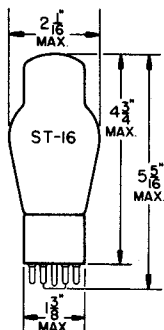


## TUNG-SOL

## TWIN TRIODE



## GLASS BULB

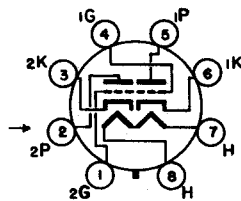
MEDIUM SHELL  
8 PIN OCTAL 88-11

## HEATER

$6.3 \pm 10\%$  VOLTS 2.5 AMP.

ANY MOUNTING POSITION

(IF TUBE IS TO BE MOUNTED IN A HORIZONTAL POSITION IT IS RECOMMENDED THAT IT BE MOUNTED SO THAT THE GRID PLANE BE VERTICAL.)



## BOTTOM VIEW

BASING DIAGRAM  
JEDEC 88D

THE 6AS7G IS A HIGH CURRENT, TWIN POWER TRIODE WIDELY USED IN ELECTRONICALLY REGULATED POWER SUPPLIES. THE HIGH PERVEANCE OF THIS TUBE PERMITS IT TO PASS LARGE CURRENTS AT LOW PLATE VOLTAGES, THUS PROVIDING FOR EFFICIENT SERIES REGULATION.

## ELECTRICAL DATA

HEATER VOLTAGE	$6.3 \pm 10\%$	VOLTS
HEATER CURRENT ( $E_f = 6.3$ VOLTS)	2.5	AMP.
MINIMUM CATHODE HEATING TIME	30	SECONDS
TRANSCONDUCTANCE (PER SECTION)	7 000	$\mu$ MHOS
AMPLIFICATION FACTOR	2.0	
INTER ELECTRODE CAPACITANCES PER TRIODE SECTION:		
GRID TO CATHODE	6.2	$\mu$ f
GRID TO PLATE	8.4	$\mu$ f
CATHODE TO PLATE	2.2	$\mu$ f
HEATER TO CATHODE	7.0	$\mu$ f
INTER ELECTRODE CAPACITIES BETWEEN TRIODE SECTIONS:		
SECTION 1 GRID TO SECTION 2 GRID	0.9	$\mu$ f
SECTION 1 PLATE TO SECTION 2 PLATE	2.2	$\mu$ f

## MECHANICAL DATA

MOUNTING POSITION	ANY	
BULB	ST-16	
BASE	MEDIUM SHELL OCTAL 8 PIN 88-11 PHENOLIC	
AVERAGE NET WEIGHT	2.5	OUNCES
MAXIMUM VIBRATION RATING (D-.08" @ 25 CPS)	2.5	G

→ INDICATES A CHANGE.

CONTINUED ON FOLLOWING PAGE

## TUNG-SOL

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RATINGS  
ABSOLUTE VALUES

	MIN.	MAX.	
HEATER VOLTAGE	5.7	6.9	VOLTS
PLATE VOLTAGE (DC)	---	275	VOLTS
GRID VOLTAGE (DC)	---	0	VOLTS
HEATER-CATHODE VOLTAGE (DC)	-300	+300	VOLTS
GRID CURRENT PER GRID	---	0	MA.
PLATE CURRENT PER PLATE (DC)	---	125	MA.
(IF SEVERAL TUBE SECTIONS ARE TO BE USED IN PARALLEL WITH EACH OTHER, IT IS RECOMMENDED NOT TO EXCEED 100 MA. PER PLATE)			
POWER DISSIPATION PER PLATE	---	14	WATTS
ENVELOPE TEMPERATURE	---	200	°C
ALTITUDE FOR FULL RATINGS	---	10 000	FEET
CIRCUIT VALUES <sup>A</sup>			
GRID CIRCUIT RESISTANCE FOR CATHODE BIAS OPERATION	---	1.0	MEGOHM
GRID CIRCUIT RESISTANCE FOR FIXED BIAS OR COMBINATION	---	0.1	MEGOHM
FIXED AND CATHODE BIAS OPERATION	---	0.1	MEGOHM

## RANGE OF VALUES

CONDITIONS:  $E_f = 6.3V$ ;  $E_b = 135V$ ;  
 $E_c = 0$ ;  $R_{k/k} = 250 \Omega$ .  
 BOTH SECTIONS OPERATING.  
 EACH SECTION READ SEPARATELY.

