

Power Triode

Forced-Air Cooled

VHF Grid-Drive or Cathode-Drive Operation

6350 Watts VHF TV
Output at 216 MHz

7000 Watts CW
Output at 30 MHz

ELECTRICAL

Filamentary Cathode, Thoriated-Tungsten Type:

| | | |
|---|---------------------------------|----------|
| Voltage (ac or dc) | } 12.6 typical V 13.2 max. V | V |
| Current: | | V |
| Typical value at 12.6 volts | 29 | A |
| Maximum value for starting, even momentarily | 175 | A |
| Cold Resistance | 0.052 | Ω |
| Minimum heating time | 15 | s |
| Amplification Factor | 29 | |
| Direct Interelectrode Capacitances: | | |
| Grid to plate | 21 | pF |
| Grid to filament | 19 | pF |
| Plate to filament | 0.5 | pF |

MECHANICAL

| | |
|--------------------------------|-------------------------|
| Operating Position | Vertical, either end up |
| Overall Length | (181.1 mm) 7.13 max. in |
| Greatest Diameter | (119.1 mm) 4.69 max. in |
| Terminal Connections | See Dimensional Outline |
| Radiator | Integral part of tube |
| Weight (Approx.) | (2.8 kg) 6-1/4 lb |

THERMAL

| | |
|--|-------------|
| Terminal Temperature (Plate, grid and filament) | 250 max. °C |
| Plate-Core Temperature | 250 max. °C |
| Envelope Temperature (at hottest point) | 250 max. °C |

AF POWER AMPLIFIER & MODULATOR - CLASS B^a

Maximum CCS Ratings, Absolute-Maximum Values:

| | |
|--|-------------|
| DC Plate Voltage | 6200 max. V |
| Max.-Signal DC Plate Current | 1.5 max. A |
| Max.-Signal Plate Input | 8700 max. W |
| Plate Dissipation | 5000 max. W |

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Typical Operation:

Values are for 2 tubes

| | | |
|---|------|----------|
| DC Plate Voltage | 4700 | V |
| DC Grid Voltage | -200 | V |
| Peak AF Grid-to-Grid Voltage | 900 | V |
| Zero-Signal DC Plate Current | 0.3 | A |
| Max.-Signal DC Plate Current | 2.8 | A |
| Effective Load Resistance (Plate to plate) | 3640 | Ω |
| Max.-Signal Driving Power (Approx.) | 195 | W |
| Max.-Signal Power Output (Approx.) | 8800 | W |

GRID MODULATED RF POWER AMPLIFIER – CLASS C TELEVISION SERVICE^b

Synchronizing-level conditions per tube unless otherwise specified. At frequency of 54 to 216 MHz.

Maximum CCS Ratings, Absolute-Maximum Values:

| | | |
|--|------------|---|
| DC Plate Voltage | 3700 max. | V |
| DC Grid Voltage (White level) | -800 max. | V |
| DC Plate Current | 1.9 max. | A |
| DC Grid Current (Pedestal level) | 0.225 max. | A |
| Plate Input | 6500 max. | W |
| Plate Dissipation | 5000 max. | W |

Typical Operation in Cathode-Drive Circuit:

Bandwidth^c of 8.5 MHz

| | | |
|--------------------------------|-------|---|
| DC Plate Voltage | 3200 | V |
| DC Grid Voltage: | | |
| Synchronizing level | -110 | V |
| Pedestal level | -220 | V |
| White level | -520 | V |
| Peak RF Grid Voltage | 435 | V |
| DC Plate Current: | | |
| Synchronizing level | 1.8 | A |
| Pedestal level | 1.25 | A |
| DC Grid Current (Approx.): | | |
| Synchronizing level | 0.400 | A |
| Pedestal level | 0.130 | A |
| Driving Power (Approx.): | | |
| Synchronizing level | 770 | W |
| Power Output (Approx.): | | |
| Synchronizing level | 4000 | W |
| Pedestal level | 2300 | W |

RF POWER AMPLIFIER – CLASS B TELEVISION SERVICE^b

Synchronizing-level conditions per tube unless otherwise specified. At frequency of 54 to 216 MHz.

