ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

VALVE ELECTRONIC **CV6101**

Specification AD/CV6101 Issue 1A dated 1.1.65 To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE - Cathode Ray Tube, Projection Type

TYPE OF DEFLECTION - Magnetic

TYPE OF FOCUS - Magnetic

BULB - Glass, internally coated with conducting layer

SCREEN - BB2 with aluminium backing

SCREEN DIAMETER - 3.5 inches (nominal)

PROTOTYPE - VX5074

MARKING

See K1001/4

BASE

B7B

RATING

			Note
Heater Voltage	(V)	6.3	
Heater Current	(A)	0.5	
Max. Anode Voltage	(kV)	28	A, D
Max. Heater-Cathode Voltage	(V)	200	A, E
Min. Negative Grid Voltage	(V)	1	A, C
Max. Negative Grid Voltage	(V)	400	A

CONNECTIONS

Pin	Electrode	
1	Heater	h
2	No connection	nc
3	Grid	g
4	Internal connection	IC
5	Heater	h
6	Cathode	k
7	Internal connection	IC
Side contact	anode	a

CAPACITANCES (pF)

Max. Cg to all other electrodes	15
Max. Ck to all other electrodes	10

SIDE CONTACT

CT8 type anode connector inside a special glass shroud; see drawing on page 6.

DIMENSIONS

See drawing on page 6 and note B below.

NOTES

A. Absolute maximum and minimum values.

B. The flange of the mounting collar which is cemented to the tube is precisely located with respect to the inner surface of the tube face. By means of the flange the tube may be supported and correctly positioned in a suitable optical projection system without having to make any optical focusing adjustments.

C. To prevent damage to the screen the tube should never be operated with the spot stationary for longer than 5 microseconds at maximum beam current. The tube should always be operated at the lowest usable brightness.

D. When the tube is operating at anode voltages greater than 16 kV, precautions must be taken to restrict the radiation of X-rays.

E. With heater negative with respect to cathode. The normal K1001 limit of 100V applies for heater positive with respect to cathode.

F. The Joint Services Catalogue Number is:- 5960-99-037-2729

TESTS

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_a (kV)
6.3	28

Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
a Capacitances	See K1001/5A. 13	6.5	IB	C_g - all	-	15	pF
				Ck - all	-	10	pF
Arnold 2 b Heater Current	No voltages except V_h		100%	I_h	0.44	~~0.56~~ 0.66	A
c Heater-Cathode Insulation Leakage current	V_{hk} = 200 volts d.c., Test with heater negative to cathode.		100%	I_{hk}	-	200	µA
d Grid Base (Value to be noted).	See K1001/5A.10 Adjust V_g to cut-off		100%	$-V_g$	100	200	V
e Line Width Measured at the centre of the screen	See K1001/5A.7 Apply an expanded raster pattern formed by 10 kc/s and 50 c/s linear scanning generators and approved scanning coils about the centre of the screen. Length of high frequency scan = 75 mm. Apply a grid drive from cut-off of one tenth of the cut-off voltage measured in test "D". Adjust focus field for optimum focus.		100%		-	0.25	mm
Arnold 2 f Diameter of Unfocused Spot	No deflecting or focusing fields. Pulse V_g from its cut-off ~~voltage to -1V~~ (A) with tp not greater than 10 µ secs. and duty ratio of 0.02.		100%		-	33	mm
g Brightness	Scan with a raster formed by 10 kc/s and 50 c/s linear scanning generators. The raster shall be 1" x 1" positioned centrally on the screen. Pulse V_g from its cut-off value to -5 volts with tp = 10 µ secs. (nom) and duty ratio = 0.02. Adjust focus to give minimum brightness of the raster. Note 1.		100%		See graph on page 8	-	Candela

(A) voltage obtained in test d to one tenth of the cut-off voltage

TESTS (Contd.)

Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min	Limits Max	Units
h Grid Insulation (i) Leakage Current OR (ii) Increase in Voltmeter reading	V_g = -200V OR See K1001/5A.3.2. Resistor = 10 Megohms		100%		- -	20 100%	µA
j Useful Screen Area Diameter of circle on screen centred on geometrical centre of the ~~screen~~. locating collar	Adjust V_g for convenient light intensity. Use raster covering the whole screen. Adjust for optimum focus. Notes 1 ~~and 2~~.		100%		~~85~~ 74	-	mm
k Gun Alignment Deviation of Centre of unfocused spot from the geometrical centre of the screen.	No deflecting or focusing fields. Adjust V_g almost to cut-off to give a just visible spot. Note 2		100%		-	5	mm
l Over-voltage	Heat cathode at V_h = 6.3V for 10 minutes, then apply V_g = -300V and V_a = 32 kV. The tube shall be viewed for 10 seconds in a dark room or box		100%		There shall be no flash-over or stray emission as indicated by visible screen excitation, after the first 5 seconds of the test.		
m Screen Quality Glass defects 1 (a) Limit size. (No defects larger than this size) 1(b) Number between 0.5 mm and 1 mm dia. Screen defects 2(a) Limit size (No defects larger than this size) 2(b) Distance between defects of size 0.5 mm and 1 mm	Use raster covering the whole screen. Adjust V_g for convenient light intensity. Disregard defects of less than 0.5 mm diam. See Note 3 regarding nature of face-plate glass.		100%		- - - 10	1 5 1 -	mm mm mm

Annex 2

	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits Min.	Limits Max.	Units
Amdt 2 n	Position of Mounting Collar on Tube	No voltages. ~~Note 4~~. See Note 4		100%		See Note 6		
p	Temperature Cycle	No voltages. Temperature limits = -20°C and +70°C.		Q/A		See Note 5		

NOTES

1. The focus coil used shall be that fitted in Deflection and Focus Coils Unit, Design 2, A.P.70271. The tube shall be located by its collar inside this Unit and the focusing value of the coil current shall be between 5 and 60 mA. The deflection coil shall be of an approved design.

2. The geometrical centre of the screen is defined as the point of intersection of any two diameters of the screen at right angles.

3. The face plate of the tube must be made of a non-solarising glass which will not discolour appreciably with time under the action of X-rays emitted from the phosphor or of electrons which pass through the phosphor and hit the glass under normal operating conditions.

Amdt 2 4. ~~The optical test for alignment of the tube and collar and limits to be applied are~~ An approved method of determining the position of the locating collar is given in Appendix A to this specification. (A copy of ~~this~~ appendix may be obtained on application to the Specification Authority.)

5. The tube (with mounting collar attached) shall be cycled once between room temperature and the limits given in test (p). Each temperature change shall occupy between 3 and 6 hours and the limit temperatures shall be maintained for at least 1 hour. There shall be no resulting damage to the envelope or collar and no separation between them.

Samples of these tubes submitted for Qualification Approval will also be subjected to the Climatic Tests of K1001, Section 10 and measurements will also be made of any movement that may take place during the test in the distance between the mounting flange on the collar and some fixed point on the tube such as the highest point on the tube face. This distance shall be measured before and after the climatic test with the tube at the same temperature in both measurements. The two measurements shall not differ by more than 0.001 inch. The outside diameter of the projecting portion of the flange shown as 3.7465 ± 0.0010 on the drawing on page 7 shall be within these limits after the climatic test. The tube may be protected by a polythene bag during the climatic test.

Amdt 2 6 (See page 5)

CV 6101

DRAWING NOTES

V The approximate position of the cathode is shown for guidance only.

W The required radius of curvature of the inner surface of the tube face is 143.5 ± 1.5 mms. The required thickness of the face is 3.75 ± 0.25 mm with a variation of thickness over any one face of less than 0.05 mm. These dimensions will not be checked during testing to this specification but the manufacturer may be required to demonstrate that reasonable precautions have been taken to ensure that they are within the limits quoted.

X The mounting collar shall be permanently attached to the tube by the manufacturer. The position of the collar on the tube is critical. Full details of an approved procedure for fixing the position of the collar are obtainable from the Specifying Authority.

