1.175	1.325	amp
Grid-No.1-to-Plate Capacitance. . . . .	2	-	0.22	$\mu$ f
Input Capacitance. . . . .	2	11.1	15.9	$\mu$ f
Output Capacitance . . . . .	2	6.4	10.6	$\mu$ f
Plate Current. . . . .	3	45	83	ma
Grid-No.2 Current. . . . .	3	-	5	ma
Useful Power Output. . . . .	4	47.5	-	watts

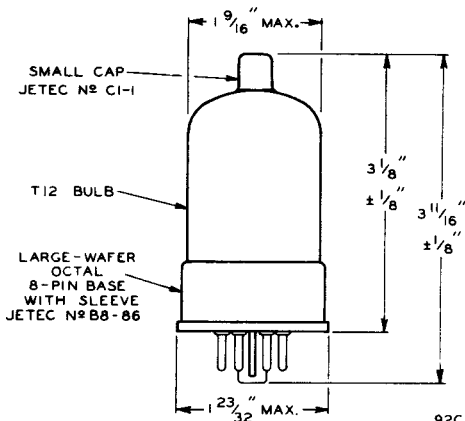
Note 1: With 6.3 volts ac on heater.

Note 2: With no external shield. Base sleeve (pin No.8) is grounded.

Note 3: With 5.5 volts ac on heater, dc plate voltage of 300 volts, dc grid-No.2 voltage of 180 volts, grid-No.1 resistor of  $0.030 \pm 10\%$  megohm, max. dc plate current of 100 ma. to 112 ma., dc grid-No.1 current of 2 to 2.5 ma., and frequency of 15 Mc.

Note 4: In a single-tube self-excited oscillator circuit, and with 5.5 volts ac on heater, dc plate voltage of 600 volts, dc grid-No.2 voltage of 180 volts, grid-No.1 resistor of  $0.030 \pm 10\%$  megohm, max. dc plate current of 100 ma. to 112 ma., dc grid-No.1 current of 2 to 2.5 ma., and frequency of 15 Mc.

<sup>†</sup> When grid No.1 is driven positive and the 6146 is operated at maximum ratings, the total dc grid-No.1-circuit resistance should not exceed the specified value of 30000 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 100000 ohms.



92CS-7700RI

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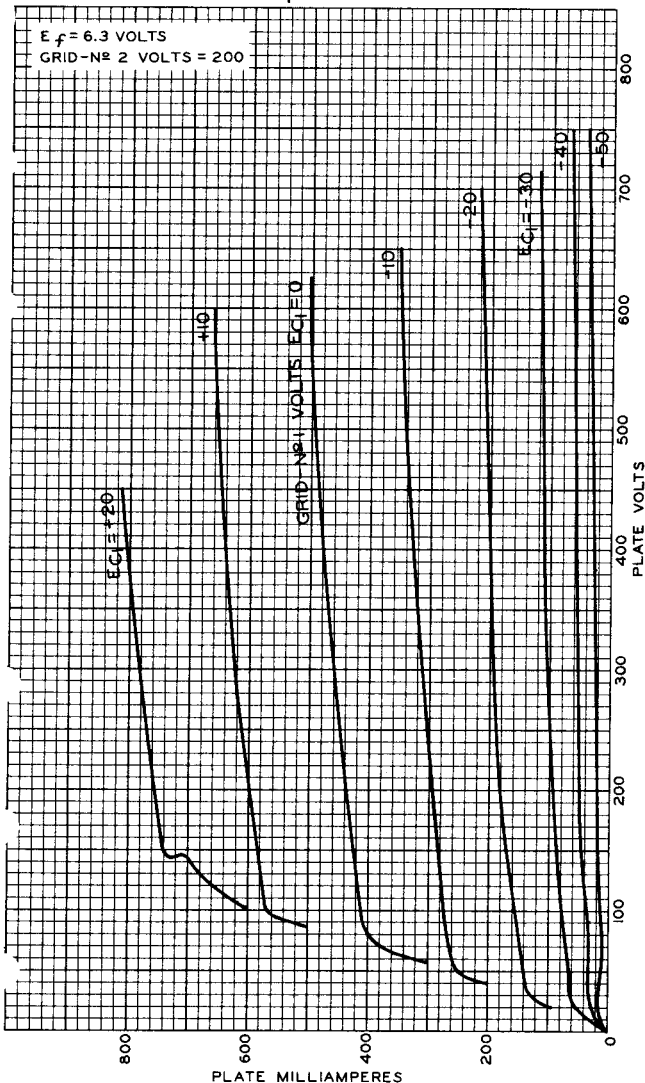




