

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

15BD11

3 SECTIONS

CONSTRUCTION

Voltage - Dual Triode Pentode electronic tube

PENTODE-TRIODE-TRIODE

Three-section Compactron combining high-mu and medium-mu triodes with a sharp-cutoff pentode for television and related signal-amplifier service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12DP	BASE PINS	12
NOMINAL HEATER	14.7 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

12DP - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	H – Heater	CONNECTED
PIN2	A	P – Plate (Anode)	CONNECTED
PIN3	C	G1 – Control Grid	CONNECTED
PIN4	C	P – Plate (Anode)	CONNECTED
PIN5	B	K – Cathode	CONNECTED
PIN6	B	G3 – Suppressor Grid	CONNECTED
PIN7	C	K – Cathode	CONNECTED
PIN7	–	IS – Internal Screen	CONNECTED
PIN8	B	P – Plate (Anode)	CONNECTED
PIN9	A	G3 – Suppressor Grid	CONNECTED
PIN9	A	K – Cathode	CONNECTED
PIN10	A	G2 – Screen Grid	CONNECTED
PIN11	A	G1 – Control Grid	CONNECTED

TERMINAL	SECTION	ELEMENT	STATUS
PIN12	—	H – Heater	CONNECTED

SECTION RATINGS

SECTION1 Triode		
PLATE RESISTANCE		40000 Ω
TRANSCONDUCTANCE		0.0025 S
AMPLIFICATION FACTOR		70
MAXIMUM PLATE VOLTAGE		330 V
MAXIMUM PLATE DISSIPATION		1.5 W
<i>triode 1</i>		

SECTION2 Triode		
PLATE RESISTANCE		10000 Ω
TRANSCONDUCTANCE		0.005 S
AMPLIFICATION FACTOR		30
MAXIMUM PLATE VOLTAGE		330 V
MAXIMUM PLATE DISSIPATION		2 W
<i>triode 2</i>		

SECTION3 Pentode		
PLATE RESISTANCE		70000 Ω
TRANSCONDUCTANCE		0.012 S
MAXIMUM PLATE VOLTAGE		330 V
MAXIMUM SCREEN VOLTAGE		330 V
MAXIMUM PLATE DISSIPATION		5 W
MAXIMUM SCREEN DISSIPATION		1.5 W
<i>sharp-cutoff</i>		

15BD11 — Dual Triode and Sharp-Cutoff Pentode

The **15BD11** is a multi-unit vacuum tube of the Compactron (Duodecar) design, containing three independent active sections within a single T-9 glass envelope. It is specifically engineered for television receiver applications, combining a high-mu triode, a medium-mu triode, and a high-transconductance sharp-cutoff pentode. This combination allows a single envelope to perform multiple distinct roles in a receiver circuit, such as general-purpose voltage amplification, sync separation, and video amplification.

The 15BD11 is designed for series-string heater applications and is identical to the [6BD11](#) except for its heater ratings and warm-up characteristics.

Construction, Physical Dimensions, and Base

The 15BD11 features a Compactron T-9 construction with a glass envelope and a button 12-pin base (designation E12-70). This configuration requires a standard duodecar 12-contact socket. The physical dimensions of the tube are as follows:

Physical Parameter	Value
Maximum Diameter	1.188 inches
Maximum Seated Height	2.000 inches
Maximum Overall Height	2.375 inches
Outline Designation	9-58
Basing Diagram	12DP

Pin Connections

The 12DP basing arrangement provides independent connections for the three internal sections, with some shared internal shielding. The pin assignments, viewed from the bottom of the base, are:

Pin Number	Connection
Pin 1	Cathode (Triode Unit No. 1)
Pin 2	Plate (Triode Unit No. 2)
Pin 3	Grid (Triode Unit No. 2)
Pin 4	Plate (Pentode Unit)
Pin 5	Heater
Pin 6	Grid (Triode Unit No. 1)

Pin Number	Connection
Pin 7	Cathode (Triode Unit No. 2) / Internal Shield
Pin 8	Plate (Triode Unit No. 1)
Pin 9	Cathode (Pentode Unit) / Grid No. 3 / Internal Shield
Pin 10	Grid No. 2 (Screen Grid, Pentode Unit)
Pin 11	Grid No. 1 (Control Grid, Pentode Unit)
Pin 12	Heater

Heater Characteristics and Ratings

The heater of the 15BD11 is designed for series-string operation with a controlled warm-up time to minimize voltage surges in television receiver heater chains.

Heater Parameter	Value
Heater Voltage (AC or DC)	14.7 V
Heater Current	0.450 ± 0.030 A
Average Warm-up Time	11 seconds

Heater-Cathode Voltage Ratings

To maintain insulation integrity between the heater and the separate cathodes of the three units, the following maximum voltage limits must be observed:

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

Electrical Characteristics and Typical Operating Points

The three sections of the 15BD11 operate independently, each optimized for its designated function.

