

ELECTRONIC VALVE SPECIFICATIONS  
SPECIFICATION MOA/CV 5314 ISSUE 2 DATED 1.4.63.

AMENDMENT No. 1.

Page 4 NOTES

- (a) Note 2. Amend "3 cu. ft. per min." to read "35 cu. ft. per min."
- (b) Note 6 Clause a1. Delete all reference to this clause.
- (c) Note 6 Clause a2. Delete the "2" in "Clause a2"

August, 1963

T.V.C. for  
R.A.E.

N.190323

SPECIFICATION MOA/CV5314  ISSUE 2 DATED 1-4-63  To be read in conjunction with K1001 and BSL409	<u>SECURITY</u>	
	<u>SPECIFICATION</u> Unclassified	<u>VALVE</u> Unclassified

→ Indicates change

TYPE OF VALVE:- KLYSTRON AMPLIFIER for use with three external cavities ENVELOPE:- GLASS and METAL CATHODE:- Indirectly Heated FOCUSING:- Electromagnetic COOLANT:- Forced Air CONNECTIONS:- Flying Leads PROTOTYPE:- VX7154 (VX7136)	<u>MARKING</u>  See K1001/4  <u>BASE</u>  See drawing on page 6																																																																																						
<p style="text-align: center;"><u>RATINGS</u> (All limiting values are absolute)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th></th> <th></th> <th style="text-align: center;">Notes</th> </tr> </thead> <tbody> <tr> <td>→ Heater Voltage</td> <td>(V)</td> <td>12.6</td> <td></td> </tr> <tr> <td>→ Heater Current (max)</td> <td>(A)</td> <td>2.0</td> <td></td> </tr> <tr> <td>Max. Collector Voltage</td> <td>(kV)</td> <td>18</td> <td></td> </tr> <tr> <td>Max. Collector Dissipation</td> <td>(kW)</td> <td>1.0</td> <td></td> </tr> <tr> <td>Max. Cavity Resonator Voltage</td> <td>(kV)</td> <td>18</td> <td></td> </tr> <tr> <td>Max. Resonator Dissipation (any one disc seal)</td> <td>(W)</td> <td>3.0</td> <td></td> </tr> <tr> <td>Max. Peak Modulator Voltage</td> <td>(kV)</td> <td>5.5</td> <td></td> </tr> <tr> <td>Min. Negative Modulator Voltage (Hold Off)</td> <td>(V)</td> <td>150</td> <td></td> </tr> <tr> <td>Max. Modulator Dissipation</td> <td>(W)</td> <td>12.0</td> <td></td> </tr> <tr> <td>Max. Modulator Resistor</td> <td>(kΩ)</td> <td>250</td> <td></td> </tr> <tr> <td>→ Max. Average Cathode Current</td> <td>(mA)</td> <td>70</td> <td></td> </tr> <tr> <td>Nom. Duty Cycle</td> <td>(%)</td> <td>3.0</td> <td></td> </tr> <tr> <td>Min. Gain</td> <td>(dB)</td> <td>33</td> <td></td> </tr> <tr> <td>Min. Cooling Supply</td> <td>(cu.ft/min)</td> <td>35</td> <td>A</td> </tr> <tr> <td>Min. Cathode Heating Time</td> <td>(mins)</td> <td>2</td> <td></td> </tr> <tr> <td>Normal Operating Frequency Range</td> <td>(Mc/s)</td> <td>960- 1215</td> <td></td> </tr> <tr> <td>→ Min. Peak Power Output (Final Cavity) Under Test Specification Conditions</td> <td>(kW)</td> <td>6.5</td> <td></td> </tr> <tr> <td>Focussing Coil Requirements</td> <td></td> <td>-</td> <td>B</td> </tr> </tbody> </table>				Notes	→ Heater Voltage	(V)	12.6		→ Heater Current (max)	(A)	2.0		Max. Collector Voltage	(kV)	18		Max. Collector Dissipation	(kW)	1.0		Max. Cavity Resonator Voltage	(kV)	18		Max. Resonator Dissipation (any one disc seal)	(W)	3.0		Max. Peak Modulator Voltage	(kV)	5.5		Min. Negative Modulator Voltage (Hold Off)	(V)	150		Max. Modulator Dissipation	(W)	12.0		Max. Modulator Resistor	(kΩ)	250		→ Max. Average Cathode Current	(mA)	70		Nom. Duty Cycle	(%)	3.0		Min. Gain	(dB)	33		Min. Cooling Supply	(cu.ft/min)	35	A	Min. Cathode Heating Time	(mins)	2		Normal Operating Frequency Range	(Mc/s)	960- 1215		→ Min. Peak Power Output (Final Cavity) Under Test Specification Conditions	(kW)	6.5		Focussing Coil Requirements		-	B	<p style="text-align: center;"><u>CONNECTIONS</u> See drawing on page 6</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Lead</th> <th style="text-align: center;">Electrode</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Modulator</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Heater plus Cathode</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Heater</td> </tr> <tr> <td style="text-align: center;">Block</td> <td style="text-align: center;">Collector</td> </tr> </tbody> </table> <p style="text-align: center;"><u>DIMENSIONS</u> See drawing on page 6</p> <p style="text-align: center;"><u>MOUNTING POSITION</u> Vertical</p>	Lead	Electrode	1	Modulator	2	Heater plus Cathode	3	Heater	Block	Collector
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<p style="text-align: center;"><u>NOTES</u></p> <p>A. Minimum requirements for a Collector Dissipation of 1 kW.</p> <p>B. See Curve on page 7.</p> <p>C. The Joint Services Catalogue Number is 5960-99-037-2267</p>																																																																																							

