

TUNG-SOL

TWIN TRIODE

MINIATURE TYPE

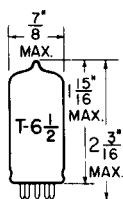
COATED UNIPOTENTIAL CATHODE

HEATER

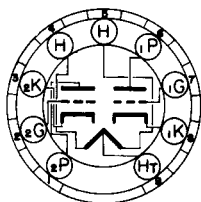
6.3 VOLTS 0.3 AMP.
12.6 VOLTS 0.150 AMP.

AC OR DC

ANY MOUNTING POSITION



GLASS BULB



BOTTOM VIEW
SMALL BUTTON
9 PIN BASE

9A

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS #4 AND #5. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN #9 AND PINS #4 AND #5 CONNECTED TOGETHER.

THE 12AT7WA IS A RUGGEDIZED TWIN TRIODE OF THE 9-PIN MINIATURE CONSTRUCTION. THE TWO HIGH TRANSCONDUCTANCE TRIODE SECTIONS ARE ELECTRICALLY INDEPENDENT, ALLOWING SIMULTANEOUS USE OF THE TWO IN COMPLETELY DIFFERENT APPLICATIONS. THE HIGH RATIO OF PLATE CURRENT TO TRANSCONDUCTANCE MAKES IT ADAPTABLE FOR USE AS A COMBINED HIGH FREQUENCY OSCILLATOR AND MIXER, OR AS A GROUNDED GRID RF AMPLIFIER. THE HEATER CENTER TAP PERMITS OPERATION FROM EITHER A 6.3 OR 12.6 VOLT SUPPLY. CONTROLS ON THE PRODUCT AVERAGE FOR SUCH CHARACTERISTICS AS HEATER CURRENT, PLATE CURRENT, AND TRANSCONDUCTANCE ASSURE THAT THESE CRITICAL CHARACTERISTICS WILL REMAIN WELL CENTERED. SINCE IT MUST BE ABLE TO WITHSTAND SEVERE MECHANICAL TESTS TO MEET TEST SPECIFICATIONS, THE 12AT7WA IS ESPECIALLY SUITED FOR USE IN INDUSTRIAL AND MILITARY AIRBORNE EQUIPMENT WHICH MAY BE SUBJECTED TO SEVERE SHOCK AND VIBRATION.

DIRECT INTERELECTRODE CAPACITANCES
EACH SECTION

	WITH SHIELD #316	WITHOUT SHIELD	
GRID TO PLATE #1 (RATED)	1.5	1.5	f
MAXIMUM	---	1.90	f
MINIMUM	---	1.30	f
INPUT SECTION #1 (RATED)	2.2	2.2	f
MAXIMUM	---	3.00	f
MINIMUM	---	2.00	f
OUTPUT (SECTION#1) (RATED)	1.2	0.5	f
MAXIMUM	---	0.70	f
MINIMUM	---	0.20	f
OUTPUT (SECTION#2) (RATED)	1.5	0.4	f
MAXIMUM	---	0.60	f
MINIMUM	---	0.16	f
PLATE TO PLATE			
MAXIMUM	---	0.33	f
MINIMUM	---	0.15	f
HEATER TO CATHODE #1 (RATED)	2.4	2.4	f
MAXIMUM	---	3.50	f
MINIMUM	---	2.10	f
HEATER TO CATHODE #2 (RATED)	2.4	2.4	f
MAXIMUM	---	3.50	f
MINIMUM	---	2.10	f
GRID TO PLATE #2 (RATED)	1.5	1.5	f
MAXIMUM	---	1.90	f
MINIMUM	---	1.30	f
INPUT SECTION #2 (RATED)	2.2	2.2	f
MAXIMUM	---	3.00	f
MINIMUM	---	2.00	f

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RATINGS
ABSOLUTE MAXIMUM VALUES

