

Specification MOA/CV5235 Issue 1 reprint A, dated 5.5.61 To be read in conjunction with K1006 and with MIL-E-1/937E dated 22nd October, 1957.	<u>Security</u>	
	<u>Specification</u> Unclassified	<u>Valve</u> Unclassified

→ indicates a change

<u>TYPE OF VALVE</u> : Pulse Magnetron integral magnet fixed frequency <u>PROTOTYPE</u> : 2J56 with additional rugged features.	<u>MARKING</u> See K1001/4. Additional Markings :- Serial No:
<u>RATING</u> : As on Page 1 of MIL-E-1/937E	<u>CONNECTIONS AND DIMENSIONS</u> As MIL-E-1/937E
<u>TESTS</u> : As in MIL-E-1/937E with additional requirements as in notes BB - EE.	<u>JOINT SERVICES CATALOGUE NO.</u> 5960 - 99 - 037 - 2085

NOTES

- A.A. Copies of the ancilliary documents called for, can be obtained from :-
The Secretary, TL5 (b), The Ministry of Aviation, Castlewood House,
77/91, New Oxford Street, London.W.C.1.
- B.B. Page 1. Insert below 4.9.19.2.
 (a)**Vibration: 50 c/s at 10g (min) for one minute (min). Valve
must repass all 100% tests.
 (b)**Vibration with pulse voltages : conditions as for Osc 1, limits
as for Osc 1 tests, microphony $\Delta F = 1.0$ Mc/s total excursion
(max). Vibrations between 10 and 150 c/s at 0.4g (min) shall be
applied at a rate not exceeding one octave per minute. The
vibration shall be applied along the axis of the cathode stem,
and in two other mutually perpendicular directions at right
angles to the cathode stem.
- C.C. Page 1. Insert below ** Shock Test :- ** Impulse Acceleration : No pulse
voltages : Acceleration 25g (min) for 4.0 milliseconds. Valve must
repass all 100% tests.
- D.D. Page 2. Add at Stability :- $i_b = 12.5$ A (min)
- E.E. Page 2. $\nearrow$ Spectrum Measurements (for Oscillation 1 only),
delete $i_b = 11$ to 13 mAdc, and replace with $i_b = 8.5$ to 12.5 A.

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MIL-E-1/937E
22 October 1957
SUPERSEDING
MIL-E-1/937D
17 April 1957

INDIVIDUAL MILITARY SPECIFICATION SHEET

ELECTRON TUBE, MAGNETRON, PULSED TYPE, 9240Mc, 40KW NOMINAL,

INTEGRAL MAGNET, AIR COOLED, UNIPOTENTIAL CATHODE

JAN-2J56

This specification sheet forms a part of the latest issue of Military Specification MIL-E-1.

Application Design-Limits: (Note 1)

	ib a	Pi W	Du	tp us	Ef V	tp us	Max. rrv in kv/us (Note 5)
Maximum:	13.0	170	0.001	2.0	(Note 2)	0.5	150
Minimum:	11.0	—	—	0.5	—	2.0	100

Independent Absolute Ratings

	Ef V	tk sec	VSWR	Anode T °C	Environment Pressurization mmHg
Maximum:	7.0	—	1.5	150	—
Minimum:	—	120	(Note 3)	(Note 4)	522 (10,000 ft.)

The independent absolute ratings must not be exceeded. These ratings are limiting values beyond which the serviceability of any individual tube may be impaired.

Storage, Handling, and Installation

Mounting Support:	Mounting flange per outline	Input Connections:	Per outline
Mounting Positions:	Any position	Weight:	4 lbs. approx.
Output Coupling:	Per outline		

For miscellaneous requirements, see Paragraph 3.3, Inspection Instructions for Electron Tubes.

