CV6052
CV6053
CV6054

MINISTRY OF AVIATION, **DLRD/RRE.**

VALVE ELECTRONIC

Specification MOA/CV6052-4 Issue 2A, Dated 12th December 1963 To be read in connection with K1006.	SECURITY SPECIFICATION: **UNCLASSIFIED** (See Note 13) VALVE: UNCLASSIFIED

→ Indicates change

TYPE OF VALVE: PULSE MAGNETRON, 5 MW Nominal Peak Power **water cooled, used in electro- magnet.**

CATHODE: UNIPOTENTIAL

ENVELOPE: GLASS AND METAL.

Issue 2 onwards:
Prototypes VX2578, VX2579, VX2580, M1585

MARKING

K1001/4. ALSO SERIAL NO.

CONNECTIONS AND DIMENSIONS

See Pages:- 8,9,10, 11

ABSOLUTE NON-SIMULTANEOUS RATINGS (NOTE A)

NOT FOR INSPECTION PURPOSES

PARAMETER	SYMBOL AND UNITS	MAX.	MIN.	NOTES
Heater Voltage	Ef, volts	50.4	45.6	B
Heater Current (surge)	If, Amps	40	-	C
Cathode warm-up time	tk, secs	-	480	B
VSWR of R/F Load	VSWR ratio	1.3	-	K
Rate of rise of voltage	rrv,kv/μsec	100	75	F
Peak Anode Current	ib, Amps	250	200	-
Cathode Temperature	°C	150	-	D
Waveguide Pressure	psi ABS	35	25	-
Duty Cycle	Du, ratio	.0025	-	-
Air flow for window	cu.ft./min		3	H
Air Inlet Temperature	°C	70	-	-
Magnetic Field	Oersteds	800	750	E
Water Outlet Temp.	°C	75	-	J

DESIGN RATINGS

PARAMETER	SYMBOL AND UNITS	MAX.	MIN.	NOTES
Heater Voltage	See Note B			
Input Power	Pi, kw	30	-	G
Pulse Width	tp, usec	10	-	

JOINT SERVICES CATALOGUE NUMBERS

CV NO.	CAT. NO.
6052	5960-99-037 - 2233
6053	" " " - 2234
6054	" " " - 2235

RATING NOTES

A. These ratings cannot be used simultaneously and no individual rating should be exceeded. The requirements of K1006, (MIL-E-1c) para 6.5, apply.

B. Prior to the application of anode voltage, the cathode shall be heated to the required initial temperature by the application of 48 volts to the heater for at least ten minutes. The heater voltage must not exceed 50.4 volts for longer than five minutes. The heater voltage should be reduced, after application of anode voltage, according to the table below.

Mean Input Power (KW)	Max. heater volts	Min. heater volts
Zero	50.4	45.6
0 - 5	48	43
5 - 10	43	38
10 - 15	38	32
15 - 20	32	25
20 - 24	25	15
24 - 30	15	0

The valve heater shall be protected against arcing by a capacitance of 8.0 µf (minimum), placed directly across the magnetron heater terminals, as shown on page 10.

C. Surge current

D. To be measured at the point specified on the outline drawing.

E. The axial magnetic field shall be measured at one point within $\frac{1}{8}$" spherical radius of the magnetic field reference point specified on page 8 and shall be 800 oersteds. After the measurement, the probe shall be moved parallel to the axis and the axial magnetic field shall reach its maximum value within $\frac{1}{8}$" of movement on each side of the initial measurement position. The axial magnetic field shall decrease monotonically as the probe is moved parallel to the axis, to points 4.000" ± 0.005" on each side of the initial measurement position, and the axial magnetic field at these two positions must be within 700 - 720 oersteds.

F. The rate of rise of voltage (rrv) shall be expressed in kilovolts per microsecond defined by the steepest tangent to the leading edge of the voltage pulse above 80% amplitude.

