



2E24

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### VHF BEAM POWER AMPLIFIER

#### GENERAL DATA

##### Electrical:

Filament, Coated:

Voltage . . . . . 6.3 ± 10% . . . . . ac or dc volts  
 Current . . . . . 0.65 . . . . . amp  
 Heating Time . . . . . Less than 2 seconds

Transconductance, for plate volts =  
 500, grid-No.2 volts = 200 and plate  
 ma. = 16. . . . . 3200  $\mu$ mhos

Mu-Factor, Grid No.2 to Grid No.1  
 for plate volts and grid-No.2 volts =  
 200, and plate ma. = 16 . . . . . 7.5

Direct Interelectrode Capacitances:<sup>o</sup>

Grid No.1 to Plate . . . . . 0.11 max. . . . .  $\mu$ mf  
 Input . . . . . 8.5 . . . . .  $\mu$ mf  
 Output . . . . . 6.5 . . . . .  $\mu$ mf

<sup>o</sup> with no external shielding, and with base sleeve connected to ground.

##### Mechanical:

Mounting Position . . . . . Vertical, or horizontal with  
 plane of pins 3 and 7 vertical

Maximum Overall Length . . . . . 3-21/32"

Seated Length . . . . . 2-15/16 ± 5/32"

Maximum Diameter . . . . . 1-5/16"

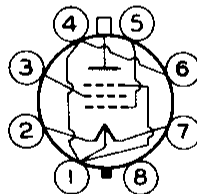
Bulb . . . . . T-9

Cap. . . . . Small

Base . . . . . Small-Micanol-Wafer Octal 8-Pin,  
 with Sleeve No.R6159

Basing Designation for BOTTOM VIEW . . . . . 7CL

Pin 1 - Grid No.3,  
 Int.Shield &  
 Filament  
 Center-Tap  
 Pin 2 - Filament  
 Pin 3 - Grid No.2



Pin 4 - Same as Pin 1  
 Pin 5 - Grid No.1  
 Pin 6 - Same as Pin 1  
 Pin 7 - Filament  
 Pin 8 - Base Sleeve  
 Cap - Plate

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

##### Maximum Ratings, Absolute Values:

CCS<sup>•</sup>

DC PLATE VOLTAGE . . . . . 300 max. volts  
 DC GRID-No.2 (SCREEN) VOLTAGE. . . . . 200 max. volts  
 GRID-No.2 INPUT. . . . . 2.5 max. watts  
 PLATE DISSIPATION. . . . . 10 max. watts

##### Typical Operation:

DC Plate Voltage . . . . . 250 volts  
 DC Grid-No.2 Voltage . . . . . 160 volts

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

•: See next page.

← Indicates a change.

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## VHF BEAM POWER AMPLIFIER

	CCS <sup>•</sup>	
DC Grid-No.1 (Control-Grid) Voltage <sup>⊖*</sup> . . . . .	-8	volts
Peak AF Grid-No.1 Voltage. . . . .	8	volts
Zero-Signal DC Plate Current . . . . .	35	ma
Max.-Signal DC Plate Current . . . . .	40	ma
Zero-Signal DC Grid-No.2 Current . . . . .	2.6	ma
Max.-Signal DC Grid-No.2 Current.. . . .	6.8	ma
Load Resistance. . . . .	6000	ohms
Total Harmonic Distortion. . . . .	10	%
Power Output . . . . .	3.9	watts

→ **AF POWER AMPLIFIER & MODULATOR- Class AB<sub>2</sub><sup>▲</sup>**

**Maximum Ratings, Absolute Values:**

	CCS <sup>•</sup>	ICAS <sup>••</sup>	
DC PLATE VOLTAGE . . . . .	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE. . . . .	200 max.	200 max.	volts
MAX.-SIG. DC PLATE CURRENT§. . . . .	75 max.	75 max.	ma
MAX.-SIG. PLATE INPUT§ . . . . .	30 max.	37.5 max.	watts
MAX.-SIG. GRID-No.2 INPUT§ . . . . .	2.5 max.	2.5 max.	watts
PLATE DISSIPATION§ . . . . .	10 max.	13.5 max.	watts

