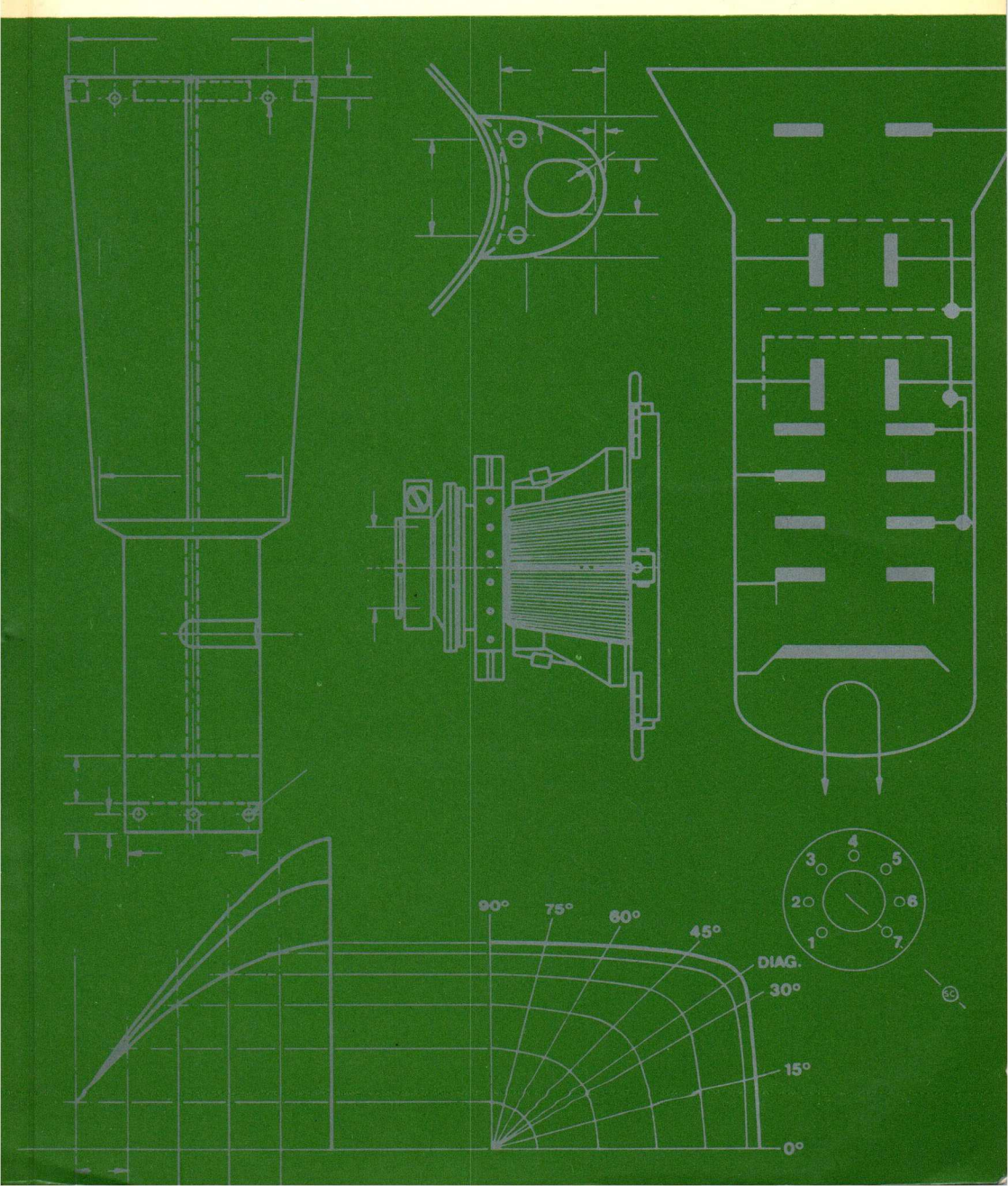
BRIMAR

Industrial Cathode Ray Tubes

Supplement 1 — Data Section



DESIGN DATA HANDBOOK

INDUSTRIAL CATHODE RAY TUBES

Supplement 1

The facilities and organisation of Thorn Brimar Limited meet the requirements of the M.O.D. (P.E.) Defence Standard 05-21 and BS9000.

BRIMAR

Thorn Brimar Limited
Mollison Avenue, Brimsdown, Enfield,
Middlesex EN3 7NS
Telephone: 01-804 1201
Telex: 23953

A Member of the THORN EMI Group

Issue 1 October 1981

Printed in England

This volume is a supplement to the third edition of the Brimar CRT Data Handbook. The original Handbook is published in two volumes.

Volume 1	**Operational recommendations** **Safety recommendations** **Aspects of Design Reports**
Volume 2	**Tube index** **Tube selection tables** **Design data of phosphors** **Design data of accessories** **Design data of tubes**

This supplement contains data on new tube types designed to maintain the Brimar range as the most comprehensive available and to meet the requirements of modern equipment.

This supplement should be read in conjunction with Volumes 1 and 2

Extreme care has been taken in the preparation of the data to ensure these volumes are as comprehensive, accurate and up to date as possible at the time of going to press. Before designing tubes into equipment, it is advisable to check with the sales office or authorised agents that availability and data remain unaltered.

HEALTH AND SAFETY AT WORK ACT 1974

Attention is drawn to the recommendations under this heading in the Safety Recommendations in Volume one.

WARNING

These tubes should be used in accordance with their published ratings, and in conformity with the operational recommendations of the company's data handbook. The company will not entertain claims for loss or damage where this advice has been disregarded.

APPLICATIONS SERVICE

The Applications Laboratory provide a free advisory service to equipment manufacturers.

THORN BRIMAR LIMITED,
Applications Laboratory,
Mollison Avenue.
Brimsdown, Enfield,
Middx. EN3 7NS.

CONTENTS

Index

Industrial Cathode Ray Tubes

This index is a comprehensive list of all the data in Volume 2 and the Supplement. It shows in which volume and section the data may be found. The status column shows that a number of tubes for which data is contained in Volume 2 are now considered as maintenance only types and that others are obsolescent types which are available from Thorn Brimar as long as stocks last, but no further manufacture of these types will take place. The replacement type column offers alternative types and commercial equivalents in some cases.

Type Number	Volume	Section	Status	Replacement Type
CV5119	Vol. 2	Radar	Maintenance	
CV5819	Vol. 2	Radar	Maintenance	F31-11LD
CV6198	Vol. 2	Data and Monitor	Maintenance	
CV6244	Vol. 2	Data and Monitor	Current	M16-100W
CV8299	Vol. 2	Oscilloscope	Maintenance	SE4D/P31
CV8300	Vol. 2	Oscilloscope	Maintenance	SE4D/T14
CV9337	Vol. 2	Oscilloscope	Maintenance	SE5/2A/P31
CV10543	Vol. 2	Radar	Maintenance	F22-10LD
D3-130	Vol. 2	Oscilloscope	Current	
D7-200	Vol. 2	Oscilloscope	Current	
D7-201	Vol. 2	Oscilloscope	Current	
D9-110	Vol. 2	Oscilloscope	Current	
D9-120	Suppl.	Oscilloscope	Current	
D10-210	Vol. 2	Oscilloscope	Current	
D10-230	Vol. 2	Oscilloscope	Current	
D10-240	Vol. 2	Oscilloscope	Current	
D10-293	Vol. 2	Oscilloscope	Current	
D10-300	Suppl.	Oscilloscope	Current	
D10-310	Suppl.	Oscilloscope	Current	
D13-33	Vol. 2	Oscilloscope	Maintenance	
D13-47	Vol. 2	Oscilloscope	Current	
D13-51	Vol. 2	Oscilloscope	Current	
D13-471	Vol. 2	Oscilloscope	Maintenance	

Industrial Cathode Ray Tubes

Index

Type Number	Volume	Section	Status	Replacement Type
D13-600	Vol. 2	Oscilloscope	Maintenance	
D13-601	Vol. 2	Oscilloscope	Obsolescent	
D13-610	Vol. 2	Oscilloscope	Current	
D13-611	Vol. 2	Oscilloscope	Current	
D13-630	Vol. 2	Oscilloscope	Current	
D14-150	Vol. 2	Oscilloscope	Current	
D14-170	Vol. 2	Oscilloscope	Obsolescent	D14-172
D14-171	Vol. 2	Oscilloscope	Obsolescent	D14-173
D14-172	Vol. 2	Oscilloscope	Current	
D14-173	Vol. 2	Oscilloscope	Current	
D14-180	Vol. 2	Oscilloscope	Obsolete	D14-181
D14-181	Vol. 2	Oscilloscope	Current	
D14-182	Suppl.	Oscilloscope	Current	
D14-200	Vol. 2	Oscilloscope	Current	
D14-270	Vol. 2	Oscilloscope	Current	
D14-280	Vol. 2	Oscilloscope	Current	
D14-310	Vol. 2	Oscilloscope	Current	
D14-320	Suppl.	Oscilloscope	Current	
D14-340	Suppl.	Oscilloscope	Current	
D14-350	Suppl.	Oscilloscope	Current	
D16-100	Vol. 2	Oscilloscope	Current	
D16-110	Vol. 2	Oscilloscope	Obsolescent	
D16-111	Suppl.	Oscilloscope	Current	
D18-130	Vol. 2	Oscilloscope	Current	
D18-160	Vol. 2	Oscilloscope	Current	
D21-10	Vol. 2	Oscilloscope	Obsolescent	
D21-102	Vol. 2	Oscilloscope	Current	

Type Number	Volume	Section	Status	Replacement Type
F10-100	Vol. 2	Radar	Obsolete	
F15-101	Vol. 2	Radar	Maintenance	
F16-101	Vol. 2	Radar	Current	
F21-10	Vol. 2	Radar	Current	
F21-12	Vol. 2	Radar	Obsolescent	
F21-130	Vol. 2	Radar	Current	
F22-10	Vol. 2	Radar	Maintenance	
F22-11	Vol. 2	Radar	Current	
F31-10	Vol. 2	Radar	Current	
F31-11	Vol. 2	Radar	Maintenance	
F31-12	Vol. 2	Radar	Maintenance	
F31-13	Vol. 2	Radar	Maintenance	
F31-14	Vol. 2	Radar	Obsolescent	
F31-111	Vol. 2	Radar	Current	
F31-112	Vol. 2	Radar	Obsolescent	
F41-12	Vol. 2	Radar	Current	
F41-13	Vol. 2	Radar	Obsolescent	
F41-14	Vol. 2	Radar	Current	
F41-120	Vol. 2	Radar	Obsolete	F41-12
F41-121	Vol. 2	Radar	Maintenance	
F41-122	Vol. 2	Radar	Obsolete	F41-123
F41-123	Vol. 2	Radar	Current	
F41-124	Vol. 2	Radar	Current	
F41-130	Vol. 2	Radar	Obsolete	F41-13
F41-140	Vol. 2	Radar	Obsolete	F41-14
F41-141	Vol. 2	Radar	Current	
F41-142	Suppl.	Radar	Current	

Industrial Cathode Ray Tubes

Index

Type Number	Volume	Section	Status	Replacement Type
M8-100	Vol. 2	Data and Monitor	Obsolete	
M14-100	Vol. 2	Data and Monitor	Current	
M14-101	Suppl.	Data and Monitor	Current	
M14-110	Suppl.	Data and Monitor	Current	
M16-100	Vol. 2	Data and Monitor	Current	
M17-10	Vol. 2	Data and Monitor	Current	
M17-12	Vol. 2	Data and Monitor	Current	
M17-15	Vol. 2	Data and Monitor	Current	
M17-151	Suppl.	Data and Monitor	Current	
M17-152	Vol. 2	Data and Monitor	Obsolete	
M19-100	Vol. 2	Data and Monitor	Maintenance	
M19-101	Suppl.	Data and Monitor	Current	
M19-102	Suppl.	Data and Monitor	Current	
M19-111	Suppl.	Data and Monitor	Current	
M21-13	Vol. 2	Data and Monitor	Maintenance	
M23-110	Vol. 2	Data and Monitor	Maintenance	
M23-111	Vol. 2	Data and Monitor	Maintenance	
M23-112	Vol. 2	Data and Monitor	Current	
M23-113	Vol. 2	Data and Monitor	Current	
M23-114	Suppl.	Data and Monitor	Current	
M23-130	Suppl.	Data and Monitor	Current	
M24-120	Vol. 2	Data and Monitor	Current	
M24-121	Vol. 2	Data and Monitor	Current	
M24-124	Suppl.	Data and Monitor	Current	
M24-130	Vol. 2	Data and Monitor	Current	
M24-150	Suppl.	Data and Monitor	Current	
M28-11	Vol. 2	Data and Monitor	Maintenance	
M28-12	Vol. 2	Data and Monitor	Obsolescent	
M28-13	Vol. 2	Data and Monitor	Current	
M28-131	Vol. 2	Data and Monitor	Maintenance	
M28-132	Vol. 2	Data and Monitor	Current	

Type Number	Volume	Section	Status	Replacement Type
M28-133	Vol. 2	Data and Monitor	Current	
M28-134	Suppl.	Data and Monitor	Current	
M31-100	Vol. 2	Data and Monitor	Obsolescent	
M31-101	Vol. 2	Data and Monitor	Obsolescent	
M31-120	Vol. 2	Data and Monitor	Obsolescent	
M31-182	Vol. 2	Data and Monitor	Maintenance	
M31-184	Vol. 2	Data and Monitor	Current	
M31-185	Vol. 2	Data and Monitor	Current	
M31-190	Vol. 2	Data and Monitor	Current	
M31-191	Vol. 2	Data and Monitor	Current	
M31-192	Vol. 2	Data and Monitor	Current	
M31-193	Suppl.	Data and Monitor	Current	
M31-212	Vol. 2	Data and Monitor	Current	
M31-213	Vol. 2	Data and Monitor	Current	
M31-220	Suppl.	Data and Monitor	Current	
M31-222	Suppl.	Data and Monitor	Current	
M31-223	Suppl.	Data and Monitor	Current	
M31-230	Suppl.	Data and Monitor	Current	
M31-231	Suppl.	Data and Monitor	Current	
M31-260	Suppl.	Data and Monitor	Current	
M36-141	Vol. 2	Data and Monitor	Current	
M36-142	Vol. 2	Data and Monitor	Obsolescent	
M36-190	Suppl.	Data and Monitor	Current	
M38-100	Vol. 2	Data and Monitor	Current	
M38-101	Vol. 2	Data and Monitor	Current	
M38-102	Vol. 2	Data and Monitor	Obsolescent	
M38-103	Vol. 2	Data and Monitor	Current	
M38-104	Vol. 2	Data and Monitor	Current	
M38-105	Vol. 2	Data and Monitor	Current	
M38-106	Vol. 2	Data and Monitor	Current	

Industrial Cathode Ray Tubes

Index

Type Number	Volume	Section	Status	Replacement Type
M38-107	Suppl.	Data and Monitor	Current	
M38-111	Vol. 2	Data and Monitor	Obsolescent	
M38-112	Vol. 2	Data and Monitor	Obsolescent	
M38-113	Vol. 2	Data and Monitor	Current	
M38-120	Vol. 2	Data and Monitor	Current	
M38-121	Vol. 2	Data and Monitor	Current	
M38-122	Vol. 2	Data and Monitor	Current	
M38-124	Suppl.	Data and Monitor	Current	
M38-142	Vol. 2	Data and Monitor	Current	
M44-120	Vol. 2	Data and Monitor	Current	
M50-120	Vol. 2	Data and Monitor	Current	
M61-120	Vol. 2	Data and Monitor	Current	
PMT58-1	Vol. 2	Data and Monitor	Current	M36-141W
PMT61	Vol. 2	Data and Monitor	Current	M36-141LA
PMT65	Vol. 2	Data and Monitor	Current	M17-10W
PMT66	Vol. 2	Data and Monitor	Current	M36-141W
PMT68	Vol. 2	Data and Monitor	Current	M17-10LA
Q13-202	Vol. 2	Special	Current	
Q13-203	Vol. 2	Special	Current	
SE4D	Vol. 2	Oscilloscope	Maintenance	
SE5/2A	Vol. 2	Oscilloscope	Obsolescent	
SE5F	Vol. 2	Oscilloscope	Maintenance	

Type Number	Volume	Section	Status	Replacement Type
XR1000	Vol. 2	Special	Obsolescent	
XR1000A	Vol. 2	Special	Obsolescent	
XR1002	Vol. 2	Special	Obsolescent	
XR1002A	Vol. 2	Special	Obsolescent	
XR1003	Vol. 2	Special	Obsolescent	
XR1003A	Vol. 2	Special	Obsolescent	
7ABP33A	Vol. 2	Radar	Current	
31C14/T1	Vol. 2	Radar	Maintenance	CV5119
31C16	Vol. 2	Data and Monitor	Current	M17-12
31F14	Vol. 2	Radar	Current	F41-12
59-60/09/307	Suppl.	Radar	Current	
59-60/90/037	Vol. 2	Data and Monitor	Current	
59-60/90/074	Vol. 2	Data and Monitor	Current	

SINGLE GUN INSTRUMENT TUBES - CURRENT TYPES

Common features:- Electrostatic deflection and focus, 6.3 V heaters.

