This was distributed to EW-S Book holders in May 1966

VALVE ELECTRONIC

CV 6183

ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

Specification AD/CV 6183 Issue No. 1 dated 18.1.66 To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE Amplifier, Travelling Wave Tube, **Permanent Magnet** Focusing Mount, ~~in storage container~~

CATHODE Indirectly Heated
ENVELOPE Glass, in removable capsule
PROTOTYPE VX8520

RATINGS
(All limiting values are absolute and non-simultaneous)

	Symbol		Unit	Note
Heater Voltage	Vh	6.3±0.1	V	A, C
Heater Current	Ih	0.7	A	
Heater-Cathode Voltage (Max.)	Vhc	10	V	
Grid 1 Voltage, Negative (Max.)	-Vg	100	V	A, B, C
Grid 2 Voltage, (Max.)	Vg2	100	V	A, C
Grid 3 Voltage, (Max.)	Vg3	100	V	A, B, C
Grid 4 Voltage, (Max.)	Vg4	1,000	V	A, B, C
Grid 5 Voltage, (Max.)	Vg5	1,500	V	A, B, C
Helix Voltage, (Max.)	Vhel	1,600	V	A, B, C
Helix Current, (Max.)	Ihel	50	μA	C
Helix Current, Surge, (Max.)	Ihel,sur	200	μA	C, D
Collector Voltage (Max.)	Vcol	1,700	V	A, B, C
Collector Current (Max.)	Icol	600	μA	A, C
Input Power, Mean (Max.)	Pin	1	W	

TYPICAL OPERATING CONDITIONS	Symbol		Unit	Note
Grid 1 Voltage, Negative	-Vg1	40	V	A, B, C
Grid 2 Voltage	Vg2	30	V	A, C
Grid 3 Voltage	Vg3	50	V	A, B, C
Grid 4 Voltage	Vg4	550	V	A, B, C
Grid 5 Voltage	Vg5	850	V	A, B, C
Helix Voltage	Vhel	1,300	V	A, B, C
Collector Voltage	Vcol	1,400	V	A, B, C
Helix Current	Ihel	5	μA	C
Collector Current	Icol	450	μA	A, C
Frequency Range		(9.0 (-10.0	Gc/s	
Noise Factor	F	8	dB	
Small Signal Gain		23-26	dB	E
Working Saturated Output Power	Psat	4	mW	E

MARKING
K1001/4 See Outline Drawing Page 9 Amdt 1

CONNECTIONS
See Outline Drawing Page 9
6 Contact fixed plugs, Mk. IV
N.A.T.O. Stock Nos:
(1) 5935-99-920-8646
(2) 5935-99-920-8647

Pin Ref.	5935-99-920-8646	5935-99-920-8647
A	Heater	Grid 4
B	Heater	Blank
C	Cathode	Grid 5
D	Grid 1	Blank
E	Grid 2	Grid 5
F	Grid 3	Blank

Top Connectors:
A Helix
B Collector

R.F. Input/Output CONNECTORS
W.G.16 Choke Flanges
N.A.T.O. Stock No.
5985-99-083-0003

MOUNTING POSITION
Any

DIMENSIONS
See Outline Drawing Page 9

WEIGHT
50 lbs. approximately exclusive of storage container

NOTES

A. Each valve shall be inscribed with individual markings determined by the manufacturer see Drawing Page 9 . The valve should be operated under the marked conditions and within the following tolerances:

$V_h \pm 0.1V$, $V_{g1} \pm 1\%$, $V_{g3} \pm 1\%$, $V_{g4} \pm 1\%$, $V_{g5} \pm 1\%$,

$V_{hel} \pm 0.5\%$, $V_{col} \pm 1\%$, $I_{col} \pm 0.5\%$. The marked value of V_{g2} shall be nominal.

Power Supply Stability and Ripple: see K1001/5.4.2.

B. All voltages are quoted with respect to cathode.

C. The required setting-up and switch off procedures are as follows:

1. Switch on heater and increase voltage slowly to the marked value.

2. Allow a minimum of 5 minutes cathode heating time.

3. Ensure that V_{g2} is zero.

4. Switch on V_{col}, V_{hel} and all other grid voltages (excluding V_{g2}) simultaneously and adjust to marked values.

5. Increase V_{g2} until I_{col} reaches the marked value, maintaining I_{hel} at a minimum by adjustment of V_{g5} within the specified tolerance; I_{hel} must not exceed 50 μA. If the rate of increase of V_{g2} is too great, helix current surges may be experienced. These will be of short duration and should not exceed 200 μA.

