



4-250A

4-250A/5D22 POWER TETRODE

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage	5.0	ac or dc volts
Current	14.5	amp

Transconductance (Approx.) for plate current of 100 ma.	4000	μ hos
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Mu-Factor, Grid No.2 to Grid No.1	5.1	
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Direct Interelectrode Capacitances:

Grid No.1 to Plate ^o	0.12	μ f
Input	12.7	μ f
Output	4.5	μ f

^o With no external shield and with base shell connected to ground.

Mechanical:

Mounting Position Vertical, base up or down

Overall Length 6-1/8" \pm 1/4"

Seated Length 5-3/8" \pm 1/4"

Maximum Diameter 3-9/16"

Cap. Skirted Small

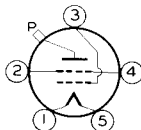
Base^o Special Metal-Shell Giant 5-Pin

Basing Designation for BOTTOM VIEW 5BK

Pin 1 - Filament

Pin 2 - Grid No.2

Pin 3 - Grid No.1



Pin 4 - Grid No.2

Pin 5 - Filament

Cap - Plate

Forced-Air Cooling:

Through Base Toward Bulb 5 cfm

The specified air flow from a small fan or centrifugal blower should be applied simultaneously with filament power.

Of Bulb and Plate Seal:

Continuous Service: At frequencies below 30 Mc, relatively slow movement of air past the tube is sufficient to prevent exceeding the specified plate-seal temperature. At frequencies above 30 Mc, special attention should be given to adequate cooling of bulb and plate seal. A small fan directed toward the upper part of the bulb will generally provide sufficient cooling.

Intermittent Service ("On" period does not exceed 5 minutes and is followed by "off" period of the same or greater duration): At frequencies below 30 Mc,

^o Metal base shell should be grounded by means of suitable spring fingers.

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forced-air cooling of the bulb and plate seal is not usually required if the ambient temperature is below 30°C, provided a heat-radiating plate connector is used and free circulation of air is provided.

Plate-Seal Temperature (Measured on top of plate cap):		
Continuous Service	170 max.	°C
Intermittent Service (As defined above).	220 max.	°C

AF POWER AMPLIFIER & MODULATOR - Class AB₁[#]

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	350 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 DISSIPATION*	35 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage [▲]	500	500	500	500	volts
DC Grid-No.1 (Control- Grid) Voltage [®]	-64	-88	-90	-93	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage.	128	176	180	186	volts
Zero-Signal DC Plate Cur..	120	110	120	120	ma
Max.-Signal DC Plate Cur..	400	405	430	417	ma
Zero-Signal DC Grid-No.2 Current.	-0.4	-0.3	-0.3	-0.2	ma
Max.-Signal DC Grid-No.2 Current.	23	22	13	10.5	ma
Effective Load Resistance (Plate-to-plate).	6250	9170	11400	15000	ohms
Max.-Signal Driving Power.	0	0	0	0	watts
Total Harmonic Distortion.	4	2.5	2	2.5	%
Max.-Signal Power Output (Approx.).	310	460	625	750	watts

[#] Subscript 1 indicates that grid current does not flow during any part of input cycle.

[®] Total effective grid-No.1-circuit resistance should not exceed 0.25 megohm.

AF POWER AMPLIFIER & MODULATOR - Class AB₂^{*}

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	350 max.	ma
PLATE DISSIPATION*	250 max.	watts
GRID-No.2 DISSIPATION*	35 max.	watts

* , ▲ , ® : See next page.