**Typical Operation:***Values are for 2 tubes*

DC Plate Voltage . . . . .	400	500	volts
DC Grid-No.2 Voltage . . . . .	125	125	volts
DC Grid-No.1 (Control Grid) Voltage <sup>⊖*</sup> . . . . .	-15	-15	volts
Peak AF Grid-No.1-to-Grid- No.1 Voltage . . . . .	82	82	volts
Zero-Signal DC Plate Current . . . . .	18	20	ma
Max.-Signal DC Plate Current . . . . .	150	150	ma
Zero-Signal DC Grid-No.2 Cur. . . . .	0.6	0.6	ma
Max.-Signal DC Grid-No.2 Cur. . . . .	26	28	ma
Effective Load Resistance, (Plate-to-plate) . . . . .	7000	9000	ohms
Max.-Signal Driving Power, (Approx.) <sup>◆</sup> . . . . .	0.43	0.46	watt
Max.-Signal Power Output (Approx.). . . . .	42	54	watts

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

§ Averaged over any audio-frequency cycle of sine-wave form.

◆ 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. The effective resistance per grid-No.1 circuit of the AB<sub>2</sub> stage should be held at low value.

⊖ 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 100000 ohms. For high 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 0.5 megohm.

•, ••, ⊖, \* : See next page.

→ Indicates a change.



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### VHF BEAM POWER AMPLIFIER

#### PLATE-MODULATED RF POWER AMPLIFIER- Class C Telephony ←

Carrier conditions per tube for use with a max. modulation factor of 1.0

##### Maximum Ratings, Absolute Values:

	CCS*	ICAS**	
DC PLATE VOLTAGE . . . . .	400 max.	500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT . . . . .	60 max.	70 max.	ma
DC GRID-No.1 CURRENT . . . . .	3.5 max.	3.5 max.	ma
PLATE INPUT. . . . .	20 max.	27 max.	watts
GRID-No.2 INPUT. . . . .	1.7 max.	2.3 max.	watts
PLATE DISSIPATION. . . . .	6.7 max.	9 max.	watts

##### Typical Operation:

DC Plate Voltage . . . . .	400	500	volts
DC Grid-No.2 Voltage <sup>‡</sup> . . . . .	180	180	volts
From a series resistor of. . . . .	27500	40000	ohms
DC Grid-No.1 Voltage <sup>o□*</sup> . . . . .	-45	-45	volts
From a grid resistor of. . . . .	18000	18000	ohms
Peak RF Grid-No.1 Voltage. . . . .	61	62	volts
DC Plate Current . . . . .	50	54	ma
DC Grid-No.2 Current . . . . .	8	8	ma
DC Grid-No.1 Current (Approx.)	2.5	2.5	ma
Driving Power (Approx.) . . . . .	0.15	0.16	watt
Power Output (Approx.) . . . . .	13.5	18	watts

#### RF POWER AMPLIFIER AND OSCILLATOR- Class C Telegraphy ←

Key-down conditions per tube without amplitude modulation\*\*

##### Maximum Ratings, Absolute Values:

	CCS*	ICAS**	
DC PLATE VOLTAGE . . . . .	500 max.	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	200 max.	200 max.	volts
DC GRID-No.1 (CONTROL GRID) VOLTAGE.	-175 max.	-175 max.	volts
DC PLATE CURRENT . . . . .	75 max.	85 max.	ma
DC GRID-No.1 CURRENT . . . . .	3.5 max.	3.5 max.	ma
PLATE INPUT. . . . .	30 max.	40 max.	watts
GRID-No.2 INPUT. . . . .	2.5 max.	2.5 max.	watts
PLATE DISSIPATION. . . . .	10 max.	13.5 max.	watts

‡ Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate supply through series resistor of the value shown.

\*\* Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

o Obtained from grid resistor of value shown, or by partial self-bias methods.