6. Variation of electrode voltages within the specified limits is permissible.

Switching off (a) Reduce V_{g2} to zero.

(b) Then simultaneously switch off all other voltages.

D. The duration of any surge current shall not exceed 5 secs.

E. Measured over the frequency range 9-10 Gc/s with electrodes at fixed voltages.

F. WARNING. Magnets and ferro-magnetic material in the proximity of the valve will affect its performance and may cause permanent damage. Minimum distances for small quantities of magnetic materials shall be as shown on drawing, page 9.

G. The valve should be kept in its storage container when not in use.

H. N.A.T.O. Stock No. 5960-99-037-4625

CV 6183

TESTS

To be performed in addition to those applicable in K1001.
Tests are to be performed, after a holding period of 28 days, in the order specified, unless otherwise agreed with the Inspecting Authority.

Test Conditions - Unless Otherwise Specified

(i) Voltages and Currents shall be those marked on the valve, with the following tolerances applying:
$V_{g1} \pm 1\%$, $V_{g3} \pm 1\%$, $V_{g4} \pm 1\%$, $V_{g5} \pm 1\%$, $V_{col} \pm 1\%$, $V_{hel} \pm 0.5\%$, $I_{col} \pm 0.5\%$, $V_h \pm 0.1V$

(ii) $V_{col} = V_{hel} + 100V$.

(iii) Maximum mismatch presented to output waveguide 1.25:1

Clause	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
a.	Heater Current	Apply V_h only. Note 1.		100%	I_h	0.3	~~0.7~~ 0.55	A
b.	Noise Factor	Note 2, 3, 4.		100%	F	-	9.5	dB
c.	Small Signal Gain	Note 2, 3, 5, 9.		100%		22	28	dB
d.	Working Saturated Output Power	Note 2, 3, 6.		Note 20	P_{sat}	2	10	mW
e.	Grid 1 Voltage (Negative)	Note 2, 3.		100%	$-V_{g1}$	20	50	V
f.	Grid 2 Voltage	Note 2, 3.		100%	V_{g2}	-	50	V
g.	Grid 3 Voltage	Note 2, 3.		100%	V_{g3}	30	70	V
h.	Grid 4 Voltage	Note 2, 3.		100%	V_{g4}	300	600	V
j.	Grid 5 Voltage	Note 2, 3.		100%	V_{g5}	600	1000	V
k.	Helix Voltage	Note 2, 3.		100%	V_{hrl}	1,100	~~1,400~~ 1350	V
l.	Grid 1 Current	Note 2, 3.		100%	I_{g1}	-10	10	µA

Clause	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits		Units
						Min.	Max.	
m.	Grid 2 Current	Note 2.		100%	I_{g2}	-10	10	µA
n.	Grid 3 Current	Note 2.		100%	I_{g3}	-10	10	µA
o.	Grid 4 Current	Note 2.		100%	I_{g4}	-10	10	µA
p.	Grid 5 Current	Note 2.		100%	I_{g5}	-10	10	µA
q.	Helix Current	Note 2.		100%	I_{hel}	-	30	µA
r.	Collector Current	Note 2.		100%	I_{col}	395	505	µA
s.	Hot Output V.S.W.R.	Note 2, 9		100%		-	2.5:1	Ratio
t.	Output Mismatch	Mismatch presented to output waveguide 1.5:1 (1) Noise Factor Retest clause (b) Note 2, 3, 4. (2) Small Signal Gain Retest clause (c) Note 2, 3, 5, 9.		Note 22		- 21.5	9.6 28.0	dB dB
u.	Cold Attenuation	Note 7, 8.	15	Note 20		35	-	dB
v.	Vibration (i) Resonance Search	All voltages applied. At a frequency of 9.35 Gc/s apply a signal to give an output not exceeding 100 µW. Observe amplitude Modulation of output. Note 10, 11, 12, 13, 14, 15.		Q.A.		-	1	%
	(ii) Fatigue End Point	No voltages applied. Retest clauses (a), (b), (c) and (e) to (r) inclusive. Note 10, 15, 16.						

