



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  $\mu$ hos

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. . . . .  $\mu$ f  
 Input. . . . . 8.5 . . . . .  $\mu$ f  
 Output . . . . . 6.5 . . . . .  $\mu$ f

<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

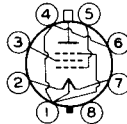
Base . . . . . Small-Micanol-Wafer Octal 8-Pin,  
with Sleeve No.R6159

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\*

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*	
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*	ICAS**	
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 100,000 ohms. 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 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>□*</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.

□ obtained from grid resistor of value shown, or by partial self-bias methods.

●, ●●, □, \*: See next page.

← indicates a change.

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## VHF BEAM POWER AMPLIFIER

	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.

NOV. 1, 1950

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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## VHF BEAM POWER AMPLIFIER

- \* 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

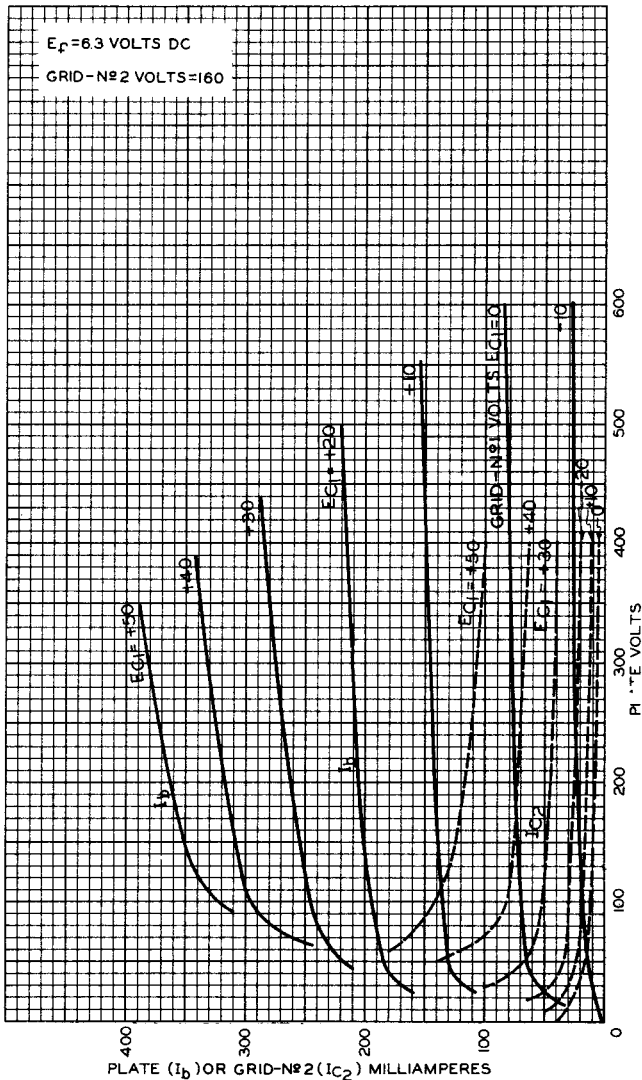
The 2E24 is intended for use in mobile and emergency-communications equipment. Its filament combines sturdiness and efficiency with quick heating and provides wide latitude in operating-voltage range. Although designed for intermittent operation, the filament will give reasonable life when it is operated 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

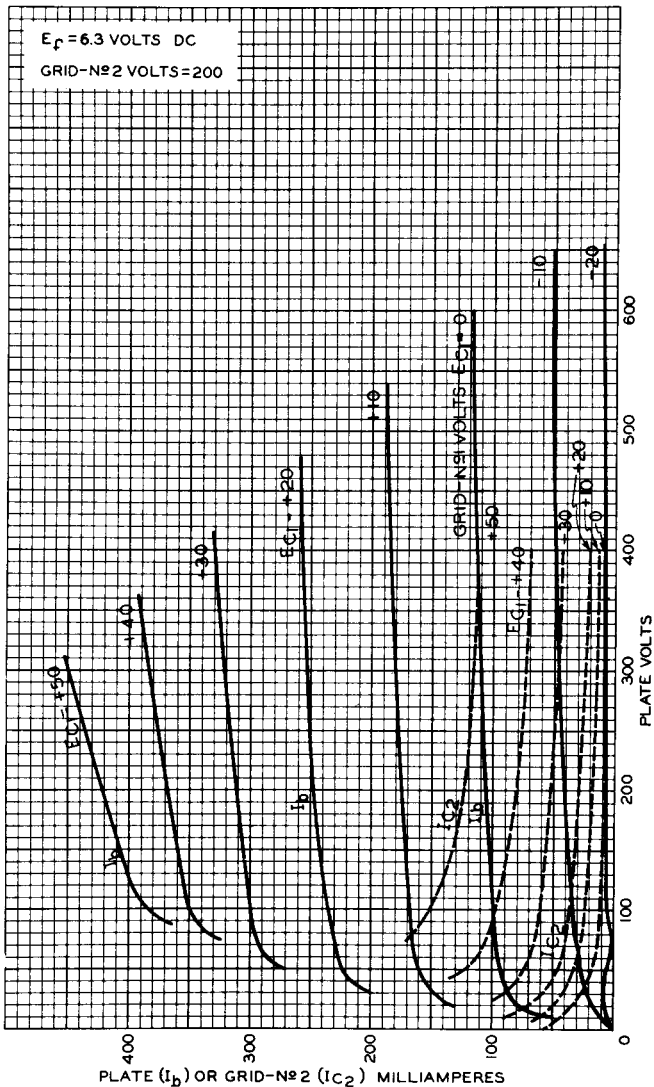
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### AVERAGE PLATE CHARACTERISTICS



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## VHF BEAM POWER AMPLIFIER