G. The parameters are related by the formula Pi = ib x Du x 48 kV.

H. Free air volume.

J. Normal distilled water should be used. During operation a water flow of at least three gallons per minute is recommended.

After all the power is removed from the magnetron, a water flow of at least $1\frac{1}{2}$ gallons per minute must be maintained for at least fifteen minutes to remove stored heat, otherwise damage may occur.

K. The VSWR presented to the magnetron should not exceed 2:1 over a frequency range:- fo + 90 to fo + 170 mc/s, where fo is the centre frequency of the appropriate band, and should not exceed 5:1 over a frequency range 1530 to 1650 mc/s.

TESTS

For miscellaneous requirements, see para 3.3, Inspection Instructions for Electron Tubes. Note 12

K1006 Ref.	Test	Conditions	Min.	Max.	Units
	(a)	All valves shall be subjected to these tests (except life) for acceptance.			
4.5	Holding period	t = 672 hours (min)			
4.9.2	(b) Dimensions	Per outline drawing page 10.			
4.10.8	(c) Heater Current	Ef = 48.0 volts A.C. tk = 600 secs (min)	13.0	15.0	A
4.16.3	(d) Oscillation (1)	Notes 1 and 2			
-	(e) Magnet	Valve fitted in specified electromagnet and launching section.			
-	(f) Pressurizing (Oscillation 1)	Waveguide pressure 25 lb/sq.in. absolute max. Note 3			
-	(g) †Air Leakage	Note 6		0.01	lb.wt/hr
-	(h) Window Cooling	3 cu.ft/min max. Note 3			
-	(j) Water Cooling	3-5 gal/minute Inlet temp. 15 - 45 °C			
4.16.3.1	(k) Magnetic Field(1)	800 gauss, Note 9			
4.16.3.2	(l) Heater	Ef = 48.0 volts for tk = 480 secs (max) Ef = 0 volts for test.			
4.16.3.3	(m) †Pulse Characteristics	tp = 10.0 ± 1.0 Du = 0.0025 rrv = 100 kv/µsec (min) Notes 5 and 7.			
4.16.3.4	(n) Average Anode (1) Current	Notes 8 and 14			
4.16.3.5	(p) †Pulse Voltage	CV6052 epy CV6053 epy CV6054 epy	45 46 47	49 50 51	kv kv kv
4.16.3.6	(q) †Power Output	CV6052 Po CV6053 Po CV6054 Po	10,000 10,000 10,000		watts watts watts
4.10.7.3	(r) †Frequency Code	CV6052 CV6053 CV6054 Note 13 Drawing Note No. 12	Red Yellow Blue		

TESTS (Contd.)

K1006 Ref.	Test	Conditions	Min.	Max.	Units
4.16.5	(s) Pulling Figure	VSWR = 1.3/1 ΔF	-	2.25	Mc
	(t) Stability (1)	Note 4 M.P.		0.5	%
	(u) Stability (2)	VSWR = 1.3 min M.P. Notes 4, 16.		0.5	%
4.16.3.7	(v) Bandwidth (1)	VSWR = 1.3/1 min ΔF Note 11		0.25	Mc
4.16.3	(w) Oscillation (2)	Notes 1 and 2			
-	(x) Magnet	Valve to be fitted in specified electromagnet and launching section.			
4.16.3.1	(y) Magnetic Field(2)	750 gauss, Note 10.			
4.16.3.2	(z) Heater	Ef = 48.0 volts for tk = 480 secs (max) Ef = 0 volts for test.			
4.16.3.3	(aa) Pulse Characteristics	tp = 10.0 ± 1.0 Du = 0.0025 rrv = 70 kv/usec (max) Notes 5 and 7.			
4.16.3.4	(bb) Average Anode Current (2)	Note 15.			
-	(cc) Stability(3)	Note 4 M.P.		0.5	%
-	(dd) Bandwidth(2)	ΔF		0.25	Mc

NOTES

1. The modulator shall be such that the pulse energy delivered to the magnetron, following an arcing pulse, shall not be less than, and cannot greatly exceed the normal energy per pulse.