Triode Unit No. 1 (High-Mu Triode)

This section is intended for general-purpose voltage amplification. At a typical operating point, it exhibits a high amplification factor and moderate plate resistance:

- **Plate Supply Voltage:** 200 V
- **Grid-No. 1 Voltage:** -2.0 V
- **Amplification Factor (μ):** 68
- **Plate Resistance (Approx.):** 12,400 Ω
- **Transconductance (g_m):** 5,500 μ mhos
- **Plate Current:** 7.0 mA
- **Grid-No. 1 Voltage for $I_b = 100 \mu$ A (Approx.):** -5.5 V

Triode Unit No. 2 (Medium-Mu Triode)

This section is optimized for sync-separator circuits, featuring a lower amplification factor and lower plate resistance:

- **Plate Supply Voltage:** 200 V
- **Cathode-Bias Resistor:** 220 Ω
- **Amplification Factor (μ):** 41
- **Plate Resistance (Approx.):** 9,400 Ω
- **Transconductance (g_m):** 4,400 μ mhos
- **Plate Current:** 9.2 mA
- **Grid-No. 1 Voltage for $I_b = 100 \mu$ A (Approx.):** -6.5 V

Pentode Unit (Sharp-Cutoff Pentode)

The pentode section is designed for video amplifier service, offering high transconductance. It can be operated under two typical conditions:

Parameter	Low-Voltage Condition	Standard Condition
Plate Voltage	35 V	135 V
Grid-No. 2 (Screen) Voltage	135 V	135 V
Grid-No. 1 (Control Grid) Voltage	0 V	—
Cathode-Bias Resistor	—	100 Ω
Plate Resistance (Approx.)	—	45,000 Ω
Transconductance (g_m)	—	10,400 μ mhos
Plate Current	34 mA	17 mA
Grid-No. 2 Current	13 mA	4 mA
Grid-No. 1 Voltage for $I_b = 100 \mu$ A (Approx.)	—	-6 V

Maximum Ratings (Design-Maximum System)

The maximum ratings define the operating limits to ensure reliable performance and prevent premature tube failure.

Rating Parameter	Triode Unit No. 1	Triode Unit No. 2	Pentode Unit
Plate Voltage	330 V max	330 V max	330 V max
Grid-No. 2 Supply Voltage	—	—	330 V max
Grid-No. 2 Voltage	—	—	See Rating Chart
Positive DC Grid-No. 1 Voltage	0 V max	0 V max	0 V max
Plate Dissipation	1.5 W max	2.0 W max	4.0 W max
Grid-No. 2 Input (up to 165 V)	—	—	1.1 W max
Grid-No. 2 Input (166 to 330 V)	—	—	See Rating Chart

Note: For the related variant [15BD11A](#), the maximum screen (Grid-No. 2) dissipation rating is increased to 1.5 Watts.

Maximum Circuit Values

The maximum allowable grid-circuit resistance depends on the biasing method used:

- **Triode Unit No. 1:**
 - Fixed Bias: 0.5 M Ω max
 - Cathode Bias: 1.0 M Ω max
- **Triode Unit No. 2:**
 - Fixed Bias: 0.5 M Ω max
 - Cathode Bias: 1.0 M Ω max
- **Pentode Unit:**
 - Fixed Bias: 1.0 M Ω max
 - Cathode Bias: 1.0 M Ω max

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 15BD11 are measured without an external shield.

Triode Unit No. 1

- **Grid to Plate:** 1.9 pF
- **Input (Grid to Cathodes, Pentode Cathode, Pentode Grid 3, Heater, and Internal Shield):** 3.0 pF
- **Output (Plate to Cathodes, Pentode Cathode, Pentode Grid 3, Heater, and Internal Shield):** 2.2 pF

Triode Unit No. 2

- **Grid to Plate:** 3.6 pF
- **Input (Grid to Triode 2 Cathode, Pentode Cathode, Pentode Grid 3, Heater, and Internal Shield):** 2.4 pF
- **Output (Plate to Triode 2 Cathode, Pentode Cathode, Pentode Grid 3, Heater, and Internal Shield):** 3.8 pF

Pentode Unit

- **Grid No. 1 to Plate:** 0.13 pF
- **Input (Grid No. 1 to Triode 2 Cathode, Pentode Cathode, Pentode Grid 2, Pentode Grid 3, Heater, and Internal Shield):** 11 pF
- **Output (Plate to Triode 2 Cathode, Pentode Cathode, Pentode Grid 2, Pentode Grid 3, Heater, and Internal Shield):** 4.6 pF

Inter-Section Coupling Capacitances

- **Pentode Plate to Triode Unit No. 2 Plate:** 0.045 pF max
- **Triode Unit No. 1 Plate to Triode Unit No. 2 Plate:** 0.075 pF max

Technical Summary

The **15BD11** is a versatile, multi-unit Compactron tube designed for television receiver circuits. By integrating a high-mu triode, a medium-mu triode, and a high-transconductance sharp-cutoff pentode into a single T-9 envelope, it reduces component count and space requirements. Operating with a 14.7 V, 0.450 A heater, it is optimized for series-string heater chains. The independent cathodes and low inter-section coupling capacitances ensure that each section can operate reliably in its respective role as a general-purpose amplifier, sync separator, or video amplifier.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	Inherited from explicitly referenced 6BD11 parent except heater data.
Plate Dissipation	1.5 W	Inherited from explicitly referenced 6BD11 parent except heater data.

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Amplification Factor	70	Inherited from explicitly referenced 6BD11 parent except heater data.
Transconductance	2500 μ S	Inherited from explicitly referenced 6BD11 parent except heater data.

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Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	Inherited from explicitly referenced 6BD11 parent except heater data.
Plate Dissipation	2 W	Inherited from explicitly referenced 6BD11 parent except heater data.

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Amplification Factor	30	Inherited from explicitly referenced 6BD11 parent except heater data.
Transconductance	5000 μ S	Inherited from explicitly referenced 6BD11 parent except heater data.

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OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	Inherited from explicitly referenced 6BD11 parent except heater data.
Maximum Screen Voltage	330 V	Inherited from explicitly referenced 6BD11 parent except heater data.
Plate Dissipation	5 W	Inherited from explicitly referenced 6BD11 parent except heater data.
Screen Dissipation	1.5 W	Inherited from explicitly referenced 6BD11 parent except heater data.

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	12000 μ S	Inherited from explicitly referenced 6BD11 parent except heater data.

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