Ref.	Test	Conditions	Min.	Max.
3.1	Qualification Approval:	Required for JAN Marking		
4.9.2	Dimensions:	Per Outline		
3.7	Marking:			
4.5	Holding Period:	t = 168 hours		
4.9.8	**Salt Spray Corrosion:	Omit		
4.9.13	Pressurizing:	40 psia min.		
4.9.18.1.8	Container Drop:	(1) Package Group 9; Container Size D		
4.9.19.2	*High-frequency vibration:	No voltage		
—	**High-frequency vibration:	No voltage; 50-500 cps t = 5 min; G = 5; (Note 6)		
—	**Shock Test:	(Note 7) G = 15		
4.16.1	**Air Cooling:	(Note 8)	ΔT: ---	60 °C ←
4.10.8	Heater Current:	Rf=6.3V; tk=180 sec	If: 0.9	1.1 A

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<u>Ref.</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>
4.16.3	<u>Oscillation (1)</u>			
—	Standing Wave Ratio:	VSWR = 1.1 (max.) except as noted		
4.16.3.2	Heater-Cathode Warm-Up Time:	tk=120 sec (max); at Ef=6.3V; Ef=0 V for test		
4.16.3.3	Pulse Characteristics:	tp=0.4 to 0.6 us; Du=0.001; rrv=150 kv/us min; (Note 5)		
4.16.3.4	Average Anode Current:	Ib=12mAdc		
4.16.3.6	Power Output:	Method B	Po: 40	— W
4.16.3.5	Pulse Voltage:		epy: 11	13 kv
4.10.7.3	Frequency:		F: 9215	9275 Mc
—	Stability:	(Note 10)	Missing Pulses: —	0.5 %
4.16.3.7	<u>Spectrum Measurements:</u>	VSWR = 1.5; (Note 9); Ib=11 to 13 mAdc		
	R. F. Bandwidth:		Bandwidth: —	2.0/tp Mc
	Minor Lobes:		Ratio: 6.0	— db
4.16.5	Pulling Factor:		ΔF : —	15 Mc
—	**Temperature Coefficient:	Anode T; 70° to 100°C; (Note 4)	$\Delta F/\Delta T$: —	0.25 Mc/°C
4.9.12	**Low Pressure:	Pressure = 500 mmHg		
4.9.15	**Low Temperature:	tk = 120 (max)		
4.16.3	<u>Oscillation (2):</u>			
—	Standing Wave Ratio:	VSWR = 1.1 (max) except where noted		
4.16.3.2	Heater-Cathode Warm-Up Time	tk = 120 sec max at Ef = 6.3 V; Ef = 2.5 V for test		
4.16.3.5	Pulse Characteristics:	tp = 1.9 to 2.1 us; Du = 0.00065 rrv = 100 kv/us min; (Note 5)		
4.16.3.4	Average Anode Current:	Ib = 8.0 mAdc		
4.16.3.6	Power Output:	Method B	Po: 26	— W
4.16.3.7	Spectrum Measurements:	VSWR = 1.5; (Note 9) Ib = 7.15 to 8.45 mAdc		
	R.F. Bandwidth:		Bandwidth: —	2.5/tp Mc
	Minor Lobes:		Ratio: 6.0	— db
—	Stability:	(Note 10)	Missing Pulses: —	0.5 %

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<u>Ref.</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>
4.11.5	Intermittent Life Test:	Group C	Life: 250	— Cycles
		Output: VSWR = 1.5 Min. with Phase varying through a minimum of $1/2\lambda_g$ approx. every 15 minutes		
		Simultaneously, input power shall be varied as follows:		
		Cond: Ib(Ma) Ef(V) Duration		
		Standby: — 6.3 2 Min.		
		Osc. (1) 12 0 45		
		Osc. (2) 8 2.5 14		
		Off: — 0 9		
4.11.4	Life Test End Point:			
4.16.3.6	Power Output:	Osc. (1); Method B	Po: 30	— W
—	Stability:	Same as Stability Test for both Osc (1) and (2)	Missing Pulses: —	1 %
4.10.7.3	Frequency:		F: 9210	9280 Mc
4.16.3.7	Spectrum Measurements:	Osc. (1)		
	Minor Lobes:		Ratio: 6	— db
	RF Bandwidth:		Bandwidth: —	3/tp Mc

Note 1: The cognizant Service Laboratory should be consulted regarding details of application.