Maximum CCS Ratings, Absolute-Maximum Values:

| | |
|--|--------------|
| DC Plate Voltage | 4500 max. V |
| DC Plate Current | 2.0 max. A |
| DC Grid Current (Pedestal level) | 0.325 max. A |
| Plate Input | 9000 max. W |
| Plate Dissipation | 5000 max. W |

Typical Operation in Cathode-Drive Circuit:

| | Bandwidth ^c of 10 MHz | | | |
|-------------------------------|----------------------------------|---------|-------|---|
| | 8.5 MHz | 6.0 MHz | | |
| DC Plate Voltage | 3000 | 3200 | 4300 | V |
| DC Grid Voltage | -105 | -110 | -150 | V |
| Peak RF Grid Voltage: | | | | |
| Synchronizing level | 380 | 435 | 500 | V |
| Pedestal level | 290 | 310 | 355 | V |
| DC Plate Current: | | | | |
| Synchronizing level | 1.8 | 1.8 | 2.0 | A |
| Pedestal level | 1.36 | 1.35 | 1.5 | A |
| DC Grid Current: | | | | |
| Synchronizing level | 0.265 | 0.400 | 0.439 | A |
| Pedestal level | 0.115 | 0.130 | 0.118 | A |
| Driving Power (Approx.): | | | | |
| Synchronizing level | 625 | 770 | 983 | W |
| Power Output (Approx.): | | | | |
| Synchronizing level | 3150 | 4000 | 6350 | W |
| Pedestal level | 1800 | 2300 | 3590 | W |

PLATE MODULATED RF POWER AMPLIFIER – CLASS C TELEPHONY^b

Carrier conditions per tube for use with a maximum modulation factor of 1.0. See Ratings vs. Frequency Chart.

Maximum CCS Ratings, Absolute-Maximum Values:

| | |
|-----------------------------|--------------|
| DC Plate Voltage | 5000 max. V |
| DC Grid Voltage | -1000 max. V |
| DC Plate Current | 1.0 max. A |
| DC Grid Current | 0.3 max. A |
| Plate Input | 5000 max. W |
| Plate Dissipation | 3300 max. W |

Typical Operation in Grid-Drive Circuit:

| | Up to 30 MHz | At 110 MHz | |
|----------------------------|-----------------|---------------|---|
| DC Plate Voltage | 4700 | 4000 | V |

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| | | | |
|---|------|------|----------|
| DC Grid Voltage | -400 | -350 | V |
| From a grid resistor of | 1425 | 1460 | Ω |
| Peak RF Grid Voltage ^d | 675 | 600 | V |
| DC Plate Current | 0.96 | 0.93 | A |
| DC Grid Current (Approx.) | 0.28 | 0.24 | A |
| Driving Power (Approx.) | 170 | 130 | W |
| Power Output (Approx.) | 3700 | 2800 | W |

Typical Operation in Cathode-Drive Circuit:

| | | | |
|--|------|------|----------|
| DC Plate Voltage | 4700 | 4000 | V |
| DC Grid Voltage | -400 | -350 | V |
| From a grid resistor of | 1425 | 1460 | Ω |
| Peak RF Grid Voltage | 675 | 600 | V |
| DC Plate Current | 0.96 | 0.93 | A |
| DC Grid Current (Approx.) | 0.28 | 0.24 | A |
| Driving Power (Approx.) ^e | 720 | 600 | W |
| Power Output (Approx.) | 4200 | 3200 | W |

