 VALVE ELECTRONIC

ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

Specification AD/CV5398 Issue 1 Dated 2nd April, 1962. To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE: Microwave gas switch (Plug-in type T.R.Cell)

ENVELOPE: Metal and Glass

PROTOTYPE: E2978

MARKING

See K1001/4

DIMENSIONS

See drawing on page 5

RATING

(All limiting values are absolute)

			Note
Max. Peak r.f. Power	(kW)	5	A.
Min. Peak r.f. Power	(W)	500	B.
Operating Frequency Range		S-band	C.

MOUNTING POSITION

Any

PACKAGING

See K1005

NOTES

A. At a duty cycle of 0.002.

B. This power level is the minimum at which the valve will fire consistantly into a match. When followed by a short circuit or a primed T.R. gap the valve will fire at about 10W.

C. Operating Frequency Range

The valve is designed to operate in No. 10 or No. 11 waveguide and the operating frequency depends on the mounting. Chokes are provided on the valve and r.f. contact with the mount is not important.

A typical mount for No. 11 waveguide (Mount A), is shown on page 7 and for No. 10 waveguide (Mount B) on page 8. Curves of iris window dimension and Q value in No. 10 waveguide as a function of frequency are shown on page 6.
Higher Q values can be obtained using double irises and lower values by using a small ridge in the waveguide.

Typical performance

The valve is intended to be used in front of a primed T.R. gap in a conventional duplexer or in conjunction with a pre-T.R. or other unprimed gaps where the leakage power requirements are less stringent.

(Notes continued on page 2.)

NOTES (Contd.)

		MOUNT A.	MOUNT B.	NOTES
Centre frequency	(Mc/s)	3620	3265	
Loaded Q value		6.0	4.5	(i)
Insertion loss	(dB)	0.12	0.15	(ii)
Spike leakage energy	(e/p)	11	43	(ii) (iii) (iv)
Flat break through peak power	(W)	-	2.5	(ii) (iii) (iv)
Total leakage energy at 0.8/usecs pulse	(e/p)	25	-	(ii) (iii) (iv)
Recovery time to 6dB	(usecs)	8	8	(ii) (iii) ~~(iv)~~ (v)

Amdt 2

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 -

$$Q_L = \frac{1 - r}{2\sqrt{r}} \cdot \frac{fo}{f_2 - f_1}$$

where r = v.s.w.r. (< 1) within the range 0.5 to 0.6 at which f_1 and f_2 are quoted.

(ii) Measured at the nominal centre frequency.

(iii) Measured at an incident peak r.f. power of 5kW.

(iv) Calculated as given in Note 3 on page 4.

(v) See Note 4 on page 4.

D. The Joint Services Catalogue No. is 5960-99-037-2368.

TESTS

To be performed in addition to those applicable in K1001.

Amdt 1. All tests to be carried out at least 7 days after completion of manufacture.

Tests are to be performed in the specified order unless otherwise agreed with the Inspecting Authority.

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
a	Centre Frequency This frequency shall be determined as the mean of frequencies at which the v.s.w.r's are the same and in the range 0.75 ± 0.05	The line shall be energised with 20 ± 10mW r.f. power and terminated in an impedance matched better than 0.98 v.s.w.r. Note 1		100%		3600	3645	Mc/s
b	V.S.W.R. Determined as if the line were terminated in a perfectly matched load.	As test "a" above. Test frequency = 3620 Mc/s Note 1		100%		0.89	-	
c	Insertion Loss	The line shall be energised with 20 ± 10mW r.f. power and the valve mounted between impedances matched better than 0.91 v.s.w.r. Test frequency = 3620 Mc/s Note 1		100%		-	0.20	dB
d	High Power Leakage (i) Spike leakage energy (ii) Total leakage energy	The line shall be energised with 5 ± 1kW peak r.f. power and the valve mounted between impedances matched better than 0.91 v.s.w.r. Test frequency = 3600 ± 50 Mc/s. Pulse length = (i) 0.1 µsecs. min. (ii) 0.9 ± 0.1 µsecs. Notes 1, 2 and 3		100%		- -	16 35	e/p e/p
e	Recovery time	As test "d" above Pulse length = 0.9 ± 0.1 µsecs. Frequency of the simulated echo = 3620 Mc/s Notes 1 and 4		100%		-	16	µsecs

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TESTS (Contd.)