•, ••, □, \*: See next page.

← Indicates a change.

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	CCS*		ICAS**	
<b>Typical Operation up to 125 Mc:</b>				
DC Plate Voltage . . . . .	400	500	600	volts
DC Grid-No.2 Voltage <sup>⊕</sup> . . . . .	200	190	195	volts
From a series resistor of. . . . .	20000	29500	40500	ohms
DC Grid-No.1 Voltage <sup>□*</sup> . . . . .	-45	-45	-50	volts
From a grid resistor of. . . . .	15000	15000	16700	ohms
Peak RF Grid-No.1 Voltage. . . . .	62	65	71	volts
DC Plate Current . . . . .	75	60	66	ma
DC Grid-No.2 Current . . . . .	10	10.5	10	ma
DC Grid-No.1 Current (Approx.) . . . . .	3	3	3	ma
Driving Power (Approx.) . . . . .	0.19	0.20	0.21	watt
Power Output (Approx.) . . . . .	20	20	27	watts
<b>Typical Operation up to 160 Mc:</b>				
DC Plate Voltage . . . . .	-	-	350	volts
DC Grid-No.2 Voltage <sup>⊕</sup> . . . . .	-	-	170	volts
From a series resistor of. . . . .	-	-	18000	ohms
DC Grid-No.1 Voltage <sup>□*</sup> . . . . .	-	-	-50	volts
From a grid resistor of. . . . .	-	-	16500	ohms
Peak RF Grid-No.1 Voltage. . . . .	-	-	70	volts
DC Plate Current . . . . .	-	-	85	ma
DC Grid-No.2 Current . . . . .	-	-	10	ma
DC Grid-No.1 Current (Approx.) . . . . .	-	-	3	ma
Driving Power (Approx.) . . . . .	-	-	2.0	watts
Power Output (Approx.) . . . . .	-	-	16.5	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current . . . . .	1	0.59	0.71	amp
Grid No.1-Plate Capacitance. . . . .	2	-	0.11	μf
Input Capacitance. . . . .	2	7	10	μf
Output Capacitance . . . . .	2	4.9	8.1	μf
Plate Current. . . . .	1,3	24	46	ma
Grid-No.2 Current. . . . .	1,3	-	5	ma
Grid-No.1 Current. . . . .	1,4	-	-5	μa
Useful Power Output. . . . .	1,5	18	-	watts

- Note 1: With 6.3 volts ac on filament.
- Note 2: With no external shield. Base pin No.8 grounded.
- Note 3: With dc plate voltage of 200 volts, dc grid-No.2 voltage of 135 volts, and dc grid-No.1 voltage of -5 volts.
- Note 4: With dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 20 ma.
- Note 5: With dc plate voltage of 500 volts, dc grid-No.2 voltage of 200 volts, grid-No.1 resistor of 0.015 megohm ± 10%, dc plate current of 60 ma., dc grid-No.1 current of 2.5 to 3.5 ma., and frequency of 15 Mc.

- Continuous Commercial Service.
- Intermittent Commercial & Amateur Service.
- With ac on filament.
- \*, ⊕, □: See next page.



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- \* When grid No. 1 is driven positive and the 2E24 is operated at maximum ratings, the total dc grid-No. 1-circuit resistance should not exceed 30000 ohms. If additional bias is required, it 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.
- ⊕⊕ Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor of the value shown. The grid-No. 2 voltage must not exceed 600 volts under key-up conditions.
- Obtained from fixed supply or by grid-No. 1 resistor of value shown.

