VALVE ELECTRONIC

ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

CV6060

Specification AD/CV6060 Issue 1 Dated 6th February 1962 To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE: Microwave Gas Switch (Plug-in type Pre-T.R.Cell).

ENVELOPE: Metal and Glass

PROTOTYPE: CV2339

MARKING

See K1001/4

RATING

(All limiting values are absolute)

		S-band	Note
Operating frequency range			A
Max. Peak Power	(MW)	1.5	
Min. Peak Power	(kW)	20	
Max. Mean Power	(kW)	2	

DIMENSIONS

See drawing on page 5.

MOUNTING POSITION

Any

PACKAGING

See K1005

NOTES

A. The valve may be used in a hybrid or branched duplexer.

Operating Frequency Range

The valve is designed for use with No. 10 w.g. and the operating frequency depends on the mounting.

The valve has been tested in four single element mountings, A.B.C and D (shown on pages 6, 7 and 8) with the typical performances shown below.

Mounts A, B and C are single iris mounts. Mount D illustrates a double iris mount for use when a higher Q value is required. Above 3500 Mc/s it is necessary to remove the dielectric material from the choke to overcome a choke resonance.

	MOUNT A	MOUNT B	MOUNT C	MOUNT D	NOTES
Centre frequency (fo) (Mc/s)	3000 ± 50	3340 ± 60	3570 ± 50	3000 ± 50	
Q Value	1.4 ±0.2	1.7 ±0.2	2.15 ±0.2	4.2 ± 0.3	(i)
Insertion Loss at fo. (dB)	0.10 Max.	0.10 Max.	0.10 Max.	0.10 Max.	(ii) (iii)
Spike Leakage Energy (e/p)	1600 Max.	1200 Max.	650 Max.	850 Max.	
Flat breakthrough power (W peak)	60 Max.	70 Max.	-	20 Max.	(ii) (iii)
Total leakage energy at 0.8 μsec. pulse. (e/p)	-	-	500 Max.	-	(ii) (iii)
Recovery time (μsecs)	60 Max.	80 Max.	80 Max.	100 Max.	(ii) (iv)
Position of short circuit	+0.010" -0.040"	-	-	-	(v)

NOTES

(i) Q Value. This is the Q of the cell in its mount when loaded by a matched guide in both directions. To calculate Q, the V.S.W.R. of the mount terminated in a matched load is plotted as a function of frequency. The Q is then deduced from the formula:-

$$Q_L = \frac{1 - r}{2\sqrt{r}} \cdot \frac{fo}{f2 - f1}$$

where r = V.S.W.R. (< 1) within the range 0.5 to 0.6 at which f1 and f2 are quoted.

(ii) Measured on a matched T junction at the nominal centre frequencies and at the power levels shown:

3000 Mc/s - 240 ± 40 kW peak power
3340 Mc/s - 100 ± 10 kW peak power
3570 Mc/s - 100 ± 10 kW peak power

(iii) Calculated as given in Note 5 on page 4.

(iv) See Note 6 on page 4.

(v) The position of short circuit is measured as the distance of the effective r.f. short in front of the centre-line of the mount.

The waveguide arrangement is shown on page 9.

B. The Joint Services Catalogue Number is 5960-99-037-2253.

TESTS

CV6060

To be performed in addition to those applicable in K1001.

Tests are to be performed in the specified order unless otherwise agreed with the Inspecting Authority and are to be carried out at least 7 days after completion of manufacture. Amdt-1

Test conditions - unless otherwise stated:- Frequency = 3000 Mc/s.

