



ELECTRONIC TUBE REFERENCE

12JS6

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

BEAMPOWER

Beam-power horizontal-output tube registered as the 12.6 V heater counterpart of the 6JS6, retaining its television line-deflection function.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12FY	BASE PINS	12
NOMINAL HEATER	12.6 V / 1.125 A	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Beam Power	
PLATE RESISTANCE	5500 Ω
TRANSCONDUCTANCE	0.0115 S
AMPLIFICATION FACTOR	3
MAXIMUM PLATE VOLTAGE	990 V
MAXIMUM SCREEN VOLTAGE	220 V
MAXIMUM PLATE DISSIPATION	30 W
MAXIMUM SCREEN DISSIPATION	5.5 W
MAXIMUM CATHODE CURRENT	1.2 A
<i>Sylvania 1970 pp.284-285: horizontal-deflection beam power pentode; 990 V maximum DC plate-supply voltage, 7500 V peak positive pulse, 1200 V peak negative pulse; triode-connected amplification factor 3. 12JS6 plate-knee voltage 70 V.</i>	

12JS6 — Beam Power Pentode Horizontal Deflection Amplifier

A high-power Compactron beam power pentode designed for horizontal deflection amplifier service in color television receivers.

Overview

The **12JS6** is a specialized beam power pentode designed primarily for horizontal deflection amplifier service in color television receivers. Housed in a 12-pin Compactron envelope, the tube is engineered to deliver high peak plate currents at low plate voltages, ensuring high efficiency in scanning circuits. The 12JS6 is part of a family of structurally similar horizontal deflection tubes, including the [6JS6C](#), [23JS6A](#), and [31JS6C](#), but is distinguished by its specific heater operating parameters.

Construction, Physical Dimensions, and Basing

The 12JS6 is constructed using the **Compactron T-12** configuration, featuring a glass bulb with a 12-pin button base (E12-74). To safely isolate the high peak positive voltages encountered in horizontal deflection circuits, the plate connection is brought out to a top cap (C1-1).

The physical dimensions of the tube are:

- **Maximum Diameter:** 1.563 inches
- **Maximum Seated Height:** 3.750 inches
- **Maximum Overall Height:** 4.125 inches
- **Outline Designation:** 12-89

The tube utilizes the **12FY** basing arrangement. Looking at the bottom of the base, the pin connections are assigned as follows:

- **Pin 1:** Grid No. 3 (Beam Plates)
- **Pin 2:** Grid No. 1 (Control Grid)
- **Pin 3:** Cathode
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Grid No. 2 (Screen Grid)
- **Pin 7:** No Connection
- **Pin 8:** Grid No. 1 (Control Grid)
- **Pin 9:** Internal Connection (do not use for external circuit connections)
- **Pin 10:** Grid No. 3 (Beam Plates)
- **Pin 11:** No Connection
- **Pin 12:** Grid No. 2 (Screen Grid)
- **Top Cap:** Plate (Anode)

The duplicate connections for Grid No. 1, Grid No. 2, and Grid No. 3 are designed to reduce lead inductance and distribute current loads across multiple pins.

Heater Characteristics and Ratings

The 12JS6 is designed to operate with a nominal heater voltage of 12.6 V.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V
Heater Voltage Tolerance	± 0.6 V (12.0 V to 13.2 V)
Nominal Heater Current	1.125 A (1125 mA)

Calculation of Nominal Heater Power: Using the nominal heater voltage ($V_f = 12.6$ V) and nominal heater current ($I_f = 1.125$ A), the nominal power dissipated by the heater is calculated as: $P_f = V_f \times I_f = 12.6 \text{ V} \times 1.125 \text{ A} = 14.175 \text{ W}$

(Note: While some early registration records list the heater current as 12.125 A, this is a typographical anomaly; the standard operating current is 1.125 A, which corresponds to 1125 mA.)

The heater-to-cathode insulation is rated to withstand significant potential differences, which is critical in television receiver circuits where the cathode may operate at elevated potentials:

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

Electrical Characteristics and Typical Operation

Under typical operating conditions as a class A amplifier, the 12JS6 exhibits high transconductance and moderate plate resistance. The typical operating parameters are defined below:

Parameter	Value
Plate Voltage	175 V
Beam Plate (Grid No. 3) Voltage	Connected to Cathode at Socket
Grid No. 2 (Screen) Voltage	125 V
Grid No. 1 (Control Grid) Voltage	-25 V
Plate Current	130 mA
Grid No. 2 Current	2.8 mA
Transconductance	11,500 μmhos
Plate Resistance (Approx.)	5500 Ω

Parameter	Value
Grid No. 1 Voltage for $I_b = 1$ mA (Approx. Cutoff)	-54 V

When triode-connected (with 125 V on the plate and Grid No. 2, and -25 V on Grid No. 1), the tube exhibits an amplification factor (μ) of **3**.

Design Maximum Ratings

The ratings of the 12JS6 are established under the Design Maximum Rating System. These ratings represent the limiting values of operating and environmental conditions that should not be exceeded under any normal service condition.

- **DC Plate Supply Voltage (Boost + DC Power Supply):** 990 V Max
- **Peak Positive Plate Voltage:** 7500 V Max
- **Peak Negative Plate Voltage:** 1200 V Max
- **Positive DC Beam Plate (Grid No. 3) Voltage:** 75 V Max
- **Grid No. 2 (Screen Grid) Voltage:** 220 V Max
- **Peak Negative Grid No. 1 Voltage:** 330 V Max
- **Plate Dissipation:** 30 W Max
- **Grid No. 2 Input:** 5.5 W Max
- **Average Cathode Current:** 350 mA Max
- **Peak Cathode Current:** 1200 mA Max
- **Grid No. 1 Circuit Resistance (with Grid Bias Feedback HV Regulation):** 0.47 M Ω Max
- **Grid No. 1 Circuit Resistance (with DC or Pulse Shunt HV Regulation):** 10.0 M Ω Max
- **Bulb Temperature (at hottest point):** 225 °C Max

For horizontal deflection service in a 525-line, 30-frame television system, the duty cycle of the voltage pulse must not exceed 15% of one horizontal scanning cycle.

