VALVE ELECTRONIC

ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

CV6096

Specification AD/CV6096
Issue No. 1A dated 1.1.64
To be read in conjunction with K1001 excluding
Section 10. Climatic Tests.

SECURITY	
Specification	Valve
Unclassified	Unclassified

TYPE OF VALVE: Travelling wave power amplifier, X-band, (low modulation noise).

CATHODE: Indirectly heated.

ENVELOPE: Packaged in a periodic magnetic focussing system.

PROTOTYPE: VX3291

RATING

(All limiting values are absolute and non-simultaneous)

			Note
Max. Heater Voltage	(V)	6.0	A
Max. Heater Current	(A)	10.0	
Max. Grid 1 Voltage	(V)	0	B,C,D,E
Max. Grid 2 Voltage	(V)	1000	B,D
Max. Grid 2 Current	(mA)	1.5	
Max. Helix Voltage	(kV)	2.8	B,C
Max. Helix Current	(mA)	2.0	
Max. Collector Voltage	(kV)	2.8	B
Max. Collector Current	(mA)	10	C

TYPICAL WORKING CONDITIONS

Heater Voltage	(V)	4.5 ± 5%	A
Heater Current	(A)	3.5 to 4.5	
Grid 1 Voltage	(V)	0 to -30	B,C,D,E
Grid 2 Voltage	(V)	350 to 700	B,D
Grid 2 Current	(mA)	0 to 1.0	
Helix Voltage	(kV)	2.2 to 2.6	B,C
Helix Current	(mA)	0 to 2.0	
Collector Voltage	(kV)	2.35 to 2.75	B
Collector Current	(mA)	6 to 8	C
Frequency Range	(kMc/s)	7 to 11.5	
Min. Cold Attenuation	(dB)	40	
Power input v. Power Output			F
Noise Output			F,G
The v.s.w.r. of the input and output measured with I_{col} at the specified value is not greater than 3:1.			H

MARKING

See K1001/4
See also Notes C, F and L on page 2.

BASE

Special 7 pin. See page 5.

CONNECTIONS

PIN LETTER	ELECTRODE	
A	Grid 2	g2
B	N.C.	
C	Helix	hel
D	Grid 1	g1
E	Heater	h
F	Cathode-heater	k, h
H	Collector (Body)	Col.

DIMENSIONS

See drawing on page 5.

MOUNTING POSITION

Any (but see Note J.)

OPERATING TEMPERATURE

See Note J.

WEIGHT

5 lbs.

NOTES

A. The cathode pre-heating time is 2 minutes.

B. All voltages are measured relative to the cathode. The collector is connected to the body and is normally earthed. The helix voltage should never exceed the collector voltage.

C. The operating Grid 1 and Helix voltages and Collector current are marked on each valve. These shall be set to the following accuracies:-

Helix Voltage	± 1%
Grid 1 Voltage	± 15%
Collector Current	± 2%

D. It must be possible to reduce this voltage to zero.

E. This voltage must be available at any value of beam current.

F. As the r.f. power input is varied from 0.5 mW to 5 mW the power output does not fall below 100 mW and the range of power output does not exceed 10 dB; the noise output is not greater that 60 dB above KTB referred to 290°K. The maximum and minimum output powers will be stated on the valve.

G. Obtained by measuring the output from a crystal using a receiver having a pass band 5-50 Mc/s.

H. The valve must be operated in an r.f. circuit presenting a v.s.w.r. not greater than 5:1.

J. The valve is designed to be mounted horizontally and bolted to a heat sink of temperature not greater than 70°C and in such a position that air at a temperature of not greater than 70°C can circulate freely over the cooling fins. When operated in other mounting positions and/or higher ambient temperatures forced air cooling may be required.

K. The setting-up procedure is as follows:

(i) Switch on the heater and increase the voltage slowly to the correct value; the surge current must not be allowed to exceed 10 amps. Wait for at least 2 minutes.

(ii) Switch on G1, Helix and collector voltages, ensuring G2 voltage is zero. Set these voltages to the values indicated on the valve.

(iii) Switch on G2 and increase the voltage gradually until I_{col} reaches the operating value marked on the valve.

(iv) Readjust G1, Collector and Helix voltages to required values as necessary.

(v) Apply r.f. power input.

The above procedure is reversed for switching off.

L. A warning label stating that the valve must be kept at least 8 inches from magnets shall be affixed to each valve. The valve may be bolted to a steel chassis.

M. The Joint Services Catalogue number is: 5960-99-037-2539.

CV6096

TESTS

To be performed in addition to those applicable in K1001, excluding Section 10 Climatic Test.

Test Conditions - Unless Otherwise Specified

V_h (V)	V_{col} (V)	V_{hel}, V_{g1} and I_{col}
4.5	(V_{helix} +150V)	Values marked on valve

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
a	Heater Current	No voltages except V_h Note 1.		100%	I_h	3.5	4.5	A
b	Grid 2 Voltage	Note 2.		100%	V_{g2}	350	700	V
c	Grid 2 Current	As (b)		100%	I_{g2}	-	1.0	mA
d	Helix Current	As (b)		100%	I_{hel}	-	1.0	mA
e	Hot v.s.w.r.	As (b). Measured over the frequency range 7.0-11.5 kMc/s (a) Input (b) Output		100%		 - -	 3.1 3.1	 Ratio Ratio
f	R.F. Power Outputs	As (b). Apply r.f. power input varying from 0.5 mW to 5.0 mW at each of the three frequencies 7,000 ± 50 Mc/s 9,000 ± 50 Mc/s 11,500 ± 50 Mc/s Observe maximum and minimum r.f. power outputs (i) Overall range of Power Output (ii) Level of Power Output		100%		 100	 10	 dB mW
g	High Level Noise Output	As (b). Note 3. At frequencies:- 7,000 ± 50 Mc/s 9,000 ± 50 Mc/s 11,500 ± 50 Mc/s		100%		-	60	dB
h	Life	See Note 4.				See Note 4		

NOTES

1. The surge current shall not exceed 10 Amps.

2. During adjustment and test the helix current shall not exceed 2.0 mA.

3. (i) Measure the low level noise output (i.e. the output noise without application of r.f. Power Input) by comparing the noise with that from a standard noise source, the detector being a broad-band crystal and receiver having a pass band 5-50 Mc/s. Note the reading X dB.

