

BRITISH STANDARDS INSTITUTION
2, PARK STREET, LONDON W1A 2BS

BS CECC 11 001-021



Specification available from:- AS SHOWN IN PD 9002,
CECC 00 200, AND

ISSUE 1 NOVEMBER 1983

RANK ELECTRONIC TUBES,
SIDCUP BY-PASS,
SIDCUP, KENT. DA14 6LZ.

TELEPHONE 01-302-0271

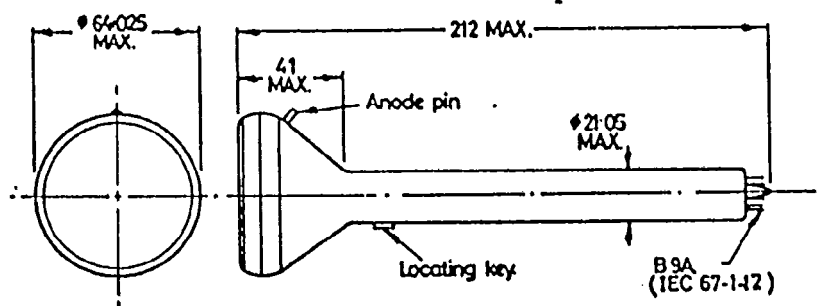
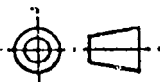
TELEX 896215

Page 1 of 27

ELECTRONIC COMPONENTS OF ASSESSED QUALITY : DETAIL
SPECIFICATION IN ACCORDANCE WITH BS CECC 11 000 : 1980

MANUFACTURER'S TYPE NUMBER
G 0612-J2

Outline and dimensions Third angle
projection



NATO Stock No.
5960-99-037-4576

SEE PD 9002 and CECC 00 200

For ordering information
see Clause 4.

HEAD-UP DISPLAY CATHODE
RAY TUBE

DEFLECTION : MAGNETIC
(45° total angle)

FOCUS : MAGNETIC

SCREEN : 47 mm DIA.

PHOSPHOR : J2 (JEDEC P1)

COLOUR : YELLOWISH GREEN
x = 0.218, y = 0.712

PERSISTENCE: MEDIUM

FULL ASSESSMENT
(ADDITIONAL)

All dimensions in mm

For detail dimensions, base connections and
pinch clearance see Appendix B.

Marking information see Clause 3.

1. DATA (not for inspection purposes)

Mechanical

Mounting position : Unrestricted

Mass (weight)

0.15 kg max.

Environmental

Vibration

Acceleration

Min. Max. Units

- 56 m/s²

Frequency Range

3 150 Hz

Acceleration

- 170 m/s²

Air pressure

- 200 kN/m²

Temperature (operating)

-26. +70 °C

Temperature (storage)

-40 +90 °C

Electrical - Limiting values (absolute maximum rating system - IEC 134)

Heater voltage

Min. Max. Units

5.7 6.9 V

Heater to cathode, positive voltage

- 75 V

Heater to cathode, negative voltage

- 100 V

Intensity modulator electrode negative voltage

1 100 V

Refer to Qualified Products List PD 9002 and/or CECC 00 200 for details of
manufacturers approved to this specification



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ISSUE 1 NOVEMBER 1983

DATA (continued)

	Min.	Max.	Units
Intensity modulator electrode positive voltage	Must never become positive		
Final anode voltage	10	20	kV
Intensity modulator electrode cathode circuit resistance	-	1.5	MΩ

2. OPERATING CONDITIONS AND TYPICAL CHARACTERISTICS

When the tube is operated under the conditions given below, the characteristic values which follow them are attainable:

Vh = 6.3 Vac ; Vg2 = 15 kV

Focus coil: Celco type B 1809-1 or equivalent.

Deflector coil: Cintel type A93/25176 or equivalent.

