



RCA-6SA7

**PENTAGRID CONVERTER  
 Single-Ended Metal Type**

The 6SA7 is a new, single-ended, metal, pentagrid converter designed to perform simultaneously the functions of a mixer tube and of an oscillator tube in superheterodyne circuits, especially those of the all-wave type. It may also be used as a separately excited mixer.

Utilizing a special structure, the 6SA7 has excellent oscillator frequency stability. The magnitude of the input capacitance of the oscillator grid is not appreciably affected by signal-grid bias; changes in cathode current and in oscillator transconductance with avc voltage are small.

The 6SA7 offers several advantages from a circuit standpoint over other converter types: (1) elimination of loose or broken grid wires, (2) wiring can be completed below the set panel, (3) neater appearance of the chassis, (4) use of simplified oscillator coil and switching arrangements, (5) higher conversion gain, (6) small frequency shift at high frequencies, (7) lowered cost, and (8) simplification of tube renewal.

**TENTATIVE CHARACTERISTICS and RATINGS**

HEATER VOLTAGE (A.C. or D.C.)	6.3	Volts
HEATER CURRENT	0.3	Ampere
DIRECT INTERELECTRODE CAPACITANCES:		
Grid #3 to All Other Electrodes (R-F Input) °	9.5	µµf
Plate to All Other Electrodes (Mixer Output) °	12	µµf
Grid #1 to All Other Electrodes °	7	µµf
Grid #3 to Plate °	0.13 max.	µµf
Grid #1 to Grid #3 °	0.15 max.	µµf
Grid #1 to Plate °	0.06 max.	µµf
Grid #1 to All Other Electrodes except Cathode	4.4	µµf
Grid #1 to Cathode	2.6	µµf
Cathode to All Other Electrodes except Grid #1	5	µµf
MAXIMUM OVERALL LENGTH	2-5/8"	
MAXIMUM DIAMETER	1-5/16"	
BASE	Small Wafer Octal 8-Pin	

**CONVERTER SERVICE**

PLATE VOLTAGE	250 max.	Volts
GRIDS #2 & #4 VOLTAGE	100 max.	Volts
TOTAL CATHODE CURRENT	14 max.	Milliamperes

TYPICAL OPERATION:	Self-Excitation*		Separate Excitation		
Heater Voltage □	6.3	6.3	6.3	6.3	Volts
Plate Voltage	100	250	100	250	Volts
Grids #2 & #4 Voltage	100	100	100	100	Volts
Grid #3 (Control Grid) Voltage	0	0	-2	-2	Volts
Shell & Grid #5 Voltage	0	0	0	0	Volts
Grid #1 Resistor	20000	20000	20000	20000	Ohms
Plate Resistance (Approx.)	0.5	0.8	0.5	0.8	Megohm
Conversion Transcond.	425	450	425	450	Micromhos
Grid #3 Bias (Approx.) for Conversion Transconductance = 5 micromhos	-35	-35	-35	-35	Volts
Plate Current	3.2	3.4	3.2	3.4	Milliamperes
Grids #2 & #4 Current	8	8	8	8	Milliamperes
Grid #1 Current	0.5	0.5	0.5	0.5	Milliamperes

NOTE: The transconductance between Grid #1 and Grids #2 & #4 tied to plate (not oscillating) is approximately 4500 micromhos under the following conditions:

Grid #1	}	at 0 volts
Grid #3		
Grid #5 & Shell		
Grid #2 & #4	}	at 100 volts
Plate		

°, \*, □ : see next page.



# RCA-6SA7 (contd.)

- o With shell connected to cathode.
- \* Characteristics values are approximate only and are shown for a Hartley circuit with a feedback of approximately 2 volts peak in the cathode circuit.
- 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.

## Pin Connections

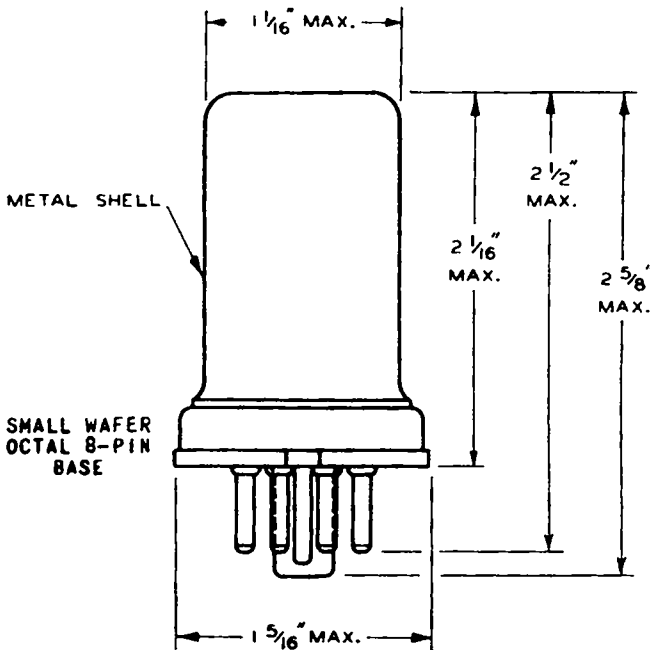
Pin 1 - Shell & Grid #5	Pin 5 - Grid #1
Pin 2 - Heater	Pin 6 - Cathode
Pin 3 - Plate	Pin 7 - Heater
Pin 4 - Grids #2 & #4	Pin 8 - Grid #3