Y The inside gauge, A, shall enter the anode connector shroud so that the pin end rests on the anode connector and the taper section does not seat on the inner surface of the shroud. The taper section of the inside gauge, B, shall seat in the shroud before the pin end touches the anode connector. With gauge B in position, gauge C shall slide over gauge B until the internal step rests on the lip of the shroud. The angle between the centre line of the shroud and the centre line of the neck of the tube shall be $71^{\circ} \pm 5^{\circ}$. Also, the shroud shall be sufficiently centrally located in the slot in the collar to ensure that the centre line of the shroud shall be within 1/16" of the centre line of the slot.

Z Only the critical dimensions are shown on the drawings of the collar. The shape of the collar may be varied within these dimensions to suit the material and method of construction used.

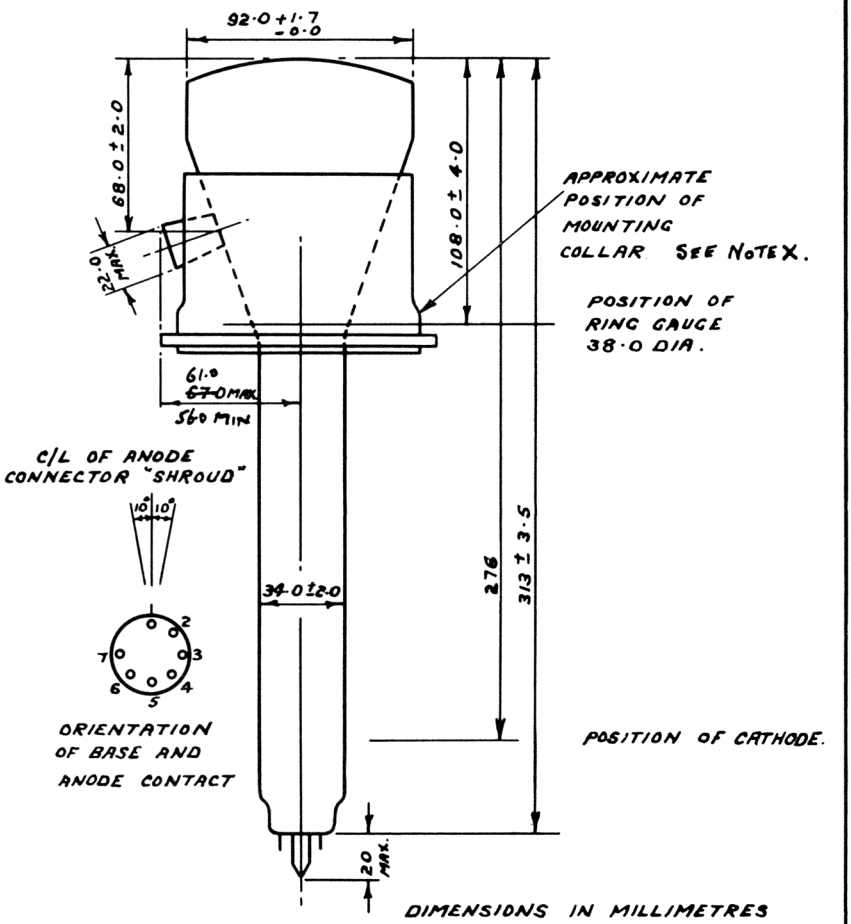
6. The height of the image plane of the tube above the collar seating surface along the major axis of the collar locating surface shall be 4·435 ±0·003". (The dimension of 4·435 ±0·003" only applies if the image plane is determined using a metal filament lamp. Appropriate corrections shall be made if other light sources are used.) Alternatively, when using the optical apparatus described in Appendix A, the average of the three scale readings, referred to the zero position, shall not exceed 0·15 inches.

