

ELECTRONIC TUBE REFERENCE

# 12JN6

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION  
CONSTRUCTION  
BEAMPOWER

Duodecar beam-power tube for television horizontal-deflection amplification, electrically related to the 6JM6 and optimized for efficient high-voltage line-output operation.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | 12FK              | BASE PINS            | 12            |
| NOMINAL HEATER      | 12.6 V / 600 mA   | PARALLEL HEATER      | – / –         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

## 12FK - TERMINAL PINOUT

| TERMINAL | SECTION | ELEMENT              | STATUS    |
|----------|---------|----------------------|-----------|
| PIN1     | –       | H – Heater           | CONNECTED |
| PIN2     | –       | K – Cathode          | CONNECTED |
| PIN3     | –       | G2 – Screen Grid     | CONNECTED |
| PIN4     | –       | G3 – Suppressor Grid | CONNECTED |
| PIN7     | –       | P – Plate (Anode)    | CONNECTED |
| PIN10    | –       | G3 – Suppressor Grid | CONNECTED |
| PIN11    | –       | G1 – Control Grid    | CONNECTED |
| PIN12    | –       | H – Heater           | CONNECTED |

## SECTION RATINGS

| SECTION1 Beam Power                                                                                                               |                |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------|
| PLATE RESISTANCE                                                                                                                  | 18000 $\Omega$ |
| TRANSCONDUCTANCE                                                                                                                  | 0.0073 S       |
| AMPLIFICATION FACTOR                                                                                                              | 4.4            |
| 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                                                                                                           | 550 mA         |
| WARM-UP TIME                                                                                                                      | 11 s           |
| <i>Published ratings/characteristics promoted where applicable; additional operating data retained in TUBE_SECTION_PARAMETER.</i> |                |

# 12JN6 — Beam Power Pentode Compactron

An indirectly heated, 12-pin compactron beam power pentode designed for horizontal-deflection amplifier service in television receivers.

## Overview

The **12JN6** is a multi-electrode beam power tube utilizing compactron construction. It is designed primarily for use as a horizontal-deflection output amplifier in both color and black-and-white television receivers. The tube is characterized by a high zero-bias plate current, a high ratio of plate current to screen grid (Grid No. 2) current, and high DC plate supply voltage capabilities.

The 12JN6 belongs to a family of electrically identical tubes, including the [6JN6](#) and [17JN6](#), which differ only in their heater ratings. Additionally, the 12JN6 is electrically identical to the [6JM6](#) except for a slightly lower grid-No. 1-to-plate capacitance.

## Mechanical Construction and Pinout

The 12JN6 is constructed in a T-12 glass bulb envelope with a 12-pin button base (EIA E12-74) and conforms to the JEDEC 12-56 outline. It features a JEDEC 12FK bottom-view basing diagram. The tube can be mounted and operated in any physical position.

The physical dimensions of the envelope are:

- **Maximum Diameter:** 1.563 inches
- **Maximum Seated Height:** 2.500 inches
- **Maximum Overall Height:** 2.875 inches

The 12-pin base configuration provides the following electrical connections:

- **Pin 1:** Heater
- **Pin 2:** Cathode
- **Pin 3:** Grid No. 2 (Screen Grid)
- **Pin 4:** Grid No. 3 (Beam Plates)
- **Pin 5:** No Connection (NC)
- **Pin 6:** No Connection (NC)
- **Pin 7:** Plate
- **Pin 8:** No Connection (NC)
- **Pin 9:** No Connection (NC)
- **Pin 10:** Grid No. 3 (Beam Plates)
- **Pin 11:** Grid No. 1 (Control Grid)
- **Pin 12:** Heater

## Heater Characteristics

The 12JN6 incorporates a coated unipotential cathode. The heater is designed for operation in series-connected heater strings, featuring a controlled warm-up characteristic to minimize voltage surges across other tubes in the string during start-up.

| Heater Parameter            | Value           |
|-----------------------------|-----------------|
| Heater Voltage (AC or DC)   | 12.6 V          |
| Heater Current              | 0.6 A (600 mA)  |
| Heater Current Limits       | 600 $\pm$ 40 mA |
| Average Heater Warm-up Time | 11 seconds      |

## Heater-Cathode Voltage Ratings

To ensure insulation integrity, the voltage difference between the heater and the cathode must be maintained within the following limits:

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

## Electrical Characteristics and Typical Operation

### Direct Interelectrode Capacitances

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

- **Grid No. 1 to Plate:** 0.34 pF

- **Input (Grid No. 1 to Cathode, Heater, Grid No. 2, and Grid No. 3):** 16 pF
- **Output (Plate to Cathode, Heater, Grid No. 2, and Grid No. 3):** 7.0 pF

