

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

1853

1 SECTION
CONSTRUCTION
PENTODE

Voltage - Pentode Remote Cutoff (single) electronic tube

Remote-cutoff high-transconductance pentode, co-designated 6AB7/1853, for gain-controlled high-frequency receiver and television amplification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8N	BASE PINS	8
NOMINAL HEATER	6.3 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

8N - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	700000 Ω
TRANSCONDUCTANCE	0.005 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	200 V
Published maximum ratings and representative operating characteristics reviewed.	

1853 — Remote-Cutoff RF Pentode

The **1853** (also designated under RMA designation [6AB7](#)) is a heater-cathode type metal pentode designed primarily for high-frequency amplification. It is particularly suited for use in the radio-frequency (r-f) and intermediate-frequency (i-f) stages of picture amplifiers in experimental television receivers, especially those employing automatic gain control (AGC). Additionally, the 1853 can function as a mixer or as a low-voltage oscillator.

Construction, Physical Dimensions, and Mounting

The 1853 features a metal shell envelope with a Small Wafer Octal 8-pin base (utilizing the 8N base connection). Physically, the tube has a maximum overall length of 2-5/8 inches and a maximum diameter of 1-5/16 inches.

A key construction feature of the 1853 is its special shielded lead design. This construction allows the control-grid lead to be brought out directly to a base pin (Pin 4) rather than to a top cap. This design choice provides several technical advantages:

- It maintains a very low grid-to-plate capacitance.
- It simplifies circuit wiring.
- It reduces the size of the input inductance loop by placing the control-grid pin in close proximity to the cathode pin, which significantly improves high-frequency stability.

The tube is preferably mounted in a vertical position, either base up or base down. Horizontal mounting is also permissible, provided that pins 2 and 7 are aligned in a vertical plane.

Heater Ratings and Pinout

The 1853 is equipped with an indirectly heated cathode. The heater is designed for either alternating current (A.C.) or direct current (D.C.) operation. The cathode-to-heater potential should always be kept as low as possible.

Heater Parameter	Value
Nominal Heater Voltage	6.3 V (allowable deviation of ±%)

Heater Parameter	Value
Nominal Heater Current	0.45 A

The bottom view of the socket connections (8N base) is configured as follows:

Pin Number	Electrode Connection
Pin 1	Shell / Shield (S)
Pin 2	Heater (H)
Pin 3	Suppressor Grid (G_3)
Pin 4	Control Grid (G_1)
Pin 5	Cathode (K)
Pin 6	Screen Grid (G_2)
Pin 7	Heater (H)
Pin 8	Plate (P)

Electrical Characteristics and Maximum Ratings

The direct interelectrode capacitances of the 1853, measured with the metal shell connected to the cathode and without an external shield, are:

- **Input Capacitance:** 8.0 pF (8 μ mf)
- **Output Capacitance:** 5.0 pF (5 μ mf)
- **Grid-to-Plate Capacitance (G_1 to P):** 0.015 pF (0.015 μ mf) Maximum

The absolute maximum ratings established for the device must not be exceeded:

Rating Parameter	Maximum Limit
Plate Voltage	300 V
Screen (G_2) Voltage	200 V
Screen-Supply Voltage	300 V
Total Plate and Screen Dissipation	4.4 W
Screen Dissipation	0.65 W

Typical Operation and Circuit Guidelines

The 1853 can be operated under different screen supply configurations depending on the desired cutoff characteristics. Two typical Class A amplifier operating conditions are defined:

Parameter	Condition I (Fixed Screen Supply)	Condition II (Series Screen Resistor)
Plate Voltage	300 V	300 V
Suppressor Voltage (G_3)	0 V	0 V
Screen-Supply Voltage	200 V	300 V
Screen Series Resistor	—	30,000 Ohms
Grid Voltage (G_1)	-3 V (Minimum)	-3 V (Minimum)
Amplification Factor (Approx.)	3500	3500
Plate Resistance (Approx.)	0.7 Megohm	0.7 Megohm
Transconductance	5000 μ mhos	5000 μ mhos
Grid Bias for $g_m = 50 \mu$ mhos	-15 V	-22.5 V
Plate Current	12.5 mA	12.5 mA
Screen Current	3.2 mA	3.2 mA

