CV9311

Ministry of Technology - R.R.E.

Specification Min. Tech./CV9311 Issue No. 1, dated November 1967 To be read in conjunction with K1001, BS448 and DEF-133	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE	Cathode Ray Tube
TYPE OF DEFLECTION	Magnetic
TYPE OF FOCUS	Magnetic
TYPE OF ELECTRON GUN	Triode with beam limiting aperture
SCREEN	GG5 Aluminium backed
PROTOTYPE	G312

MARKING

K1001/4

BASE

B9A modified (See drawing on page 7)

Superseded by Issue 1A

RATINGS
(All limiting ratings are absolute)
(Not for Inspection purposes)

			Note
Heater Voltage	(V)	6.3	
Heater Current	(A)	0.3	
Max. Anode Voltage	(kV)	20	
Max Heater/Cathode Voltage	(-Vh/k)	100	A
	(+Vh/k)	75	
Max. Cathode Current	(μA)	150	

TYPICAL OPERATING CONDITIONS

Anode Voltage	(kV)	15
Cathode Current	(μA)	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 Min	Limits Max	Unit
a	4.6	Inter-Electrode Capacitance		Note 7				
		(1) Grid to all other electrodes.			Cg-all	-	6.5	pF
		(2) Cathode to all other electrodes.			Ck-all	-	6.5	pF
		For all further tests, Vh = 6.3V, unless otherwise stated.						
b		Heater Current		100%	Ih	0.27	0.33	A
c	4.1.3	Heater Cathode Leakage	Vhk = 200V	100%				
		(1) Heater positive			+Ihk	-	50	μA
		(2) Heater negative			-Ihk	-	50	μA
		For all further tests, Va = 15kV, except clauses (m) and (r).						
d	4.3	Grid Cut-off Voltage	Adjust for optimum focus. Adjust Vg for cut-off.	100%	-Vg	20	40	V
e	4.4	Grid Drive (1)	Deflecting fields applied to give a focused raster. Grid voltage adjusted to produce a photometric intensity of 2 candela. Note 1.	100%				
		(1) Change in Vg from that in test (d).			Vg	-	18	V
		Grid Drive (2)	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.	5%				
		(2) Change in Vg from that in test (d).			Vg	-	18	V
		(3) Cathode Current			Ik	-	140	μA
f		Line Width (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

TESTS (Cont'd.)

CV9311

	K1001 Ref. 5A	Test	Conditions	Insp. Level	Symbol	Limits Min	Limits Max	Unit
g		Total Cathode Current	Deflecting fields applied to give a defocused raster.	100%	Ik	150	-	μA
h	6.3	(1) Useful Screen Area Centrally disposed circle.	Vg = any convenient value.	100%	dia.	47	-	mm
		(2) Screen Blemishes Note 3.	Defocused raster to cover whole screen.	100%				
		Centrally disposed circle, 15 mm dia.						
		(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
		Remainder of Useful Screen						
		(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
		Whole of Useful Screen						
		(2.7) Area below 13 units shall be ignored unless in sufficient number to cause perceptible darkening of the screen when viewed at a distance of 1 ft.						
		(2.8) Variation in luminance of area above 80 units from average screen luminance.		-	-	-	0.25	-
j	6.4.2	Spot Position	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		Over - Voltage	Va = 20kV, Vg = any convenient value. Note 4	100%	-	Note 5		-
l	4.1.2	Grid Insulation	Resistor = 25 MΩ.	100%				
		Increase in cut-off voltage.			Vg	-	17	V