Note 2: The heater voltage must be reduced during operation after the application of high voltage. For values of average power input greater than 150 watts, heater voltage should be zero. For input powers less than 150 watts the heater voltage should be adjusted as recommended by the manufacturer. Prior to application of high voltage the heater voltage shall be $6.3 \pm 10\%$ volts for a minimum time of two minutes.

Note 3: Frequency skipping or unstable operation may be encountered at some positions when the mismatch occurs at the end of a long line.

Note 4: The anode temperature shall be measured with a thermocouple embedded into a hole of 0.1" depth located at a point on the anode block that is located approximately $1/8$ of an inch from the antenna output housing and approximately $1/8$ of an inch above the "anode block - magnetic pole piece" joint that is the furthest from the cathode terminal.

Note 5: The rate of rise voltage (rrv) shall be expressed in kolovolts per microsecond defined by the steepest tangent to the leading edge of the voltage pulse above 80 percent amplitude. Any capacitance used in viewing system shall not exceed 6 uuf.

Note 6: The magnetron shall be vibrated in each of three mutually perpendicular planes with a frequency of 50 to 500 to 50 cycles per second during a 5 minute interval for each plane. The sinusoidal displacement shall be adjusted to maintain acceleration at 5 G.

Note 7: The magnetron shall be mounted on a test plate and dropped ten times on each of three mutually perpendicular planes parallel to the reference planes shown on the outline drawing. The shock pulse shall have a duration of approximately 11 milliseconds as measured at the quarter amplitude points.

Note 8: With an air flow at standard atmospheric pressure of 65 cfm directed at the cooling fins ← from an orifice of 1-11/64" and 1-23/64", the rise above ambient specified shall not be exceeded. The anode temperature shall be measured as specified in Note 4. The conditions for this test will be those of Osc (1) and the ambient temperature will be approximately 50°C. The orifice shall be located 1/4 inches from the cooling fins.

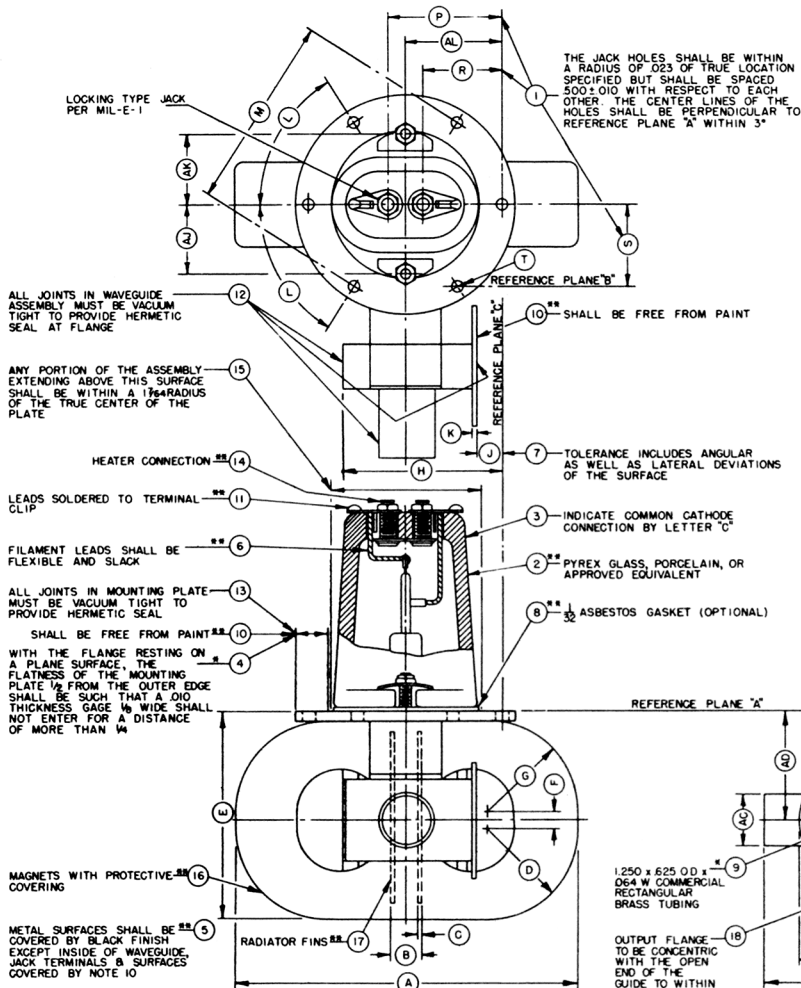
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- Note 9: A mismatch resulting in a VSWR of 1.5 to 1 minimum shall be inserted into the waveguide at a distance no greater than 1/2 meter from the magnetron coupling flange and the phase to be adjusted to produce maximum spectrum degradation at 12 mAdc for Osc. (1) and 8 mAdc for Osc. (2). The RF bandwidth and the height of the minor lobes shall be within the limits specified when the current is varied through the range as specified under conditions.
- Note 10: Stability shall be measured with a VSWR of 1.5 minimum adjusted to that phase which produces maximum instability. The missing pulses shall be counted during the last 3 minutes of a test interval not to exceed six minutes. A missing pulse is defined as one whose energy within a $\pm 1\%$ frequency range of the normal test frequency is 70% or less than that of a normal pulse.
- Note 11: Reference specification shall be of the issue in effect on the date of invitation for bid.