Type Number	Description	Face § Diag. Diam. nom. inch	Useful Screen Area min. cm^2	Overall length max. mm	TYPICAL OPERATION - voltages to cathode								Base Type
					I_h A	V_{a1} kV	V_{a2} focus V	V_{a3} kV	V_{a4} kV	$-V_g$ † V	D_x V/cm	D_y V/cm	
D3-130GH	General purpose indicating device	(1)	2.7ø	103.2	0.3	1.0	48 to 144	1.0	1.0	20 to 48	80 to 120	58 to 88	B13B
D7-200GH	Indicators, oscilloscopes, alpha-numerical readout	[3]	5 x 4	180	0.3	1.0	65 to 200	1.0	1.0	25 to 50	21 to 29	25 to 35	B13B
D7-201GH	Improved D7-200GH	[3]	5 x 4	190	0.12	1.2	80 to 250	1.2	-	30 to 60	29 to 37	14 to 18	B13B
D9-110GH	Low profile mono-accelerator	[3.5]	6.6 x 4	264	0.12	2.0	300 to 510	2.0	-	40 to 87	28 to 34.8	12.8 to 16	B14G
D9-120GH	Short length mono-accelerator	[3.5]	6.3x5.1	220	0.12	1.5	206 to 412	1.5	-	22 to 52	25 to 35	14 to 19.5	B14G
D10-210GH	Compact tube, mesh p.d.a	[4]	7 x 5	230	0.075‡	0.6	100 to 220	0.54	6.0	30 to 55	11.2 to 13.8	8 to 10	B12F
D10-230GH	Flat-faced mono-accelerator	(4)	8 x 6.4*	260	0.3	1.5	120 to 250	1.5	-	22 to 52	21 to 26	13 to 16	B14G
D10-240GH	Medium bandwidth, spiral p.d.a.	[4]	7 x 5	260	0.12	1.0	175 to 350	1.0	2.0	35 to 70	21.6 to 26.4	8.3 to 10.2	B12F
D10-293GH	Medium to high bandwidth, mesh p.d.a.	[4]	6.8x5.6	300	0.12	1.0	180 to 360	1.0	6.0	26 to 52	10.5 to 12.8	3.6 to 4.6	B12F
D10-294GH	D10-293 with twist coil	[4]	6.8x5.6	300	0.12	1.0	180 to 360	1.0	6.0	26 to 52	10.5 to 12.8	3.6 to 4.6	B12F
D10-300GH	Compact oscilloscopes operating up to 10 MHz	[4]	6.8x5.6	230	0.12	2.0	275 to 550	2.0	-	30 to 70	30 to 38	35 to 44	B14G

Other phosphor screens are available to special order. Both x and y-plates are designed for symmetrical operation.

* Corners cut † Cut-off § (1) Round face [3] Rectangular face. ø Diameter

SINGLE GUN INSTRUMENT TUBES - CURRENT TYPES (continued)

Common features:- Electrostatic deflection and focus, 6.3 V heaters

Type Number	Description	Face § Diag. Diam. nom. inch	Useful Screen Area min. cm^2	Overall length max. mm	TYPICAL OPERATION - voltages to cathode								Base Type
					I_h A	V_{a1} kV	V_{a2} focus V	V_{a3} kV	V_{a4} kV	$-V_g$ † V	D_x V/cm	D_y V/cm	
D10-310GH	Compact tube, medium bandwidth, mesh p.d.a.	[4]	6.8x5.6	230	0.12	0.6	100 to 220	0.55	6.0	24 to 48	10.8 to 13.7	8 to 10.5	B12F
D13-47GH	Medium bandwidth, spiral p.d.a.	[5]	10 x 6	371	0.3	1.0	175 to 400	1.0	4.0	35 to 65	14.5 to 17.5	6.7 to 8.3	B12F
D13-51GH	High bandwidth, mesh p.d.a.	[5]	10 x 6	335	0.3	1.0	30 to 150	1.0	10	50 to 90	11 to 15	4.5 to 6.0	B12F
D13-610GH	General purpose, medium bandwidth, spiral p.d.a.	(5)	10 x 8*	371	0.3	1.0	170 to 380	1.0	3.0	35 to 65	12.5 to 15.8	6.8 to 8.7	B12F
D13-611GH	General purpose, medium bandwith, spiral p.d.a.	(5)	10 x 8*	371	0.3	1.0	170 to 380	1.0	3.5	35 to 70	14.1 to 16.9	7.0 to 8.9	B12F
D13-630GH	Short length mono-accelerator	(5)	10 x 8*	340	0.3	2.0	170 to 290	2.0	-	30 to 70	19 to 23	12 to 15	B14G
D14-150GH	High bandwidth mesh p.d.a.	[5.5]	10 x 8	386	0.3	1.2	30 to 200	1.2	12	50 to 90	11 to 14.5	4.6 to 6.0	B12F
D14-172GH	General purpose, short length, spiral p.d.a.	[5.5]	10 x 8	308	0.3	1.0	180 to 380	1.0	2.0	35 to 65	15.7 to 18.7	7.4 to 9.7	B12F
D14-173GH	D14-172GH with low wattage heater	[5.5]	10 x 8	308	0.12	1.0	180 to 380	1.0	2.0	35 to 65	15.7 to 18.7	7.4 to 9.7	B12F
D14-181GH	Medium bandwidth, spiral p.d.a.	[5.5]	10 x 8	384	0.3	1.0	200 to 400	1.0	4.0	35 to 65	13.5 to 17.2	6.7 to 8.7	B12F
D14-182GH	D14-181 with aluminized screen	[5.5]	10 x 8	384	0.3	1.5	300 to 600	1.5	6.0	50 to 95	20.2 to 25.8	10 to 13.1	B12F

Other phosphor screens are available to special order. Both x and y-plates are designed for symmetrical operation.

* Corners cut † Cut-off § (○) Round face [ ] Rectangular face

SINGLE GUN INSTRUMENT TUBES - CURRENT TYPES (continued)

Common features:- Electrostatic deflection and focus, 6.3V heaters.

Type Number	Description	Face § Diag. Diam. nom. inch	Useful Screen Area min. cm^2	Overall length max. mm	TYPICAL OPERATION - voltages to cathode								Base Type
					I_h A	V_{a1} kV	V_{a2} focus V	V_{a3} kV	V_{a4} kV	$-V_g$† V	D_x V/cm	D_y V/cm	
D14-200GH	High bandwidth, mesh p.d.a.	▭ 5.5	10 x 8	405	0.3	1.2	30 to 200	1.2	12	50 to 90	11 to 14.2	4.3 to 5.4	B12F
D14-270GH	Large screen short length mono-accelerator	▭ 5.5	10 x 8	333	0.12	2.0	170 to 290	2.0	-	30 to 70	19 to 23	12 to 15	B14G
D14-280GH	Medium to high bandwidth mesh p.d.a.	▭ 5.5	10 x 8	395	0.3	2.0	335 to 670	2.0	12	53 to 106	14 to 17.4	5.6 to 6.9	B12F
D14-310GH	High performance, mesh p.d.a.	▭ 5.5	10 x 8	420	0.3	1.5	380 to 540	1.5	12	35 to 66	11 to 14	3.4 to 4.3	B12F
D14-320GH	Very short length mono-accelerator	▭ 5.5	10 x 8	230	0.3	2.0	170 to 350	2.0	-	30 to 70	27 to 35	21 to 28	B14G
D14-340GH	Large screen mono-accelerator	▭ 5.5	10 x 8	333	0.3	2.0	170 to 290	2.0	-	30 to 70	19 to 23	12 to 15	B14G
D14-350GH	Medium bandwidth short length, spiral p.d.a.	▭ 5.5	10 x 8	308	0.3	1.0	160 to 320	1.0	3.0	27 to 54	18 to 23	9 to 11.5	B12F
D16-100GH	Square face, X-Y plotter, spiral p.d.a.	▭ 6.5	10 x 10	387	0.3	1.25	250 to 450	1.25	2.5	45 to 85	13.5 to 17	13.5 to 17	B12F
D16-111GH	Medium bandwidth, square face, X-Y plotter, spiral p.d.a. aluminized screen	▭ 6.5	10 x 10	384	0.3	1.5	260 to 600	1.5	6.0	40 to 80	21.8 to 27.8	12.8 to 16.1	B12F
D18-130GH	General purpose. large screen area, spiral p.d.a.	▭ 7	12 x 10	310	0.3	1.5	270 to 570	1.5	3.0	40 to 80	23 to 29	13 to 16.5	B12F

Other phosphor screens are available to special order. Both x and y-plates are designed for symmetrical operation.

*Corners cut † Cut-off § ◯ Round face ▭ Rectangular face.

SINGLE GUN INSTRUMENT TUBES - CURRENT TYPES (continued)

Common features:- Electrostatic deflection and focus, 6.3V heaters.

Type Number	Description	Face § Diag. Diam. nom. inch	Useful Screen Area min. cm^2	Overall length max. mm	TYPICAL OPERATION - voltages to cathode								Base Type
					I_h A	V_{a1} kV	V_{a2} focus V	V_{a3} kV	V_{a4} kV	$-V_g$ † V	D_x V/cm	D_y V/cm	
D18-160GH	Large screen, mesh p.d.a. medium to high bandwidth	[7]	12 x 10	440	0.3	2.0	380 to 760	2.0	12	40 to 80	11 to 14.5	4.7 to 6.0	B12F
D21-102GH	Large diameter display p.d.a.	(8.5)	15 x 15 *	420	0.3	3.0	800 to 1200	3.0	6	36 to 84	34.5 to 48	28.5 to 40.5	B12F

Other phosphor screens are available to special order. Both x and y-plates are designed for symmetrical operation.

* Corners cut † Cut-off § ◯ Round face ▭ Rectangular face.

RADAR TUBES - CURRENT TYPES

Common features:- Electrostatic focus, magnetic deflection, 6.3V 0.3A heaters, aluminized screens, CT8 side contacts.

Type Number	Application and Description	Face Dia. nom.	Overall Length max.	Neck Dia. max.	Defl. Angle nom.	TYPICAL OPERATION Voltages referred to cathode				Base Type
						V_{a1}	V_{a2+a4}	V_{a3}	$-V_g$ cut-off	
		inch	mm	mm	°	V	kV	V	V	
F16-101LD	Small boat radar	6	370	29.4	37	500	14	0 to 400	27 to 44	B8H
7ABP33A	American type for small boat radar	7	342	38	50	300	7	0 to 250	28 to 72	B12A
F21-10LG	General marine radar	8.5	450	35.5	41	600	14	0 to 400	32 to 48	B8H
F21-130GR	General marine radar	8.5	326	29.4	60	400	14	0 to 400	34 to 78	B8H
F22-11LD	General marine radar	9	408	35.5	60	300	12	-300 to +300	30 to 78	B12A
F31-10LC	General marine radar	12	572	35.5	40	600	15	-300 to +300	40 to 85	B8H
F31-111LC	Wider scan angle than F31-10..	12	494	35.5	50	300	14	-300 to +300	30 to 70	B12A
F41-12LC	Major radars for ships, ports & airport traffic control	16	610	35.5	50	300	15	-300 to +300	40 to 80	B12A
F41-14LC	Enlarged spot version of F41-12..	16	610	35.5	50	300	15	-300 to +300	40 to 80	B12A
F41-123LG	Long neck version of F41-12..	16	650	35.5	50	300	15	-300 to +300	40 to 80	B12A
F41-124LC	F41-123.. except positive focus voltage range	16	650	35.5	50	300	15	0 to +400	40 to 80	B12A
F41-141LC	Enlarged spot version of F41-12..	16	610	35.5	50	300	18	-300 to +300	40 to 80	B12A
F41-142LC	F41-141LC with mounting flange	16	610	35.5	50	300	18	-300 to +300	40 to 80	B12A

All 16 inch Radar Tubes (F41 series) now have 52% transmission glass as clear glass is no longer available for these types.

The above tubes, in certain cases, can be supplied with phosphor screens other than those listed to special order.
Tubes using the B8H base may be fitted with the B8H Sparkguard Base and will then have a suffix after the type number.

DATA DISPLAY AND MONITOR TUBES - CURRENT TYPES

Common features:- Rectangular face-plates, electrostatic focus, magnetic deflection, aluminized screens, CT8 side contacts.

Type Number	Application and Description	Face † Diag. nom. inch	Overall Length max. mm	Neck Dia. max. mm	Defl. Angle °	Screen Glass Trans. (Appr) %	TYPICAL OPERATION Voltages referred to cathode V_h V	I_h mA	V_{a1} V	V_a final kV	V_{a3} focus V	$-V_g$ cut-off V	Base Type
M14-100GH	Medical, monitor, & camera viewfinder applications	5.5	184	20.7	70	62	11	75	250	10	0 to 350	35 to 69	B7G/D
M14-101GH	M14-100GH with mounting lugs	5.5	184	20.7	70	62	11	75	250	10	0 to 350	35 to 69	B7G/D
M14-110GH	Strengthened structure version of M14-100GH	5.5	184	20.7	70	42	11	75	250	10	0 to 350	35 to 69	B7G/D
M16-100W	Mobile or military monitor. Fully ruggedised construction Encapsulated flexible leads to base and anode button.	6	233.7	27.45	70	Clear	6.3	300	400	14	0 to 400	31 to 71	Flying leads
59-60/09/ 307	Packaged high contrast display with GY phosphor. Fully ruggedised construction	6	236	-	70	15	6.3	300	450	14	0 to 450	40 to 80	Flying leads
M17-10W	Small, quality monitor or TV camera viewfinder	7	236	29.4	70	Clear	11.5	150	400	14	0 to 400	38 to 78	B8H
M17-12W	M17-10.. with different heater	7	236	29.4	70	Clear	6.3	300	400	14	0 to 400	38 to 78	B8H
M17-15W	M17-10.. with laminated face-plate	7	242	29.4	70	Clear	11.5	150	400	14	0 to 400	38 to 78	B8H
M17-151BE	M17-15.. with low wattage heater	7	242	29.4	70	Clear	11.5	75	400	14	0 to 400	38 to 78	B8H
M19-101GH	Medical data display or monitor with anti-reflection laminated face-plate	7.5	201	20.7	90	30	11	75	250	10	0 to 350	35 to 69	B7G/D
M19-102GH	General purpose monitor tube	7.5	196	20.7	90	65	11	75	250	10	0 to 350	35 to 69	B7G/D

Other phosphor screens can be supplied to special order. † Rectangular face Mounting lugs Mounting frame

Types using the B8H base may be fitted with the B8H Sparkguard Base and will have a suffix after the type number.

DATA DISPLAY AND MONITOR TUBES - CURRENT TYPES (continued)

Common features:- Rectangular face-plates, electrostatic focus, magnetic deflection, aluminized screens, CT8 side contacts.

Type Number	Application and Description	Face † Diag. nom. inch	Overall Length max. mm	Neck Dia. max. mm	Defl. Angle °	Screen Glass Trans. (Appr) %	TYPICAL OPERATION Voltages referred to cathode V_h V	I_h mA	V_{a1} V	V_a final kV	V_{a3} focus V	$-V_g$ cut-off V	Base Type
M19-111GH	Strengthened structure version of M19-101GH	7.5	207	20.7	90	36	11	75	250	10	0 to 350	35 to 69	B7G/D
59-60/90/037	Mobile or military monitor. Fully ruggedised construction	8.5	292	27.45	70	Clear	6.3	300	400	14	-50 to 400	35 to 75	Flying leads
M23-112GH	Medical and general purpose monitor with Rimguard III protection	9	222	20.7	90	50	11	75	250	10	0 to 350	35 to 69	B7G/D
M23-113GH	M23-112.. with a laminated anti-reflection face-plate	9	228	20.7	90	30	11	75	250	10	0 to 350	35 to 69	B7G/D
M23-114GH	M23-113GH with green filter	9	228	20.7	90	32	11	75	250	10	0 to 350	35 to 69	B7G/D
M23-130GH	Data display and monitor tube, laminated anti-reflection face-plate with green filter	9	228	29.4	90	32	6.3	300	400	14	0 to 400	38 to 82	B8H
M24-120W	Data display or monitor with Rimguard protection	9.5	260	29.4	90	52	6.3	300	400	14	0 to 400	38 to 82	B8H
M24-121W	Unprotected version of M24-120..	9.5	260	29.4	90	52	6.3	300	400	14	0 to 400	38 to 82	B8H
M24-124GH	M24-120.. with laminated anti-reflection face-plate	9.5	265	29.4	90	30	6.3	300	400	14	0 to 400	38 to 82	B8H
M24-130GJ	Mobile or military monitor Fully ruggedised construction laminated anti-reflection face-plate	9.5	280	29.4	90	32	6.3	300	400	14	0 to 400	38 to 82	Flying leads

Other phosphor screens can be supplied to special order. † Rectangular face Mounting lugs Mounting frame

Types using the B8H base may be fitted with the B8H Sparkguard Base and will then have a suffix after the type number.

