MIL-E-1/1491D
8 November 1978
SUPERSEDING
MIL-E-1/1491C
7 March 1969
(See note 14)

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING

TYPE 8058

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The complete requirements for procuring the electron tube described herein shall consist of this document and the latest issue of Specification MIL-E-1.

DESCRIPTION: Triode, miniature, high-Mu, metal shell

Outline	}	See figure 1
Base	}	
Envelope	}	
Cathode	---	Coated unipotential

Base connections:

Pin No.	---	2	4	7	8	10	12	Cap	Shell
Element	---	k	k	int con	k	h	h	a	g

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Ef	Eb	Ec	Ehk	Rk	Rg	Ik	Pp	TE	Alt
Unit:	V	Vdc	Vdc	v	Ohms	Meg	mAdc	W	°C	ft
Maximum:	6.9	150	0,-55	100	---	(see note 1)	15	1.5	150	100,000
Minimum:	5.7	---	---	---	---	---	---	---	---	---
TEST CONDITIONS:	6.3	110	0	---	47	---	---	---	---	---

GENERAL:

Qualifications - Required

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS			UNIT
						MIN	BOGEY	MAX	
	Qualification								
1002	Barometric pressure, reduced	Pressure = 8.0 ±0.5 mm Hg; voltage=250 Vac	6.5	Code E	---	---	---	---	---
1041	Shock (1)	No voltages; condition A (see note 2)	---	---	---	---	---	---	---
---	Post-shock (1): end points:								
1306	Transconductance (1)		---	---	ΔSm	---	---	10	%
1266	Total grid current		---	---	Ic	---	---	-0.3	μAdc
1336	Heater-cathode leakage		---	---	Ihk	---	---	5	μAdc
1031	Sweep-frequency vibration (1)		---	---	Ep	---	---	See note 3	---
	Quality conformance inspection, part 1								
1301	Heater current		---	---	If	---	135	---	mA
1301	Heater current		0.4	II	If	125	---	145	mA
1336	Heater-cathode leakage		0.4	II	Ihk	---	---	3	μAdc
1266	Total grid current	Eb = 150 Vdc; Ec = -1.3 Vdc; Rk = 0; Rg = 0.5 Meg (see note 4)	0.4	II	Ic	0	---	-0.1	μAdc
1256	Electrode current (1) (anode)		---	---	Ib	---	9.5	---	mAdc
1256	Electrode current (1) (anode)		0.4	II	Ib	7	---	12	mAdc
1256	Electrode current (2) (anode)	Ec = -5.0 Vdc; Rk = 0	0.4	II	Ib	---	---	50	μAdc
1306	Transconductance (1)		---	---	Sm	---	12,700	---	μmhos
1306	Transconductance (1)		0.4	II	Sm	10,200	---	15,200	μmhos
1201	Short and discontinuity detection	See note 5	0.4	II	---	---	---	---	---
	Quality conformance inspection, part 2								
1211	Insulation of electrodes	g to all a to all	2.5	I	R R	5,000 10,000	---	---	Meg Meg
1306	Transconductance (2)	Ef = 5.7 V	1.0	I	Sm	8,700	---	---	μmhos
1316	Amplification factor		6.5	Code E	Mu	60	---	100	---
1306	Transconductance (3)	Ef = 5.7 V	4.0	Code F	ΔSm Ef	---	---	20	%

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS MIN	LIMITS BOGEY	LIMITS MAX	UNIT
	Quality conformance inspection, part 2 -Continued								
1331	Direct-interelectrode capacitance	No shields (see note 6)	6.5	Code E	Cp-k	0.02	---	0.04	pF
					Cin	5.0	---	7.0	pF
					Cout	1.1	---	1.5	pF
					Chk	1.1	---	1.7	pF
1031	Sweep-frequency vibration (1)	Rp = 2,000 ohms; 1G (see note 7)	6.5	Code E	Ep	---	---	See note 8	---
1031	Sweep-frequency vibration (2)	Rp = 2,000 ohms; 1G (see note 9); F=0.05 to 3 kHz	6.5	Code E (see note 10)	Ep	---	---	35	mv (rms)
1041	Shock (2)	1,000 G; Eb = 150 Vdc; Ec = -1.5 Vdc; Rk=0; Ehk = +100 Vdc (see note 2)	---	---	---	---	---	---	---
---	Post-shock (2) end points:								
1306	Transconductance (1)		---	---	ΔSm	---	---	10	%
1266	Total grid current		---	---	Ic	---	---	-0.3	μAdc
1336	Heater-cathode leakage		---	---	Ihk	---	---	5	μAdc
1031	Sweep-frequency vibration (1)		---	---	Ep	---	---	See note 3	---
---	Radio frequency noise figure	F = 700 MHz (see note 13)	2.5	I	NF	---	---	10.5	dB

