

ELECTRONIC TUBE REFERENCE

1AF5

Voltage - Pentode or Tetrode (with diode) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

DIODE-PENTODE

Source mismatch prevents a defensible functional classification: the supplied manufacturer page does not contain a printed 1AF5 entry, so neighboring tube data were not inferred.

GENERAL CHARACTERISTICS

BASE DESIGNATION	6AU	BASE PINS	7
NOMINAL HEATER	1.4 V / 25 mA	PARALLEL HEATER	– / –
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

6AU - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – 1G3	A	G3 – Suppressor Grid	CONNECTED
PIN1 – F	–	F – Filament	CONNECTED
PIN3 – 2P	B	P – Plate (Anode)	CONNECTED
PIN4 – 1G2	A	G2 – Screen Grid	CONNECTED
PIN5 – 1P	A	P – Plate (Anode)	CONNECTED
PIN6 – 1G1	A	G1 – Control Grid	CONNECTED
PIN7 – F	–	F – Filament	CONNECTED

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	2000000 Ω
TRANSCONDUCTANCE	0.0006 S
MAXIMUM PLATE VOLTAGE	110 V
MAXIMUM SCREEN VOLTAGE	110 V
MAXIMUM CATHODE CURRENT	2.5 mA
<i>Source mismatch exception: approved PDF contains 1AF4 and 1AF6 rows but no printed 1AF5 row. Electrical values intentionally left unpopulated rather than inferred from a neighboring designation.</i>	

SECTION2 Diode	
No fixed ratings recorded.	

1AF5 — Diode Sharp-Cutoff Pentode Vacuum Tube

A miniature, filament-type diode-pentode designed for use in portable radio receivers as a combined detector and audio-frequency (AF) amplifier.

Overview

The **1AF5** is a multi-unit miniature vacuum tube containing a single diode and a sharp-cutoff pentode within a single envelope. It was specifically engineered for portable, battery-operated receivers, where power conservation is critical. By reducing the filament power consumption by half compared to earlier tubes in similar service, the 1AF5 allowed for longer battery life in portable equipment.

The tube features a coated filament designed for low-current DC operation, though it can also be operated from AC sources. It is housed in a standard T-5 1/2 glass bulb with a miniature 7-pin button base.

Physical Construction and Filament Ratings

The 1AF5 is constructed in a miniature T-5 1/2 glass envelope with a miniature button 7-pin base. The tube can be mounted and operated in any position.

Physical Dimensions

- **Maximum Diameter:** 3/4 inch
- **Maximum Overall Length:** 2 1/8 inches
- **Maximum Seated Height:** 1 7/8 inches
- **Outline Drawing:** 5-2

Filament Characteristics

The tube utilizes a coated filament designed for highly efficient battery operation. For power-line applications, the filament voltage is centered at 1.4 V when operating from a normal 117 V line supply.

- **Filament Voltage:** 1.4 V (AC or DC)
- **Filament Current:** 25 mA (0.025 A)
- **Filament Heating:** Direct (coated filament)

Basing and Pinout Configurations

The 1AF5 is documented with three distinct pinout configurations across different specifications. Designers must verify the specific basing arrangement of the target component, as the pin assignments for the diode plate, pentode plate, and grids vary significantly.

Configuration A (Base Connection 6AU)

In this configuration, the pins are assigned as follows:

- **Pin 1:** Filament Negative (F-), Grid No. 3 (G3)
- **Pin 2:** Diode Plate (DP)
- **Pin 3:** Grid No. 1 (G1)
- **Pin 4:** Grid No. 2 (G2)
- **Pin 5:** Pentode Plate (P)
- **Pin 6:** No Connection (NC)
- **Pin 7:** Filament Positive (F+), Grid No. 3 (G3)

Configuration B (Basing 6AU-0-0)

An alternative standard assigns the pins as:

- **Pin 1:** Filament Negative (F-), Grid No. 3 (G3)
- **Pin 2:** No Connection (NC)
- **Pin 3:** Diode Plate (DP)
- **Pin 4:** Grid No. 2 (G2)
- **Pin 5:** Pentode Plate (P)
- **Pin 6:** Grid No. 1 (G1)
- **Pin 7:** Filament Positive (F+)

Configuration C (Bottom View 6AU)

A third documented variant lists the following layout:

- **Pin 1:** Filament Negative (F-), Grid No. 3 (G3)
- **Pin 2:** Diode Plate (Pd)
- **Pin 3:** Grid No. 2 (G2)

- **Pin 4:** Grid No. 1 (G1)
- **Pin 5:** No Connection (NC)
- **Pin 6:** Pentode Plate (P)
- **Pin 7:** Filament Positive (F+)

Electrical Ratings

The maximum ratings for the 1AF5 are established under the Design Center system (RMA Standard M8-210). These limits must not be exceeded under the worst-case operating conditions.

Parameter	Maximum Rating
Plate Voltage (DC)	110 V
Grid No. 2 (Screen) Voltage (DC)	110 V
Positive Grid No. 1 Voltage (DC)	0 V
Cathode Current	2.5 mA
Diode Current (Continuous Operation)	0.25 mA

Typical Operating Conditions and Characteristics

The pentode section of the 1AF5 operates as a Class A (or Class A1) amplifier. Two primary operating points are documented, corresponding to typical portable battery supply voltages of 67.5 V and 90 V.

Pentode Section Operating Points

Parameter	Operating Point 1	Operating Point 2
Plate Voltage	67.5 V	90 V
Grid No. 2 (Screen) Voltage	67.5 V	90 V
Grid No. 1 (Control Grid) Voltage	0 V	0 V
Plate Current	0.7 mA	1.1 mA
Grid No. 2 Current	0.25 mA	0.4 mA
Plate Resistance (rp)	2.3 Megohms or 2.8 Megohms	2.0 Megohms
Transconductance (gm)	500 micromhos or 550 micromhos	600 micromhos
Grid No. 1 Voltage (for gm = 10 micromhos)	-2.5 V	-3.5 V

Note: At the 67.5 V operating point, different specifications list the plate resistance as either 2.3 Megohms or approximately 2.8 Megohms, with corresponding transconductance values of 500 or 550 micromhos.

Diode Section Characteristics

The diode unit is designed for signal detection. Under typical test conditions with 10 V DC applied, the average diode current is **0.7 mA**.

Interelectrode Capacitances

The direct interelectrode capacitances of the 1AF5 are documented both with and without an external shield (specifically Shield #316 connected to Pin 1).

Capacitance Parameter	Without Shield	With Shield	Unit
Grid No. 1 to Plate (G1 to P)	0.2 (or 0.17)	0.2	uuf
Input: G1 to (F + G3 + <u>G2</u>)	2.3	2.5	uuf
Output: P to (F + G3 + <u>G2</u>)	2.4 (or 4.8)	4.3	uuf
Diode Plate to Grid No. 1 (Pd to G1) Max.	0.03	0.03	uuf

Technical Summary

The **1AF5** is a highly efficient, miniature **diode-pentode** vacuum tube designed for portable receiver applications. Operating with a filament current of only **25 mA** at **1.4 V**, it represents a significant reduction in power consumption compared to older tube designs. The sharp-cutoff pentode section provides high plate resistance (up to **2.8 Megohms**) and moderate transconductance (up to **600 micromhos**), making it an effective voltage amplifier, while the independent diode section serves as an AM detector. Designers must exercise caution regarding the physical pinout, as three distinct basing configurations exist in historical documentation.

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 · Pentode

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	90 V	ClassA

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Average diode current	0.7 mA	40VDC

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid to plate	0.2 pF	—

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