TESTS CONT'D

CV 6183

Clause	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits Min.	Limits Max.	Units
w	Shock Test (i) End point	No voltages applied. Retest clauses (a), (b), (c) and (e) to (r) inclusive Note 17.		Q.A.				
	Shock Test (ii)	No voltages applied. Change of Noise Factor. Note 2, 3, 4, 21.		100%			±0.25	dB
x	Life Test End points	All voltages applied.				500	-	hours
		Retest clause (b). Change of noise factor.				-	+0.5	dB
		Retest clause (c). Change of small signal gain.				-	±1.0	dB
		Retest clause ~~(8)~~(9) Change of helix current. Note 18, 19.				-	+50 or +10 whichever is greater	% / µA

Amdt 1

NOTES

1. Read I_h after a minimum running time of 5 minutes.

2. The setting up procedure for test is as follows:

   (i) Switch on heater and increase voltage slowly to the marked value.

   (ii) Allow a minimum of 5 minutes cathode heating time.

   (iii) Ensure that V_{g2} is zero.

   (iv) Switch on V_{col}, V_{hel} and all other grid voltages simultaneously and adjust to marked values.

   (v) Increase V_{g2} gradually until I_{col} reaches the marked value.

   (vi) Check and re-adjust electrode voltages.

   (vii) Adjust position of magnetic shunts over a small range to obtain minimum I_{hel}.

3. Variation of electrode voltages about the marked values, within the specified tolerances, is permissible to optimize collectively small signal gain, noise factor and saturated output power. The voltages thus obtained shall be used for all tests.

4. The noise factor measurement shall be made by comparing the travelling wave tube noise with that from a standard noise source, Type CV1881 and shall be single sideband only. A tunable filter of bandwidth 2 Mc/s at the 3 dB points, preceded and followed by an isolator of not less than 20 dB reverse attenuation, shall be inserted between the travelling wave tube output and mixer input terminals. The centre frequency of the intermediate frequency amplifier used for the measurement shall be in the range 40-60 Mc/s and the bandwidth shall be 2 Mc/s. The measurement shall be made at intervals of approximately 33 Mc/s $\pm$ 20% from 9.0 Gc/s to 10.0 Gc/s. Any valve exhibiting a variation in noise factor of 1 dB or more in measurements made at any 4 consecutive frequency intervals shall not be accepted.

5. The small signal gain shall normally be measured by comparison with a calibrated attenuator.

6. The working saturated power is defined as the maximum output power attained as the input power is increased from zero when the procedures of Notes 2 and 3 have been performed. The input frequency shall be 9.5 Gc/s.

7. At Qualification Approval only, the Cold Attenuation shall be measured at intervals of 100 Mc/s from 9.0 to 10.0 Gc/s.

8. Measured at a frequency of 9.5 Gc/s.

9. Measured at intervals of 100 Mc/s from 9.0 to 10.0 Gc/s.

10. The valve shall be mounted, with the major axis horizontal, and the waveguide connectors uppermost, in an anti-vibration mount, N.A.T.O. Stock No. 5340-99-120-7509. The axis of vibration shall be vertical. The vibration shall be sinusoidal and shall cover the frequency range of 10-100 cycles per second, the rate of change not exceeding 1 octave per minute.

CV 6183

as follows:-
10 to 25 Hz at ½g
25 to 50 Hz at 1g
50 to 100 Hz at ½g

Amdt 1

The acceleration shall be 2g except over the frequency range in which the peak to peak amplitude would exceed 4 mm, in which case the acceleration shall be adjusted to limit the amplitude to 4 mm.

11. The test shall be performed by one sweep of increasing frequency and one sweep of decreasing frequency. At any resonant frequency, determined by an increase of amplitude modulation by a factor of three, in any frequency interval of 5 cycles per second, the valve shall be vibrated for 2 minutes.

12. The percentage amplitude modulation at a frequency 65 ± 5 cycles per second shall be recorded.

13. The crystal detector used in the measurement shall not be operated in a saturated condition.

14. The amplitude modulation limit is provisional and subject to review after measurements have been made on production samples.

15. In the event of a failure, deliveries shall be suspended and a further sample tested. Should this also fail, the Qualification Approval Authority shall be consulted.

16. The valve shall be vibrated, subject to the conditions of Note 10, for a period of 50 hours.

17. The test shall be performed either on the complete assembly or on the assembly less focusing mount. The acceleration shall be 20g for a period of 12 mS, with a rise time not exceeding 1 mS. Three shocks shall be applied in each of three mutually perpendicular directions, one of which shall be the major axis of the valve.

18. After adjustment of electrode voltages within the specified limits, the valve performance shall meet the given requirements.