RF POWER AMPLIFIER & OSC. - CLASS C TELEGRAPHY^b

AND

RF POWER AMPLIFIER - CLASS C FM TELEPHONY^b

See Ratings vs. Frequency Chart

Maximum CCS Ratings, Absolute-Maximum Values:

| | | |
|-----------------------------|------------|---|
| DC Plate Voltage | 6200 max. | V |
| DC Grid Voltage | -1000 max. | V |
| DC Plate Current | 1.4 max. | A |
| DC Grid Current | 0.3 max. | A |
| Plate Input | 8700 max. | W |
| Plate Dissipation | 5000 max. | W |

Typical Operation in Grid-Drive Circuit:

Up to 30 MHz

| | | |
|--------------------------------------|-------|----------|
| DC Plate Voltage | 6000 | V |
| DC Grid Voltage: | | |
| From a fixed supply of | -550 | V |
| From a grid resistor of | 1900 | Ω |
| From a cathode resistor of | 360 | Ω |
| Peak RF Grid Voltage | 875 | V |
| DC Plate Current | 1.25 | A |
| DC Grid Current (Approx.) | 0.290 | A |
| Driving Power (Approx.) | 225 | W |
| Power Output (Approx.) | 6000 | W |

Typical Operation in Cathode-Drive Circuit:

| | | | | |
|----------------------------|--------|---------|---------|---|
| | Up to | At | At | |
| | 30 MHz | 110 MHz | 220 MHz | |
| DC Plate Voltage | 6000 | 5000 | 4300 | V |

DC Grid Voltage:

| | | | | |
|----------------------------------|-------|-------|------|----------|
| From a fixed supply of . . . | -550 | -340 | -200 | V |
| From a grid resistor of . . . | 1900 | 1225 | 807 | Ω |
| From a cathode resistor of . . . | 360 | 208 | 134 | Ω |
| Peak RF Grid Voltage | 875 | 625 | 432 | V |
| DC Plate Current | 1.25 | 1.35 | 1.25 | A |
| DC Grid Current (Approx.) . . . | 0.290 | 0.275 | 0.25 | A |
| Driving Power (Approx.) | 1225 | 1000 | 542 | W |
| Power Output (Approx.) | 7000 | 5500 | 4000 | W |

SELF-RECTIFYING OSCILLATOR OR AMPLIFIER - CLASS C^b

See Ratings vs. Frequency Chart

Maximum CCS Ratings, Absolute-Maximum Values:

| | | |
|------------------------------------|------------|---|
| AC Plate Voltage (RMS) | 7000 max. | V |
| DC Grid Voltage | -300 max. | V |
| DC Plate Current | 0.635 max. | A |
| DC Grid Current | 0.135 max. | A |
| Plate Input ^f | 4900 max. | W |
| Plate Dissipation | 5000 max. | W |

Typical Operation:

| | | |
|--|-------|---|
| AC Plate Voltage (RMS) | 6600 | V |
| DC Grid Voltage | -127 | V |
| DC Plate Current | 0.625 | A |
| DC Grid Current (Approx.) | 0.105 | A |
| Driving Power (Approx.) ^g | 60 | W |
| Power Output (Approx.) | 3350 | W |

AMPLIFIER OR OSCILLATOR - CLASS C^b

With separate, rectified, unfiltered, single-phase, full-wave plate supply. See Ratings vs. Frequency Chart.

Maximum CCS Ratings, Absolute-Maximum Values:

| | | |
|------------------------------------|------------|---|
| DC Plate Voltage | 5600 max. | V |
| DC Grid Voltage | -600 max. | V |
| DC Plate Current | 1.25 max. | A |
| DC Grid Current | 0.270 max. | A |
| Plate Input ^h | 8600 max. | W |
| Plate Dissipation | 5000 max. | W |

Typical Operation:

| | | |
|--|-------|---|
| DC Plate Voltage | 5000 | V |
| DC Grid Voltage | -260 | V |
| DC Plate Current | 1.2 | A |
| DC Grid Current (Approx.) | 0.260 | A |
| Driving Power (Approx.) ⁱ | 150 | W |
| Power Output (Approx.) | 5650 | W |

