UHF POWER TETRODE
FORCED-AIR COOLED

GENERAL DATA

Electrical:
Heater, for Unipotential Cathode:

Voltage* ........... 120 av. ...... ac or dc volts
130 max. ...... 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. ............ μf
Grid-No.1 to Cathode .... 44 ............ μf
Plate to Cathode** .... 0.10 max. ............ μf
Grid No.1 to Grid No.2 .... 50 ............ μf
Grid No.2 to Plate .... 22 ............ μf
Grid No.2 to Cathode** .... 4 max. ............ μf

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. & 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" ± 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 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 and the frequency is increased with resultant increase in temperature, the heater voltage should be reduced dependingAT 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.
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 de-
ivered 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.

JULY 1, 1952
UHF POWER TETRODE

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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>2000 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.2 (SCREEN) VOLTAGE</td>
<td>500 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.1 (CONTROL-GRID) VOLTAGE (White Level)</td>
<td>-300 max. volts</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>1.75 max. amp</td>
</tr>
<tr>
<td>DC GRID-No.1 CURRENT</td>
<td>0.2 max. amp</td>
</tr>
<tr>
<td>PLATE INPUT</td>
<td>3500 max. watts</td>
</tr>
<tr>
<td>GRID-No.2 INPUT</td>
<td>40 max. watts</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>2000 max. watts</td>
</tr>
</tbody>
</table>

Typical Grid-Bias-Modulated Operation
in Cathode-Drive Circuit at 900 Mc:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Flow Through Radiator:</td>
<td></td>
</tr>
<tr>
<td>Minimum, with Incoming Air at 45°C</td>
<td>60 cfm</td>
</tr>
<tr>
<td>Static Pressure</td>
<td>0.36 in. of water</td>
</tr>
<tr>
<td>DC Plate-to-Grid-No.1 Voltage</td>
<td>1875 volts</td>
</tr>
<tr>
<td>DC Grid-No.2-to-Grid-No.1 Voltage</td>
<td>550 volts</td>
</tr>
<tr>
<td>DC Cathode-to-Grid-No.1 Voltage</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>75 volts</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>105 volts</td>
</tr>
<tr>
<td>White Level</td>
<td>230 volts</td>
</tr>
<tr>
<td>Peak RF Cathode-to-Grid-No.1 Voltage</td>
<td>120 volts</td>
</tr>
<tr>
<td>DC Plate Current</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>1.7 amp</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>1.2 amp</td>
</tr>
<tr>
<td>DC Grid-No.2 Current (Pedestal Level)</td>
<td>-0.025 amp</td>
</tr>
</tbody>
</table>

---

* See next page.

JULY 1, 1952

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 2
# UHF Power Tetrode

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Grid-No.1 Current (Approx.)</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>0.075 amp</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>0.020 amp</td>
</tr>
<tr>
<td>Driver Power Output (Approx.)</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>200 watts</td>
</tr>
<tr>
<td>Output-Circuit Efficiency (Approx.)</td>
<td>75 per cent</td>
</tr>
<tr>
<td>Useful Power Output (Approx.)</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>1200** watts</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>675** watts</td>
</tr>
</tbody>
</table>

**Typical Cathode-Bias-Modulated Operation**

In Cathode-Drive Circuit at 900 Mc:

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Flow Through Radiator</td>
<td></td>
</tr>
<tr>
<td>Minimum, with Incoming Air at 45°C</td>
<td>60 cfm</td>
</tr>
<tr>
<td>Static Pressure</td>
<td>0.36 in. of water</td>
</tr>
<tr>
<td>DC Plate-to-Grid-No.1 Voltage</td>
<td>1875 volts</td>
</tr>
<tr>
<td>DC Grid-No.2-to-Grid-No.1 Voltage</td>
<td>550 volts</td>
</tr>
<tr>
<td>DC Cathode-to-Grid-No.1 Voltage:</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>75 volts</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>105 volts</td>
</tr>
<tr>
<td>White Level</td>
<td>210 volts</td>
</tr>
<tr>
<td>Peak RF Cathode-to-Grid No.1 Voltage</td>
<td>120 volts</td>
</tr>
<tr>
<td>DC Plate Current</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>1.7 amp</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>1.2 amp</td>
</tr>
<tr>
<td>DC Grid-No.2 Current (Pedestal Level)</td>
<td>-0.025 amp</td>
</tr>
<tr>
<td>DC Grid-No.1 Current (Approx.):</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>0.075 amp</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>0.020 amp</td>
</tr>
<tr>
<td>Driver Power Output (Approx.):</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>200 watts</td>
</tr>
<tr>
<td>Output-Circuit Efficiency (Approx.)</td>
<td>75 per cent</td>
</tr>
<tr>
<td>Useful Power Output (Approx.):</td>
<td></td>
</tr>
<tr>
<td>Synchronizing Level</td>
<td>1200** watts</td>
</tr>
<tr>
<td>Pedestal Level</td>
<td>675** watts</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>1600 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.2 (SCREEN) VOLTAGE</td>
<td>400 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.1 (CONTROL-GRID) VOLTAGE</td>
<td>-300 max. volts</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>1.05 max. amp</td>
</tr>
<tr>
<td>DC GRID-No.1 CURRENT</td>
<td>0.2 max. amp</td>
</tr>
</tbody>
</table>