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
f	**Life**	Frequency = 3625 Mc/s ± 50 Mc/s (3265) The valve shall be		T.A.		1000	-	Hours
	Life test end-points	mounted on the side-arm						
	(i) Centre frequency	of a matched T-junction.				3595	3650	Mc/s
	(ii) v.s.w.r.	Incident Peak Power = 5				-	0.87	
	(iii) Insertion Loss	± 1kW p.r.f. = ~~875 ± 25~~				-	0.3	dB
	(iv) High Power Leakage	~~p.p.s.~~ 500 pps ± 50pps Pulse length = ~~5 ± 0.5~~						
	(a) Spike energy	~~usecs.~~ 2 μsecs ±0.2				-	20	e/p
	(b) Total energy	in 5 or alternatively 1250 pps ± 100 pps				-	40	e/p
	(v) Recovery Time	and 1 μsec ±0.1 μsec respectively Notes 5, 6 and 7				-	30	μsecs

Amdt 3

Amdt 2

NOTES

1. The valve shall be tested in Mount A shown on page 7.

2. Measured with a thermistor head having a bandwidth not less than 350 Mc/s at a v.s.w.r. of 0.67 and centred on the magnetron frequency.

3. If the measured mean leakage powers are p_1 and p_2 respectively then -

$$\text{Spike leakage energy} = \frac{10^{p_1}}{\text{p.r.f.}} \text{ ergs/pulse}$$

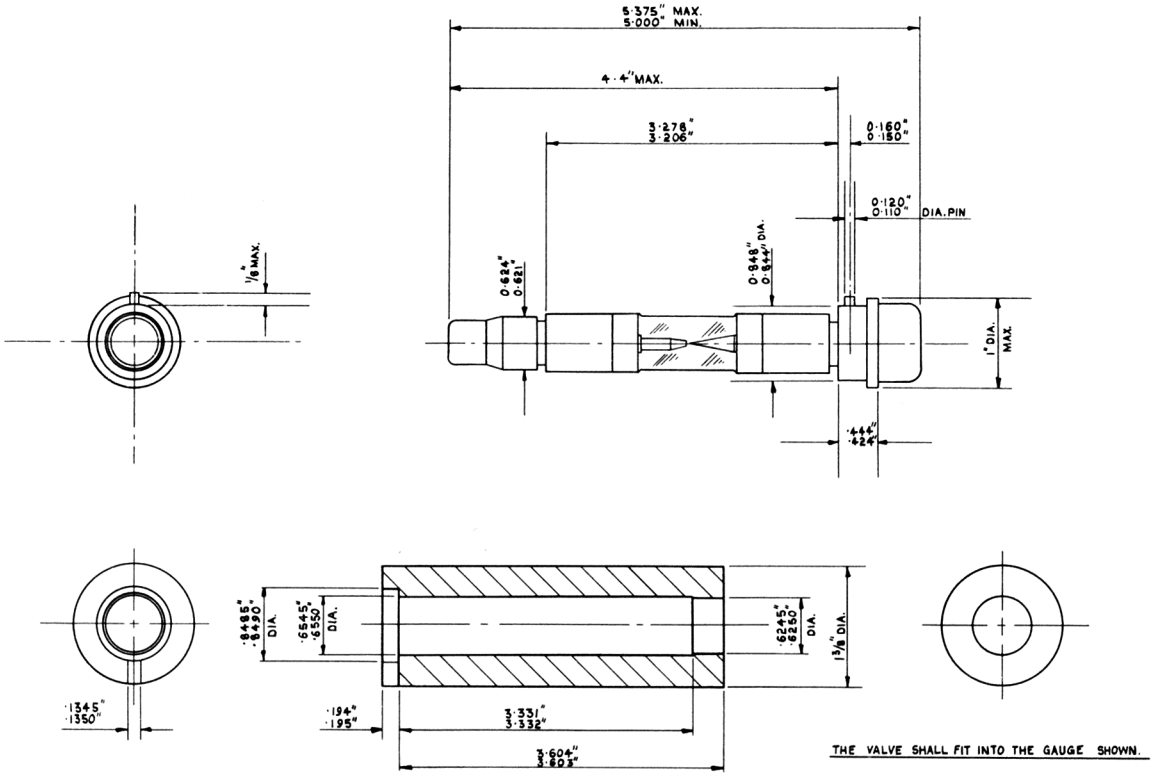
$$\text{Total leakage energy} = \frac{10^{p_2}}{\text{p.r.f.}} \text{ ergs/pulse}$$

4. The time shall be measured from the trailing edge of the transmitter pulse for an insertion loss 6dB greater than that immediately before the transmitter pulse.