CHARACTERISTICS RANGE VALUES

| | Note | Min. | Max. | |
|--------------------------------------|------|------|------|----|
| Filament Current | k | 27 | 31 | A |
| Amplification Factor | k,m | 25 | 33 | |
| Grid-Plate Capacitance | — | 18.7 | 22.7 | pF |
| Grid-Filament Capacitance | — | 15.5 | 22.5 | pF |
| Plate-Filament Capacitance | — | 0.38 | 0.62 | pF |
| Grid Voltage | k,n | -125 | -190 | V |
| Plate Voltage | k,p | 1350 | 1750 | V |
| Plate Voltage | k,r | 2600 | 3400 | V |
| Useful Power Output | k,s | 3 | — | kW |

Footnotes (a) and (b) apply to the *RCA Transmitting Tub Operating Considerations* given at front of this section.

^a See *Classes of Service — AF Power Amplifiers*.

^b See *Classes of Service — RF Power Amplifiers or Oscillators*.

^c Computed between -3 dB points in a single-tuned circuit and based on the tube output capacitance only.

^d Driver modulated approximately 30%.

^e Carrier power of driver modulated 100%.

^f Plate input is 1.11 times the product of the ac voltage (rms) and the dc plate current.

^g From a self-rectified driver.

^h Plate input is 1.23 times the product of the dc plate voltage and the dc plate current.

ⁱ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

^k With 12.6 volts rms on filament.

^m With dc grid voltage of -25 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

ⁿ With dc plate voltage of 4000 volts, and dc grid voltage adjusted to give dc plate current of 0.05 ampere.

^p With dc grid voltage of 0 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.

- ^r With dc grid voltage of -50 volts measured from center tap of filament supply, and dc plate voltage adjusted to give dc plate current of 0.5 ampere.
- ^s In a self-excited, coaxial, oscillator circuit and with dc plate voltage of 5000 volts, dc plate current of 1.1 amperes, grid resistor of $1500 \pm 10\%$ ohms, dc grid current of 0.250 to 0.300 ampere, and frequency of 110 MHz.

FORCED-AIR COOLING

Air Flow:

Through Radiator – Adequate air flow, to limit the plate-core temperature to 250° C, should be delivered by a blower through the radiator before and during the application of all voltages to the tube in accordance with "Typical Air-Cooling Characteristics".

To Grid and Filament Terminals – 10 min. cfm. The specified air flow from a one-inch dia. nozzle, or as obtained by deflectors, should be directed into the filament header before and during the application of any voltages in order to limit the temperature of the filament and grid terminals to 250° C.

During Standby Operation – Cooling air is required when only filament voltage is applied to the tube.

During Shutdown Operation – Air flow should continue for a few minutes after all electrode power is removed.

RATINGS VERSUS FREQUENCY

Frequency has a limiting effect on certain critical parameters. These parameters include: plate voltage, plate input, grid voltage, and grid current. The permissible percentage of maximum rated value for these parameters varies with frequency and service. The service falls into two categories: 1. Television Class B or C service, and 2. all other recommended service. All other recommended service includes:

- Class C Telephony, Plate Modulated
- Class C Telegraphy and FM Telephony
- Class C Amplifier or Oscillator (self-rectifying)

Class C Amplifier or Oscillator (with separate rectified unfiltered plate supply)

PERMISSIBLE PERCENTAGE OF MAXIMUM RATED VALUES

| Service | TV | All Other Service | | | |
|---------------|--------------|-------------------|-----|-----|-----|
| | (B, C) | | | | |
| Frequency | 54 to 216 | 30 | 110 | 220 | MHz |
| Plate Voltage | 100 | 100 | 84 | 72 | % |
| Plate Input | 100 | 100 | 84 | 72 | % |
| Grid Voltage | 100 | 100 | 100 | 60 | % |
| Grid Current | 100 | 100 | 100 | 83 | % |