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSP LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC 1ST SAMPLE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC COMBINED SAMPLES	SYMBOL	LIMITS MIN	LIMITS MAX	UNIT
	Quality conformance inspection, part 3 (see note 11)									
1506	Heater-cycling life	Ef = 8.5 V; Ehk = -100 Vdc; Eb = 0; Rk=0; 1 min "on", 2 min "off"	---	---	---	---	---	---	---	---
---	Heater-cycling life test end point:									
1336	Heater-cathode leakage		---	---	---	---	Ihk	---	10	μAdc
1516	Stability life	Eb = 150 Vdc; Rg = 0.5 Meg; Ehk = +100 Vdc; Rk = 100 ohms; TA = room	---	---	---	---	---	---	---	---
---	Stability life-test end point:									
1306	Change in transconductance (1) of individual tubes		---	---	---	---	ΔSmt	---	15	%
1501	Intermittent life	Stability life-test conditions; TE = +150°C (min) (see note 12)	---	---	---	---	---	---	---	---

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSP LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC		SYMBOL	LIMITS		UNIT
					1ST SAMPLE	COMBINED SAMPLES		MIN	MAX	
---	Quality conformance inspection, part 3 -Continued									
	Intermittent life-test end points (500 hours):									
---	Inoperatives		---	---	1	3	---	---	---	---
1266	Total grid current		---	---	1	3	Ic1	---	-0.2	µAdc
1301	Heater current		---	---	1	3	If	125	147	mA
---	RF noise figure		---	---	1	3	NF	---	11.5	dB
1336	Heater-cathode leakage		---	---	1	3	Ihk	---	5	µAdc
1211	Insulation of electrodes		---	---	1	3	R	1,000	---	Meg
1306	Transconductance (1), average change		---	---	---	---	Avg ΔSmt	---	15	%
---	Total defectives		---	---	2	4	---	---	---	---
---	Intermittent life-test end points (1,000 hours):									
---	Inoperatives		---	---	1	3	---	---	---	---
1266	Total grid current		---	---	1	3	Ic1	---	-0.3	µAdc
1301	Heater current		---	---	1	3	If	125	149	mA
---	RF noise figure		---	---	1	3	NF	---	11.5	dB
1336	Heater-cathode leakage		---	---	1	3	Ihk	---	5	µAdc
1211	Insulation of electrodes		---	---	1	3	R	1,000	---	Meg
1306	Transconductance (1), average change		---	---	---	---	Avg ΔSmt	---	20	%
---	Total defectives		---	---	2	4	---	---	---	---

NOTES:

1. Maximum grid-circuit resistance for operation at metal-shell temperatures up to 150° C.

   For fixed-bias operation: 0.5 Meg
   For cathode-bias operation: 1.0 Meg

2. A grid resistor of 0.5 megohm shall be added; however, this resistor shall not be used when a thyratron-type short indicator is employed. For holding fixtures, see Drawing 184-JAN.

3. For post-shock tests, tubes shall be considered failures if they have an output exceeding:

   100 mv peak: 3 to 6 kHz
   1,000 mv peak: 6 to 15 kHz

4. This test to be performed at the conclusion of the holding period.

5. Test in accordance with method 1201, except that the tube shall be tapped three times in each of two planes 90° to 120° apart, using a hand tapped consisting of a Bakelite rod 1/8-inch (.125mm) in diameter and 7-inches (177.8mm) in length with a rubber tip 1-inch (25.4mm) long. The rubber tip consists of gum tubing 1/8-inch (.125mm) ID and 3/32-inch (.0938mm) wall thickness with an average Durometer rating of 35 ±5 Shore A, or equivalent.