5. The valve shall be tested in Mount B shown on page 8.

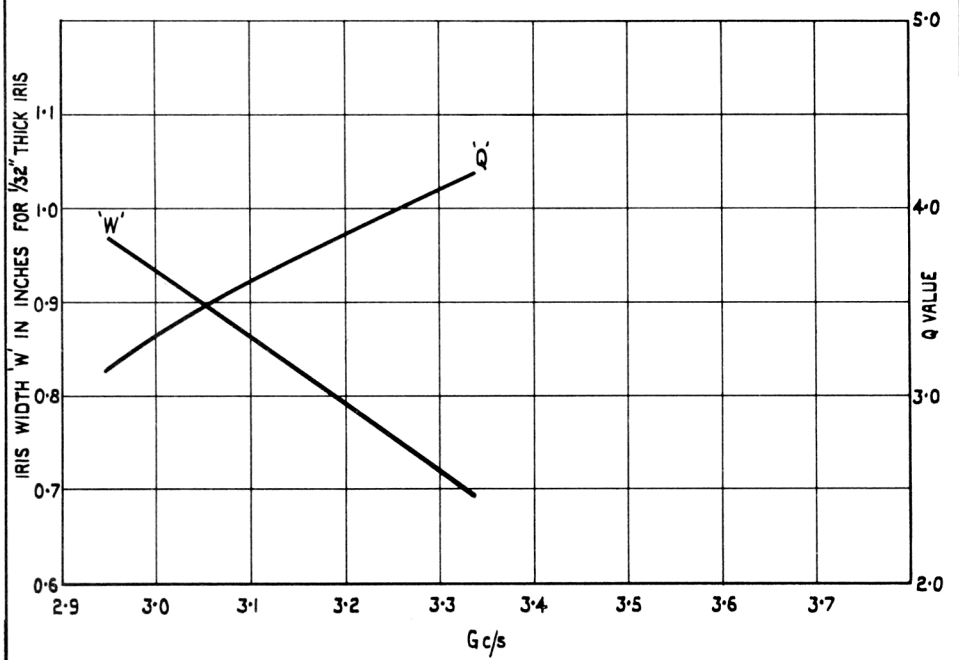
6. The end-points to be tested as given in tests "a", "b", "c", "d" and "e".

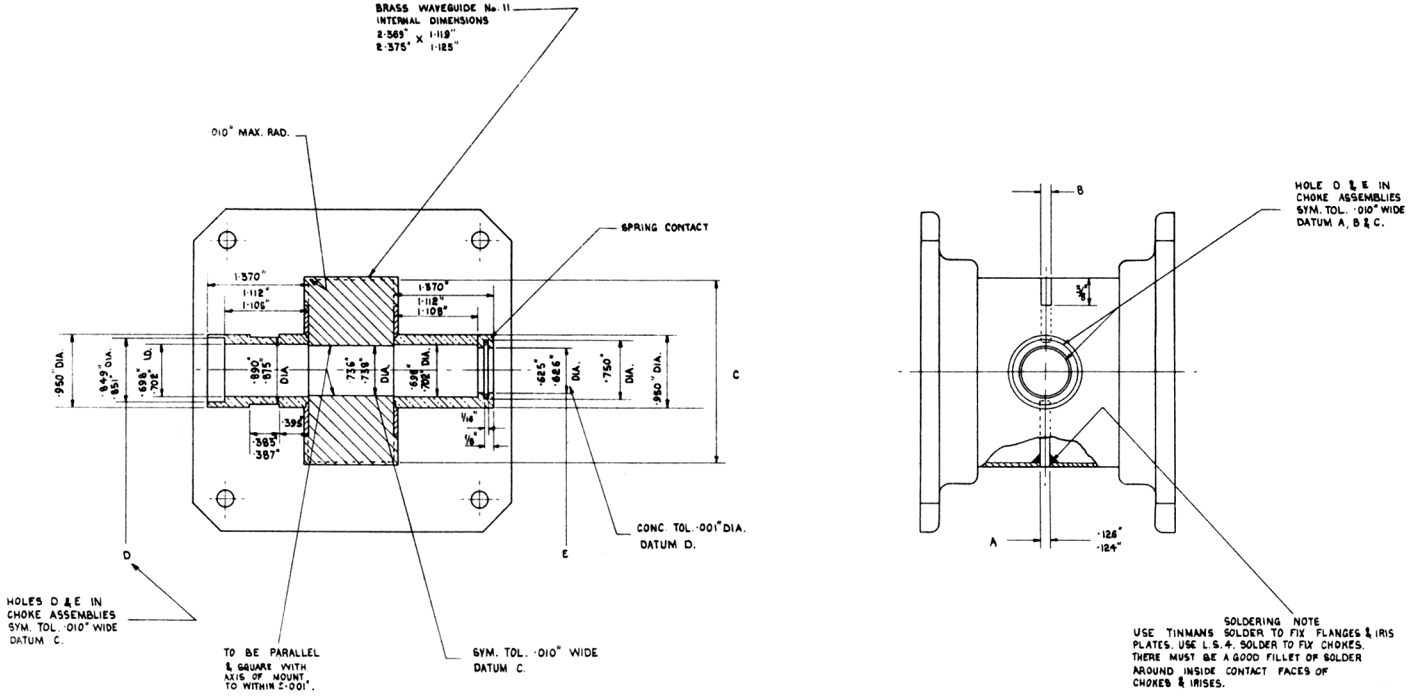
7. These test conditions apply to production life testing.



