



TECHNICAL
INFORMATION
SERVICE

Technical Information

5814WA

DOUBLE TRIODE

The 5814WA is a heater-cathode type medium-Mu double triode of miniature construction designed for use in general purpose amplifier, oscillator, and multivibrator applications. It employs separate cathode connections and a heater center-tap permitting either series or parallel operation. The 5814WA is similar in characteristics to the type 12AU7 and is intended for use in applications requiring a tube of sturdy, shock resistant design to withstand rugged service conditions.

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test-Note 2)	450 G
Maximum Vibrational Acceleration (96 Hour Fatigue Test-Note 3)	2.5 G
Maximum Bulb Temperature	165 °C

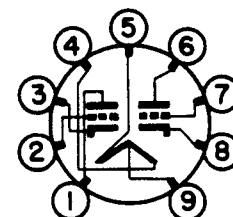
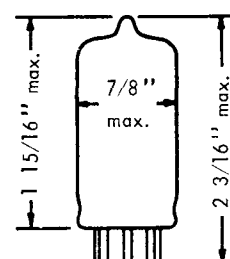
ELECTRICAL DATA

CAUTION - To electronic equipment design engineers: Special attention should be given to the temperatures at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

Ratings and Normal Operation	MIL - E - 1 Symbol	Absolute Minimum	Normal Test Conditions (Note 5)	Normal Operation (Note 4)	Absolute Maximum	MIL - E - 1 Units
Heater Voltages (Note 6)	Ef	Series 11.4 Parallel 5.7	12.6	12.6 6.3	13.8 6.9	V
Plate Voltage	Eb	---	250	100	330	Vdc
Grid Voltage	Ec1	---	-8.5	0	-8.5	Vdc
Plate Dissipation	Pp/p	---	---	1.18	2.62	W
Heater-Cathode Voltage	Ehk	-200	---	---	+200	Vdc
Plate Current (Note 8)	Ib/p	---	---	11.8	10.5	mAac
Grid Circuit Resistance	Rg/g	---	---	1.0	0.25	Meg.

ENVELOPE.....T-6½ Glass
BASE....Miniature Button 9-Pin
MOUNTING POSITION.....Any

PHYSICAL DIMENSIONS



BOTTOM VIEW

TERMINAL CONNECTIONS:

- Pin 1 Plate, Unit #2
- Pin 2 Grid, Unit #2
- Pin 3 Cathode, Unit #2
- Pin 4 Heater
- Pin 5 Heater
- Pin 6 Plate, Unit #1
- Pin 7 Grid, Unit #1
- Pin 8 Cathode, Unit #1
- Pin 9 Heater Center-Tap



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ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

In the following tests, each unit is tested separately.