* Measured between half-power points.

---

JULY 1, 1952

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
**UHF POWER TETRODE**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLATE INPUT</td>
<td>1650 max. watts</td>
</tr>
<tr>
<td>GRID-No.2 INPUT</td>
<td>25 max. watts</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>1300 max. watts</td>
</tr>
</tbody>
</table>

**Typical Operation in Cathode-Drive Circuit at 400 Mc:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Flow Through Radiator:</td>
<td></td>
</tr>
<tr>
<td>Minimum with Incoming Air at 45°C</td>
<td>40 cfm</td>
</tr>
<tr>
<td>Static Pressure</td>
<td>0.16 in. of water</td>
</tr>
<tr>
<td>DC Plate-to-Grid-No.1 Voltage</td>
<td>1775 volts</td>
</tr>
<tr>
<td>DC Grid-No.2-to-Grid-No.1 Voltage</td>
<td>550 volts</td>
</tr>
<tr>
<td>DC Cathode-to-Grid-No.1 Voltage</td>
<td>175 volts</td>
</tr>
<tr>
<td>Peak RF Cathode-to-Grid-No.1 Voltage</td>
<td>210 volts</td>
</tr>
<tr>
<td>DC Plate Current</td>
<td>1.00 amp</td>
</tr>
<tr>
<td>DC Grid-No.2 Current</td>
<td>0.065 amp</td>
</tr>
<tr>
<td>DC Grid-No.1 Current (Approx.)</td>
<td>0.045 amp</td>
</tr>
<tr>
<td>Driver Power Output (Approx.)#</td>
<td>250 watts</td>
</tr>
<tr>
<td>Output-Circuit Efficiency (Approx.)...</td>
<td>90 per cent</td>
</tr>
<tr>
<td>Useful Power Output (Approx.)...</td>
<td>950*** watts</td>
</tr>
</tbody>
</table>

**RF POWER AMPLIFIER & OSC. -- Class C Telegraphy □**

**RF POWER AMPLIFIER -- Class C FM Telephony**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>2000 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.2 (SCREEN) VOLTAGE</td>
<td>500 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.1 (CONTROL-GRID) VOLTAGE</td>
<td>300 max. volts</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>1.25 max. amp</td>
</tr>
<tr>
<td>DC GRID-No.1 CURRENT</td>
<td>0.2 max. amp</td>
</tr>
<tr>
<td>PLATE INPUT</td>
<td>2500 max. watts</td>
</tr>
<tr>
<td>GRID-No.2 INPUT</td>
<td>40 max. watts</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>2000 max. watts</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Flow Through Radiator:</td>
<td></td>
</tr>
<tr>
<td>Minimum, with Incoming Air at 45°C</td>
<td>30 cfm</td>
</tr>
<tr>
<td>Static Pressure</td>
<td>0.09 in. of water</td>
</tr>
<tr>
<td>DC Plate-to-Grid-No.1 Voltage</td>
<td>1910 volts</td>
</tr>
<tr>
<td>DC Grid-No.2-to-Grid-No.1 Voltage†</td>
<td>550 volts</td>
</tr>
<tr>
<td>DC Cathode-to-Grid-No.1 Voltage††</td>
<td>110 volts</td>
</tr>
</tbody>
</table>

* 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.

