

ELECTRONIC TUBE REFERENCE

18GB5

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
BEAMPOWER

Magnoval beam-power tube designed for television horizontal-deflection amplification, with high positive-pulse plate-voltage capability for line-output service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9NH	BASE PINS	9
NOMINAL HEATER	18 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

9NH - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	G1 – Control Grid	CONNECTED
PIN2	–	G1 – Control Grid	CONNECTED
PIN3	–	G3 – Suppressor Grid	CONNECTED
PIN3	–	K – Cathode	CONNECTED
PIN4	–	H – Heater	CONNECTED
PIN5	–	H – Heater	CONNECTED
PIN6	–	G2 – Screen Grid	CONNECTED
PIN7	–	G2 – Screen Grid	CONNECTED
PIN8	–	G3 – Suppressor Grid	CONNECTED
PIN8	–	K – Cathode	CONNECTED
PIN9	–	–	IC
CAP1	A	P – Plate (Anode)	CONNECTED

SECTION1 Beam Power	
MAXIMUM PLATE VOLTAGE	275 V
MAXIMUM SCREEN VOLTAGE	275 V
MAXIMUM PLATE DISSIPATION	17 W
MAXIMUM SCREEN DISSIPATION	5 W
MAXIMUM CATHODE CURRENT	275 mA
<i>Horizontal-deflection ratings; 7700 V peak positive plate pulse preserved as parameter.</i>	

18GB5 — Beam Power Tube

The **18GB5** (also designated as **LL500**) is a beam power tube designed primarily for use as a horizontal-deflection amplifier in television receivers. It belongs to the **6GB5/EL500** family of tubes, which includes the **6GB5/EL500**, **13GB5/XL500**, **27GB5/PL500**, and **28GB5**. These types are identical to the 18GB5 except for their heater ratings.

Mechanical Construction and Base Configuration

The 18GB5 is constructed in a Magnoval T-9 glass envelope with a maximum diameter of 1.188 inches, a maximum seated height of 3.750 inches, and a maximum overall height of 4.125 inches. It requires a neonoval 9-contact socket.

The tube uses the **9NH** basing diagram, though different technical sources describe the specific pin assignments with some variations:

- **Heater (H):** Pins 4 and 5 are consistently assigned to the heater.
- **Internal Connection (IC):** Pin 9 is designated as an internal connection.
- **Plate (P):** Connected to the top cap (C1-2). (Note: One source lists Pin 6 as Plate, while others specify the top cap for the plate connection).
- **Control Grid (G1):** Variouslly assigned to Pin 1 and Pin 2, or Pin 1 and Pin 6.
- **Screen Grid (G2):** Variouslly assigned to Pin 7 (with Pin 6 or Pin 2), or Pins 2 and 7, or Pins 6 and 7.
- **Cathode and Suppressor Grid (K, G3):** Assigned to Pin 3 and Pin 8, which may be internally connected or separate.

This variation in documented pinouts highlights the importance of verifying the physical socket wiring against the specific device implementation.

Heater Ratings and Heater-Cathode Limits

The 18GB5 heater is designed for series or parallel AC/DC operation:

- **Heater Voltage:** 18 V
- **Heater Current:** 0.45 A (450 mA)

Heater-Cathode Voltage Limits

To prevent insulation breakdown, the voltage between the heater and cathode must be kept within specified limits:

- **Peak Value:** ± 250 V max (Total DC and Peak Max)
- **Average/DC Value:** 125 V max (Heater positive or negative with respect to cathode)

Electrical Characteristics and Typical Operation

The 18GB5 exhibits high peak current capability at low plate voltages, which is a key requirement for horizontal deflection service.

Typical Instantaneous Characteristics

When measured with a recurrent waveform to prevent exceeding maximum ratings, the tube exhibits the following knee characteristics:

- **Plate Voltage:** 75 V
- **Grid-No. 2 (Screen-Grid) Voltage:** 200 V
- **Grid-No. 1 (Control-Grid) Voltage:** -10 V
- **Plate Current:** 440 mA
- **Grid-No. 2 Current:** 37 mA

Standard Operating Points

In typical horizontal deflection circuits, the operating conditions vary based on the supply voltage. A minimum screen-grid resistor ($R_{[g2]}$ (/tubes/G2)) is required to prevent excessive screen-grid dissipation during the receiver warm-up period.