NOV. 15, 1948

TUBE DEPARTMENT

TENTATIVE* DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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4-250A/5D22

POWER TETRODE

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	1500	2000	2500	3000	volts
DC Grid-No.2 Voltage▲	300	300	300	300	volts
DC Grid-No.1 (Control-Grid) Voltage▲▲.	-48	-48	-51	-53	volts
Peak AF Grid-No.1 to Grid-No.1 Voltage.	192	198	200	198	volts
Zero-Signal DC Plate Cur.	100	120	120	125	ma
Max.-Signal DC Plate Cur.	485	510	500	473	ma
Zero-Signal DC Grid-No.2 Current	0	0	0	0	ma
Max.-Signal DC Grid-No.2 Current	34	26	23	33	ma
Effective Load Resistance (Plate-to-plate).	5400	8000	10900	16000	ohms
Max.-Signal Av. Driving Power (Approx.)■	2.1	2.3	2.2	1.9	watts
Max.-Signal Peak Driving Power (Approx.)■	4.7	5.5	4.8	4.6	watts
Total Harmonic Distortion.	3	4	4	4.5	%
Max.-Signal Power Output (Approx.).	428	650	840	1040	watts

- * Averaged over any audio-frequency cycle of sine-wave form.
- ▲ Obtained from a source having good regulation.
- ★ Subscript 2 indicates that grid current flows during some part of input cycle.
- ▲▲ Obtained from fixed supply having dc resistance not exceeding 250 ohms.
- Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class AB₂ stage. The effective resistance per grid-No.1 circuit of the class AB₂ stage should be held at a low value.

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:

DC PLATE VOLTAGE	3200 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-500 max.	volts
DC PLATE CURRENT	275 max.	ma
PLATE DISSIPATION.	165 max.	watts
GRID-No.2 DISSIPATION.	35 max.	watts
GRID-No.1 DISSIPATION.	5 max.	watts

Typical Operation:

DC Plate Voltage	2500	3000	..	volts
DC Grid-No.2 Voltage†	400	400	..	volts
DC Grid-No.1 Voltage††.	-200	-310	..	volts

†,††: see next page.

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POWER TETRODE

Peak RF Grid-No.1 Volt. (Approx.)	255	365	volts
DC Plate Current	200	225	ma
DC Grid-No.2 Current	30	30	. . . . .	ma
DC Grid-No.1 Current (Approx.)*	9	9	. . . . .	ma
Driving Power (Approx.)*	2.2	3.2	. . . . .	watts
Power Output (Approx.)	375	510	. . . . .	watts

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

†† For high-level modulated service, the use of partial grid-resistor bias is recommended. Bypass capacitors across the grid resistor should have a reactance at the highest modulation frequency equal to at least twice the grid-resistor value.

RF POWER AMPLIFIER & OSCILLATOR—

Class C Telegraphy or FM Telephony

Key-down conditions per tube without amplitude modulation

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE	4000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	600 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT	350 max.	ma
PLATE DISSIPATION	250 max.	watts
GRID-No.2 DISSIPATION	35 max.	watts
GRID-No.1 DISSIPATION	5 max.	watts

Typical Operation:

DC Plate Voltage	2500	3000	4000	. . . . .	volts
DC Grid-No.2 Voltage	500	500	500	. . . . .	volts
DC Grid-No.1 Voltage	-150	-180	-225	. . . . .	volts
Peak RF Grid-No.1 Voltage (Approx.)	220	265	303	. . . . .	volts
DC Plate Current	300	345	312	. . . . .	ma
DC Grid-No.2 Current	60	60	45	. . . . .	ma
DC Grid-No.1 Current (Approx.)*	9	10	9	. . . . .	ma
Driving Power (Approx.)*	1.7	2.6	2.46	. . . . .	watts
Power Output (Approx.)	575	800	1000	. . . . .	watts

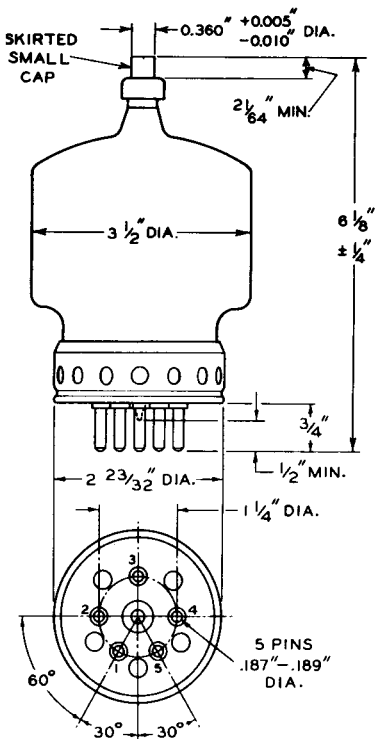
* For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—Grid Current and Driving Power in the General Section.

