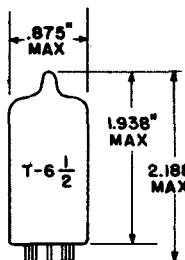


TUNG-SOL

→ TWIN TRIODE

MINIATURE TYPE



GLASS BULB
SMALL-BUTTON NOVAL
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-2

UNIPOTENTIAL CATHODE

HEATER

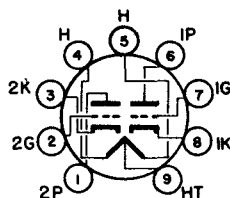
SERIES
12.61 1.3 VOLTS
0.15 AMP.

PARALLEL
6.3± 0.6 VOLTS
0.3 AMP.

AC OR DC

OPERATING POSITION*

ANY, BUT FOR UTMOST IN SERVICE, THE TUBE SHOULD BE OPERATED IN A VERTICAL POSITION WITH BASE UP OR DOWN, OR IN A HORIZONTAL POSITION WITH BASE PINS 6 & 9 IN A VERTICAL PLANE.



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9A

THE 5963 IS A MEDIUM-MU TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ESPECIALLY DESIGNED FOR FREQUENCY-DIVIDER CIRCUITS IN ELECTRONIC COMPUTERS AND OTHER 'ON-OFF' CONTROL APPLICATIONS REQUIRING LONG PERIODS OF OPERATION UNDER CUT-OFF CONDITIONS.

DIRECT INTERELECTRODE CAPACITANCES
WITHOUT EXTERNAL SHIELD

GRID TO PLATE (EACH UNIT)	1.5	pF
GRID TO CATHODE & HEATER (EACH UNIT)	1.9	pF
PLATE TO CATHODE & HEATER (UNIT #1)	0.5	pF
PLATE TO CATHODE & HEATER (UNITS #2)	0.35	pF
GRID OF UNIT #1 TO GRID OF UNIT #2 (MAX.)	0.01	pF

RATINGS

ABSOLUTE MAXIMUM VALUES

EACH UNIT

FREQUENCY DIVIDER IN COMPUTER SERVICE
AND
'ON-OFF' CONTROL SERVICE

MAXIMUM PLATE VOLTAGE	250	VOLTS
MAXIMUM GRID VOLTAGE:		
NEGATIVE BIAS VALUE	100	VOLTS
POSITIVE BIAS VALUE	0	VOLTS
PEAK NEGATIVE VALUE	200	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM GRID INPUT	0.5	WATT
MAXIMUM DC CATHODE CURRENT	20	MA.
MAXIMUM PEAK CATHODE CURRENT	100	MA.
MAXIMUM PEAK HEATER CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	90	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	90	VOLTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	120	°C

→ INDICATES A CHANGE.

CONTINUED ON FOLLOWING PAGE

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A AMPLIFIER (EACH UNIT)

PLATE VOLTAGE	67.5	VOLTS
GRID VOLTAGE	0	VOLTS
AMPLIFICATION FACTOR	21	
PLATE RESISTANCE	6600	OHMS
TRANSCONDUCTANCE	3200	μ MHOS
PLATE CURRENT	8.5	MA.

FREQUENCY DIVIDER IN COMPUTER SERVICE
AND
'ON-OFF' CONTROL SERVICE

TYPICAL OPERATION AS FREQUENCY HALFER
EACH UNIT

	CUTOFF CONDITION	ZERO-BIAS CONDITION	
PLATE SUPPLY VOLTAGE	150	150	VOLTS
GRID VOLTAGE	-15	0	VOLTS
PLATE CIRCUIT RESISTANCE	20000	20000	OHMS
GRID-CIRCUIT RESISTANCE	47000	47000	OHMS
PLATE CURRENT	0	5.1	MA.

CIRCUIT VALUES

GRID-CIRCUIT RESISTANCE: (MAX.) FOR FIXED BIAS OPERATION	0.5	MEGOHM
FOR CATHODE-BIAS OPERATION	1.0	MEGOHM

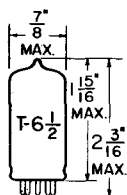
RANGE VALUES FOR EQUIPMENT DESIGN

	NOTE	MIN	MAX	
CUTOFF CONDITION				
PLATE CURRENT	1	—	50	μ AMP.
DIFFERENCE IN PLATE CURRENT BETWEEN UNITS	—	—	50	μ AMP.
ZERO-BIAS CONDITION				
PLATE CURRENT	2	4.6	5.4	MA.
DIFFERENCE IN PLATE CURRENT BETWEEN UNITS	—	—	0.8	MA.

¹FOR CONDITIONS WITH 12.6 VOLTS ON HEATER, PLATE-SUPPLY VOLTS = 150, PLATE-CIRCUIT RESISTANCE (OHMS) = 20000, GRID-SUPPLY VOLTS = -15, AND GRID-CIRCUIT RESISTANCE (OHMS) = 47000.