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
a.	V.S.W.R. Determined as if the line were terminated in a perfectly matched load.	(i) Frequency = 3000 Mc/s (ii) " = 3060 Mc/s (iii) " = 2940 Mc/s Note 1.		100% 100% 100%		0.91 0.85 0.85	- - -	
b.	Insertion Loss	The valve shall be mounted between impedances matched better than 0.91 V.S.W.R. Note 1.		100%		-	0.10	dB
c.	Arc Loss	The valve shall be mounted on the side-arm of a T-junction and the line energised with 10 ±1kW peak r.f. power measured at the end of the main run. The main run shall be terminated in an impedance matched better than 0.91 V.S.W.R. Notes 1, 2 and 3		100%		-	0.2	dB
d.	High Power Leakage	The valve shall be mounted on the side-arm of a T-junction and the line energised with 240 ± 40 kW peak r.f. power measured at the end of the main run. The main run shall be terminated in an impedance matched better than 0.91 V.S.W.R. Notes 1,2,4 and 5		T.A.				
	(i) Spike energy					-	1600	e/p
	(ii) Peak flat power					-	60	W
e	Recovery Time	As test "d" above. Pulse length = 2 μsecs. Frequency of the simulated echo = 3000 ± 50 Mc/s. Notes 1, 2 and 6		T.A.		-	60	μsecs

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
f.	Low Power Leakage	The valve shall be mounted on the side-arm of a T-junction and the power increased until the valve fires. The maximum leakage through the valve shall be measured. Notes 1, 2 and 4		T.A.		-	15	kW
g.	Life Life test end points. (i) V.S.W.R. at 3000 Mc/s 3060 " 2940 " (ii) Insertion Loss (iii) Arc Loss (iv) High Power Leakage Spike energy Peak flat power (v) Recovery Time (vi) Low Power Leakage	Peak line power = 750 ± 50 kW. P.r.f. = 275 ± 25 p.p.s. Pulse length = 5 ± 0.5 μsecs. The valve shall be mounted on the side-arm of a T-junction. Notes 1, 2 and 7		T.A.		1000	-	hours

Notes

1. The valve shall be tested using Mount A shown on page 6.
2. The T-junction arrangement shall be as shown on page 10.
3. The arc loss of the valve is referred to the loss of the brass element shown on page 11 when substituted for the valve.
4. A thermistor mount having a bandwidth of 2500 Mc/s - 4100 Mc/s to 0.6 V.S.W.R. shall be used.
5. If the leakage power is B mW mean at a maximum pulse length of T μsecs and the average variation in leakage power over the range of approximately 1 to T μsecs is x mW / μsec then -

$$\text{Flat power} = 10^3 \frac{x}{\text{p. r. f.}} \text{ watts peak}$$

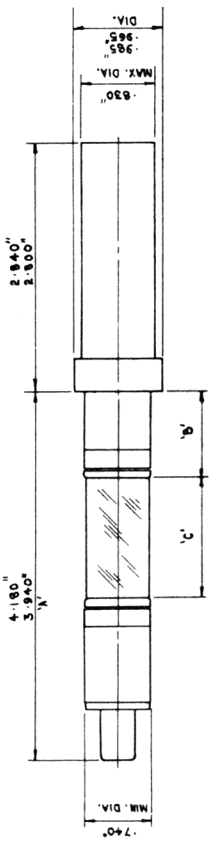
$$\text{Spike energy} = 10^4 \frac{(B - Tx)}{\text{p.r.f.}} \text{ ergs/pulse}$$

6. The time shall be measured from the trailing edge of the transmitter pulse for an insertion loss of 6 dB greater than that immediately before the transmitter pulse. The receiver arm shall be matched better than 0.9 V.S.W.R.
7. These test conditions to apply for production life testing.

NOTE TO EQUIPMENT DESIGNERS.

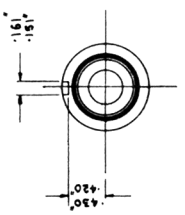
DIM.'B' - 0·905" NOMINAL.

DIM.'C' - 1·340" NOMINAL.