---

JULY 1, 1952

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 3

4, 0, 0, †, †: see next page.
### UHF POWER TETRODE

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak RF Cathode-to-Grid-No.1 Voltage</td>
<td>120 volts</td>
</tr>
<tr>
<td>DC Plate Current</td>
<td>0.9 amp</td>
</tr>
<tr>
<td>DC Grid-No.2 Current</td>
<td>0.05 amp</td>
</tr>
<tr>
<td>DC Grid-No.1 Current (Approx.)</td>
<td>0.015 amp</td>
</tr>
<tr>
<td>Driver Power Output (Approx.)</td>
<td>150 watts</td>
</tr>
<tr>
<td>Output-Circuit Efficiency (Approx.)</td>
<td>70 per cent</td>
</tr>
<tr>
<td>Useful Power Output (Approx.)</td>
<td>600 watts</td>
</tr>
</tbody>
</table>

* 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.
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 1/8" WIDE TO ENTER MORE THAN 1/16" BETWEEN SHOULDER SURFACE AND PLATE FLANGE. SLOTS ARE PROVIDED TO PERMIT THIS MEASUREMENT TO BE MADE.
THE CYLINDRICAL HOLES H₁ THROUGH H₈ HAVE AXES COINCIDENT WITHIN 0.001".
COOLING REQUIREMENTS

$E_F = 120$ VOLTS  MAXIMUM RADIATOR TEMPERATURE = $180^\circ$C

<table>
<thead>
<tr>
<th>CURVE</th>
<th>PRESSURE DROP INCHES OF WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.25</td>
</tr>
<tr>
<td>B</td>
<td>0.56</td>
</tr>
<tr>
<td>C</td>
<td>1.00</td>
</tr>
<tr>
<td>D</td>
<td>1.55</td>
</tr>
</tbody>
</table>

RADIATOR TEMPERATURE RISE ABOVE INCOMING-AIR TEMPERATURE $^\circ$C

PLATE DISSIPATION - KILOWATTS

MAR. 11, 1952
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7767
AVERAGE PLATE CHARACTERISTICS
FOR CATHODE-DRIVE OPERATION

$E_p = 120 \text{ VOLTS}$
$\text{GRID-N}^\circ2 \text{- TO - GRID-N}^\circ1 \text{ VOLTS} = 550$
$\text{PLATE, GRID-N}^\circ2, \text{ AND CATHODE VOLTAGES ARE REFERRED TO GRID N}^\circ1$

MAR. 7, 1952
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7766
BEAM POWER TUBE
FORCED-AIR COOLED

GENERAL DATA

Electrical:
Heater, for Unipotential Cathode:
Voltage* .......... 120 max. .... ac or dc volts
Current at 120 volts .... 1.6 .... amperes
Minimum heating time at 117 volts .... 5 minutes
Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 1000,
grid-No.2 volts = 400,
and plate amperes = 1 .......... 7
Direct Interelectrode Capacitances:
Grid No.1 to plate** .... 0.40 max. ..... \( \mu F \)
Grid No.1 to cathode & heater .... 46 \( \mu F \)
Plate to cathode & heater*** .... 0.10 max. \( \mu F \)
Grid No.1 to grid No.2 .... 50 \( \mu F \)
Grid No.2 to plate .... 22 \( \mu F \)
Grid No.2 to cathode & heater*** .... 4.4 max. \( \mu F \)

Mechanical:
Mounting Position .... Vertical, cathode end up or down
Maximum Overall Length .......... \( 5" \pm 1/32" \)
Greatest Diameter .......... \( 5" \)
Weight (Approx.) .......... 5 lbs
Radiator .......... Integral part of tube
Terminal Connections (See Dimensional Outline):

G1 - Grid No.1
G2 - Grid No.2
H - Heater
K - Cathode
P - Plate

Air Flow:
Through Radiator--The specified flow of incoming air for various plate dissipations, as indicated in the following tabulation, should be delivered by a blower through the radiator in either direction before and during the application of any voltages. In this tabulation, the flow and pressure values are for condition with radiator-temperature rise held constant at 135 \( ^\circ C \) above incoming-air temperature. Under any condition, the air flow must be ade-

* 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 having a diameter of 8\( ^\circ \) and center hole approximately 3-7/16\( ^\circ \) 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 approximately 3\( ^\circ \), and shield is connected to grid-No.1 terminal.