Data on operating frequencies for the 4-250A/5D22 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.



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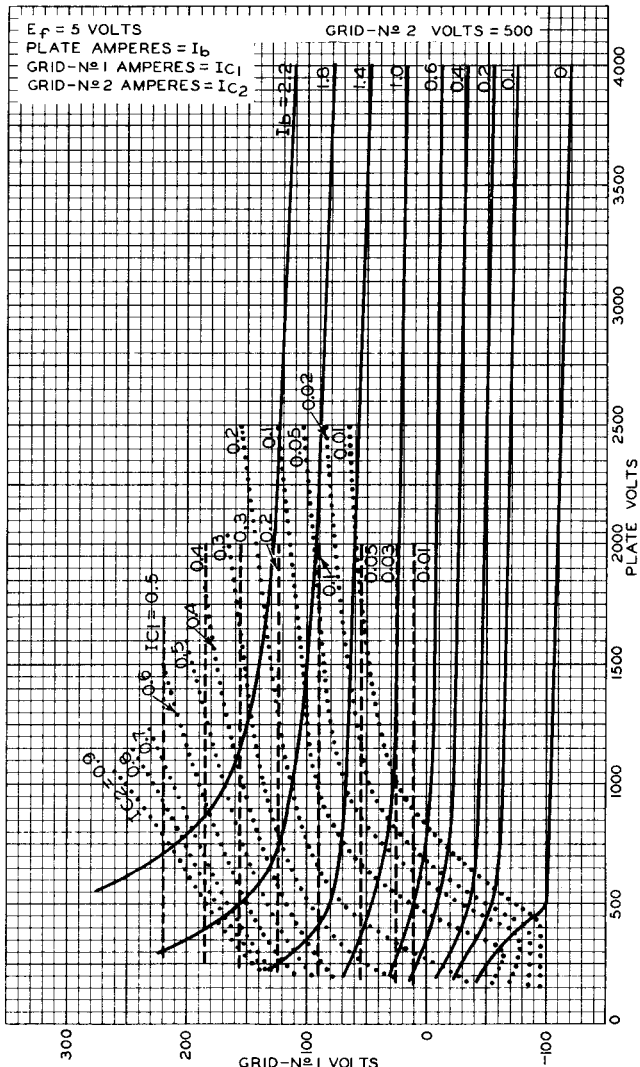
92CS-7075

4-250A



4-250A / 5D22

AVERAGE CONSTANT-CURRENT CHARACTERISTICS



4-250A/5D22

Beam Power Tube

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage (AC or DC) 5.0 ± 5% volts
Current at filament volts = 5.0 14.5 amp

Transconductance, for plate volts

= 2500, grid-No.2 volts = 500, and
plate ma. = 100 4000 μmhos

Mu-Factor, Grid No.2 to Grid No.1 5.1

Direct Interelectrode Capacitances:^a

Grid No.1 to plate. 0.12 max. μμf

Grid No.1 to filament, grid No.2,
and base shell. 13.0 μμf

Plate to filament, grid No.2,
and base shell. 4.6 μμf

Mechanical:

Operating Position. Vertical, base down or up

Maximum Overall Length. 6-3/8"

Seated Length 5-3/8" ± 1/4"

Maximum Diameter. 3-9/16"

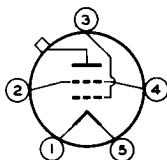
Weight (Approx.). 8 oz

Cap Skirted Small (JEDEC No.C1-22)

Base^b Special Metal-Shell Giant 5-Pin

Basing Designation for BOTTOM VIEW. 5BK

Pin 1 - Filament
Pin 2 - Grid No.2
Pin 3 - Grid No.1



Pin 4 - Grid No.2
Pin 5 - Filament
Cap - Plate

Thermal:

Forced-Air Cooling:

Upward through base toward bulb:

Base-cooling air flow from a small fan or centrifugal blower should be applied simultaneously with filament power. In continuous service at frequencies below 30 Mc, 2 cfm at a static pressure of 0.1 inch of water are required through the base; at frequencies above 30 Mc, 5 cfm at a static pressure of 0.2 inch of water are required. In intermittent service, regardless of the operating frequency, an air flow of 5 cfm through the base must be maintained.