INDIVIDUAL PLATE CURRENT (DC)	100	150	MA.
INDIVIDUAL SECTION TRANSCONDUCTANCE	5 800	8 200	$\mu$ MHOS
AMPLIFICATION FACTOR	1.4	2.6	

CONDITIONS:  $E_f = 6.3$ ;  $E_b = 250$  VDC.  
 $E_c = -200$  VDC.  $R_{k/k} = 0$ .

INDIVIDUAL PLATE CURRENT (DC)		10	MA.
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## TUNG-SOL

## APPLICATION NOTES

THE 6AS7G IS WIDELY USED AS A "PASSING" TUBE OR SERIES REGULATOR IN CONTROLLED POWER SUPPLIES BECAUSE OF ITS HIGH TRANSCONDUCTANCE AT RELATIVELY LOW PLATE VOLTAGES. TO PROVIDE THE DESIRED OUTPUT CURRENT, MANY TRIODE SECTIONS CAN BE PARALLELED. IF TUBE SECTIONS ARE TO BE PARALLELED, HOWEVER, THE DESIGNER IS STRONGLY URGED TO USE SUFFICIENT RESISTANCE IN EACH CATHODE LEG TO EQUALIZE CURRENT DIVISION AMONG THE TRIODE SECTIONS. RECOMMENDED VALUES FOR VARIOUS OPERATING CURRENTS ARE SHOWN ON THE PLATE CHARACTERISTICS CURVE. IF THE OUTPUT CURRENT OF THE SUPPLY IS NOT FIXED, USE THE RESISTANCE INDICATED FOR THE LOWEST CURRENT THAT APPROACHES THE MAXIMUM PLATE DISSIPATION LINE. CATHODE RESISTANCE IS SUPERIOR TO ANODE RESISTANCE BECAUSE IT PROVIDES MORE BIAS ON THE SECTIONS TAKING GREATER PLATE CURRENT. A CATHODE RESISTOR NEED BE ONLY ONE THIRD THE VALUE ( $\frac{R}{U+1}$ ) OF A PLATE RESISTOR, AND THEREFORE WILL DISSIPATE ONLY ONE THIRD THE POWER. IN ANY CASE, THE ONLY LOSSES INCURRED IN USING A RESISTOR IS THE INSERTION LOSS OF THE RESISTOR ITSELF (LESS THAN ONE WATT) AND THE ADDITIONAL VOLTAGE (LESS THAN 10 VOLTS) NECESSARY FROM THE UNREGULATED SUPPLY. A CATHODE RESISTOR ADDS A SMALL ADDITIONAL LOSS BY CAUSING THE PASSING TUBE TO WORK WITH HIGHER BIAS AND HENCE WITH GREATER TUBE DROP.

A THIRTY SECOND CATHODE WARMUP TIME IS RECOMMENDED BEFORE THE PLATE VOLTAGE IS APPLIED. THIS IS ESPECIALLY NECESSARY IN CIRCUITS WHERE THE AMPLIFIER TUBE PLATE RESISTOR IS RETURNED TO THE PLATE SIDE OF THE PASSING TUBE, AS ILLUSTRATED IN THE SIMPLIFIED CIRCUIT IN FIGURE 1. IN THIS CASE DURING WARMUP THE AMPLIFIER TUBE DRAWS LITTLE CURRENT, THERE IS LITTLE IR DROP ACROSS THE RESISTOR, AND THE GRID OF THE PASSING TUBE IS EFFECTIVELY, TIED TO THE PLATE. THE PLATE WILL ATTEMPT TO DRAW EXCESSIVE CURRENT FROM THE PASSING TUBE'S CATHODE AND MAY SERIOUSLY IMPAIR TUBE LIFE. THE CIRCUIT IN FIGURE 2 IS PREFERABLE FROM THE CONSIDERATION OF THE SAFETY OF THE PASSING TUBE BOTH DURING WARMUP AND IN THE EVENT OF TROUBLE IN THE AMPLIFIER CIRCUIT OR IF THE AMPLIFIER TUBE IS REMOVED FROM ITS SOCKET. IT HAS THE ADDITIONAL ADVANTAGE OF PROVIDING A CONSTANT VOLTAGE FOR THE AMPLIFIER CIRCUIT. HOWEVER, IF THE REGULATED OUTPUT IS LOW (BELOW 250 VOLTS) IT WILL BE NECESSARY TO PROVIDE ADDITIONAL NEGATIVE VOLTAGE FOR THE REFERENCE TUBE CIRCUIT. ALSO, IF THE REGULATED OUTPUT VOLTAGE IS TO BE VARIABLE, IT MAY BE NECESSARY TO FOLLOW FIGURE 1.