2. The load termination of the magnetron during this test shall be a waveguide with a VSWR of less than 1.10 at the oscillation frequency.

3. There shall be no evidence of breakdown in the output waveguide during this test.

4. Stability shall be measured in terms of the average number of output pulses missing, expressed as a percentage of the number of input pulses applied during the period of observation. The missing pulses (M.P.) due to any causes are considered to be missing if the r.f. energy is less than 70% of the normal energy level.

   Missing pulses shall be counted during any five minute interval of a ten-minute test period.

NOTES (Contd.)

5. The rate of rise of voltage (rrv) shall be expressed in kilovolts per microsecond, and shall be the value of dv/dt at the onset of r.f. oscillations.

6. Leakage shall be measured in a sealed chamber. See page 9, and note 3 on that page.

7. The value of rrv to be at the discretion of the manufacturer, provided it satisfies the specified limit.

8. A figure shall be marked on the cathode terminal cover equal to the current stipulated for oscillation 1 plus 15 mA.

9. The axial magnetic field shall be measured at one point within $\frac{1}{8}$" spherical radius of the magnetic field reference point specified on page 8 and shall be 800 oersteds. After the measurement, the probe shall be moved parallel to the axis and the axial magnetic field shall reach its maximum value within $\frac{1}{8}$" of movement on each side of the initial measurement position. The axial magnetic field shall decrease monotonically as the probe is moved parallel to the axis, to points 4.000" $\pm$ 0.005" on each side of the initial measurement position, and the axial magnetic field at these two positions must be within 700-720 oersteds.

10. Similar to Note 9, but with a value of 750 oersteds at the specified point, and a value of between 655 and 675 oersteds at points four inches away.

11. VSWR = 1.3/1 MIN for all phases, the phase to be varied and the spectrum checked continuously.

12. The value of each parameter is at the discretion of the manufacturer providing it satisfies the specified limits.

13. Reference to be made to classified document entitled "Appendix for use with Electronic Valve Specification CV6052-4", note 1

14. The valve shall be tested at a current stipulated by the manufacturer, and which shall be between 500 - 585 mA. The power shall be greater than 10kW into a matched load, and the pulling figure and bandwith requirements shall be met. The bandwidth requirement shall also be met at the stipulated current plus 30mA.

15. The current for oscillation (2) shall be 1.125 times the current stipulated for oscillation (1).

16. The phase of the VSWR is to be shifted through 180° and set to the position of maximum instability. At this point the stability shall be observed and recorded.

OUTLINE DIMENSIONS

All dimensions in inches

DIMENSION	VALUE	REMARKS
A	18.594	Nominal
B	8.250	Maximum
C	11.900	Nominal
D	11.125	Nominal
E	1.125	± .020
F	0.437	± .010
G	10.250	± .015 Dia.
H	7.240	Maximum
J	7.000	+ .000 - .040
K	10.250	Nominal
L	1.937	Nominal
M	0.375	± .000 - .020
N	10.750	± .125
P	1.062	± .062
Q	0.391	+ .004 - .000 Dia.
R	$22\frac{1}{2}^{o}$	Nominal
S	45^{o}	Nominal
T	1.500	Maximum
U	4.032	Nominal Inside
V	5.500	Maximum
W	0.500	Position of V
X	6.000	Maximum
Y	3.125	Position of X
Z	1.093	Nominal
AA	1.247	Nominal
AB	0.093	Nominal
AC	0.577	± .020
AD	0.452	± .010

DRAWING NOTES

1. Reference Plane A.

2. 8 Holes 0.312 $^{+\ .004}_{-\ .000}$ Dia. Spacing and P.C.D. to suit gauge.

3. 'O' Sealing Ring 6.475 I/Dia : 0.275 Section Diameter O.S.67 (B.S.1806:1951). Neoprene Rubber - 60° Shore. Ring, Sealing, Toroidal, NATO Stock No 5330-99-954-8782

Amdt 2

DRAWING NOTES Cont'd.

