



#187
5/14

Video Beam Power Amplifier

RCA-6AG7 is a heater-cathode type of metal tube intended for use primarily in the output stage of the video amplifier of television receivers. It may also be used advantageously in television transmitters as a coupling device between video-frequency stages and transmission lines.

The design of the 6AG7 features not only an exceedingly high value of transconductance but also high plate-current capability. As a result, a large voltage for modulating a Kinescope can be built up across the relatively low load resistance required for coupling the 6AG7 to the Kinescope.

TENTATIVE CHARACTERISTICS and RATINGS

HEATER VOLTAGE (A.C. or D.C.)	6.3	Volts
HEATER CURRENT	0.65	Ampere
DIRECT INTERELECTRODE CAPACITANCES: °		
Grid to Plate	0.060 max.	µmf
Input	12	µmf
Output	12	µmf
Grid to Screen	5 approx.	µmf
Grid to Cathode and Heater	7 approx.	µmf
Heater to Cathode	11 approx.	µmf
MAXIMUM OVERALL LENGTH	3-1/4"	
MAXIMUM DIAMETER	1-5/16"	
BASE	Small Wafer Octal 8-Pin	

CHARACTERISTICS

PLATE VOLTAGE	300	Volts
SCREEN VOLTAGE	300	Volts
GRID VOLTAGE	-10.5	Volts
INTERLEAD SHIELD	Connected to ground	
AMPLIFICATION FACTOR	770	
PLATE RESISTANCE	0.1	Megohm
TRANSCONDUCTANCE	7700	Micromhos
PLATE CURRENT	25	Milliamperes
SCREEN CURRENT	6.5	Milliamperes

MAXIMUM RATINGS and TYPICAL OPERATING CONDITIONS

VIDEO VOLTAGE AMPLIFIER - Class A

PLATE VOLTAGE	300 max.*	Volts
SCREEN VOLTAGE	300 max.*	Volts
PLATE DISSIPATION	8.7 max.*	Watts
SCREEN INPUT	2 max.*	Watts

° With shell connected to cathode.
* Design maximum for 117-volt line.

TYPICAL OPERATION IN 4 Mc BANDWIDTH AMPLIFIER:

Heater Voltage #	6.3	Volts
Plate-Supply Voltage	250	Volts
Screen Voltage	140	Volts
Grid Voltage ##	-2	Volts
Grid Signal-Swing Voltage (Peak to peak)	4	Volts
Plate Current	33	Milliamperes
Screen Current	8.5	Milliamperes
Load Resistance	1700	Ohms
Voltage Output (Peak to peak)	70 approx.	Volts

In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

The d-c resistance in the grid circuit should not exceed 0.25 megohm.

INSTALLATION

The base pins of the 6AG7 fit the standard octal socket which should be installed to hold the tube preferably in a vertical position with the base either up or down. Horizontal operation is permissible if the socket is positioned so that pins No.2 and No.7 are in a vertical plane.

The heater of the 6AG7 is designed to operate on either a.c. or d.c. When a.c. is used, the winding which supplies the heater circuit should operate the heater at its recommended value for full-load operating conditions at average line voltage. When d.c. is used on the heater, the heater terminals should be connected directly across a 6-volt battery. Under any condition of operation, the heater voltage should not deviate more than plus or minus 10% from the normal value of 6.3 volts.

The cathode, when the 6AG7 is operated from a transformer, should be connected through a bias source either to one side or to the electrical mid-point of the heater circuit. In the case of d-c operation from a 6-volt storage battery, the cathode circuit should be tied through a bias source to the negative battery terminal. The potential difference between heater and cathode should be kept as low as possible.

Control-grid bias may be obtained from a fixed supply, from a cathode resistor, or from a variable voltage supplied for automatic control purposes. In video use, the latter method provides for control of the picture background. With the cathode-resistor bias method, the resistor should not be by-passed if it is desired to have degeneration and freedom from distortion. When, however, no degeneration and maximum signal amplitude are desired, compensation can be provided by utilizing filters with equal time constants in the cathode circuit and in the plate circuit.

