

ELECTRONIC TUBE REFERENCE

17C5

Power - Beam Single (NOT sweep) (under 10W) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
BEAMPOWER

Miniature beam-power tube designed for the audio-output stage of television receivers, providing roughly two watts of Class-A output depending on operating conditions.

GENERAL CHARACTERISTICS

BASE DESIGNATION	7CV	BASE PINS	7
NOMINAL HEATER	16.8 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

7CV - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Beam Power	
PLATE RESISTANCE	10000 Ω
TRANSCONDUCTANCE	0.0075 S
MAXIMUM PLATE VOLTAGE	135 V
MAXIMUM SCREEN VOLTAGE	117 V
MAXIMUM PLATE DISSIPATION	5.5 W
MAXIMUM SCREEN DISSIPATION	1.25 W
<i>Shared family ratings and Class A characteristics promoted; heater-specific differences remain at tube level.</i>	

17C5 — Beam Power Pentode

The 17C5 is a miniature beam power tube designed primarily for use in the audio output stage of television receivers, including color television systems, and in AC/DC radio receivers. It is characterized by high power sensitivity at low plate and screen voltages, making it highly efficient in compact and cost-effective consumer electronics designs.

Construction, Heater, and Physical Characteristics

The 17C5 features a coated unipotential cathode and a heater designed for series-string applications. To minimize heater voltage surges during the warm-up phase, the heater has controlled thermal characteristics. This makes it suitable for operation in series-string circuits alongside other tubes with similarly controlled warm-up times.

The heater warm-up time is nominally 11 seconds. This warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated voltage when four times the rated heater voltage is applied to a circuit consisting of the tube heater in series with an external resistance equal to three times the nominal heater operating resistance.

Heater and Cathode Ratings

- Heater Voltage (AC or DC): 16.8 V
- Heater Current: 0.45 A (450 mA)
- Heater Warm-up Time: 11 seconds

The nominal heater power can be calculated as follows:

$$\text{Heater Power} = \text{Heater Voltage} \times \text{Heater Current} = 16.8 \text{ V} \times 0.45 \text{ A} = 7.56 \text{ W}$$

This calculation represents the nominal power dissipation of the heater filament under standard operating conditions.

Heater-Cathode Voltage Limits

The maximum allowable voltage between the heater and the cathode depends on the polarity and the rating system applied:

- Heater Negative with Respect to Cathode:
 - DC Component: 200 V
 - Total DC and Peak: 200 V to 300 V
- Heater Positive with Respect to Cathode:
 - DC Component: 100 V
 - Total DC and Peak: 200 V

Physical Dimensions and Mounting

The 17C5 is housed in a T-5 1/2 glass bulb with a miniature button 7-pin base (designation 7CV or E7-1). It can be mounted in any position. The physical dimensions are:

- Maximum Overall Height: 2.625 inches (2-5/8 inches)
- Maximum Seated Height: 2.125 inches (2-1/8 inches) to 2.375 inches (2-3/8 inches)
- Maximum Diameter: 0.750 inches (3/4 inch)

Pinout and Interelectrode Capacitances

The 17C5 utilizes the 7CV bottom-view pinout configuration. The connections are distributed across the seven pins as follows:

Pin Number	Connection
Pin 1	Grid No. 1 (G1)
Pin 2	Cathode (K) and Grid No. 3 (G3)
Pin 3	Heater (H)
Pin 4	Heater (H)
Pin 5	Grid No. 1 (G1)
Pin 6	Grid No. 2 (<u>G</u> 2)
Pin 7	Plate (P)

Note that Grid No. 1 is internally connected to both Pin 1 and Pin 5, providing flexibility in circuit layout. Grid No. 3 (the suppressing grid) is internally tied to the cathode at Pin 2.

Direct Interelectrode Capacitances

The approximate capacitances of the tube, measured without an external shield, are:

- Grid No. 1 to Plate (G1 to P): 0.6 pF
- Input (G1 to [H + K and G3 + G2]): 13.0 pF
- Output (P to [H + K and G3 + G2]): 8.5 pF to 8.9 pF

Maximum Ratings and Rating Systems

The maximum ratings for the 17C5 are specified under two different rating systems: the Design-Maximum Rating System and the Design Center System. Designers must adhere strictly to the limits of a single system and not combine parameters from both.

Parameter	Design-Maximum Values	Design Center System
Plate Voltage	150 V	135 V
Grid No. 2 (Screen-Grid) Voltage	130 V	117 V
Plate Dissipation	7.0 W	6.0 W
Grid No. 2 Input / Dissipation	1.4 W	1.25 W

Additional Maximum Limits

Regardless of the rating system used, the following maximum limits must be observed:

- Maximum Positive DC Grid No. 1 Voltage: 0 V
- Maximum Bulb Temperature (at hottest point): 220 degrees Celsius
- Maximum Grid No. 1 Circuit Resistance:
 - Fixed Bias: 0.1 megohms
 - Cathode Bias: 0.5 megohms

Typical Operation and Performance Curves

In typical Class A1 audio amplifier service, the 17C5 is operated at moderate plate and screen voltages to deliver high power output with high sensitivity.