4. Water Connections - ½" B.S. Screwed Pipe to B.S. 2051 Part 2. The final union dimensions after plating shall conform to the limits defined in BS 2779.

5. Heater Cathode Coaxial Connector:- The Joint Services Cat. No is 5935-99-940-1839 Amdt 1
See also drg on page 11.

6. Bush threaded 1-12 UNF-2B (American thread). Brass Silver plated.

7. Inside width of lifting handles.

8. Dimension F shall apply only within circles 0.625" Dia. centred on each of the eight 0.312" Dia. holes.

9. All parts mounted on the flange shall lie within a 13" Dia. cylinder.

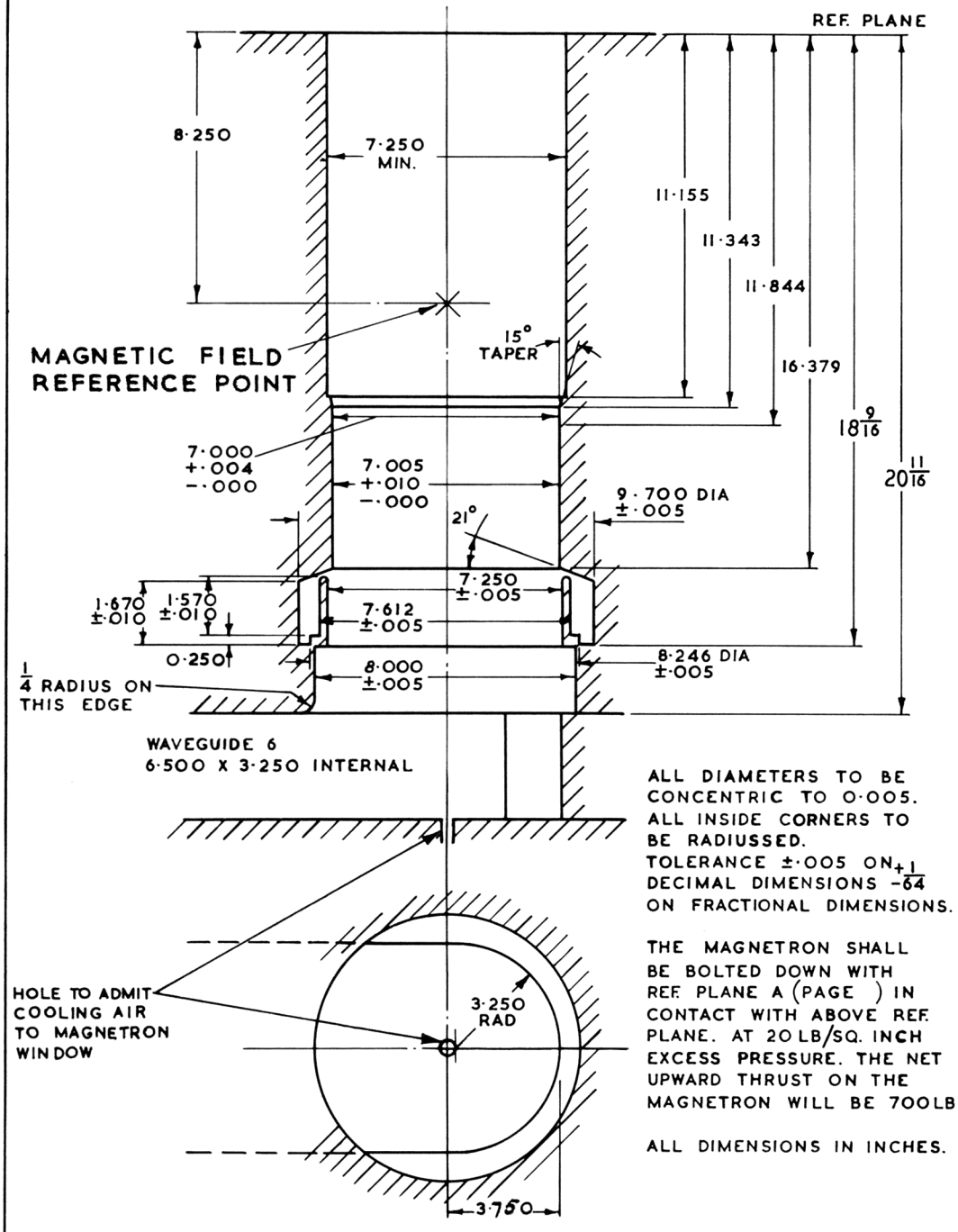
10. 0.187 Rad. Domed contact, brass - silver plated

