MINISTRY OF AVIATION - DLRD/RRE

VALVE ELECTRONIC **CV6106**

Specification MOA/CV6106

Issue 1 dated 7th November, 1962.

To be used in conjunction with K1001

SECURITY	
Specification	Valve
Unclassified	Unclassified

——————→ indicates a change

TYPE OF VALVE - Low noise Travelling Wave Amplifier

CATHODE - Indirectly heated

ENVELOPE - Glass Envelope packaged in Metal Container

PROTOTYPE - N1017M

MARKING

See K1001/4

RATING

All limiting values are absolute

			Note
Heater Voltage	(V)	6.3 ± 0.3	
Heater Current	(A)	0.36	A
Maximum Heater/Cathode Voltage	(V)	30	C
Maximum Grid 1 voltage (positive value)	(V)	20	BH
Maximum Grid 1 voltage (negative value)	(V)	50	BH
Maximum Grid 2 voltage	(V)	150	BJ
Maximum Grid 2 Dissipation	(W)	C.1	
Maximum Grid 3 voltage	(V)	150	BH
Maximum Grid 3 Dissipation	(W)	0.1	
Maximum Helix voltage	(V)	400	BG
Maximum Helix current	(µA)	20	
Maximum Collector Voltage	(V)	600	BF
Maximum Collector Current	(µA)	250	
Frequency Range	K Mc/s	1.2 to 1.4'	
Minimum Low Level Gain over Frequency Range without adjustment	(dB)	25	D
Minimum Saturated Power Output	(mW)	2	
Minimum Cold Transmission Loss	(dB)	40	
Maximum Noise Factor	(dB)	7.5	
Magnetic Field	-	-	E
Net Weight	(lbs)	1.5	

BASE

International Octal

CONNECTIONS

Pin

1 - Cathode
2 - Heater
3 - Heater
4 - Grid 2
5 - Helix
6 - No connection
7 - Grid 1
8 - Grid 3
Cap Collector

R.F. CONNECTIONS

70 ohms Co-axial ~~Type~~ C Connectors Transmitter code No CCZ/7 Amdt7

DIMENSIONS

See Drawing ~~P/5~~ P6 Amdt.1

MOUNTING POSITION

Any

NOTES

A. The peak instantaneous value of heater starting current must not exceed 2.5 Amp. The minimum cathode heating time required is 2 minutes, but in the event of a power supply failure of less than 30 seconds duration all voltages may be re-applied simultaneously.

B. All voltages given with respect to the cathode.

C. In normal operation the cathode lead should be connected to one side of the heater.

D. For input signals less than 10^{-7} watts.

E. The distribution of the magnetic field required to focus the valve is indicated on Page 6, and should be within ± 10% of values shown. Care must be taken to avoid distortion of the magnetic field by metal parts in the vicinity of the valve, and where possible non-magnetic material should be used for such parts. It is necessary to provide for alignment of the tube in the solenoid to achieve correct focussing, and generally adjustment of ± 0.2 inch about the axis is sufficient.

F. It is essential to maintain the collector positive with respect to the helix, and fluctuations in the collector voltage should be less than ± 10%.

G. The helix voltage should be adjusted to the optimum value and stabilized within ± 5%.

H. Voltages should be stabilized within ± 5%.

J. Voltage adjusted to provide 200 µA collector current and then stabilized within ± 5%.

K. Joint Services Catalogue No. 5960-99-037-2909.

SETTING UP PROCEDURE

Note: This T.W.T. is operated in a focussing solenoid and H.T. voltages must not be applied to the tube unless the solenoid is switched on.

1. Insert the tube in the solenoid. Apply pressure to the end cap rather than the R.F. connectors and ensure that the tube is fully home in the socket. Centralise the tube by means of the adjusting screws.

2. Set grid 2 voltage control to its minimum position and switch on heater and H.T. voltages. Allow two minutes for the cathode to heat up, meanwhile adjusting all voltages except grid 2 to their recommended values.

3. Increase grid 2 voltage slowly, observing both helix and collector current. The helix current will usually rise rapidly to its limiting value and it will be necessary to adjust the centering of the tube to obtain a minimum. Continue to increase grid 2 voltage and alter the centering screws until a collector current of 200 µA is obtained with a helix current of less than 2µA. The helix current should never be allowed to exceed 20 µA and should be finally set to the lowest possible value.

Note: For subsequent operation the tube may be switched on without re-adjustment.

4. If the recommended voltages on the test sheet accompanying the tube have been adhered to the tube should now be ready for use over the full frequency range. If the full "setting up" information is not available or it is desired to obtain optimum performance at a particular frequency the following procedure should be followed:

   Apply an R.F. signal of power level less than -40 dBm to the input of the tube, connect a suitable receiver to the output and adjust the helix voltage to give maximum power output.