	Min.	Max.	Unit
Heater current at Vh = 6.3 V	0.270	0.330	A
Focusing requirements	Dependent on coil used		
Voltage required on the intensity modulator electrode for cut-off (negative)	20	40	-V
Useful screen dimensions	47 dia.	-	mm
Resolution (line width) measured to 20 % peak luminance at Vg2 = 15 kV and a writing speed = 25.4 m/s	-	0.3	mm
Luminous intensity at Vg2 = 15 kV and a writing speed = 25.4 m/s	-	2.0	cd

3. MARKING

Each tube and package shall bear the following markings:

- Manufacturer's type number.
- NATO Stock Number if applicable.
- Special marking relating to hazards. Each tube and/or package contains a warning of hazards with respect to handling, implosion and Xrays.
- Factory Identification Code.
- Date Code.
- To BS CECC 11 001-021
- Manufacturer's serial number.

4. ORDERING INFORMATION

Orders for components to this specification shall include the following minimum information:

- Quantity
- Manufacturer's type number.
- NATO Stock Number if applicable.
- Specification BS CECC 11 001-021 Issue 1
- Any special requirements and packaging instructions shall be included in the order.

5. RELATED DOCUMENTS

BS 6001	Sampling procedures and tables for inspection by attributes.
BS 9000	General requirements for a system of electronic components of assessed quality.
BS CECC 11 000	Generic specifications : Cathode ray tubes.

ATED DOCUMENTS (continued)

CECC 00 200	CECC Qualified Products List.
IEC 67	Dimensions of electronic tubes and valves.
IEC 68	Basic environmental testing procedures.
IEC 100	Methods for the measurement of direct interelectrode capacitances of electronic tubes and valves.
IEC 134	Rating systems for electronic tubes and valves and analogous semiconductor devices.
PD 9002	BS 9000 Component Selection Guide.

STRUCTURAL SIMILARITY

Not applicable.

X-RADIATION

If this tube is operated at voltages in excess of 16 kV., X-ray shielding is advisable to give protection against the possible danger of personal injury arising from prolonged exposure at close range.

ADDITIONAL INFORMATION

- 8.1 The precautions taken in manufacture reduce the possibility of spontaneous implosion to a minimum, but any additional stress due to mishandling considerably increases the risk of implosion; such implosion may occur immediately or may be delayed. Particular care should be taken not to scratch any part of the tube envelope, especially the faceplate and the area where the faceplate and side-walls meet as this will appreciably weaken the glass and may lead to implosion of the tube.
- 8.2 The tube should be operated at its minimum useful brightness in order to prevent damage to the screen material and prolong phosphor life.
- 8.3 This tube has an accurately controlled phosphor image plane with respect to a ground glass reference surface to facilitate interchangeability in fixed optical systems.
- 8.4 The tube should be shielded from magnetic fields which can be detrimental to its performance.
- 8.5 B9A valve holders for use with this tube should be modified by drilling a central hole 6.5 mm diameter to allow clearance of exhaust stem.

BS CECC 11 001-021
ISSUE 1 NOVEMBER 1983

TEST CONDITIONS AND INSPECTION REQUIREMENT

GROUP A - Lot by Lot

GENERAL TEST CONDITIONS. (unless stated otherwise for a particular test)

Vh 6.3 V. Final anode voltage 15 kV. All other electrodes as required.

Focus coil details: Celco type B1809-1 or equivalent. The front of the focus coil shall be positioned 114 mm from the front ground reference surface on the tube envelope. (See Appendix B).

Deflection coil details: Cintel type A93/25176 or equivalent. Position centre of deflection coil 17 mm from reference line.

Raster details: (when specified) Non-interlaced 256 line raster. Number of lines per field 256. Field repetition frequency 33.3 Hz. Line repetition frequency 8.533 kHz. Horizontal and vertical dimensions of the display to be beyond the edge of the phosphor screen. (overscanned).

Line scan details: (when specified) Writing speed 2540 cm/s. Repetition frequency 58 Hz. Line flyback suppressed.

Pre-heating: Apply Vh only, 6.3 V for 60 s minimum.

All electrode voltages are with respect to the cathode unless otherwise stated.

Astigmatism correction is not applied.

Samples submitted to tests which are marked '(D)' shall not be accepted for release.

