

ELECTRONIC TUBE REFERENCE

17JF6

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
BEAMPOWER

Novar beam-power tube designed for horizontal-deflection amplification in black-and-white television receivers, with controlled warm-up and high pulse ratings.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9QU	BASE PINS	9
NOMINAL HEATER	16.8 V / 600 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

9QU - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	G2 – Screen Grid	CONNECTED
PIN2	–	G1 – Control Grid	CONNECTED
PIN3	–	K – Cathode	CONNECTED
PIN4	–	H – Heater	CONNECTED
PIN5	–	H – Heater	CONNECTED
PIN6	–	G3 – Suppressor Grid	CONNECTED
PIN7	–	G2 – Screen Grid	CONNECTED
PIN8	–	–	IC
PIN9	–	P – Plate (Anode)	CONNECTED

SECTION RATINGS

SECTION1 Beam Power	
PLATE RESISTANCE	15000 Ω
TRANSCONDUCTANCE	0.0075 S
AMPLIFICATION FACTOR	4.1
MAXIMUM PLATE VOLTAGE	770 V
MAXIMUM SCREEN VOLTAGE	220 V
MAXIMUM PLATE DISSIPATION	17.5 W
MAXIMUM SCREEN DISSIPATION	3.5 W
MAXIMUM CATHODE CURRENT	175 mA
<i>6JF6 electrical system; heater changed by 17JF6 sheet.</i>	

17JF6 — Novar Beam Power Tube

The **17JF6** is a beam power tube of the Novar design, primarily intended for use as a horizontal-deflection amplifier in black-and-white television receivers operating on a 525-line, 30-frame system. It is engineered to deliver high peak plate currents at low plate voltages, featuring a sharp knee in its plate characteristics and robust power handling capabilities. The 17JF6 is electrically identical to the [6JF6](#) and [22JF6](#) except for its heater ratings.

Construction, Heater, and Base Pinout

The 17JF6 features a Novar construction, requiring a standard 9-contact novar socket. The tube is housed in an envelope corresponding to outline 18E or 18F.

The heater is designed for series-string or parallel operation, with the following ratings:

- **Heater Voltage (AC or DC):** 16.8 V at a current of 0.600 A
- **Heater Current:** 0.600 ± 0.040 A
- **Average Heater Warm-up Time:** 11 seconds
- **Heater-Cathode Voltage Limits:**
 - Peak value: ± 200 V maximum
 - Average value: 100 V maximum

Heater Power Calculation

The nominal heater power consumption can be calculated as follows: $\text{Heater Power} = \text{Heater Voltage} \times \text{Heater Current}$ Using the nominal inputs of 16.8 V and 0.6 A: $\text{Heater Power} = 16.8 \text{ V} \times 0.6 \text{ A} = 10.08 \text{ W}$

The tube utilizes the **9QL** pinout configuration, which provides the following connections when viewed from the bottom of the base:

Pin	Connection
Pin 1	Grid No. 1 (G1)
Pin 2	Grid No. 2 (<u>G2</u>)
Pin 3	Cathode (K)
Pin 4	Heater (H)
Pin 5	Heater (H)
Pin 6	Grid No. 1 (G1)
Pin 7	Grid No. 2 (<u>G2</u>)
Pin 8	Grid No. 3 (G3)
Pin 9	Internal Connection (IC) — Do not use

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the 17JF6, measured without an external shield, are:

- **Grid No. 1 to Plate:** 1.2 pF
- **Grid No. 1 to Cathode, Heater, Grid No. 2, and Grid No. 3:** 22 pF
- **Plate to Cathode, Heater, Grid No. 2, and Grid No. 3:** 9 pF

Electrical Characteristics and Operating Points

The 17JF6 can be operated in both triode and pentode configurations. The typical characteristics under Class A1 amplifier conditions are detailed below.

Triode Connection

In this configuration, Grid No. 2 is connected to the plate at the socket, and Grid No. 3 is connected to the cathode at the socket.