The screen voltage for the 6AG7 operated with fixed bias or cathode-resistor bias, should preferably be obtained through the use of a resistor in series with the high-voltage B-supply. The use of a series screen resistor requires the use of a large by-pass con-

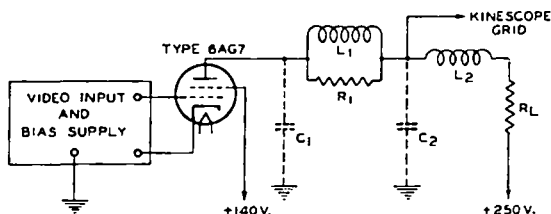
denser in the screen circuit. The size of the by-pass condenser can be reduced if a suitable compensating filter is used in the plate circuit. When the bias for the 6AG7 is obtained by the automatic background-control method, it is recommended that the screen voltage be obtained from a source of good regulation.

The *interlead shield* is connected within the tube to pin No.3. This pin should be grounded at the socket to provide a shield between the grid and heater (pin No.2).

APPLICATION

As a *video amplifier*, the 6AG7 is especially designed for use in the final video stage to modulate the Kinescope in a television receiver. In such service, the 6AG7 will provide adequate modulating voltage without frequency discrimination over the wide bandwidth required for high-definition television reception. The extremely high transconductance and the large plate current of this tube make possible relatively high voltage gain with the low load resistance needed to give uniform output over the wide frequency range. A typical circuit showing suitable constants for a video amplifier is shown below.

TYPICAL VIDEO VOLTAGE AMPLIFIER
HAVING BANDWIDTH OF 4 MEGACYCLES



$C_1 = 16 \mu\mu f$ = TUBE OUTPUT CAPACITANCE + SOCKET CAPACITANCE + WIRING CAPACITANCE + COIL CAPACITANCE

$C_2 = 16 \mu\mu f$ = KINESCOPE INPUT CAPACITANCE + SOCKET CAPACITANCE + WIRING CAPACITANCE + COIL CAPACITANCE

$L_1 = 94 \mu h$ FILTER INDUCTOR

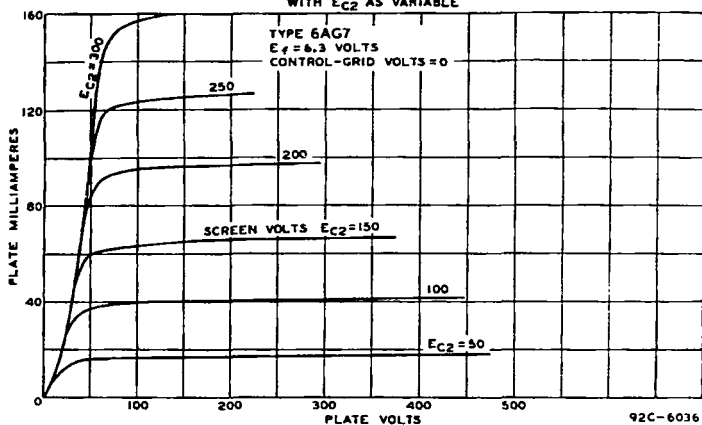
$L_2 = 47 \mu h$ FILTER INDUCTOR

$R_1 = 30000\text{-OHM}$, NON-REACTIVE RESISTOR

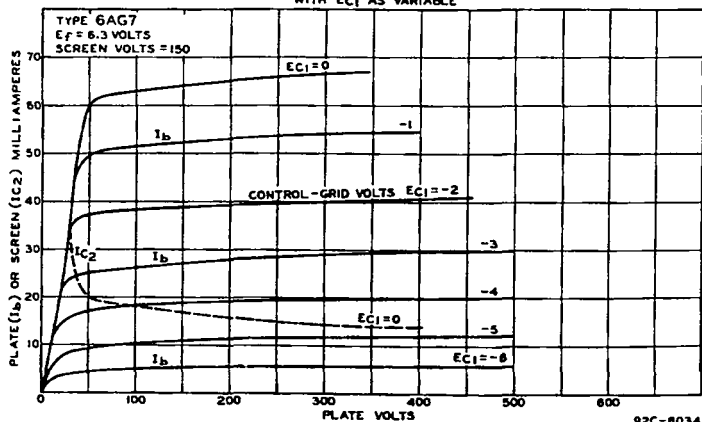
$R_L = 1700\text{-OHM}$, 10-WATT, NON-REACTIVE RESISTOR

