



ELECTRONIC TUBE REFERENCE

11BQ11

Voltage Dual Pentode electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-PENTODE

Duodecar dual semiremote-cutoff pentode designed specifically for television intermediate-frequency amplification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12DM	BASE PINS	12
NOMINAL HEATER	11.2 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	200000 Ω
TRANSCONDUCTANCE	0.0105 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	3.1 W
MAXIMUM SCREEN DISSIPATION	0.65 W
<i>Remote-cutoff pentode, Section 1.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	200000 Ω
TRANSCONDUCTANCE	0.013 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	3.1 W
MAXIMUM SCREEN DISSIPATION	0.65 W
<i>Sharp-cutoff pentode, Section 2.</i>	

11BQ11 — Dissimilar Double Pentode Compactron

The **11BQ11** is a multi-electrode compactron-type vacuum tube containing two dissimilar pentode sections in a single envelope. Section 1 is designed as a remote-cutoff (or semiremote-cutoff) pentode, while Section 2 is a sharp-cutoff pentode. This combination is intended primarily for use in the intermediate-frequency (IF) amplifier stages of television receivers, particularly color television sets.

Mechanical Design, Basing, and Physical Dimensions

The 11BQ11 is constructed in a T-9 glass envelope utilizing a 12-pin button base (E12-70), which requires a standard duodecar 12-contact socket. The tube can be operated in any position.

The physical dimensions of the envelope are standardized under the EIA 9-58 outline:

Dimension	Value (Inches)
Maximum Diameter	1.188
Minimum Diameter	1.062
Maximum Over-all Length	2.375
Maximum Seated Height	2.000
Minimum Seated Height	1.750

Terminal Connections and Basing Diagram

The tube utilizes the **12DM** basing arrangement. The pin connections, viewed from the bottom of the base, are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Plate (Section 2)

- **Pin 3:** Grid Number 2 (Screen Grid) (Section 2)
- **Pin 4:** Grid Number 3 (Suppressor Grid) (Section 2)
- **Pin 5:** Grid Number 1 (Control Grid) (Section 2)
- **Pin 6:** Cathode (Section 2)
- **Pin 7:** Grid Number 3 (Suppressor Grid) (Section 1) and Internal Shield
- **Pin 8:** Plate (Section 1)
- **Pin 9:** Grid Number 2 (Screen Grid) (Section 1)
- **Pin 10:** Grid Number 1 (Control Grid) (Section 1)
- **Pin 11:** Cathode (Section 1)
- **Pin 12:** Heater

In this configuration, Section 1's suppressor grid is internally tied to the internal shield and brought out to Pin 7, whereas Section 2's suppressor grid is brought out independently to Pin 4. Both sections feature coated unipotential cathodes.

Heater Characteristics and Ratings

The heater of the 11BQ11 is designed for series or parallel AC/DC operation. It features controlled warm-up characteristics to ensure reliable operation in series-string receiver designs.

Heater Parameter	Value
Nominal Heater Voltage (AC/DC)	11.2 V
Nominal Heater Current	0.45 $\pm$ 0.03 A
Average Heater Warm-up Time	11 seconds

The average heater warm-up time is defined as the time required for the voltage across the heater to reach 80 percent of its nominal value when a voltage equal to 4 times the nominal heater voltage is applied to a circuit consisting of the tube heater in series with a resistance equal to 3 times the nominal heater voltage divided by the nominal heater current.

Heater-Cathode Voltage Limits

To prevent insulation breakdown between the heater and the cathodes, the following maximum voltage limits must be observed:

- **Heater Negative with Respect to Cathode:**
 - Total DC and Peak: 200 V maximum
- **Heater Positive with Respect to Cathode:**
 - DC Component: 100 V maximum
 - Total DC and Peak: 200 V maximum

Direct Interelectrode Capacitances

The capacitances of the individual sections are measured with an external shield (EIA 309) connected to the cathode of the section under test.

Section 1 (Remote-Cutoff Pentode)

- **Grid No. 1 to Plate:** 0.022 pF
- **Input** (1g1 to [1k + 1g2 + 1g3 + h + i.s.]): 10 pF
- **Output** (1p to [1k + 1g2 + 1g3 + h + i.s.]): 2.8 pF

Section 2 (Sharp-Cutoff Pentode)

- **Grid No. 1 to Plate:** 0.024 pF
- **Input** (2g1 to [2k + 2g2 + 2g3 + 1g3 + h + i.s.]): 11 pF
- **Output** (2p to [2k + 2g2 + 2g3 + 1g3 + h + i.s.]): 2.8 pF

Inter-Section Coupling Capacitances

- **Plate of Section 1 to Plate of Section 2:** 0.015 pF maximum
- **Grid No. 1 of Section 1 to Plate of Section 2:** 0.002 pF maximum
- **Grid No. 1 of Section 2 to Plate of Section 1:** 0.008 pF maximum
- **Grid No. 1 of Section 1 to Grid No. 1 of Section 2:** 0.002 pF maximum

These low coupling capacitances indicate that despite sharing a single envelope, the two pentode sections are highly isolated from each other, minimizing unwanted crosstalk in high-frequency applications.

Maximum Ratings (Design-Maximum Values)

The maximum ratings are established under the Design-Maximum Rating System. These are limiting values of operating and environmental conditions that should not be exceeded under the worst probable conditions in a bogey tube. Both Section 1 and Section 2 share identical maximum ratings.