Circuit-Specific Guidelines

- **Control-Grid Bias:** Grid bias can be obtained from a fixed source or via a cathode-bias (self-bias) resistor. When using self-bias, a minimum resistor value of 190 Ohms is required to establish the minimum -3 V bias.
- **Grid Circuit Resistance:** Under fixed bias conditions, the grid circuit resistance must not exceed 0.25 Megohm. If full cathode bias is used in conjunction with a series screen resistor, the grid circuit resistance may be increased up to a maximum of 0.5 Megohm.
- **Input Stabilization:** Because of the tube's high transconductance, changes in plate current cause corresponding variations in input capacitance and input conductance. To minimize these variations and stabilize operation, a portion of the cathode-bias resistor can be left unby-passed. While this sacrifices a small amount of transconductance and slightly increases the effective grid-plate capacitance, it improves overall stability. Alternatively, the associated circuits can be heavily loaded with resistance and capacitance.
- **Screen Voltage Supply:** The screen voltage can be supplied via a potentiometer, a bleeder, or a series resistor. The series resistor method (Condition II) provides a more extended cutoff characteristic because the screen voltage rises as the grid bias increases and the plate and screen currents drop.

- **Suppressor Connection:** In r-f and i-f stages, the suppressor grid (G_3) should be connected directly to ground to minimize feedback.

Typical R-F or I-F Amplifier Circuit Values

For a typical r-f or i-f amplifier stage, the following component values are recommended:

- **Cathode Resistor (R_k):** 190 Ohms total, with a tap located approximately 70 Ohms from the cathode end to leave a portion unby-passed.
- **Grid Resistor (R_1):** 0.25 Megohm (connected to the AGC voltage source).
- **Screen Series Resistor (R_2):** 30,000 Ohms.
- **Plate Filter Resistor (R_3):** 1000 Ohms.
- **Bypass Capacitor (C):** 0.05 μ f.

Qualitative Curve Observations

An analysis of the characteristic curves of the 1853 reveals distinct operating behaviors:

- **Plate Characteristics:** At a screen voltage (E_{c2}) of 200 V, the plate current curves exhibit a sharp knee below 40 to 80 plate volts. Above this range, the curves become highly flat, demonstrating typical pentode behavior. The screen current curves remain at a characteristically low magnitude.
- **Transconductance vs. Grid Bias:** The choice of screen supply significantly alters the transconductance cutoff profile. A fixed screen supply of 200 V yields a relatively sharp cutoff, with transconductance dropping to 50 μ mhos at a grid bias of -15 V. Conversely, utilizing a 30,000 Ohm series resistor from a 300 V supply extends the cutoff region significantly, requiring a grid bias of approximately -22.5 V to reduce transconductance to the same 50 μ mhos level.

Technical Summary

The **1853** (RMA [6AB7](#)) is a high-transconductance, remote-cutoff metal pentode featuring an octal base and a 6.3 V, 0.45 A heater. Its unique shielded lead construction eliminates the need for a top cap, bringing the control grid to a base pin close to the cathode to optimize high-frequency stability and minimize grid-plate capacitance (0.015 pF maximum). Under typical Class A operating conditions, the tube delivers a transconductance of 5000 μ mhos and a plate resistance of approximately 0.7 Megohm. By utilizing either a fixed screen supply or a series screen resistor, designers can tailor the cutoff characteristic from a sharper -15 V cutoff to an extended -22.5 V cutoff, making the 1853 highly versatile for AGC-controlled r-f and i-f television picture amplifier stages, mixers, and low-voltage oscillators.