	K1001 Ref. 5A	Test	Conditions	Insp. Level	Symbol	Limits Min	Limits Max	Unit
m	8	Life 200 hours	Deflecting fields applied to give a single focused diametric line. Frequency = 50Hz. Grid voltage pulsed from beyond cut-off to give a visual brightness of ... ft-lamberts. Note 2 (except frequency) and 12.	Note 11	-	-	-	-
		Life End Point						
		Change in Brightness			-	-	85	%
		Cathode Emission	As in test clause g		Ik	150	-	μA
n	3.7	Holding Period	7 days. No voltages	100%				
		Cathode Emission	As in test clause g.		Ik	150	-	μA
p	7.2	External Pressure		100%	-	25	-	lb/sq. in.
q		Heater Warm-up	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.				
		(1) Time for raster to become visible.			t_1	-	30	Sec.
		(2) Time for raster to reach photometric intensity of 2 candela.			t_2	-	120	Sec
r		Environmental		Q.A.				
		(1) High Temperature	Note 8.					
		(1.1) Operational. Light output to be reasonably constant	Tamb. = +70°C.		-	-	-	-
		(1.2) Non-operational Heaters must not fail when switched on.	Tamb. = +90°C.		-	-	-	-
		(2) Low Temperature	Note 9.					
		(2.1) Operational Light output to be reasonably constant.	Tamb. = -26°C					
		(2.2 Non-operational Heaters must not fail when switched on.	Tamb = -40°C.		-	-	-	-
		(3) Vibration	DEF-133, Clause 8.2. Curve A and C, Fig. 5 Normal Flight Conditions. Note 10					
		Trace Movement			-	-	±0.1	mm

TESTS (Cont'd.)

CV9311

	K1001 Ref. 5A	Test	Conditions	Insp Level	Sym-bol	Limits Min	Limits Max	Unit
		(4) Acceleration	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	Heater Modulation		Q.A.		-	-	-
t	3.9.2.	Cathode Illumination		Q.A.	-	-	-	-
u	3.9.3	Effects of Magnetism		Q.A.	-	-	-	-
v	8	Life 500 hours	Conditions as in test clause m . Record brightness.	Q.A.				
		Life End Point						
		Change in brightness			-	-	90	%
		Cathode Emission	As in test clause g		Ik	150	-	μA

NOTES

1. Raster size = 2.54 cm square.
   Scan Conditions: Line frequency = 8,533 Hz.
   Frame frequency = 33.3 Hz, (approximately 245 lines.)

2. 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).

3. The unit of area is 10^{-6} square inches.

4. 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.

5. 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.

6. 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.

7. An Inspection Level of IC and A.Q.L. of 6.5% shall apply.

/8

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.

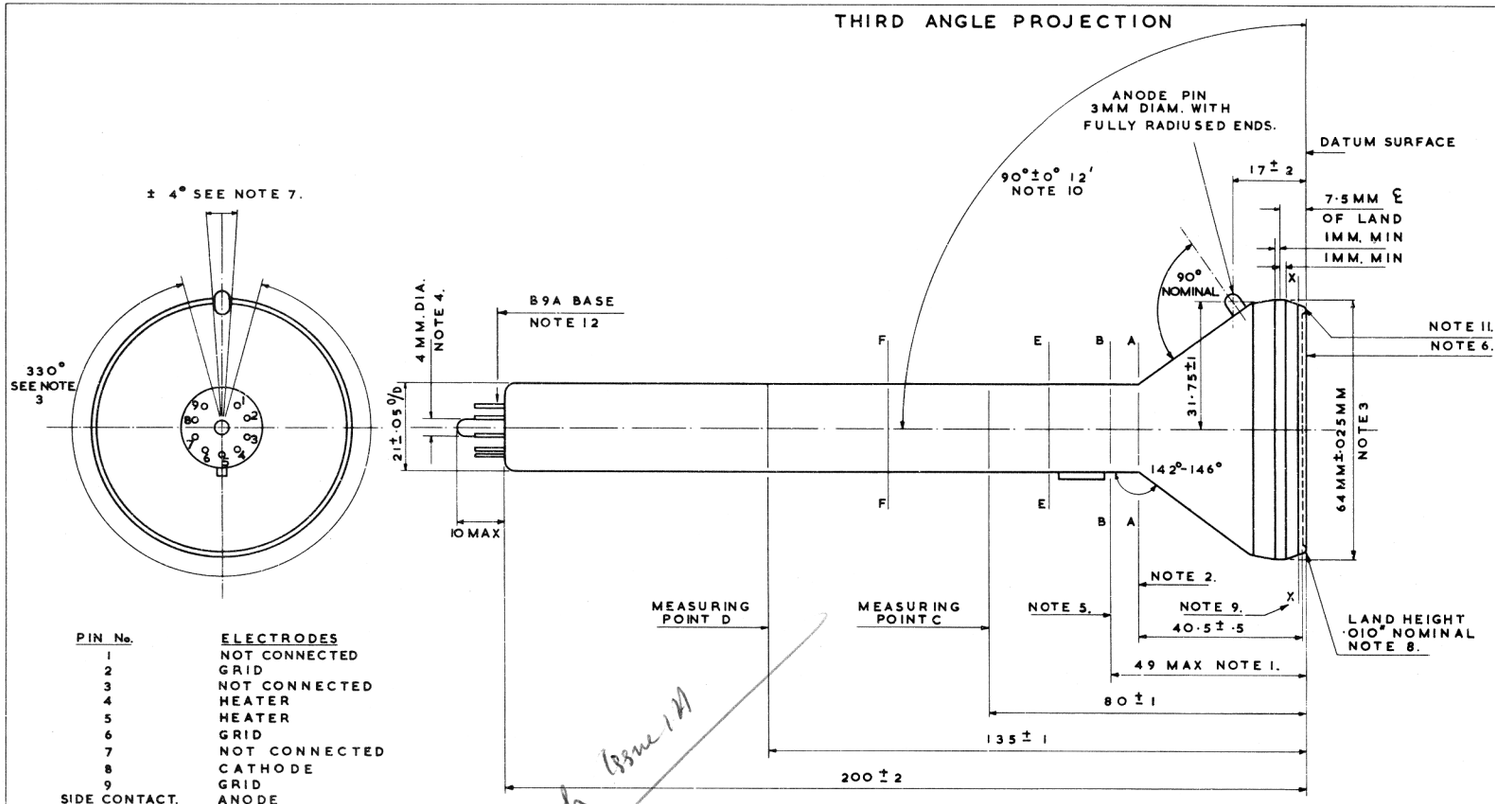
10. Tube mounted on vibration table through normal points of attachment in P.D.U. Type 152270/a.