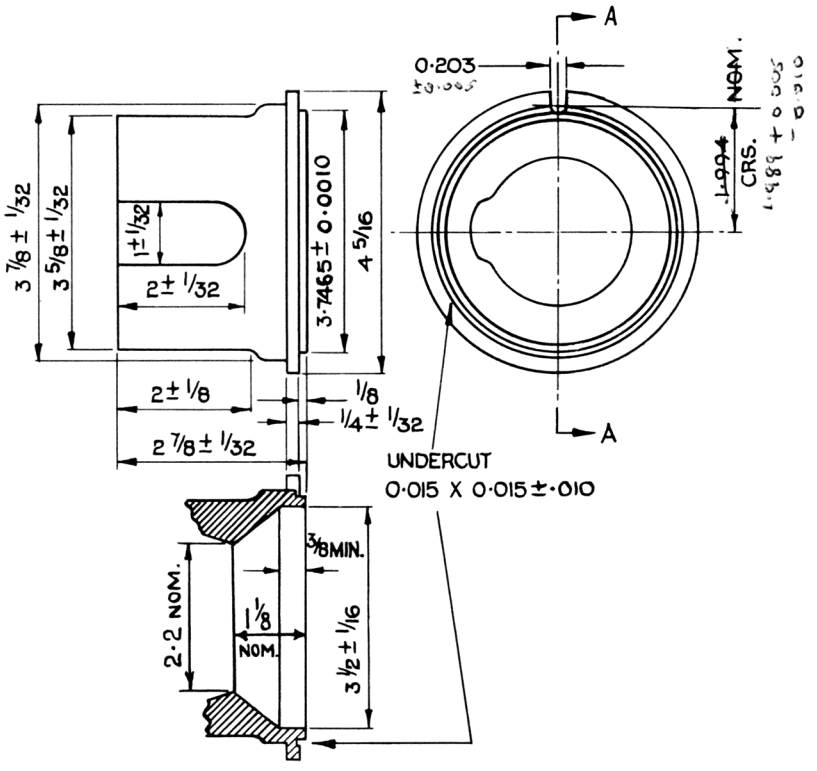
The allowable height variation (i.e. tilt) of the tube face on a 60mm diameter centred on the major axis of the collar locating surface, is computed arithmetically from:-

(2 × height error) + tilt ≤ 0·012"

Alternatively, when using the optical apparatus described in Appendix A, the greatest difference between any two of the readings shall not exceed 0·22 inches.

Samples submitted for Qualification Approval will be set up and operated in an approved JYA CV6101 test assembly or JYA plotting table to confirm satisfactory focusing and size of the projected image.


92·0 +1·7 -0·0
68·0 ± 2·0
12·2 MAX
108·0 ± 4·0
APPROXIMATE POSITION OF MOUNTING COLLAR SEE NOTE X.
POSITION OF RING GAUGE 38·0 DIA.
61·0
67·0 MAX
56·0 MIN
C/L OF ANODE CONNECTOR "SHROUD"
10° 10°
34·0 ± 2·0
276
313 ± 3·5
1
2
3
4
5
6
7
ORIENTATION OF BASE AND ANODE CONTACT
POSITION OF CATHODE.
20 MAX.
DIMENSIONS IN MILLIMETRES