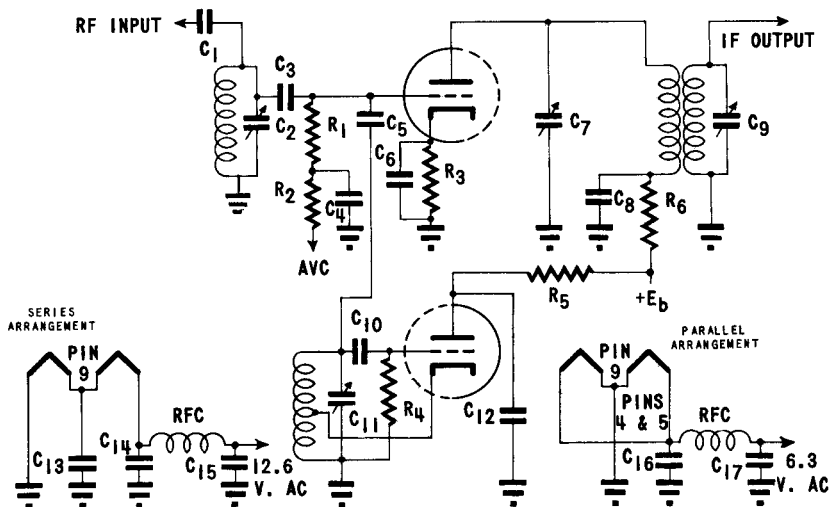
HEATER VOLTAGE	6.3±10%	12.6±10%	VOLTS
MAXIMUM DC PLATE VOLTAGE	330		VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	-55		VOLTS
MAXIMUM PLATE DISSIPATION (EACH SECTION)	2.8		WATTS
MAXIMUM HEATER CATHODE VOLTAGE	±100		VOLTS
MAXIMUM BULB TEMPERATURE	200		° C
MAXIMUM ALTITUDE	10 000		FEET
MAXIMUM SHOCK	600		G

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A₁ AMPLIFIER - EACH TRIODE UNIT

HEATER VOLTAGE	12.6	6.3	12.6	6.3	VOLTS
HEATER CURRENT	150	300	150	300	mA
PLATE VOLTAGE	100		250		VOLTS
CATHODE BIAS RESISTOR	270		200		OHMS
PLATE CURRENT	3.7		10		mA
PLATE RESISTANCE	15 000		10 900		OHMS
TRANSCONDUCTANCE	4 000		5 500		μMHOS
AMPLIFICATION FACTOR	60		60		
GRID VOLTAGE (APPROX.) FOR I _b = 10 μA.	-5		-12		VOLTS

TYPICAL CIRCUIT FOR CONVERTER OPERATION AT 100 MEGACYCLES



- C₁ = 100 μLFF
- C₂ = RF TUNING CAPACITOR
- C₃ = 25 μLFF
- C₄ = 1000 μLFF
- C₅ = 1 μLFF
- C₆ = 1000 μLFF

- C₇ = 50 μLFF (MAX.)
- C₈ = 1000 μLFF
- C₉ = 50 μLFF (MAX.)
- C₁₀ = 50 μLFF
- C₁₁ = OSCILLATOR TUNING CAPACITOR
- C₁₂ = 1000 μLFF

- C₁₃ = 1000 μLFF
- C₁₄ = 1000 μLFF
- C₁₅ = 1000 μLFF
- C₁₆ = 1000 μLFF
- C₁₇ = 1000 μLFF
- R₁ = 50000 OHMS
- R₂ = 50000 OHMS
- R₃ = 2000 OHMS
- R₄ = 10000 OHMS
- R₅ = 1000 OHMS
- R₆ = 1000 OHMS
- E_b = 100 OR 250V.

OSCILLATOR VOLTAGE APPLIED TO MIXER SHOULD BE JUST SUFFICIENT TO CAUSE GRID CURRENT TO FLOW IN THE MIXER SECTION.

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CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

($E_f = 12.6V$, $E_b = 250Vdc$, $R_k/K = 200 OHMS$)

EXCEPT AS MODIFIED BELOW

	INITIAL		500 HOUR LIFE TEST				
	INDIVIDUAL MIN.	MAX.	PROD. MIN.	AVG. MAX.		INDIVIDUAL MIN.	MAX.
HEATER CURRENT	138	162	144	156	138	162	mA
HEATER-CATHODE LEAKAGE ^A ($E_{hk} = \pm 100Vdc$)	---	± 10	---	± 2	---	± 10	$\mu A dc$
GRID CURRENT ^B ($R_g = 0.5 MEG.$)	---	-0.7	---	-0.2	---	-0.7	$\mu A dc$
PLATE CURRENT (1) ^B	7.0	14.0	8.5	11.5	---	---	mAdc
TRANSCONDUCTANCE (1)	4500	6500	4880	6120	3800	6500	$\mu MHOS$
Δ AVERAGE TRANS- CONDUCTANCE (1)	---	---	---	---	---	20	PERCENT
INSULATION OF ELECTRODES ^{CB} ($E_f = 12.6 V$, $E(g-all) =$ $-100Vdc$, $E(p-all) = -300Vdc$)							
R_{g-all}	100	---	---	---	50	---	MEGOHM
R_{p-all}	100	---	---	---	50	---	MEGOHM
PLATE CURRENT (2) ^{DB} ($E_c = -20Vdc$, $R_p = 0.1 MEG.$, $R_k = 0$, $C_k = 0$)	---	100	---	---	---	---	$\mu A dc$
PLATE CURRENT DIFFERENCE ^B BETWEEN SECTIONS	---	3.2	---	---	---	---	mAdc
TRANSCONDUCTANCE (2) ^{EB} ($E_f = 11.0V$)	4000	---	4400	---	---	---	$\mu MHOS$
AMPLIFICATION FACTOR ^{FB}	50	70	---	---	---	---	
GRID EMISSION ^{GB} ($E_f = 15.0V$, $E_c = 20Vdc$, $R_g = 0.5 MEG.$, $R_k = 0$, $C_k = 0$)	---	-1.5	---	---	---	---	$\mu A dc$