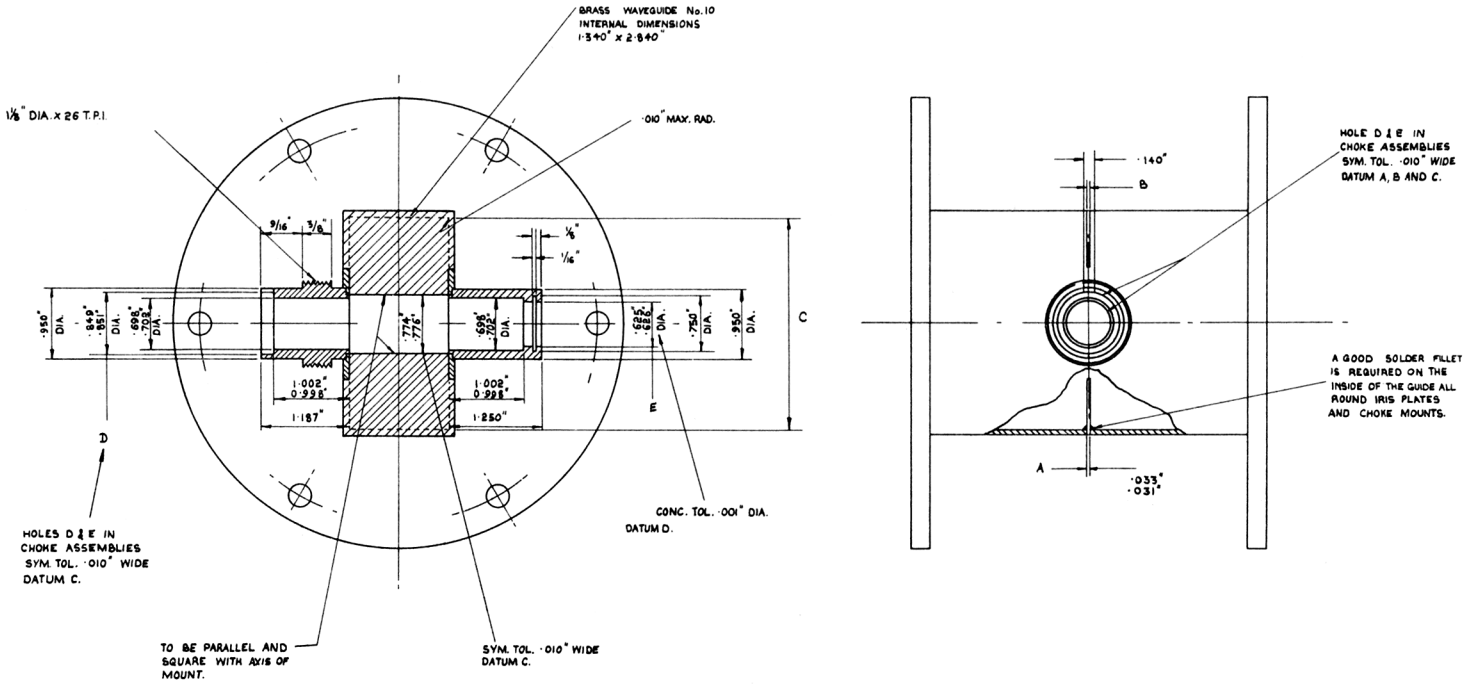
OUTLINE DRAWING

IRIS WIDTH AND Q VALUE AS A FUNCTION OF CENTRE FREQUENCY FOR 1/32" THICK IRIS PLATES IN No 10 WAVEGUIDE




BRASS WAVEGUIDE No. 11
INTERNAL DIMENSIONS
2·369" x 1·119"
2·375" 1·125"
·010" MAX. RAD.
SPRING CONTACT
1·370"
1·112"
1·109"
·950" DIA.
·849" DIA.
·851"
LD.
·698"
·702"
·890"
·875"
DIA.
·736"
·738"
DIA.
·698"
·702"
DIA.
·625"
·626"
DIA.
·750"
DIA.
·950" DIA.
C
·395"
·385"
·387"
Vie"
1/8"
D
E
CONC TOL. ·001" DIA.
DATUM D.
HOLES D & E IN
CHOKE ASSEMBLIES
SYM. TOL. ·010" WIDE
DATUM C.
TO BE PARALLEL
& SQUARE WITH
AXIS OF MOUNT,
TO WITHIN ±·001".
SYM. TOL. ·010" WIDE
DATUM C.
B
HOLE D & E IN
CHOKE ASSEMBLIES
SYM. TOL. ·010" WIDE
DATUM A, B & C.
A
·126"
·124"
SOLDERING NOTE
USE TINMANS SOLDER TO FIX FLANGES & IRIS
PLATES. USE L. S. A. SOLDER TO FIX CHOKES.
THERE MUST BE A GOOD FILLET OF SOLDER
AROUND INSIDE CONTACT FACES OF
CHOKES & IRISES.

MOUNT A


BRASS WAVEGUIDE No.10
INTERNAL DIMENSIONS
1·340" x 2·840"
1⅛" DIA. x 26 T.P.I.
·010" MAX. RAD.
9/16"
3/8"
⅛"
1/16"
·950" DIA.
·849" ·851" DIA.
·698" ·702" DIA.
·774" ·776"
·698" ·702" DIA.
·625" ·626" DIA.
·750" DIA.
·950" DIA.
C
1·002" 0·998"
1·002" 0·998"
1·187"
1·250"
D
E
HOLES D & E IN CHOKE ASSEMBLIES SYM. TOL. ·010" WIDE DATUM C.
CONC. TOL. ·001" DIA. DATUM D.
TO BE PARALLEL AND SQUARE WITH AXIS OF MOUNT.
SYM. TOL. ·010" WIDE DATUM C.
·140"
B
A
·033" ·031"
HOLE D & E IN CHOKE ASSEMBLIES SYM. TOL. ·010" WIDE DATUM A, B AND C.