← indicates a change.



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To bulb and plate seal:

Continuous Service: At frequencies below 30 Mc, relatively slow movement of air past the bulb is sufficient to prevent exceeding the specified plate-seal temperature of 170° C. At frequencies above 30 Mc, special attention should be given to adequate cooling of bulb and plate seal. A small stream of air directed toward the upper part of the bulb will generally provide sufficient cooling.

Plate-Seal Temperature (Measured on top of plate cap):

Continuous service. 170 max. °C

Components:

Socket. . . E.F. Johnson Co. Socket No.122-275, or equivalent
Heat-Radiating Plate Connector. . . Eimac HR-6, or equivalent

AF POWER AMPLIFIER & MODULATOR — Class AB₁^c

Maximum CCS^d Ratings, Absolute-Maximum Values:

DC PLATE VOLTAGE.	4000 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT ^e	350 max.	ma
GRID-No.2 INPUT ^e	35 max.	watts
GRID-No.1 INPUT ^e	10 max.	watts
PLATE DISSIPATION ^e	250 max.	watts

AF POWER AMPLIFIER & MODULATOR — Class AB₂^f

Maximum CCS^d Ratings, Absolute-Maximum Values:

DC PLATE VOLTAGE.	4000 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
MAX.-SIGNAL DC PLATE CURRENT ^e	350 max.	ma
GRID-No.2 INPUT ^e	35 max.	watts
GRID-No.1 INPUT ^e	10 max.	watts
PLATE DISSIPATION ^e	250 max.	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

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

Maximum CCS^d Ratings, Absolute-Maximum Values:

	<i>Up to 75 Mc</i>	
DC PLATE VOLTAGE.	3200 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
DC GRID-No.1 VOLTAGE.	-500 max.	volts
DC PLATE CURRENT.	275 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	165 max.	watts

→ Indicates a change.



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RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy^g and

RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS^d Ratings, Absolute Maximum Values:

	Up to 75 Mc	←
DC PLATE VOLTAGE.	4000 max.	volts
DC GRID-No.2 VOLTAGE.	600 max.	volts
DC GRID-No.1 VOLTAGE.	-500 max.	volts
DC PLATE CURRENT.	350 max.	ma
GRID-No.2 INPUT	35 max.	watts
GRID-No.1 INPUT	10 max.	watts
PLATE DISSIPATION	250 max.	watts

^a Without external shield.

^b Metal base shell should be grounded by means of suitable spring fingers.

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

^d Continuous Commercial Service.

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

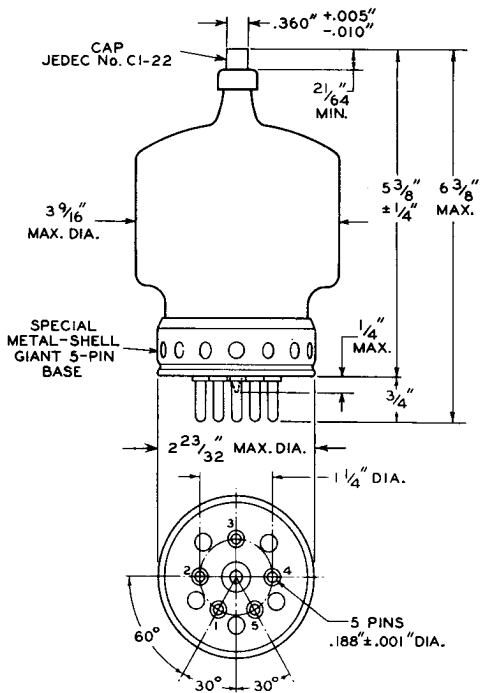
^f Subscript 2 indicates that grid-No.1 current flows during some part of input cycle.

^g 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 per cent of the carrier conditions.

← Indicates a change.



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92CS-7075R2

