TRAVELING-WAVE TUBE
LOW-NOISE AMPLIFIER TYPE
Useful over frequency range of 2700 to 3500 Mc

GENERAL DATA

Electrical:
Heater, for Unipotential Cathode:
Voltage .......... 5 ......... ac or dc volts
Current at 5 volts. .... 0.65 ............ amp
Starting current: The maximum instantaneous starting cur-
rent must never exceed 4 amperes, even momentarily.
Minimum Cathode Heating Time. ............ 1 minute
Frequency Range .......... 2700 to 3500 Mc
Cold Insertion Loss .......... 80 db

Mechanical:
Operating Position. ............ Any
Cooling .......... Natural
Maximum Overall Length. .......... 19-3/8"
Metal-Shell Diameter. .......... 1.375" ± 0.005"
Weight (Approx.) .......... 1-1/2 lbs
Collector-Terminal Connector. Birnbach No.403 Banana Jack
RF Connectors:
Input terminal .......... Type N UG-18B/U Plug
Output terminal .......... Type N UG-18B/U Plug
Base .......... Octal 8-Pin

BOTTOM VIEW

Pin 1—Grid No.1
Pin 2—No Connection
Pin 3—Helix
Pin 4—Grid No.4
Pin 5—Grid No.3
Pin 6—Grid No.2
Pin 7—Heater
Pin 8—Heater, Cathode

Maximum and Minimum Ratings, Absolute Values:
DC COLLECTOR VOLTAGE .......... 500 max. volts
DC HELIX VOLTAGE .......... 500 max. volts
DC GRID-No.4 VOLTAGE .......... 500 max. volts
DC GRID-No.3 VOLTAGE .......... 300 max. volts
DC GRID-No.2 VOLTAGE .......... 75 max. volts
DC GRID-No.1 VOLTAGE .......... 20 max. volts
DC COLLECTOR CURRENT .......... 500 max. μA
DC HELIX CURRENT .......... 5 max. μA
MAGNETIC FIELD STRENGTH .......... 400 min. gausses
PEAK RF POWER INPUT .......... 100 max. watts
AVERAGE RF POWER INPUT .......... 0.4 max. watt
METAL-SHELL TEMPERATURE
(At hottest point) .......... 175 max. °C

△ During alignment of the tube in the magnetic-focusing field, the helix
current may exceed this value for short periods, but should never ex-
ceed 25 μA.

* See next page.

DATA

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
TRAVELING-WAVE TUBE

Typical Operation at 3100 Mc:
DC Collector Voltage .................. 400 volts
DC Helix Voltage ...................... 375 volts
DC Grid-No.4 Voltage .................. 200 volts
DC Grid-No.3 Voltage .................. 40 volts
DC Grid-No.2 Voltage (Approx.) ...... 20 volts
DC Grid-No.1 Voltage .................. 0 volts
DC Collector Current ................. 150 μa
DC Helix Current ...................... 0.5 μa
DC Grid-No.4 Current \{ \}
DC Grid-No.3 Current \} .. each less than 1 μa
DC Grid-No.2 Current \}
DC Grid-No.1 Current \}
Magnetic-Field Strength † ............ 525 ± 5% gausses
Gain (Low level) ..................... 25 db
Power Output (Saturated) ............ 1 mw
Noise Figure ......................... 6.5 db

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

Note Min. Max.
Heater Current .................. 1 0.45 0.85 amp
Input VSWR (Non-operating) .... 2 – 1.7
Output VSWR (Non-operating) .. 2 – 2
DC Helix Voltage .................. 3 350 390 volts
DC Grid-No.4 Voltage ............. 3 160 275 volts
DC Grid-No.3 Voltage ............. 3 20 50 volts
Saturated Power Output ........... 3 0.25 – mw
Gain ................................ 3 20 – db
Noise Figure ......................... 3 – 7 db

Note 1: With heater voltage of 5 volts.
Note 2: Measured at specified connector over the frequency range of 2700 to 3500 Mc.
Note 3: Adjusted for optimum noise figure with a magnetic field of 525 gausses, signal frequency of 3100 Mc, and heater voltage of 5 volts.

