

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

BS CECC 11001-013



Specification available from:- AS SHOWN IN PD9002,
CECC 00 200 AND,

ISSUE 2 AUG. 1986.

RANK BRIMAR LIMITED,
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ELECTRONIC COMPONENTS OF ASSESSED QUALITY: DETAIL
SPECIFICATION IN ACCORDANCE WITH CECC 11000:1980

MANUFACTURER'S TYPE NUMBER

31C/159H2M
(previously R3121-L1) and
31C/159L3M
(previously R3121-L6)

NATO Stock No.

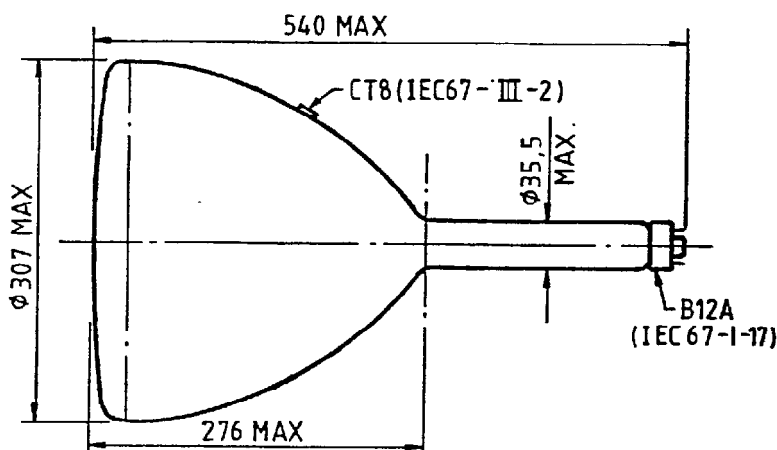
31C/159H2M 5960-99-037-5774

31C/159L3M 5960-99-037-5775

SEE PD 9002 and CECC 00 200

For ordering information
See Clause 4.

Outline and dimensions (not for inspection purposes)



RADAR DISPLAY CATHODE
RAY TUBE

DEFLECTION : MAGNETIC
(50° total angle)

FOCUS : ELECTROSTATIC

SCREEN : 265 MM DIA.

PHOSPHOR : H2 (JEDEC P26)

L3 (JEDEC P38)

PERSISTENCE: H2 VERY LONG

L3 LONG

Dimensions in mm

For detail dimensions and base connections see
Appendix B.

Marking information see Clause 3.

INTERNAL SERIES RESISTOR
FOR TRANSISTOR PROTECTION

See ADDITIONAL INFORMATION 8.6

WITH ADDITIONAL ASSESSMENT

1. DATA (not for inspection purposes)

Mechanical

Mounting position: Restricted (see additional information 8.2 and 8.3)

Mass (weight) 5.5 kg max.

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

	Min.	Max.	Units.
Operating temperature	-40	+70	°C.
Storage temperature	-40	+70	°C.

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

	Min.	Max.	Units
Heater voltage	5.7	7.0	V
Heater to cathode, positive voltage		150	V
Heater to cathode, negative voltage		150	V

Refer to Qualified Products List PD 9002 and/or CECC 00 200 for details of
manufacturer's approved to this specification.

1. DATA - Electrical (cont'd)

	Min.	Max.	Units
Intensity modulator electrode negative voltage	1	220	-V
Intensity modulator electrode positive voltage	Must never become positive		V
Final anode voltage	8	18	kV
Focus electrode voltage	-500	700	V
Second grid voltage	200	700	V
Intensity modulator electrode cathode 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:

$V_h = 6.3$ Vac ; $V_{g2} = 300$ V ; V_{g4} Adjust for focus ; $V_{g3} + g5 = 15$ kV.

Deflector coil: Cintel type GAA 5130 or equivalent.

	Min.	Max.	Units
Heater current ($V_h = 6.3$ V)	0.270	0.330	A
Focusing requirements Electrode voltage	0	400	V
Voltage required on the intensity modulator electrode for cut-off (negative)	30	70	-V
Useful screen dimensions	265 dia.		mm

Resolution (line width) measured to 20 % peak
luminance at $V_{g3} + g5 = 15$ kV and $I_{g3} + g5 = 50$ μA 0.5 mm

3. MARKING

Each tube and package shall bear the following markings:

- Manufacturer's type number.
- NATO Stock Number.
- Special marking relating to hazards. Each tube and/or package contains a warning of hazards with respect to handling, implosion and X-rays.
- Factory identification code.
- Date code.
- To BS CECC 11 001 - 013
- Manufacturer's serial number.

4. ORDERING INFORMATION

Orders for these radar display tubes shall contain the following minimum information:-

- Quantity
- Manufacturer's type number
- NATO Stock No.
- BS CECC 11 001 - 013 Issue 2.
- 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.
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.

6. STRUCTURAL SIMILARITY

Not applicable

7. X-RADIATION

If this tube is operated at voltages in excess of 16 kV, X-ray radiation can be produced which, after prolonged exposure, may constitute a health hazard if not adequately shielded.