DATA DISPLAY AND MONITOR TUBES - CURRENT TYPES (continued)

Common features:- Rectangular face-plates, electrostatic focus, magnetic deflection, aluminized screens, CT8 side contacts.

Type Number	Application and Description	Face † Diag. nom. inch	Overall Length max. mm	Neck Dia. max. mm	Defl. Angle	Screen Glass Trans. (Appr) %	TYPICAL OPERATION Voltages referred to cathode V_h V	I_h mA	V_{a1} V	V_a final kV	V_{a3} focus V	$-V_g$ cut-off V	Base Type
M24-150GH	Data display tube with 2:1 aspect ratio. Laminated anti-reflection face-plate	9.5	249	29.4	90	30	6.3	300	400	14	0 to 400	38 to 82	B8H
M28-13WA	Data display tube with Rimguard III protection for push-through mounting	11	266	29.4	90	58	11.5	150	400	14	0 to 400	40 to 76	B8H
M28-132GH	M28-13.. with a laminated anti-reflection face-plate	11	271	29.4	90	35	11.5	150	400	14	0 to 400	40 to 76	B8H
M28-133GH	M28-13.. with laminated anti-reflection face-plate	11	271	29.4	90	18	11.5	150	400	14	0 to 400	40 to 76	B8H
M28-134W	M28-13.. with a laminated face-plate	11	271	29.4	90	58	11.5	150	400	14	0 to 400	40 to 76	B8H
M31-184W	Data display or industrial monitor with Rimguard III protection	12	243	29.4	110	50	6.3	300	400	15	0 to 400	40 to 77	B8H
M31-185GH	Data display tube with laminated anti-reflection face-plate	12	248.5	29.4	110	15	6.3	300	400	12	0 to 400	40 to 77	B8H
M31-190GH	Medical, data display or general purpose monitor Rimguard III protection	12	277	20.7	90	50	11	75	250	12	0 to 350	35 to 69	B7G/D
M31-191GH	M31-190.. with laminated anti-reflection face-plate	12	282	20.7	90	15	11	75	250	12	0 to 350	35 to 69	B7G/D

Other phosphor screens can be supplied to special order. † ▭ Rectangular face ⟷ Mounting lugs ▭ Mounting frame
Types using the B8H base may be fitted with the B8H Sparkguard Base and will then have a suffix after the type number.

DATA DISPLAY AND MONITOR TUBES - CURRENT TYPES (continued)

Common Features:- Rectangular face-plates, electrostatic focus, magnetic deflection, aluminized screens, CT8 side contacts

Type Number	Application and Description	Face † Diag. nom.	Overall Length max.	Neck Dia. max.	Defl. Angle	Screen Glass Trans. (Appr)	TYPICAL OPERATION Voltages referred to cathode						Base Type
							V_h	I_h	V_{a1}	$V_{a\,final}$	V_{a3} focus	$-V_g$ cut-off	
		inch	mm	mm	°	%	V	mA	V	kV	V	V	
M31-192W	M31-190.. with laminated anti-reflection face-plate	12	282	20.7	90	50	11	75	250	12	0 to 350	35 to 69	B7G/D
M31-193GH	M31-190.. with laminated anti-reflection face-plate	12	282	20.7	90	30	11	75	250	12	0 to 350	35 to 69	B7G/D
M31-212GH	Data display laminated anti-reflection face-plate	12	282	20.7	90	15	11	75	300	12	0 to 350	40 to 79	B7G/D
M31-213GH	M31-212.. with different face-plate transmission	12	282	20.7	90	50	11	75	300	12	0 to 350	40 to 79	B7G/D
M31-220GH	High density data display Rimguard III protection	12	310	29.4	90	50	6.3	300	400	14	0 to 400	38 to 82	B8H
M31-222GH	M31-220.. with laminated anti-reflection face-plate	12	315	29.4	90	50	6.3	300	400	14	0 to 400	38 to 82	B8H
M31-223GH	M31-220.. with laminated anti-reflection face-plate	12	315	29.4	90	30	6.3	300	400	14	0 to 400	38 to 82	B8H
M31-230GH	High voltage focus high resolution data display Rimguard III protection	12	326	29.4	90	50	6.3	300	450	16	4000 *	35 to 85	B8H
M31-231GH	M31-230.. with laminated face-plate	12	331	29.4	90	50	6.3	300	450	16	4000 *	35 to 85	B8H
M31-260GH	Fully ruggedised construction laminated face-plate flexible leads to base and anode	12	330	29.4	90	15	11.5	150	400	14	0 to 400	38 to 82	Flying leads

Other phosphor screens can be supplied to special order. † Rectangular face Mounting lugs Mounting frame

Types using the B8H base may be fitted with the B8H Sparkguard Base and will then have a suffix after the type number. *Va2

DATA DISPLAY AND MONITOR TUBES - CURRENT TYPES (continued)

Common Features:- Rectangular face-plates, electrostatic focus, magnetic deflection, aluminized screens, CT8 side contacts

Type Number	Application and Description	Face † Diag. nom. inch	Overall Length max. mm	Neck Dia. max. mm	Defl. Angle °	Screen Glass Trans. (Appr) %	TYPICAL OPERATION Voltages referred to cathode						Base Type
							V_h V	I_h mA	V_{a1} V	V_a final kV	V_{a3} focus V	$-V_g$ cut-off V	
M36-141W	Studio quality monitor	14	425	38	70	60	6.3	300	300	12	-200 to +200	30 to 72	B12A
M36-190GH	Data display tube with 2:1 aspect ratio. Laminated anti-reflection face-plate	14	340	29.4	90	33	6.3	400	400	16	0 to 400	38 to 82	B8H
M38-100GH	Industrial monitor. Data display. Rimguard III protection. Squared-off screen.	15	356	29.4	90	50	11.5	150	400	16	0 to 400	38 to 82	B8H
M38-101GH	M38-100.. with longer neck for 'position and write' coils	15	378	29.4	90	50	11.5	150	400	16	0 to 400	38 to 82	B8H
M38-103WA	M38-100WA with modified lugs	15	356	29.4	90	50	11.5	150	400	16	0 to 400	38 to 82	B8H
M38-104GH	M38-100.. with laminated anti-reflection face-plate	15	361	29.4	90	50	11.5	150	400	16	0 to 400	38 to 82	B8H
M38-105GH	M38-100.. with laminated anti-reflection face-plate	15	361	29.4	90	15	11.5	150	400	16	0 to 400	38 to 82	B8H
M38-106W	M38-100.. with laminated anti-reflection face-plate	15	361	29.4	90	30	11.5	150	400	16	0 to 400	38 to 82	B8H
M38-107GH	M38-100.. with laminated face-plate	15	361	29.4	90	50	11.5	150	400	16	0 to 400	38 to 82	B8H

Other phosphor screens can be supplied to special order. † Rectangular face Mounting lugs Mounting frame

Types using the B8H base may be fitted with B8H Sparkguard Base and will then have a suffix after the type number.

DATE DISPLAY AND MONITOR TUBES - CURRENT TYPES (continued)

Common Features:- Rectangular face-plates, electrostatic focus, magnetic deflection, aluminized screens, CT8 side contacts

Type Number	Application and Description	Face † Diag. nom. inch	Overall Length max. mm	Neck Dia. max. mm	Defl. Angle °	Screen Glass Trans. (Appr) %	TYPICAL OPERATION Voltages referred to cathode V_h V	I_h mA	V_{a1} V	V_a final kV	V_{a3} focus V	$-V_g$ cut-off V	Base Type
M38-113GH	High resolution 'position and write' data display	15	441	38	90	50	6.3	300	400	15	0 to 400	30 to 70	B12A
59-60/90/074	Mobile or military monitor. Fully ruggedised construction Rimguard III protection integral mounting lugs	15	372	29.4	90	50	6.3	300	400	16	0 to 400	42 to 86	Flying leads
M38-120W	General purpose monitor tube	15	279.5	29.4	110	50	6.3	300	400	16	0 to 400	40 to 85	B8H
M38-121W	M38-120.. with Rimguard IV protection	15	279.5	29.4	110	50	6.3	300	400	16	0 to 400	40 to 85	B8H
M38-122GH	Data display laminated anti-reflection face-plate	15	284.5	29.4	110	15	6.3	300	400	16	0 to 400	40 to 85	B8H
M38-124GH	Data display, laminated anti-reflection face-plate	15	284.5	29.4	110	30	6.3	300	400	16	0 to 400	40 to 85	B8H
M38-142LA	High voltage focus high resolution data display. Rimguard IV protection	15	321	29.4	110	50	6.3	300	450	17	4000 *	35 to 85	B8H
M44-120W	Rimguard III push-through protection. Squared-up screen	17	291	29.4	110	48	6.3	300	400	16	0 to 400	40 to 77	B8H
M50-120W	Rimguard III push-through protection. Squared-up screen	20	319	29.4	110	45	6.3	300	400	16	0 to 400	40 to 77	B8H
M61-120W	Rimguard III push-through protection. Squared-up screen	24	370	29.4	110	42	6.3	300	400	16	0 to 400	40 to 77	B8H

Other phosphor screens can be supplied to special order. † Rectangular face Mounting lugs Mounting frame

Types using the B8H base may be fitted with the B8H Sparkguard Base and will then have a suffix after the type number. * Va2

FLYING-SPOT SCANNER TUBES - CURRENT TYPES

Common features:- High resolution, small spot size, magnetic deflection, 6.3 V 0.3 A heaters

Type	Application and Description	Face Diam. nom. inch	Useful Screen Area min. mm^2	Overall Length max. mm	Neck Dia. max. mm	TYPICAL OPERATION-voltages referred to cathode					Base Type
						V_{a1} V	$V_{a\ focus}$ kV	$V_{a\ final}$ kV	$-V_{g}$ cut-off V	Max. Spot Dia. at 60% pk. luminance mm at I_{a3} μA	
Q13-202GS	Electrostatic focus. Document readers or telecine. Precision mounting frame. EHT connection by rubber encapsulated flexible lead.	5	96.5 x 76.2 corners cut †	580	38	300	3.7 to 5.2	15	30 to 70	0.07 4.5	B12A
Q13-203GT	Smaller spot size version of Q13-202..	5	89 x 68.6 corners cut †	580	38	300	3.7 to 5.2	15	30 to 70	0.05 4.5	B12A

Other phosphor screens are available to special order.

† Diagonal 108 mm min.

Oscilloscope Tubes

Tube Type	Magnetic Shield Number MS	Twist Coil Number TW
D3-130	2	-
D7-200	3	28
D7-201	33	28
	34	
D9-110	65	50
D10-210	6	24
D10-230	41	-
D10-240	7	33
D10-293	83	56
D10-294	82	-
D10-300	88	60
D10-310	89	56
D13-33	27	-
D13-47	23	30
D13-51	36	21
D13-471	23	30
D13-600	47	-
D13-601	47	-
D13-610	49	-
D13-611	50	-
D13-630	43	-
D14-150	9	25
D14-172	15	20
		26
D14-173	15	20
		26
D14-181	20	23
D14-200	11	29
D14-270	70	52
D14-280	72	29
D14-310	1	29
D14-320	86	58
D14-340	90	52
D14-350	15	26

Magnetic Shields Tube Coils

Tube Type	Magnetic Shield Number MS	Twist Coil Number TW
D16-100	45	45
D16-110	63	45
D16-111	63	45
D18-130	61	48
D18-160	84	29
D21-10	52	-
D21-102	52	-
SE4D	55	-
SE5/2A	58	-
SE5F	59	-

Magnetic Shields Tube Coils

Magnetic Shield Number MS	Used on Tube Type number	
1	D14-310	
2	D3-130	
3	D7-200	
6	D10-210	
7	D10-240	
9	D14-150	
11	D14-200	
15	D14-172	D14-173
	D14-350	
20	D14-181	
23	D13-47	D13-471
27	D13-33	
33	D7-201	
34	D7-201	
36	D13-51	
41	D10-230	
43	D13-630	
45	D16-100	
47	D13-600	D13-601
49	D13-610	
50	D13-611	
52	D21-10	D21-102
55	SE4D	
58	SE5/2A	
59	SE5F	
61	D18-130	
63	D16-110	D16-111
65	D9-110	
70	D14-270	
72	D14-280	
82	D10-294	
83	D10-293	
84	D18-160	
86	D14-320	
88	D10-300	
89	D10-310	
90	D14-340	

Oscilloscope Tubes

Twist Coil Number TW	Used on Tube Type number	
20	D14-172	D14-173
21	D13-51	
23	D14-181	
24	D10-210	
25	D14-150	
26	D14-172	D14-173
	D14-350	
28	D7-200	D7-201
29	D14-200	D14-310
	D14-280	D18-160
30	D13-47	D13-471
33	D10-240	
45	D16-100	D16-110
	D16-111	
48	D18-130	
50	D9-110	
52	D14-270	D14-340
56	D10-293	D10-310
58	D14-320	
60	D10-300	

Data Display or Monitor Tubes

Scan Coils

CURRENT TYPES

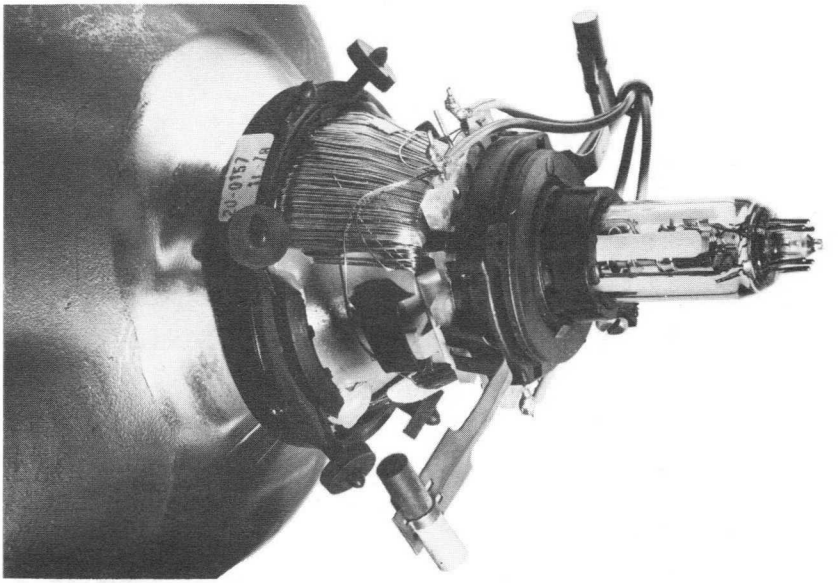
Tube Type	Scan Coil Number TBY
M14-100	5
M14-101	5
M14-110	5
M16-100	*
M17-10	8 or 10
M17-12	8 or 10
M17-15	8 or 10
M17-151	8 or 10
M19-101	5
M19-102	5
M19-111	5
M23-112	5
M23-113	5
M23-114	5
M23-130	8 or 10 or 13
M24-120	8 or 10
M24-121	8 or 10
M24-124	8 or 10
M24-130	*
M24-150	8 or 10
M28-13	8 or 10
M28-132	8 or 10
M28-133	8 or 10
M28-134	8 or 10
M31-184	8 or 10
M31-185	8 or 10
M31-190	5
M31-191	5
M31-192	5
M31-212	5
M31-220	8 or 10
M31-222	8 or 10
M31-223	8 or 10
M31-230	*
M31-231	*
M31-260	8 or 10

Tube Type	Scan Coil Number TBY
M36-141	*
M36-190	*
M38-100	8 or 10
M38-101	8 or 10
M38-103	8 or 10
M38-104	8 or 10
M38-105	8 or 10
M38-106	8 or 10
M38-107	8 or 10
M38-113	*
M38-120	8 or 10
M38-121	8 or 10
M38-122	8 or 10
M38-124	8 or 10
M38-142	*
M44-120	8 or 10
M59-120	8 or 10
M61-120	8 or 10
59-60/90/037	*
59-60/90/074	*

* For scan coil information on these tubes contact –
Brimar Equipment Sales Department or Brimar Export Division.

The above table gives currently available scan coils,other types available to order.

GRATICULES
SCAN COILS



The facilities and organisation provided by Thorn Brimar Limited meet the requirements of the M.O.D. (P.E.) Defence Standard 05-21 and BS9000.

HEALTH AND SAFETY AT WORK ACT, 1974

Attention is drawn to the recommendations under this heading in the Operational Recommendations.

WARNING

These tubes should be used in accordance with their published ratings, and in conformity with the Operational Recommendations of the Company's data handbook. The Company will not entertain claims for loss or damage where this advice has been disregarded.