11. Leaf spring to provide positive contact through dimension range 0.540 to 0.600.

12. A notice shall be printed prominently on this surface "DANGER, X-RADIATION HAZARD". Reference should also be made to classified document entitled "Appendix for use with Electronic Valve Specification CV6052- 54", note 2. and also to Note 8, page 5.

5. The U.K. NATO Stock No for the Heater Cathode Coaxial Socket is Amdt 1
5960-99-932-5870
The U.K. NATO Stock No. for the free plug mating with the above socket is 5960-99-960-1839.

ELECTROMAGNET AND LAUNCHING SECTION

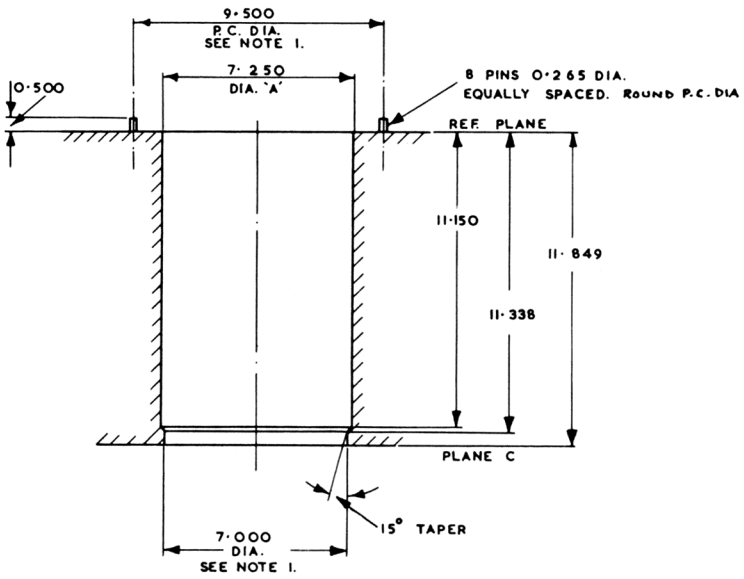


ALL DIAMETERS TO BE CONCENTRIC TO 0·005. ALL INSIDE CORNERS TO BE RADIUSSED. TOLERANCE ±·005 ON $^{+1}_{-64}$ DECIMAL DIMENSIONS ON FRACTIONAL DIMENSIONS.

THE MAGNETRON SHALL BE BOLTED DOWN WITH REF. PLANE A (PAGE) IN CONTACT WITH ABOVE REF. PLANE. AT 20 LB/SQ. INCH EXCESS PRESSURE. THE NET UPWARD THRUST ON THE MAGNETRON WILL BE 700LB.

ALL DIMENSIONS IN INCHES.

