



Excellence in Electronics

**TYPE
6AH6WA**

The 6AH6WA is a heater-cathode type, high transconductance, sharp cut-off pentode of miniature construction designed for use as a wide band or HF amplifier. It will maintain its emission and freedom from excessive cathode interface resistance even after long periods of operation under cut-off conditions. It is designed for dependable operation under conditions of shock and vibration usually found in mobil and aircraft application. The heater-cathode construction is designed to withstand many thousands of cycles of intermittent operation.

MECHANICAL DATA

ENVELOPE: T-5 1/2 Glass

BASE: Miniature Button 7-Pin

TERMINAL CONNECTIONS:

- | | |
|---------------|---------------|
| Pin 1 Grid #1 | Pin 5 Plate |
| Pin 2 Grid #3 | Pin 6 Grid #2 |
| Pin 3 Heater | Pin 7 Cathode |
| Pin 4 Heater | |

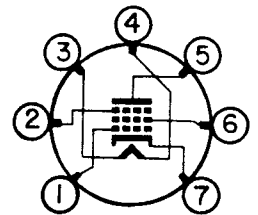
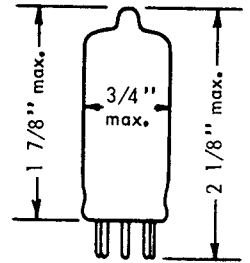
MECHANICAL RATINGS:

- | | |
|--|--------|
| Maximum Impact Acceleration (Shock Test - Note 3) | 450 G |
| Maximum Vibrational Acceleration (96 Hour Fatigue Test - Note 4) | 2.5 G |
| Maximum Bulb Temperature | 180 °C |

MOUNTING POSITION: Any

ELECTRICAL DATA

CAUTION-----To Electronic Equipment Design Engineers. Special attention should be given to the temperature 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 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.



BOTTOM VIEW

7BK

RATINGS AND NORMAL OPERATION:	MIL-E-1 SYMBOL	DESIGN MINIMUM	NORMAL TEST CONDITIONS (Note 6)	NORMAL OPERATION (Note 5)	DESIGN MAXIMUM	MIL-E-1 UNITS
Heater Voltage (Note 7)	Ef:	5.7	6.3	6.3	6.9	V
Plate Voltage	Eb:	----	300	300	330	Vdc
Grid #1 Voltage	Ec1:	----	0	0	----	Vdc
Grid #2 Voltage	Ec2:	----	150	150	165	Vdc
Grid #3 Voltage	Ec3:	----	0	0	----	Vdc
Plate Dissipation	Pp:	----	----	3.0	3.3	W
Grid #2 Dissipation	Pg2:	----	----	0.38	0.45	W
Heater-Cathode Voltage	Ehk:	-200	----	100	+200	v
Cathode Current	Ik:	----	----	12.5	28	mAdc
Cathode Resistance	Rk:	----	160	160	----	ohms
Plate Current (1)	Ib(1):	----	----	10	----	mAdc
Grid #2 Current	Ic2:	----	----	2.5	----	mAdc
Transconductance (1)	Sm(1):	----	----	9000	----	μmhos
Plate Resistance	rp:	----	----	0.5	----	Meg.

