

## ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

Specification AD/CV6090 Issue 1 Dated 4. 8. 61. To be read in conjunction with K1001.	<table border="1"> <tr> <th colspan="2">SECURITY</th></tr> <tr> <td>Specification</td><td>Valve</td></tr> <tr> <td>Unclassified</td><td>Unclassified</td></tr> </table>	SECURITY		Specification	Valve	Unclassified	Unclassified
SECURITY							
Specification	Valve						
Unclassified	Unclassified						

TYPE OF VALVE : Travelling Wave Tube

CATHODE: Indirectly heated.

ENVELOPE: Glass.

PROTOTYPE: VX7156.

MARKING

See K1001/4

BASE

SPECIAL. Pin spacing as for B9A.

See drawing on Page 6.

<u>RATING</u>		
(All limiting values are absolute)		
		Note
Heater Voltage	(V) 5.0	
Heater Current	(A) 0.55	
Min. Grid 1 Voltage	(V) - 50	D
Max. Grid 2 Voltage	(V) 400	D
Max. Grid 3 Voltage	(V) 400	D
Max. Grid 4 Voltage	(V) 400	D
Max. Helix Voltage	(V) 600	D
Max. Collector Voltage	(V) 800	D
Max. Collector Current	( $\mu$ A) 600	
Max. Helix Current	( $\mu$ A) 50	

<u>CONNECTIONS</u>	
Pin	Electrode
1	Heater, Cathode h, k.
2	Grid 3 g3
3	Grid 4 g4
4	I.C.
5	Heater h
6	Grid 1 g1
7	Grid 2 g2
8	I.C.
9	Helix hel
End Cap.	Collector col.

<u>Typical Operating Conditions</u>		Note
Grid 1 Voltage (Negative)	(V) 0 to 10	D
Grid 2 Voltage	(V) 12 to 40	A,D
Grid 3 Voltage	(V) 50 to 150	A,B,D
Grid 4 Voltage	(V) 150 to 300	A,B,D
Helix Voltage	(V) 350 to 450	B,D
Collector Voltage	(V) 550 to 650	D
Helix Current	( $\mu$ A) 0 to 5	
Collector Current	( $\mu$ A) 400	
Frequency Range	(Mc/s) 2500 to 4100	
Max. Noise Factor	(dB) 10	
Min. Small Signal Gain	(dB) 38	
Min. Working Saturated Power Output	(mW) 3	E
Focusing Field Strength (oersted)	550	C

DIMENSIONS

See drawing on page 6.

MOUNTING POSITION

Any.  
But see Note F on page 2.

OPERATING TEMPERATURE

See Note G on page 2.

WEIGHT

Valve only 2 ozs.  
Solenoid only 23 lbs.  
See Note J on page 2.

NOTES

See page 2.

NOTES

- A. These electrodes draw very low current (less than 25  $\mu$ A).
- B. Voltages adjusted to optimum value at 3,300 Mc/s.
- C. When operated in the approved circuit the current in the field coils giving this field strength is 9 amps.
- D. All voltages are relative to the cathode.  
The collector is normally earthed.
- E. The saturated power obtained at synchronous helix potential.
- F. The valve will operate in any position with suitable fixing arrangements on the mount.
- G. For operation at a voltage of 24V, forced air cooling will be necessary in an ambient temperature of more than 30°C in order to keep the external temperature of the larger diameter coil below 120°C. Where a higher voltage power supply is available the coil temperature may be allowed to reach 140°C.
- H. A set of operating data (including setting-up procedure) is supplied with each valve.
- J. The solenoid is not supplied with the valve.
- K. The Joint Services Catalogue Number is 5960-99-037-2440.

TESTS

To be performed in addition to those applicable in K1001.