The sample size shall be as follows:-

Lot Size	Sample Size
1-14	Subject to negotiation
15-25	1
26 or greater	2 or 2%, whichever is greater

The lot size shall be the total contract quantity.

Deliveries shall be held until satisfactory completion of a life of 250 hours minimum. Where previous life test data is available, deliveries may be released at the discretion of the Qualification Approval Authority.

Thereafter, where previous results have proved satisfactory, delivery of valves may be permitted without awaiting results of current tests.

In the event of a failure, the Qualification Approval Authority shall be informed.

19. The life test end points are provisional. The contractor shall maintain records of performance during life test and these shall be submitted to the Qualification Approval Authority.

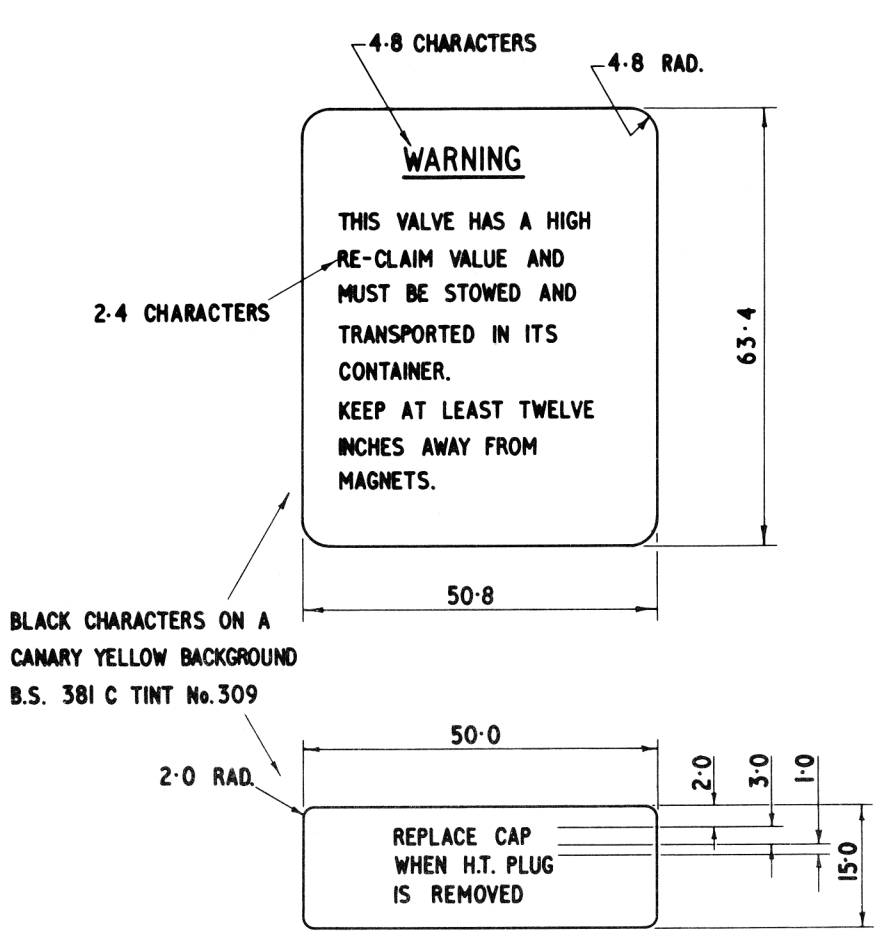
A valve which fails to meet the designated life test end points at the end of 500 hours shall be deemed to have failed life test clause **(x)** only after negotiation with the Qualification Approval Authority.