Tentative Data

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RECEIVING TUBE AND SEMICONDUCTOR OPERATIONS



RELIABLE PENTODE

ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOGIE	UAL	MAX	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS PART 1		Combined AQL = 1.0% excluding Mechanical and Inoperatives								
Heater Current:		0.65	lf:	420	432	450	468	480	36	mA
Heater - Cathode Leakage:	Ehk = +100 Vdc Ehk = -100 Vdc	0.65	lhk: lhk:	....	....	....	....	15	....	μ Adc μ Adc
Grid Current:	Rg1 = 1.0 Meg.	0.65	lc (1):	....	....	....	....	-2.0	....	μ Adc
Plate Current (1):		0.65	lb (1):	7.5	8.7	10.0	11.3	12.5	2.5	mA
Plate Current (2):	Ec1 = 10.0 Vdc	0.65	lb (2):	....	....	....	....	30	....	μ Adc
Transconductance (1):		0.65	Sm (1):	7000	8000	9000	10000	11000	2000	μ mhos
Screen Grid Current:		0.65	lc2:	1.5	1.9	2.5	3.1	3.5	1.4	mA
Continuity and Shorts (Inoperatives):		0.4	....	....	....	....	....	....	....	....
Mechanical:	Envelope T-5 1/2 (6-2)	....	....	....	....	....	....	....	....	....
MEASUREMENTS ACCEPTANCE TESTS PART 2										
Insulation of Electrodes:	Ef = 6.3 V Eg1 - all = -100 Vdc Ep - all = -300 Vdc	2.5	Rg1 - all: Rp - all:	100	....	....	....	....	....	Meg. Meg.
Plate Current (3):	Ec1 = -5.0 Vdc	2.5	lb (3):	5	....	....	....	....	....	μ Adc
Transconductance (2):	Ef = 5.7 V (Note 8)	2.5	$\Delta_{Ef} Sm (2)$:	....	....	....	....	15	....	%
Grid Emission:	Ef = 7.5 V; preheat 5 minutes at Ec1 = 0 Vdc; Test at Ec1 = -10 Vdc	2.5	lc1 (2):	....	....	....	....	-2.0	....	μ Adc
RF Noise:	Esig = 35 mVac; Ck = 0.2 μ f	2.5	EB:	....	....	....	....	5	....	VU
Noise and Microphonics:	Ef = 6.3 Vdc; Ebb = Ecc2 = 300 Vdc; Ec1 = 0; Rk = 200 ohms; Ec3 to ground; Rp = 10,000 ohms; Rg2 = 60,000 ohms; Cg2 = 2 μ f; Ck = 1000 μ f; Ecal = 300 mVac	2.5	EB:	....	....	....	....	17	....	VU
Capacitance:			Cgp:	....	....	....	....	0.035	....	μ f
Capacitance:	Note 2	6.5	Cin:	8.0	....	10	....	12	....	μ f
Capacitance:			Cout:	3.0	....	4.5	....	6	....	μ f
Low Pressure Voltage Breakdown:	Pressure = 55 \pm 5 mmHg; Voltage = 500 Vac	6.5	....	....	....	....	....	....	....	....
Vibration (2):	F = 25 cps; G = 2.5; Rp = 2000 ohms; Ck = 1000 μ f	2.5	Ep:	....	....	....	....	100	....	mVac
DEGRADATION RATE ACCEPTANCE TESTS										
Shock:	Hammer Angle = 30°; Ehk = +100 Vdc; (Note 3)	20	....	....	....	....	....	....	....	....
Fatigue:	96 Hours; G = 2.5 Fixed Frequency; F = 25 min., 60 max. (Note 4)	6.5	....	....	....	....	....	....	....	....
Post Shock and Fatigue Test End Points:										
Vibration (2):	F = 25 cps; G = 2.5; Rp = 2000 ohms; Ck = 1000 μ f	....	Ep:	....	....	....	....	200	....	mVac
Heater - Cathode Leakage:	Ehk = +100 Vdc Ehk = -100 Vdc	....	lhk: lhk:	....	....	....	....	30	....	μ Adc μ Adc
Change in Transconductance (1) of individual tubes:		....	$\Delta_{\dagger} Sm (1)$:	....	....	....	....	20	....	%



RELIABLE PENTODE

ELECTRICAL DATA (Cont' d.)