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# AVERAGE PLATE CHARACTERISTICS WITH $E_{c1}$ AS VARIABLE

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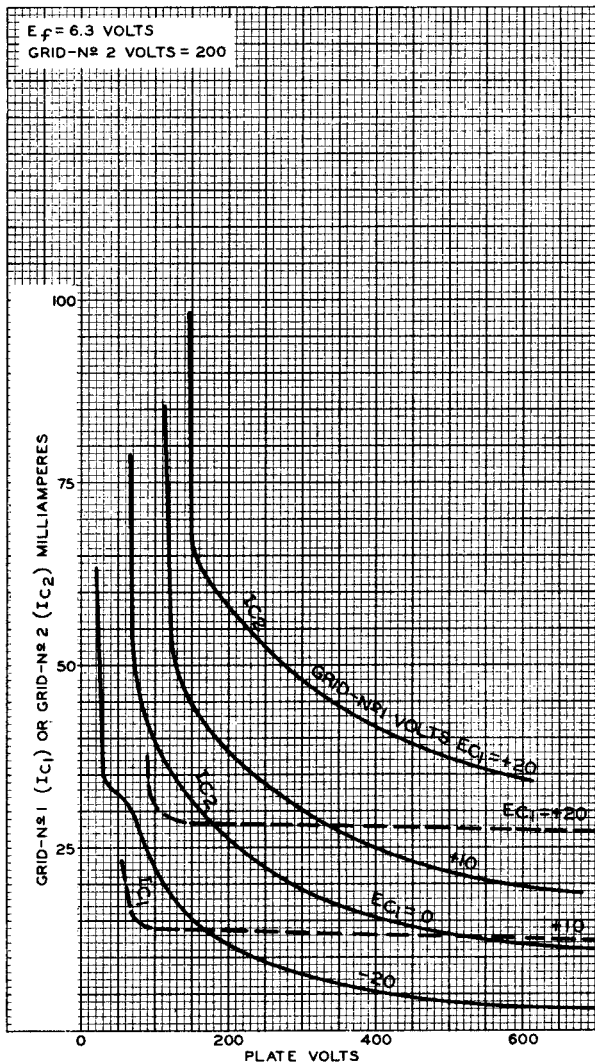


