

N O T E

SPECIFICATION MOA/CV5235, ISSUE 1  
REPRINT A.

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

1961

TVC Office

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>	<u>Valve</u>
	Unclassified	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 re-pass 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 40 milliseconds. Valve must  
 re-pass all 100% tests.
- D.D. Page 2. Add at Stability :-  $i_b = 12.5$  A (min)
- E.E. Page 2.  $\nabla$  Spectrum Measurements (for Oscillation 1 only),  
 delete  $i_b = 11$  to 13 mA<sub>dc</sub>, and replace with  $i_b = 8.5$  to 12.5 A.

Specification MOS/CV5235 Issue 1 dated 25.6.59 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	
<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 EB-EE		<u>Packaging</u> To the requirements of the R.R.E. Valve packaging specification			
<u>NOTES</u> <p>A.A. Copies of the ancilliary documents called for, can be obtained from:-          The Secretary; TL5(b), The Ministry of Supply, Castlewood House, 77-91,          New Oxford Street, London W. C. 1.</p> <p style="text-align: center;"><del>XX</del></p> <p>B.B. Page 1. insert below 4.9.19.2, (a) Vibration: 50 c/s at 10G (Min) for          one minute (Min.) Valve must re-pass all 100% tests (b) <del>XX</del> Vibration          with pulse voltages: conditions as for Osc 1, limits as for Osc 1 tests,          microphony 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 min. The vibration shall be applied along the axis of the          cathode stem, and in two other mutually perpendicular directions at right          angles to this.</p> <p>C.C. Page 1, insert below <del>XX</del> Shock Test:- <del>XX</del> Impulse Acceleration No pulse          voltages: Acceleration 25g (Min). for 40 milliseconds. Valve must          re-pass all 100% tests.</p> <p>D.D. Page 2, add at Stability:- i b = 12.5 A (Min).</p> <p>E.E. Page 2, add at Spectrum Measurements:- i b = 8.5 - 12.5A</p>					

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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	Pi	Du	tp	Ef	tp	Max. rrv in
	a	W		us	V	us	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	tk	VSWR	Anode T	Environment
	V	sec		°C	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:	Ef=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)	ΔF/ΔT: —	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:	VSMR = 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 λg 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 ± 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 kilovolts 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			* 5/8
B			* 1/2
C	** 1/16		
D	** 1 1/32 R		
E			* 3/8
F	** .374		
G	** 1 1/32 R		
H			* 2.50
J		.417	.457
K		* .080	* .090
L		* 59° 48'	* 60° 12'
M		* 2.869 DIA	* 2.881 DIA
N		* 59° 48'	* 60° 12'
P	* 1.687		
R	1.187		
S	* 1.245		
T		* 1.90 DIA	* 1.96 DIA
U			* 2.745
V	2.057		
W		* 1.172	* 1.212
X		* .432	
Y		* 1.743	1.757
Z		* 55/64	* 57/64
AB			
AC	3/4 DIA		
AD	** 1.542	** 1.582	
AE	** 1.20	** 1.30	
AF	* 2.85/64	* 3.3/64	
AG	* 3.3/32	* 3.3/32	
AH		* 2.5/32	
AJ	* .875	* .937	
AK	* .875	* .937	
AL	* 1.406	* 1.468	