Average Plate Characteristics and Knee Values

The 12JS6 is designed to deliver high current at low plate voltages, which is a critical requirement for horizontal deflection amplifiers to ensure high efficiency. This capability is characterized by the "knee" of the plate characteristic curve, where the plate current reaches a high value before saturating.

At the instantaneous plate knee, the typical values are:

- **Plate Voltage (E_b):** 70 V
- **Grid No. 2 Voltage (E_{c2}):** 125 V
- **Grid No. 1 Voltage (E_{c1})(/tubes/C1):** 0 V
- **Instantaneous Plate Current (I_b):** 570 mA
- **Instantaneous Grid No. 2 Current (I_{c2}):** 34 mA

The average plate characteristics show that with Grid No. 1 at 0 V, the plate current rises rapidly as plate voltage increases, reaching the knee near 70 V. Above this voltage, the plate current remains relatively flat, demonstrating a high dynamic output impedance. Grid No. 2 current peaks at very low plate voltages and drops significantly once the plate voltage exceeds the knee, minimizing screen grid dissipation during the conduction cycle.

Related Designations and Comparisons

The 12JS6 is closely related to several other horizontal deflection amplifiers:

- **6JS6 / 6JS6C:** The 12JS6 is electrically similar to the [6JS6](#) and [6JS6C](#), except for its heater ratings. The [6JS6C](#) operates with a 6.3 V heater drawing 2250 mA, whereas the 12JS6 operates at 12.6 V drawing 1125 mA.
- **23JS6A:** This variant operates with a 23.6 V heater drawing 600 mA and has a controlled heater warm-up time of 11 seconds.
- **31JS6C:** This variant operates with a 31.5 V heater drawing 450 mA and also features an 11-second heater warm-up time.

While these tubes share the same 12FY basing, physical dimensions, and internal plate structures, they are not direct drop-in substitutes for one another due to their incompatible heater voltage and current requirements.

Technical Summary

The **12JS6** is a high-performance, Compactron-style beam power pentode designed for horizontal deflection amplifier service in color television receivers. Operating with a 12.6 V, 1.125 A heater, it features a 12-pin button base with a top cap plate connection to handle peak positive plate voltages up to 7500 V. With a plate dissipation rating of 30 W and a peak cathode current capability of 1200 mA, the 12JS6 is optimized for high-efficiency, high-current operation at low plate voltages, as evidenced by its knee characteristic of 570 mA at a plate voltage of 70 V.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1970 Sylvania Technical Manual

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

1970 SYLVANIA TECHNICAL MANUAL

Section 1 · Beam Power

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	0.7 pF	Unshielded; grid-to-plate; Sylvania Technical Manual 1970 pp. 284-285
Input capacitance	24 pF	Unshielded; input; Sylvania Technical Manual 1970 pp. 284-285
Output capacitance	10 pF	Unshielded; output; Sylvania Technical Manual 1970 pp. 284-285

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak positive pulse plate voltage	7500 V	Peak positive pulse plate voltage; Sylvania Technical Manual 1970 pp. 284-285
Peak negative pulse plate voltage	-1200 V	Peak negative pulse plate voltage; Sylvania Technical Manual 1970 pp. 284-285
Positive DC beam-plate voltage	75 V	Positive DC beam-plate voltage; Sylvania Technical Manual 1970 pp. 284-285
Average cathode current	350 mA	Maximum average cathode current; Sylvania Technical Manual 1970 pp. 284-285
Plate voltage	175 V	Typical pentode operation; Sylvania Technical Manual 1970 pp. 284-285
Grid #2 voltage	125 V	Typical pentode operation; screen; Sylvania Technical Manual 1970 pp. 284-285
Grid #1 voltage	-25 V	Typical pentode operation; control grid; Sylvania Technical Manual 1970 pp. 284-285
Plate current	130 mA	Typical pentode operation; plate current; Sylvania Technical Manual 1970 pp. 284-285
Grid #2 current	2.8 mA	Typical pentode operation; screen current; Sylvania Technical Manual 1970 pp. 284-285

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate current	570 mA	Instantaneous plate knee; Eb=70V, Ec2=125V, Ec1=0V; Sylvania Technical Manual 1970 pp. 284-285
Plate voltage	70 V	12JS6 instantaneous plate knee; Sylvania Technical Manual 1970 pp. 284-285
Grid #2 current	34 mA	Instantaneous plate knee; Eb=70V, Ec2=125V, Ec1=0V; Sylvania Technical Manual 1970 pp. 284-285
Grid #1 voltage	-54 V	Approximate cutoff, Ib=1mA; Sylvania Technical Manual 1970 pp. 284-285
Peak Heater-Cathode Voltage	200 V	Heater negative with respect to cathode; total DC and peak; Sylvania Technical Manual 1970 pp.284-285
Peak Heater-Cathode Voltage	100 V	Heater positive with respect to cathode; DC component; Sylvania Technical Manual 1970 pp.284-285
Peak Heater-Cathode Voltage	200 V	Heater positive with respect to cathode; total DC and peak; Sylvania Technical Manual 1970 pp.284-285