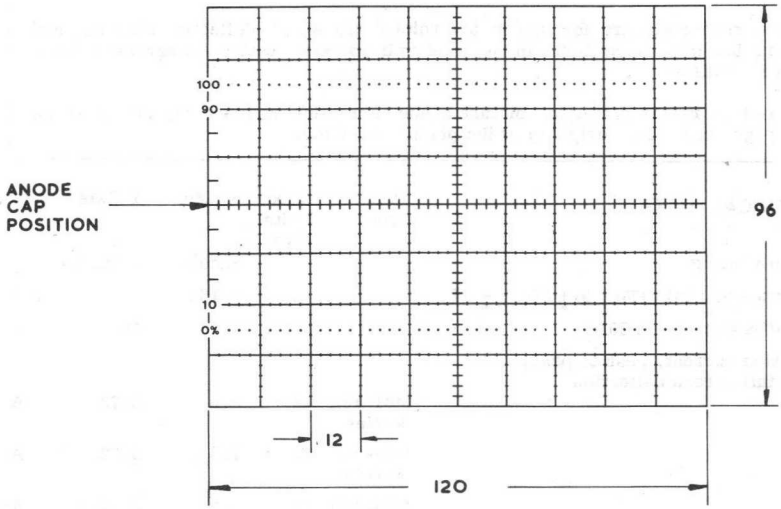
Thorn Brimar Limited
Mollison Avenue - Brimsdown - Enfield - Middlesex EN3 7NS

BRIMAR

Graticule

Type 102

DETAILS OF GRATICULE



All dimensions in mm

Not to be scaled

This dual purpose internal graticule is suitable for direct view or for illumination with an appropriate light guide.

The graticule X and Y axes will be on the tube face axes ± 2°.

The centre of the graticule will be within 1 mm of the mechanical centre of the face.

This graticule is specially designed for use on certain mesh p.d.a. tubes, for example D18-160GH/102.

GRATICULES
SCAN COILS

TBY8 Deflection Component

GENERAL -SCAN COILS

Scan coils can be used for 110° tubes with 28 mm diameter necks.

A short ferrite ring is used with saddle wound line and toroidal wound field coils. Shift rings and a neck clamp assembly are provided.

These scan coils are for use in low voltage transistor deflection circuits, and have a low impedance field winding to permit operation with an integrated circuit drive amplifier.

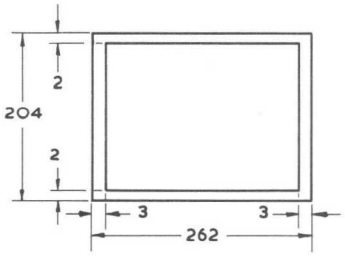
To reduce raster distortion picture shape correction magnets may be placed on the pegs around the periphery of the plastic moulding.

ELECTRICAL DATA

	Tube Type	Anode Volts (kV)	X Axis	Y Axis	
Type of winding			Saddle	Toroidal	
Inductance at 1 kHz (Tol. X ± 5%, Y ± 8%)			0.164	22	mH
Typical resistance at 20°C			0.23	10	Ω
Deflection current, peak to peak, for full screen deflection					
	M31-182 series	12	8.0	0.73	A
	M38-100 series	16	7.4	0.62	A
	M38-120 series	16	8.7	0.79	A
	M50-120	16	8.9	0.83	A
	M61-120	16	8.9	0.84	A
Rectangularity between x and y traces			90° ± 1.0°		

Raster distortion

The edges of a test raster for M38-120.. can be contained between two concentric rectangles.



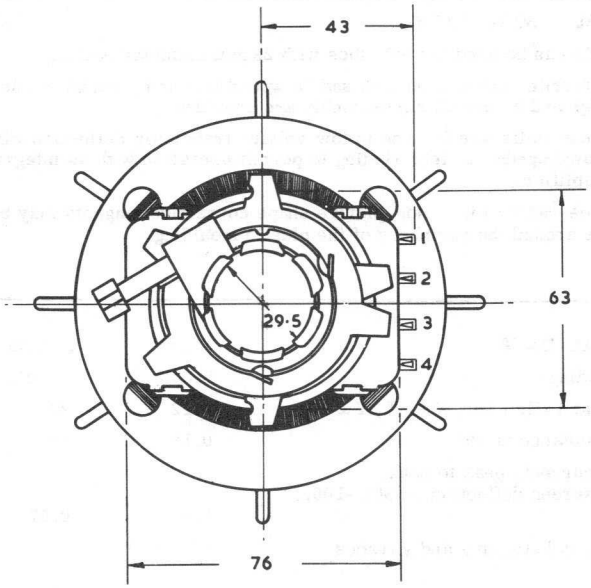
All dimensions in mm

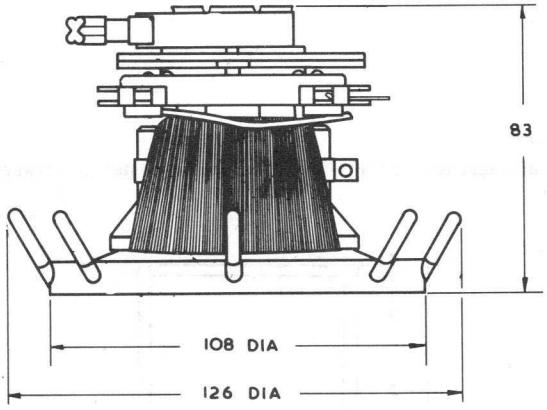
Not to be scaled

BRIMAR

Deflection Component

TBY8





All dimensions in mm

Not to be scaled

TB Y10 Deflection Component

GENERAL - SCAN COILS

Scan coils can be used for 90° tubes with 28 mm diameter necks.

A short ferrite ring is used with saddle wound line and toroidal wound field coils. Shift rings and a neck clamp assembly are provided.

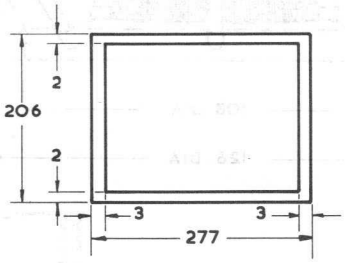
These scan coils are for use in low voltage transistor deflection circuits, and have a low impedance field winding to permit operation with an integrated circuit drive amplifier.

To reduce raster distortion picture shape correction magnets may be placed on the pegs around the periphery of the plastic moulding.

ELECTRICAL DATA	X Axis	Y Axis	
Type of winding	Saddle	Toroidal	
Inductance at 1 kHz (Tol. X ± 5%, Y ± 8%)	0.12	23	mH
Typical resistance at 20°C	0.18	10	Ω
Deflection current, peak to peak, for full screen deflection on M38-100.. at 16 kV.	7.9	0.57	A
Rectangularity between x and y traces	90° ± 1.0°		

Raster distortion

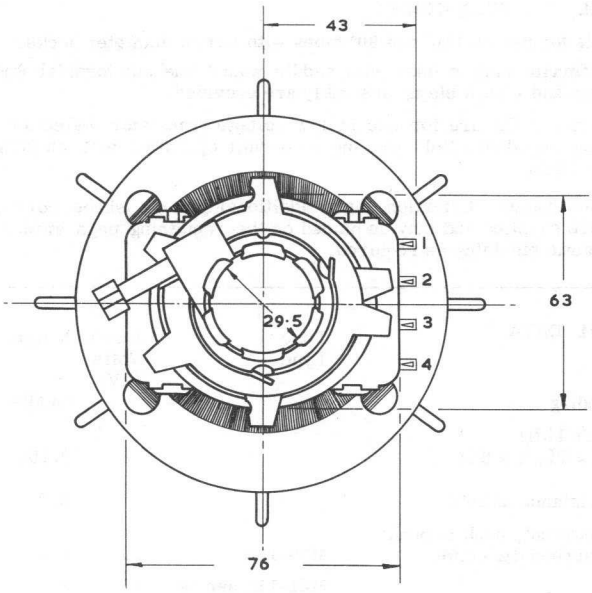
The edges of a test raster for M38-100.. can be contained between two concentric rectangles.

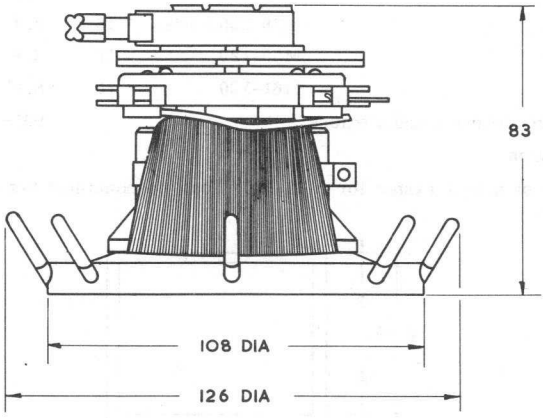


All dimensions in mm

Not to be scaled

BRIMAR





VERTICAL COIL

HORIZONTAL COIL

All dimensions in mm

Not to be scaled

TBY 13 Deflection Component

GENERAL - SCAN COILS

Scan coils for use on 110° and 90° tubes with 28 mm diameter necks.

A short ferrite ring is used with saddle wound line and toroidal wound field coils. Shift rings and a neck clamp assembly are provided.

These scan coils are for use in low voltage transistor deflection circuits, and have a low impedance field winding to permit operation with an integrated circuit drive amplifier.

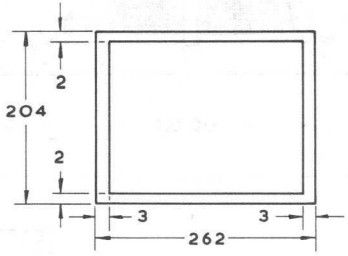
To reduce raster distortion eight additional picture shape correction magnets TBY15 are supplied and may be placed on the remaining pegs around the periphery of the plastic moulding as required.

ELECTRICAL DATA

	Tube Type	Anode Volts (kV)	X Axis	Y Axis	
Type of winding			Saddle	Toroidal	
Inductance at 1kHz (Tol. X ± 5%, Y ± 8%)			0.157	21.3	mH
Typical resistance at 20°C			0.2	8.9	Ω
Deflection current, peak to peak for full screen deflection	M23-130	16	7.6	0.70	A
	M31-182 series	12	7.7	0.71	A
	M38-100 series	16	6.9	0.61	A
	M38-120 series	16	8.4	0.78	A
	M50-120	16	8.8	0.83	A
	M61-120	16	8.8	0.82	A
Rectangularity between x and y traces			90° ± 1.0°		

Raster distortion

The edges of a test raster for M38-120.. can be contained between two concentric rectangles.

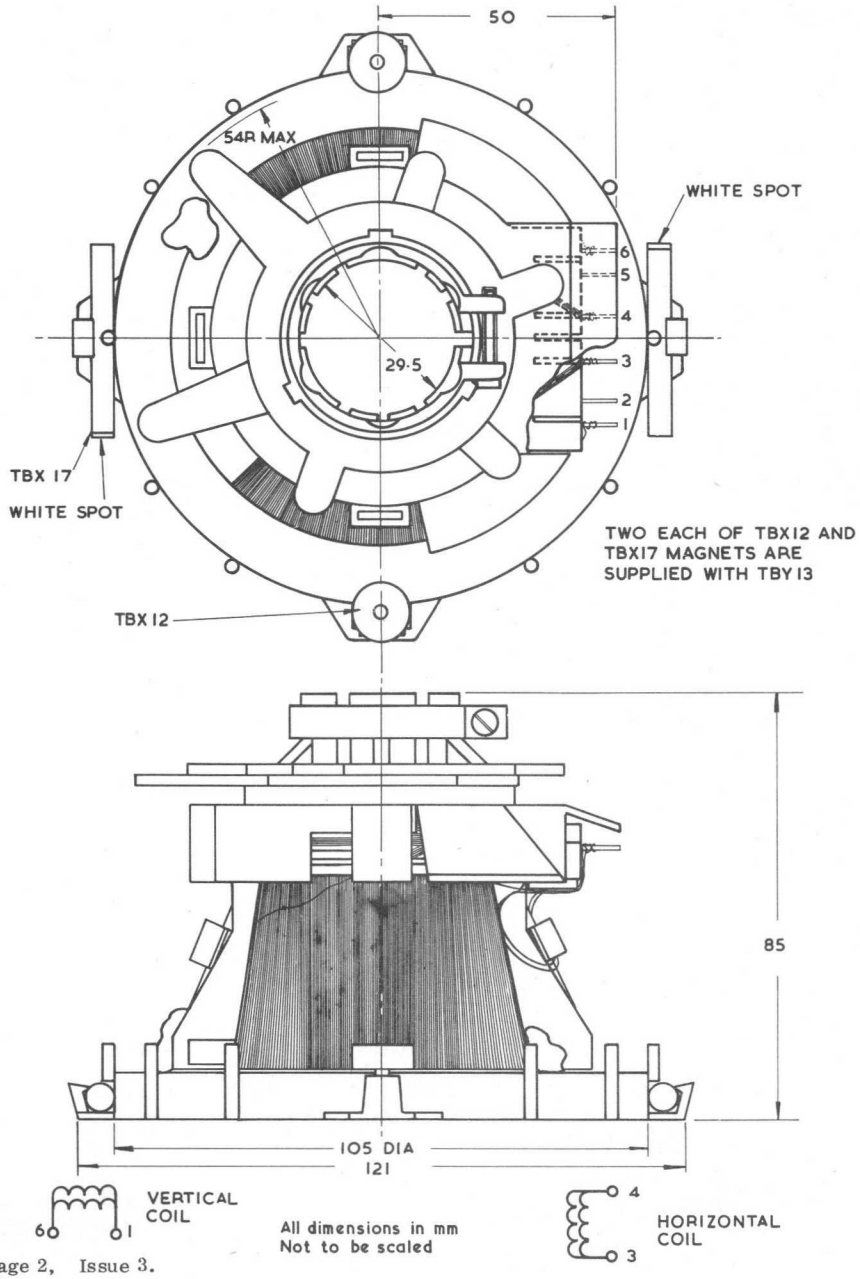


All dimensions in mm

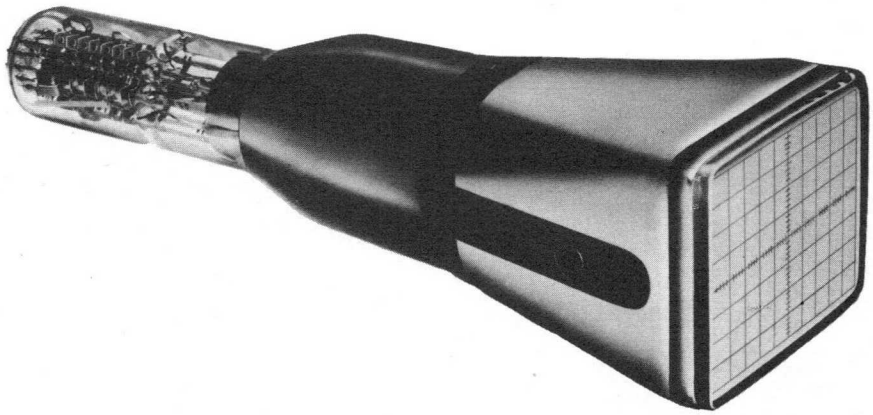
Not to be scaled

BRIMAR

Deflection Component TBY13



OSCILLOSCOPE TUBES



The facilities and organisation provided by Thorn Brimar Limited meet the requirements of the M.O.D. (P.E.) Defence Standard 05-21 and BS9000.

HEALTH AND SAFETY AT WORK ACT, 1974

Attention is drawn to the recommendations under this heading in the Operational Recommendations.

WARNING

These tubes should be used in accordance with their published ratings, and in conformity with the Operational Recommendations of the Company's data handbook. The Company will not entertain claims for loss or damage where this advice has been disregarded.

Thorn Brimar Limited
Mollison Avenue - Brimsdown - Enfield - Middlesex EN3 7NS

BRIMAR

Oscilloscope Tube

PRELIMINARY DATA

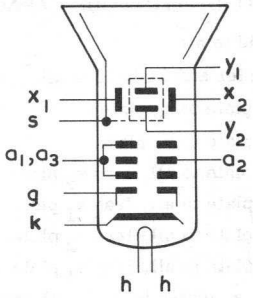
D9-120..

GENERAL

This 9 cm diagonal rectangular short oscilloscope tube is primarily intended for use in inexpensive oscilloscopes and monitoring devices.

