

ELECTRONIC TUBE REFERENCE

12AB5

Power - Beam (NOT sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
BEAMPOWER

Miniature beam-power tube intended for audio-frequency output service in television and radio receivers, providing several watts of Class-A power from a compact envelope.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9EU	BASE PINS	9
NOMINAL HEATER	12.6 V / 200 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

9EU - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	G2 – Screen Grid	CONNECTED
PIN3	–	G1 – Control Grid	CONNECTED
PIN4	–	H – Heater	CONNECTED
PIN5	–	H – Heater	CONNECTED
PIN6	–	G1 – Control Grid	CONNECTED
PIN7	–	G3 – Suppressor Grid	CONNECTED
PIN7	–	K – Cathode	CONNECTED
PIN8	–	G2 – Screen Grid	CONNECTED
PIN9	–	P – Plate (Anode)	CONNECTED

SECTION RATINGS

SECTION1 Beam Power	
PLATE RESISTANCE	50000 Ω
TRANSCONDUCTANCE	0.004 S
MAXIMUM PLATE VOLTAGE	315 V
MAXIMUM SCREEN VOLTAGE	285 V
MAXIMUM PLATE DISSIPATION	12 W
MAXIMUM SCREEN DISSIPATION	2 W
<i>Promoted characteristics use the first listed complete characteristic where available; alternate operating point preserved in parameters.</i>	

12AB5 — Beam Power Tube

A miniature 9-pin beam power pentode designed primarily for use in the audio output stage of automobile radio receivers operating from a nominal 12-volt electrical system.

Overview

The **12AB5** is a miniature beam power tube (often classified as a beam pentode) designed specifically for mobile and automotive applications. Its primary intended application is as an audio power amplifier in the output stage of automobile radio receivers operating from a nominal 12-volt storage battery.

To withstand the harsh electrical environment of automotive charging systems, the 12AB5 features a specially processed heater designed to tolerate wide voltage fluctuations. It also incorporates a large plate structure to facilitate heat dissipation within its compact miniature envelope. Depending on the specific pinout configuration employed, the tube may feature double base-pin connections for Grid No. 1 and Grid No. 2, which helps ensure cooler grid operation and provides greater flexibility in circuit layout.

Mechanical Construction and Physical Dimensions

The 12AB5 is constructed in a miniature glass envelope (T-6 1/2 bulb) and utilizes a small-button noval 9-pin base (JETEC No. E9-1). The tube is designed to operate in any mounting position.

The physical dimensions of the tube are as follows:

- **Maximum Overall Length:** 2-5/8 inches (2.625 in.)
- **Maximum Seated Length:** 2-3/8 inches (2.375 in.)
- **Length from Base Seat to Bulb Top (excluding tip):** 2 inches ± 3/32 inch
- **Maximum Diameter:** 7/8 inch (0.875 in.)
- **Bulb Temperature (at hottest point):** 250 °C maximum

Heater Ratings and Automotive Operating Conditions

The 12AB5 is equipped with an indirectly heated, coated unipotential cathode. Because it is designed for automotive service where the storage battery is subject to charging and discharging, the heater is rated to operate over a wide voltage range.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V (AC or DC)
Heater Current (Approximate)	0.2 A (200 mA) at 12.6 V
Absolute Heater Voltage Range	10.0 to 15.9 V
Recommended Voltage Range (for longest life)	11.0 to 14.0 V
Heater Connection	Series heater operation is not recommended

Automotive Voltage Fluctuations

In storage-battery-with-charger supply systems, the normal battery voltage fluctuation can reach 35% or more. To ensure reliable operation under these conditions, equipment using the 12AB5 should be designed so that 90% of the design-center maximum values (for plate voltage, grid-No. 2 voltage, plate dissipation, and grid-No. 2 input) are never exceeded when the battery terminal potential is at a nominal 13.2 V.

Heater-Cathode Voltage Ratings

The maximum allowable voltage between the heater and the cathode varies depending on the rating system and specific manufacturing specifications:

- **Standard Peak Limit:** 90 V maximum (heater negative or positive with respect to cathode).
- **DC-Specific Limits:**
 - Heater negative with respect to cathode: 200 V maximum (total DC and peak).
 - Heater positive with respect to cathode: 100 V maximum (DC), or 200 V maximum (total DC and peak).