- **Plate Voltage:** 125 V
- **Grid No. 2 Voltage:** 125 V
- **Grid No. 1 Voltage:** -20 V
- **Triode Amplification Factor (μ):** 4.1

Pentode Connection

In this configuration, Grid No. 3 is connected directly to the cathode at the socket.

Parameter	Condition A (Cutoff)	Condition B (High Current/Knee)	Condition C (Typical Operation)
Plate Voltage	—	50 V	130 V
Grid No. 2 Voltage	125 V	125 V	125 V
Grid No. 1 Voltage	—	0 V	-20 V
Plate Resistance (Approx.)	—	—	12,000 Ω
Transconductance	—	—	10,000 μmhos
Plate Current	1 mA (at -125 V bias)	525 mA*	80 mA
Grid No. 2 Current	—	32 mA*	2.5 mA
Grid No. 1 Cutoff Voltage	-125 V (for 1 mA Ib)	—	-40 V (for 1 mA Ib)

**Note: Measured using a recurrent waveform to prevent exceeding maximum dissipation limits during testing.*

Horizontal-Deflection Amplifier Service

When used in horizontal-deflection amplifier service for 525-line, 30-frame television receivers, the 17JF6 must be operated within strict design-maximum ratings to ensure reliability.

Design-Maximum Ratings

- **DC Plate Supply Voltage:** 770 V
- **Peak Positive-Pulse Plate Voltage:** 6,500 V (with a pulse duration not exceeding 15% of the horizontal scanning cycle, or 10 μs)
- **Peak Negative-Pulse Plate Voltage:** 1,500 V
- **DC Grid-No. 3 Voltage:** 100 V (a positive bias up to a typical value of 50 V may be applied to minimize "snivets" interference)
- **DC Grid-No. 2 Voltage:** 220 V
- **Peak Negative-Pulse Grid-No. 1 Voltage:** 330 V
- **Peak Cathode Current:** 950 mA
- **Average Cathode Current:** 275 mA
- **Grid-No. 2 Input:** 3.5 W
- **Plate Dissipation:** 17 W (measured using a recurrent waveform)
- **Maximum Bulb Temperature (at hottest point):** 240 $^{\circ}\text{C}$

Maximum Circuit Values

To prevent thermal runaway and protect the tube, the Grid-No. 1 circuit resistance must not exceed the following limits depending on the biasing method:

- **Cathode-bias operation:** 1.0 M Ω
- **Grid-leak-bias operation:** 10 M Ω
- **Fixed-bias operation:** 0.47 M Ω

A bias resistor or other protective means is strictly required to safeguard the tube in the event that excitation is lost.

Curve Observations and Behavior

The plate characteristics of the 17JF6 demonstrate its suitability for high-efficiency deflection service:

- **Knee Characteristics:** At a constant Grid No. 2 voltage of 125 V, the plate current (I_b) curves exhibit a sharp knee occurring between 50 V and 75 V plate voltage. This sharp transition allows for efficient switching and minimizes power loss in deflection circuits.
- **Peak Current Capability:** At $E_{c1}(/tubes/C1) = 0$ V and $E_{c2} = 125$ V, the plate current peaks near 800 mA at a plate voltage of 100 V. When the screen voltage (E_{c2}) is increased, the peak plate current rises significantly, exceeding 1,000 mA at $E_{c2} = 175$ V.
- **Screen Grid Behavior:** The Grid No. 2 current (I_{c2}) rises sharply at low plate voltages, peaking near 100 mA at $E_b = 0$ V when $E_{c1}(/tubes/C1) = 0$ V.
- **Screen Voltage Influence:** Varying the screen voltage (E_{c2}) from 50 V to 175 V demonstrates that higher screen voltages shift the knee voltage upward while substantially increasing the available peak plate current.

Related Designations

The **17JF6** is part of a family of closely related beam power tubes. It is identical in its internal structure, electrode configuration, and electrical characteristics to the **6JF6** and **22JF6**. These types differ solely in their heater ratings, allowing designers to select the appropriate version depending on whether the receiver uses a 6.3 V parallel heater supply, a 17 V series string, or a 22 V series string. Unrestricted substitution between these types is not possible without modifying the heater supply circuit.