## Typical Pentode Operation (Class A1)

Under typical operating conditions as a pentode, with Grid No. 3 connected directly to the cathode at the socket, the electrical parameters are:

- **Plate Voltage:** 250 V
- **Grid No. 2 Voltage:** 150 V
- **Grid No. 1 Voltage:** -22.5 V
- **Plate Current:** 65 mA
- **Grid No. 2 Current:** 1.8 mA
- **Transconductance:** 7300  $\mu$ mhos
- **Plate Resistance (Approximate):** 18,000  $\Omega$
- **Grid No. 1 Voltage for Cutoff (at Plate Current = 1.0 mA):** -42 V (at 250 V plate), -100 V (at 5000 V plate)

## Triode-Connected Characteristics

When the tube is triode-connected (with Grid No. 2 tied directly to the plate):

- **Plate Voltage:** 150 V
- **Grid No. 1 Voltage:** -22.5 V
- **Amplification Factor ( $\mu$ ):** 4.4

## Instantaneous Plate Knee Values

To evaluate performance at the knee of the characteristic curve, the following instantaneous values are specified (measured using a recurrent waveform or applied for a short interval not exceeding 2 seconds to prevent thermal damage):

- **Plate Voltage:** 60 V
- **Grid No. 2 Voltage:** 150 V
- **Grid No. 1 Voltage:** 0 V
- **Plate Current:** 345 mA
- **Grid No. 2 Current:** 27 mA

## Maximum Ratings

The maximum ratings for the 12JN6 are established under the Design-Maximum Rating System. For service as a horizontal-deflection output amplifier in a 525-line, 30-frame television system, the limits are defined as follows:

| Rating Parameter                                  | Maximum Limit                             |
|---------------------------------------------------|-------------------------------------------|
| DC Plate Supply Voltage (Boost + DC Power Supply) | 770 V                                     |
| Peak Positive Pulse Plate Voltage                 | 6500 V                                    |
| Peak Negative Pulse Plate Voltage                 | 1500 V                                    |
| Positive DC Grid No. 3 Voltage                    | 70 V                                      |
| DC Grid No. 2 Voltage                             | 220 V                                     |
| Negative DC Grid No. 1 Voltage                    | 55 V                                      |
| Peak Negative Pulse Grid No. 1 Voltage            | 330 V                                     |
| Plate Dissipation                                 | 17.5 W (or 17.6 W in some specifications) |
| Grid No. 2 Input                                  | 3.5 W                                     |
| Average Cathode Current                           | 175 mA                                    |
| Peak Cathode Current                              | 550 mA (or 650 mA in some specifications) |
| Grid No. 1 Circuit Resistance                     | 1.0 MΩ                                    |
| Bulb Temperature (at hottest point)               | 220 °C                                    |

*Note on Pulse Ratings:* The peak pulse ratings are valid only when the pulse duration does not exceed 15% of a horizontal scanning cycle, which corresponds to a maximum of 10 microseconds in a standard television sweep circuit.

## Application and Circuit Considerations

### Snivet Suppression

A key design feature of the 12JN6 is the provision of separate external connections for the beam-forming plates (Grid No. 3) via pins 4 and 10. In television horizontal-deflection circuits, high-frequency oscillations known as "snivets" can occur, leading to visual interference on the screen. By providing independent terminals for Grid No. 3, circuit designers can apply specific potentials or grounding configurations to suppress these oscillations effectively.

### Protective Bias Requirements

When the 12JN6 is operated in stages utilizing grid-leak bias, there is a risk of excessive current run-away if the drive signal (excitation) is lost. To prevent catastrophic tube failure under these conditions, the circuit must incorporate an adequate cathode-bias resistor or other suitable protective means to limit the current to safe levels in the absence of excitation.

## Technical Summary

The **12JN6** is a robust, high-performance compactron beam power pentode designed specifically for demanding horizontal-deflection amplifier service. It features a **12.6 V, 0.6 A** heater with controlled warm-up characteristics for series-string reliability. Housed in a T-12 envelope with a 12-pin button base, it provides high peak voltage capabilities (up to **6500 V** peak positive pulse) and a plate dissipation rating of **17.5 W**. With its separate beam plate connections for snivet control and high transconductance of **7300  $\mu\text{mhos}$** , the 12JN6 represents a highly optimized solution for television sweep output stages.