OUTLINE CHECKING GAUGE

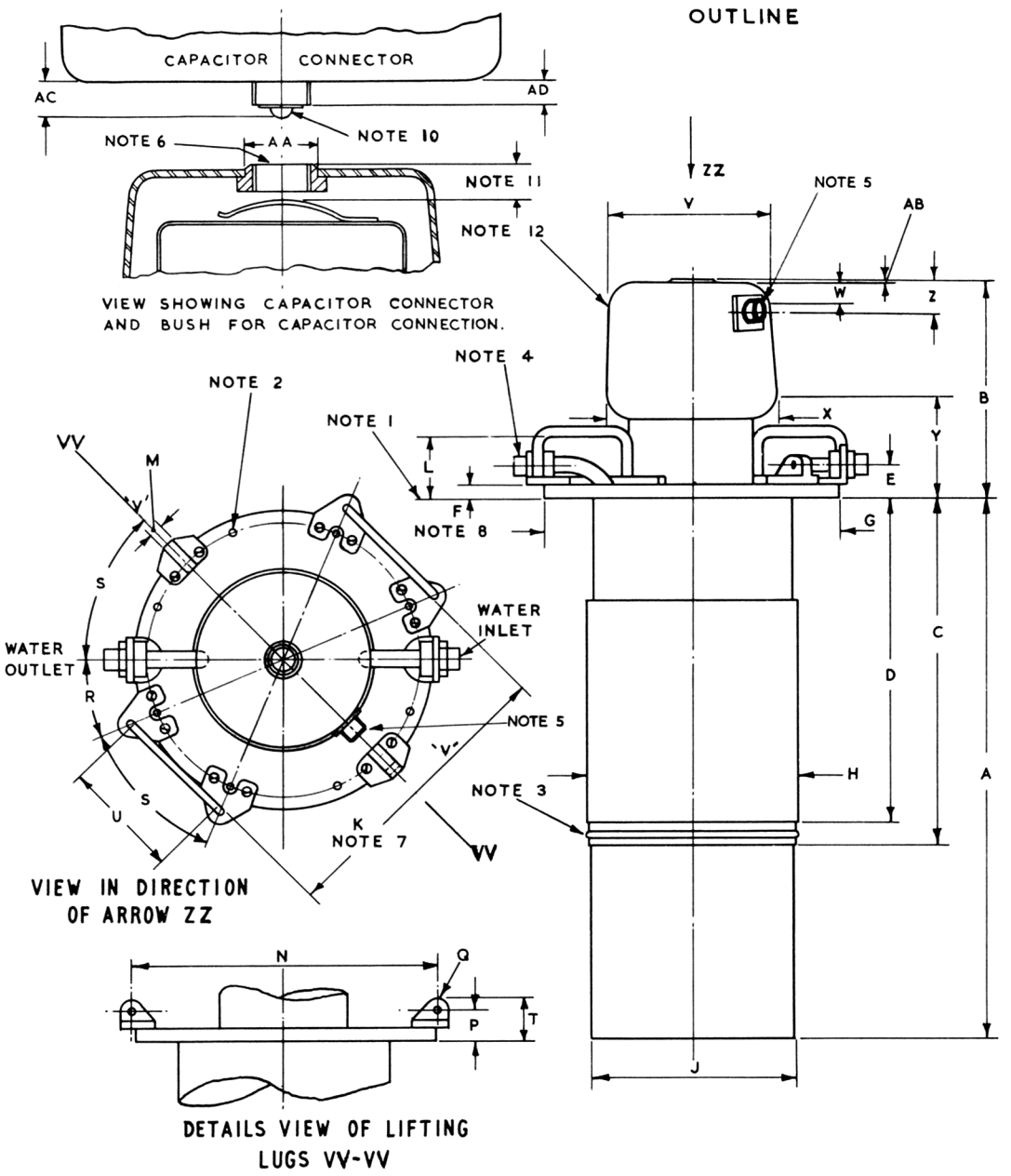


NOTES:-1. CONCENTRIC TOLERANCE 0·005" DIA. DATUM DIA. A. (B.S. 308: 1953)

2. THE VALVE SHALL BE INSERTED INTO THIS GAUGE AND SHALL ENTER. THE PINS SHALL ENTER THE 8 HOLES IN THE VALVE FLANGE. WITH VALVE PLANE A RESTING ON THE REFERENCE PLANE, A 0·010" FEELER GAUGE SHALL NOT ENTER BETWEEN THEM. IT SHALL THEN BE DEMONSTRATED THAT THE PART OF THE VALVE BELOW PLANE C LIES WITHIN A CYLINDER DIAMETER 7·000" COAXIAL WITH THE DIAMETERS OF THE ABOVE GAUGE.