ELECTRICAL

Filament

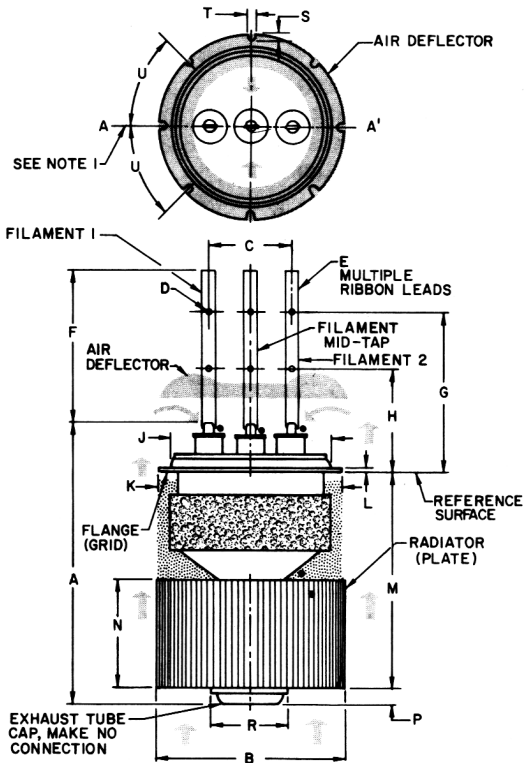
The filament is center-tapped in order to minimize the effect of filament lead inductance, and not to permit operation of the two sections in parallel. At the higher frequencies, all three filament leads should be connected in parallel by means of rf bypass capacitors. Any one of these three leads may then be used as the rf return to the filament.

MECHANICAL

Mounting

The tube requires a clamp support for the radiator (plate connection), a flexible connector for the grid-terminal flange, and three connectors for the filament leads. The tube should be supported in a vertical position with either end up or down. If the tube is subjected in service to considerable vibration, it is advisable to support the mounting by means of a spring suspension. The installation of all wires and connections must be made so that they will not intrude upon the stippled area.

DIMENSIONAL OUTLINE



92LM-2959

NOTES FOR DIMENSIONAL OUTLINE

1. Plane of filament leads will not deviate more than $3\frac{1}{2}^{\circ}$ from plane passing through AA', normal to grid flange.
2. Keep all stippled regions clear. In general do not allow intrusions into these annular regions. If such intrusions are required contact RCA Power Tube Application Engineering, Lancaster, PA for instructions.

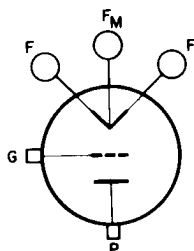
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OUTLINE DIMENSIONS*

| Dimension | Value | | |
|-----------|------------------|-------------------|------|
| A | 7.12 | (180.85) | Max. |
| B | $4.62 \pm .06$ | (117.4 ± 1.5) | |
| C | 2.5 | (63.5) | Max. |
| D Dia. | 0.144 | (3.658) | |
| E | $0.31 \pm .06$ | (7.9 ± 1.5) | |
| F | 3.5 | (88.9) | Min. |
| G | $3.88 \pm .38$ | (98.5 ± 9.7) | |
| H | $2.50 \pm .38$ | (63.5 ± 9.7) | |
| J Dia. | 3.94 | (100.08) | Max. |
| K Dia. | $4.56 \pm .03$ | $(115.8 \pm .8)$ | |
| L | $0.062 \pm .015$ | $(1.58 \pm .38)$ | |
| M | $5.25 \pm .12$ | (133.4 ± 3.1) | |
| N | 2.75 | (69.85) | Max. |
| P | 0.5 | (12.7) | Max. |
| R | 2.0 | (50.8) | Max. |
| S | 0.210 | (5.334) | |
| T | 0.182 | (4.623) | |
| U | 45° | 0.785 Radian | |