   (ii) Apply an r.f. input signal of power 0.5 mW and compare the noise output with the low level noise output at each of the specified frequencies. **Note** the difference Δ dB, which may be positive or negative.

   (iii) The High Level Noise Output is then $x + \Delta$ dB.

4. Life Test.

   (a) The sample size shall be as follows:

Lot size	Sample size
1-25	1
26-50	2
51-100	3
101 or greater	2%

   The manufacturer may test additional samples at his discretion.

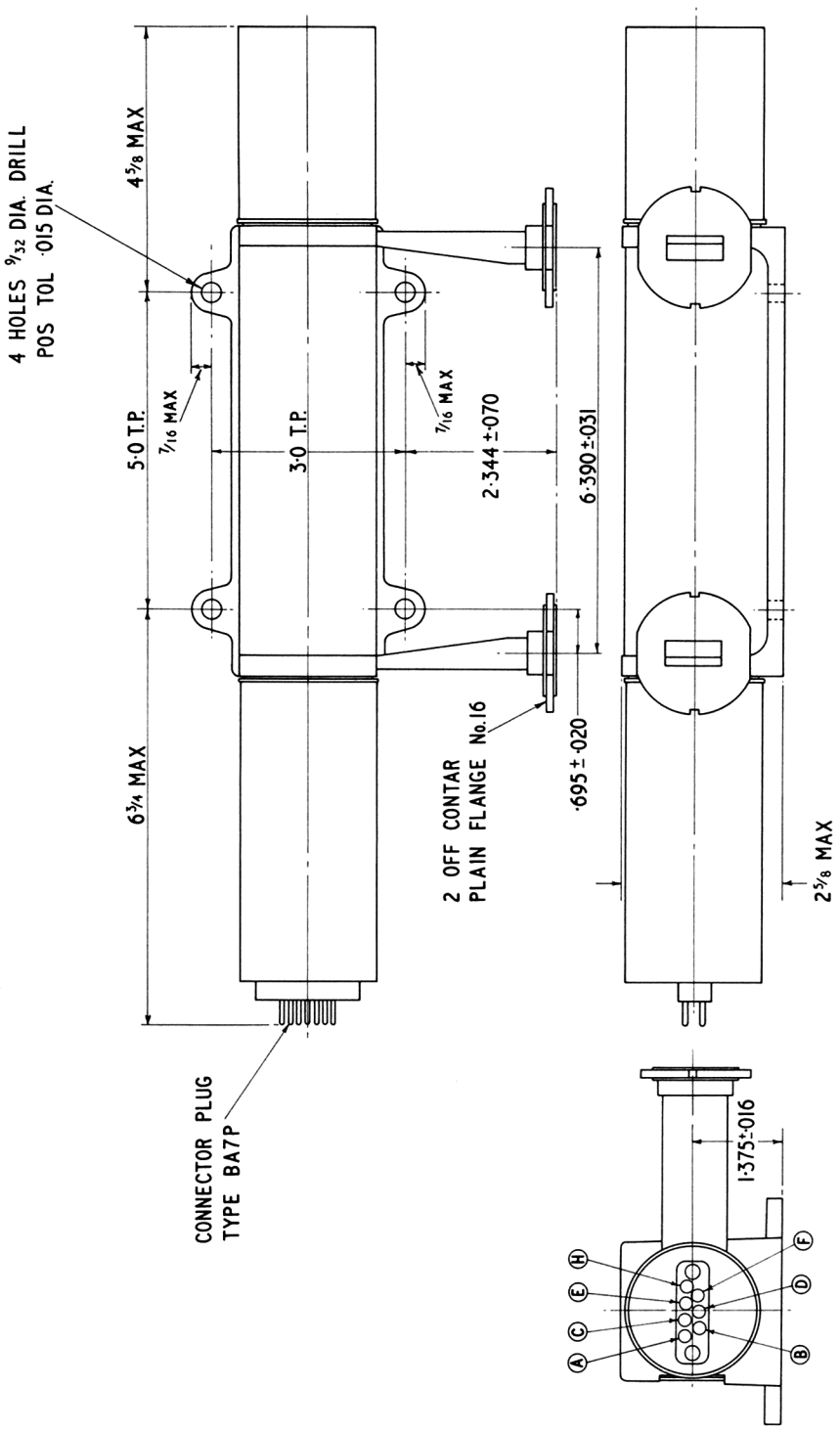
   (b) For the first lot of any production order, deliveries shall be held until satisfactory completion of a minimum of 250 hours life. Where previous life test data is available deliveries may be released at the discretion of the Authority.

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

   (c) The criterion of acceptance shall be that the average life of the sample shall be at least 500 hours.

   (d) In the event of a failure the Approving Authority shall be informed.

   (e) The end of life is reached when after adjustment of voltages within the specified limits, the valve fails to meet the specification except that the level of R.F. power, noise and gain may deteriorate by 3 dB.



VALVE OUTLINE

PIN A – GRID 2 (g_2)
B – N.C.
C – HELIX (hel)
D – GRID 1 (g_1)
E – HEATER (h)
F – CATHODE – HEATER
H – COLLECTOR (coll) BODY