## SOURCE OPERATING CONDITIONS

# 1965 Sylvania Electronic Tubes Vol3

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

## 1965 SYLVANIA ELECTRONIC TUBES VOL3

## Section 1 · Beam Power

| CAPACITANCE               |                 |                  |
|---------------------------|-----------------|------------------|
| PARAMETER                 | PUBLISHED VALUE | CONDITION / NOTE |
| Grid-to-plate capacitance | 0.34 pF         | —                |
| Input capacitance         | 16 pF           | —                |
| Output capacitance        | 1.7 pF          | —                |

| OTHER                             |                 |                  |
|-----------------------------------|-----------------|------------------|
| PARAMETER                         | PUBLISHED VALUE | CONDITION / NOTE |
| Peak positive plate voltage       | 6500 V          | Pulse            |
| Peak negative pulse plate voltage | 1500 V          | Pulse            |
| Positive DC beam-plate voltage    | 70 V            | —                |
| Peak cathode current              | 550 mA          | —                |

| CHARACTERISTICS             |                 |                  |
|-----------------------------|-----------------|------------------|
| PARAMETER                   | PUBLISHED VALUE | CONDITION / NOTE |
| Plate voltage               | 250 V           | —                |
| Control-grid voltage        | -22.5 V         | —                |
| Transconductance            | 7300 uS         | —                |
| Plate resistance            | 18000 Ohm       | —                |
| Triode amplification factor | 4.4 ratio       | TriodeConnection |

# 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       |
| DC plate-supply voltage           | 770 V           | HorizontalDeflection   |
| Peak positive pulse plate voltage | 6500 V          | HorizontalDeflection   |
| Peak negative pulse plate voltage | -1500 V         | HorizontalDeflection   |
| Grid #2 voltage maximum           | 220 V           | HorizontalDeflection   |
| Peak negative grid #1 voltage     | -330 V          | HorizontalDeflection   |
| Peak cathode current              | 550 mA          | HorizontalDeflection   |
| Average cathode current           | 175 mA          | HorizontalDeflection   |
| Plate voltage                     | 250 V           | AverageCharacteristics |
| Grid #2 voltage                   | 150 V           | AverageCharacteristics |
| Grid #1 voltage                   | -22.5 V         | AverageCharacteristics |
| Plate current                     | 65 mA           | AverageCharacteristics |
| Grid #2 current                   | 1.8 mA          | AverageCharacteristics |
| Heater warm-up time               | 11 s            | —                      |

| CHARACTERISTIC              |                 |                        |
|-----------------------------|-----------------|------------------------|
| PARAMETER                   | PUBLISHED VALUE | CONDITION / NOTE       |
| Plate resistance            | 18000 ohm       | AverageCharacteristics |
| Transconductance            | 7300 uS         | AverageCharacteristics |
| Triode amplification factor | 4.4             | TriodeConnection       |

| CAPACITANCE                  |                 |                  |
|------------------------------|-----------------|------------------|
| PARAMETER                    | PUBLISHED VALUE | CONDITION / NOTE |
| Grid #1-to-plate capacitance | 0.34 pF         | —                |
| Input capacitance            | 16 pF           | —                |
| Output capacitance           | 7 pF            | —                |

## 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                                             |
| # Pulse duration must not exceed 15% of a horizontal scanning cycle ( | <b>10 microseconds</b> | Published in approved 17JN6 target datasheet entry; Section1 |
| Heater Warm-up Time (Average) 11                                      | <b>11 seconds</b>      | Published in approved 17JN6 target datasheet entry; Section1 |
| Heater Warm-up Time (Average)                                         | <b>11 seconds</b>      | Published in approved 17JN6 target datasheet entry; Section1 |
| Plate Voltage 300                                                     | <b>300 V</b>           | Published in approved 17JN6 target datasheet entry; Section1 |

| CAPACITANCE                                            |                 |                                                              |
|--------------------------------------------------------|-----------------|--------------------------------------------------------------|
| PARAMETER                                              | PUBLISHED VALUE | CONDITION / NOTE                                             |
| Grid No.1 to Plate                                     | <b>0.34 pF</b>  | Published in approved 17JN6 target datasheet entry; Section1 |
| Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3 | <b>16 pF</b>    | Published in approved 17JN6 target datasheet entry; Section1 |
| Plate to Cathode, Heater, Grid No.2, and Grid No.3     | <b>7 pF</b>     | Published in approved 17JN6 target datasheet entry; Section1 |
| Grid No.1 to Plate                                     | <b>0.01 pF</b>  | Published in approved 17JN6 target datasheet entry; Section1 |
| Shield                                                 | <b>5.5 pF</b>   | Published in approved 17JN6 target datasheet entry; Section1 |
| Shield                                                 | <b>3.4 pF</b>   | Published in approved 17JN6 target datasheet entry; Section1 |
| Grid to Plate                                          | <b>1.7 pF</b>   | Published in approved 17JN6 target datasheet entry; Section1 |
| and Internal Shield                                    | <b>3.2 pF</b>   | Published in approved 17JN6 target datasheet entry; Section1 |

| PARAMETER           | PUBLISHED VALUE | CONDITION / NOTE                                             |
|---------------------|-----------------|--------------------------------------------------------------|
| and Internal Shield | <b>2.2 pF</b>   | Published in approved 17JN6 target datasheet entry; Section1 |

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