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

Test conditions - unless otherwise stated:-

$V_h$ (V)	$V_{g1}$ (V)	$V_{g3}$ (V)	$V_{g4}$ (V)	$V_{hel.}$ (V)	$V_{col.}$ (V)	$I_{col.}$ ( $\mu A$ )	Mean Field (oersteds)
5.0	$-2\frac{1}{2}$	100	200	400	600	400	550

	Test	Test Conditions	AQL %	Insp. Level	Sym- bol	Limits		Units
						Min.	Max.	
a	Heater Current	No voltages except $V_h$ No magnetic field. Note 1.		100%	$I_h$	0.45	0.65	A
b	Helix current	Notes 2 and 3.		100%	$I_{hel}$	0	5	$\mu A$
c	Helix voltage	$V_{col.} = V_{hel} + 200V$ Notes 2 and 4.		100%	$V_{hel}$	350	450	V
d	Spurious oscillations.	$V_{g2} = \text{Adjust}$ $V_{hel} = \text{Value}$ obtained in test c. $V_{col.} = V_{hel} + 200V$ Notes 2 and 5.		100%		No oscillations should be detected.		
e	Optimum $V_{g1}$ do $V_{g2}$ do $V_{g3}$ do $V_{g4}$ for minimum noise factor.	$V_{hel} = \text{value}$ obtained in test c. $V_{col.} = V_{hel} + 200V$ Notes 2 and 6.		100% 100% 100% 100%	$V_{g1}$ $V_{g2}$ $V_{g3}$ $V_{g4}$	0 12 50 150	- 10 40 150 300	V V V V
f	Noise Factor	$V_{g2} = \text{value}$ obtained in test e. $V_{g3} = \text{value}$ obtained in test e. $V_{g4} = \text{value}$ obtained in test e. $V_{hel} = \text{value}$ obtained in test c. $V_{col.} = V_{hel} + 200V$ Notes 2, 7 and 10.		100%		-	10.0	dB
g	(i) Small Signal Gain.	$V_{g2} = \text{value}$ obtained in test e.		100%		38	50	dB
	(ii) Gain variation (i.e. the difference between any two readings in test g(i).	$V_{hel.} = \text{value}$ obtained in test c. $V_{col.} = V_{hel} + 200V$ Notes 2, 8 and 10.		100%		-	6	dB

TESTS (Contd.)

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.

Test conditions - unless otherwise stated:-

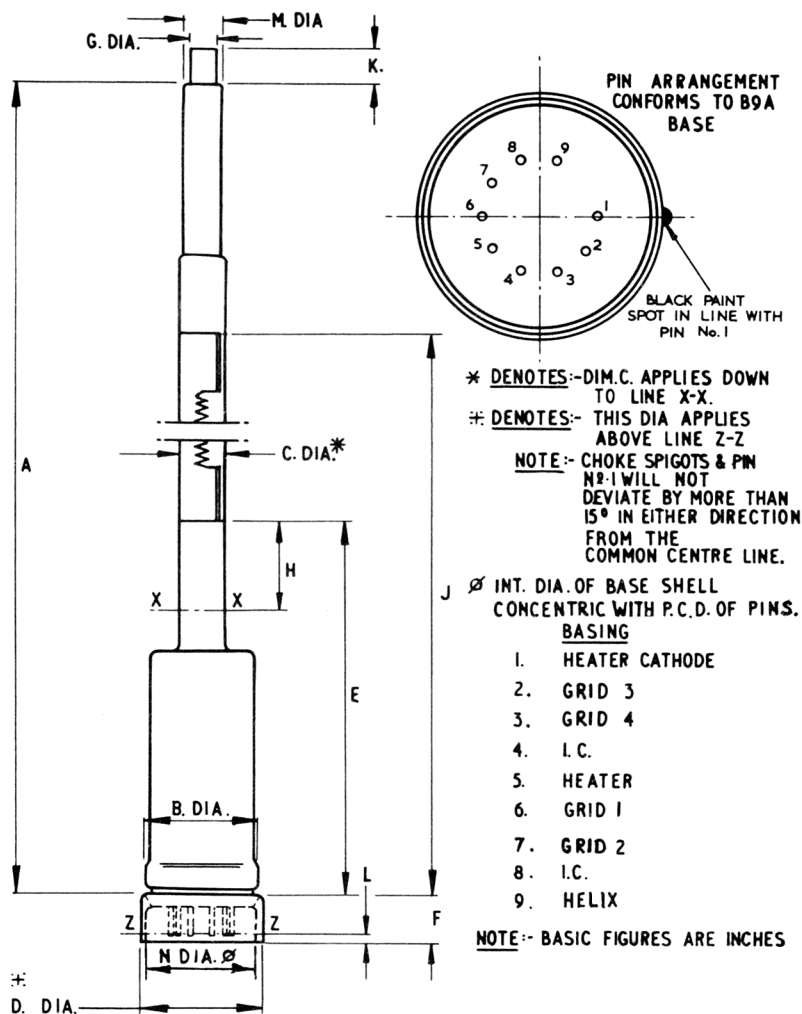
$V_h$ (V)	$V_{g1}$ (V)	$V_{g3}$ (V)	$V_{g4}$ (V)	$V_{hel.}$ (V)	$V_{col.}$ (V)	$I_{col.}$ (mA)	Mean Field (oersteds)
5.0	-2 $\frac{1}{2}$	100	200	400	600	400	550