# C.V.5314

## TESTS

Page 2.

To be performed in addition to those applicable in K1001

TEST CONDITIONS:- Unless otherwise stated.

Vh (V) 12.6 (Heater Volts)	Vmod.d.c (V) -150 (D.C.Modulator Volts)	Vcoll + Vcav (V) 15 kV (Collector and Resonator Cavity Volts)	Vmod Peak (kV) 5 (Peak Modulator Pulse Volts)	I.f.d.(Note 11) (A) 2.2 (Field Current Magnetic Focussing)
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NOTES 1, 2, 3, 7

Test Conditions	Test	Units	Limits		Insp. Level	Notes
			Min.	Max.		
a Vmod = 7kV d.c. All other electrodes earthed	<u>Electrode Leakage</u> Modulator to all:- (including cathode)	µA	-	100	100%	3 ←
b Vh = 12.6V No other voltages	<u>Heater Current</u>	A	1.55	2.0	100%	3 ←
c Ifd = 0, Vcoll + Vcav = -50V Vmodpk = 0, Vk = 0 Adjust Vmod.d.c. for Imod. = 20 mA.	<u>Gas Current</u>	µA	-	0.9	100%	3, 4
d Ifd = 0.9A, Vcoll + Vcav = 2.5kV Vmod.d.c. = 800 V. Vmod.Peak = 0	1) Collector Current 2) Modulator Current 3) Cavity Current	mA mA mA	130 0 0	215 0.25 2.0	100% 100% 100%	1,3 ←
e Vmod Peak = 0	Collector Current	mA	0	2.5	100%	1,3
f Frequency = 962 Mc/s Max.Drive Power = 3.25W	1) Peak Power Output 2) Average Collector Current 3) Peak Collector Current	kW mA	6.5 0	- 70	100% 100%	1,2,3 7 ← Record I1 12 & 13 ←
g Max. Drive power= 3.25W 1) Frequency=1024Mc/s 2) Frequency=1151Mc/s 3) Frequency=1213Mc/s	1) <u>Peak Power Output</u>  2) Peak Collector Current	kW kW kW	6.5 6.5 6.5	- - -	100%	1,2,3 7 ← Record I1 12 & 13 ←

	Test Conditions	Test	Units	Limits		Insp. Level	Notes
				Min.	Max.		
→ h	Vh = 11.3V No R.F. Drive	1) Peak collector Current 2) Calculate <u>Reading of Clause "h" x 100</u> <u>Reading of Clause "f3 or g2"</u>	%	90	-		1,2, 3,7  12
j	1) Repeat Test Clause 'c' 2) Repeat Test Clause 'd' (d1, d2, d3)	<u>Electrical Retest after 28 days holding Period</u> Gas Current	µA	Note 5		100%	4,5
k	The valves in the sample shall initially be tested to the tests specified in clauses "a" to "h" inclusive and the results recorded. The valves shall then be run under the specified conditions, with forced air cooling for a minimum period of 500 hours (RF input=0) On completion of the 500 hours running time, the sample shall be retested.	<u>Life Test</u>		Note 6		10% or two valves per month (which ever is greater)	1,2,3 6, 8, 10