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL-E-1 UNITS
ACCEPTANCE TEST - GROUP C										
Continuity and Short:		0.4	---	---	---	---	---	---	---	---
ACCEPTANCE TEST - GROUP D Combined AQL = 1.0%										
Heater Current:		0.65	If:	160	---	175	---	190	---	mA
Heater Cathode Leakage:	Ehk=100 Vdc Heater Positive	0.65	Ihk:	---	---	---	---	10	---	μ Adc
	Ehk=100 Vdc Heater Negative		Ihk:	---	---	---	---	10	---	μ Adc
	Units connected in parallel									
Grid Current (1):	Rg=0.5 Meg.	0.65	Ic(1):	---	---	---	---	-0.5	---	μ Adc
Plate Current (1):		0.65	Ib(1):	6.5	9.0	10.5	12.0	14.5	3.5	mA
Transconductance (1):		0.65	Sm(1):	1750	2000	2200	2400	2650	450	μ mhos
ACCEPTANCE TESTS - GROUP E										
Insulation of Electrodes:	Ef=12.6 V Eg-all=-100 Vdc Ep-all=-300 Vdc	2.5	Rg-all: Rp-all:	500 500	---	---	---	---	---	Meg. Meg.
Plate Current (2):	Ec=-25 Vdc	2.5	Ib(2):	---	---	---	---	20	---	μ Adc
Plate Current (3):	Ec=-18 Vdc	2.5	Ib(3):	5	---	---	---	---	---	μ Adc
Transconductance (2):	Ef=11.4 V (Note 7)	2.5	Δ Sm(2):	---	---	---	---	15	---	%
Grid Current (2):	After 5 minutes at Ef=14.0 V; measure Grid Current at Ef= 14.0 V; 3 minutes test not permitted	2.5	Ic(2):	---	---	---	---	-1.5	---	μ Adc
RF Noise:	Ec=-9 Vdc; Ecal=7.0 mVac; Units connected in parallel	2.5		---	---	---	---	3.0	---	mW
Noise and Microphonics:	Ef=12.6 Vac; Ebb= 300 Vdc; Ec=0; Rp= 50,000 ohms; Units connected in parallel Rk=1500 ohms	2.5	Ep:	---	---	---	---	50	---	mVac
Plate Current (1): Difference between sections		2.5	Δ Ib(1):	---	---	---	---	3.5	---	mA
ACCEPTANCE TESTS - GROUP F										
Vibration (2):	F=25 cps; G=2.5; Rp= 2000 ohms Units con- nected in parallel	6.5	Ep:	---	---	---	---	100	---	mVac
Transconductance (3):	Eb=100 Vdc; Ec=0	6.5	Sm(3):	2500	2775	3100	3425	3700	750	μ mhos
Amplification Factor:		6.5	Mu:	15.5	16.2	17.0	17.8	18.5	1.8	---
Low Pressure Voltage Breakdown:		6.5	---	500	---	---	---	---	---	Vac



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ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (Cont'd.)

In the following tests, each unit is tested separately.

TEST	CONDITIONS	AQL %	MIL - E - 1 SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL - E - 1 UNITS
ACCEPTANCE TESTS- GROUP A										
Shock:	Hammer angle=30°; Note 2									
Fatigue:	96 hours; Note 3									
Post Shock and Fatigue Test End Points:										
Vibration (2):	F=25 cps; G= 2.5; Rp=2000 ohms; Units connected in parallel		Ep:	---	---	---	---	150	---	mVac
Heater - Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc Units connected in parallel		lhk: lhk:	---	---	---	---	30 30	---	μ Adc μ Adc
Transconductance (3):	Eb=100 Vdc; Ec1=0		Sm(3):	2000	---	---	---	---	---	μ mhos
Grid Current (1):			lc(1):	---	---	---	---	-1.5	---	μ Adc

ACCEPTANCE TESTS- GROUP B

Glass Strain :		2.5	---	---	---	---	---	---	---
TEST	CONDITIONS	AQL %	MIL - E - 1 SYMBOL	MIN.	MAX.	MIL - E - 1 UNITS	Maximum Defects per Characteristics 1 st Sample Combined Samples		

ACCEPTANCE LIFE TEST

Heater Cycling	Ef=7.5 V; Ehk=+135 Vdc; Eb=Ec=0; 1 min. on, 1 min. off	---	---	2000	---	Cycles	---	---
Heater Cycling Life Test End Points:								
Heater - Cathode Leakage:	Heater Positive Heater Negative	---	lhk: lhk:	---	20 20	μ Adc μ Adc	---	---
1 Hour Stability Life Test:	TA=room; Ehk=+135 Vdc; Rg=0.5 Meg.							
1 Hour Stability Life Test End Points:								
Transconductance (1) change of individual tubes from initial:	(Typical sample size= 50 tubes)	1.0	Δ Sm(1):	---	10	%	---	---
100 Hour Survival Rate Life Test:	TA=room; Ehk=+135 Vdc; Rg1=0.5 Meg.							
100 Hour Survival Rate Life Test End Points:								
Inoperatives:	(Typical Sample Size=200 tubes)	0.65	---	---	---	---	---	---



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ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (Cont'd.)

In the following tests, each unit is tested separately.