8. ADDITIONAL INFORMATION

- 8.1 The tube should be operated at its minimum useful brightness in order to prevent damage to the screen material. There is a possibility of a rapid burn on the screen if the spot is allowed to remain stationary.
- 8.2 The tube may not be mounted with the screen down and the major axis of the tube making angle of less than 20° with the vertical.
- 8.3 Under no circumstances is the base socket to be used to support the tube. The tube mounting should ensure that the main support is near the faceplate and so arranged that no stresses exist between the glass envelope and the neck.
- 8.4 The tube should be shielded from magnetic fields which can be detrimental to its performance.
- 8.5 The tube is expected by the manufacturer to have a shelf life of one year from the date of delivery.
- 8.6 A transistor protection device (surge limiter) is fitted to limit the discharge current in the event of a flashover. This is achieved by mounting a ceramic resistor in series with the final anode connection and final anode electrode. The value of each resistor is measured prior to sealing the electron gun assembly into the bulb.
LIMITS, 0.05 to 3.0 MΩ.
- 8.7 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 envelop, especially the faceplate and the area where the faceplate and side-walls meet, as this will appreciably weaken the glass.
- 8.8 In systems where high frequency character writing is required, the deflector coil assembly should not extend further than 80 mm from the reference line, otherwise there may be undesirable interaction with the tube gun.

TEST CONDITIONS AND INSPECTION REQUIREMENTS

GROUP A - Lot by Lot

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

Vh 6.3 V Vg2 300 V Vg4 Adjust for focus Vg3 + g5 15 kV

Cathode preheating time = 60 s minimum.

Focus coil details: Not applicable.

Deflector coil details: Cintel type GAA 5130 or equivalent.

Raster details: 405 or 625 line interlaced TV raster. Number of lines per field 202.5/312.5. Field repetition frequency 50 Hz. Horizontal and vertical dimensions of the display to be beyond the edge of phosphor screen, (overscanned).

Luminance measurements made with eye corrected photometer with a minimum aperture of 20 mm dia. and viewed through a Wratten 22 filter.

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

All electrode voltages are with respect to the cathode unless otherwise stated. In all cases where instructions read 'focus' adjust focus control for optimum focus.

Astigmatism correction is not applied.

All tests are non destructive AQL: given in %

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
Subgroup A1						100 %
-Visual inspection	4.3	No voltages	See 4.3			
-Non-operating endurance	4.9.1	Duration = 24 h minimum				
Post non-operating endurance tests						
-Cathode emission	4.6.3	Minimum cathode factor $K = 2.2$. Modulator voltage equal to half the value found in 4.6.2. Defocused raster.	+	-	μA $Ik = K(-V_{mod})^{3/2} / \sqrt{128}$	

+ To be calculated

GROUP A (continued)

INSPECTION OR TEST	REFERENCE CECC 11000	CONDITIONS OF TEST	INSPECTION REQUIREMENTS			
			MIN.	MAX.	UNITS	IL AQL
<i>Subgroup A1 (cont'd)</i>						
-Quality of fluorescent screen and faceplate and	4.6.10	Adjust -Vg1 for convenient screen luminance. Defocused raster over useful screen area.	As blemish specification (Appendix A)			
-Useful screen area		Deflection coil pulled back 3.0 mm minimum from the fully seated position.	250	-	mm	
and			No evidence of neck shadowing anywhere within the useful screen area.			
-Non-uniformity of luminance		Visual inspection	No significant variation in luminance within the useful screen area.			
-Gas content coefficient	4.6.1	No deflection fields. Vg2 = 300 V. Vg3 + g5 = -20 V. Vg4 = 300 V. Zk = 400 μ A. Measure Ig3 + g5.	-	0.3	nA/ μ A	
-Intensity modulator electrode cut-off voltage (negative)	4.6.2		30	70	-V	
-Luminance characteristics	4.6.4	Focused raster 250 mm x 250 mm. Screen luminance = 8.0 cd/m ² measure at centre of screen. Measure Vdrive with respect to cut-off voltage (4.6.2). Screen horizontal and uppermost. Cathode preheating time = 120 s. Vg3 + g5 = 18 kV. -Vg1 at cut-off. Duration of tapping = 15 s.	-	29	V	
-Stray emission	4.6.6		Performance requirements as in 4.6.6 and 4.6.7.			
-Flashover	4.6.7					
<i>Subgroup A2</i>						
-Mechanical spot displacement	4.6.5 Method B	50 Hz pulsed spot if desired.	-	10	mm	II 1.5
-Resolution	4.6.14	Line length = 250 mm. Ig3 + g5 = 50 μ A. Measure line width to 20 % level at screen centre only. Tube or coil may be rotated through 90° instead of interchanging the line and field scanning voltages.	-	0.5	mm	
and						
-Focus electrode voltage			0	400	V	