

Specification Min. Tech./CV9311 Issue No. 1 A, Dated August 1968. To be read in conjunction with K1001, BS448 and DEF-133	<table border="1"> <tr> <th colspan="2">SECURITY</th></tr> <tr> <th>Specification</th><th>Valve</th></tr> <tr> <td>Unclassified</td><td>Unclassified</td></tr> </table>	SECURITY		Specification	Valve	Unclassified	Unclassified
SECURITY							
Specification	Valve						
Unclassified	Unclassified						

← indicates a change

TYPE OF VALVE Cathode Ray Tube		MARKING	
TYPE OF DEFLECTION Magnetic		K1001/4	
TYPE OF FOCUS Magnetic		BASE	
TYPE OF ELECTRON GUN Triode with beam limiting aperture		B9A modified (See drawing on page 7)	
SCREEN GG5 Aluminium backed			
PROTOTYPE G312			
RATINGS			
(All limiting ratings are absolute)			
(Not for Inspection purposes)			
		Note	
Heater Voltage	(V)	6.3	A
Heater Current	(A)	0.3	
Max. Anode Voltage	(kV)	20	
Max Heater/Cathode Voltage	(-Vh/k)	100	
	(+Vh/k)	75	
Max. Cathode Current	(mA)	150	
TYPICAL OPERATING CONDITIONS			
Anode Voltage	(kV)	15	
Cathode Current	(mA)	30	
CAPACITANCES			
Max. Cg to all other electrodes	(pF)	6.5	
Max. Ck to all other electrodes	(pF)	6.5	
CONNECTIONS			
Pin	Electrode		
1	NC		
2	g		
3	NC		
4	h		
5	h		
6	g		
7	NC		
8	k		
9	g		
Side Contact	a		
SIDE CONTACT			
Stud			
DIMENSIONS			
See drawing on page 7			
NOTES			
A Voltage may be temporarily increased to 250V maximum either polarity, (short term overload condition).			
N.A.T.O. Stock Number 5960-99-037-4576			

	K1001 Ref. 5A	Test	Conditions	Insp. Level	Sym- bol	Limits		Unit
						Min	Max	
a	4.6	<u>Inter-Electrode Capacitance</u> (1) Grid to all other electrodes. (2) Cathode to all other electrodes.		Note 7	Cg-all Ck-all	- -	6.5 6.5	pF pF
		For all further tests, $V_h = 6.3V$, unless otherwise stated.						
b		<u>Heater Current</u>		100%	Ih	0.27	0.33	A
c	4.1.3	<u>Heater Cathode Leakage</u> (1) Heater positive (2) Heater negative	$V_{hk} = 200V$	100%	+Ihk -Ihk	- -	50 50	μA μA
<p>For all further tests, $V_a = 15kV$, except clauses (m) and (r).</p> <p>(a) Unless otherwise stated, the focus and scan coils shall be those specified in Note 2.</p> <p>(b) The raster to be in accordance with Note 1.</p>								
d	4.3	<u>Grid Cut-off Voltage</u>	Adjust for optimum focus. Adjust V_g for cut-off.	100%	- V_g	20	40	V
e	4.4	<u>Grid Drive</u> (1) (1) Change in V_g from that in test (d). <u>Grid Drive</u> (2) (2) Change in V_g from that in test (d). (3) Cathode Current	Deflecting fields applied to give a focused raster. Grid voltage adjusted to produce a photometric intensity of 2 candela. Note 1. Deflecting fields applied to give a single focused diametric line. Grid voltage pulsed from beyond cut-off to give a visual brightness of 10,000 ft.-lamberts. Note 2.	100% 5% Note 13	V_g V_g Ik	- - -	18 18 140	V V μA
f		<u>Line Width</u> (at centre of raster). Note 6	Deflecting fields applied to give a single focused diametric line. Grid voltage pulsed from beyond cut-off to the level obtained in test clause e. Note 2.	100%	-	-	0.2	mm