²CONDITIONS ARE SAME AS FOR NOTE 1 EXCEPT THAT GRID-SUPPLY VOLTS = 0.

TUNG-SOL

TRIODE
MINIATURE TYPE

GLASS BULB

UNIPOTENTIAL CATHODE

HEATER

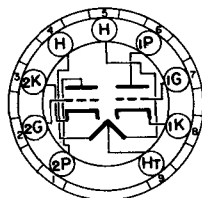
SERIES
12.6 $\pm$ 10% VOLTS
0.15 AMP.

PARALLEL
6.3 $\pm$ 10% VOLTS
0.3 AMP.

AC OR DC

ANY MOUNTING POSITION

MICROPHONISM NOT TESTED



BOTTOM VIEW

SMALL-BUTTON NOVAL
9 PIN BASE

9A

THE 5963 IS A MEDIUM-MU TRIODE IN THE 9 PIN MINATURE CONSTRUCTION. IT IS ESPECIALLY DESIGNED FOR FREQUENCY-DIVIDER CIRCUITS IN ELECTRONIC COMPUTERS AND OTHER 'ON-OFF' CONTROL APPLICATIONS REQUIRING LONG PERIODS OF OPERATION UNDER CUT-OFF CONDITIONS.

DIRECT INTERELECTRODE CAPACITANCES
WITHOUT EXTERNAL SHIELD

GRID TO PLATE (EACH UNIT)	1.5	μf
GRID TO CATHODE & HEATER (EACH UNIT)	1.9	μf
PLATE TO CATHODE & HEATER (UNIT #1)	0.5	μf
PLATE TO CATHODE & HEATER (UNITS #2)	0.35	μf
GRID OF UNIT #1 TO GRID OF UNIT #2 (MAX.)	0.01	μf

RATINGS

ABSOLUTE MAXIMUM VALUES

EACH UNIT

FREQUENCY DIVIDER IN COMPUTER SERVICE

AND

'ON-OFF' CONTROL SERVICE

	SERIES 12.6 $\pm$ 10%	PARALLEL 6.3 $\pm$ 10%	
HEATER VOLTAGE			VOLTS
MAXIMUM PLATE VOLTAGE		250	VOLTS
MAXIMUM GRID VOLTAGE:			
NEGATIVE BIAS VALUE	100		VOLTS
POSITIVE BIAS VALUE	0		VOLTS
PEAK NEGATIVE VALUE	200		VOLTS
MAXIMUM PLATE DISSIPATION	2.5		WATTS
MAXIMUM GRID INPUT	0.5		WATT
MAXIMUM DC CATHODE CURRENT	20		MA.
MAXIMUM PEAK CATHODE CURRENT	100		MA.
MAXIMUM PEAK HEATER CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	90		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	90		VOLTS
MAXIMUM BULB TEMPERATURE			
(AT HOTTEST POINT ON BULB SURFACE)	120		$^{\circ}\text{C}$

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TUNG-SOL

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A AMPLIFIER (EACH UNIT)

HEATER VOLTAGE (SERIES)	12.6±10%	VOLTS
HEATER VOLTAGE (PARALL EL)	6.3±10%	VOLTS
HEATER CURRENT (SERIES)	0.15	AMP.
HEATER CURRENT (PARALLEL)	0.3	AMP.
PLATE VOLTAGE	67.5	VOLTS
GRID VOLTAGE	0	VOLTS
AMPLIFICATION FACTOR	21	
PLATE RESISTANCE	6600	OHMS
TRANSCONDUCTANCE	3200	μMHOS
PLATE CURRENT	8.5	MA.

FREQUENCY DIVIDER IN COMPUTER SERVICE
AND
'ON-OFF' CONTROL SERVICE

TYPICAL OPERATION AS FREQUENCY HALFER
EACH UNIT

	CUTOFF CONDITION	ZERO-BIAS CONDITION	
PLATE SUPPLY VOLTAGE	150	150	VOLTS
GRID VOLTAGE	-15	0	VOLTS
PLATE CIRCUIT RESISTANCE	20000	20000	OHMS
GRID-CIRCUIT RESISTANCE	47000	47000	OHMS
PLATE CURRENT	0	5.1	MA.

CIRCUIT VALUES

GRID-CIRCUIT RESISTANCE (MAX.)		
FOR FIXED BIAS OPERATION	0.5	MEGOHM
FOR CATHODE-BIAS OPERATION	1.0	MEGOHM

RANGE VALUES FOR EQUIPMENT DESIGN

	NOTE	MIN	MAX	
CUTOFF CONDITION				
PLATE CURRENT	1	—	50	μAMP.
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ZERO-BIAS CONDITION				
PLATE CURRENT	2	4.6	5.4	MA.
DIFFERENCE IN PLATE CURRENT BETWEEN UNITS	—	—	0.8	MA.

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²CONDITIONS ARE SAME AS FOR NOTE 1 EXCEPT THAT GRID-SUPPLY VOLTS = 0.