OPERATING CONSIDERATIONS

The magnetic field required for focusing the electron beam of the 6861 may be obtained from a solenoid or permanent magnet capable of providing a uniform field of 525 gausses over the length of the tube axis starting 2 inches from the groove near the base end of the metal shell and continuing for at least 9 inches along the tube axis.

* This value of field strength will focus the electron beam, but noise figure will not be optimum.
† For RCA Solenoid Type MW-4900.
NOISE-Figure CHARACTERISTICS

\[ E_f = 5 \text{ VOLTS} \]
\[ \text{COLLECTOR VOLTS} = 400 \]
\[ \text{GRID-No. 4 VOLTS} = 200 \]
\[ \text{GRID-No. 3 VOLTS} = 40 \]
\[ \text{GRID-No. 2 VOLTS ADJUSTED TO GIVE COLLECTOR MICROAMPERES} = 150 \]
\[ \text{GRID No. 1 CONNECTED TO CATHODE AT SOCKET} \]
\[ \text{SIGNAL FREQUENCY} (\text{Mc}) = 3100 \]
\[ \text{FIELD STRENGTH ALONG HELIX AXIS} \]
\[ (\text{GAUSSES}) = 525 \]

\[ \text{NOISE FIGURE - \text{db}} \]
\[ 26 \]
\[ 24 \]
\[ 22 \]
\[ 20 \]
\[ 18 \]
\[ 16 \]
\[ 14 \]
\[ 12 \]
\[ 10 \]
\[ 8 \]
\[ 6 \]
\[ 360 \ 370 \ 380 \ 390 \ 400 \]
\[ \text{HELIX VOLTS} \]

\[ E_f = 5 \text{ VOLTS} \]
\[ \text{COLLECTOR VOLTS} = 400 \]
\[ \text{HELIX VOLTS ADJUSTED TO GIVE} \]
\[ \text{GRID-No. 4 VOLTS \ MINIMUM NOISE} \]
\[ \text{GRID-No. 3 VOLTS \ INDICATED} i_{CL} \]
\[ \text{GRID No. 1 CONNECTED TO CATHODE AT SOCKET} \]
\[ \text{SIGNAL FREQUENCY} (\text{Mc}) = 3100 \]
\[ \text{FIELD STRENGTH ALONG HELIX AXIS} \]
\[ (\text{GAUSSES}) = 525 \]

\[ \text{NOISE FIGURE - \text{db}} \]
\[ 35 \]
\[ 30 \]
\[ 25 \]
\[ 20 \]
\[ 15 \]
\[ 10 \]
\[ 5 \]
\[ 6 \]
\[ 100 \ 140 \ 180 \ 220 \ 260 \]
\[ \text{COLLECTOR MICROAMPERES \ (} i_{CL} \text{)} \]
TRAVELING-WAVE TUBE

NOISE-Figure Characteristics

- \( E_f = 5 \text{ VOLTS} \)
- Collector Volts = 400
- Helix Volts = 375
- Grid-No.4 Volts = 200
- Grid-No.3 Volts = 40
- Grid-No.2 Volts Adjusted to give Collector Microamperes = 150
- Grid No.1 Connected to cathode at socket
- Signal Frequency \((\text{Mc}) = 3100\)
- Field Strength along Helix Axis (Gausses) = 525

SaturatioN Characteristics

- \( E_f = 5 \text{ VOLTS} \)
- Collector Volts = 400
- Helix Volts = 375
- Grid-No.4 Volts = 200
- Grid-No.3 Volts = 40
- Grid-No.2 Volts Adjusted to give Collector Microamperes = 150
- Grid No.1 Connected to cathode at socket
- Signal Frequency \((\text{Mc}) = 3100\)
- Field Strength along Helix Axis (Gausses) = 525
INPUT-MATCHING CHARACTERISTIC

WITH NO VOLTAGES APPLIED TO TUBE

VOLTAGE STANDING-WAVE RATIO

FREQUENCY - Mc

2600  2800  3000  3200  3400  3600

1.75  1.50  1.25  1.00

92CS-9018T