Data on operating frequencies for the 2E24 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY

OUTLINE DIMENSIONS  
for the 2E24 are the same as those for the 2E26

### OPERATING NOTES

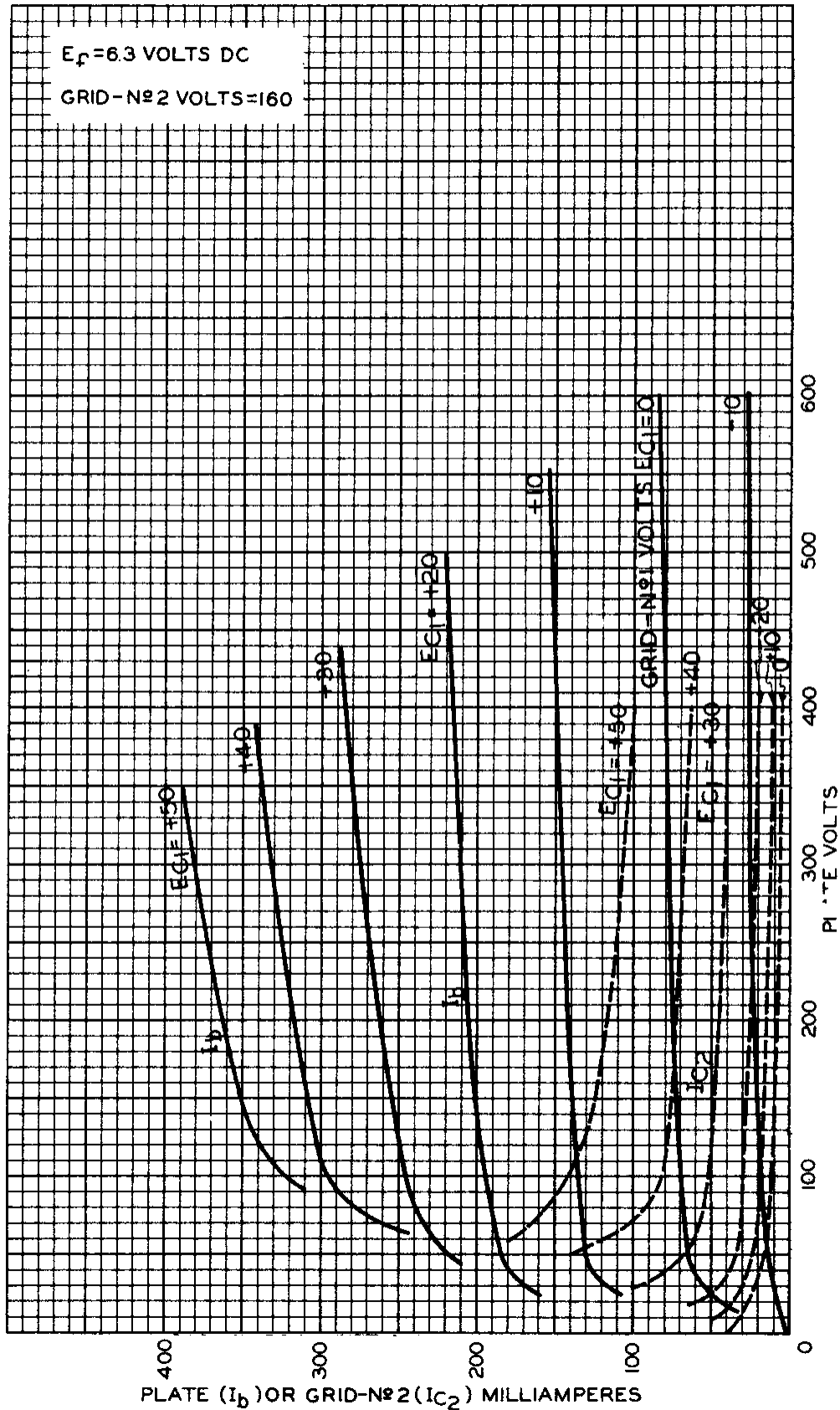
The 2E24 is intended for use in mobile and emergency-communications equipment. Its filament combines sturdiness and efficiency with quick heating and provides wide latitude in operating-voltage range. Although designed for intermittent operation, the filament will give reasonable life when it is operated continuously. In continuous-service applications where extremely long life is desired, it is recommended that the heater-cathode type 2E26 be used.