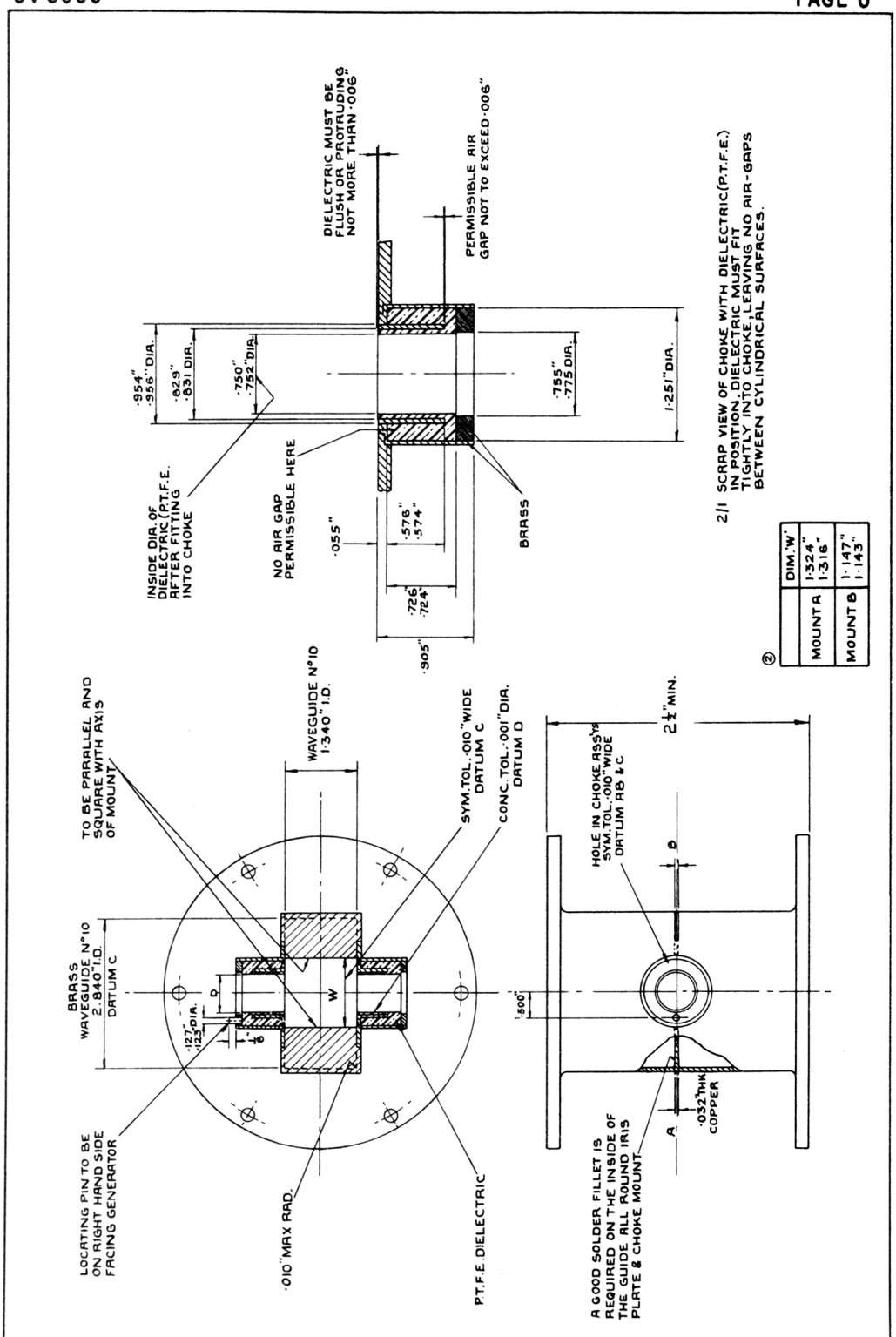


NOTE:-

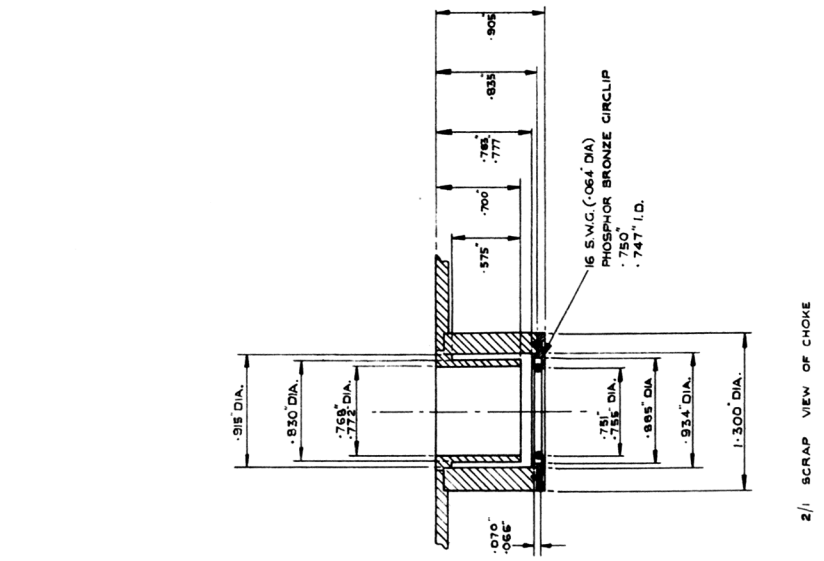
THE VALVE SHALL ENTER A STRAIGHT GAUGE TUBE ·7495" +·0005" -·0005" I.D. & LENGTH 'A'.

