



6181

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UHF POWER TETRODE

FORCED-AIR COOLED

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage*	$\left\{ \begin{array}{l} 120 \text{ av.} \\ 130 \text{ max.} \end{array} \right.$	ac or dc volts
		ac or dc volts
Current at 120 volts	1.55	amp
Minimum Heating Time	2	minutes

Mu-Factor, Grid No.2

to Grid No.1 for plate
volts = 1000, grid-No.2 volts
= 400, and plate amperes = 1 8

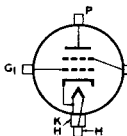
Direct Interelectrode Capacitances:

Grid No.1 to Plate**	0.36 max.	$\mu\mu\text{f}$
Grid-No.1 to Cathode	44	$\mu\mu\text{f}$
Plate to Cathode**	0.10 max.	$\mu\mu\text{f}$
Grid No.1 to Grid No.2	50	$\mu\mu\text{f}$
Grid No.2 to Plate	22	$\mu\mu\text{f}$
Grid No.2 to Cathode***	4 max.	$\mu\mu\text{f}$

Mechanical:

Terminal Connections:

- G₁ - Grid-No.1 Term.
(Adjacent to Cath.
& Heat. Term.)
- G₂ - Grid-No.2 Term.
(Adjacent to
Plate Flange)



- H - Heater Terminals
(Center Pin at Cath.
End & Cath. Term.)
- K - Cathode Terminal
(End Opposite Rad'r)
- P - Plate-Term. Flange

Mounting Position	Vertical, cathode end up or down
Maximum Overall Length	7-7/16"
Greatest Diameter	5" \pm 1/32"
Radiator	Integral part of tube

Air Flow:

Through Radiator--The specified flow of incoming air for various plate dissipations, as indicated in the tabulation below, should be delivered by a blower through the radiator in either direction before and during the application of any voltages. The flow and pressure values are for condition with radiator-temperature rise held constant at 135°C above incoming-air temperature. Under any condition, the air flow must be adequate to limit the temperature of the radiator to its specified maximum value. Heater power, plate power, and air flow may be removed simultaneously.

(Continued on next page)

* Because the cathode is subjected to considerable back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should be reduced depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

** With external flat metal shield 8" in diameter and having center hole 3-13/32" in diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid-No.2 terminal.

*** Same as (**) except that center hole has diameter of 2-15/16", and shield is connected to grid-No.1 terminal.

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Percentage of Max. Rated Plate Dissipation for Each Class of Service	100	75	50	per cent
Minimum Air Flow	75	50	30	cfm
Static Pressure	0.56	0.25	0.10	in. of water

To Grid-No.2 Terminal—A sufficient quantity of air should be delivered to this terminal so that its temperature does not exceed the specified maximum value.

To Grid-No.1 Terminal
Cathode Terminal, and

Heater Pin—An air flow of about 20 cfm from a 1" diameter nozzle at a distance of 1/2" from the heater pin should be directed onto the cathode terminal and heater pin, and then over the grid-No.1 terminal. The quantity of air should be sufficient so that the temperature of the cathode, heater, and grid-No.1 seals does not exceed the specified maximum value.

Radiator Temperature (Measured on the core at end adjacent to plate-terminal flange)	180 max.	°C
Seal and Terminal Temperature: Cathode, Heater, Grid No.1, Grid No.2, and Plate	180 max.	°C

RF POWER AMPLIFIER—Class B Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS* Ratings, Absolute Values:

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC PLATE CURRENT	1.75 max.	amp
DC GRID-No.1 (CONTROL-GRID) CURRENT	0.2 max.	amp
PLATE INPUT	3500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in Cathode-Drive Circuit at 900 Mc:

Bandwidth[▲] of 8 Mc

Air Flow Through Radiator:

Minimum with Incoming Air at 45°C	60	cfm
Static Pressure	0.36	in. of water
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage	75	volts
Peak RF Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	120	volts
Pedestal Level	90	volts

* , ▲: See next page.

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TUBE DEPARTMENT
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DC Plate Current:		
Synchronizing Level	1.7	amp
Pedestal Level	1.3	amp
DC Grid-No.2 Current (Pedestal Level) . .	-0.025	amp
DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.075	amp
Pedestal Level	0.020	amp
Driver Power Output (Approx.):*		
Synchronizing Level	200	watts
Pedestal Level	115	watts
Output-Circuit Efficiency (Approx.) . . .	75	per cent
Useful Power Output (Approx.):		
Synchronizing Level	1200**	watts
Pedestal Level	675**	watts

BIAS-MODULATED RF POWER AMPLIFIER--Class C Television Service

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS* Ratings, Absolute Values:

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White Level)	-300 max.	volts
DC PLATE CURRENT	1.75 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	3500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Grid-Bias-Modulated Operation

in Cathode-Drive Circuit at 900 Mc:

Bandwidth of 8 Mc

Air Flow Through Radiator:

Minimum, with Incoming Air at 45°C . .	60	cfm
Static Pressure	0.36	in. of water
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	75	volts
Pedestal Level	105	volts
White Level	230	volts
Peak RF Cathode-to-Grid-No.1 Voltage . .	120	volts
DC Plate Current:		
Synchronizing Level	1.7	amp
Pedestal Level	1.2	amp
DC Grid-No.2 Current (Pedestal Level) . .	-0.025	amp

*, †, ‡, **, ††: See next page.