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### AVERAGE PLATE CHARACTERISTICS



AUG. 22, 1949

TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

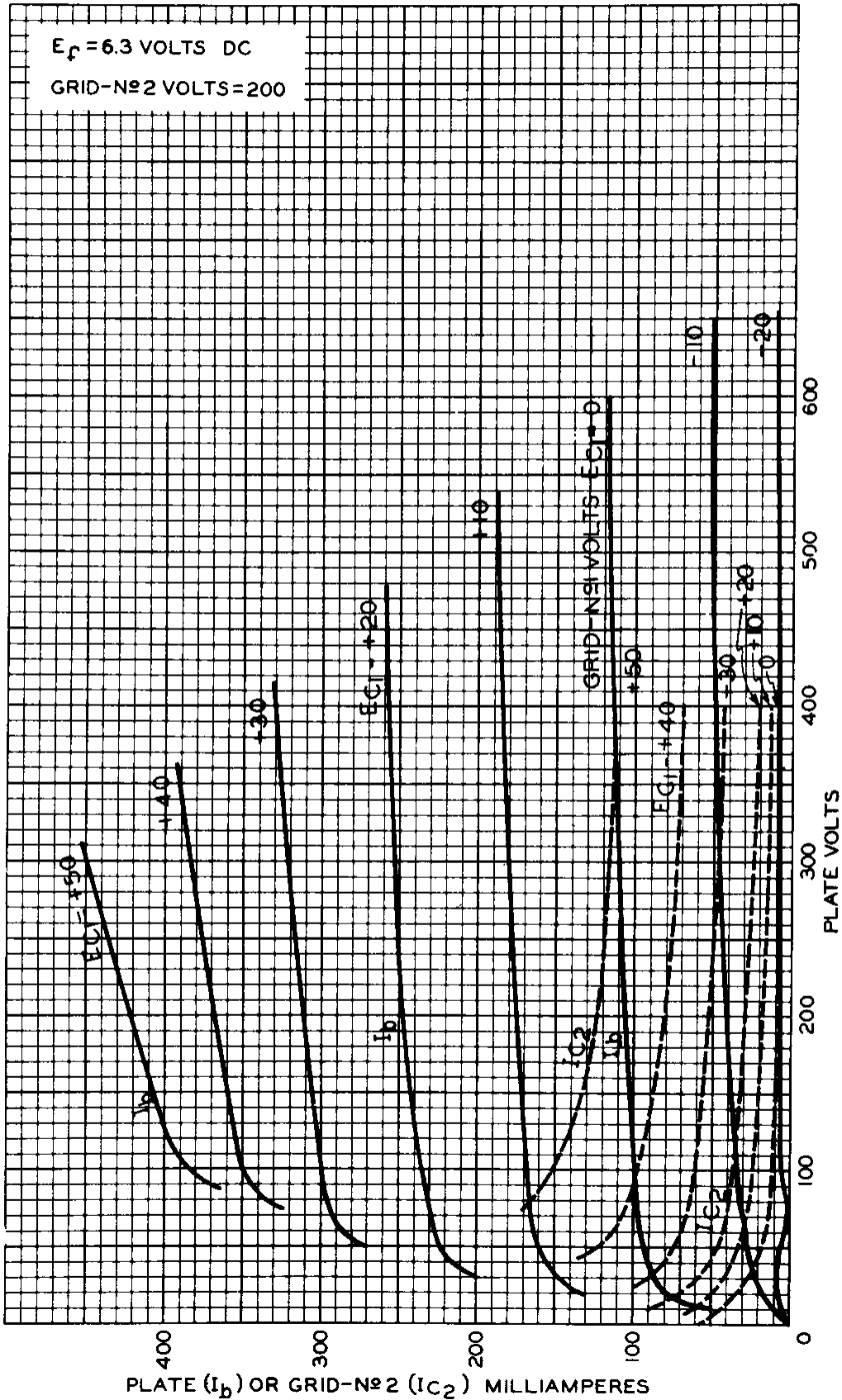
92CM-6660RI



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### AVERAGE PLATE CHARACTERISTICS