TEST	CONDITIONS	AQL %	MIL - E - 1 SYMBOL	MIN.	MAX.	MIL - E - 1	Maximum Defects per Characteristics 1st Sample	Combined Samples
500 and 1000 Hour Intermittent High Temperature Life Test:	T Bulb=165 °C; Ehk= +135 Vdc; Rg1=0.5 Meg.							
500 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Sizes= 20 tubes 1st sample, 40 tubes 2nd sample, Total allowable combined defects=4 tubes 1st sample, 8 tubes 1st and 2nd samples)							
Inoperatives:		---	---	---	---	---	1	3
Heater Current:		---	If:	160	190	mA	1	3
Heater - Cathode Leakage:		---	Ihk:	---	10	μAdc	1	3
Grid Current (1):		---	Ic(1):	0	-0.5	μAdc	1	3
Transconductance (1)		---	Sm(1):	1600	2650	μmhos	1	3
Transconductance (1) Average change (Note 9)		---	Avg. ΔtSm(1):	---	15	%	---	---
Electrode Insulation: (g-all) (p-all)		---	Rg-all: Rp-all:	50 50	---	Meg. Meg.	2	5
Transconductance (2) (Note 7)		---	ΔEfSm(2):	---	15	%	2	5
1000 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size= 20 tubes 1st sample, 40 tubes 2nd sample)							
Inoperatives:		---	---	---	---	---	2	5
Heater Current:		---	If:	160	190	mA	2	5
Heater - Cathode Leakage:		---	Ihk:	---	10	μAdc	2	5
Grid Current (1):		---	Ic(1):	0	-0.5	μAdc	2	5
Transconductance (1):		---	Sm(1):	1500	2650	μmhos	2	5

NOTES:

Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL - E - 1 and MIL - STD - 105A.

Note 2: Test Conditions and Acceptance Criteria per Shock Test procedures of MIL - E - 1 basic specifications.

Note 3: Test Conditions and Acceptance Criteria per Fatigue Test procedures of MIL - E - 1 basic specifications.

Note 4: These normal values represent conditions at which control of reliability may be expected.

Note 5: These normal test conditions are used for all characteristics unless otherwise stated under the individual test item.

Note 6: For most applications the performance will not be adversely affected by ±10% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

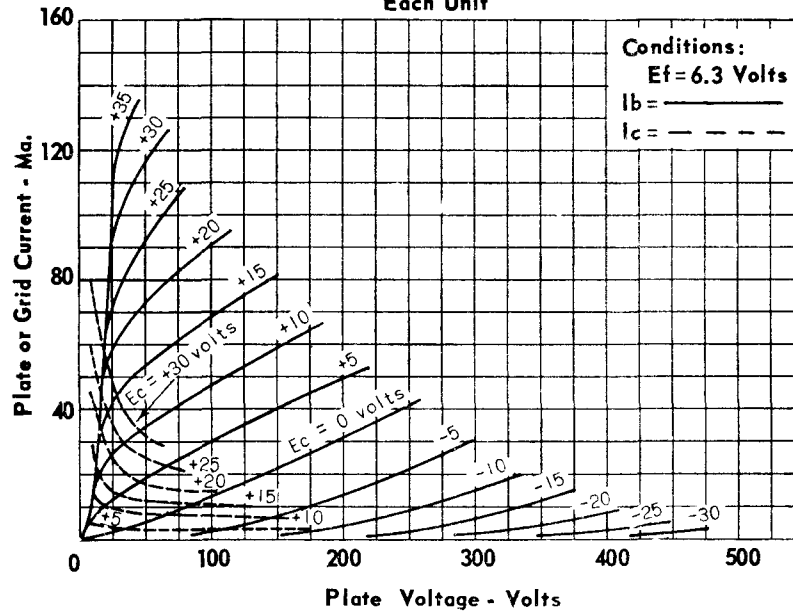
Note 7: Change of transconductance for individual tubes from that value measured at Ef=12.6 V to that value measured at Ef=11.4 V.

Note 8: Difficulty may be encountered if this tube is operated for long periods of time with very small values of cathode current.