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## AVERAGE CHARACTERISTICS

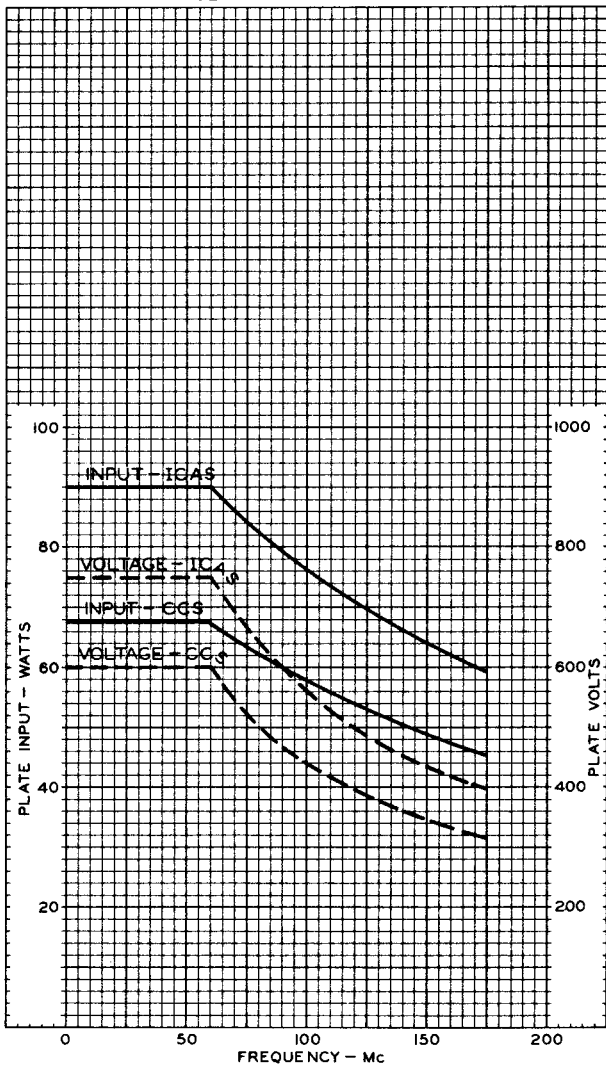




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# MAXIMUM RATINGS VS OPERATING FREQUENCY CLASS C TELEGRAPHY

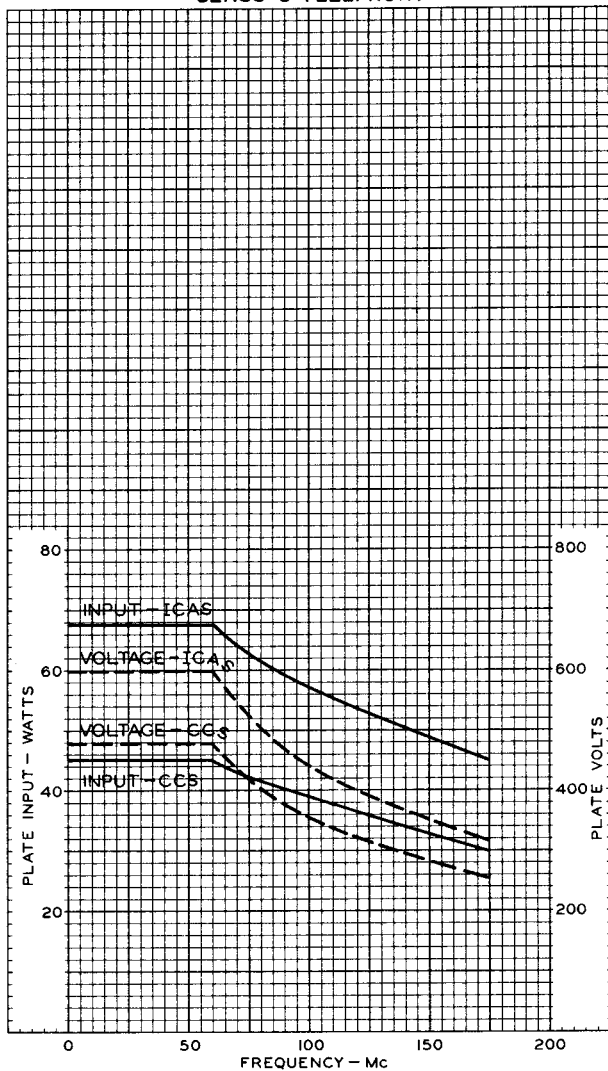


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# MAXIMUM RATINGS vs OPERATING FREQUENCY CLASS C TELEPHONY



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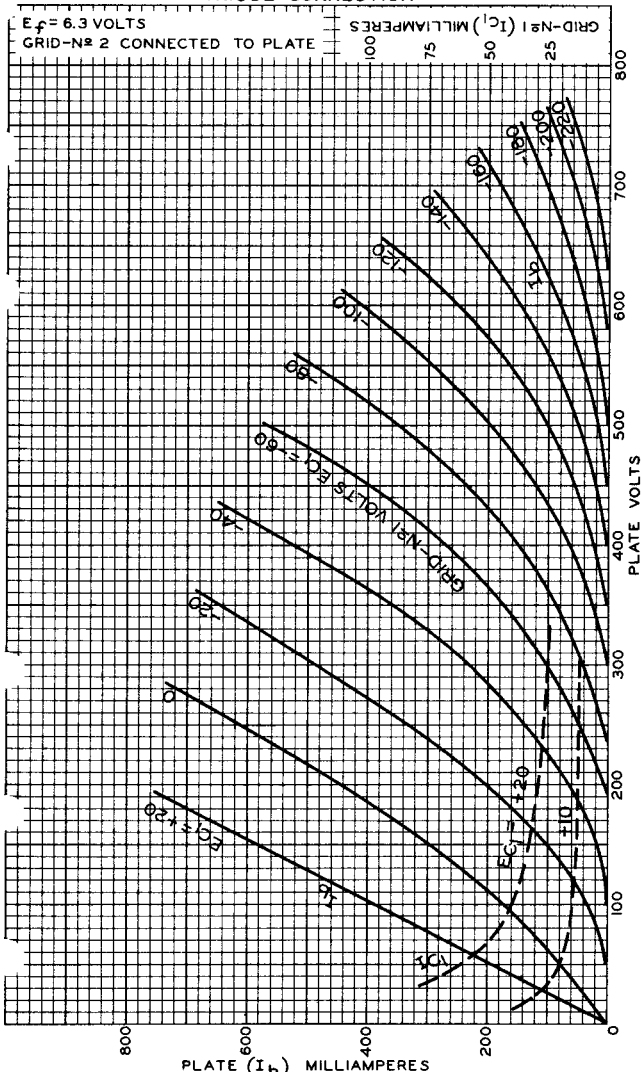
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### AVERAGE CHARACTERISTICS TRIODE CONNECTION



NOV. 27, 1951

PLATE ( $I_b$ ) MILLIAMPERES  
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92CM-7711