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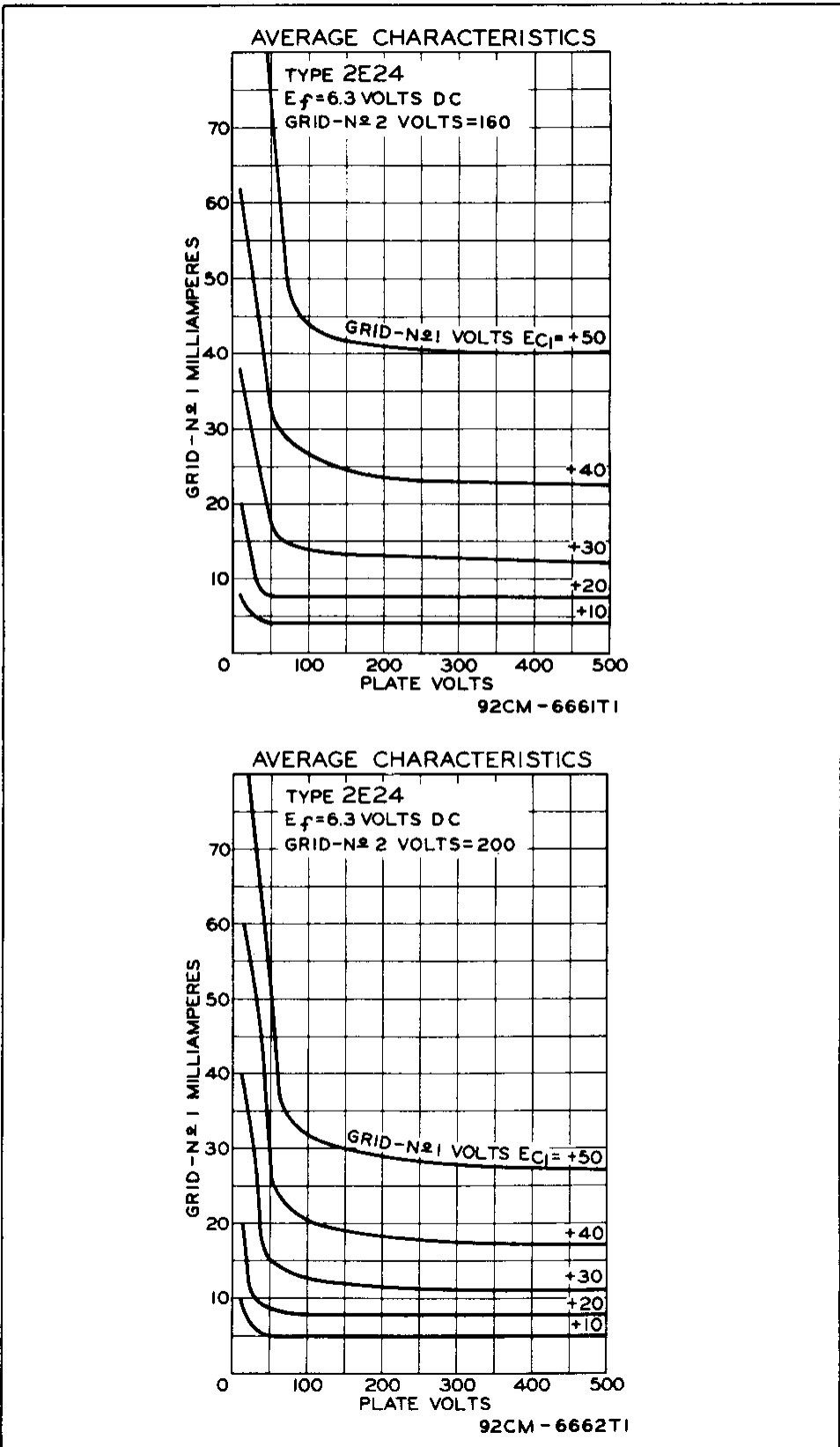
92CM-6659RI

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# VHF BEAM POWER AMPLIFIER



SEPT. 15, 1949

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