	K1001 Ref. 5A	Test	Conditions	Insp. Level	Sym- bol	Limits		Unit
						Min	Max	
g		<u>Total Cathode Current</u>	Deflecting fields applied to give a defocused raster.	100%	Ik	150	-	μ A
h	6.3	(1) <u>Useful Screen Area</u> Centrally disposed circle.	Vg = any convenient value.	100%	dia.	47	-	mm
		(2) <u>Screen Blemishes</u> Note 3.	Defocused raster to cover whole screen.	100%				
		<u>Centrally disposed circle, 15 mm dia.</u>						
		(2.1) Area above 50 units: number.			-	-	0	-
		(2.2) Area 28 - 50 units: separation.			-	-	10	mm
		(2.3) Area 13 - 28 units: separation			-	-	5	mm
		<u>Remainder of Useful Screen</u>						
		(2.4) Area above 80 units: number.			-	-	0	-
		(2.5) Area 28 - 80 units: separation.			-	-	10	mm
		(2.6) Area 13 - 28 units: separation.			-	-	5	mm
j	6.4.2	<u>Spot Position</u>	Vg = any convenient value. No deflecting or focusing fields.	100%				
		Displacement of centre of spot from point of intersection of neck axis with screen surface.			-	-	3	mm
k		<u>Over - Voltage</u>	Va = 20kV, Vg = any convenient value. Note 4	100%	-	Note 5		-
1	4.1.2	<u>Grid Insulation</u>	Resistor = 25 M Ω .	100%				
		Increase in cut-off voltage.			Vg	-	17	V

	K1001 Ref. 5A	Test	Conditions	Insp. Level	Sym- bol	Limits		Unit
						Min	Max	
m	8	<u>Life</u> 200 hours <u>Life End Point</u> Change in Brightness Cathode Emission	Deflecting fields applied to give an unsynchronised focused raster. Grid value adjusted to give an initial visual line brightness of 10,000 ft-lamberts. Note 12. As in test clause g	Note 11	-	-	-	-
n	3.7	<u>Holding Period</u> Cathode Emission	7 days. No voltages As in test clause g.	100%	- Ik	- 150	50 -	% μ A
p	7.2	<u>External Pressure</u>		100%	-	25	-	lb/sq. in.
q		<u>Heater Warm-up</u> (1) Time for raster to become visible. (2) Time for raster to reach photometric intensity of 2 candelas.	Deflecting fields applied to give a focused raster. Grid voltage = 18V positive from level measured in test clause d. Test commences at instant of heater switch-on. Note 1.	Q.A.	 t_1 t_2	 - -	30 120	Sec. Sec
r		<u>Environmental</u> (1) <u>High Temperature</u> (1.1) Operational. Light output to be reasonably constant (1.2) Non-operational Heaters must not fail when switched on. (2) <u>Low Temperature</u> (2.1) Operational Light output to be reasonably constant. (2.2) Non-operational Heaters must not fail when switched on. (3) <u>Vibration</u> Trace Movement	Note 8. Tamb. = +70°C. Tamb. = +90°C. Note 9. Tamb. = -26°C Tamb = -40°C. DEF-133, Clause 8.2. Curve A and C, Fig. 5 Normal Flight Conditions. Note 10	Q.A.	 - - - -	 - - - -	 - - - -	 - - - mm

	K1001 Ref. 5A	Test	Conditions	Insp Level	Sym- bol	Limits		Unit
						Min	Max	
		(4) <u>Acceleration</u>	DEF-133, Clause 9.1. Main Fuselage (1) Proof 13g, 2 mins. duration. (2) Ultimate 17.3g, 1 min. duration.					
	10.2	(5) Climatic	Duration 28 days.					
s	3.9.1	<u>Heater Modulation</u>		Q.A.		-	-	-
t	3.9.2.	<u>Cathode Illumination</u>		Q.A.	-	-	-	-
u	3.9.3	<u>Effects of Magnetism</u>		Q.A.	-	-	-	-
v	8	<u>Life</u> 500 hours <u>Life End Point</u> Change in brightness Cathode Emission	Conditions as in test clause m. Record brightness. Note 12. As in test clause g	Q.A.				
					-	-	80	%
					Ik	150	-	μ A

NOTES

- Raster size = 2.54 cm square.
Scan Conditions: Line frequency = 8,533 Hz.
Frame frequency = 33.3 Hz, (approximately 245 lines.)
- Line Scan Conditions: Writing Speed = 2,540 cm/sec. Frequency = 58 Hz.
Focus coil type B.1809-1 (Celco), Scan Coil Type A.93/25176. The front of the focus coil shall be positioned 114 mm from the front ground reference surface on the tube envelope, (See drawing on page 7).
- The unit of area is 10^{-6} square inches.
- Pre-heat the cathode for 10 minutes. The tube shall be held with the neck vertical and screen uppermost while the neck is tapped gently with an approved rubber covered forked hammer at a minimum of four taps per second for 15 seconds.
- The tube shall be free from sparking and field emission after the first five seconds, and for a period of not less than 15 seconds, after tapping has ceased.
- The line width is defined as the separation of those regions of the line where the luminous intensity is one half the peak intensity at the centre of the line.
- An Inspection Level of S4 and A.Q.L. of 6.5% shall apply.

