

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

15AF11

3 SECTIONS

CONSTRUCTION

Voltage - Dual Triode Pentode electronic tube

PENTODE-TRIODE-TRIODE

Television Duodecar combining an AGC-keyer triode, sync-separator triode, and video-amplifier pentode, integrating three major picture-signal processing functions.

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>Heater-variant reference sheet; electrical data explicitly cross-referenced to 6AF11.</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>Heater-variant reference sheet; electrical data explicitly cross-referenced to 6AF11.</i>		

SECTION3 Pentode		
PLATE RESISTANCE		70000 Ω
TRANSCONDUCTANCE		0.012 S
AMPLIFICATION FACTOR		68
MAXIMUM PLATE VOLTAGE		330 V
MAXIMUM SCREEN VOLTAGE		330 V
MAXIMUM PLATE DISSIPATION		5 W
MAXIMUM SCREEN DISSIPATION		1.5 W
<i>Heater-variant reference sheet; electrical data explicitly cross-referenced to 6AF11.</i>		

15AF11 — Dissimilar Double Triode and Sharp-

Cutoff Pentode

The **15AF11** is a multi-unit, indirectly heated vacuum tube of the duodecar (also referred to as compactron) type designed primarily for television receiver applications. It integrates three distinct, electrically independent active structures within a single T-9 glass envelope: a high-mu triode, a medium-mu triode, and a sharp-cutoff pentode. This combination is specifically tailored to perform multiple functions in television circuitry, where the high-mu triode serves as an automatic gain control (AGC) keyer, the medium-mu triode operates as a sync separator, and the pentode functions as a video amplifier.

Construction, Physical Characteristics, and Basing

The 15AF11 features a compactron T-9 glass bulb construction with a button 12-pin base (E12-70 designation), requiring a standard duodecar 12-contact socket. The internal elements utilize coated unipotential cathodes. The physical dimensions of the tube are as follows:

Physical Parameter	Value
Bulb Type	T-9
Base	Button 12-Pin, E12-70
Basing Arrangement	12DP
Maximum Diameter	1.188 inches
Maximum Seated Height	2.250 inches
Maximum Overall Height	2.625 inches

The 12DP basing configuration provides independent connections for the three units, allowing them to be biased and operated separately, subject to heater-cathode voltage limitations.

Heater Characteristics and Ratings

The 15AF11 is designed for series-string heater circuits. Its heater has controlled warm-up characteristics to ensure reliable operation in series configurations.

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

The average heater warm-up time of 11 seconds is defined under specific test conditions: it is the time required for the voltage across the heater to reach 80 percent of its nominal value when four times the nominal heater voltage is applied to a circuit consisting of the heater in series with an external resistance equal to three times the nominal heater voltage divided by the nominal heater current.

Heater-Cathode Voltage Limits

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

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

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 15AF11 are measured without an external shield. The coupling capacitances between the separate units are kept low by internal shielding.

Triode Unit No. 1 (High-Mu Triode)

- **Grid to Plate:** 1.9 pF
- **Input (Grid to Cathodes, Heater, Pentode Grid No. 3, and Internal Shield):** 3.0 pF
- **Output (Plate to Cathodes, Heater, Pentode Grid No. 3, and Internal Shield):** 2.2 pF

Triode Unit No. 2 (Medium-Mu Triode)

- **Grid to Plate:** 3.6 pF
- **Input (Grid to Cathodes, Heater, Pentode Grid No. 3, and Internal Shield):** 2.4 pF
- **Output (Plate to Cathodes, Heater, Pentode Grid No. 3, and Internal Shield):** 3.8 pF

Pentode Unit

- **Grid No. 1 to Plate:** 0.12 pF
- **Input (Grid No. 1 to Cathodes, Heater, Pentode Grid No. 2, Pentode Grid No. 3, and Internal Shield):** 10.0 pF
- **Output (Plate to Cathodes, Heater, Pentode Grid No. 2, Pentode Grid No. 3, and Internal Shield):** 4.5 pF

Inter-Unit Coupling

- **Pentode Plate to Triode No. 2 Plate:** 0.045 pF maximum
- **Triode No. 1 Plate to Triode No. 2 Plate:** 0.06 pF maximum

Maximum Ratings (Design-Maximum System)

The maximum ratings for each section of the 15AF11 are established under the Design-Maximum Rating System. These limits must not be exceeded under the worst-case operating conditions.