A GOOD SOLDER FILLET IS REQUIRED ON THE INSIDE OF THE GUIDE ALL ROUND IRIS PLATES AND CHOKE MOUNTS.

TEST MOUNT B

ELECTRONIC VALVE SPECIFICATIONS

Specification AD/CV5398 Issue 1. Dated 2nd April, 1962.

Amendment No. 1

Page 3, 2nd line

Amend the existing sentence to read:-

"All tests to be carried out at least 7 days after completion of manufacture"

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

August, 1962.

N.40620

Ams 26/62

ELECTRONIC VALVE SPECIFICATIONS
SPECIFICATION AD/CV.5398 ISSUE NO.1 DATED 2ND APRIL, 1962
AMENDMENT NO.2

Page 2. Last Line in Table. Recovery time to 6dB

In the column headed 'NOTES', delete '(iv)' and substitute '(v)'

Page 4. Test Clause 'f'

In the column headed 'Test Conditions'

(a) Insert, 'Frequency = 3625 Mc/s ± 50 Mc/s'.

(b) Delete 'p.r.f. = 275 ± 25 p.p.s., Pulse length = 5 ± 0.5 μSecs.'

(c) Substitute 'p.r.f. = 500 p.p.s. ± 50 p.p.s., Pulse length = 2 μSecs. ± 0.2μSecs. or alternatively 1200 p.p.s. ± 100 p.p.s. and 1 μSec. ± 0.1μSec. respectively'.

August, 1963.
R190370

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

12/8/63

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION AD/CV5398 ISSUE 1 DATED 2nd April, 1962

AMENDMENT NO. 3

Page 4 Test Clause (f) Test Conditions

Amend 'Frequency = 3625 Mc/s ± 50 Mc/s'
(inserted by Amendment No. 2) to read
'Frequency = 3265 Mc/s ± 50 Mc/s.'

March, 1964

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

N.222069