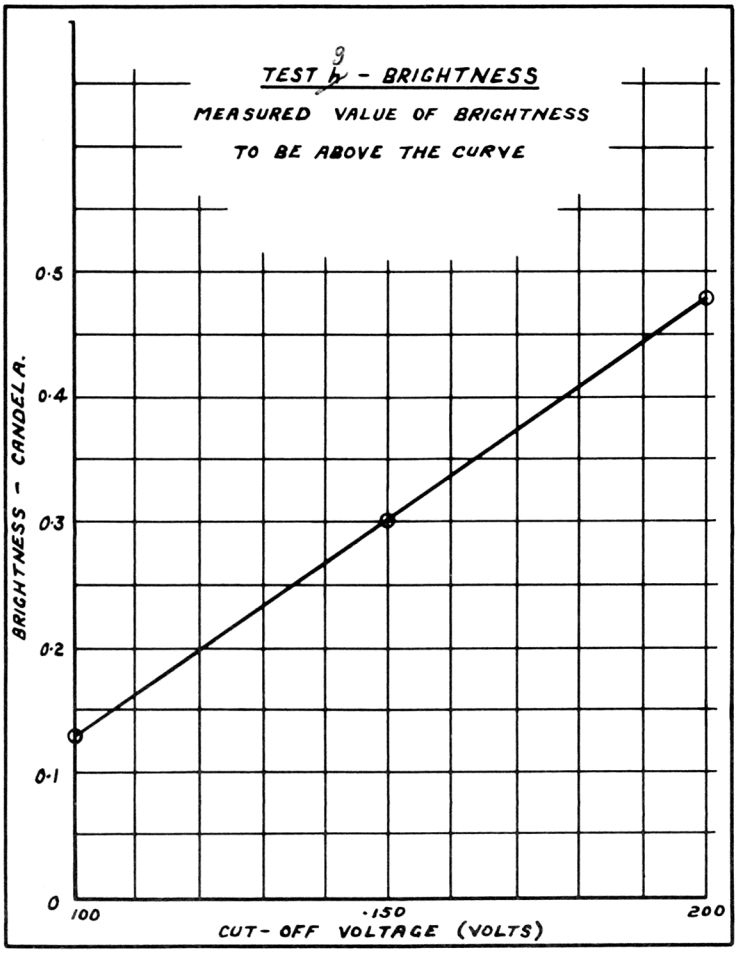


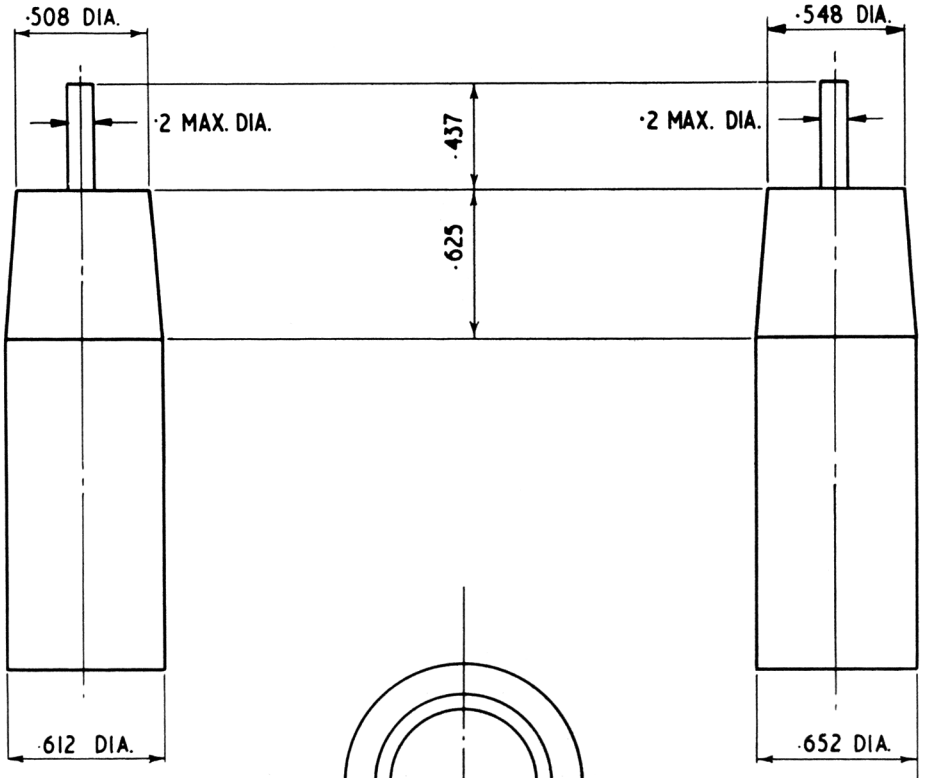
PART
SECTION A-A.

DIMENSIONS IN INCHES
DECIMAL DIMS. ± ·005
FRACTIONAL DIMS. ± 1/64
} UNLESS OTHERWISE STATED

MOUNTING COLLAR.