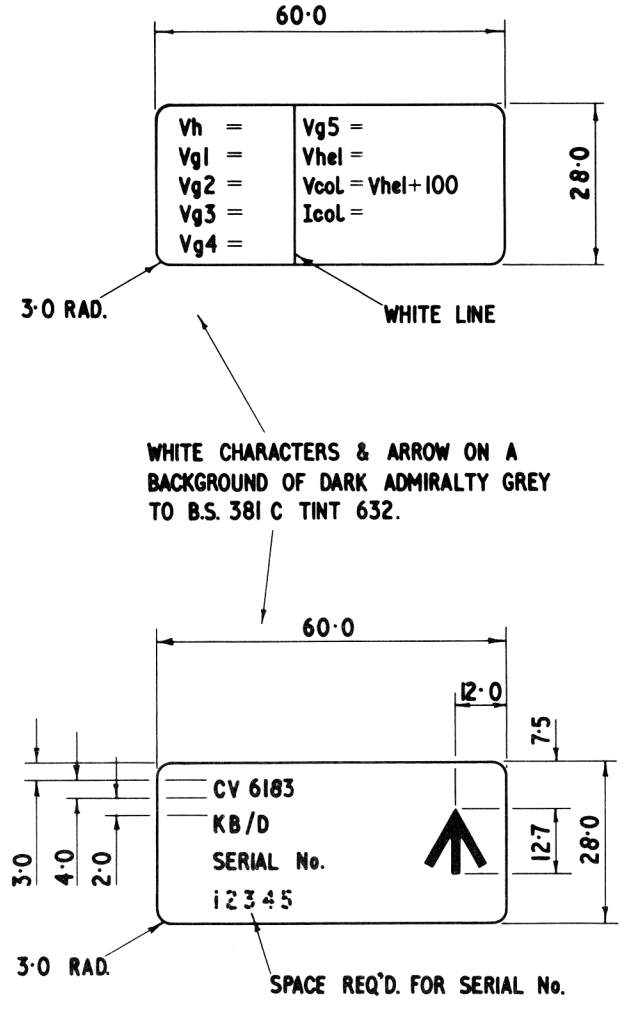
20. The measurement to be made at Qualification Approval and thereafter on every tenth valve. The results of the test are to be submitted to the Qualification Approval Authority.

21. The valve shall be subject to 5 free falls, each fall of 0.25 inch amplitude, along each of three mutually perpendicular axes. The noise factor shall be determined at the 4 frequencies at which the highest noise factors were measured in test clause (b). The maximum individual change of noise factor shall be $\pm$ 0.25 dB. The valve shall then be subject to a further 5 free falls, each fall of 0.25 inch amplitude, along the opposed mutually perpendicular axes. The noise factor shall again be determined at those 4 frequencies at which the highest noise factors were measured in test clause (b). The maximum individual change in noise factor from that initially determined in test clause (b) shall again be $\pm$ 0.25 dB. If any measurement indicates a change of noise factor of greater than $\pm$ 0.25 dB, test clause (b) shall be performed again and the results submitted to the Qualification Approval Authority.

22. The measurement to be made at Qualification Approval and thereafter on every fifth valve. The results of the test are to be submitted to the Qualification Approval Authority.