This tube has a tinted face-plate with 72% transmission.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.12	A



ABSOLUTE RATINGS - voltages with respect to cathode

		Max.	Min.	
First and third anode voltage	V_{a1+a3}	2600	1150	V
Second anode voltage	V_{a2}	800	-	V
Negative grid voltage	$-V_g$	200	1.0	V
Heater to cathode voltage	V_{h-k}	±125	-	V
Peak x-plate to third anode voltage	$v_{x-a3(pk)}$	500	-	V
Peak y-plate to third anode voltage	$v_{ya3(pk)}$	500	-	V
x-plate to third anode resistance	R_{x-a3}	1.2	-	MΩ
y-plate to third anode resistance	R_{y-a3}	1.2	-	MΩ
Grid to cathode resistance	R_{g-k}	3.0	-	MΩ

OSCILLOSCOPE TUBES

PHOSPHOR SCREEN

This tube is usually supplied with GH phosphor (D9-120GH) giving a green trace of medium short persistence. Other phosphors can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

Grid to all	c_{g-all}	5.5	pF
Heater and Cathode to all	$c_{h,k-all}$	3.8	pF
x_1 plate to x_2 plate	c_{x1-x2}	1.2	pF
y_1 plate to y_2 plate	c_{y1-y2}	1.2	pF
x_1 plate to all, less x_2 plate	$c_{x1-all,\ less\ x2}$	4.2	pF
x_2 plate to all, less x_1 plate	$c_{x2-all,\ less\ x1}$	4.0	pF
y_1 plate to all, less y_2 plate	$c_{y1-all,\ less\ y2}$	3.4	pF
y_2 plate to all, less y_1 plate	$c_{y2-all,\ less\ y1}$	3.4	pF
x_1, x_2 plates to y_1, y_2 plates	$c_{x1,\ x1-y1,\ y2}$	0.8	pF
g to x_1, x_2, y_1 and y_2 plates	$c_{g-x1,\ x2,\ y1,\ y2}$	0.6	pF

TYPICAL OPERATION - voltages with respect to cathode

Mean deflector plate potential *		1500	2000	V
Final anode voltage for optimum astigmatism correction	V_{a1+a3}	1500 †	2000 †	V
Second anode voltage for optimum focus	V_{a2}	206 to 412	275 to 550	V
Shield voltage for optimum raster shape	V_s	1450 to 1550	1950 to 2050	V
Control grid voltage for cut-off	V_g	-22 to -52	-30 to -70	V
y deflection coefficient	D_y	14 to 19.5	19 to 25	V/cm
x deflection coefficient	D_x	25 to 35	35 to 46	V/cm
Minimum useful screen area		6.3 x 5.1	6.3 x 5.1	cm^2
Grid drive to 10 μA beam current		12	13	V
Line width at 10 μA beam current Shrinking raster measurement at centre		0.23	0.20	mm

* This tube is designed for symmetrical operation.

† The required voltage will not differ from the quoted value by more than ± 50 V.

RASTER DISTORTION AND ALIGNMENT

The following data applies for the typical operation conditions.

The undeflected spot will fall in a square 10 mm x 10 mm about the centre of the tube face.

Raster distortion: The edges of a test raster will fall between two concentric rectangles 6.0 cm x 5.0 cm and 5.8 cm x 4.8 cm.

Orthogonality of x and y axes is 90° ± 1°.

The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield approximately 90 mm from the face and should not extend more than 100 mm from the face.

The sensitivity (for both x and y plates) at 75% deflection of the useful scan will not differ by more than 2% from the sensitivity over 25% deflection.

It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. Under no circumstances should the mean y plate potential differ from the mean x plate potential by more than 50 V.

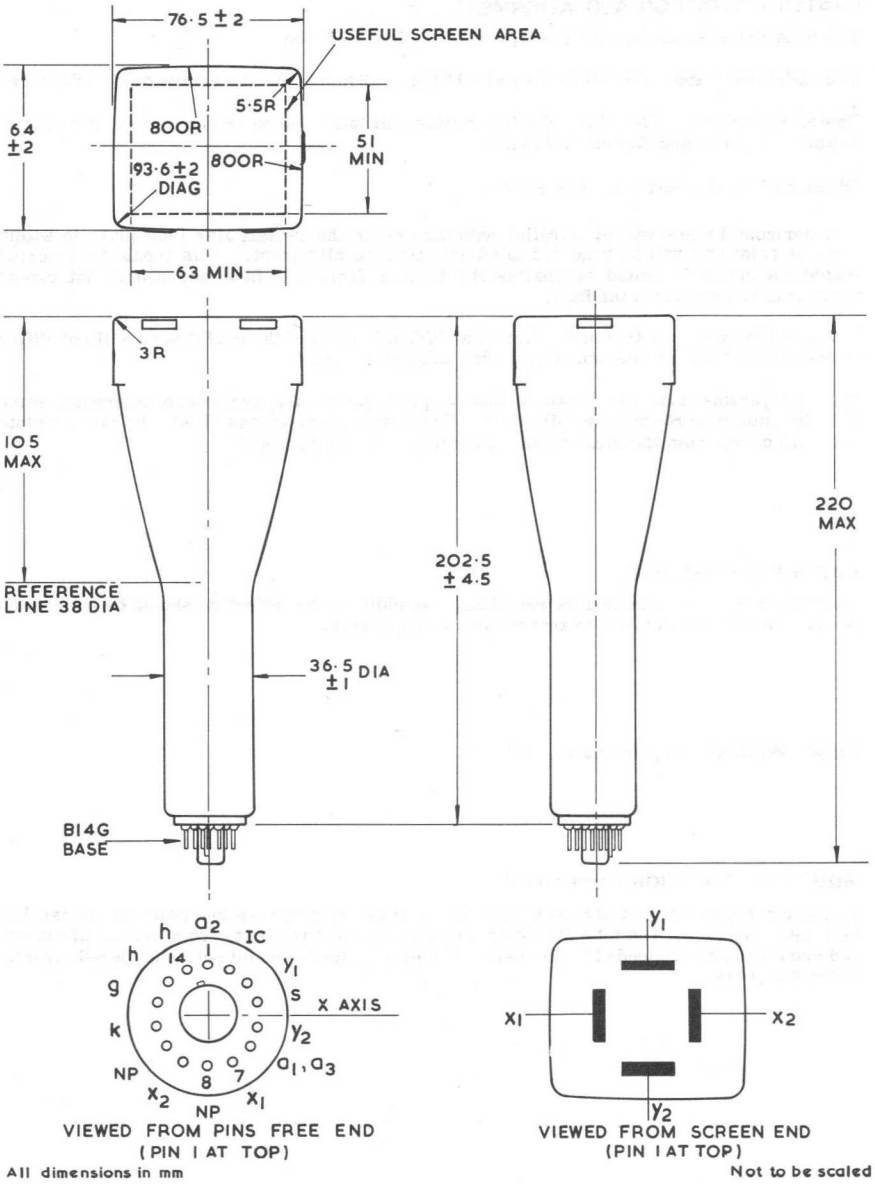
MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT (approximate) - 430 g.

MOUNTING POSITION unrestricted

It is advisable to support the tube near the screen, and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base. Connecting leads should not be soldered directly to the tube pins.



All dimensions in mm

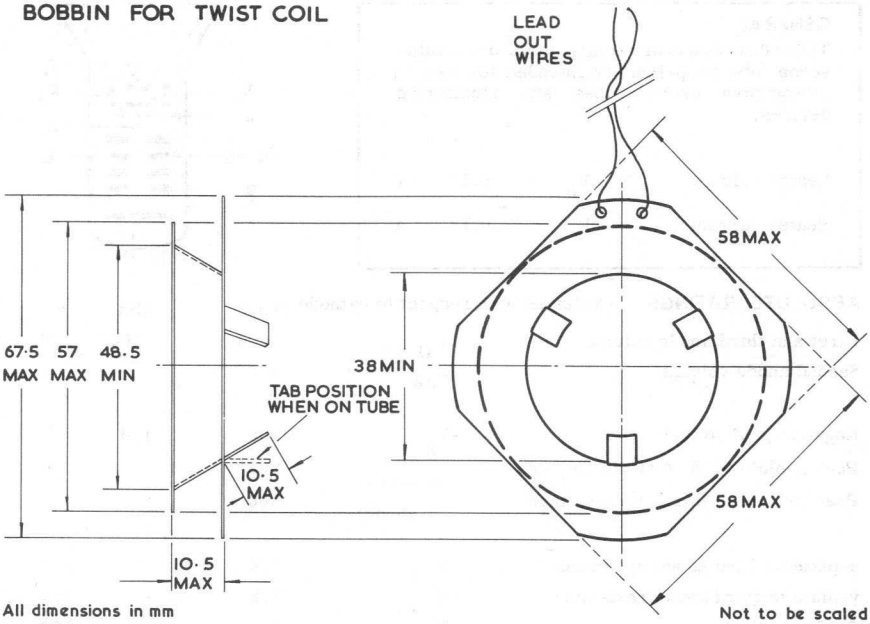
Not to be scaled

Tolerance on base pin 1 position with respect to tube y axis ± 5°.

Tube Coil TW 60

D9-120..

BOBBIN FOR TWIST COIL



OSCILLOSCOPE TUBES

BOBBIN

Nylon or suitable approved material.

SHIELD

This twist coil is designed to be used in conjunction with a magnetic shield.

WINDING

1400 turns of 0.112mm Lewmex Grade 1 or 2 wire, or approved alternative.
Start and finish of winding to be brought out on 400mm long 7 x 0.2mm leads with PVC Type 2 Insulation in Different Colours. Cover with Adhesive Tape.

ELECTRICAL CHARACTERISTICS

Resistance approx. 390Ω. Twist coefficient approximately 3mA/degree measured on Typical D9-120.. with Va1 + a3 = 2kV.

FITTING

The completed twist coil should be pushed onto the tube and secured to tube by the tabs with suitable adhesive tape.

D10-300..

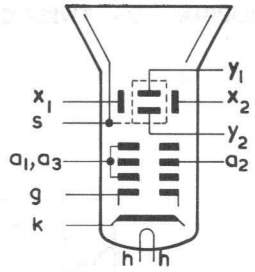
Oscilloscope Tube

PRELIMINARY DATA

GENERAL

This 10cm diagonal rectangular short oscilloscope tube is primarily intended for use in inexpensive oscilloscopes and monitoring devices.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.12	A



ABSOLUTE RATINGS - voltages with respect to cathode

		Max.	Min.	
First and third anode voltage	V_{a1+a3}	2600	1200	V
Second anode voltage	V_{a2}	800	-	V
Negative grid voltage	$-V_g$	200	1.0	V
Peak x-plate to third anode voltage	$V_{x-a3(pk)}$	500	-	V
Peak y-plate to third anode voltage	$V_{y-a3(pk)}$	500	-	V
x-plate to third anode resistance	R_{x-a3}	1.2	-	MΩ
y-plate to third anode resistance	R_{y-a3}	1.2	-	MΩ
Grid to cathode resistance	R_{g-k}	3.0	-	MΩ

PHOSPHOR SCREEN

This tube is usually supplied with GH phosphor (D10-300GH) giving a green trace of medium short persistence. Other phosphors can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

Grid to all	$C_{g\text{-all}}$	5.5	pF
Heater and Cathode to all	$C_{h,k\text{-all}}$	3.8	pF
x_1 plate to x_2 plate	$C_{x1\text{-}x2}$	1.2	pF
y_1 plate to y_2 plate	$C_{y1\text{-}y2}$	1.2	pF
x_1 plate to all, less x_2 plate	$C_{x1\text{-all, less x2}}$	4.2	pF
x_2 plate to all, less x_1 plate	$C_{x2\text{-all, less x1}}$	4.0	pF
y_1 plate to all, less y_2 plate	$C_{y1\text{-all, less y2}}$	3.4	pF
y_2 plate to all, less y_1 plate	$C_{y2\text{-all, less y1}}$	3.4	pF
x_1, x_2 plates to y_1, y_2 plates	$C_{x1,\ x1\text{-}y1,\ y2}$	0.8	pF
g to x_1, x_2, y_1 and y_2 plates	$C_{g\text{-}x1,\ x2,\ y1,\ y2}$	0.6	pF

TYPICAL OPERATION - voltages with respect to cathode

Mean deflector plate potential *		1500	2000	V
Final anode voltage for optimum astigmatism correction	V_{a1+a3}	1500†	2000†	V
Second anode voltage for optimum focus	V_{a2}	206 to 412	275 to 550	V
Shield voltage for optimum raster shape	V_s	1485 to 1585	1985 to 2085	V
Control grid voltage for cut-off	V_g	-22 to -52	-30 to -70	V
x deflection coefficient	D_x	22 to 28.5	30 to 38	V/cm
y deflection coefficient	D_y	26 to 33	35 to 44	V/cm
Minimum useful screen area		6.8 x 5.6	6.8 x 5.6	cm^2
Grid drive to 10μA beam current		12	13	V
Line width at 10μA beam current Shrinking raster measurement at centre		0.23	0.20	mm

* This tube is designed for symmetrical operation.

† The required voltage will not differ from the quoted value by more than ± 50V.

OSCILLOSCOPE TUBES

RASTER DISTORTION AND ALIGNMENT

The following data applies for the typical operation conditions.

The undeflected spot will fall in a square 10 mm x 10 mm about the centre of the tube face.

Raster distortion: The edges of a test raster will fall between two concentric rectangles 6.8 cm x 5.6 cm and 6.55 cm x 5.4 cm.

Orthogonality of x and y axes is 90° ± 1°.

The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield approximately 100 mm from the face and should not extend more than 110 mm from the face.

The sensitivity (for both x and y plates) at 75% deflection of the useful scan will not differ by more than 2% from the sensitivity over 25% deflection.

It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. Under no circumstances should the mean y plate potential differ from the mean x plate potential by more than 50 V.

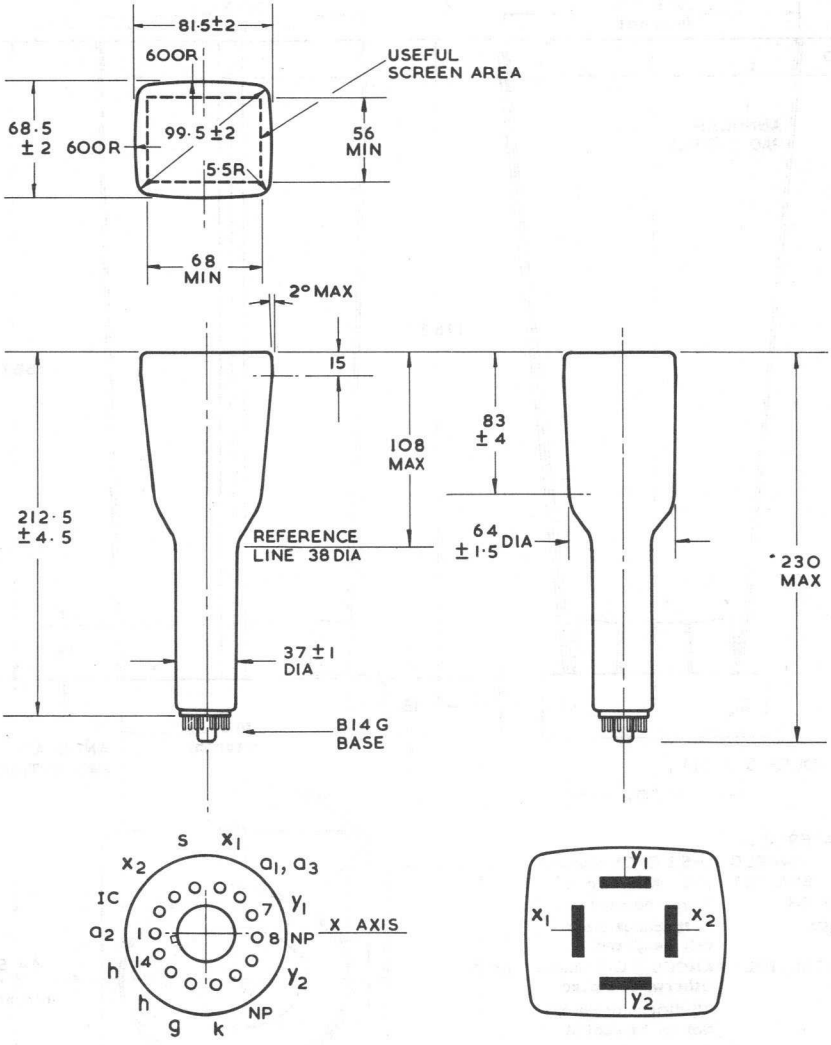
MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT (approximate) - 430 g.

MOUNTING Position unrestricted

It is advisable to support the tube near the screen, and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base. Connecting leads should not be soldered directly to the tube pins.