Basing and Pinout Configurations

The 12AB5 is registered with the **9EU** basing designation. However, different manufacturers and technical specifications document several distinct pinout configurations for this designation. Designers must verify the physical pinout of the specific device being used.

Configuration A (Double-Connection Layout)

This configuration features double connections for Grid No. 1 (Pins 3 and 6) and Grid No. 2 (Pins 1 and 8) to promote cooler grid operation and layout flexibility:

- **Pin 1:** Grid No. 2 (G_2)
- **Pin 2:** No Connection (NC)
- **Pin 3:** Grid No. 1 (G_1)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Grid No. 1 (G_1)
- **Pin 7:** Cathode & Grid No. 3 (K, G_3)
- **Pin 8:** Grid No. 2 (G_2)
- **Pin 9:** Plate (P)

Configuration B (Alternative Double-Connection Layout)

An alternative layout also provides double connections but swaps the positions of Grid No. 1 and Grid No. 2:

- **Pin 1:** Grid No. 1 (G_1)
- **Pin 2:** No Connection (NC)
- **Pin 3:** Grid No. 2 (G_2)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Grid No. 1 (G_1)
- **Pin 7:** Cathode & Grid No. 3 (K, G_3)
- **Pin 8:** Grid No. 2 (G_2)
- **Pin 9:** Plate (P)

Configuration C (Single-Connection Layouts)

Other documented variations do not feature double grid connections or utilize different pin assignments:

- **Variation C1:**
 - **Pin 1:** Grid No. 1 (G_1)
 - **Pin 2:** Cathode (K)
 - **Pin 3:** Grid No. 2 (G_2)
 - **Pin 4:** Heater (H)
 - **Pin 5:** Heater (H)
 - **Pin 6:** Grid No. 1 (G_1)
 - **Pin 7:** No Connection (NC)
 - **Pin 8:** Plate (P)
 - **Pin 9:** Grid No. 2 (G_2)
- **Variation C2:**
 - **Pin 1:** Grid No. 1 (G_1)
 - **Pin 2:** Grid No. 2 (G_2)

- **Pin 3:** Cathode, Grid No. 3, and Internal Shield (K, G_3, IS)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** No Connection (NC)
- **Pin 7:** Plate (P)
- **Pin 8:** Grid No. 2 (G_2)
- **Pin 9:** Grid No. 1 (G_1)
- **Variation C3:**
 - **Pin 1:** Grid No. 1 (G_1)
 - **Pin 2:** No Connection (NC)
 - **Pin 3:** Grid No. 1 (G_1)
 - **Pin 4:** Heater (H)
 - **Pin 5:** Heater (H)
 - **Pin 6:** Grid No. 2 (G_2)
 - **Pin 7:** Plate (P)
 - **Pin 8:** Grid No. 3 & Cathode (G_3, K)
 - **Pin 9:** Grid No. 2 (G_2)

Electrical Characteristics and Interelectrode Capacitances

Direct Interelectrode Capacitances

The capacitances of the 12AB5 are measured without an external shield:

- **Grid No. 1 to Plate (G_1 to P):** 0.7 pF maximum
- **Input (G_1 to $[H + K + G_2 + G_3]$):** 8.0 pF
- **Output (P to $[H + K + G_2 + G_3]$):** 8.5 pF

Maximum Ratings (Design-Center System)

These maximum ratings represent the limits within which the tube should be operated to ensure reliable performance:

- **Plate Voltage:** 315 V maximum
- **Grid No. 2 (Screen-Grid) Voltage:** 285 V maximum
- **Plate Dissipation:** 12 W maximum
- **Grid No. 2 Input:** 2 W maximum
- **Maximum Grid No. 1 Circuit Resistance:**
 - **Fixed-Bias Operation:** 0.1 M Ω maximum
 - **Cathode-Bias Operation:** 0.5 M Ω maximum

Typical Operating Points and Circuit Examples

Single-Tube Class A1 Amplifier

The 12AB5 can be operated in Class A1 using either cathode bias or fixed bias. The following table details typical operating conditions at different supply voltages:

