



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	Milliampere

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.)

° 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

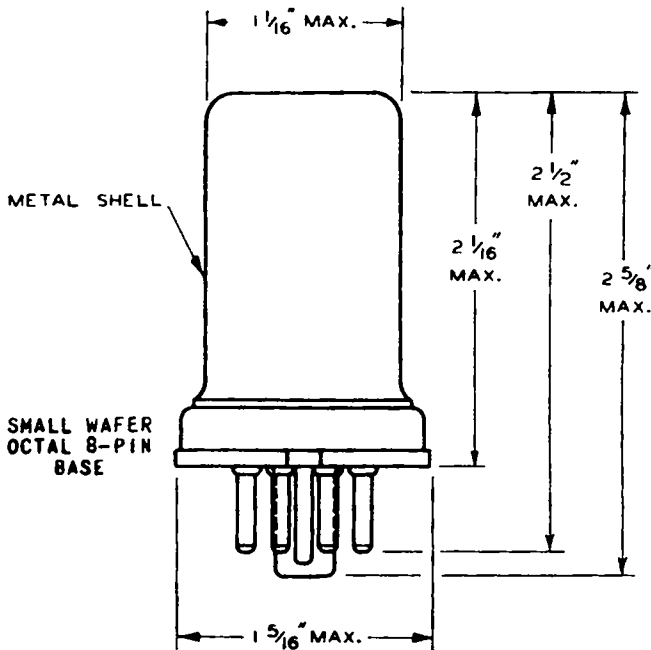
Pin 1 - Shell & Grid #5	Pin 5 - Grid #1
Pin 2 - Heater	Pin 6 - Cathode
Pin 3 - Plate	Pin 7 - Heater
Pin 4 - Grids #2 & #4	Pin 8 - Grid #3

(Pin numbers are according to RMA system)

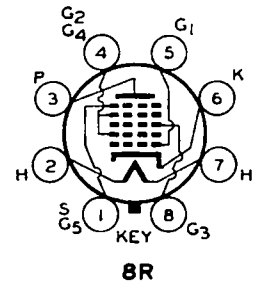
Mounting Position

Vertical or Horizontal - No restrictions

OUTLINE DRAWING FOR 6SA7



BOTTOM VIEW OF SOCKET CONNECTIONS FOR 6SA7



JETEC DATA
JOINT ELECTRON TUBE ENGINEERING COUNCIL
COMMITTEE ON RECEIVING TUBES

RCA Laboratories Div.
Newark Industry Serv. Lab.
150A
APR 8 1956
Page 1
FILED Feb. 20, 1950

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		Biasing 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.

Continued on Page 2

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	μmhos
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 $G_c = 10 \mu\text{mhos}$	-25	-25	volts
Grid #3 voltage (approx.) for $G_c = 100 \mu\text{mhos}$	-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	μmhos
Cathode current	25	ma
Amplification factor.	14	
Grid #1 voltage (approx.) for $I_b = 10 \mu\text{a}$	14.0	volts

Refer to "Interpretation of Receiving Tube Ratings"