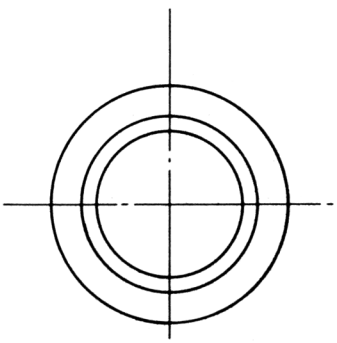
Arnold 2


TEST 9 - BRIGHTNESS
MEASURED VALUE OF BRIGHTNESS
TO BE ABOVE THE CURVE
BRIGHTNESS - CANDELA.
0·5
0·4
0·3
0·2
0·1
0
100
·150
200
CUT-OFF VOLTAGE (VOLTS)

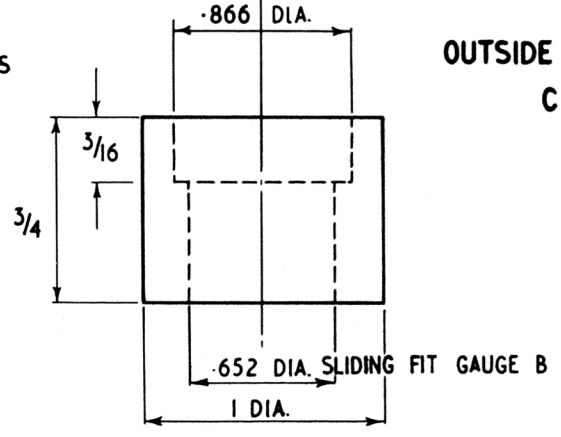


INSIDE GAUGE A

INSIDE GAUGE B



DIMENSIONS IN INCHES
DECIMAL DIMS ± ·001



OUTSIDE GAUGE C

ANODE SHROUD GAUGES

OUTLINE DRAWING

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION AD/CV6101

ISSUE 1A DATED 1.1.65

AMENDMENT NO. 1

Page 6 Drawing — Amend the dimension "67.0 MAX" for the projection of the anode connector shroud from centre line to read "61.0 MAX, 56.0 MIN".

April 1967.

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

NM.445467

ELECTRONIC VALVE SPECIFICATION
SPECIFICATION AD/CV6101 ISSUE 1A DATED 1 JANUARY 1965
AMENDMENT NO 2

Page 2 Test b — Amend the max heater current limit from 0.56A to 0.66A.

Test f — Amend the 'Test Condition' column to read:-

No deflecting or focusing fields. Pulse Vg from its cut-off voltage obtained in test d to one tenth of the cut-off voltage with tp not greater than 10 µs and duty ratio of 0.02.

Page 3 Test j

a. Amend the 'Test' column to read:-

j Useful Screen Area

Diameter of circle on screen centred on geometrical centre of the locating collar.

b. Delete reference to Note 2 in the 'Test Condition' column.

c. Amend the limit to 79 mm minimum.

Page 4 Test n — Amend 'See Note 4' in the Limits column to read 'See Note 6'.

Notes

a. Amend Note 4 to read:-

An approved method of determining the position of the locating collar is given in Appendix A to this Specification. (A copy of Appendix A may be obtained on application to the Specification Authority).

b. Add a new Note 6 as follows:-

The height of the image plane of the tube above the collar seating surface along the major axis of the collar locating surface shall be 4.435 ± 0.003". (The dimension of 4.435 ± 0.003" only applies if the image plane is determined using a metal filament lamp. Appropriate corrections shall be made if other light sources are used.) Alternatively, when using the optical apparatus described in Appendix A, the average of the three scale readings, referred to the zero position, shall not exceed 0.15 inches.

The allowable height variation (ie tilt) of the tube face on a 60 mm diameter centred on the major axis of the collar locating surface, is computed arithmetically from:-

$$(2 \times \text{height error}) + \text{tilt} \leqslant 0.012"$$

Alternatively, when using the optical apparatus described in Appendix A, the greatest difference between any two of the readings shall not exceed 0.22 inches.

Samples submitted for Qualification Approval will be set up and operated in an approved JYA CV6101 test assembly or JYA plotting table to confirm satisfactory focusing and size of the projected image.

Page 7 Mounting Collar — Mounting collar locating slot dimensions:-

a. Add a tolerance of ± 0.005 to the slot width dimension.

b. Amend the existing dimension of '1.994 Nom' to read $1.989 \begin{smallmatrix} +\ 0.005 \\ -\ 0.010 \end{smallmatrix}$

Page 8 Brightness Graph — Amend title of graph to read:-

Test g - Brightness

ASWE - November 1970

✓ AAL 7/11