Technical Summary

The **17JF6** is a Novar-type beam power tube designed for high-current, low-voltage applications, specifically horizontal-deflection amplifier service in television receivers. It features a 16.8 V, 0.6 A heater with a controlled 11-second warm-up time. Under typical pentode operating conditions, it exhibits a transconductance of 10,000 μ mhos and a plate resistance of approximately 12,000 Ω . Its design-maximum ratings include a peak positive-pulse plate voltage of 6,500 V and a plate dissipation of 17 W, making it a robust and reliable choice for demanding deflection circuits when operated within its specified limits.

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 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	16.8 V	—
Heater current	600 mA	—
Heater warm-up time	11 s	ControlledWarmup
Maximum DC plate voltage	770 V	HorizontalDeflection
Peak positive-pulse plate voltage	6500 V	HorizontalDeflection
Maximum screen voltage	220 V	HorizontalDeflection
Average cathode current	175 mA	HorizontalDeflection
Plate dissipation	17.5 W	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Screen voltage	150 V	ClassA
Plate current	70 mA	ClassA
Plate resistance	15000 ohm	ClassA
Transconductance	7500 uS	ClassA

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	0.26 pF	—

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Television horizontal-deflection amplifier	—

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage (ac/dc) 6.3 16.8	22 V	Published in approved 17JF6 target datasheet entry; Section1
Heater Current 1.6 0.6	450 mA	Published in approved 17JF6 target datasheet entry; Section1
Heater Warm-up Time (Average) 11	11 seconds	Published in approved 17JF6 target datasheet entry; Section1
Transconductance	10000 μ S	Published in approved 17JF6 target datasheet entry; Section1
– – 525f	80 mA	Published in approved 17JF6 target datasheet entry; Section1
Grid-No.2 Current – 32f	2.5 mA	Published in approved 17JF6 target datasheet entry; Section1
of	1 mA	Published in approved 17JF6 target datasheet entry; Section1
of 1 mA – –125 –	-40 V	Published in approved 17JF6 target datasheet entry; Section1
DC Plate Supply Voltage	770 V	Published in approved 17JF6 target datasheet entry; Section1
Peak Positive-Pulse Plate Voltage*	6500 V	Published in approved 17JF6 target datasheet entry; Section1
Peak Negative-Pulse Plate Voltage	1500 V	Published in approved 17JF6 target datasheet entry; Section1
DC Grid-No.3 Voltage"	100 V	Published in approved 17JF6 target datasheet entry; Section1
DC Grid-No.2 Voltage	220 V	Published in approved 17JF6 target datasheet entry; Section1
Peak Negative-Pulse Grid-No.1 Voltage	330 V	Published in approved 17JF6 target datasheet entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Cathode Current	950 mA	Published in approved 17JF6 target datasheet entry; Section1
Plate Dissipation!	17 W	Published in approved 17JF6 target datasheet entry; Section1
Bulb Temperature (At hottest point)	240 °C	Published in approved 17JF6 target datasheet entry; Section1
GRID-No	2 V	Published in approved 17JF6 target datasheet entry; Section1
For cathode-bias operation	1 MΩ	Published in approved 17JF6 target datasheet entry; Section1
For grid-leak-bias operation	10 MΩ	Published in approved 17JF6 target datasheet entry; Section1
For fixed-bias operation	0.47 MΩ	Published in approved 17JF6 target datasheet entry; Section1
# Pulse duration must not exceed 15% of a horizontal scanning cycle (	10 microseconds	Published in approved 17JF6 target datasheet entry; Section1
ference ; a typical value for this voltage is	50 V	Published in approved 17JF6 target datasheet entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	1.2 pF	Published in approved 17JF6 target datasheet entry; Section1
0.3	22 pF	Published in approved 17JF6 target datasheet entry; Section1
Plate to Cathode. Heater, Grid No.2, and Grid No.3	9 pF	Published in approved 17JF6 target datasheet entry; Section1

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