SPECIAL REQUIREMENTS

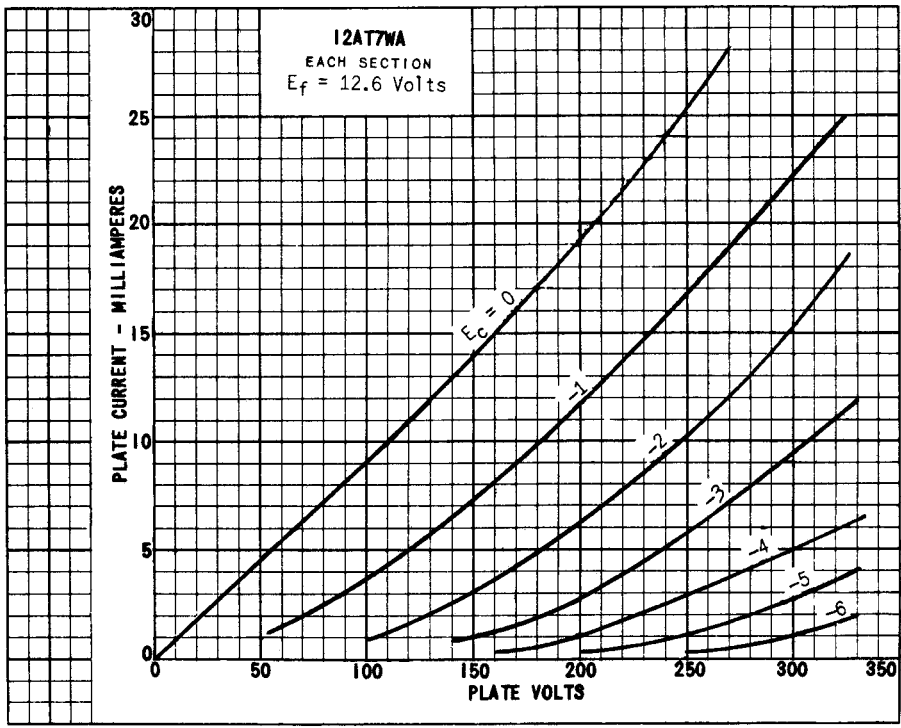
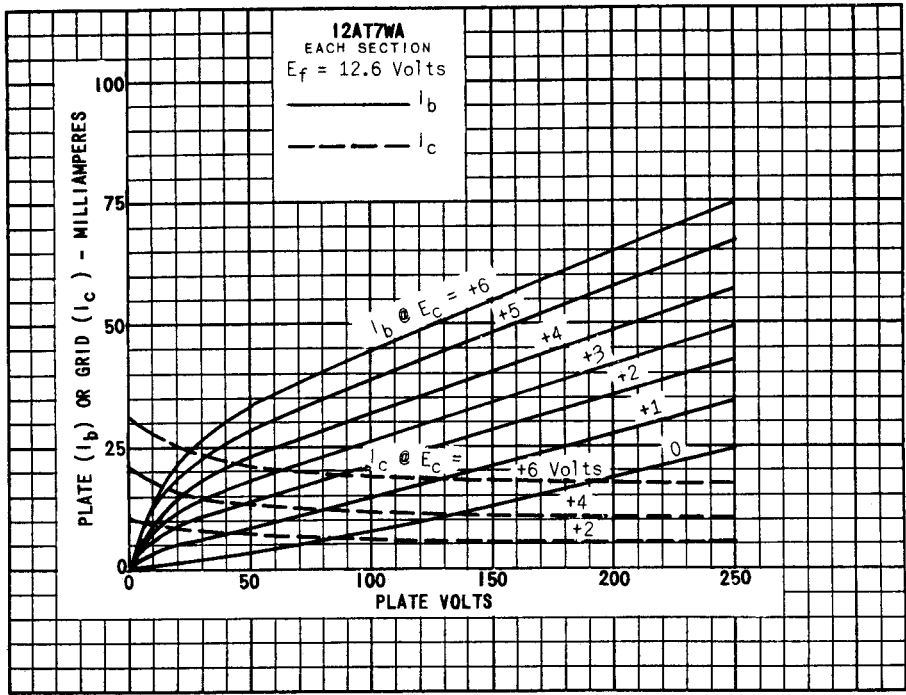
	MIN.	MAX.	
VARIABLE FREQUENCY VIBRATION ^{HA} ($E_c = -3Vdc$, $R_p = 2000$, $R_k = 0$, $C_k = 0$)	---	100	mVac
VIBRATIONAL FATIGUE ^J	---	---	
MINIATURE TUBE BASE STRAIN ^K (NO VOLTAGES)	---	---	
STABILIZATION ^L (INTERMITTENT LIFE TEST CONDITIONS OR EQUIVALENT)	---	---	
SHOCK ^M (HAMMER ANGLE = 42° , $E_{hk} = 100Vdc$, $R_g = 0.1 MEG.$)	---	---	
POST SHOCK AND VIBRATIONAL FATIGUE TEST END POINTS	---	---	
LOW FREQUENCY VIBRATION	---	150	mVac
HEATER CATHODE LEAKAGE	---	30	$\mu A dc$
TRANSCONDUCTANCE (1)	3800	---	$\mu MHOS$
GRID CURRENT	---	-1.5	$\mu A dc$
SHORT AND CONTINUITY	---	---	
RF NOISE ^{NA} ($E_{sig} = 15mVac$, $R_k = 100$, $C_k = 0.2 \mu f$)	---	---	
NOISE AND MICROPHONICS ^P ($E_f = 12.6Vdc$, $E_{bb} = 300Vdc$, $E_{cal} = 100mVac$, $R_p = 10,000$)	---	100	mVac
LOW FREQUENCY VIBRATION ^{QA} ($E_c = -3Vdc$, $R_p = 2000$, $R_k = 0$, $C_k = 0$)	---	100	mVac
INTERMITTENT LIFE TEST ($E_{hk} = 135Vdc$, $R_g = 0.5 MEG.$, $C_k = 0$)	---	---	
HEATER CYCLING LIFE TEST ($E_f = 7.5V$ HEATERS IN PARALLEL, $E_{hk} = 135Vdc$)	2000	---	CYCLES
HEATER CYCLING LIFE TEST END POINT HEATER CATHODE LEAKAGE	---	20	$\mu A dc$