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

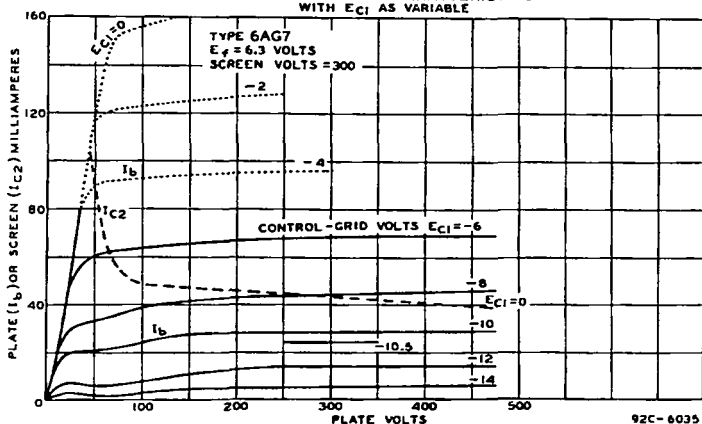
AVERAGE PLATE CHARACTERISTICS
WITH E_{C2} AS VARIABLE



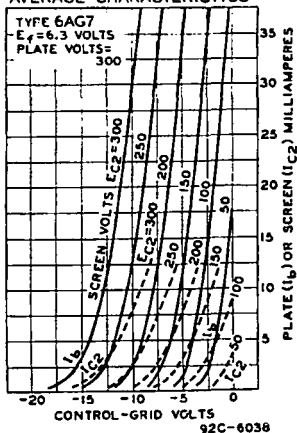
AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



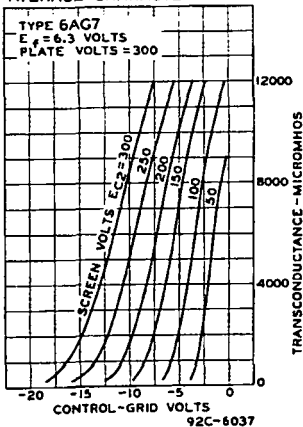
AVERAGE PLATE CHARACTERISTICS WITH E_{C1} AS VARIABLE

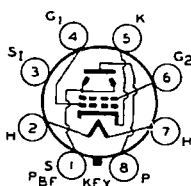
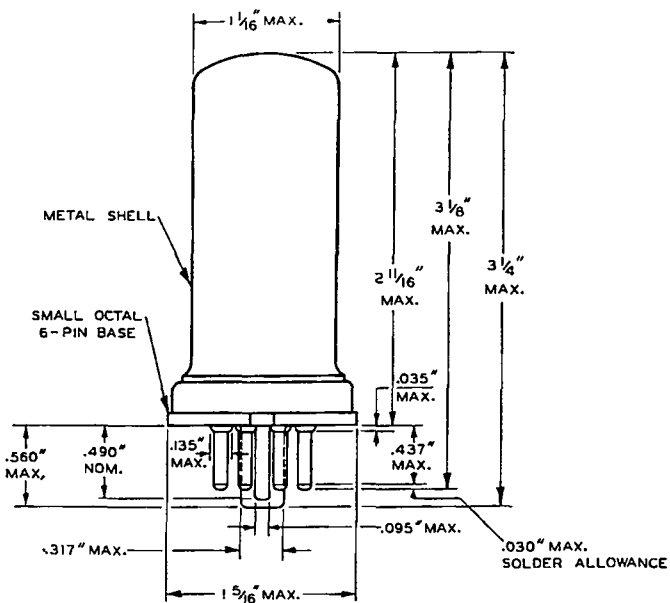


AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS





8Y

- G_1 = GRID
- G_2 = SCREEN
- H = HEATER
- K = CATHODE
- P_{BF} = BEAM-FORMING PLATES
- S_I = INTERLEAD SHIELD

JETEC DATA
JOINT ELECTRON TUBE ENGINEERING COUNCIL
COMMITTEE ON RECEIVING TUBES

J5-6AG7
Page 1
Dec. 15, 1950

JETEC TYPE 6AG7

PENTODE

MECHANICAL DATA

Coated unipotential cathode		
Outline drawing.	8-6	Bulb MT-8
Base		B8-21 small wafer octal 8-pin
Maximum diameter		1-5/16"
Maximum overall length		3-1/4"
Maximum seated height.		2-11/16"
Pin connections.		Basing 8Y
Pin 1 - Shell, grid #3		Pin 5 - Cathode
Pin 2 - Heater		Pin 6 - Grid #2
Pin 3 - Interlead shield		Pin 7 - Heater
Pin 4 - Grid #1		Pin 8 - Plate

Mounting position. Vertical*

*Horizontal operation permitted if pins #2 and #7 are in vertical plane.