6. Cin and Cout are read under the grounded-grid method.

7. Tubes under test for sweep-frequency vibration (1), shall be vibrated in the plane perpendicular to the tube axis (3 planes) through a frequency range of 3,000 to 15,000 Hz. Sweep time shall be approximately 7.5 seconds, and the rate of change of frequency shall be approximately linear. Each tube shall be rotated to find the direction of vibration of the 3 planes which gives highest output reading. For holding fixtures, see Drawing 184-JAN.

8. Tubes shall be rejected for sweep-frequency vibration (1), if they have an output exceeding the following limits:

80 mv peak: 3 to 6 kHz
700 mv peak: 6 to 15 kHz

9. Tubes under test for sweep-frequency vibration (2), shall be vibrated in the X plane through a frequency range of 50 to 3,000 Hz. Sweep time shall be 30 seconds per octave.

10. This test shall be conducted on the initial lot and thereafter on a lot approximately every 6 months. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes. When one lot has passed, the 6-month rule shall apply. MIL-STD-105, sample size code letter E, shall apply.

11. A lot resubmitted after failure to meet the requirements of any life test shall be subjected to all quality conformance inspection tests except, visual and mechanical, capacitance, sweep-frequency vibration (1), sweep-frequency vibration (2), barometric pressure (reduced), and shock.

12. Envelope temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (method 1226), or with thermocouple elements welded to shell, will be satisfied if a tube having bogey Ib (±5 percent) under normal test conditions, is determined to operate at or above minimum specified temperature at any position in the life-test rack.

13. a. Definitions: The noise figure of a system is the quotient of (1) the noise power output per unit bandwidth at the output of the system divided by (2) that portion of the noise power output per unit bandwidth engendered by the input termination, when the input termination is a passive system at a standard temperature (290° K).

The noise figure F1 of an amplifier constituting the first stage of a system can be found by using equation (1):

$$F1 = F - (F2-1)/G1 \quad (1)$$

where: F is the noise figure of the complete system.

F2 is the noise figure of the system with the first stage removed, when the input termination is a passive element having the same impedance as the output impedance of the removed first stage.

G1 is the available gain of the first stage.

a. Calibration: Refer to block diagram, figure 2. The standard signal generator and power output meter are connected and the test amplifier and second stage amplifier are tuned for maximum output. The gain of the test amplifier is determined from readings of input and output obtained with the test amplifier connected and removed. The noise figure of the system starting with the second stage is measured by connecting the output of the IF amplifier to the noise-figure meter and the input of the second stage to the noise source. The noise figures and the gain for equation (1) must be given as power ratios, not as decibels.

The conditions for equation (1) will be exactly satisfied if the output impedance of the first stage is the same as the output impedance of the noise source and the input impedance of the second stage is matched to this value. No test is made to insure that these conditions are realized, because it is found that when the gain of the first stage is reasonable high the correction term of equation (1) is small. Therefore, the gain of the first-stage amplifier and the noise figure of the second stage, as measured with the described procedure, are used as F2 and G1 in equation (1) to obtain the correction term (F2-1)/G1.