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

TEST	CONDITIONS	AQL %	MIL - E - 1 SYMBOL	MIN	MAX	MIL - E - 1 UNITS	Allowable Defects per Characteristic	1st Sample	Combined Samples
DEGRADATION RATE ACCEPTANCE TESTS (cont' d.)									
Grid Current (1):		----	Ic1:	----	-4.0	μ Adc			
Miniature Tube Base Strain:		----	----	----	----	----			
Glass Strain (Thermal Shock)		2.5	----	----	----	----			
ACCEPTANCE LIFE TESTS									
Heater Cycling Life Test:	Ef=7.5V; Eb=Ec1=Ec2=Ec3=0V; Ehk=+100 Vdc; 1 min. on, 4 min. off.	1.0	----	----	----	----			
Heater Cycling Life Test End Points:									
Heater -Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc	----	lhk:	----	30	μ Adc			
1 Hour Stability Life Test:	TA=Room; Ehk=+135 Vdc; Rg1=0.1 meg. min.	----	----	----	----	----			
1 Hour Stability Life Test End Points:									
Change in Transconductance (1) of individual tubes:	(Typical Sample Size=50 tubes)	1.0	Δ_{\uparrow} Sm (1):	----	10	%			
100 Hour Survival Rate Life Test:	TA=Room; Ehk=+135 Vdc; Rg1=0.1 Meg. Min.	----	----	----	----	----			
100 Hour Survival Rate Life Test End Points:	(Typical Sample Size=200 tubes)	----	----	----	----	----			
Continuity and Shorts (Inoperatives):		0.65	----	----	----	----			
Transconductance (1):		1.0	Sm (1):	6300	----	μ mhos			
Intermittent High Temperature Life Test:	T Bulb=+180°C; Ehk=+135 Vdc; Rg1=0.1 Meg. Min.	----	----	----	----	----			
500 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size=20 tubes 1st sample; 40 tubes 2nd sample).								
Inoperatives:		----	----	----	----	----	1		3
Grid Current (1):		----	Ic (1):	0	-2.0	μ Adc	1		3
Heater Current:		----	If:	410	490	mA	1		3
Change in Transconductance (1) of individual tubes:		----	Δ_{\uparrow} Sm (1):	----	20	%	1		3
Transconductance (2):	(Note 8)	----	Δ_{\uparrow} Sm (2):	----	15	%	2		5
Heater -Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc	----	lhk:	----	20	μ Adc	1		3
Electrode Insulation:									
g1-all		----	Rg1-all:	50	----	Meg.			
p-all		----	Rp-all:	50	----	Meg.	2		5
Transconductance (1) average change:		----	Avg. Δ_{\uparrow} Sm (1):	----	15	%	---		---
Total Defectives		----	----	----	----	----	4		8



RELIABLE PENTODE

ELECTRICAL DATA (Cont'd.)

