



ELECTRONIC TUBE REFERENCE

13J47S

Voltage - Pentode High Frequency (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Pentode designed for underwater amplifier equipment and high-frequency voltage amplification. Manufacturer documentation identifies it as a specialized communications signal tube for submerged cable systems rather than a general-purpose or power-output pentode.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	13.3 V / 295 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
TRANSCONDUCTANCE	0.0067 S
MAXIMUM PLATE VOLTAGE	100 V
MAXIMUM SCREEN VOLTAGE	100 V
MAXIMUM CATHODE CURRENT	7.5 mA
Values promoted where clearly identifiable from Russian source.	

13J47S — High-Reliability Pentode for Cable Telephony

Overview

The **13J47S** (also designated as **13Ж47С**) is a specialized glass-envelope pentode designed for high-reliability service in long-distance high-frequency cable telephony. Its primary application is in

underwater line amplifiers, where long operating life, low noise, and stable electrical characteristics are critical. The tube has a mass of approximately 50 grams and features a ruggedized construction capable of withstanding significant mechanical stress.

Pinout and Physical Construction

The 13J47S is housed in a glass envelope. The physical connections are made through a base with the following pin assignments:

- **Pin 1:** Anode (a)
- **Pin 2:** Heater (p)
- **Pin 3:** Cathode and Grid 3 (k, c3) — internally connected
- **Pin 4:** Control Grid / Grid 1 (c1)
- **Pin 5:** Screen Grid / Grid 2 (c2)
- **Pin 6:** Heater (p)

The internal connection of the suppressor grid (Grid 3) directly to the cathode simplifies external circuitry and ensures stable potential distribution within the electron stream.

Electrical Characteristics and Operating Points

The nominal electrical characteristics of the 13J47S are specified under the following test conditions:

- **Heater Voltage (Uh):** 13.3 ± 0.9 V
- **Anode Voltage (Ua):** 80 V
- **Screen Grid Voltage (Uc2):** 80 V
- **Cathode Resistor (Rk):** 312 Ω

Under these standard operating conditions, the tube exhibits the following typical parameters:

Parameter	Value
Heater Current (Ih)	295 mA
Anode Current (Ia)	5 ± 0.8 mA
Screen Grid Current (Ic2)	≤ 1.5 mA
Reverse Control Grid Current (Ic1)	≤ 0.05 AA
Transconductance (gm)	6.7 ± 1.1 mA/V
Internal Resistance (Ri) (at Ia = 5 mA)	> 450 kΩ
Equivalent Noise Resistance (Req)	≤ 2 kΩ
Vibro-Noise Voltage (Uvib) (at Ra = 10 kΩ, vibration 50 Hz, acceleration 10 g)	≤ 250 mV

Interelectrode Capacitances

The interelectrode capacitances of the 13J47S are tightly controlled to ensure stable high-frequency performance:

- **Input Capacitance (C_{in}):** 11.6 $\pm$ 1.2 pF
- **Output Capacitance (C_{out}):** 3 $\pm$ 0.7 pF
- **Transfer Capacitance (C_{gp}):** $\leq$ 0.04 pF

Reliability and Lifetime Criteria

Designed for submerged and remote telecommunication repeaters where maintenance is extremely difficult, the 13J47S is rated for an exceptionally long operating life:

- **Minimum Operating Life:** > 45,000 hours

To determine the end of useful life, the tube is evaluated under specific test conditions (P_{out} = 10 mW, R_a = 5 k Ω , f = 6 kHz). The criteria for failure or exhaustion are:

- **Reverse Control Grid Current:** > 0.5 AA
- **Transconductance Decrease:** > 30% of the initial value

Maximum Ratings and Environmental Tolerances

To ensure the integrity of the tube over its long service life, operation must be maintained within the following absolute maximum limits:

Parameter	Limit
Heater Current Range	290 - 299 mA
Maximum Anode Voltage	100 V
Maximum Screen Grid Voltage (U _{c2})	100 V
Maximum Cathode Current	7.5 mA
Maximum Heater-to-Cathode Voltage (Heater Positive)	110 V
Maximum Control Grid Circuit Resistance	0.5 M Ω
Maximum Bulb Temperature	50 $^{\circ}$ C

Environmental and Mechanical Durability

The 13J47S is designed to withstand harsh mechanical environments during transport, installation, and operation:

- **Vibration Resistance (5 to 50 Hz):** Up to 10 g acceleration

- **Vibration Resistance (50 to 300 Hz):** Up to 1.5 g acceleration
- **Single Shock Resistance:** Up to 300 g acceleration
- **Operating Ambient Temperature Range:** -60 °C to +70 °C

Technical Summary

The **13J47S** is a high-reliability, glass-envelope pentode specifically engineered for long-life applications in underwater high-frequency telephony cable amplifiers. Operating at a nominal heater voltage of 13.3 V and drawing approximately 295 mA of heater current, it provides a transconductance of 6.7 mA/V and an internal resistance exceeding 450 k Ω under typical 80 V operating conditions. With an operating life exceeding 45,000 hours and robust mechanical tolerances, the 13J47S represents a highly specialized solution for critical telecommunications infrastructure.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1981 Russian Tubes Katsnelson and Larionov

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

1981 RUSSIAN TUBES KATSNELSON AND LARIONOV

Section 1 · Pentode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate current	8 mA	Published Russian-source value; OCR-normalized.
Screen current	1.5 mA	Published Russian-source value; OCR-normalized.
Transconductance	1.1 μ S	Published Russian-source value; OCR-normalized.
Input capacitance	2 pF	Published Russian-source value; OCR-normalized.
Output capacitance	7 pF	Published Russian-source value; OCR-normalized.
Transfer capacitance	0.04 pF	Published Russian-source value; OCR-normalized.
Service life	909 h	Published Russian-source value; OCR-normalized.
Heater current	295 mA	Nominal/published heater value.

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