VIEWED FROM PINS FREE END (PIN 1 AT LEFT)

VIEWED FROM SCREEN END (PIN 1 AT RIGHT)

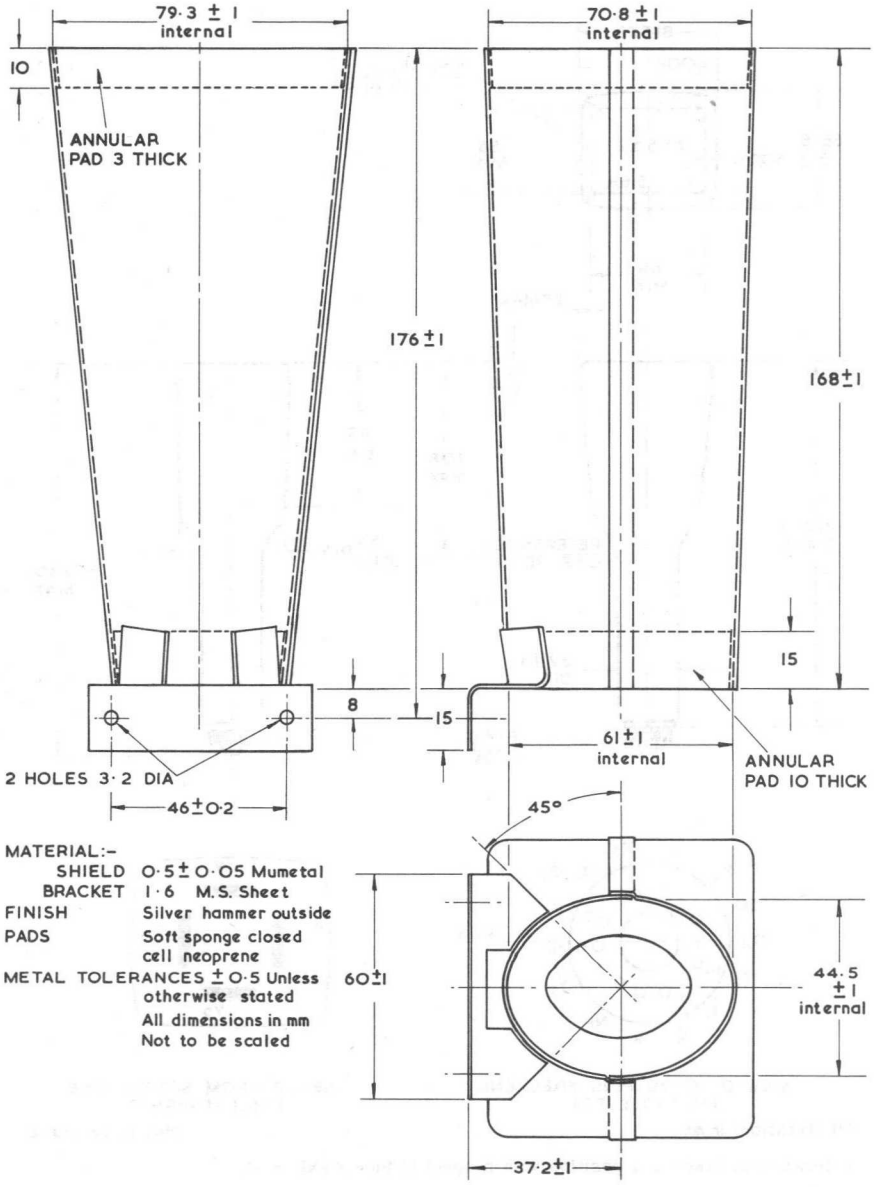
All dimensions in mm

Not to be scaled

Tolerance on base pin 1 position with respect to tube x axis ± 5°.

D10-300..

Magnetic Shield MS 88

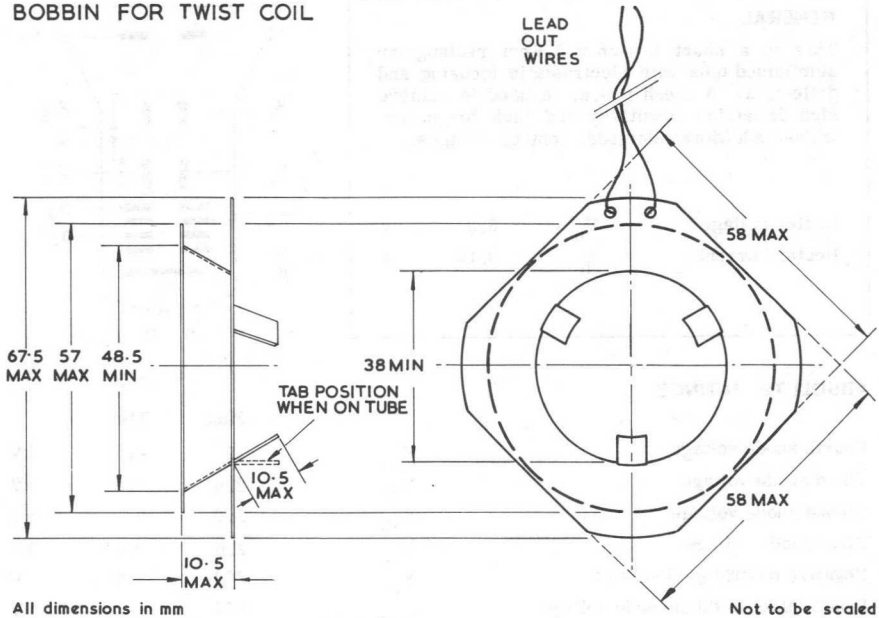


MATERIAL:-
SHIELD 0·5 ± 0·05 Mumetal
BRACKET 1·6 M.S. Sheet
FINISH Silver hammer outside
PADS Soft sponge closed cell neoprene
METAL TOLERANCES ± 0·5 Unless otherwise stated
All dimensions in mm
Not to be scaled

BRIMAR

Tube Coil TW 60 D10-300..

BOBBIN FOR TWIST COIL



All dimensions in mm

Not to be scaled

BOBBIN

Nylon or suitable approved material.

SHIELD

This twist coil is designed to be used in conjunction with magnetic shield MS88 for D10-300..

WINDING

1400 turns of 0.112 mm Lewmex Grade 1 or 2 wire, or approved alternative.
Start and finish of winding to be brought out on 400 mm long 7 x 0.2 mm leads with PVC Type 2 Insulation in Different Colours. Cover with Adhesive Tape.

ELECTRICAL CHARACTERISTICS

Resistance approx. 390 Ω. Twist coefficient approximately 3 mA/degree measured on typical D10-300.. with Va3 = 2 kV.

FITTING

The completed twist coil should be pushed onto the tube and secured to tube by the tabs with suitable adhesive tape.

OSCILLOSCOPE TUBES

BRIMAR

D10 – 310..

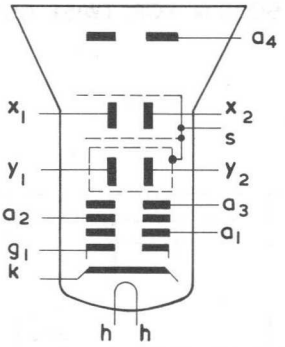
Oscilloscope Tube

PRELIMINARY DATA

GENERAL

This is a short 6.8 cm x 5.6 cm rectangular aluminised tube with electrostatic focusing and deflection. A mesh p.d.a. is used to achieve high deflection sensitivity and high brightness without additional electrode control voltages.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.12	A



ABSOLUTE RATINGS

		Max	Min	
Fourth anode voltage	V_{a4}	12	5.0	kV
Third anode voltage	V_{a3}	2.0	0.5	kV
Second anode voltage	V_{a2}	1.0	0	kV
First anode voltage	V_{a1}	2.0	0.5	kV
Negative control grid voltage	$-V_{g1}$	200	1.0	V
Peak x plate to third anode voltage	$V_{x-a3\,(pk)}$	500	-	V
Peak y plate to third anode voltage	$V_{y-a3\,(pk)}$	500	-	V
x plate to third anode resistance	R_{x-a3}	5.0	-	MΩ
y plate to third anode resistance	R_{y-a3}	100	-	kΩ
Control grid to cathode resistance	R_{g1-k}	1.5	-	MΩ
Second anode current	I_{a2}	10	-	μA
P.D.A. ratio (V_{a4}/V_{a3})		11.2:1		

All voltages referred to cathode unless otherwise stated.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (D10-310GH) giving a green trace of medium short persistence. Other phosphors can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

Grid 1 to all	$C_{g1\text{-all}}$	10	pF
Grid 1 to x_1, x_2, y_1 and y_2 plates	$C_{g1\text{-}x1,x2,y1,y2}$	1.2	pF
Heater and cathode to all	$C_{h,k\text{-all}}$	3.5	pF
x_1 plate to x_2 plate	$C_{x1\text{-}x2}$	1.9	pF
y_1 plate to y_2 plate	$C_{y1\text{-}y2}$	0.9	pF
x_1 plate to all, less x_2 plate	$C_{x1\text{-all, less x2}}$	5.7	pF
x_2 plate to all, less x_1 plate	$C_{x2\text{-all, less x1}}$	5.7	pF
y_1 plate to all, less y_2 plate	$C_{y1\text{-all, less y2}}$	5.4	pF
y_2 plate to all, less y_1 plate	$C_{y2\text{-all, less y1}}$	5.1	pF
x_1, x_2 plates to y_1, y_2 plates	$C_{x1,x2,-y1,y2}$	0.4	pF

TYPICAL OPERATION - voltages with respect to cathode

Fourth anode voltage	V_{a4}	6.0	10	kV
Mean deflector plate potential		600	1000	V
Third anode voltage for optimum Astigmatism correction	V_{a3}	500 to 600	900 to 1000	V
Second anode voltage for optimum focus	V_{a2}	100 to 220	160 to 380	V
First anode voltage	V_{a1}	600	1000	V
Shield voltage for optimum raster shape	V_s	600 to 700	900 to 1100	V
Control grid voltage for cut-off	V_{g1}	-24 to -48	-40 to -80	V
x plate deflection coefficient	D_x	10.8 to 13.7	18.0 to 22.8	V/cm
y plate deflection coefficient	D_y	8.0 to 10.5	13.4 to 17.7	V/cm
Minimum screen area		6.8 x 5.6	6.8 x 5.6	cm^2
Line width at centre	at 5μA beam current	0.65	0.6	mm
Line width at edge		1.0	0.95	mm
Line width at centre measured by shrinking raster		0.32	0.27	mm

RASTER DISTORTION AND ALIGNMENT

The following data applies for the typical operation conditions.

The undeflected spot will fall in a circle 5 mm radius from the geometric centre of the tube face.

The edges of a test raster will fall between two concentric rectangles 68 mm x 56 mm and 65.5 mm x 54 mm.

Rectangularity of x and y axes is 90° ± 1°. The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield and should not extend more than 100 mm from the face. 40 ampere turns will suffice with provision for reversing the current.

The deflection coefficient (for both x and y plates) at 75% deflection of the useful scan will not differ by more than 2% from the deflection coefficient over 10% deflection.

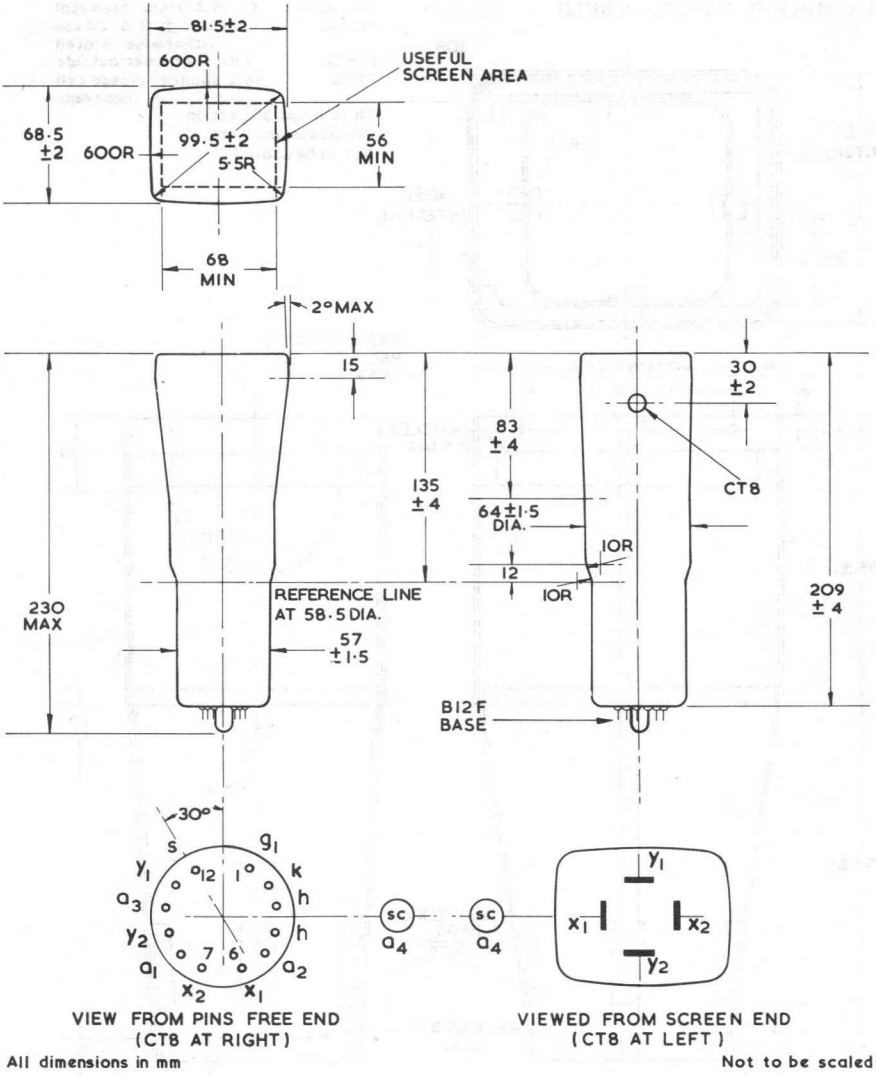
It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. Under no circumstances should the mean y plate potential differ from the mean x plate potential by more than 50 V.

MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT (approximate) - 550 g

MOUNTING POSITION - unrestricted



VIEW FROM PINS FREE END (CT8 AT RIGHT)

VIEWED FROM SCREEN END (CT8 AT LEFT)

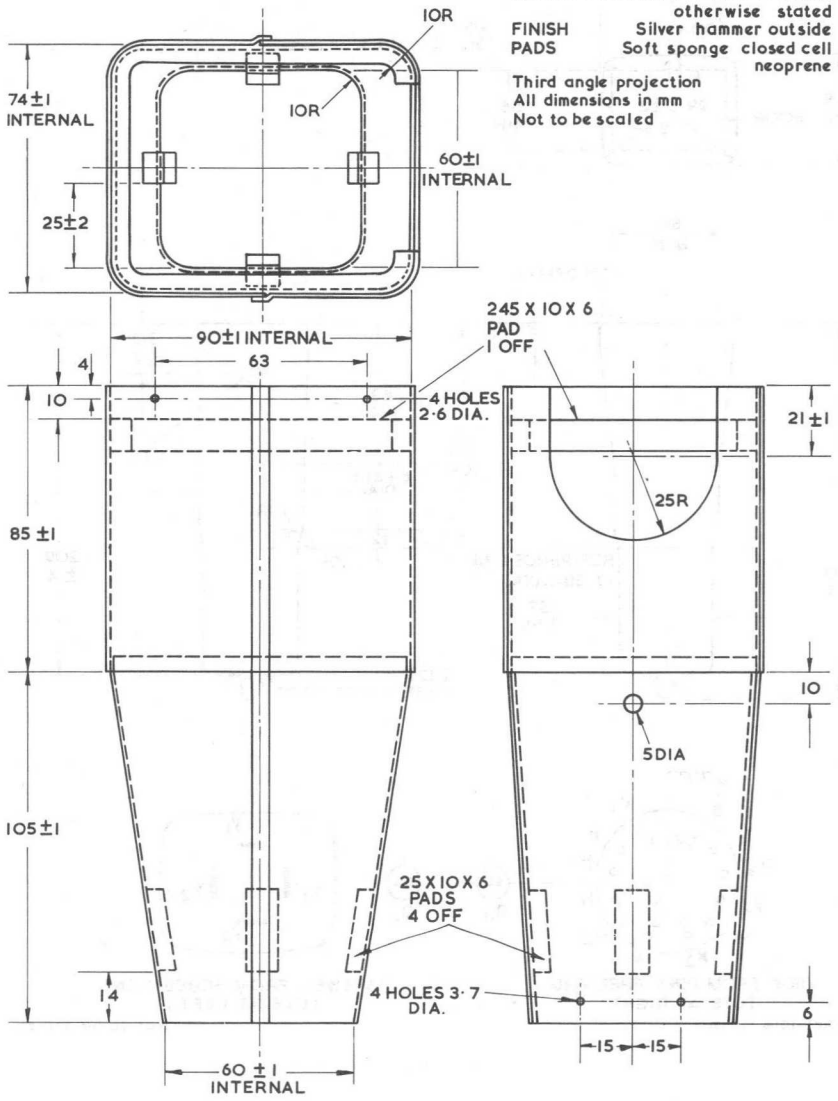
All dimensions in mm

Not to be scaled

OSCILLOSCOPE TUBES

D10-310.. Magnetic Shield MS 89

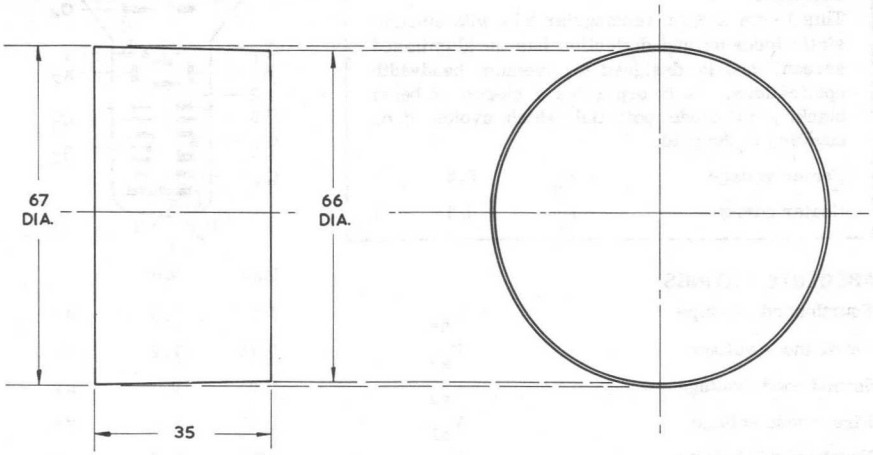
EXAMPLE OF TYPICAL SHIELD



BRIMAR

Tube Coil TW 56 D10-310..