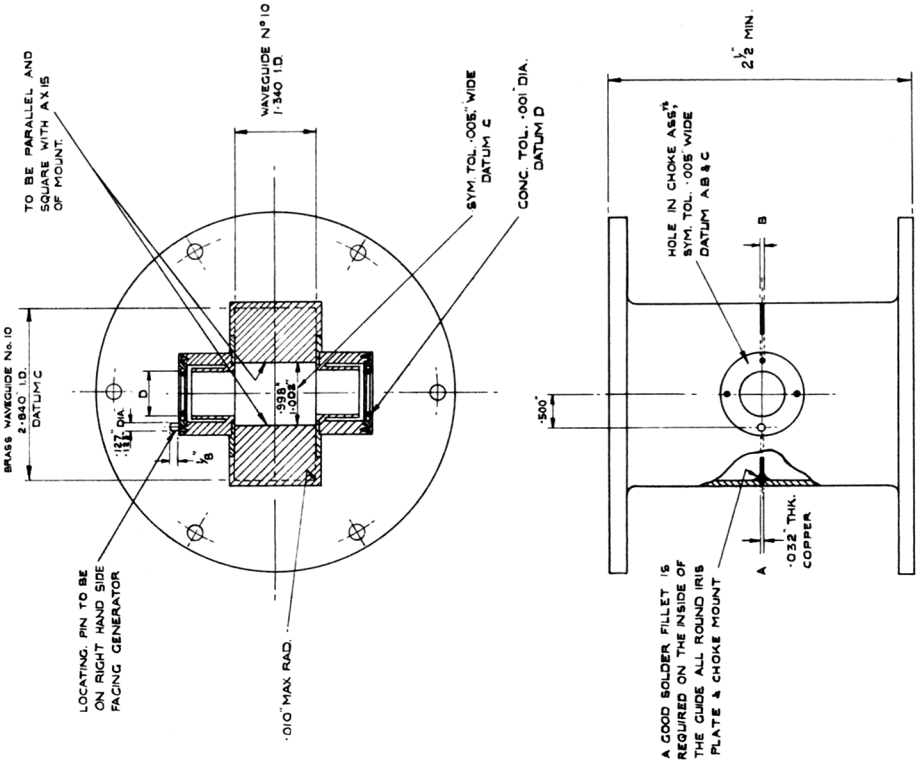


OUTLINE DRAWING

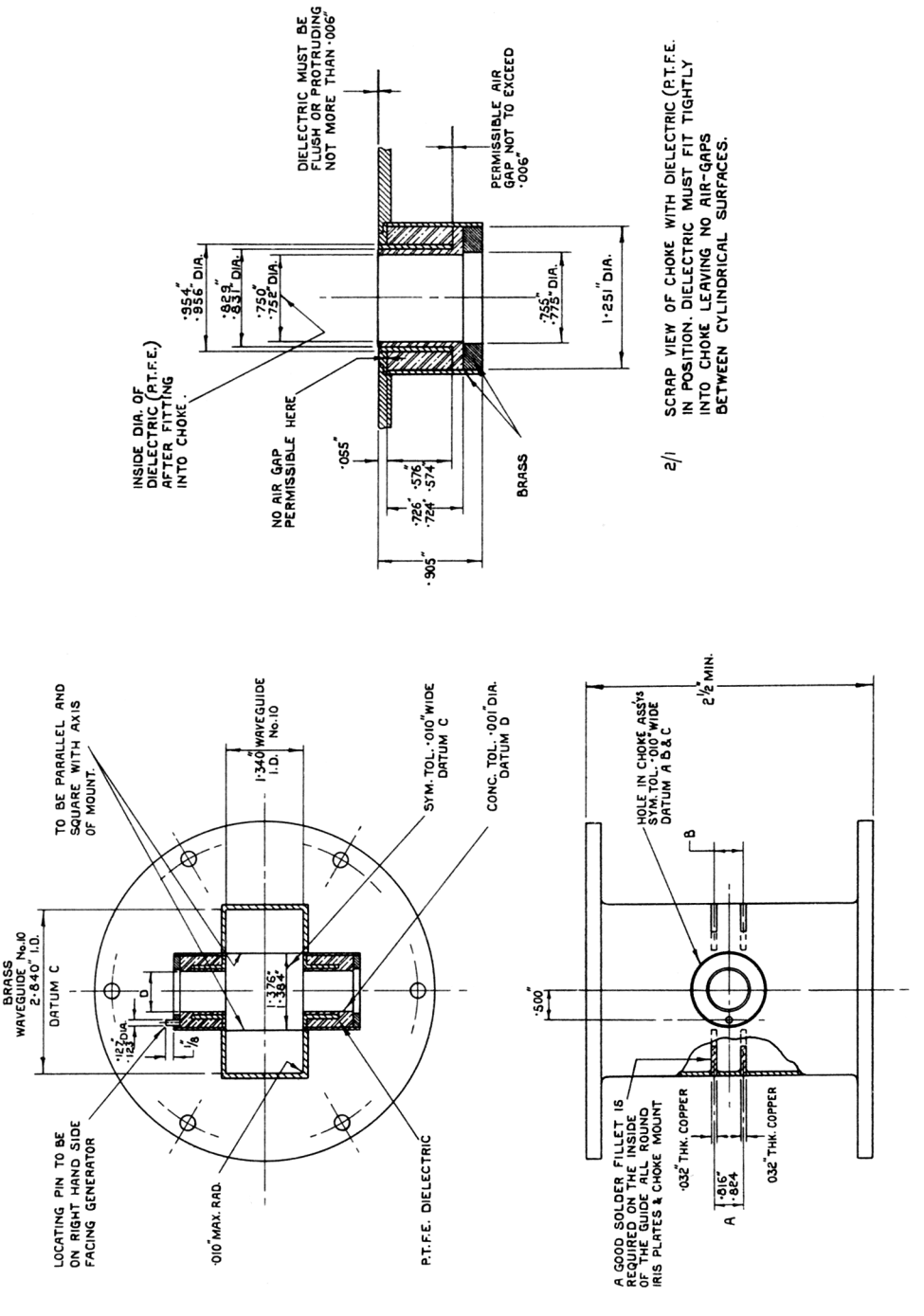


TEST MOUNTS 'A' & 'B' FOR CV 6060

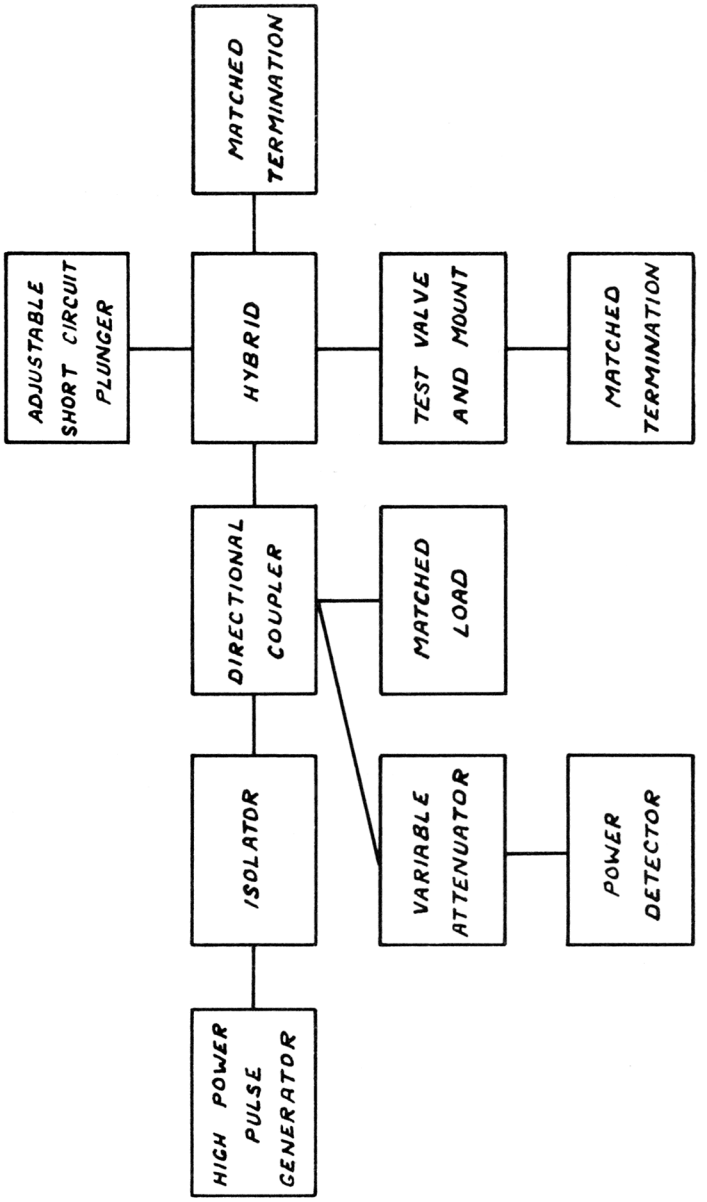




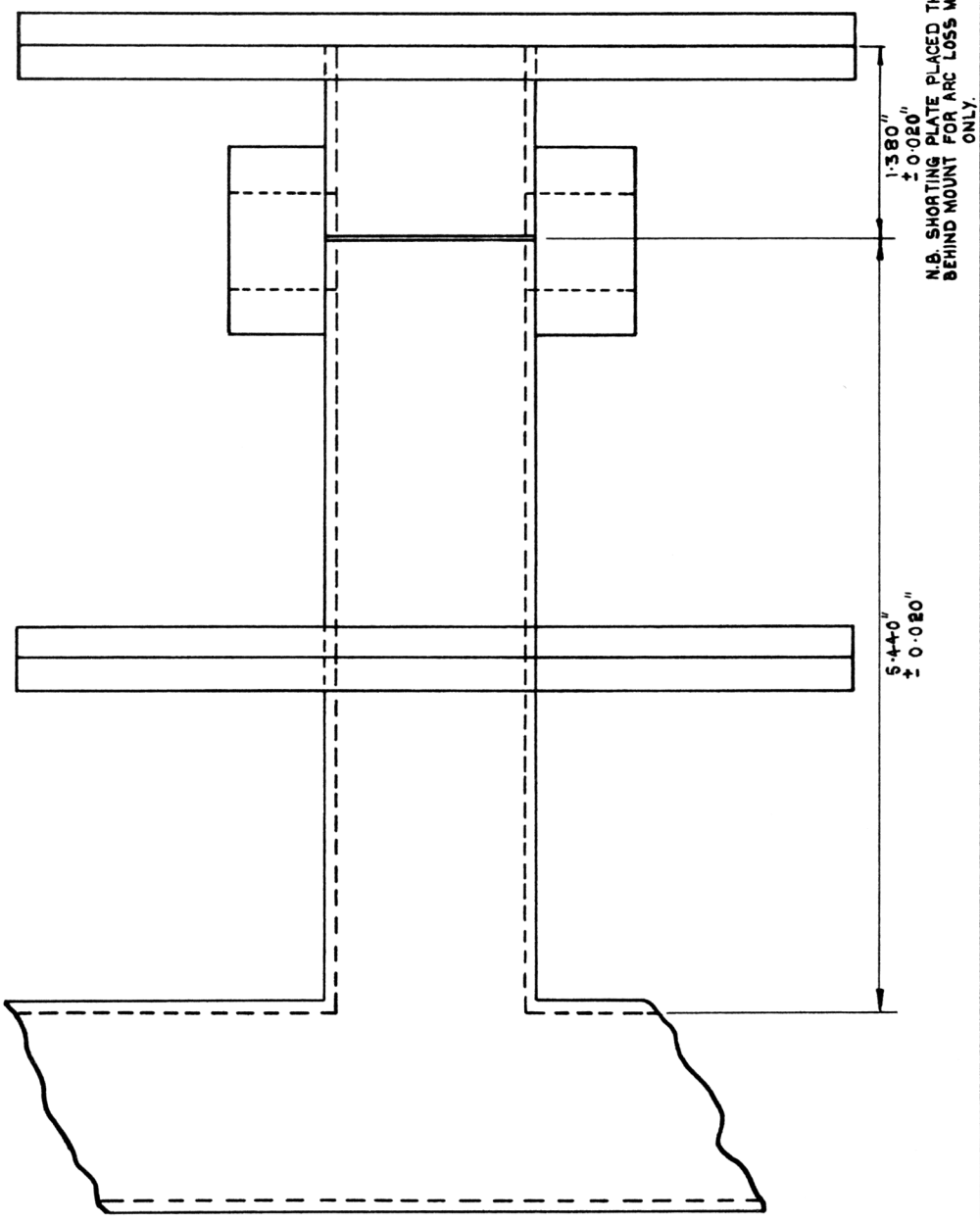
TEST MOUNT C FOR CV6060