Typical Operating Conditions

- Plate Voltage: 120 V
- Grid No. 2 Voltage: 110 V
- Grid No. 1 Voltage: -8 V
- Peak AF Grid No. 1 Voltage: 8 V
- Zero-Signal Plate Current: 49 mA
- Maximum-Signal Plate Current: 50 mA
- Zero-Signal Grid No. 2 Current: 4.0 mA

- Maximum-Signal Grid No. 2 Current: 8.5 mA
- Plate Resistance (Approx.): 10,000 ohms
- Transconductance: 7,500 micromhos
- Load Resistance: 2,500 ohms
- Total Harmonic Distortion: 10%
- Maximum-Signal Power Output: 2.3 W

Performance Curve Analysis

Under typical pentode connection operating conditions (with a nominal plate voltage of 110 V, screen voltage of 110 V, grid bias of -7.5 V, and an input signal of 5.3 V RMS), the relationship between load resistance, power output, and distortion exhibits the following behaviors:

- **Power Output (Po):** The power output rises rapidly from zero at zero load, peaking at approximately 1.9 Watts with an optimal load resistance of 2.4 kOhms to 2.5 kOhms. As the load resistance increases further, the power output gradually declines, falling to approximately 1.4 to 1.6 Watts at a load of 5.0 kOhms, and continuing down to about 1.2 Watts at 8.5 kOhms.
- **Total Harmonic Distortion (THD):** Distortion is highly sensitive to the load resistance. It starts at approximately 8% with a low load of 0.5 kOhms, reaches a minimum of 5% to 8% near the optimal load of 2.2 kOhms to 3.0 kOhms, and then rises steeply as the load resistance increases, reaching approximately 28% to 30% at a load resistance of 8.5 kOhms to 10 kOhms. At a very low load resistance of 1.0 kOhms, the distortion rises to about 14%.

Related Designations and Family Members

The 17C5 belongs to a family of beam power pentodes that share identical electrode structures and electrical characteristics, differing only in their heater configurations and warm-up times:

- **17CU5:** Shares the identical 16.8 V, 0.45 A heater ratings and warm-up characteristics.
- **6CU5:** Identical to the 17C5 except for its heater ratings.
- **50C5:** Identical to the 17C5 except for its heater voltage, heater current, and heater warm-up time.
- **Other Family Members:** The electrical characteristics (excluding heater parameters) of the 17C5 are identical to the [12C5](#), [12CU5](#), [25C5](#), and [50B5](#).

These relationships indicate shared electrical behavior under typical operating conditions, but direct substitution is only possible when heater supply differences are properly accounted for in the circuit design.

Technical Summary

The 17C5 is a miniature, 7-pin beam power pentode designed for high-sensitivity audio power amplification in television and AC/DC radio receivers. Operating with a 16.8 V, 0.45 A heater with controlled warm-up characteristics, it is optimized for series-string heater circuits. At a typical operating point of 120 V on the plate and 110 V on the screen, the tube provides a transconductance of 7,500 micromhos and can deliver up to 2.3 Watts of audio output into a 2,500 ohm load with 10% total harmonic distortion. By understanding the differences between its Design-Maximum and Design Center ratings, and

matching the load resistance to the optimal 2.4 to 2.5 kOhm range, designers can maximize power output while minimizing harmonic distortion.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	16.8 V	Nominal
Heater current	300 mA	Nominal



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 3 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAX. Lb.B VOLTS	0.45 V	Published datasheet
THE	7 A	Published datasheet
TOTAL DC AND PEAK	3 V	Published datasheet
MAXIMUM GRID #	17 V	Published datasheet
NAAXIMUM GRID #	1.25 W	Published datasheet
MAXIMUM POSITIVE DC GRID #	1 V	Published datasheet
MAXIMUM GRID #	1 mA	Published datasheet
FIXED BIAS 0	1 ohm	Published datasheet
C ATHODF BIAS 0	5 ohm	Published datasheet
HEATER WARM- UP TIME*	11 s	Published datasheet

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
GRID #	110 V	Published datasheet
GRID #	1 V	Published datasheet
PEAK AF GRID #	1 V	Published datasheet
ZERO- SIGNAL GRID #	4 mA	Published datasheet
MAXIMUM SIGNAL PLATE CURRENT jE	0 mA	Published datasheet
MAXIMUM S	2 mA	Published datasheet
E{ =	50 V	Published datasheet
Eb =	110 V	Published datasheet
~~ E~	110 V	Published datasheet
E C	-7.5 V	Published datasheet
Es i	5.3 V	Published datasheet

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER VOLTAGE	16 V	Published datasheet
KIAXIMUM PLATE VOLTAGE]	35 V	Published datasheet
HEATER CURRENT	450 mA	Published datasheet
PLATE VOLTAGE	12 V	Published datasheet
ZERO-SIGNAL PLATE CURRENT	49 mA	Published datasheet
PLATE RESISTANCE (APFRGX.~ 10	0 pF	Published datasheet
TRANSCONDUCTANCE ~	500 μ S	Published datasheet
LOAD RESISTANCE Z	500 ohm	Published datasheet