	Test	Test Conditions	AQL %	Insp. Level	Sym- bol.	Limits		Units
						Min.	Max.	
h	Working Saturated Power Output	$V_{g2}$ = value obtained in test e. $V_{g3}$ = value obtained in test e. $V_{g4}$ = value obtained in test e. $V_{hel}$ = value obtained in test c. $V_{col}$ = $V_{hel} + 200V$ Notes 2, 9 and 10.		100%		3	12	mW
j	Cold Attenuation	Measured at a frequency of 3300 Mc/s No voltages. No magnetic field. Notes 2 and 10.		100%		75	-	dB
k	Life Test (end of life)	$V_{g1}, V_{g3}$ and $V_{g4}$ = values obtained in test e. $V_{g2}$ = not more than 15V above value obtained in test e. Notes 2, 6, 7 and 11.		See Note 11.		500	-	hours

NOTES

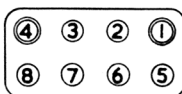
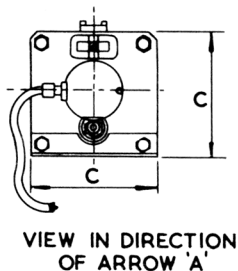
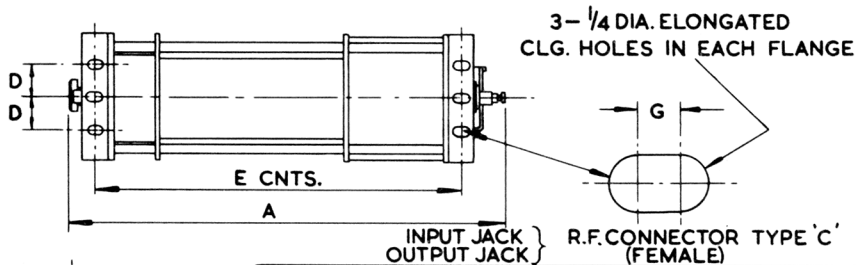
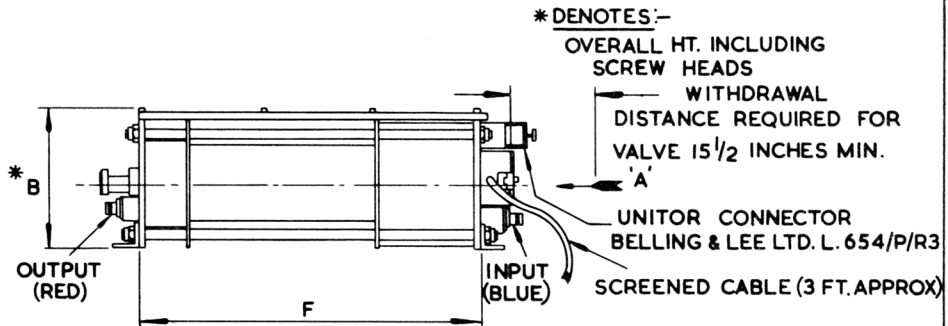
1. Heater current shall be read at least three minutes after switching on.
2. These tests shall be performed in a solenoid which has been approved by the Type Approving Authority by comparison with the reference standard held by that Authority.
3. Optimise deflector coils for minimum helix current at the same time adjusting grid 2 voltage to maintain 400  $\mu A$  collector current.
4. Adjust helix voltage for maximum low level gain at 3300 Mc/s.
5. The collector current is increased to 600  $\mu A$  by adjusting grid 2 and the helix voltage is swept with a 50 c/s voltage of r.m.s. value 50V, about the value obtained in test "d". The r.f. output against helix voltage characteristic is examined on an oscilloscope with an r.f. input of less than - 50 dBm. The characteristic should be a smooth curve with a maximum at the optimum helix voltage, and should decrease and increase as the input level is decreased and increased. Any oscillation present will give an output which does not decrease with input level or discontinuities in the otherwise smooth trace.
6. The voltages on grids 1, 3 and 4 shall be adjusted repeatedly for minimum noise at 3300 Mc/s. The voltage on grid 2 shall be varied to maintain 400  $\mu A$  collector current. The input to the tube shall be terminated in a load of v.s.w.r. < 1.1 : 1.
7. The noise factor shall be measured at 2500, 3300 and 4100 Mc/s.