\( \rightarrow \) Indicates a change.
BEAM POWER TUBE

quate to limit the temperature of the radiator to its
specified maximum value. Heater power, plate power, and
air flow may be removed simultaneously.

Percentage of maximum
rated plate dissipa-
tion for each class
of service ........ 100 75 50 %
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
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-GRID) 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

* A: See next page.
BEAM POWER TUBE

<table>
<thead>
<tr>
<th>DC Plate Current:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronizing level</td>
<td>1.7 amp</td>
</tr>
<tr>
<td>Pedestal level</td>
<td>1.3 amp</td>
</tr>
<tr>
<td>DC Grid-No.2 Current</td>
<td>-0.025 amp</td>
</tr>
<tr>
<td>(Pedestal Level)</td>
<td></td>
</tr>
<tr>
<td>DC Grid-No.1 Current</td>
<td></td>
</tr>
<tr>
<td>(Approx.)</td>
<td></td>
</tr>
<tr>
<td>Synchronizing level</td>
<td>0.075 amp</td>
</tr>
<tr>
<td>Pedestal level</td>
<td>0.020 amp</td>
</tr>
<tr>
<td>Driver Power Output</td>
<td></td>
</tr>
<tr>
<td>(Approx.)</td>
<td></td>
</tr>
<tr>
<td>Synchronizing level</td>
<td>200 watts</td>
</tr>
<tr>
<td>Pedestal level</td>
<td>115 watts</td>
</tr>
<tr>
<td>Output-Circuit Efficiency</td>
<td>75 %</td>
</tr>
<tr>
<td>Useful Power Output</td>
<td></td>
</tr>
<tr>
<td>(Approx.)</td>
<td></td>
</tr>
<tr>
<td>Synchronizing level</td>
<td>1200 watts</td>
</tr>
<tr>
<td>Pedestal level</td>
<td>675 watts</td>
</tr>
</tbody>
</table>

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-GRID) VOLTAGE | 500 max. volts |
| DC GRID-No.1 (CONTROL-GRID) VOLTAGE | -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: 0.96 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

DC Grid-No.1 Current (Approx.):
  Synchronizing level: 0.075 amp
  Pedestal level: 0.020 amp

* See next page.
**BEAM POWER TUBE**

Driver Power Output (Approx.):
- Synchronizing level: 200 watts
- Output-Circuit Efficiency (Approx.): 75% 
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%

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:**

<table>
<thead>
<tr>
<th>DC PLATE VOLTAGE</th>
<th>1600 max. volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC GRID-No.2 (SCREEN-GRID) VOLTAGE</td>
<td>400 max. volts</td>
</tr>
<tr>
<td>DC GRID-No.1 (CONTROL-GRID) VOLTAGE</td>
<td>-300 max. volts</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>1.05 max. amp</td>
</tr>
<tr>
<td>DC GRID-No.1 CURRENT</td>
<td>0.2 max. amp</td>
</tr>
<tr>
<td>PLATE INPUT</td>
<td>1650 max. watts</td>
</tr>
<tr>
<td>GRID-No.2 INPUT</td>
<td>25 max. watts</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>1300 max. watts</td>
</tr>
</tbody>
</table>

*Measured between half-power points.

*标注为下一页内容。
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 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 %
- Useful Power Output (Approx.): 950 watts

RF POWER AMPLIFIER & OSCILLATOR—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-GRID) 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
- 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 %
- Useful Power Output (Approx.): 600 watts

* Continuous Commercial Service.
** 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.
*** See next page.
### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Current</td>
<td></td>
<td>1</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Direct Interelectrode Capacitances:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid No.1 to plate</td>
<td></td>
<td></td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td>Grid No.1 to cathode</td>
<td></td>
<td></td>
<td>42.5</td>
<td>49.5</td>
</tr>
<tr>
<td>&amp; heater</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td>Plate to cathode &amp; heater</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid No.1 to grid No.2</td>
<td></td>
<td></td>
<td>47</td>
<td>57</td>
</tr>
<tr>
<td>Grid No.2 to plate</td>
<td></td>
<td></td>
<td>20.5</td>
<td>24.5</td>
</tr>
<tr>
<td>Grid No.2 to cathode</td>
<td></td>
<td></td>
<td>1.2</td>
<td>2.5</td>
</tr>
<tr>
<td>&amp; heater</td>
<td></td>
<td>-</td>
<td>-</td>
<td>4.4</td>
</tr>
<tr>
<td>Mu-Factor, Grid No.2 to Grid-No.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2</td>
<td>2.5</td>
<td>11.5</td>
</tr>
<tr>
<td>Grid-No.1 Voltage</td>
<td></td>
<td></td>
<td>-50</td>
<td>-140</td>
</tr>
<tr>
<td>Peak Cathode Current</td>
<td></td>
<td>1.4</td>
<td>12</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note 1:** With 120 volts ac on heater.