All tests are non destructive

AQL: given in %

INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup A1						
-Visual inspection	4.3	No voltages				100 %
Pre non-operating endurance test						
-Cathode emission	4.6.3	Min. cathode factor $K = 1.8$ Modulator voltage equal to half the value in 4.6.2. Defocused raster			$I_k = K \left(\frac{-V_{gl}}{128} \right)^{3/2}$ (Record value)	
-Non-operating endurance	4.9.1	Duration = 168 h minimum				
Post non-operating endurance tests						
-Cathode emission	4.6.3	Min. cathode factor $K = 1.8$. Modulator voltage equal to half the value in 4.6.2. Defocused raster.				I_k to be within 20 % of the value recorded in 4.6.3 pre non-operating endurance

* To be calculated



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GROUP A (continued)

INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup A1 (cont'd)						100 %
-Quality of fluorescent screen and faceplate and	4.6.10	Adjust modulator electrode for convenient screen luminance				As blemish specification (Appendix A)
-Useful screen area and			47 dia	-	mm	
-Uniformity of luminance		Photodetector aperture 8 mm dia. max. Spectral response of the photodetector/filter combination shall be that of the C.I.E. Standard Observer.	-	1.6:1 ratio		
-Gas content coefficient	4.6.1	Not applicable (Triode Gun)				
-Intensity modulator electrode cut-off voltage (negative)	4.6.2		20	40	-V (record value)	
-Luminance characteristics	4.6.4 (1)	Vh = 5.7 V. Focused raster 25 mm x 25 mm. Screen luminous intensity = 2.0 cd. Photodetector aperture size 15 mm dia. min. Measure Drive. Max anode current 140 μ A.	-	18	V	
-Resolution (line width measured to 20 % peak luminance at screen centre only)	4.16.14.5	Vh = 5.7 V. Line length 25 mm. Modulator drive voltage equal to the value obtained in 4.6.4. Tube or coil may be rotated through 90° instead of interchanging the line and field scanning voltages.	-	0.3	mm	
-Stray emission	4.6.6	Screen horizontal and uppermost. Cathode preheating time = 120 s. Final anode = 20 kV. -Vgl at cut-off. Tap for 15 s at 4 taps per second.				Performance requirements as in 4.6.6 & 4.6.7
-Flashover	4.6.7					
-Cathode stability		Test method as Appendix C. Defocused raster. Modulator electrode voltage adjusted to give Ik = 50 μ A. Test to begin 5 minutes after voltages first applied. Test duration = 5 minutes.				
-Change in cathode current						
-Robustness of final anode contact		Test method as Appendix D. Minimum applied force = 26.7 newtons.				
-Dimensions	4.4	Inspection drawing (See Appendix B)				
						As inspection drawing (Group A)

BS CECC 11 001-021
ISSUE 1 NOVEMBER 1983

GROUP A (continued)

INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	AQL
Subgroup A2						1.0
-Mechanical spot displacement	4.6.5	No raster. The spot position shall be measured relative to the point of inter-section of neck axis with screen surface.	-	3	mm	
-Increased air pressure	4.8.9	Severity: 200 kPa minimum. No voltages				
Post increased air pressure tests						
-Non-operating endurance	4.9.1	Duration = 24 h minimum				
-Visual inspection	4.3	No voltages.				
-Stray emission	4.6.6	As in subgroup A1				
-Flashover	4.6.7					
Subgroup A4						6.5
-Heater current	4.6.8	Apply Vh only	270	330	mA	
-Heater to cathode leakage	4.6.9	Vh=k (Heater positive) = 200 V Vk=h (Heater negative) = 200 V and Vh only	-	50	μA	
			-	50	μA	
-Intensity modulator electrode total negative current	4.6.12A or 4.6.12B	Set -Vg1 to cut-off Modulator current (negative) Rmod = 25 MΩ Change of modulator voltage	-	0.7	μA	
-Electrode leakage current			-	17	V	
-Final anode	4.6.11	Final anode = 20 kV	-	5	μA	



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GROUP B - Lot by Lot						
General test conditions - as for Group A						
Only tests marked (D) are destructive						
INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup B1 -Dimensions	4.4	Inspection Drawing See Appendix B	See inspection drawing (Group B) (Appendix B)			
					S4	4.0