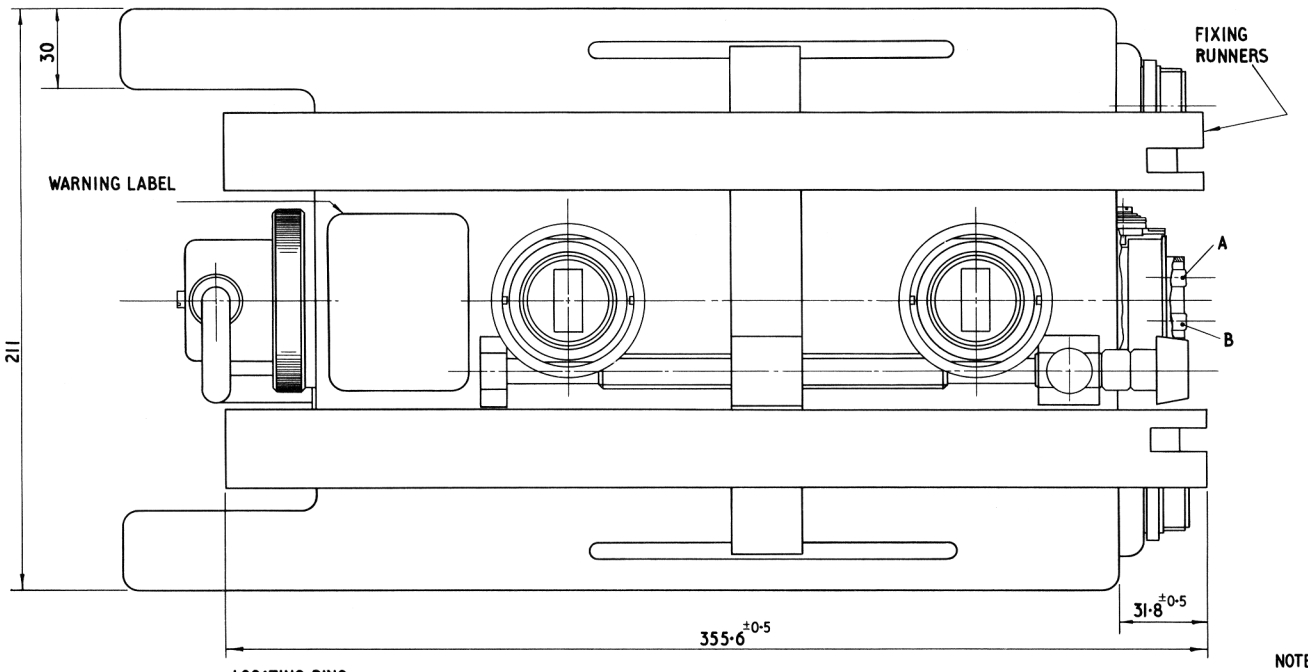
DETAILS OF LABELS





DIMENSIONS IN MILLIMETRES

THIRD ANGLE PROJECTION



DETAILS OF OPERATIONAL LABEL

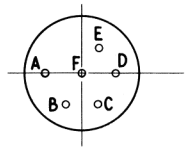
Vh =	Vg5 =
Vg1 =	Vhel =
Vg2 =	VcoL = Vhel + 100
Vg3 =	IcoL =
Vg4 =	

DETAILS OF WARNING LABEL

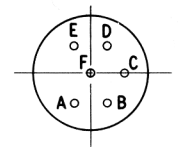
WARNING

THIS VALVE HAS A HIGH RE-CLAIM VALUE AND MUST BE STOWED AND TRANSPORTED IN ITS CONTAINER.
KEEP AT LEAST TWELVE INCHES AWAY FROM MAGNETS.