8. Small signal gain shall be measured at 2500, 2700, 3300, 3600, 3900 and 4100 Mc/s. with an input not greater than - 50 dBm in each case.
9. The working saturated power output shall be measured at 2500, 3300 and 4100 Mc/s.
10. At Type Approval, measurements shall be taken at intervals of 100 Mc/s over the band 2500 to 4100 Mc/s.
11. Life test shall be performed during Type Approval on two valves selected at random. If both valves pass the test the batch shall be accepted. If one valve fails another one from the same batch shall be selected at random and tested. If that or the remaining valve fails the batch shall be rejected.



DIMENSIONAL DRAWING

DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	366.90 ± 0.89	14.445 ± 0.035	G	5.99 ± 0.18	0.236 ± 0.007
B	23.24 MAX.	0.915 MAX.	H	19.1 MIN.	3/4 MIN.
C	9.27 MAX.	0.365 MAX.	J	315.60 ± 0.63	12.425 ± 0.025
D	25.30 ± 0.18	0.996 ± 0.007	K	7.62 ± 0.76	0.300 ± 0.030
E	76.83 ± 0.38	3.025 ± 0.015	L	1.59 MAX.	0.063 MAX.
F	10.16 ± 0.63	0.400 ± 0.025	M	7.62 ± 0.68	0.300 ± 0.027
			N	22.22 MIN.	0.875 MIN.



UNITOR  
CONNECTIONS

CONNECTIONS		DIMENSIONS		
UNITOR		DIM	INCHES	MILLIMETRES
1	FIELD CURRENT	A	19 MAX.	482.6 MAX.
2	FIELD CENTRE TAP	B	5 7/8 MAX.	149.2 MAX.
3	COLLECTOR	C	5 1/4 ± 1/16	133.4 ± 1.6
4	FIELD CURRENT	D	1 3/8 ± 1/32	34.9 ± 0.8
5	ONE PAIR OF DEFLECTOR COILS	E	15 3/8 ± 1/8	390.5 ± 3.2
6		F	14 1/4 ± 1/8	362.0 ± 3.2
7	ONE PAIR OF DEFLECTOR COILS	G	1/8	3.2
8				
SCREENED CABLE				
hk	YELLOW			
g <sub>s</sub>	GREY			
g <sub>s</sub>	WHITE			
h	BROWN	NET. WT. APPROX.	LBS	23
g <sub>i</sub>	GREEN		KGs	10.4
g <sub>s</sub>	BLUE		NOTE:- BASIC DIMENSIONS ARE INCHES	
he1	ORANGE			

**OUTLINE DRAWING OF TYPICAL SOLENOID.**  
(FOR THE INFORMATION OF EQUIPMENT DESIGNERS.)