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DC Grid-No.1 Current (Approx.):		
Synchronizing Level	0.075	amp
Pedestal Level	0.020	amp
Driver Power Output (Approx.):*		
Synchronizing Level	200	watts
Output-Circuit Efficiency (Approx.) . . .	75	per cent
Useful Power Output (Approx.):		
Synchronizing Level	1200 ^{••}	watts
Pedestal Level	675 ^{••}	watts

Typical Cathode-Bias-Modulated Operation

In Cathode-Drive Circuit at 900 Mc:

Bandwidth[▲] of 8 Mc

Air Flow Through Radiator:

Minimum, with Incoming Air at 45°C . .	60	cfm
Static Pressure	0.36	in. of water
DC Plate-to-Grid-No.1 Voltage	1875	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage:		
Synchronizing Level	75	volts
Pedestal Level	105	volts
White Level	210	volts
Peak RF Cathode-to-Grid No.1 Voltage . .	120	volts

DC Plate Current:

Synchronizing Level	1.7	amp
Pedestal Level	1.2	amp
DC Grid-No.2 Current (Pedestal Level) . .	-0.025	amp

DC Grid-No.1 Current (Approx.):

Synchronizing Level	0.075	amp
Pedestal Level	0.020	amp

Driver Power Output (Approx.):*

Synchronizing Level	200	watts
Output-Circuit Efficiency (Approx.) . . .	75	per cent

Useful Power Output (Approx.):

Synchronizing Level	1200 ^{••}	watts
Pedestal Level	675 ^{••}	watts

PLATE-MODULATED RF POWER AMPLIFIER--Class C Telephony

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

Maximum CCS[®] Ratings, Absolute Values:

DC PLATE VOLTAGE	1600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . .	-300 max.	volts
DC PLATE CURRENT	1.05 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp

▲ Measured between half-power points.

•, *, ••: See next page.

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PLATE INPUT	1650 max.	watts
GRID-No.2 INPUT	25 max.	watts
PLATE DISSIPATION	1300 max.	watts

Typical Operation in Cathode-Drive Circuit at 400 Mc:

Air Flow Through Radiator:

Minimum with Incoming Air at 45°C	40	cfm
Static Pressure	0.16	in. of water
DC Plate-to-Grid-No.1 Voltage	1775	volts
DC Grid-No.2-to-Grid-No.1 Voltage	550	volts
DC Cathode-to-Grid-No.1 Voltage	175	volts
Peak RF Cathode-to-Grid-No.1 Voltage	210	volts
DC Plate Current	1.00	amp
DC Grid-No.2 Current	0.065	amp
DC Grid-No.1 Current (Approx.)	0.045	amp
Driver Power Output (Approx.) [‡]	250	watts
Output-Circuit Efficiency (Approx.)	90	per cent
Useful Power Output (Approx.)	950 ^{••}	watts

RF POWER AMPLIFIER & OSC.--Class C Telegraphy[□]
and

RF POWER AMPLIFIER--Class C FM Telephony

Maximum CCS* Ratings, Absolute Values:

DC PLATE VOLTAGE	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	500 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-300 max.	volts
DC PLATE CURRENT	1.25 max.	amp
DC GRID-No.1 CURRENT	0.2 max.	amp
PLATE INPUT	2500 max.	watts
GRID-No.2 INPUT	40 max.	watts
PLATE DISSIPATION	2000 max.	watts

Typical Operation in FM Service with
Cathode-Drive Circuit at 900 Mc:

Air Flow Through Radiator:

Minimum, with Incoming Air at 45°C	30	cfm
Static Pressure	0.09	in. of water
DC Plate-to-Grid-No.1 Voltage	1910	volts
DC Grid-No.2-to-Grid-No.1 Voltage†	550	volts
DC Cathode-to-Grid-No.1 Voltage††	110	volts

• Continuous Commercial Service.

* In cathode-drive, plate-modulated, class C rf power amplifier service, the 6181 can be modulated 100% if the rf driver stage is also modulated 100% simultaneously. Care should be taken to insure that the driver-modulation and amplifier-modulation voltages are exactly in phase.