   To set up for best noise factor remove the input signal, set the helix voltage 5 volts less than the value just obtained and adjust grid 3 voltage until the receiver output is a minimum.

TESTS

CV 6106

To be performed in addition to those applicable in K1001

Test Conditions unless otherwise stated:

Vh (V)	V Coll. (V)	I Coll. (μA)	Magnetic Field
6.3	V Helix + 100	200	see page 6.

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
	GROUP A							
	Heater Current	Vh. only, Note 1.		100%	Ih	0.33	0.4	A
	Helix Voltage			100%	V hel	0	290	V
	Helix Current			100%	I hel	-	5	μA
5J.6.1	Gain	Note 2. with input signal at -40 dBm level		100%		25	36	dB
	R.F. Stability	Note 3.		100%	-	No oscillations - Detected.		
5J.6.4	Noise Factor	Note 2. Compared to thermal noise at 290°K		100%	N.F.	-	7.5	dB
5J.6.7	V.S.W.R.(Input)	Note 2.		100%	-	-	2.0	-
	V.S.W.R.(Output)	Note 2.		100%	-	-	2.5	-
	GROUP B	Note 7						
	Saturation Test	Note 4 Frequency 1300 Mc/s	1.0	II	-	-	3	dB
	GROUP C	Omitted						
	GROUP D	Note 7						
5J.6.5	Cold Attenuation	Frequency 1300 Mc/s	6.5	I	-	40	-	dB
	GROUP E	Omitted						
	GROUP F	Note 5 & 7						
	Life Test							
	Test point 1000 hr.	I Coll = 200 μA	6.5	IC	-	-	-	-
	Gain	As in Group A				25	36	dB
	Noise Factor	As in Group A				-	7.5	dB

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
	GROUP G	Notes 6 and 7						
	Electrical retest after 14 days holding period	Note 2						
	Inoperatives	No voltages		100%				
	Gain	As in Group A.		100%	-	25	36	dB

NOTES

1. The heater current shall be measured not less than 2 minutes after application of heater voltage.

2. Tests shall be performed at 1200, 1300 and 1400 Mc/s.

3. The input waveguide shall be short circuited and the output waveguide mismatched to a V.S.W.R. not less than 10:1 at 1300 Mc/s, and terminated by a matched crystal detector connected to the vertical deflection plates of an oscilloscope. The helix and collector voltages shall be swept at 50 c/s by a waveform of 100 volts peak to peak amplitude, and the horizontal deflection plates of the oscilloscope swept in the same phase and frequency. The helix voltage is then adjusted to obtain a symmetrical trace on the oscilloscope. The sensitivity of the test circuit shall be that necessary to provide visible valve noise output.

4. Measure the gain as in Group A test with a large interference signal at 1400 Mc/s of amplitude -40 dBm also applied to the input. The measured gain of the 1300 Mc/s signal shall not differ from that obtained in the Group A test by more than 3dB.

5. The minimum sample size shall be according to the following table

Lot size	Sample size	
	Normal	Reduced
2 - 15	2	1
16 - 40	3	2
41 - 110	5	3
111 - 300	7	4
301 - 800	10	5