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NOTES (Cont'd.)

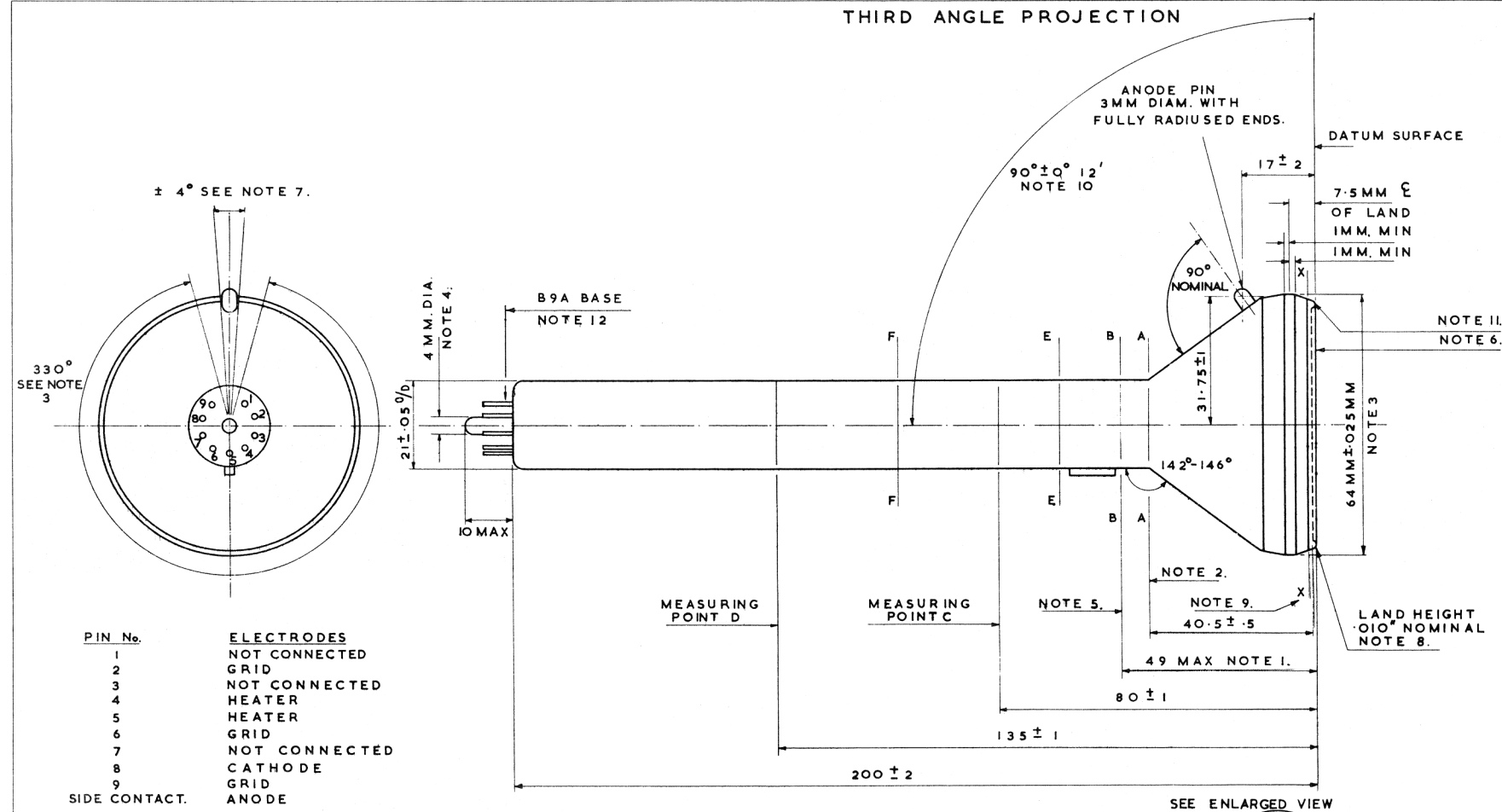
8. Operating conditions. 405 line, 25Hz focused raster, not less than 1 inch square. Drive voltage = 10V.