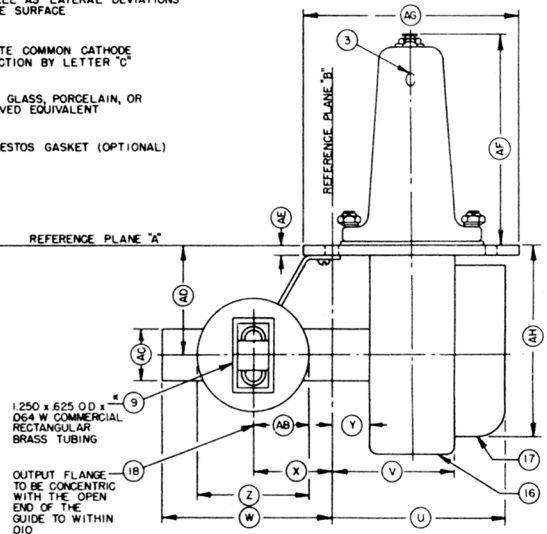
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LEGEND
 * DESIGN TEST
 ** QUALIFICATION TEST
 — PRODUCTION TEST



REF	NOMINAL	MINIMUM	MAXIMUM
A			$\frac{5}{16}$
B			$\frac{1}{2}$
C	$\frac{1}{16}$		
D	$\frac{1}{32}$		
E			$\frac{3}{8}$
F	.374		
G	$\frac{1}{32}$		
H			$\frac{1}{2}$
J		.417	.457
K		.080	.090
L	$\frac{59}{64}$		$\frac{60}{64}$
M	$\frac{2.869}{16}$		$\frac{2.881}{16}$
N	$\frac{59}{64}$		$\frac{60}{64}$
P	$\frac{1.687}{16}$		
R	1.187		
S	$\frac{1.245}{16}$		
T		$\frac{1.190}{16}$	$\frac{1.196}{16}$
U			$\frac{2.745}{16}$
V	2.057		
W			$\frac{2.661}{16}$
X		$\frac{1.172}{16}$	$\frac{1.212}{16}$
Y		.432	
Z		1.743	1.757
AB		$\frac{55}{64}$	$\frac{57}{64}$
AC	$\frac{3}{4}$		
AD		$\frac{1.542}{16}$	$\frac{1.582}{16}$
AE		.120	.130
AF		$\frac{2.576}{16}$	$\frac{2.584}{16}$
AG		$\frac{3}{32}$	$\frac{3}{16}$
AH		$\frac{1}{32}$	$\frac{3}{16}$
AI		.875	.937
AK		.875	.937
AL		$\frac{1.406}{16}$	$\frac{1.468}{16}$



N O T E

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REPRINT A.

To complete the above Specification the existing 5 pages of MIL-E-1/937E must be retained.

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TVC Office