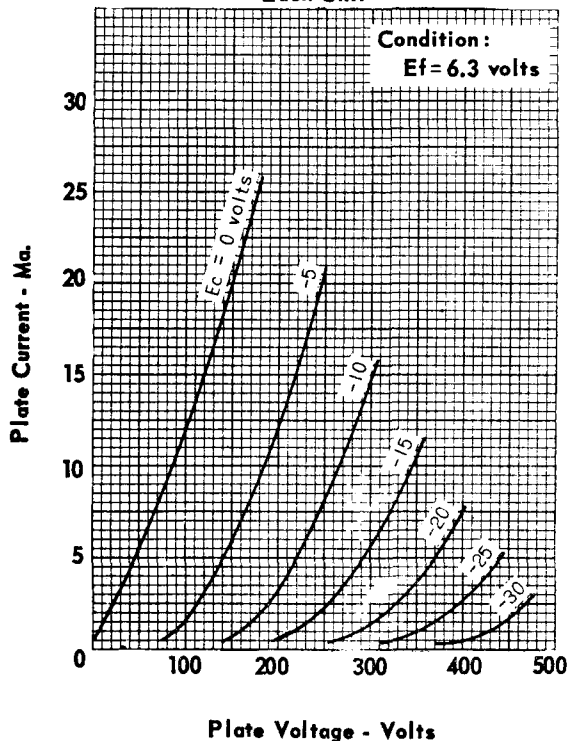
Note 9: The average percentage change shall be ascertained from the determination of the individual changes for each tube (Inoperatives excluded) from the zero hour value for the referenced characteristic.

DOUBLE TRIODE

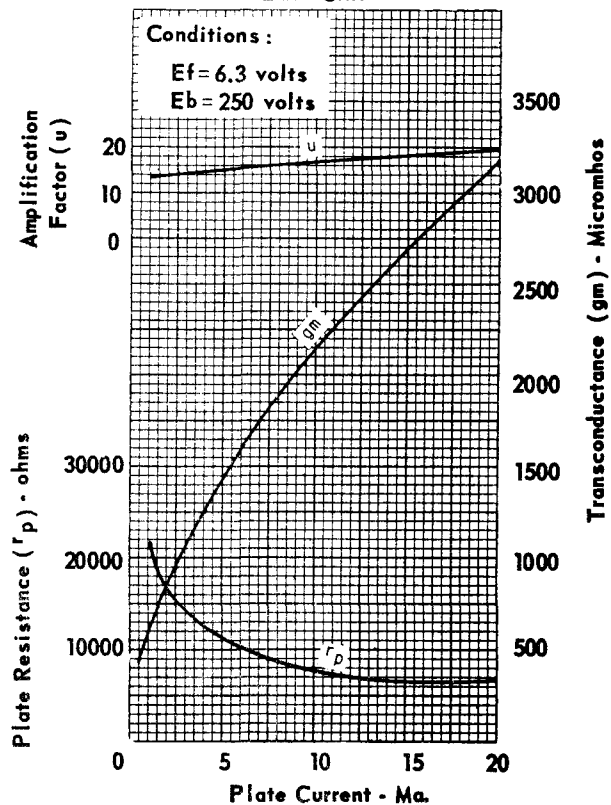
AVERAGE PLATE CHARACTERISTICS
Each Unit



AVERAGE PLATE CHARACTERISTICS
Each Unit



AVERAGE CHARACTERISTICS
Each Unit





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DOUBLE TRIODE

RESISTANCE - COUPLED AMPLIFIER CHART
(One Triode Unit)

		Ebb = 90 Volts			Ebb = 180 Volts			Ebb = 300 Volts		
R _L	R _g *	R _k	E _o	Gain +	R _k	E _o	Gain +	R _k	E _o	Gain +
.047	.047	1600	9	10 a	920	20	11	870	38	12
	0.1	1800	11	11 b	1200	26	12	1200	52	12
0.1	0.1	3000	10	11 b	2000	24	12	1900	44	12
	0.22	3800	15	11	2800	33	12	3000	68	12
0.22	0.22	6800	14	11	5300	31	12	5300	57	12
	0.47	9500	20	11	8300	44	12	8800	82	12

E_o = Voltage across R_g at the grid-current point.
* = Megohms
+ = At 5 volts (RMS) output unless index letter indicates otherwise.
a. At 3 volts (RMS) output.
b. At 4 volts (RMS) output.

Value of C selected for desired frequency response. R_k should be adequately by-passed.

AVERAGE CHARACTERISTICS
(Each Section)