□ Key-down conditions per tube without amplitude modulation. 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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Peak RF Cathode-to-Grid-No.1 Voltage . . .	120	volts
DC Plate Current	0.9	amp
DC Grid-No.2 Current	0.05	amp
DC Grid-No.1 Current (Approx.)	0.015	amp
Driver Power Output (Approx.)†	150	watts
Output-Circuit Efficiency (Approx.) . . .	70	per cent
Useful Power Output (Approx.)	600**	watts

‡ The driver stage is required to supply tube losses, rf circuit losses, and rf power added to the plate input. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

** This value of useful power is measured at load of output circuit having indicated efficiency.

† 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 not be used if the 6181 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-no.2 voltage from rising above 500 volts under key-up conditions; and additional fixed grid-no.1 bias must be provided to limit the plate current.

†† obtained from fixed supply, by grid-no.1 resistor, by cathode resistor, or by combination methods.

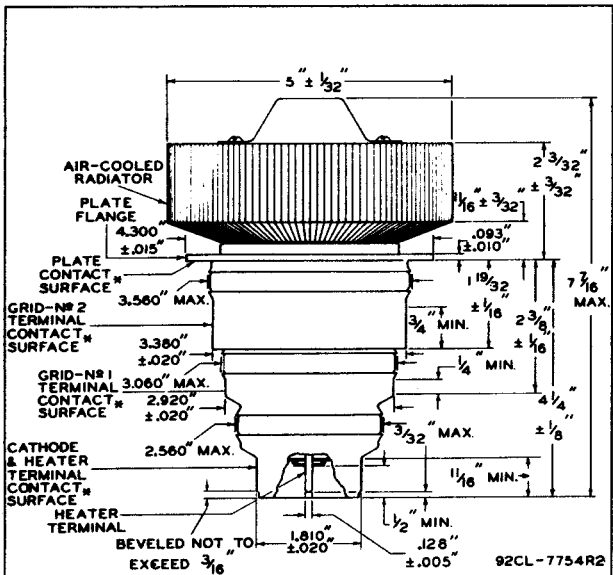
The 6181 can be operated with full plate voltage and plate input at frequencies as high as 900 Mc.



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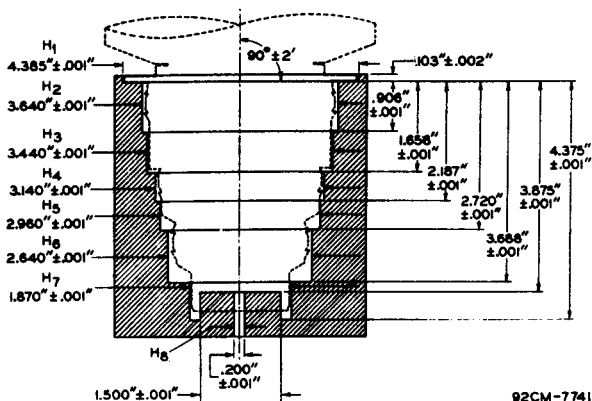
*WITH THE CYLINDRICAL SURFACES OF THE PLATE FLANGE, GRID-NO. 2 TERMINAL, GRID-NO. 1 TERMINAL, CATHODE TERMINAL, AND HEATER-PIN TERMINAL CLEAN, SMOOTH, AND FREE OF BURRS, THE TUBE WILL ENTER A GAUGE AS SHOWN IN SKETCH G₁ (on next page). PROPER ENTRY OF THE TUBE IN THE GAUGE IS OBTAINED WHEN THE PLATE FLANGE IS SEATED ON THE SHOULDER BETWEEN HOLES H₁ AND H₂. SEATING IS DETERMINED BY FAILURE OF A 0.005" THICKNESS GAUGE $\frac{1}{8}$ " WIDE TO ENTER MORE THAN $\frac{1}{16}$ " BETWEEN SHOULDER SURFACE AND PLATE FLANGE. SLOTS ARE PROVIDED TO PERMIT THIS MEASUREMENT TO BE MADE.

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SKETCH G₁

THE CYLINDRICAL HOLES H₁ THROUGH H₈ HAVE AXES COINCIDENT WITHIN 0.001".