**Note 2:** With dc plate volts = 1000; dc grid-No.2 volts = 400; and dc grid-No.1 voltage adjusted to produce a dc plate current of 1.0 ampere.

**Note 3:** With dc plate volts = 1750; dc grid-No.2 volts = 500; and dc grid-No.1 voltage adjusted to produce a dc plate current of 0.1 ampere.

**Note 4:** Designers should limit the maximum usable cathode current (Plate current plus grid-No.2 current plus grid-No.1 current) to this value under any condition of operation.

** With external flat metal shield having a diameter of 8" and center hole approximately 3-7/16" 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.

### Additional Notes

- **with external flat metal shield having a diameter of 8" and center hole approximately 3-7/16" 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 approximately 3", and shield is connected to grid-No.1 terminal.**

- **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.**

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

- **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.**

- **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.**

---

Indicates a change.
ALL DIMENSIONS IN INCHES

* 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.
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 .010"
THICKNESS GAUGE 1/8" WIDE TO ENTER MORE THAN 1/16"
BETWEEN SHOULDER SURFACE AND PLATE FLANGE. SLOTS ARE
PROVIDED TO PERMIT THIS MEASUREMENT TO BE MADE.
SKETCH G1

THE CYLINDRICAL HOLES H1 THROUGH H8 HAVE AXES COINCIDENT WITHIN 0.001 INCHES

ALL DIMENSIONS IN INCHES
COOLING REQUIREMENTS

E = 120 VOLTS
MAXIMUM RADIATOR
TEMPERATURE = 180°C

<table>
<thead>
<tr>
<th>CURVE</th>
<th>AIR FLOW CFM</th>
<th>APPROX PRESSURE DROP ACROSS RADIATOR INCHES OF WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>50</td>
<td>0.25</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
<td>0.56</td>
</tr>
<tr>
<td>C</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>D</td>
<td>125</td>
<td>1.55</td>
</tr>
</tbody>
</table>

EXAMPLE: MAXIMUM TEMPERATURE RISE (135°C)
WHEN INCOMING-AIR TEMPERATURE IS 45°C
(180°C - 45°C)

RADIO CORPORATION OF AMERICA
Electron Tube Division
Harrison, N. J.

6-63
AVERAGE PLATE CHARACTERISTICS
Cathode-Drive Operation

$E_c = 120$ VOLTS
GRID-#2 TO GRID-#1 VOLTS $= 550$
PLATE, GRID-#2, AND CATHODE VOLTAGES
ARE REFERRED TO GRID-#1.

PLATE AMPERES

92CM-7766RI
AVERAGE CHARACTERISTICS
Cathode-Drive Operation

E_c = 120 VOLTS
GRID-N2 TO GRID-N1 VOLTS = 550

CATHODE-TO-GRID-N1 VOLTS = -40

GRID-N1 AMPERES

PLATE-TO-GRID-N1 VOLTS

92CS-7768T1

E_c = 120 VOLTS
GRID-N2 TO GRID-N1 VOLTS = 550

CATHODE-TO-GRID-N1 VOLTS = -40

GRID-N2 AMPERES

PLATE-TO-GRID-N1 VOLTS

92CS-7769T1
AVERAGE CONSTANT-CURRENT CHARACTERISTICS
Cathode-Drive Operation

$E_C = 120$ VOLTS
GRID-N$\#2$-TO-GRID-N$\#1$ VOLTS = 550
$I_b =$ PLATE AMPERES
$I_{C_1} =$ GRID-N$\#1$ AMPERES
$I_{C_2} =$ GRID-N$\#2$ AMPERES

RADIO CORPORATION OF AMERICA
Electron Tube Division
Harrison, N. J.