ELECTRICAL DATA

Direct Interelectrode Capacitances**

Grid to plate: (g1 to p) max.	0.06	μpf
Input: g to (h+k+g2+g3+s+1.s.)	13	μpf
Output: p to (h+k+g2+g3+s+1.s.)	7.5	μpf
Grid #1 to grid #2: (g1 to g2) approx.	5.8	μpf
Grid #1 to cathode: (g1 to k) approx.	5.2	μpf
Heater to cathode: (h to k) approx.	10.7	μpf

**Pins #1 and #3 connected to pin #5.

Ratings

Heater voltage (ac or dc)	6.3	volts
Maximum heater-cathode voltage	90	volts
Maximum plate voltage	300	volts
Maximum grid #2 voltage	300	volts
Maximum plate dissipation	9	watts
Maximum grid #2 dissipation	1.5	watts
Maximum positive dc grid #1 voltage	0	volts
Maximum grid #1 circuit resistance (fixed bias)	0.25	megohm
Maximum grid #1 circuit resistance (self bias).	1.0	megohm

Continued on Page 2

ELECTRICAL DATA (Continued)Typical Operating Conditions and Characteristics, Class A1 Amplifier

Heater voltage	6.3	volts
Heater current	0.65	ampere
Plate voltage	300	volts
Grid #2 voltage	150	volts
Grid #1 voltage	-3	volts
Peak a-f grid #1 voltage	3	volts
Zero-signal plate current	30	ma
Maximum-signal plate current	30.5	ma
Zero-signal grid #2 current	7	ma
Maximum-signal grid #2 current	9	ma
Plate resistance (approx.)	0.13	megohm
Transconductance	11,000	μmhos
Load resistance	10,000	ohms
Maximum-signal power output	3	watts
Total harmonic distortion	7	%

Typical Operating Conditions and Characteristics,
Class A1 Video Voltage Amplifier 4MC bandwidth

	<u>Grid-leak Bias #</u>	<u>Cathode Bias</u>	
Heater voltage	6.3	6.3	volts
Heater current	0.65	0.65	ampere
Plate supply voltage	300	300	volts
Grid #2 voltage	115##	125###	volts
Grid #1 voltage	0§	-2	volts
Minimum grid #1 resistor	0.25	-	megohm
Maximum grid #1 resistor	0.5	-	megohm
Cathode resistor (by-passed by 250 μf approx.)	-	57	ohms
Interlead shield	Connected to ground		
Grid signal swing (peak to peak)	4	4	volts
Zero-signal plate current	45	28	ma
Zero-signal grid #2 current	13	7	ma
Load resistance	3500	3500	ohms
Voltage output (peak to peak)	135	140	volts

#Intended for use where dc restoration is accomplished in the grid circuit of the 6AG7.

##Obtained with regulated power supply

###From plate supply through 25,000 ohm resistor

§Zero-signal value

JOINT ELECTRON DEVICE ENGINEERING COUNCIL



Announcement of Electron Device Type Reregistration

2260 SALMON TOWER
11 WEST FORTY-SECOND STREET
NEW YORK 36, N. Y.
TELEPHONE: LONGACRE 5-0717

Release No. 187C (Tentative)*

March 29, 1960

The Joint Electron Device Engineering Council announced the registration of the following electron device designation

6AQ7

on May 24, 1939, Release No. 187, under the sponsorship of Radio Corporation of America, Harrison, New Jersey.

The sponsor now proposes reregistration based on the following data:

<u>ITEM</u>	<u>AS REGISTERED</u>	<u>AS PROPOSED</u>
Under MECHANICAL DATA		
Pin Connections:		
Pin 3	Interlead Shield	No connection
Mounting Position	Vertical*	Any
* Horizontal operation permitted if pins #2 and #7 are in vertical plane.		
Under ELECTRICAL DATA		
<u>Direct Interelectrode Capacitances:</u>		
Input:	g to (h+k+g2+g3+s+i.s.)	g1 to (h+k+g2+g3&s)
Output:	p to (h+k+g2+g3+s+i.s.)	p to (h+k+g2+g3&s)
Footnote **	Pins #1 and #3 connected to pin #5	Delete

*Unless valid objection to this reregistration is lodged with the EIA Standards Laboratory prior to April 29, 1960, this reregistration will be made and this information will be considered "FINAL" WITHOUT FURTHER NOTICE!