801 and above as K1001 App. XI Table IIIB

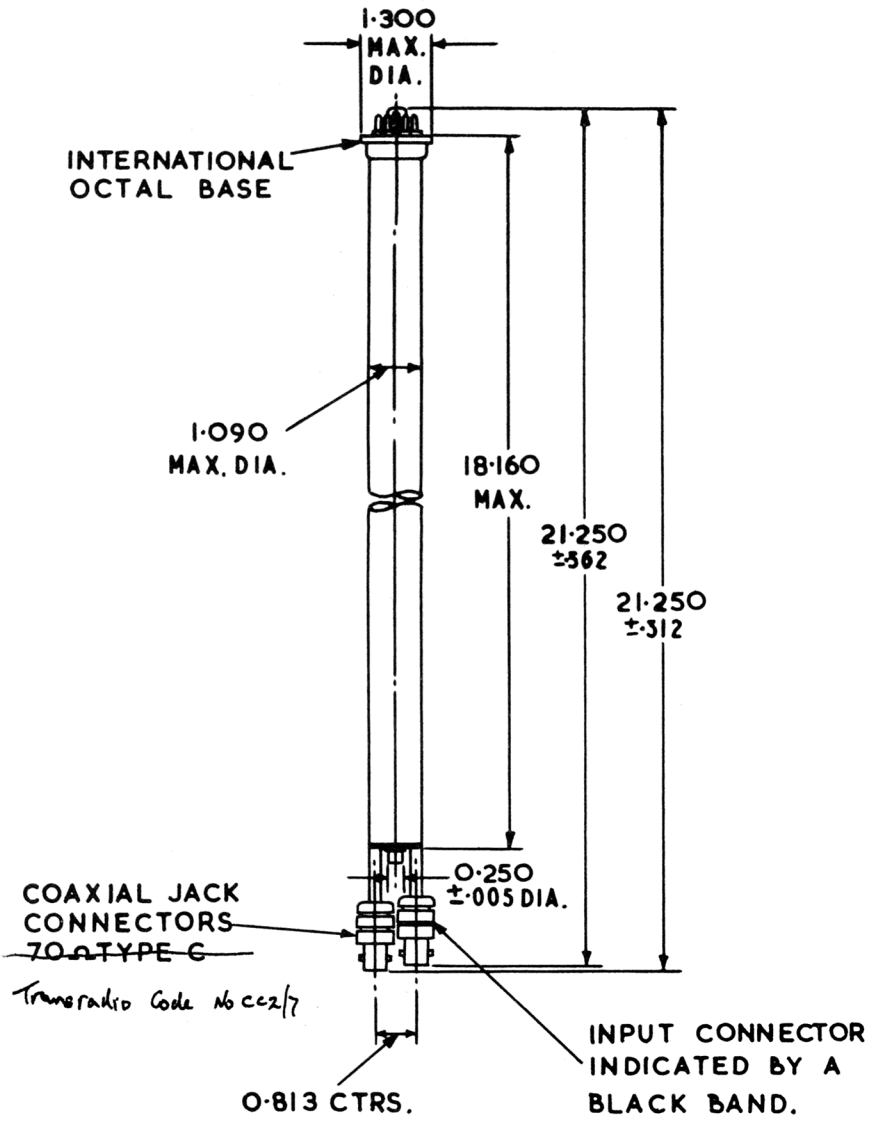
The Manufacturer may test additional samples at his discretion.

Reduced Inspection shall be permitted after 10 consecutive lots have been accepted.

6. The lot shall be held in store for at least 14 days and shall then be tested for Inoperatives and Gain. If there are no failures the lot shall be accepted. If there are failures in either of the tests given the lot shall be held for a further 14 days and then retested. The lot shall be rejected if there are any further failures.

7. Where production is at a low rate, and consists of less than 25 per month, the lot size shall be considered as consisting of a month's production for the purpose of determining the sample size required by this specification for test purposes.