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NOTES

- A TEST WITH UNITS TIED TOGETHER.
- B TEST EACH UNIT SEPARATELY WITH ELEMENTS OF OPPOSITE SECTION GROUNDED.
- C SEE MIL-E-1C 4.8.2
- D THE PLATE CURRENT DIFFERENCE BETWEEN SECTIONS SHALL BE WITHIN THE SPECIFIED LIMIT.
- E PREHEAT ALL TUBES TO BE TESTED FOR TRANSCONDUCTANCE (2) UNDER THE FOLLOWING CONDITIONS FOR A PERIOD OF 5 MINUTES PRIOR TO TESTING. PREHEAT WITH TRIODE SECTIONS OPERATING SEPARATELY. $E_f = 11.0V$, $E_b = 250Vdc$, $R_k = 200$, $R_g = 0.5MEG$.
- F SEE MIL-E-1C 4.10.11.1
- G PREHEAT ALL TUBES TO BE TESTED FOR GRID EMISSION UNDER THE FOLLOWING CONDITIONS FOR A PERIOD OF 5 MINUTES PRIOR TO TESTING: $E_f = 15.0V$, $E_b = 250Vdc$, $R_g = 0.5MEG$, $R_{i2} = 200$. PREHEAT WITH TRIODE SECTIONS OPERATING SEPARATELY. TWO SECONDS SHALL BE THE MAXIMUM TIME BETWEEN PREHEAT AND TEST.
- H SEE MIL-E-1C 4.9.20.3
- J SEE MIL-E-1C 4.9.20.6
- K SEE MIL-E-1C 4.9.6.1
- L SEE MIL-E-1C 4.6.2
- M SEE MIL-E-1C 4.9.20.5
- N SEE MIL-E-1C 4.10.3.1
- P TEST WITH TWO SECTIONS CONNECTED IN PARALLEL. TIE CATHODE TOGETHER AND GROUND THRU A 200 OHM RESISTOR. GRIDS ARE GROUNDED.
- Q SEE MIL-E-1C 4.9.20.4



12AT7WA
PREMIUM TUBE