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. The value of brightness, in ft-lamberts, to be agreed later.

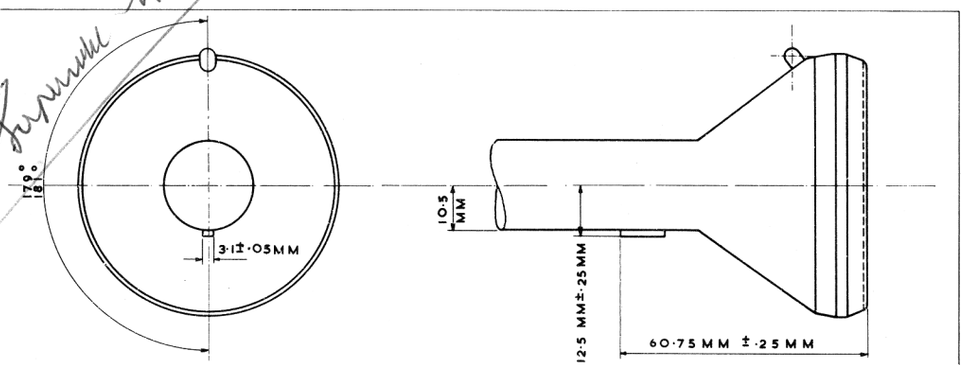
CV9311

THIRD ANGLE PROJECTION



PIN No.	ELECTRODES
1	NOT CONNECTED
2	GRID
3	NOT CONNECTED
4	HEATER
5	HEATER
6	GRID
7	NOT CONNECTED
8	CATHODE
9	GRID
SIDE CONTACT.	ANODE

KEY TO BE CEMENTED TO C.R.T. TO DIMENSIONS SHOWN.



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 65 MM & 105 MM FROM DATUM SURFACE.
4. TUBE TO ENTER A B9A VALVE BASE WITH CENTRAL HOLE 6·5 MM 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 47 MM DIAMETER.
7. CENTRE LINE OF CONTACT LIES WITHIN AN ARC OF ±4° 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" ± ·0025" WITHIN THE CENTRAL 40MM. DIAMETER, AND ·0716" ± ·0035" OVER THE REMAINING USABLE SCREEN AREA, THIS APPLIES TO A WAVE-LENGTH OF 5875 A°.
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° ± 0° 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.)

Issue 1A

CV 9311/1/7