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

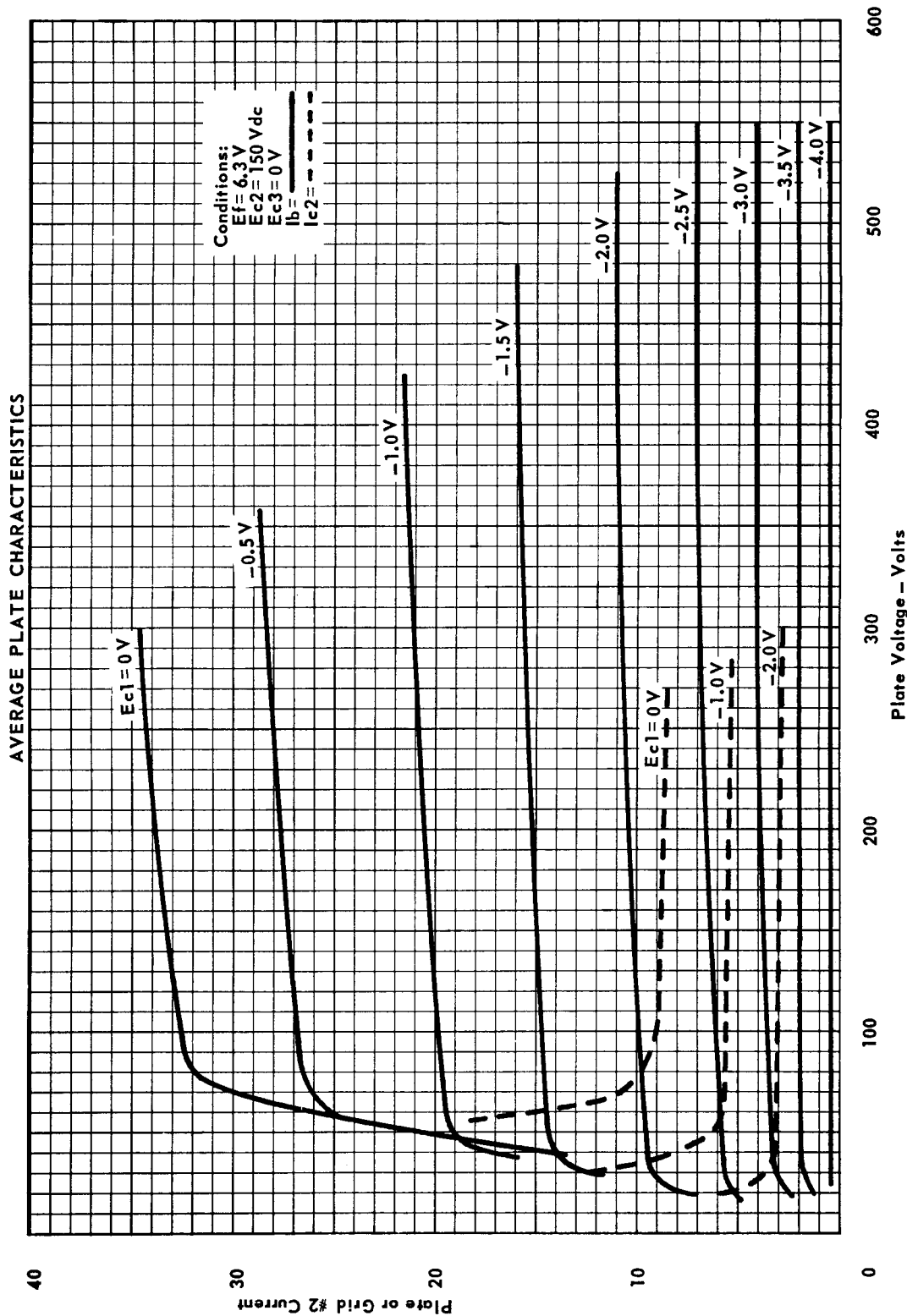
TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defects per Characteristic	
							1st Sample	Combined Samples
ACCEPTANCE LIFE TESTS (cont'd.)								
1000 Hour Intermittent Life Test End Points:	(Typical Sample Sizes= 20 tubes 1st sample; 40 tubes 2nd sample).	----	----	----	----	----	---	---
Inoperatives:		----	----	----	----	----	2	5
Grid Current (1):		----	lc1 (1):	0	-2.0	μA_{dc}	2	5
Heater Current:		----	If:	410	490	mA	2	5
Change in transconductance (1) of individual tubes:		----	$\Delta_t S_m (1)$:	----	20	%	2	5
Heater-Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc	----	lhk:	----	20	μA_{dc}	2	5
Total Defectives:		----	----	----	----	----	5	10
500 Hour Cathode Interface Resistance Life Test:	TA=Room; Ef= 7.5 Vac; Ehk= 0; g1, g2, g3 and P Floating	----	----	----	----	----	---	---
500 Hour Cathode Interface Resistance Life Test End Points:	(Typical Sample Size= 20 tubes 1st sample, 40 tubes 2nd sample)	----	----	----	----	----	---	---
Interface Resistance:		----	ri:	----	25	ohms	1	3