Parameter	Supply: 170 V	Supply: 200 V	Supply: 230 V
Minimum Screen-Grid Resistor	1.2 k Ω	1.5 k Ω	2.2 k Ω
Screen-Grid Voltage	130 V	150 V	180 V
Plate Voltage at End of Scan	55 V	59 V	65 V
Control-Grid Voltage at End of Scan	-10 V	-10 V	-10 V
Peak Plate Current	210 mA	270 mA	360 mA

Note: The plate voltage at the end of scan is specified at nominal line voltage. The tube operates above the knee at 10% below nominal line voltage.

Non-Stabilized Circuits (Drive Below the Knee)

For non-stabilized circuits where the tube is driven below the knee, the typical operating points are:

Parameter	Supply: 170 V	Supply: 200 V	Supply: 230 V
Minimum Screen-Grid Resistor	2.2 k Ω	2.2 k Ω	2.2 k Ω
Control-Grid Voltage at End of Scan	+1 V	+1 V	+1 V
Peak Plate Current	200 mA	250 mA	320 mA

The peak plate current values specified should not be exceeded at nominal line voltage to allow for tube spread, deterioration, and a 10% low line voltage condition.

Maximum Ratings and Circuit Values

The maximum ratings are defined under the Design-Maximum system for operation in a 525-line, 30-frame television system as a horizontal-deflection amplifier.

Design-Maximum Ratings

- **DC Plate Voltage:** 275 V max
- **Peak Positive-Pulse Plate Voltage:** 7700 V max (The pulse duration must not exceed 15% of a horizontal scanning cycle, or 10 microseconds)
- **DC Grid-No. 2 (Screen-Grid) Voltage:** 275 V max
- **Average Cathode Current:** 275 mA max
- **Plate Dissipation:** 17 W max (A bias resistor or other protective means is required to protect the tube in the absence of excitation)
- **Grid-No. 2 Input (Screen-Grid Dissipation):** 5 W max (May reach 6 W if the plate dissipation is below 11 W)

Maximum Circuit Values

- **Grid-No. 1 (Control-Grid) Circuit Resistance:**
 - **Without grid current:** 0.5 M Ω max
 - **With grid current (horizontal-output service only):** 2.2 M Ω max

Circuit-Specific Operating Notes

During the flyback interval, a minimum control-grid voltage of **-120 V** is required to ensure complete cut-off of the tube.

Technical Summary

The **18GB5** ([LL500](#)) is a Magnoval-based beam power pentode designed specifically for horizontal-deflection amplifier service in television receivers. It features an 18 V, 0.45 A heater and is part of a larger family of identical tubes ([6GB5/EL500](#), [13GB5/XL500](#), [27GB5/PL500](#), [28GB5](#)) differing only in heater characteristics. The tube is characterized by its high peak plate current capability (up to 440 mA at a 75 V plate knee) and its ability to withstand peak positive-pulse plate voltages of up to 7700 V. Proper circuit design requires a minimum screen-grid resistor to protect the tube during warm-up and a bias resistor or other protective means to prevent damage in the event of a loss of excitation.

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
75; g;rid-No	2 V	Published in approved XL500 target datasheet entry; Section1
mA, 440; grid-No	2 mA	Published in approved XL500 target datasheet entry; Section1
Heater Voltage (ac/dc) 6.3 13.3 18	27 V	Published in approved XL500 target datasheet entry; Section1
Heater Current 1.38 0.6 0.45	300 mA	Published in approved XL500 target datasheet entry; Section1
Peak Positive-Pulse Plate Voltage*	7700 V	Published in approved XL500 target datasheet entry; Section1
DC Giid-No.2 (Screen-Grid) Voltage	275 V	Published in approved XL500 target datasheet entry; Section1
Average Cathode Current	275 mA	Published in approved XL500 target datasheet entry; Section1
Plate Dissipation 4	17 W	Published in approved XL500 target datasheet entry; Section1
Grid-No.2 Input"	5 W	Published in approved XL500 target datasheet entry; Section1
Without grid current	0.5 MΩ	Published in approved XL500 target datasheet entry; Section1
With grid current (horizontal-output service only)	2.2 MΩ	Published in approved XL500 target datasheet entry; Section1
# Pulse duration must not exceed 15% of a horizontal scanning cycle (	10 microseconds	Published in approved XL500 target datasheet entry; Section1
Grid-No.2 input may reach	6 W	Published in approved XL500 target datasheet entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No.2 input may reach 6 watts for plate-dissipation values below	11 W	Published in approved XL500 target datasheet entry; Section1

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