## NOTES

1. The valve shall be tested with  $V_{coll} + V_{cav}$  at earth potential and the specified P.D's maintained.
2. Where cooling is specified a max. air flow of 3 cu.ft. per min. is permitted.
3. To enable "Post Holding Period" and "Post Life" tests to be performed, the individual readings obtained on each of the tests (a) to (h) inclusive are to be recorded.
4. Gas current to be measured after a minimum period of 10 mins. operation when the current should neither be rising nor outside the specified limit.
5. After the 28 days "Holding Period" a valve with a gas current less than  $0.3\mu A$  shall be acceptable. Above  $0.3\mu A$  a valve within the specified limit but having an increase in value less than 2:1 shall be acceptable. If the increase is greater than 2:1 the valve shall be held for a further period of 28 days when no further increase is allowable.
6. After completion of the 500 hours "Life Test" the valves in the sample shall be retested (clauses "a" to "h" inclusive) and the following limits shall apply:-

Clause "a 1" The specified limits to apply.

Clause "a 2" The specified limits to apply and in addition the change in value from the original reading must not exceed  $30\mu A$ .

Clause "b" The specified limits to apply and in addition the change in value from the original reading must not exceed  $\pm 0.15A$ .

Clause "c" A valve with a gas current of either less than  $0.3\mu A$  or an increase in value of less than 2:1 shall be acceptable. If the increase is greater than 2:1 then the valve shall be rejected.

Clause "d 1" The specified limits to apply and in addition the change in value from the original reading must not exceed  $\pm 10 mA$ .

Clause "d 2" and "d 3" The specified limits to apply and in addition the change in value from the original reading must not exceed  $+ 50\%$ .

Clause "e" A valve with a collector current of less than  $1mA$  or a change in value from the original reading of less than  $\pm 10\%$  shall be acceptable.

Clause "f 1" The maximum decrease from the original reading must not exceed  $10\%$

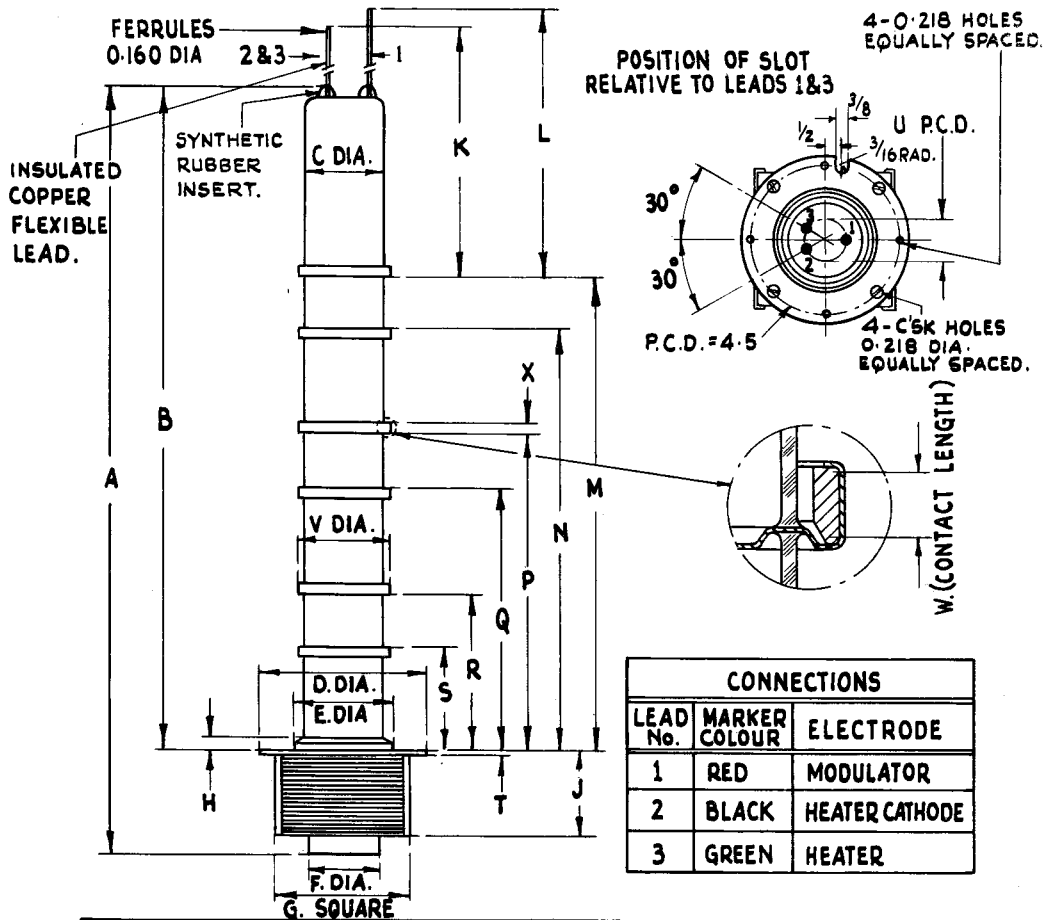
Clause "f 2" The specified limits to apply and in addition the change in value from the original reading must not exceed  $\pm 20\%$