PASSING TUBE OPERATION CONDITIONS SHOULD BE CHOSEN TO PROVIDE AS LOW A TUBE DROP AS POSSIBLE. A SAFETY MARGIN OF AT LEAST 5 VOLTS FROM THE ZERO BIAS LINE SHOULD BE ALLOWED HOWEVER, FOR VARIATIONS OF INDIVIDUAL TUBES. SUFFICIENT BIAS EXCURSION SHOULD BE ALLOWED FOR OVERCOMING RIPPLE. THE AMPLIFIER CIRCUIT SHOULD BE ABLE TO COUNTERACT THE EFFECT OF UNBALANCE DUE TO TUBE AGING.

A GRID RESISTOR SHOULD BE USED FOR EACH TRIODE SECTION. THIS SHOULD BE ENOUGH TO PREVENT PARASITIC OSCILLATION BUT NOT LARGE ENOUGH TO PREVENT LOSS OF CONTROL DUE TO A SMALL AMOUNT OF "GAS" GRID CURRENT. A VALUE OF GRID RESISTANCE THAT MEETS BOTH THESE CONDITIONS IS 1,000 OHMS. HEATER VOLTAGE SHOULD BE KEPT AS CLOSE AS POSSIBLE TO 6.3 VOLTS AS MEASURED ON THE TUBE PINS. WHEN CONNECTING MANY HIGH DRAIN TUBE HEATERS ACROSS A SINGLE TRANSFORMER, BUS BARS FEEDING FROM "ALTERNATE ENDS" (FIGURE 3) SHOULD BE USED WITH A STRANDED PAIR FEEDING INDIVIDUAL SOCKETS.