TEST MOUNT D FOR CV 6060

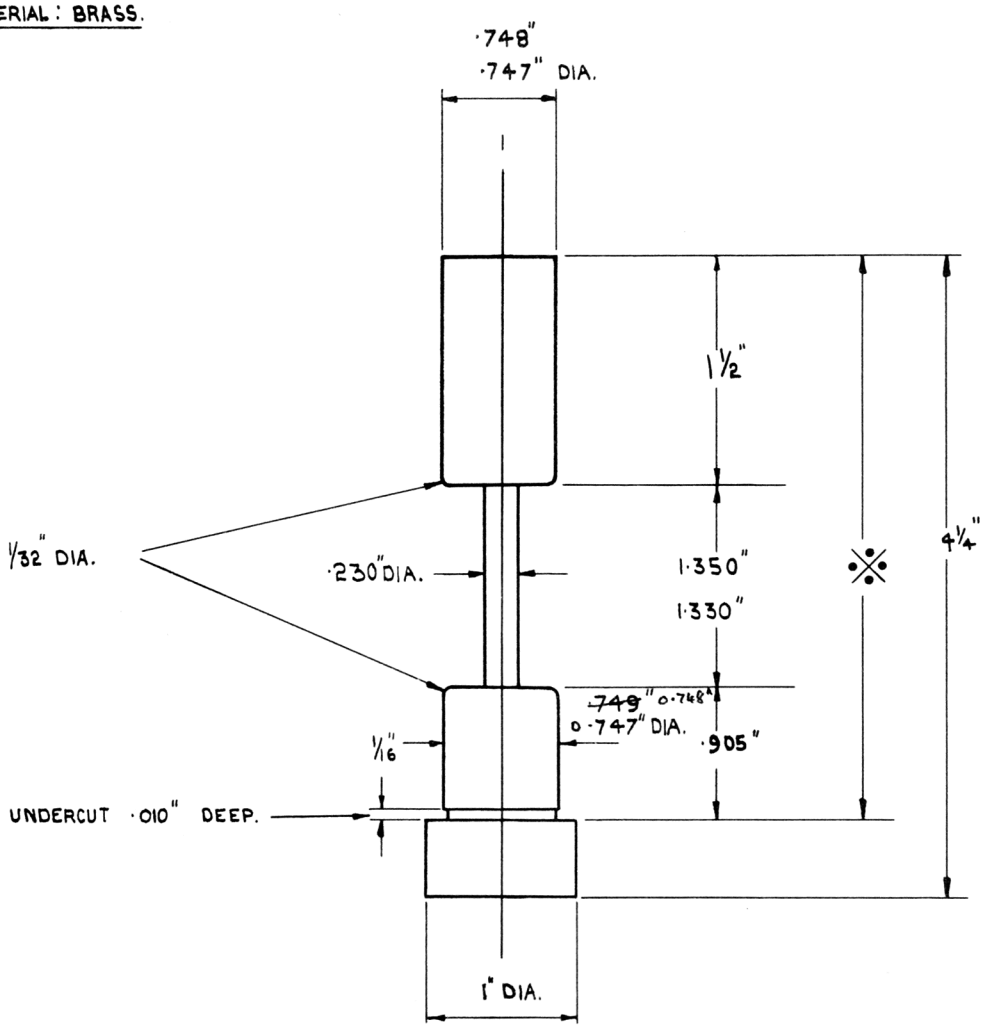


SCHEMATIC DIAGRAM FOR MEASUREMENT OF POSITION OF SHORT CIRCUIT

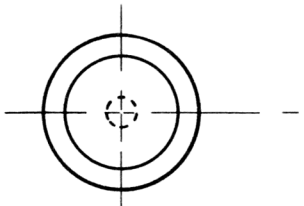


T - JUNCTION ARRANGEMENT
FOR MEASUREMENT OF CV6060

MATERIAL : BRASS.



NOTE: ✻ THIS DUMMY MUST ENTER THE VALVE STRAIGHTNESS GAUGE OVER THIS LENGTH.



DUMMY VALVE FOR ARC LOSS MEASUREMENT

CV6060/1/11

ELECTRONIC VALVE SPECIFICATIONS

Specification AD/CV6060 Issue 1. Dated 6th February, 1962

Amendment No. 1

Page 3, 2nd paragraph.

Amend this paragraph to read as follows:-

Tests to be performed in the specified order unless otherwise agreed with the Inspecting Authority and are to be carried out at least 7 days after completion of manufacture.

Page 11, Side Elevation

The diameter of the second cylinder up from the bottom quotes dimensions of "0.747" - "0.749" these should be amended to read "0.747" - "0.748".

August, 1962
N40621

T.V.C. for A.S.W.E.

AMS
26/9/62