Parameter	Low-Voltage (Fixed)	Cathode Bias	High-Voltage (Fixed)	Units
Plate Voltage	180	250	250	V
Grid No. 2 Voltage	180	200	250	V
Grid No. 1 Voltage	-8.5	—	-12.5	V
Cathode Bias Resistor	—	270	—	Ω
Peak AF Grid No. 1 Voltage	8.5	10.5	12.5	V
Zero-Signal Plate Current	29.0	33.5	45.0	mA
Maximum- Signal Plate Current	30.0	36.0	47.0	mA
Zero-Signal Grid No. 2 Current	3.0	1.6	4.5	mA
Maximum- Signal Grid No. 2 Current	4.0	3.2	7.0	mA
Plate Resistance (Approximate)	50,000	75,000	50,000	Ω
Transconductan ce	3,700	4,000	4,100	μmhos
Load Resistance	5,500	6,000	5,000	Ω
Total Harmonic Distortion	8	8 to 12	8	%

Parameter	Low-Voltage (Fixed)	Cathode Bias	High-Voltage (Fixed)	Units
Maximum-Signal Power Output	2.0	3.3	4.5	W

Note: Under the cathode-bias condition, some specifications list a total harmonic distortion of 8%, while others list 12%.

Push-Pull Class AB1 Amplifier

For higher power output, two 12AB5 tubes can be configured in a push-pull Class [AB1](#) arrangement. The typical operating values for a two-tube circuit are:

- **Plate Voltage:** 250 V
- **Grid No. 2 Voltage:** 250 V
- **Grid No. 1 Voltage:** -15 V
- **Peak AF Grid-No. 1-to-Grid-No. 1 Voltage:** 30 V
- **Zero-Signal Plate Current:** 70 mA
- **Maximum-Signal Plate Current:** 79 mA
- **Zero-Signal Grid No. 2 Current:** 5 mA (approximate)
- **Maximum-Signal Grid No. 2 Current:** 13 mA (approximate)
- **Plate Resistance (Approximate):** 60,000 Ω
- **Transconductance:** 3,750 μmhos
- **Effective Load Resistance (Plate-to-Plate):** 10,000 Ω
- **Total Harmonic Distortion:** 5%
- **Maximum-Signal Power Output:** 10 W

Characteristic Curves and Design Interpretation

Average Plate Characteristics (Pentode Connection)

When plotted in a standard pentode configuration at a constant Grid No. 2 voltage of 250 V, the plate current (I_b) and Grid No. 2 current (I_{c2}) curves are plotted against plate voltage up to 500 V. The curves are shown for Grid No. 1 bias voltages ($E_{c1}(/tubes/C1)$) ranging from +15 V down to -30 V.

- **Knee Region:** The plate current curves exhibit a very sharp knee, occurring between 50 V and 100 V (specifically concentrated around 50 V to 70 V depending on the bias). This sharp knee allows for a wide plate voltage swing, maximizing power efficiency.
- **Positive Bias Operation:** For positive Grid No. 1 voltages ($E_{c1}(/tubes/C1) = +15\text{ V}, +10\text{ V}, +5\text{ V}$), corresponding grid current ($I_{c1}(/tubes/C1)$) curves are plotted against plate voltage, showing grid currents reaching up to 30 mA.

Triode-Connected Characteristics

When Grid No. 2 is connected directly to the plate, the 12AB5 behaves as a triode. The average plate characteristics show plate current (I_b) and grid current (I_c) plotted against plate voltage for Grid No. 1 voltages ranging from +20 V down to -40 V (or -50 V in some plots).

Operation Characteristics vs. Load Resistance

Operating curves plotted at a nominal heater voltage of 12.6 V, plate voltage of 250 V, Grid No. 2 voltage of 250 V, Grid No. 1 bias of -12.5 V, and an input signal of 8.8 V RMS illustrate the performance of the tube across a load resistance range of 0 to 10,000 Ω :

- **Power Output:** The maximum-signal power output peaks at approximately 4.5 W near a load resistance of 5,500 Ω .
- **Total Harmonic Distortion:** The distortion curve reaches a local minimum of approximately 6.5% to 7% when the load resistance is configured around 6,000 Ω .

Technical Summary

The **12AB5** is a **miniature, 9-pin beam power tube** designed for **12-volt automotive audio output applications**. It features a ruggedized heater rated for **12.6 V (nominal)** with an operating range of **10.0 to 15.9 V** to handle battery charging fluctuations. The tube is housed in a **T-6 1/2 bulb** with a **9-pin noval base** and can be mounted in any position.