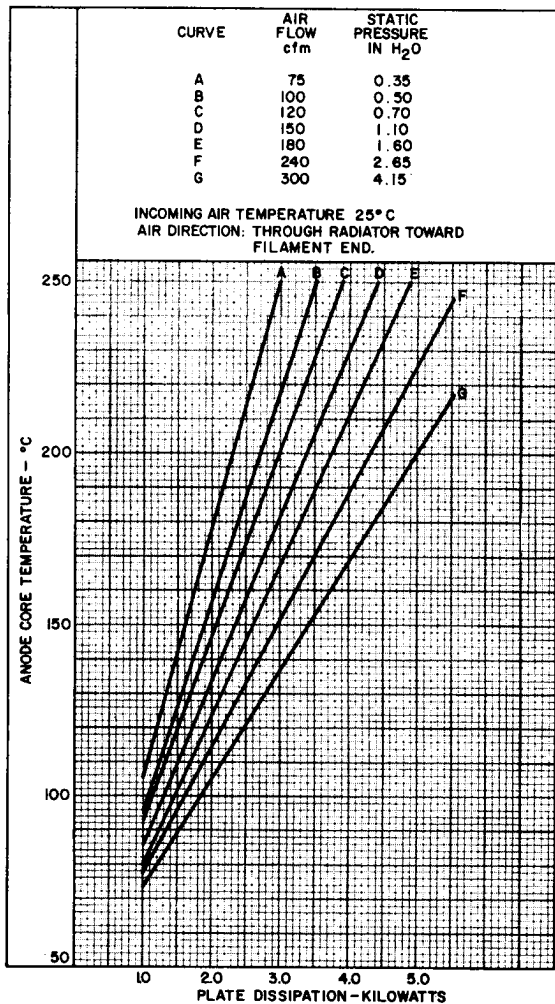
*Dimensions are in inches unless otherwise stated. Dimensions in parentheses are in millimeters.

TERMINAL DIAGRAM



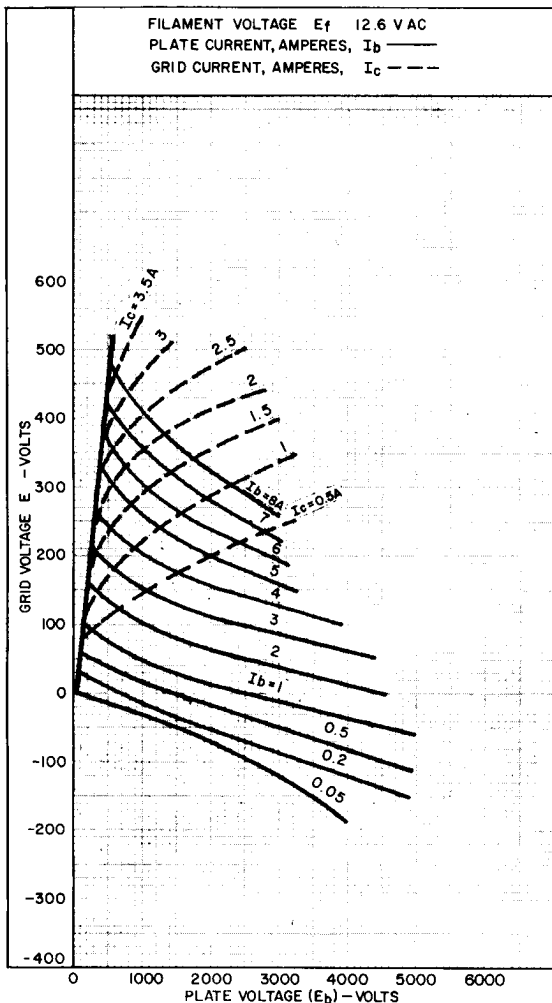
F₁: filament 1
 F_m: filament mid-tap
 F₂: filament 2
 G: grid-flange
 P: plate-radiator

TYPICAL AIR-COOLING CHARACTERISTICS



92LM-2960

TYPICAL CONSTANT-CURRENT CHARACTERISTICS



92LM-2963