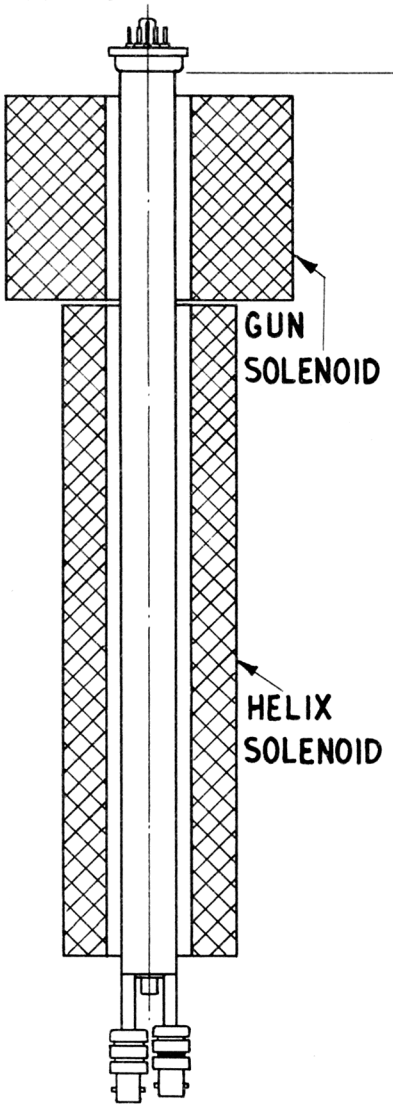
OUTLINE

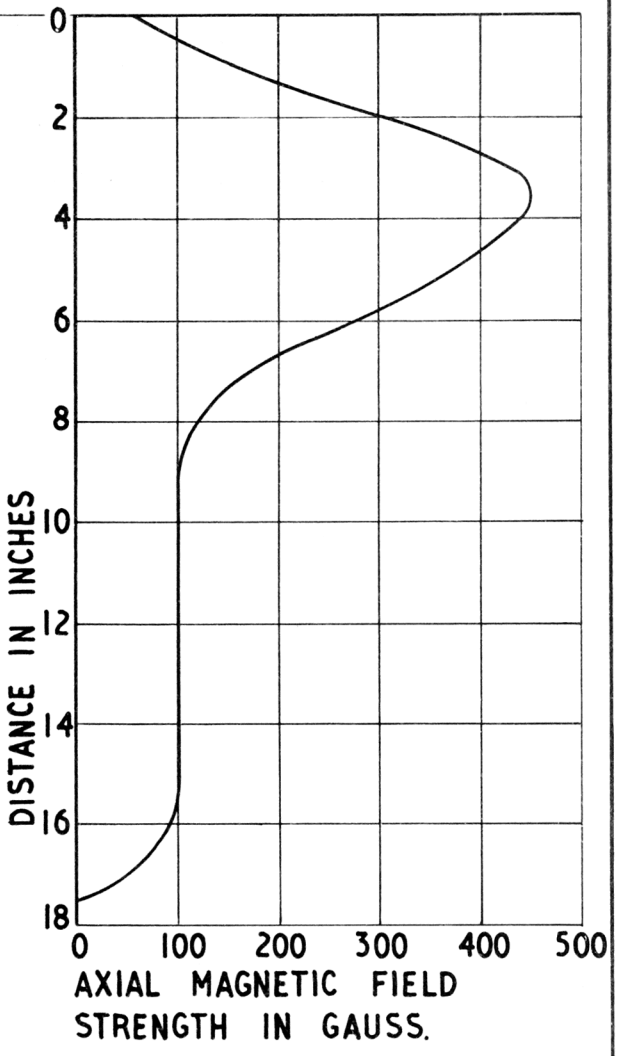


ALL DIMENSIONS IN INCHES.

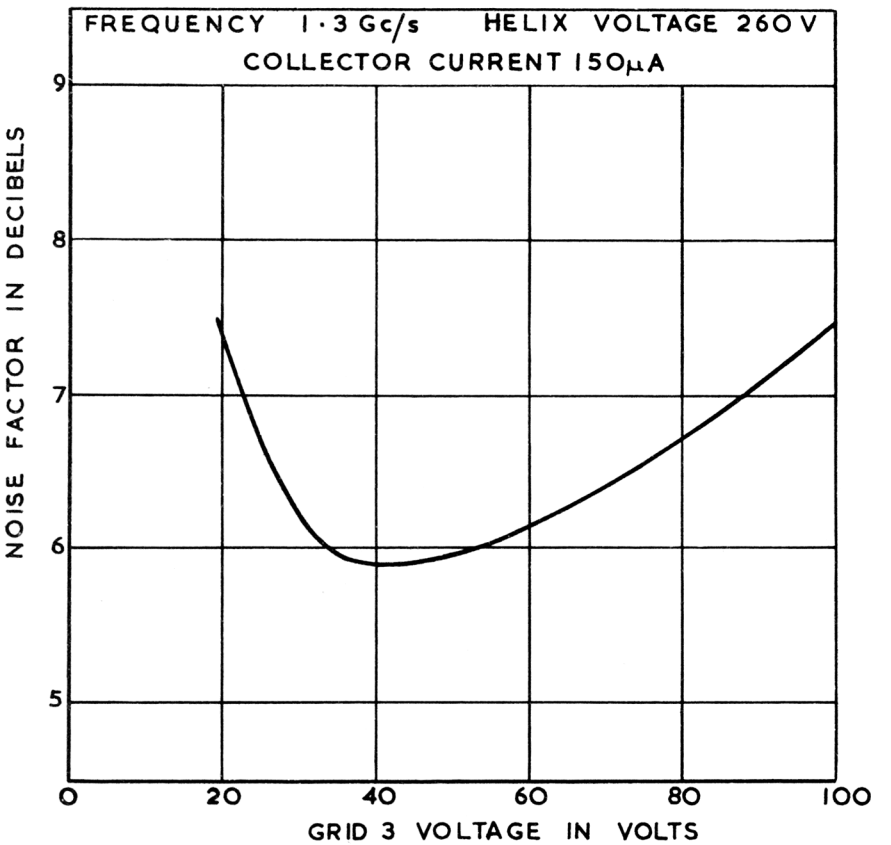
CV6106

RECOMMENDED MAGNETIC FIELD DISTRIBUTION





TYPICAL
NOISE/VOLTAGE CHARACTERISTIC



ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION MOA/CV.6106 ISSUE NO.1
DATED 7th NOVEMBER, 1962

AMENDMENT NO. 1

Page 1. Box headed 'R.F. CONNECTIONS'

Delete '70 ohms Co-axial Type C Connectors' and substitute '70 ohms Co-axial Connector, Transradio Code No. CC2/7'.

Page 1. Box headed DIMENSIONS

Amend 'P5' to read 'P6'.

Page 6. OUTLINE DRAWING

Delete '70Ω Type C' and substitute 'Transradio Code No. CC2/7'.

November, 1963

T.V.C. for R.R.E.

(204709)