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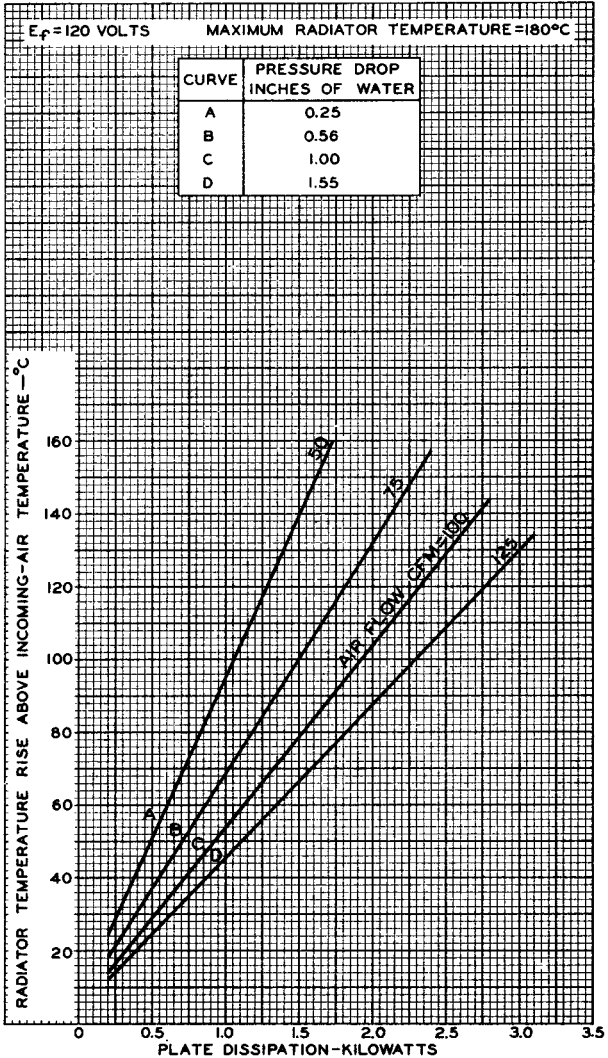
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COOLING REQUIREMENTS

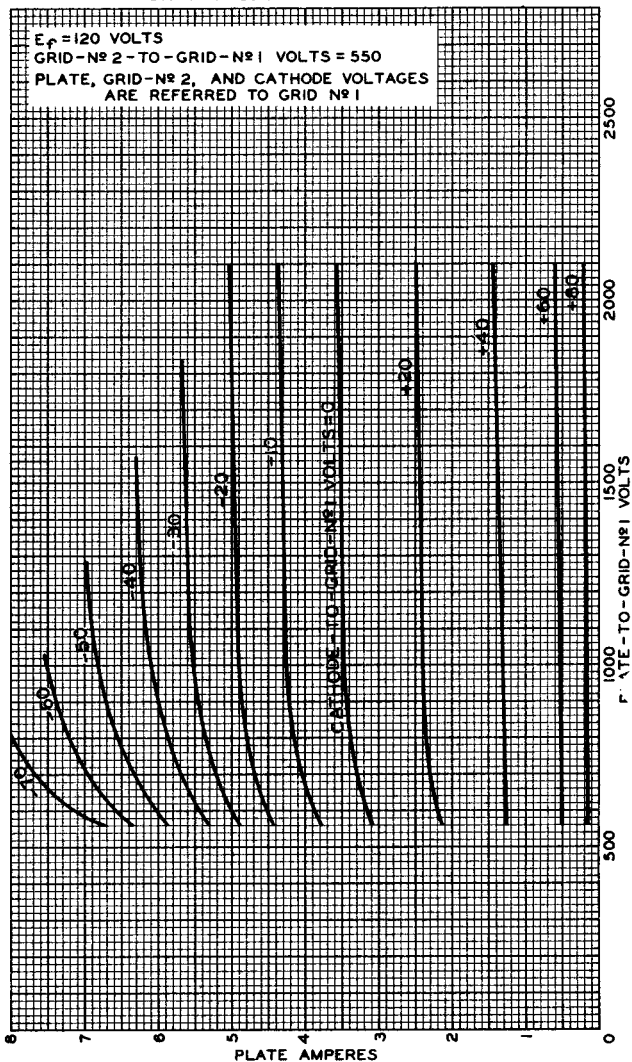


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AVERAGE PLATE CHARACTERISTICS FOR CATHODE-DRIVE OPERATION



MAR. 7, 1952

 TUBE DEPARTMENT
 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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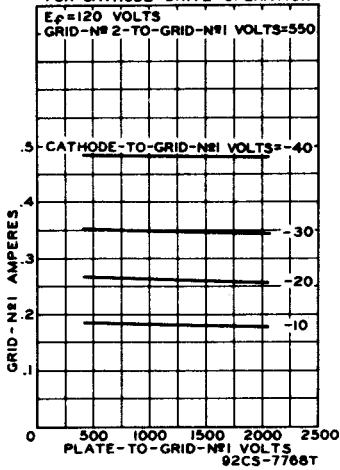


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AVERAGE CHARACTERISTICS FOR CATHODE-DRIVE OPERATION



AVERAGE CHARACTERISTICS FOR CATHODE-DRIVE OPERATION