(Pin numbers are according to RMA system)

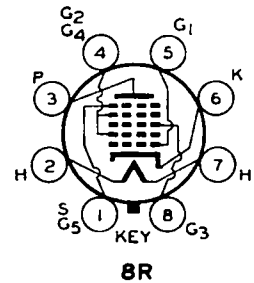
## Mounting Position

Vertical or Horizontal - No restrictions

## OUTLINE DRAWING FOR 6SA7



## BOTTOM VIEW OF SOCKET CONNECTIONS FOR 6SA7



RCA Laboratories Div.  
 Newark, N.J. Industry Serv. Lab.  
 150A  
 APR 8 1958  
 65-6SA7  
 Page 1  
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JETEC DATA  
 JOINT ELECTRON TUBE ENGINEERING COUNCIL  
 COMMITTEE ON RECEIVING TUBES

JETEC TYPE 6SA7

HEPTODE

MECHANICAL DATA

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

ELECTRICAL DATA

Direct Interelectrode Capacitances

Mixer grid to plate: (g3 to p) max. . . . .	0.25	μf
Mixer grid to oscillator grid: (g3 to g1) max. . . . .	0.15	μf
Mixer output: p to (h+k+S+g1+g2+4+g3+g5) . . . . .	9.5	μf
Oscillator input: g1 to (h+k+S+g2+4+g3+g5+p) . . . . .	7	μf
Oscillator grid to plate: (g1 to p) max. . . . .	0.06	μf
Oscillator output: k to (h+S+g2+4+g3+g5+p) . . . . .	5	μf
Oscillator grid to cathode: (g1 to k) . . . . .	2.6	μf
Oscillator grid to all except cathode: g1 to (h+S+g2+4+g3+g5+p) . . . . .	4.4	μf
R.F. input: g3 to (h+k+S+g1+g2+4+g5+p) . . . . .	9.5	μf

Ratings

Heater voltage (ac or dc) . . . . .	6.3	volts
Maximum heater-cathode voltage . . . . .	90	volts
Maximum plate voltage . . . . .	300	volts
Maximum grids #2 and #4 voltage . . . . .	100	volts
Maximum grids #2 and #4 supply voltage . . . . .	300	volts
Minimum negative dc grid #3 voltage . . . . .	-50	volts
Maximum positive dc grid #3 voltage . . . . .	0	volts
Maximum plate dissipation . . . . .	1.0	watts
Maximum grids #2 and #4 dissipation . . . . .	1.0	watts
Maximum cathode current . . . . .	14	ma.

ELECTRICAL DATA (Continued)

Typical Operating Conditions and Characteristics\*

Heater voltage . . . . .	6.3	6.3	volts
Heater current . . . . .	300	300	ma
Plate voltage . . . . .	100	250	volts
Grid #3 voltage . . . . .	-2	-2	volts
Grids #2 and #4 voltage . . . . .	100	100	volts
Oscillator grid (grid #1) voltage r.m.s. . . . .	10	10	volts
Oscillator grid (grid #1) resistance . . . . .	20,000	20,000	ohms
Plate resistance (approx.) . . . . .	0.5	1.0	megohm
Oscillator grid (grid #1) current . . . . .	0.5	0.5	ma
Conversion transconductance . . . . .	425	450	$\mu$ mhos
Plate current . . . . .	3.3	3.5	ma
Grids #2 and #4 current . . . . .	8.5	8.5	ma
Cathode current . . . . .	12.3	12.5	ma
Grid #3 voltage (approx.) for $G_c = 10 \mu$ mhos . . . . .	-25	-25	volts
Grid #3 voltage (approx.) for $G_c = 100 \mu$ mhos . . . . .	-9	-9	volts

\*Characteristics shown are obtained in the standard R.M.A. Conversion Conductance Test Set which uses separate excitation. The characteristics under these conditions correspond very closely with those obtained in a self-excited oscillatory circuit operating with zero bias.

Oscillator Characteristics (not oscillating)

Grid #3 voltage . . . . .	0	volts
Oscillator (grid #1) voltage . . . . .	0	volts
Grids #2 and #4 connected to plate . . . . .	100	volts
Transconductance between grid #1 and grids #2 and #4 connected to plate . . . . .	4500	$\mu$ mhos
Cathode current . . . . .	25	ma
Amplification factor . . . . .	14	
Grid #1 voltage (approx.) for $I_b = 10 \mu$ a. . . . .	14.0	volts

Refer to "Interpretation of Receiving Tube Ratings"