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

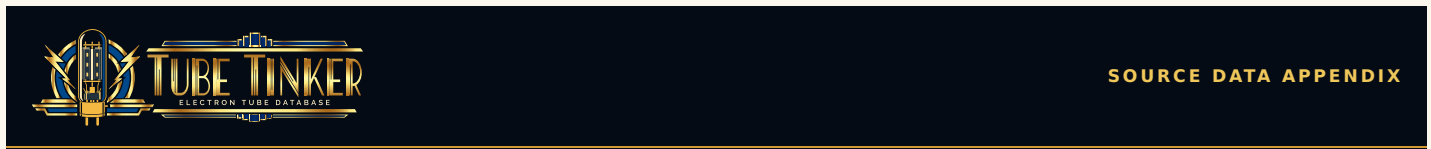
1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	110 V	ClassA
Screen Voltage	110 V	ClassA
Plate Current	49 mA	ClassA
Screen Current	4 mA	ClassA
Load Resistance	2500 ohm	ClassA
Power Output	1.9 W	ClassA
Total Harmonic Distortion	9 %	ClassA



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 12.6	16.8 V	Published in approved 17CU5 target datasheet entry; Section1
Heater Current 1.2 0.6	450 mA	Published in approved 17CU5 target datasheet entry; Section1
Heater Warm-up Time (Average) 11	11 seconds	Published in approved 17CU5 target datasheet entry; Section1
Plate Voltage	150 V	Published in approved 17CU5 target datasheet entry; Section1
Grid-No.2 (Screen-Grid) Voltage	130 V	Published in approved 17CU5 target datasheet entry; Section1
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0 V	Published in approved 17CU5 target datasheet entry; Section1
Plate Dissipation	7 W	Published in approved 17CU5 target datasheet entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No.2 Input	1.4 W	Published in approved 17CU5 target datasheet entry; Section1
Plate Voltage	120 V	Published in approved 17CU5 target datasheet entry; Section1
Grid-No.2 Voltage	110 V	Published in approved 17CU5 target datasheet entry; Section1
Grid-No.1 Voltage	-8 V	Published in approved 17CU5 target datasheet entry; Section1
Peak AF Grid-No.1 Voltage	8 V	Published in approved 17CU5 target datasheet entry; Section1
Zero-Signal Plate Current	49 mA	Published in approved 17CU5 target datasheet entry; Section1
Zero-Signal Grid-No.2 Current	4 mA	Published in approved 17CU5 target datasheet entry; Section1
Maximum-Signal Grid-No.2 Current	8.5 mA	Published in approved 17CU5 target datasheet entry; Section1
Plate Resistance (Approx.)	10000 Ω	Published in approved 17CU5 target datasheet entry; Section1
Transconductance	7500 μS	Published in approved 17CU5 target datasheet entry; Section1
Load Resistance	2500 Ω	Published in approved 17CU5 target datasheet entry; Section1
Total Harmonic Distortion	10 %	Published in approved 17CU5 target datasheet entry; Section1
Maximum-Signal Power Output	2.3 W	Published in approved 17CU5 target datasheet entry; Section1
For fixed-bias operation	0.1 MΩ	Published in approved 17CU5 target datasheet entry; Section1
For cathode-bias operation	0.5 MΩ	Published in approved 17CU5 target datasheet entry; Section1
Heater Voltage (ac/dc) 2.1 6.3	13.5 V	Published in approved 17CU5 target datasheet entry; Section1
Heater Current 0.45 0.135	60 mA	Published in approved 17CU5 target datasheet entry; Section1
Plate Voltage	135 V	Published in approved 17CU5 target datasheet entry; Section1
Negative-bias value	55 V	Published in approved 17CU5 target datasheet entry; Section1
Peak positive value	0 V	Published in approved 17CU5 target datasheet entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode Current	15 mA	Published in approved 17CU5 target datasheet entry; Section1
Plate Dissipation	1.5 W	Published in approved 17CU5 target datasheet entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.6 pF	Published in approved 17CU5 target datasheet entry; Section1
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3	13 pF	Published in approved 17CU5 target datasheet entry; Section1
Plate to Cathode, Heater, Grid No.2, and Grid No.3	8.5 pF	Published in approved 17CU5 target datasheet entry; Section1
Grid to Plate	0.92 pF	Published in approved 17CU5 target datasheet entry; Section1
Grid to Cathode. Heater, and Shell	4.3 pF	Published in approved 17CU5 target datasheet entry; Section1
Plate to Cathode, Heater, and Shell	1.8 pF	Published in approved 17CU5 target datasheet entry; Section1
Plate to Cathode	0.18 pF	Published in approved 17CU5 target datasheet entry; Section1
Heater to Cathode	1.6 pF	Published in approved 17CU5 target datasheet entry; Section1