Rating Parameter	Section 1	Section 2	Unit
Plate Voltage	330	330	Volts
Suppressor (Grid No. 3) Voltage	0	0	Volts
Screen-Grid (Grid No. 2) Supply Voltage	330	330	Volts
Screen-Grid (Grid No. 2) Voltage	See Chart	See Chart	Volts

Rating Parameter	Section 1	Section 2	Unit
Positive DC Grid No. 1 Voltage	0	0	Volts
Plate Dissipation	3.1	3.1	Watts
Screen-Grid (Grid No. 2) Dissipation (up to 165 V)	0.65	0.65	Watt
Screen-Grid (Grid No. 2) Dissipation (165 to 330 V)	<i>See Chart</i>	<i>See Chart</i>	Watt
Grid No. 1 Circuit Resistance (Cathode Bias)	1.0	0.25	Megohm

The screen-grid voltage and dissipation for voltages between 165 V and 330 V are restricted by the Screen Rating Chart. Up to 165 V, the maximum screen dissipation is flat at 0.65 W. Above 165 V, the permissible dissipation decreases along a curve, dropping to 0 W at 330 V, to protect the screen grid from thermal overload.

Electrical Characteristics and Typical Class A1 Operation

Typical operating characteristics for both sections are evaluated at a plate supply voltage of 125 V with the suppressor grid connected to the cathode at the socket.

Parameter	Section 1	Section 2	Unit
Plate Supply Voltage	125	125	Volts
Screen Voltage	125	125	Volts
Cathode-Bias Resistor	56	56	Ohms
Plate Resistance (Approximate)	0.2	0.2	Megohm
Transconductance	10,500	13,000	μmhos
Plate Current	11	11	mA
Screen Current	3.5	3.8	mA

Parameter	Section 1	Section 2	Unit
Grid No. 1 Voltage for Gm = 50 F-mhos (Approx.)	-15	—	Volts
Grid No. 1 Voltage for Ib = 20 I-A (Approx.)	—	-3	Volts

Analysis of Section Characteristics

- **Section 1 (Remote-Cutoff Pentode):** Under typical operating conditions, Section 1 exhibits a transconductance of 10,500 F-mhos. Its remote-cutoff characteristic is demonstrated by the fact that a relatively large negative grid bias of approximately -15 V is required to reduce the transconductance to 50 F-mhos. This allows the stage to handle large signal swings and interface effectively with automatic gain control (AGC) circuitry without causing clipping or cross-modulation.
- **Section 2 (Sharp-Cutoff Pentode):** Section 2 provides a higher transconductance of 13,000 F-mhos under the same typical operating conditions. It features a sharp-cutoff characteristic, with plate current falling to 20 I-A at a grid bias of approximately -3 V. This sharp transition makes it highly suitable for high-gain, stable amplification where AGC control is not required or is restricted to a narrow range.

Related Designations and Family Comparison

The **11BQ11** is part of a family of three identical compactrons that differ only in their heater ratings:

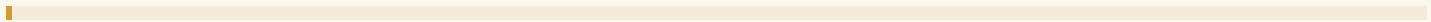
- **8BQ11:** Designed with an 8.4 V, 0.6 A heater.
- **11BQ11:** Designed with an 11.2 V, 0.45 A heater.
- **16BQ11:** Designed with a 16 V, 0.315 A heater.

All three tubes share the same T-9 glass envelope, 12DM basing diagram, maximum ratings, and electrical characteristics. They must not be confused with other dissimilar double pentodes such as the **8BM11**, which has lower maximum ratings (160 V plate voltage, 2.2 W plate dissipation) and lower transconductance values (8,800 F-mhos for Section 1 and 8,500 F-mhos for Section 2).

Technical Summary

The **11BQ11** is a **12-pin compactron dissimilar double pentode** featuring a remote-cutoff pentode (Section 1) and a sharp-cutoff pentode (Section 2) in a single T-9 glass envelope. Operating from an **11.2 V, 0.45 A** heater with controlled warm-up characteristics, it is optimized for series-string television receiver designs.

With a maximum plate voltage rating of **330 V** and plate dissipation of **3.1 W** per section, the tube provides high-performance intermediate-frequency amplification. Section 1 delivers a transconductance of **10,500 F-mhos** with a remote-cutoff bias of **-15 V**, while Section 2 delivers **13,000 F-mhos** with a sharp-cutoff bias of **-3 V**. Its low inter-section coupling capacitances (such as a plate-to-plate capacitance of **0.015 pF**) ensure excellent isolation between the two active stages.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	-55611 V	—
Screen Voltage	1 V	—
Screen Voltage	1 V	—
Screen Voltage	4 V	—
Screen Voltage	-55611 V	—
Screen Current	4 mA	—
Screen Current	2 mA	—
Transconductance	2 uS	—
Transconductance	454 uS	—
Plate Voltage	125 V	AverageCharacteristics
Screen Voltage	125 V	AverageCharacteristics

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	11 mA	AverageCharacteristics
Screen Current	3.5 mA	AverageCharacteristics
Transconductance	10500 uS	AverageCharacteristics

1968 GENERAL ELECTRIC CO

Section 2 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	125 V	AverageCharacteristics
Screen Voltage	125 V	AverageCharacteristics

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	11 mA	AverageCharacteristics
Screen Current	3.8 mA	AverageCharacteristics
Transconductance	13000 uS	AverageCharacteristics



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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1975 RCA RC30

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

1975 RCA RC30

Section 1 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.022 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate supply voltage	125 V	ClassA
Screen-grid supply voltage	125 V	ClassA
Transconductance	10500 uS	ClassA

1975 RCA RC30

Section 2 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.024 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate supply voltage	125 V	ClassA
Screen-grid supply voltage	125 V	ClassA
Transconductance	13000 uS	ClassA