In single-tube Class A1 operation, the 12AB5 delivers up to **4.5 W** of audio power with 8% distortion under fixed-bias conditions, or **3.3 W** under cathode-bias conditions. In a push-pull Class [AB1](#) configuration, a pair of 12AB5 tubes can produce **10 W** of output power with only 5% total harmonic distortion. Its sharp plate-current knee and robust thermal design make it an efficient and reliable choice for low-voltage mobile power amplification.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1940 RCA

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

1940 RCA

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Power Output	4.5 W	ClassA;OneTube;Plate 250 V



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

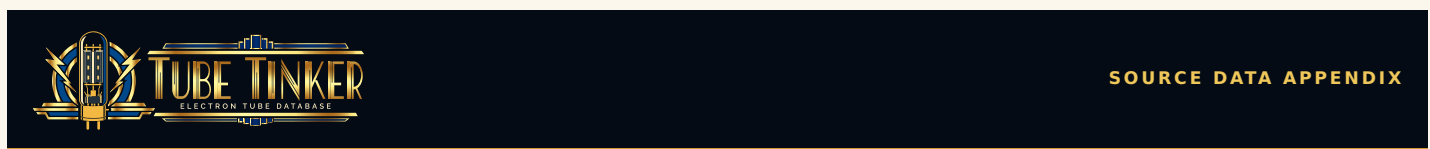
Section 1 · Beam Power

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance	50000 ohm	AlternateOperatingPoint
Transconductance	4100 uS	AlternateOperatingPoint

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Power Output	3.3 W	ClassA;OneTube
Power Output	4.5 W	ClassA;OneTube;AlternateOperatingPoint
Where The Power Source Is A	12 V	—
Negative (Dc	200 V	—
Positive {Dc	100 V	—
Maximum Plate Voltage	315 V	—
Maximum Plate Dissipation	12 W	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode Bias Resistor	270 ohm	—
Athis Tube Is Intended To Be Used In Automotive Service From A Nominal	12 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid to Plate	0.7 pF	—
Input Capacitance	8 pF	—
Output Capacitance	8.5 pF	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 2 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 2 OF 4

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA1;OneTube
Grid 2 voltage	250 V	ClassA1;OneTube
Grid 1 voltage	-12.5 V	ClassA1;OneTube
Zero-signal plate current	45 mA	ClassA1;OneTube
Maximum-signal plate current	47 mA	ClassA1;OneTube
Zero-signal grid 2 current	4.5 mA	ClassA1;OneTube
Maximum-signal grid 2 current	7 mA	ClassA1;OneTube
Load resistance	5000 ohm	ClassA1;OneTube
Power output	4.5 W	ClassA1;OneTube

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Total harmonic distortion	8 percent	ClassA1;OneTube



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1971 RCA HB3 Binder 5 of 7

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

1971 RCA HB3 BINDER 5 OF 7

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	315 V	ClassA
Maximum Screen Voltage	285 V	ClassA
Plate Dissipation	12 W	ClassA
Screen Input	2 W	ClassA
Plate Voltage	250 V	ClassA
Screen Voltage	250 V	ClassA
Plate Resistance	50000 Ω	ClassA
Transconductance	4100 μS	ClassA
Maximum-Signal Power Output	4.5 W	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

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.7 pF	—
Grid No.1 to other electrodes	8 pF	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to other electrodes	8.5 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate supply voltage	250 V	ClassA
Screen-grid supply voltage	250 V	ClassA
Control-grid voltage	-12.5 V	ClassA
Zero-signal plate current	45 mA	ClassA
Maximum-signal plate current	47 mA	ClassA
Load resistance	5000 ohm	ClassA
Maximum-signal power output	4.5 W	ClassA
Plate voltage	250 V	ClassAB;PushPull;TwoTubes
Screen-grid voltage	250 V	ClassAB;PushPull;TwoTubes
Control-grid voltage	-15 V	ClassAB;PushPull;TwoTubes
Effective plate-to-plate load resistance	10000 ohm	ClassAB;PushPull;TwoTubes
Maximum-signal power output	10 W	ClassAB;PushPull;TwoTubes

TUBE TINKER

An independent reference for electronic tubes, vacuum tubes, and their source documents.

[Catalog](#) [Tube types](#) [Full books](#) [Blog](#) [Feedback & corrections](#)

© 2026 Tube Tinker