MANDREL FOR TWIST COIL TW56



All dimensions in mm Not to be scaled

MANDREL

Shaped from wood in the form of a truncated circular cone, dimensions as above.

SHIELD

This twist coil is designed to be used in conjunction with magnetic shield MS89 for D10-310..

WINDING

900 turns of 0.125 mm Lewmex Grade 1 or 2 wire, or approved alternative, layer wound on the adhesive side of adhesive backed crepe paper to give 5 mm margins between the coil and each edge of the mandrel.
Start and finish of winding to be brought out on 450 mm long thin flexible lead wires from smaller end of winding.
Varnish, if necessary, cover with adhesive backed crepe paper and ensure that the edges of the coil are sealed in place.

ELECTRICAL CHARACTERISTICS

Resistance 260 Ω ± 10%. Twist coefficient approximately 8 mA/degree measured on typical D10-310.. with Va4 = 10 kV and Va1 = 1 kV.

FITTING

The completed twist coil should be pushed hard onto the tube with the lead-out wires in the middle of the short side of the tube on the same side as the cavity cap and sealed to the tube with suitable adhesive tape.

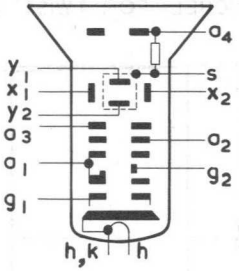
D14-182..

Oscilloscope Tube

GENERAL

This 10 cm x 8 cm rectangular tube with electrostatic focusing and deflection has an aluminised screen, and is designed for medium bandwidth applications. It incorporates a means of beam blanking at anode potential which avoids d.c. coupling to the grid.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS

		Max.	Min.	
Fourth anode voltage	V_{a4}	7.0	5.0	kV
Third anode voltage	V_{a3}	1.75	1.2	kV
Second anode voltage	V_{a2}	1.0	0	kV
First anode voltage	V_{a1}	1.75	1.2	kV
Negative grid voltage	$-V_{g1}$	200	1.0	V
Beam blanking voltage	V_{g2}	2.0	0.5	kV
Peak x plate to third anode voltage	$v_{x-a3(pk)}$	500	-	V
Peak y plate to third anode voltage	$v_{y-a3(pk)}$	500	-	V
x plate to third anode resistance	R_{x-a3}	5.0	-	MΩ
y plate to third anode resistance	R_{y-a3}	100	-	kΩ
Control grid to cathode resistance	R_{g1-k}	1.5	-	MΩ
Second anode current	I_{a2}	10	-	μA
P.D.A. ratio (V_{a4}/V_{a3})		4.3:1		
Helix resistance		-	50	MΩ

All voltages referred to cathode unless otherwise stated.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (D14-182GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

Grid 1 to all	$c_{g1\text{-all}}$	10	pF
Grid 2 to all	$c_{g2\text{-all}}$	10	pF
Heater and cathode to all	$c_{h,k\text{-all}}$	4.0	pF
x_1 plate to x_2 plate	$c_{x1\text{-}x2}$	2.1	pF
y_1 plate to y_2 plate	$c_{y1\text{-}y2}$	1.4	pF
x_1 plate to all, less x_2 plate	$c_{x1\text{-all, less x2}}$	6.9	pF
x_2 plate to all, less x_1 plate	$c_{x2\text{-all, less x1}}$	6.6	pF
y_1 plate to all, less y_2 plate	$c_{y1\text{-all, less y2}}$	5.1	pF
y_2 plate to all, less y_1 plate	$c_{y2\text{-all, less y1}}$	5.1	pF
x_1, x_2 plates to y_1, y_2 plates	$c_{x1,x2\text{-}y1,y2}$	0.8	pF
Grid 1 to x_1, x_2, y_1, y_2 plates	$c_{g1\text{-}x1,x2,y1,y2}$	1.4	pF
Grid 1 to grid 2	$c_{g1\text{-}g2}$	0.7	pF

TYPICAL OPERATION - Voltages with respect to cathode

Fourth anode voltage	V_{a4}	6.0	kV
Mean deflector plate potential		1500	V
Third anode voltage for optimum astigmatism correction	V_{a3}	1500*	V
Second anode voltage for optimum focus	V_{a2}	300 to 600	V
First anode voltage	V_{a1}	1500	V
Shield voltage for optimum raster shape	V_s	1500*	V
Beam blanking voltage for cut-off	V_{g2}	1400 †	V
Control grid voltage for cut-off	V_{g1}	-50 to -95	V
x deflection coefficient	D_x	20.2 to 25.8	V/cm
y deflection coefficient	D_y	10 to 13.1	V/cm
Minimum screen area		10 x 8	cm^2
Line width at centre-using microscope	at 5 μA beam current	0.42	mm
Line width at edge-using microscope		0.84	mm
Line width at centre measured by shrinking raster		0.25	mm

* The required voltage will not differ from the quoted value by more than ± 50V.
† The beam is unblanked when $V_{g2} = V_{a1}$. This grid 2 electrode should not be used as a brilliance control.

RASTER DISTORTION AND ALIGNMENT

The following data applies for the typical operation conditions.

The undeflected spot will fall in a circle of 8 mm radius about the centre of the tube face. The edges of a test raster will fall between two concentric rectangles 10 cm x 8 cm and 9.8 cm x 7.8 cm.

Rectangularity of x and y axes is 90° ± 1°. The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield approximately 90 mm from the face and should not extend more than 195 mm from the face. The ampere turns required will be equal to $12\sqrt{V_{a4}}$ (where V_{a4} is quoted in kV), with provision for reversing the current if necessary.

It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. Under no circumstances should the mean y plate potential differ from the mean x plate by more than 50V when the tube is operated at 6kV.

MAGNETIC SHIELDING

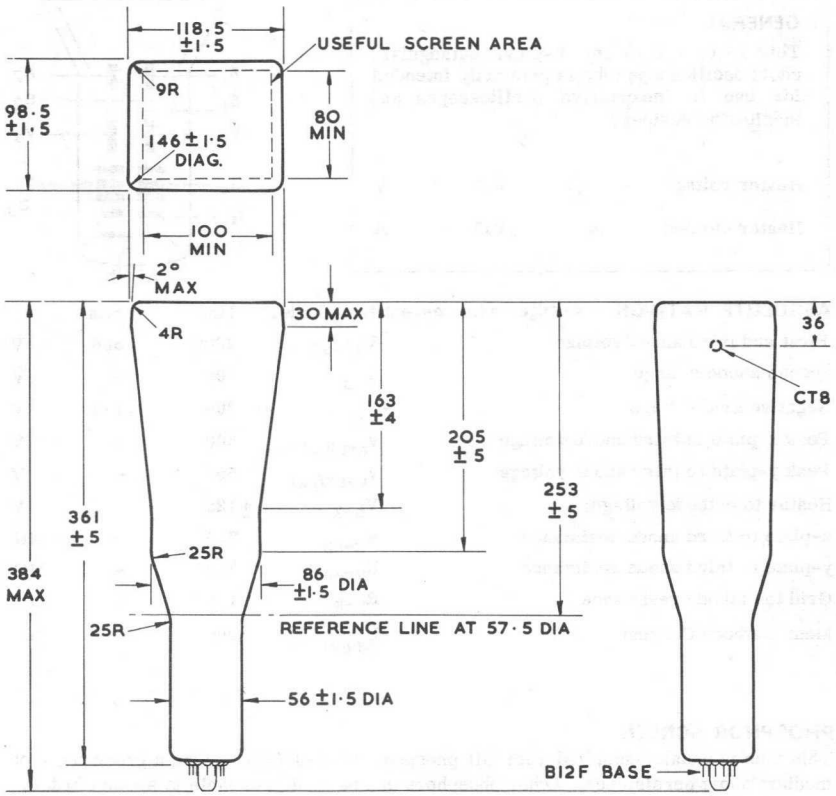
Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

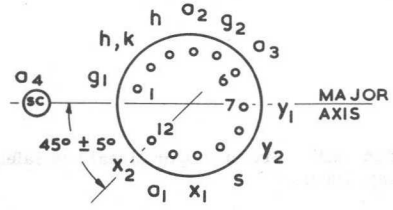
TUBE WEIGHT (approximate) 1.1 kg

MOUNTING POSITION - unrestricted.

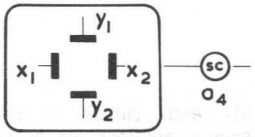
Characteristic curves as D14-181..

Magnetic Shield and Twist Coil as D14-181..





VIEW FROM PINS FREE END (CT8 AT LEFT)



VIEWED FROM SCREEN END (CT8 AT RIGHT)

All dimensions in mm Third angle projection Not to be scaled

It is advisable to support the tube near the screen and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base.

D14-320..

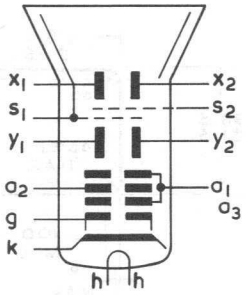
Oscilloscope Tube

PRELIMINARY DATA

GENERAL

This 10 cm x 8 cm display, rectangular, short oscilloscope tube is primarily intended for use in inexpensive oscilloscopes and monitoring devices.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - voltages with respect to cathode.		Max	Min	
First and third anode voltage	V_{a1+a3}	2200	800	V
Second anode voltage	V_{a2}	800	-	V
Negative grid voltage	$-V_g$	200	1.0	V
Peak x-plate to third anode voltage	$v_{x-a3(pk)}$	500	-	V
Peak y-plate to third anode voltage	$v_{y-a3(pk)}$	500	-	V
Heater to cathode voltage	V_{h-k}	±125		V
x-plate to third anode resistance	R_{x-a3}	2.0	-	MΩ
y-plate to third anode resistance	R_{y-a3}	2.0	-	MΩ
Grid to cathode resistance	R_{g-k}	1.5	-	MΩ
Mean Cathode Current	$I_{k(av)}$	200	-	μA

PHOSPHOR SCREEN

This tube is usually supplied with GH phosphor (D14-320GH) giving a green trace of medium short persistence. Other phosphors can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

Grid 1 to all	$C_{g1\text{-all}}$	5.5	pF
Heater and cathode to all	$C_{h,k\text{-all}}$	3.8	pF
x_1 plate to x_2 plate	$C_{x1\text{-}x2}$	1.2	pF
y_1 plate to y_2 plate	$C_{y1\text{-}y2}$	1.0	pF
x_1 plate to all, less x_2	$C_{x1\text{-all, less x2}}$	3.0	pF
x_2 plate to all, less x_1 plate	$C_{x2\text{-all, less x1}}$	3.0	pF
y_1 plate to all, less y_2 plate	$C_{y1\text{-all, less y2}}$	2.0	pF
y_2 plate to all, less y_1 plate	$C_{y2\text{-all, less y1}}$	2.0	pF
x_1, x_2 plates to y_1, y_2 plates	$C_{x1,\ x2\text{-}y1,y2}$	0.8	pF

TYPICAL OPERATION -voltages with respect to cathode, unless otherwise stated.

Mean deflector plate potential*		2000	V
Final anode voltage for optimum astigmatism correction	$V_{a1 + a3}$	2000†	V
Second anode voltage for optimum focus	V_{a2}	170 to 350	V
Shield 1 voltage for optimum raster shape	V_{s1}	2000§	V
Shield 2 voltage, with respect to shield 1 voltage, for optimum edge focus.	$V_{s2\text{-}s1}$	-30 to -80	V
Control grid voltage for cut-off	V_{g1}	-30 to -70	V
x deflection coefficient	D_x	27 to 35	V/cm
y deflection coefficient	D_y	21 to 28	V/cm
Minimum useful screen area		10 x 8	cm^2
Grid drive to 10 μA beam current (approx.)		16	V
Line width at 10 μA beam current Shrinking raster measurement at centre		0.3	mm

* This tube is designed for symmetrical operation.

† The required voltage will not differ from the quoted value by more than ± 50V.

§ The required voltage will not differ from the quoted value by more than + 115V.

OSCILLOSCOPE TUBES

RASTER DISTORTION AND ALIGNMENT

The undeflected spot will fall in a rectangle 10 mm x 14 mm about the centre of the tube face. This 10 mm dimension is in the x direction.

Raster distortion: the edges of a test raster will fall between two concentric rectangles 8.5cm x 7.0cm and 8.2cm x 6.7cm.

Orthogonality of x and y axes is 90° ± 1°.

The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°.

A twist coil will be required to effect accurate alignment. This should be mounted between 85 mm and 125 mm from the face. The ampere turns required will be equal to $17.5\sqrt{V_{a1,\ a3}}$ (where $V_{a1,\ a3}$ is quoted in kV) with provision for reversing the current.

The sensitivity (for both x and y plates) at 75% deflection of the useful scan will not differ by more than 3% from the sensitivity over 25% deflection

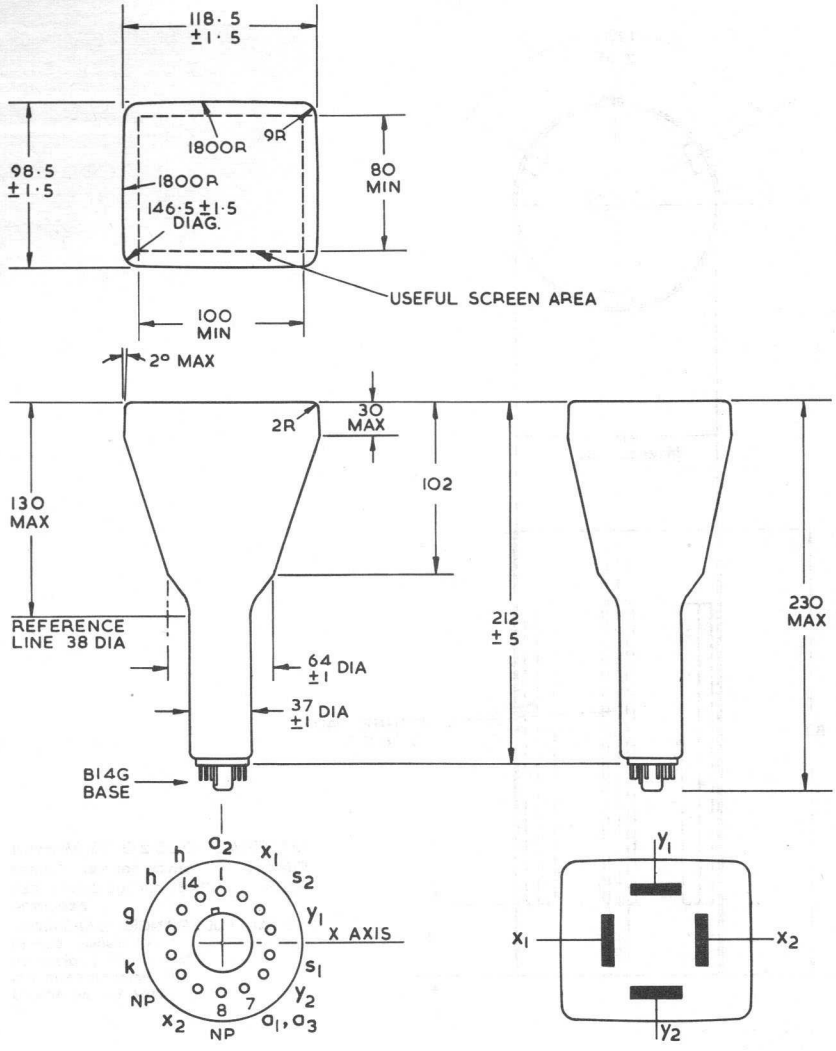
It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. The mean y plate potential should never differ from the mean x plate potential by more than 50V.

MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT - (approximate) 800g

MOUNTING POSITION - unrestricted.