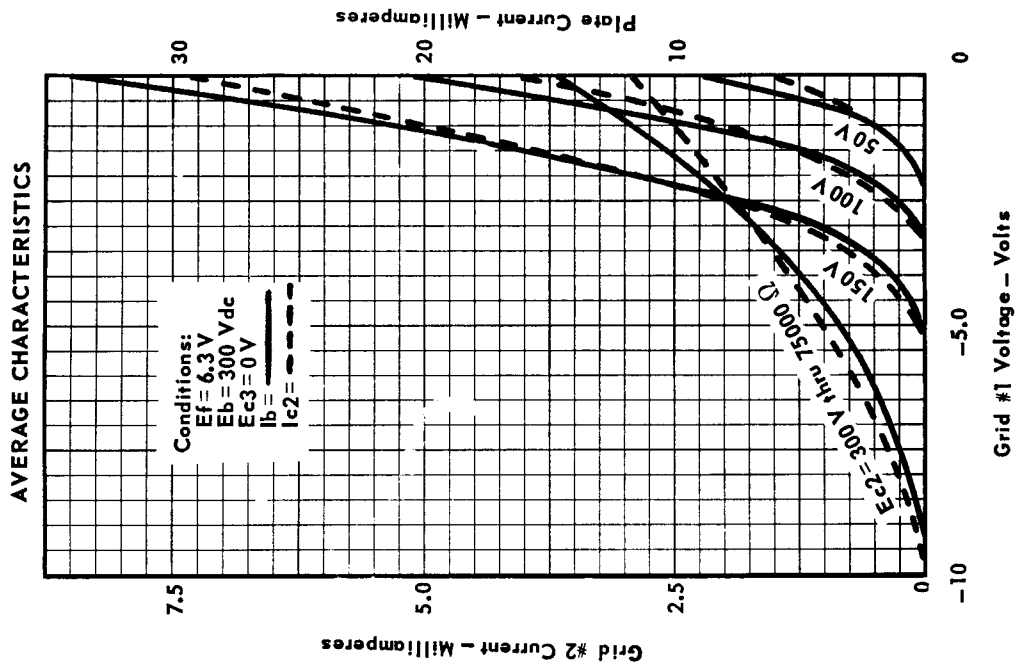
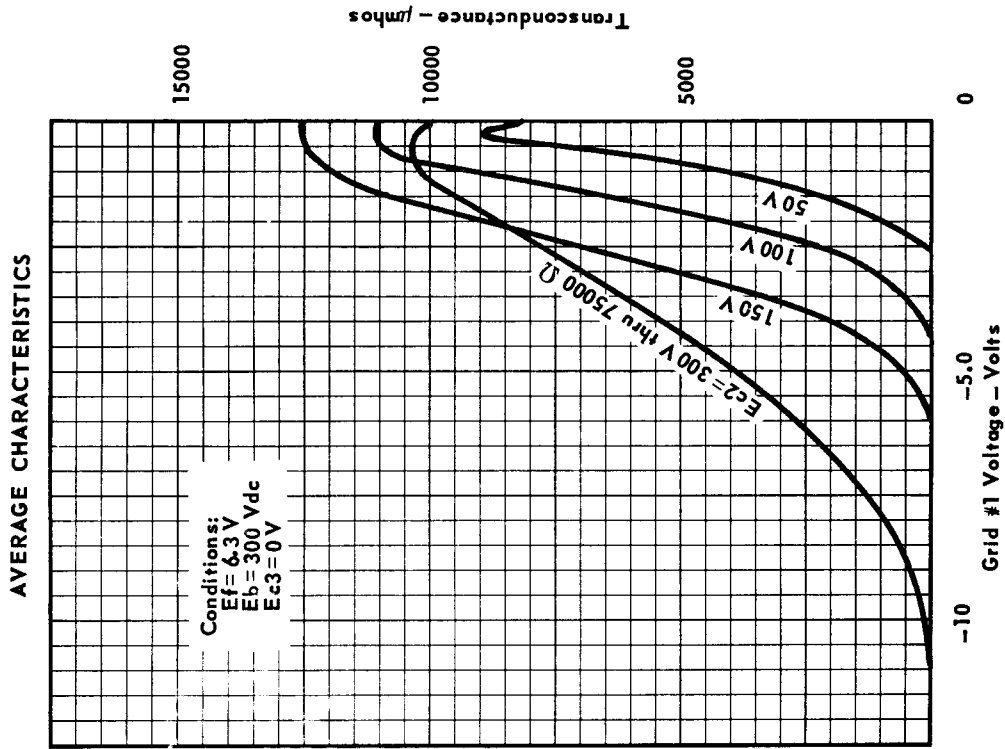
NOTES

- Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL-E-1, "Inspection Instructions for Electron Tubes" and MIL-STD-105A.
- Note 2: With cylindrical shield no. 316 connected to cathode lead.
- Note 3: Test Conditions and Acceptance Criteria per Shock Test Procedures of MIL-E-1 basic specifications.
- Note 4: Test Conditions and Acceptance Criteria per Fatigue Test Procedure of MIL-E-1 basic specifications.
- Note 5: These normal values represent conditions at which control of reliability may be expected.
- Note 6: These normal test conditions are used for all characteristic tests unless otherwise stated under individual test items.
- Note 7: For most applications the performance will not be adversely affected by $\pm 10\%$ heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.
- Note 8: Change of transconductance for individual tubes from that value measured at Ef= 6.3 V to that value measured at Ef= 5.7V.



RELIABLE PENTODE





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RECEIVING AND CATHODE RAY TUBE OPERATIONS