14. Revision letters are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army - ER
Navy - EC
Air Force - 85

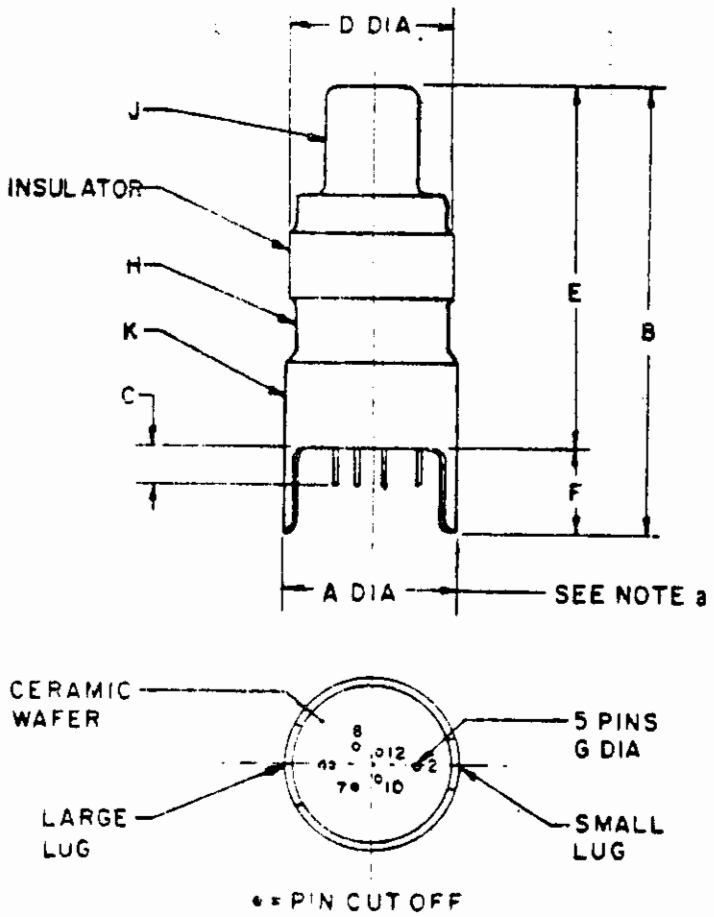
Review activities:
Army - AR
Navy -
Air Force - 99
DLA - ES

User activities:
Navy - AS, OS, MC, CG
Air Force - 11

Preparing activity:
Navy - EC

Agent: DLA - ES

(Project 5960-3182)



Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Quality conformance inspection, part 1		
A		.435 (11.05)
B		.985 (25.02)
Quality conformance inspection, part 3 (periodic check)		
C	.100 (2.54)	.130 (3.30)
D		.420 (10.67)
E	.735 (18.67)	.780 (19.81)
F	.175 (4.45)	.210 (5.33)
G	.015 (.38)	.017 (.43)
H	Envelope: MT-4	
J	Cap: C1-44	
K	Base: E5-79	

NOTE:
a. Maximum OD of A is permitted along the F lug length.

FIGURE 1. Outline drawing of electron tube type 8058.

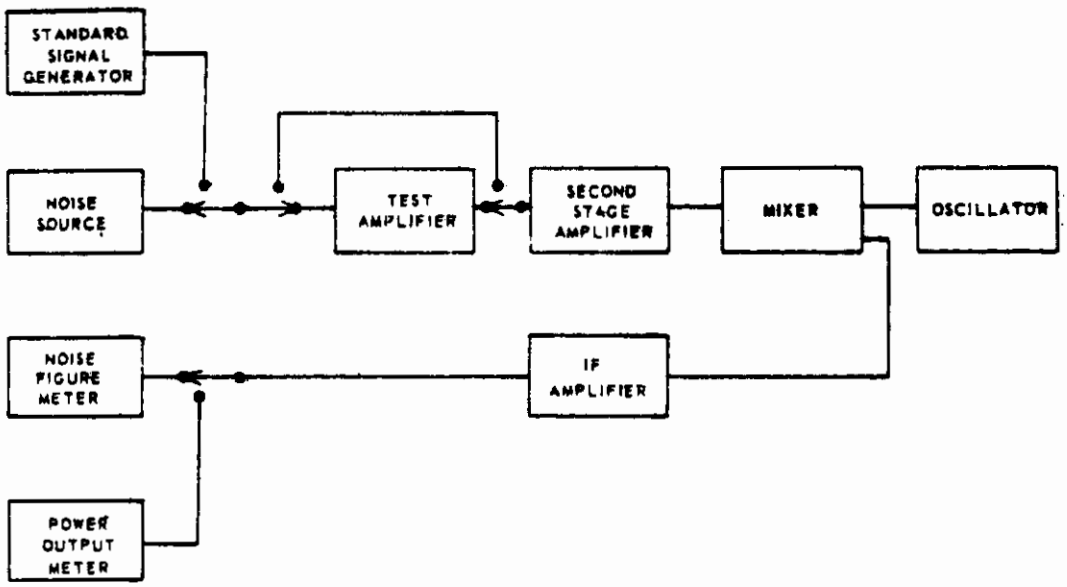


FIGURE 2. Block diagram.