TUNG-SOL

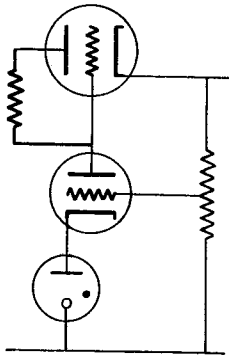


FIGURE 1

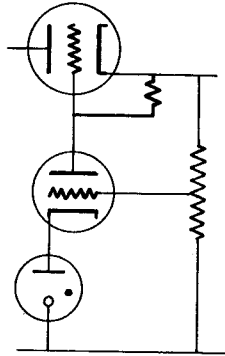


FIGURE 2

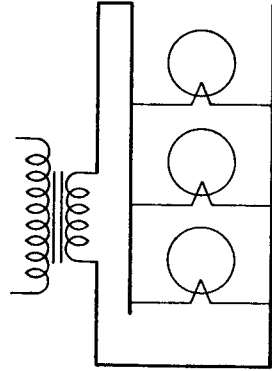
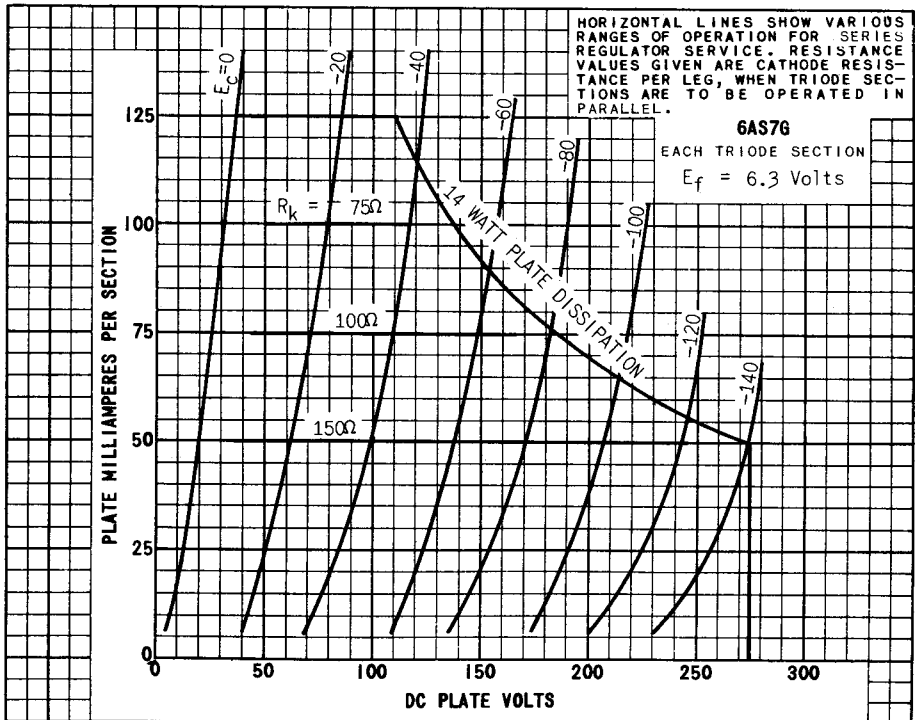
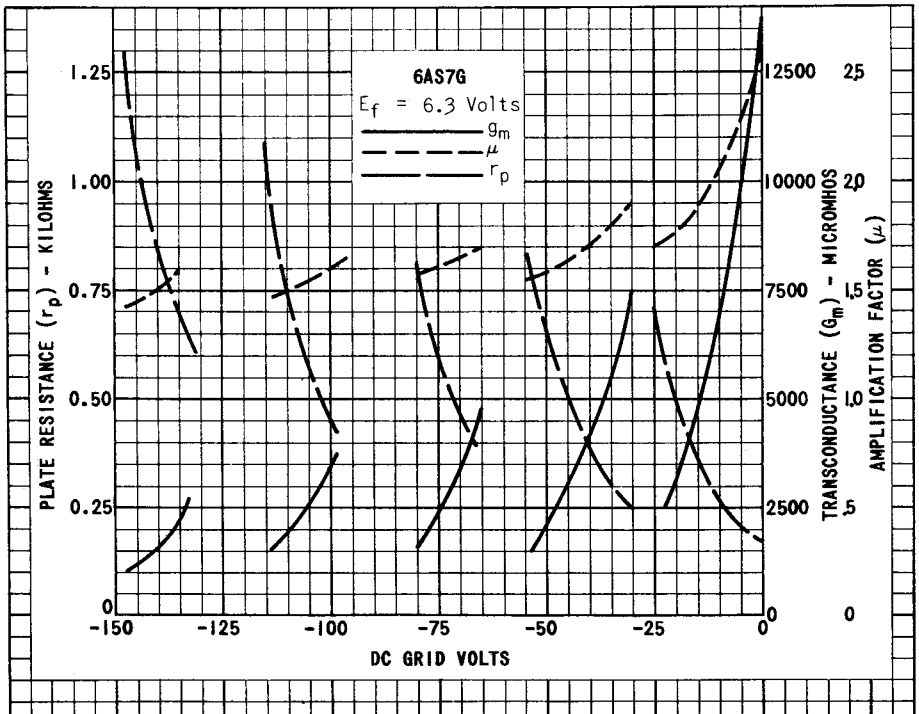
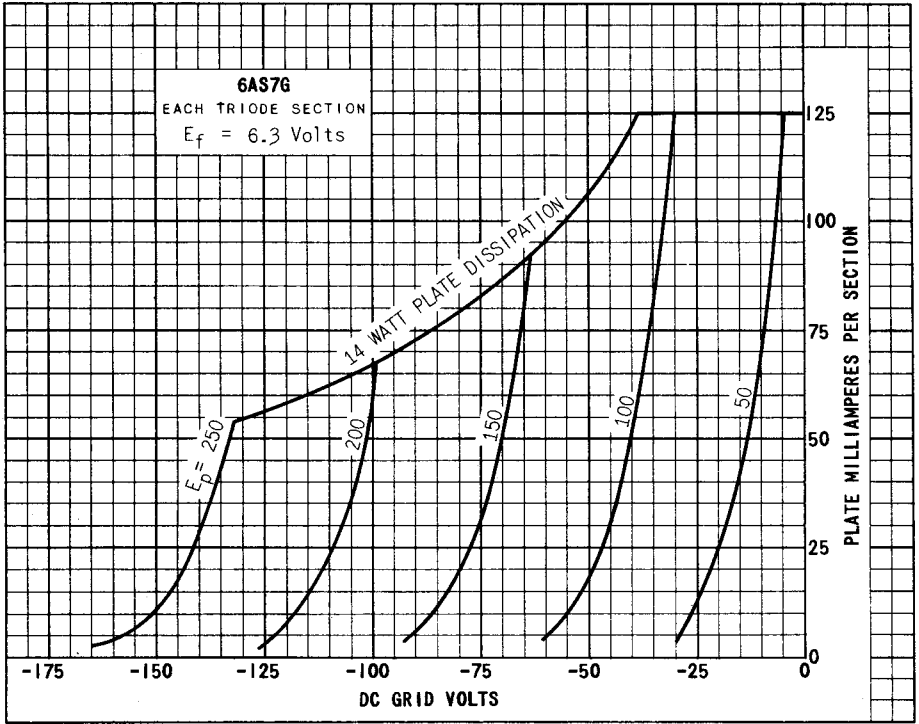


FIGURE 3





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