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 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER VOLTAGE (A.C. or D.C.)	6.3 V	HEATER VOLTAGE (A.C. or D.C.) 6.3 Volts
HEATER CURRENT	450 mA	HEATER CURRENT 0.45 Ampere
PLATE VOLTAGE	300 V	PLATE VOLTAGE 300 mex. Volts
SCREEN VOLTAGE	200	SCREEN VOLTAGE 200 max. Volits
SCREEN-SUPPLY VOLTAGE	300 V	SCREEN-SUPPLY VOLTAGE 300 max. Volts
PLATE & SCREEN DISSIPATION (total)®	4 W	PLATE & SCREEN DISSIPATION (total)® 4,4 max. Watts
SCREEN DISSIPATION	0.65 W	SCREEN DISSIPATION 0.65 max. Watts
Plate voltage	300 V	Plate voltage 300 300 Volts
Suppressor Voltage	0 V	Suppressor Voltage 0 0 Volts
Screen-Supply Voltage #	300 V	Screen-Supply Voltage # 200 300 Volts
Screen Series Resistor	30000 ohm	Screen Series Resistor - 30000 Ohms
## ®	-3 V	## ® -3 min. -3 min. Volts
=	-22.5 µS	= 50 micromhos -15 -22.5 Voits
Plate Current	12.5	Plate Current 12.5 12.5 Milliamperes
Screen Current	3.2	Screen Current 3.2 3.2 Milliamperes
# Screen-supply voltages in excess of	200 V	# Screen-supply voltages in excess of 200 volts require use of a series dropping
resistor to	200 V	resistor to 1limit the voltage at the screen to 200 volts when the plate current
is at its normal value of	12.5	is at its normal value of 12.5 milliamperes.
May be obtained with cathode-bias resistor having & minimum value of	190 ohm	May be obtained with cathode-bias resistor having & minimum value of 190 ohms.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
across a	6 V	across a 6-volt battery. Under any condition of operation, the heater
voltage should not deviate more than plus or minus	10	voltage should not deviate more than plus or minus 10% from the
normal value of	6.3 V	normal value of 6.3 volts,
operation from a	6 V	operation from a 6~volt storage battery, the cathode circuit should
12.5 milliamperes, and also using a 30000-ohm series screen resistor,	30000 ohm	12.5 milliamperes, and also using a 30000-ohm series screen resistor,
of	5	of 12,5 milliamperes,
changes when the	1853	changes when the 1853 is used as an r—f or i-f amplifier, a portion
potential, as shown in the circuit R—F or I-F AMPLIFIER on page	5	potential, as shown in the circuit R—F or I-F AMPLIFIER on page 5.
The screen voltage for the	1853	The screen voltage for the 1853 may be obtained from a poten-
As an amplifier, the	1853	As an amplifier, the 1853 is especially suited for use in the
€ %	0.3 V	€ %0.3 VOLTS
3a] SCAEEN vOLTS = 200	200 V	3a] SCAEEN vOLTS = 200
; /e ta CONTROL-GRID VOLTS €)=	-3 V	; /e ta CONTROL-GRID VOLTS €)= -3.0
FE o=	6.3 V	FE o= 6.3 VOLTS Ef = 6.3 VOLTS
PLATE VOLTS =	300 V	PLATE VOLTS =300 [PLATE VOLTS = 300
SUPPRESSOR VOLTS =	0 V	- SUPPRESSOR VOLTS =0 SUPPRESSOR VOLTS =0
CONTROL VOLTAGE	300	CONTROL VOLTAGE +300V.
C =	1000 pF	C = 0.05 pf Ry = 1000 OHMS
Ry=	150 ohm	Ry= 0.25 MEGOHM R, = 150 OHMS, WITH TAP AT
R,=	70 ohm	R,= 30000 OHMS APPROXIMATELY 70 OHMS

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance (Approx.)	0.7	Plate Resistance (Approx.) 0.7 0.7 Megohm
Transconductance	5000 µS	Transconductance 5000 5000 Micromhos

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
## The d-c resistance of the grid circuit should not exceed	0.25	## The d-c resistance of the grid circuit should not exceed 0.25 megohm with fixed
resistance of the grid circuit may be as high as	0.5	resistance of the grid circuit may be as high as 0.5 megohm,


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

1950 Sylvania

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

1950 SYLVANIA

Section 1 · Pentode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance	700000 ohm	—
Transconductance	5000 μS	—
Amplification Factor	3500	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	300 V	—
Maximum Screen Voltage	300 V	—
Typical Plate Current	12.5 mA	—
Typical Screen Current	3.2 mA	—


SOURCE DATA APPENDIX

195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	8 pF	Section1
Output capacitance	5 pF	Section1
Grid-to-plate capacitance	0.015 pF	Section1

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	300 V	ClassA
Screen voltage	200 V	ClassA
Control-grid voltage	-3 V	ClassA
Plate current	12.5 mA	ClassA
Screen current	3.2 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	700000 Ω	ClassA
Transconductance	5000 μS	ClassA

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