Clause "g" The maximum decrease from the original reading must not exceed  $10\%$  in each case.

Clause "h" The specified limits to apply

7. The modulator pulse shall be of gaussian waveform with a p.r.f. =  $7.5 \text{ kc/s} \pm 0.5 \text{ kc/s}$ . The pulse width at 50% level shall be  $3.75\mu\text{Secs} \pm 0.25\mu\text{Secs}$ .
8. The sample shall be life tested under D.C. conditions in an approved test rig.
9. The R.F. tests clauses "f" to "h" inclusive are to be performed in an approved test rig, (for example STC (Paignton) Test Set 61028). ←
10. Should a valve from the Life Test sample fail during, either, the "Life" period or the "Post Life" testing, another valve may be subjected to the "Life Test" when no further failures shall be allowed.
11. A typical Magnetic Field Strength curve is shown on Page 7.
12. It may be recorded at either 962 m/cs or 1213 m/cs. ←
13. The Characteristic Impedance of the R.F. Load used for power measurement shall be referred to  $(50 + j0)$  ohms. ←  
The V.S.W.R. shall be better than 0.9.

VALVE OUTLINE DRAWING.



CONNECTIONS		
LEAD No.	MARKER COLOUR	ELECTRODE
1	RED	MODULATOR
2	BLACK	HEATER CATHODE
3	GREEN	HEATER

DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	584.2 MAX.	23 MAX.	M	359.70 ± 2.03	14.161 ± 0.080
B	504.8 MAX.	19 7/8 MAX.	N	320.30 ± 2.03	12.611 ± 0.080
C	61.46 MAX.	2.420 MAX.	P	239.29 ± 2.29	9.421 ± 0.090
D	127.0 ± 0.8	5 ± 1/32	Q	199.92 ± 2.29	7.871 ± 0.090
E	76.20 ± 8.10	3.000 ± 8.804	R	118.90 ± 2.29	4.681 ± 0.090
F	54.0 MAX.	2 1/8 MAX.	S	79.53 ± 2.03	3.131 ± 0.080
G	104.0 MAX.	4 3/32 MAX.	T	3.2 ± 0.4	1/8 ± 1/64
H	9.5 APP.	3/8 APP.	U	31.8 APP.	1 1/4 APP.
J	63.5 ± 1.6	2 1/2 ± 1/16	V	71.12 ± 0.10	2.800 ± 0.004
K	450.9 ± 3.2	17 3/4 ± 1/8	W	7.37 MIN.	0.290 MIN.
L	469.9 ± 3.2	18 1/2 ± 1/8	X	9.5 ± 0.4	3/8 ± 1/64

NOTES.

1. THE EXTERNAL SURFACES OF THE CAVITY CONNECTIONS SHALL BE GOLD PLATED.
2. THE A.M. REFERENCE No. OF THE FERRULES IS 5H/25
3. ALL DIMENSIONS SHOWN ON DRAWING ARE IN INCHES.

TYPICAL MAGNETIC FOCUSING FIELD.