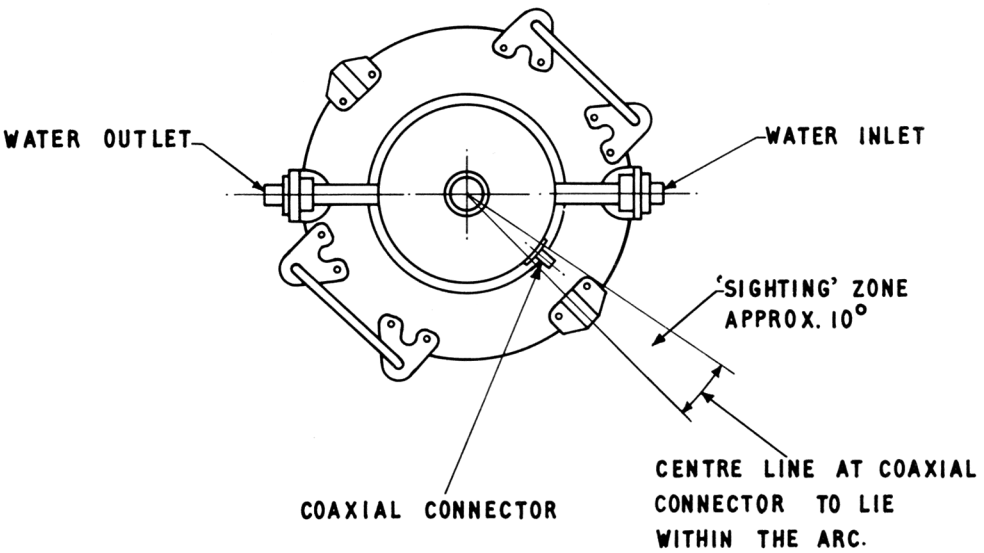
3. THE AIR LEAKAGE TEST SHALL BE MADE FROM A CHAMBER SEALED TO REFERENCE PLANE C. IN A FIXTURE SIMILAR TO THE ABOVE GAUGE.

ALL DIMENSIONS IN INCHES


OUTLINE
CAPACITOR
CONNECTOR
AC
AD
NOTE 6
AA
NOTE 10
NOTE 11
NOTE 12
VIEW SHOWING CAPACITOR CONNECTOR AND BUSH FOR CAPACITOR CONNECTION.
ZZ
V
NOTE 5
AB
W
Z
NOTE 4
NOTE 2
NOTE 1
X
B
Y
L
E
F
NOTE 8
G
VV
M
S
WATER INLET
WATER OUTLET
R
NOTE 5
C
D
H
A
NOTE 3
U
K
NOTE 7
VIEW IN DIRECTION OF ARROW ZZ
N
Q
P
T
J
DETAILS VIEW OF LIFTING LUGS VV-VV

OUTLINE DRAWING

SHOWING RELATIVE POSITION OF COAXIAL CONNECTOR



ELECTRONIC VALVE SPECIFICATIONS
SPECIFICATION MOA/CV6052-4 ISSUE 2A DATED
12th December, 1963
AMENDMENT No. 1

Page 7 Drawing Notes

Delete existing Note 5 and substitute. "The U.K. NATO Stock No. for the Heater Cathode Coaxial socket is 5960-99-932-5870.

The U.K. NATO Stock No. for the free plug mating with the above socket is 5960-99-940-1839.

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

May, 1964

23/7/64

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION MOA/CV6052-4, ISSUE 2A DATED 12th DECEMBER 1963

AMENDMENT No.2

Page 6, Note 3, add the following:-

"(Ring, Sealing, Toroidal, NATO Stock No. 5330-99-954-8782)"

March 1966

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

(230079)

6/7/66