Rating Parameter	Triode Unit No. 1 (High-Mu)	Triode Unit No. 2 (Medium-Mu)	Pentode Unit
Plate Voltage	330 V	330 V	330 V
Grid-No. 2 (Screen-Grid) Supply Voltage	—	—	330 V
Grid-No. 2 Voltage	—	—	See Rating Chart
Positive DC Grid-No. 1 Voltage	0 V	0 V	0 V
Plate Dissipation	1.1 W	2.0 W	5.0 W
Grid-No. 2 Input (up to 165 V)	—	—	1.25 W
Grid-No. 2 Input (165 V to 330 V)	—	—	See Rating Chart
Maximum Grid-No. 1 Circuit Resistance			
Fixed Bias Operation	0.5 MΩ	0.5 MΩ	0.25 MΩ
Cathode Bias Operation	1.0 MΩ	1.0 MΩ	1.0 MΩ

Electrical Characteristics and Typical Operating Points

The three units within the 15AF11 exhibit distinct electrical characteristics optimized for their respective roles. Typical Class A1 amplifier operating points are detailed below.

Triode Unit No. 1 (High-Mu AGC Keyer)

- **Plate Voltage:** 200 V
- **Grid-No. 1 Voltage:** -2.0 V
- **Amplification Factor:** 68
- **Plate Resistance (Approximate):** 12,400 Ω
- **Transconductance:** 5500 μmhos
- **Plate Current:** 7.0 mA
- **Grid-No. 1 Voltage for Cutoff (at $I_b = 10 \mu\text{A}$):** -5.5 V

Triode Unit No. 2 (Medium-Mu Sync Separator)

- **Plate Voltage:** 200 V
- **Cathode-Bias Resistor:** 220 Ω

- **Amplification Factor:** 41
- **Plate Resistance (Approximate):** 9400 Ω
- **Transconductance:** 4400 μmhos
- **Plate Current:** 9.2 mA
- **Grid-No. 1 Voltage for Cutoff (at $I_b = 10 \mu\text{A}$):** -6.5 V

Pentode Unit (Sharp-Cutoff Video Amplifier)

The pentode section can be operated under different conditions depending on the circuit requirements. Two typical operating points are documented:

Parameter	Operating Point A	Operating Point B
Plate Supply Voltage	—	250 V
Plate Voltage	50 V	200 V
Grid-No. 2 Supply Voltage	—	150 V
Grid-No. 2 Voltage	150 V	150 V
Grid-No. 1 Voltage	0 V	—
Cathode-Bias Resistor	—	100 Ω
Plate Resistance (Approximate)	—	68,000 Ω
Transconductance	—	11,000 μmhos
Plate Current	55 mA	24 mA
Grid-No. 2 Current	18 mA	4.8 mA
Grid-No. 1 Voltage for Cutoff (at $I_b = 100 \mu\text{A}$)	—	-10 V

Related Designations

The 15AF11 belongs to a family of identical multi-unit tubes that differ only in their heater configurations to accommodate different power supply arrangements:

- **6AF11**: Designed for parallel heater circuits, requiring a nominal heater supply of 6.3 V at 1.05 A.
- **10AF11**: Designed for series heater strings, requiring a nominal heater supply of 9.8 V at 0.6 A.
- **12AF11**: Designed for series heater strings, requiring a nominal heater supply of 12.6 V at 0.45 A.

Aside from these heater variations, the 6AF11, 10AF11, 12AF11, and 15AF11 share identical physical dimensions, basing configurations, interelectrode capacitances, maximum ratings, and electrical characteristics.

Technical Summary

The **15AF11** is a versatile duodecar/compactron multi-unit tube containing a high-mu triode, a medium-mu triode, and a sharp-cutoff pentode in a single T-9 envelope. Operating with a 14.7 V, 0.45 A series-string heater, it provides a highly integrated solution for television receiver designs. By combining an AGC keyer (Triode 1, $\mu = 68$), a sync separator (Triode 2, $\mu = 41$), and a high-transconductance video amplifier (Pentode, $g_m = 11,000 \mu\text{hos}$) into a single 12-pin envelope, the 15AF11 minimizes component count and chassis space while maintaining high performance.