Temperature raised from ambient to +70°C, - tube operating. Maximum rate of rise = 1°/minute. Maintain operation for 10 minutes, then switch off all supplies. Hold at +70°C for 16 hours. Switch on tube, operate for 10 minutes, then switch off all supplies. Raise temperature to +90°C - maximum rate of rise 1°/minute. Hold at +90°C for 16 hours. During this time heaters to be switched on for a period of between 30 and 60 seconds, a minimum of 6 times. Cool to ambient temperature - maximum rate of cooling 2°/minute. Switch on tube - operate for 10 minutes - test ends.

9. Operating conditions as in Note 8.

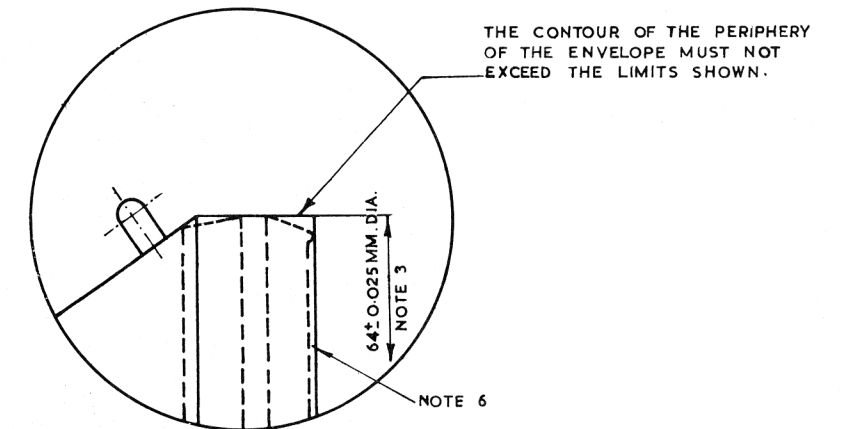
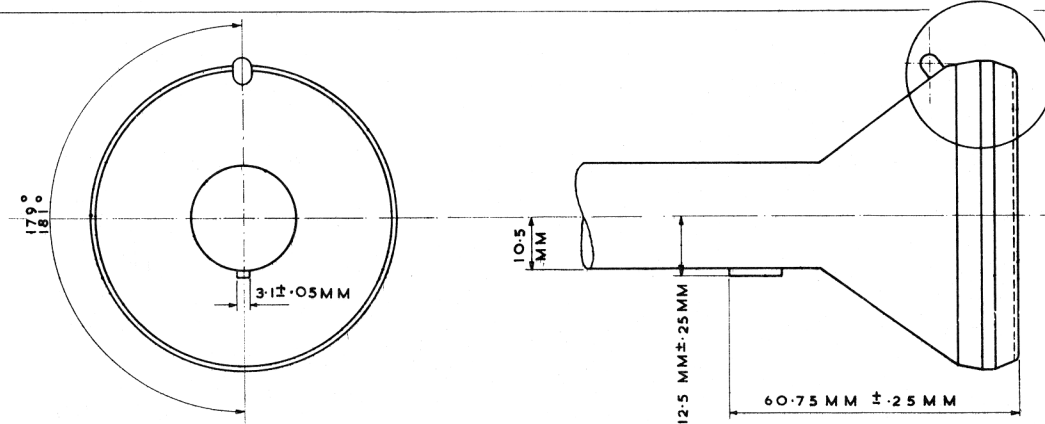
Temperature lowered from ambient to -26°C - tube operating. Maximum rate of cooling = 2°/minute. Maintain operation for 10 minutes, then switch off all supplies. Hold at -26°C for 16 hours. Switch on tube, operate for 10 minutes, then switch off all supplies. Lower temperature to -40°C - maximum rate of cooling 2°/minute. Hold at -40°C for 16 hours. During this period heaters to be switched on for a period of between 30 and 60 seconds, a minimum of 6 times. Raise to ambient temperature - maximum rate of rise 1°/minute. Switch on tube - operate for 10 minutes - test ends.