PIN DETAILS OF CONNECTOR N.A.T.O. STOCK No. 5935-99-920-8647

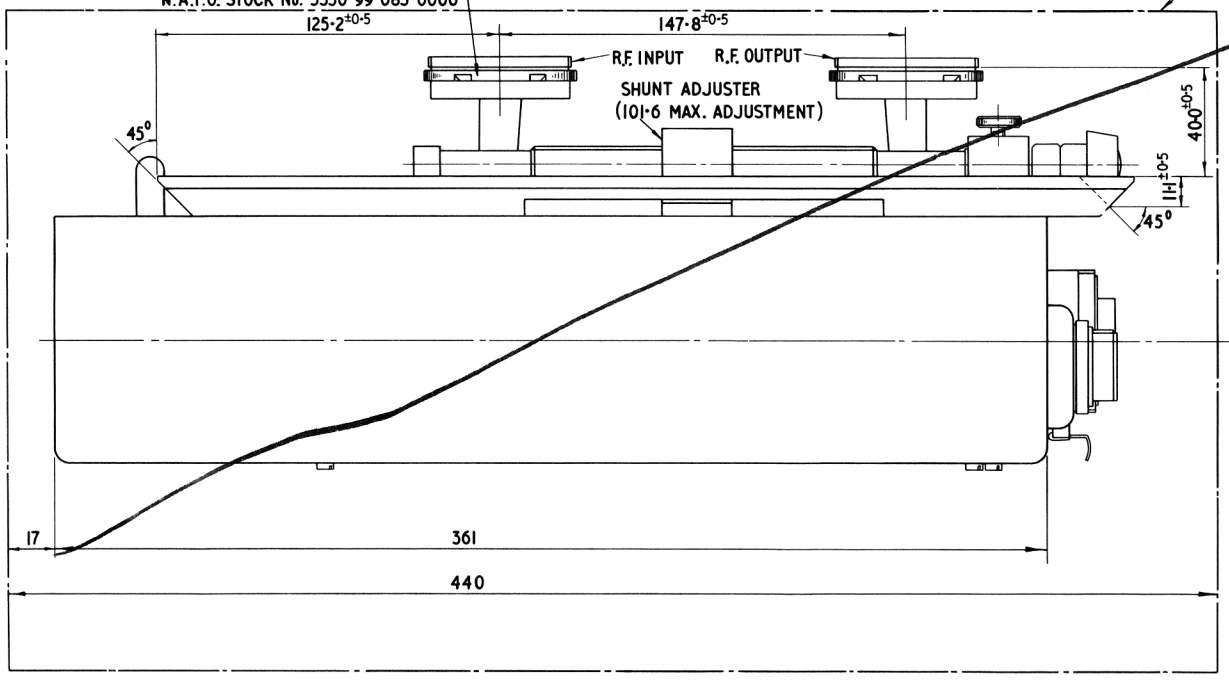


PIN DETAILS OF CONNECTOR N.A.T.O. STOCK No. 5935-99-920-8646

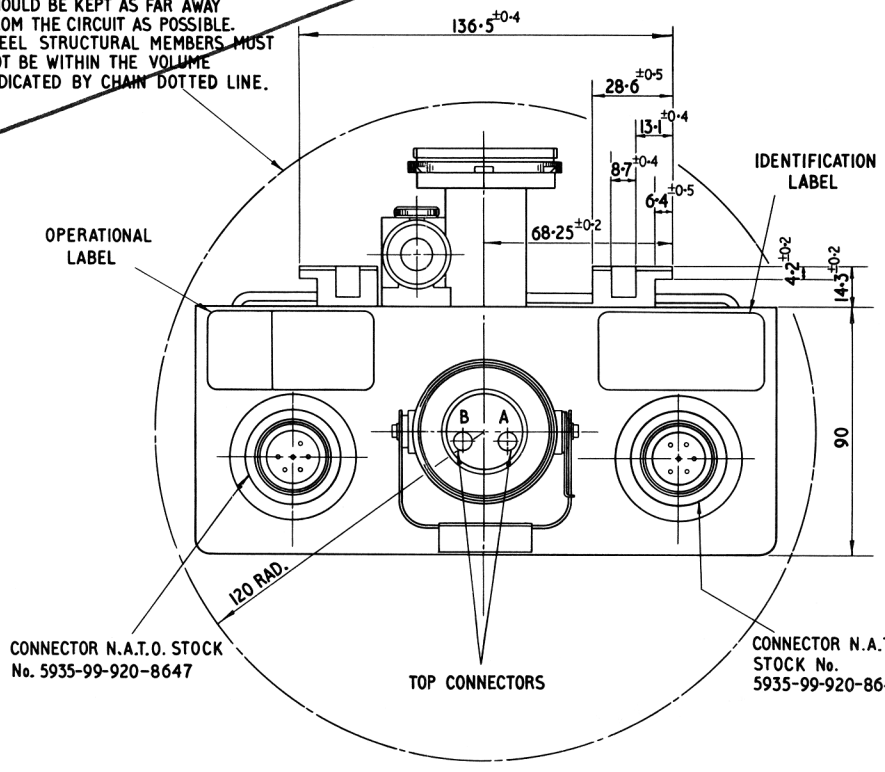


SUPERSEDED BY PAGES 9 & 9A Amdt 1

LOCATING RING
N.A.T.O. STOCK No. 5985-99-083-0002
CHOKE FLANGE
N.A.T.O. STOCK No. 5985-99-083-0003
SEALING RING
N.A.T.O. STOCK No. 5330-99-083-0006



NOTE: FERRO-MAGNETIC MATERIALS SHOULD BE KEPT AS FAR AWAY FROM THE CIRCUIT AS POSSIBLE. STEEL STRUCTURAL MEMBERS MUST NOT BE WITHIN THE VOLUME INDICATED BY CHAIN DOTTED LINE.



ALL DIMENSIONS IN M.M.
TOLERANCE UNLESS OTHERWISE STATED ±1·5 MM.

OUTLINE DRAWING

This was distributed to EVS Book holders in December 1967

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION AD/CV6183 ISSUE 1 DATED 18th JANUARY, 1966

AMENDMENT NO. 1

Page 1. Type of Valve delete "in storage container".

Page 5. Clause x, Test Conditions (Line 8) amend "Retest clause (g)" to read "Retest clause (q)".

Page 7. Line 1, delete "2g" and insert:-

"as follows:-

10 to 25 Hz at $1\frac{1}{2}$g

25 to 50 Hz at 1g

50 to 100 Hz at $\frac{1}{2}$g"

Page 9. Remove existing page 9, insert pages 9 and 9A attached.

July, 1967.

504860

JMAS 6/7/68

ELECTRONIC VALVE SPECIFICATION
SPECIFICATION AD/CV6183 ISSUE 1
DATED 18TH JANUARY 1966

AMENDMENT 2

Page 3 Clause a

Limits column:- amend the maximum value to 0.55 Amp.

Page 3 Clause k

Limits column:- amend the maximum value to 1350 Volts.

August, 1968.

TVC for ASWE

AHS 30/7/68