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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterOrFilamentVoltageNominal	14.7 V	—
HeaterOrFilamentCurrentNominal	450 mA	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1971 RCA HB3 Binder 5 of 7

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

1971 RCA HB3 BINDER 5 OF 7

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	Inherited from explicitly referenced 6AF11 parent except heater data.
Plate Dissipation	1.5 W	Inherited from explicitly referenced 6AF11 parent except heater data.

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Amplification Factor	70	Inherited from explicitly referenced 6AF11 parent except heater data.
Transconductance	2500 μ S	Inherited from explicitly referenced 6AF11 parent except heater data.

1971 RCA HB3 BINDER 5 OF 7

Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	Inherited from explicitly referenced 6AF11 parent except heater data.
Plate Dissipation	2 W	Inherited from explicitly referenced 6AF11 parent except heater data.

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Amplification Factor	30	Inherited from explicitly referenced 6AF11 parent except heater data.
Transconductance	5000 μ S	Inherited from explicitly referenced 6AF11 parent except heater data.

1971 RCA HB3 BINDER 5 OF 7

Section 3 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	Inherited from explicitly referenced 6AF11 parent except heater data.
Maximum Screen Voltage	330 V	Inherited from explicitly referenced 6AF11 parent except heater data.
Plate Dissipation	5 W	Inherited from explicitly referenced 6AF11 parent except heater data.
Screen Dissipation	1.5 W	Inherited from explicitly referenced 6AF11 parent except heater data.

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	12000 μ S	Inherited from explicitly referenced 6AF11 parent except heater data.



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 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	10 mA	Published value from supplied target entry
Grid-No	3 mA	Published value from supplied target entry
Grid-No.1-Circuit Resistance	1 megohm	Published value from supplied target entry
Heater Voltage (ac/dc)	14.7 volts	Published value from supplied target entry
Heater Current	0.45 amperes	Published value from supplied target entry
Heater Warm-up Time (Average)	11 seconds	Published value from supplied target entry
Plate Voltage	330 volts	Published value from supplied target entry
Grid-No	2	Published value from supplied target entry
Plate Dissipation	1.1 watts	Published value from supplied target entry
For grid-No	1.25 volts	Published value from supplied target entry
For grid-No	330	Published value from supplied target entry
Plate Supply Voltage	250 volts	Published value from supplied target entry
Grid-No	150 volts	Published value from supplied target entry
Grid-No	1 volts	Published value from supplied target entry
Amplification Factor	41	Published value from supplied target entry
Plate Resistance (Approx.)	68000 ohms	Published value from supplied target entry
Transconductance	11000	Published value from supplied target entry
Plate Current	24 mA	Published value from supplied target entry
Grid-No	1	Published value from supplied target entry
Heater Voltage (ac/dc)	6.3 volts	Published value from supplied target entry
Heater Current	0.3 ampere	Published value from supplied target entry
Plate Voltage	300 volts	Published value from supplied target entry
Grid-No	300 volts	Published value from supplied target entry
Grid-No	300	Published value from supplied target entry

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No.I (Control-Grid) Voltage, Positive-bias value	0 volts	Published value from supplied target entry
Plate Dissipation	2 watts	Published value from supplied target entry
For grid-No	0.5 volts	Published value from supplied target entry
For grid No	300 volts	Published value from supplied target entry
Amplification Factor	42	Published value from supplied target entry
Plate Resistance (Approx.)	0.8 megohm	Published value from supplied target entry
Transconductance	5000	Published value from supplied target entry
Plate Current	6.5 mA	Published value from supplied target entry

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to Cathode, Heater, Grid No	3	Published value from supplied target entry
Plate to Cathode, Heater, Grid No	3 pF	Published value from supplied target entry

TUBE TINKER

An independent reference for electronic tubes, vacuum tubes,
and their source documents.

[Catalog](#) [Tube types](#) [Full books](#) [Blog](#) [Feedback & corrections](#)

© 2026 Tube Tinker