10. Tube mounted on vibration table through normal points of attachment in P.D.U. Type 152270/a.
11. The scale of life testing shall be related to production. For orders of less than 51, at least one tube shall be life tested. For orders greater than 50, the production shall be divided into batches of 50, and at least one tube from each shall be life tested. The batch corresponding to the tube undergoing life test shall not be released until the life test has completed 80% of the required life. At the option of the manufacturer and at his expense any number of additional tubes may be life tested, in which case the average of the lives of these tubes shall exceed 80% of the required life before the batch is released. Life test is considered satisfactory when an accumulated total of 200 hours per sample is reached.
12. Raster size: Height 2.54 cm. Width 1.8 cm. minimum.
Scan conditions: Frame Frequency 50Hz. Line writing speed 2,540 cm./Sec..
Number of lines 18 minimum.
Cathode emission current shall be held constant for the duration of the test.
13. Test clause (e)(2) shall be performed on tubes which have passed test clause (e)(1). If more than one failure occurs, 100% inspection shall be invoked until a sequence of one month's production produces no further failures, when the 5% inspection level may be reinstated.



- NOTES .

1. MAX NECK O/DIA APPLIES FROM THE PINCH TO THIS DIMENSION FROM THE DATUM SURFACE.
2. A-A IS REFERENCE LINE DEFINED BY RING GAUGE 22.5 MM. DIA.
3. ECCENTRICITY .05MM. MAX. TOTAL INDICATED READING .1MM WITH RESPECT TO SECTION BETWEEN MEASURING POINTS E & F. WHICH ARE 65MM & 105MM FROM DATUM SURFACE.
4. TUBE TO ENTER A B9A VALVE BASE WITH CENTRAL HOLE 6.5MM DIA TO ADMIT EXHAUST STEM.
5. A GAUGE LENGTH 100MM & INTERNAL DIA OF 21.1 WILL SLIDE FREELY OVER THE NECK FROM THE PINCH TO REFERENCE LINE B-B. KEYWAY REQUIRED TO PASS NECK LOCATING KEY.
6. MIN CENTRALLY DISPOSED USABLE SCREEN AREA IS A CIRCLE OF 47MM DIAMETER.
7. CENTRE LINE OF CONTACT LIES WITHIN AN ARC OF $\pm 4^\circ$ WITH RESPECT TO THE PLANE DEFINED BY THE TUBE AXIS & BASE PIN 5.
8. LAND HEIGHT TO BE ADJUSTED DURING MANUFACTURE SUCH THAT, THE DISTANCE FROM THE DATUM SURFACE TO THE SCREEN IMAGE PLANE (X-X) WILL LIE WITHIN SPECIFIED LIMITS, THE PLATE THICKNESS WILL DEPEND UPON THE REFRACTIVE INDEX OF THE GLASS.
9. THE DISTANCE BETWEEN DATUM SURFACE AND IMAGE PLANE SHALL BE $.0716'' \pm .0025''$ WITHIN THE CENTRAL 40MM DIAMETER, AND $.0716'' \pm .0035''$ OVER THE REMAINING USABLE SCREEN AREA, THIS APPLIES TO A WAVE-LENGTH OF 5875 Å.
10. THE ANGLE BETWEEN DATUM SURFACE AND NECK AXIS (DEFINED AS AXIS OF SURFACE OF REVOLUTION BETWEEN MEASURING POINTS C & D ON NECK) WILL BE $90^\circ \pm 0^\circ 12'$.
11. THE WIDTH OF THE GROUND REFERENCE SURFACE SHALL NOT BE LESS THAN .8 MM OVER MORE THAN 10% OF THE LAND CIRCUMFERENCE. ANY PITS OR OTHER DEPRESSED REGIONS IN THE REFERENCE SURFACE SHALL NOT REDUCE THE AREA OF THAT SURFACE BY MORE THAN 10%.
12. ECCENTRICITY BETWEEN CENTRE OF BASE PINS & NECK AXIS SHALL NOT EXCEED 0.305 MM (0.61 T.I.R.)



ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION Mintech/CV9311, Issue No. 1A, Dated August 1968

AMENDMENT No. 1

Page 7 Outline Drawing

Remove and destroy existing page 7 and substitute new page 7, dated January 1969, attached hereto.

January 1969

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

✓ AAS
31/1/69