



ELECTRONIC TUBE REFERENCE

17X10

Power - Pentode (NOT beam) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-PENTODE

Dual-pentode television sound tube combining gated-beam FM limiter/discriminator service with a separate audio power-output pentode.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	16.8 V / 450 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Pentode	
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	110 V
MAXIMUM CATHODE CURRENT	13 mA
<i>Gated-beam limiter/discriminator pentode section.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	30000 Ω
TRANSCONDUCTANCE	0.0086 S
MAXIMUM PLATE VOLTAGE	165 V
MAXIMUM SCREEN VOLTAGE	150 V
MAXIMUM PLATE DISSIPATION	6.45 W
MAXIMUM SCREEN DISSIPATION	1.8 W
MAXIMUM CATHODE CURRENT	65 mA
<i>Audio power pentode section.</i>	

17X10 — Double Dissimilar Pentode

The **17X10** is a multi-section Compactron vacuum tube containing two highly dissimilar pentode sections in a single envelope. It is designed for use in television and radio receivers, where Section 1 serves as an FM limiter/discriminator (gated beam discriminator) and Section 2 serves as an audio power amplifier. The tube features a controlled heater warm-up time for series-string applications.

Mechanical Design and Basing Connection

The 17X10 is housed in a T-9 glass bulb (Compactron) with a button 12-pin base (E12-70). The physical outline is designated as 9-58 or 9-59. The tube can be operated in any mounting position.

The physical dimensions are:

- **Maximum Diameter:** 1.188 inches
- **Maximum Seated Height:** 2.250 inches
- **Maximum Overall Height:** 2.625 inches

Both sections utilize coated unipotential cathodes. The tube uses the **12BT** basing configuration, with the following pin assignments:

- **Pin 1:** Grid No. 1 (Section 1) [[1G1](#)]
- **Pin 2:** Grid No. 3 (Section 1) [[1G3](#)]
- **Pin 3:** Grid No. 2 (Section 2) [2G2]
- **Pin 4:** Cathode (Section 2) [2K]
- **Pin 5:** Grid No. 1 (Section 2) [2G1]
- **Pin 6:** Grid No. 1 (Section 1) [[1G1](#)]
- **Pin 7:** Grid No. 2 (Section 1) [1G2]
- **Pin 8:** Cathode, Shield (Section 1) [1K, 1S]
- **Pin 9:** Plate (Section 2) [2P]
- **Pin 10:** No Connection [NC]

- **Pin 11:** Grid No. 1 (Section 2) [2G1]
- **Pin 12:** Heater [H]

Heater Characteristics and Ratings

The heater is designed for series-string operation and features a controlled warm-up time to minimize voltage surges in series-connected heater chains.

- **Heater Voltage:** 16.8 Volts
- **Heater Current (Average):** 450 mA
- **Heater Current Limits (Design Maximum):** 420 to 480 mA
- **Heater Warm-up Time:** 11 Seconds

Heater-Cathode Voltage Limits

The maximum ratings for the voltage between the heater and cathode are:

- **Heater Negative with Respect to Cathode (Total DC and Peak):** 200 Volts
- **Heater Positive with Respect to Cathode (DC):** 100 Volts
- **Heater Positive with Respect to Cathode (Total DC and Peak):** 200 Volts

Direct Interelectrode Capacitances

The direct interelectrode capacitances are measured without an external shield:

Section No. 1

- **Grid No. 1 to ($h + 1k + 1g2 + 1g3 + IS$):** 4.4 pF
- **Grid No. 3 to ($h + 1k + 1g1 + 1g2 + 1p + IS$):** 3.2 pF
- **Grid No. 1 to Grid No. 3:** 0.005 pF

Section No. 2

- **Grid to Plate:** 0.24 pF
- **Input (g to $h + 2k + 2g2 + g3 + 1k + IS$):** 12.0 pF
- **Output (p to $h + 2k + 2g2 + g3 + 1k + IS$):** 9.0 pF

Design Maximum Ratings

The maximum ratings are defined under the Design Maximum Rating System:

Section No. 1 (Limiter/Discriminator)

- **Plate Supply Voltage:** 330 Volts
- **Accelerator Voltage (G_2):** 110 Volts

- **Peak Positive G_1 Voltage:** 60 Volts
- **DC Cathode Current:** 13 mA

Section No. 2 (Power Pentode)

- **Plate Voltage:** 165 Volts
- **Screen Voltage:** 150 Volts
- **Plate Dissipation:** 6.5 Watts
- **Screen Dissipation:** 1.8 Watts
- **DC Cathode Current:** 65 mA
- **Grid No. 1 Circuit Resistance (Fixed Bias):** 0.25 Megohms
- **Grid No. 1 Circuit Resistance (Cathode Bias):** 0.5 Megohms

Typical Operation and Electrical Characteristics

Section No. 1: Limiter/Discriminator Service

Section 1 is designed to operate as a gated beam discriminator. Typical operating parameters are specified for three distinct circuit configurations:

Parameter	Case A (10.7 MHz)	Case B (10.7 MHz)	Case C (4.5 MHz)
Input Signal Center Frequency	10.7 MHz	10.7 MHz	4.5 MHz
Frequency Deviation	±75 kHz	±75 kHz	±25 kHz
Plate Supply Voltage	85 V	285 V	270 V
Plate Voltage	62 V	122 V	121 V
Accelerator Voltage	55 V	100 V	100 V
Cathode Bias Resistor (Variable)	200–400 Ω	200–400 Ω	200–400 Ω
Plate Load Resistor	0.085 M Ω	0.330 M Ω	0.330 M Ω
Plate Linearity Resistor	470 Ω	1500 Ω	1000 Ω
Integrating Capacitor	0.002 μ F	0.001 μ F	0.001 μ F
Coupling Capacitor	0.25 μ F	0.01 μ F	0.25 μ F

Parameter	Case A (10.7 MHz)	Case B (10.7 MHz)	Case C (4.5 MHz)
Minimum Signal Voltage for Limiting (rms)	1.25 V	1.25 V	1.25 V
DC Plate Current	0.25 mA	0.49 mA	0.44 mA
Accelerator Current	4.1 mA	9.8 mA	10 mA
Input Signal Level for AM Rejection Adj.	1.25 V	2.0 V	2.0 V
AM Rejection at $E_{sig} = 2.0 \text{ V rms}$	31 dB	20 dB	25 dB
AM Rejection at $E_{sig} = 3.0 \text{ V rms}$	30 dB	29 dB	30 dB
Total Harmonic Distortion	2.0%	1.6%	1.8%
Peak Audio Output Voltage	6.0 V	16.6 V	16.8 V

Circuit Application Guidelines

- **AM Rejection Adjustment:** The variable cathode resistor must be adjusted to achieve maximum AM rejection in the output of the limiter-discriminator stage at the specified signal level (measured with 30% AM and 30% FM).
- **Limiting Performance:** Above the specified input signal level, limiting is maintained within ± 3 dB. Proper phasing requires adequate shielding between the components of the limiter grid and the quadrature grid.
- **Quadrature Grid Circuit:** The Q of the quadrature grid circuit must be high enough to develop a minimum of 4 V (rms) signal with 2 V (rms) of the center-frequency signal applied to the limiter grid. The coil should be shunted by a minimum of 10 pF, which includes the tube input, stray, distributed, and physical capacitances.

Section No. 2: Audio Power Amplifier

Section 2 is operated as a class-A power amplifier. Typical operating parameters are:

- **Plate Voltage:** 145 Volts
- **Screen Voltage:** 110 Volts
- **Grid No. 1 Voltage:** -6.0 Volts
- **Peak AF Grid Voltage:** 6.0 Volts
- **Plate Resistance (Approx.):** 30,000 Ohms

- **Transconductance:** 8600 μmhos
- **Zero Signal Plate Current:** 36 mA
- **Maximum Signal Plate Current:** 40 mA
- **Zero Signal Screen Current:** 3.0 mA
- **Maximum Signal Screen Current:** 9.0 mA
- **Load Resistance:** 3000 Ohms
- **Total Harmonic Distortion (Approx.):** 10%
- **Maximum Signal Power Output:** 2.1 Watts

Technical Summary

The **17X10** is a Compactron double dissimilar pentode designed for series-string television and radio receivers. It combines a gated beam discriminator (Section 1) and an audio power amplifier (Section 2) in a single T-9 envelope. The tube features a 16.8 V, 450 mA heater with an 11-second controlled warm-up time. Section 1 provides effective FM demodulation at 4.5 MHz or 10.7 MHz with up to 31 dB of AM rejection and low distortion. Section 2 provides up to 2.1 Watts of audio output power with a transconductance of 8600 μmhos , offering a compact, integrated solution for receiver design.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1964 RMA EIA

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1964 RMA EIA

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	16.8 V	SeriesHeater
Heater Current	450 mA	SeriesHeater
Heater Warm-up Time	11 s	—
Grid1-to-Other Electrodes Capacitance	10.1 pF	Section1
Grid3-to-Other Electrodes Capacitance	30.2 pF	Section1
Grid1-Grid3 Capacitance	0.005 pF	Section1

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Supply Voltage	330 V	Section1
Maximum Accelerator Voltage	110 V	Section1
Maximum Peak Positive Grid1 Voltage	60 V	Section1
Maximum DC Cathode Current	13 mA	Section1
Center Frequency	10.7 MHz	LimiterDiscriminator
Frequency Deviation	75 kHz	LimiterDiscriminator; Representative
Peak Audio Output Voltage	16.8 V	LimiterDiscriminator; Representative

1964 RMA EIA

Section 2 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	165 V	Section2

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Screen Voltage	150 V	Section2
Maximum Plate Dissipation	6.45 W	Section2
Maximum Screen Dissipation	1.8 W	Section2
Maximum DC Cathode Current	65 mA	Section2
Plate Voltage	165 V	PowerAmplifier
Screen Voltage	110 V	PowerAmplifier
Grid Voltage	-6 V	PowerAmplifier
Load Resistance	3000 ohm	PowerAmplifier
Maximum Signal Power Output	2.1 W	PowerAmplifier
Total Harmonic Distortion	16 percent	PowerAmplifier

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-Plate Capacitance	0.24 pF	Section2
Input Capacitance	12 pF	Section2
Output Capacitance	9 pF	Section2
Plate Resistance	30000 ohm	Section2
Transconductance	8600 uS	Section2

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