GROUP C - PERIODIC						
General test conditions - as for Group A.						
Only tests marked (D) are destructive						
INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup C1 -Dimensions	4.4	Inspection drawing See Appendix A	As inspection drawing (Group C)			
Subgroup C2 -Capacitances	IEC 100	No voltages.				I
		Test method as Appendix E Proc.1. $V_h = 5.7$ V Deflecting fields applied to give a single focused diametric line. Writing speed = 2540 cm/s. Repetition frequency = 58 Hz. Modulator voltage pulsed from beyond cut-off to give an average peak line luminance = 34300 cd/m ²		6.5 6.5	pF pF	S3
		Line length (cm) Pulse duration = Writing speed (cm/s) Pulse repetition frequency = 58 Hz. Pulse rise & fall times to be within 10 % of pulse duration. Droop within 2 % of pulse amplitude. Effective diameter or width of the aperture shall be ≤ 0.04 mm.		18 140	V μ A	6.5
						1.5

BS CECC 11 001-021
ISSUE 1 NOVEMBER 1983

GROUP C (continued)		INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS				
					MIN.	MAX.	UNITS	IL	AQL
Subgroup C2 (cont'd)		-Resolution (narrow slit) measured to 50 % peak luminance	4.6.14.5	Conditions as for the measurement of average peak line luminance. Measure line width at the centre of the display in both X & Y axis.	-	0.2	mm	I	1.5
		-External conductive coating resistance	4.6.27	No external conductive coating					
Subgroup C3		-Adhesion of locating key		Test method as Appendix F. Applied torque = 0.49 newton metres				S4	6.5
Subgroup C4		-Mass		Inspection level at yearly intervals					
		-Heater modulation	4.6.31	Focused raster non-synchronized with heater supply frequency. Heater supply frequency = 50 Hz.	-	0.4	kg	S4	6.5
Subgroup C5		-Base strain		Inspection level at yearly intervals				S2	6.5
		-Damp heat (steady state)	IEC 68	See Appendix M Test Ca. Duration 4 days. No voltages					
Post conditioning test		-Visual inspection	4.3	No voltages					
		-External conductive coating resistance	4.6.27	Not applicable					
Subgroup C6 (D)		Operating endurance		Inspection level (see 4.9.2 of BS CECC 11 000)					
			4.9.2	Unsynchronized focused raster. Raster details: Line writing speed = 2540 cm/s. Field repetition frequency = 50 Hz. Number of lines 18 minimum, Modulator non-interlaced. Field height 2.54 cm. Line length 1.8 cm minimum. Voltage adjusted to give an initial average peak line luminance of 34300 cd/m ² . Measure and record cathode current and maintain for duration of test. Duration = 500 h min. Yearly total = 3000 h min.					

GROUP C (continued)

INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup C6 (D) (cont'd)						
Post operating endurance tests		Tests applied at 500 h and completion				
-Change in intensity modulator electrode cut-off voltage (negative)	4.6.2	As in subgroup A1. Change in value		5	V	
-Change in average peak line luminance at screen centre only		Test method as Appendix E Proc.2. Pulse line conditions and effective aperture size as in Subgroup C2. Apply pulse to modulator electrode to give Ik equal to the value recorded in the operating endurance test.	-	80	%	
-Cathode emission	4.6.3	As in subgroup A1 Min. cathode factor K = 1.8			$* Ik = \frac{K(-V_{gl})^{3/2}}{\sqrt{128}} \mu A$	

GROUP D - Qualification approval only

General test conditions - as for Group A

Only tests marked (D) are destructive

INSPECTION OR TEST	REFERENCE BS CECC 11 000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup D1		Qualification Approval only. Sample size, refer to BS CECC 11 000 3.4				
-Cathode warm-up		Test method as Appendix G. Vh = 5.7 V. Focused raster 25 mm x 25 mm. Screen luminous intensity = 2.0 cd. Temperature = -26 ± 3 °C.				
-Time for raster to become visible			-	30	s	
-Time for raster to reach screen luminous intensity of 2.0 cd			-	120	s	

* To be calculated