VIEWED FROM PINS FREE END (PIN 1 AT TOP)

VIEWED FROM SCREEN END (PIN 1 AT TOP)

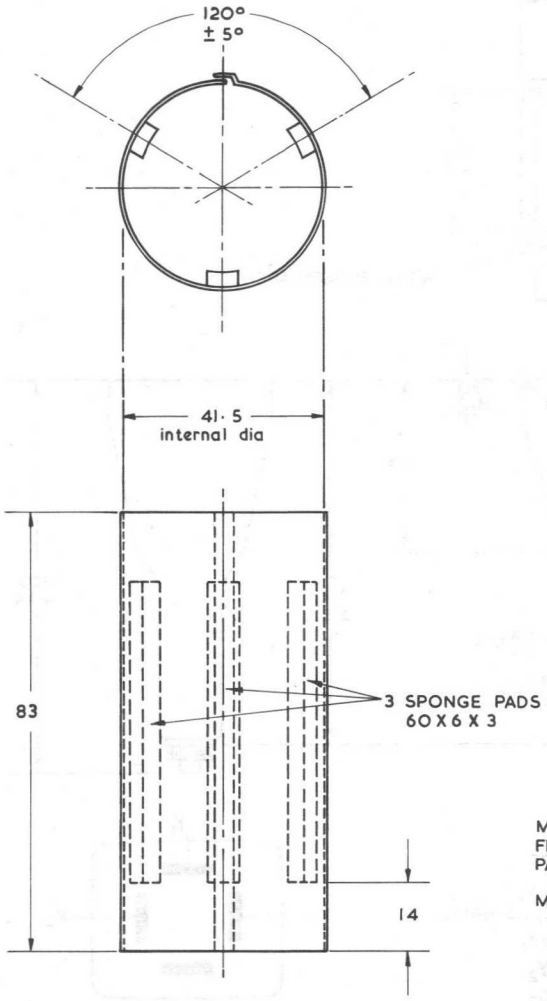
All dimensions in mm

Not to be scaled

It is advisable to support the tube near the screen and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base.
Tolerance on base pin 1 position with respect to tube y axis ± 5°

D14-320..

Magnetic Shield MS 86



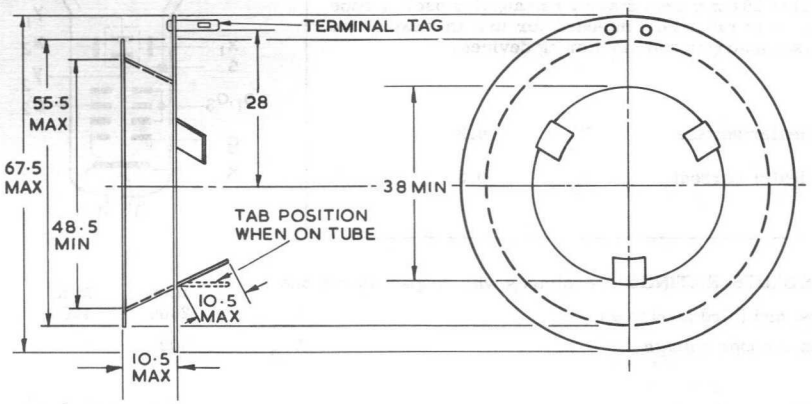
MATERIAL 0·35 ± 0·05 Mumetal
FINISH Silver hammer outside
PADS Soft sponge closed cell neoprene
METAL TOLERANCES ± 0·5 Unless otherwise stated
Third angle projection
All dimensions in mm
Not to be scaled

BRIMAR

Tube Coil TW 58

D14-320..

BOBBIN FOR TWIST COIL TW58



All dimensions in mm

Not to be scaled

BOBBIN
Nylon or suitable approved material.

SHIELD
This twist coil is designed to be used in conjunction with magnetic shield MS86 for D14-320..

WINDING

1000 turns of 0.09 mm Lewmex Grade 1 or 2 wire, or approved alternative.
Start and finish of winding to be affixed to terminal tags. Cover with Adhesive Tape.

ELECTRICAL CHARACTERISTICS
Resistance approx. 395Ω. Twist coefficient approximately 5mA/degree measured on typical D14-320.. with V_{a3} = 2kV.

FITTING
The completed twist coil should be pushed onto the tube and secured to tube by the tabs with suitable adhesive tape.

OSCILLOSCOPE TUBES

D14-340..

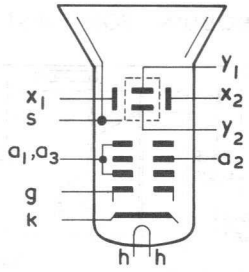
Oscilloscope Tube

PRELIMINARY DATA

GENERAL

This 10 cm x 8 cm display rectangular oscilloscope tube is primarily intended for use in inexpensive oscilloscopes and monitoring devices.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - voltages with respect to cathode

		Max.	Min.	
First and third anode voltage	V_{a1+a3}	2600	1250	V
Second anode voltage	V_{a2}	800	-	V
Negative grid voltage	$-V_g$	200	1.0	V
Peak x-plate to third anode voltage	$v_{x-a3(pk)}$	500	-	V
Peak y-plate to third anode voltage	$v_{y-a3(pk)}$	500	-	V
Heater to cathode voltage	V_{h-k}	±125		V
x-plate to third anode resistance	R_{x-a3}	100	-	kΩ
y-plate to third anode resistance	R_{y-a3}	100	-	kΩ
Grid to cathode resistance	R_{g-k}	1.5	-	MΩ

PHOSPHOR SCREEN

This tube is usually supplied with GH phosphor (D14-340GH) giving a green trace of medium short persistence. Other phosphors can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

Grid 1 to all	$c_{g1\text{-all}}$	8.2	pF
Heater and cathode to all	$c_{h,k\text{-all}}$	3.8	pF
x_1 plate to x_2 plate	$c_{x1\text{-}x2}$	1.7	pF
y_1 plate to y_2 plate	$c_{y1\text{-}y2}$	1.3	pF
x_1 plate to all, less x_2 plate	$c_{x1\text{-all, less x2}}$	5.0	pF
x_2 plate to all, less x_1 plate	$c_{x2\text{-all, less x1}}$	4.8	pF
y_1 plate to all, less y_2 plate	$c_{y1\text{-all, less y2}}$	3.6	pF
y_2 plate to all, less y_1 plate	$c_{y2\text{-all, less y1}}$	3.7	pF
x_1, x_2 plates to y_1, y_2 plates	$c_{x1,x2\text{-}y1,y2}$	0.7	pF

TYPICAL OPERATION -voltages with respect to cathode

Mean deflector plate potential*		1500	2000	V
Final anode voltage for optimum astigmatism correction	V_{a1+a3}	1500†	2000†	V
Second anode voltage for optimum focus	V_{a2}	125 to 220	170 to 290	V
Shield voltage for optimum raster shape	V_s	1500†	2000†	V
Control grid voltage for cut-off	V_{g1}	-22 to -52	-30 to -70	V
x deflection coefficient	D_x	14.3 to 17.5	19 to 23	V/cm
y deflection coefficient	D_y	9 to 11.3	12 to 15	V/cm
Minimum useful screen area		10 x 8.0	10 x 8.0	cm^2
Grid drive to 10 μA beam current		10	11	V
Line width at 10 μA beam current Shrinking raster measurement at centre		0.38	0.32	mm

* This tube is designed for symmetrical operation.

† The required voltage will not differ from the quoted value by more than ± 30 V.

RASTER DISTORTION AND ALIGNMENT

The undeflected spot will fall in a square of 14 mm x 14 mm about the centre of the tube face.

Raster distortion: the edges of a test raster will fall between two concentric rectangles 8.5 cm x 7.0 cm and 8.3 cm x 6.88 cm.

Orthogonality of x and y axes is 90° ± 1°.

The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield approximately 160 mm from the face and should not extend more than 180 mm from the face.

The sensitivity (for both x and y plates) at 75 % deflection of the useful scan will not differ by more than 2 % from the sensitivity over 25 % deflection.

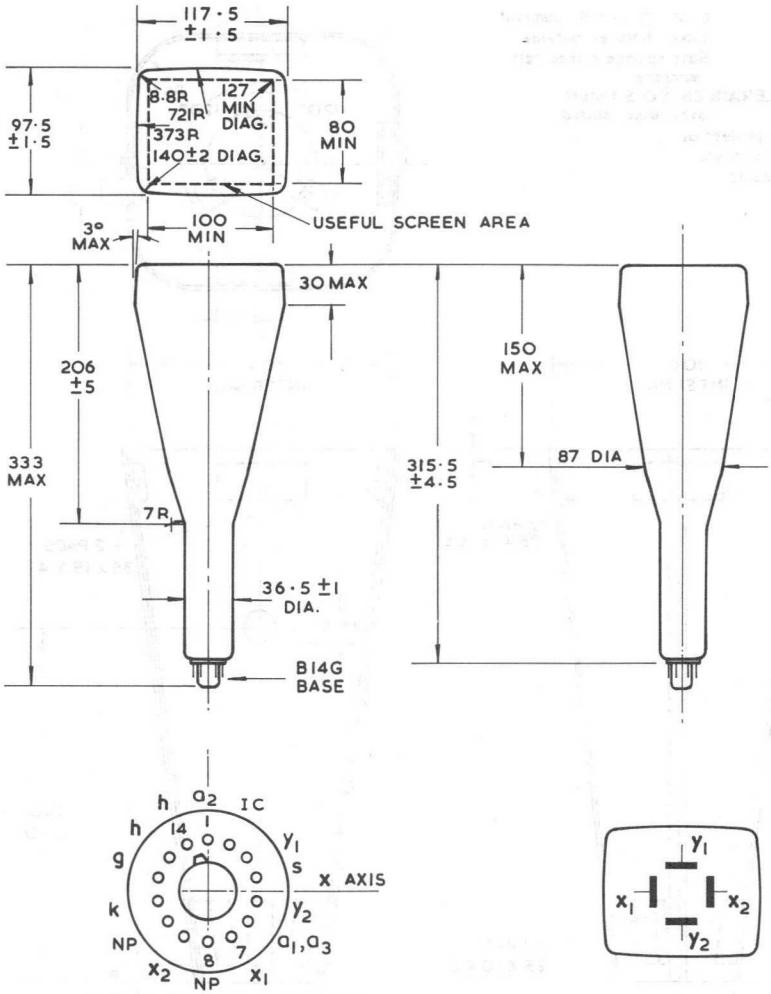
It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. Under no circumstances should the mean y plate potential differ from the mean x plate potential by more than 50 V.

MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT (approximate) 1.2 kg.

MOUNTING POSITION - unrestricted.



All dimensions in mm

Not to be scaled

It is advisable to support the tube near the screen and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base.

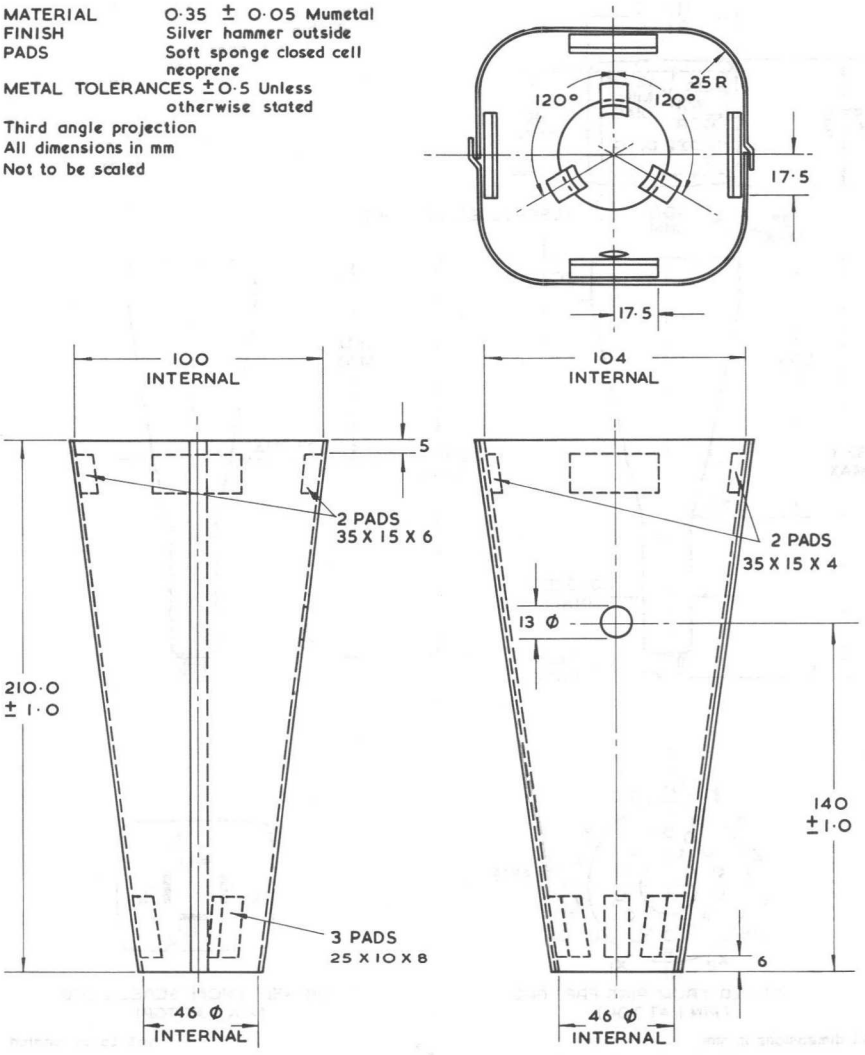
Tolerance on base pin 1 position will respect to tube y axis ± 5°.

D14 - 340. .

Magnetic Shield MS 90

MATERIAL	0·35 ± 0·05 Mumetal
FINISH	Silver hammer outside
PADS	Soft sponge closed cell neoprene
METAL TOLERANCES	±0·5 Unless otherwise stated

Third angle projection
All dimensions in mm
Not to be scaled

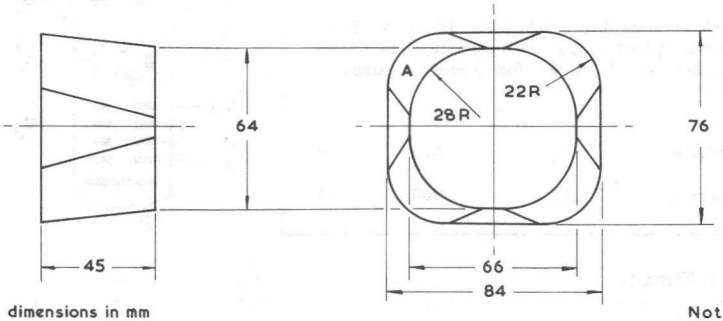


This shield is designed to provide adequate shielding for most applications. If greater shielding is required a two part full length shield is required.

BRIMAR

Tube Coil TW 52 D14-340..

MANDREL FOR TWIST COIL TW 52



All dimensions in mm

Not to be scaled

MANDREL

Shaped from wood in the form of a shaped truncated circular cone, dimensions as above.

SHIELD

This twist coil is designed to be used in conjunction with a magnetic shield.

WINDING

1000 turns of 0.14mm Lewmex Grade 1 or 2 wire, or approved alternative, layer wound on the adhesive side of adhesive backed crepe paper to give 5mm margins between the coil and each edge of the mandrel.
Start and finish of winding to be brought out on 450mm long thin flexible lead wires at position A on drawing.
Varnish, if necessary, cover with adhesive backed crepe paper and ensure that the edges of the coil are sealed in place.

ELECTRICAL CHARACTERISTICS

Resistance approx. 300Ω. Current required for ± 5° twist is ± 20mA measured on typical D14-340.. with Va1 = 1.5kV.

FITTING

The completed twist coil should be pushed onto the tube from the base end as far as it will travel and locked in position with adhesive tape.

OSCILLOSCOPE TUBES

D14-350..

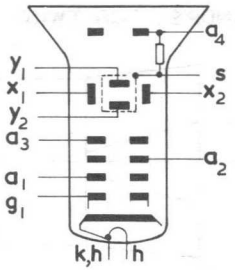
Oscilloscope Tube

PRELIMINARY DATA

GENERAL

This short rectangular tube with 10 cm x 8 cm display area, spiral p.d.a., electrostatic focusing and deflection is designed for general purpose applications.

Heater voltage	V_h	6.3	V
Heater current	I_h	300	mA



ABSOLUTE RATINGS

		Max.	Min.	
Fourth anode voltage	V_{a4}	4.0	1.5	kV
Third anode voltage	V_{a3}	1.75	0.6	kV
Second anode voltage	V_{a2}	1.0	0	kV
First anode voltage	V_{a1}	1.75	0.6	kV
Negative grid voltage	$-V_{g1}$	200	1.0	V
Peak x plate to third anode voltage	$v_{x-a3(pk)}$	500		V
Peak y plate to third anode voltage	$v_{y-a3(pk)}$	500		V
x plate to third anode resistance	R_{x-a3}	100		kΩ
y plate to third anode resistance	R_{y-a3}	100		kΩ
Control grid to cathode resistance	R_{g1-k}	1.5		MΩ
Second anode current	I_{a2}	10		μA
P.D.A. ratio (V_{a4}/V_{a3} nom.)		3.2 : 1		
Helix resistance			15	MΩ

All voltages referred to cathode unless otherwise stated.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (D14-350GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

Grid 1 to all	$C_{g1\text{-all}}$	10	pF
Heater and cathode to all	$C_{h,k\text{-all}}$	4.0	pF
x_1 plate to x_2 plate	$C_{x1\text{-}x2}$	2.3	pF
y_1 plate to y_2 plate	$C_{y1\text{-}y2}$	1.2	pF
x_1 plate to all, less x_2 plate	$C_{x1\text{-all, less x2}}$	6.9	pF
x_2 plate to all, less x_1 plate	$C_{x2\text{-all, less x1}}$	6.6	pF
y_1 plate to all, less y_2 plate	$C_{y1\text{-all, less y2}}$	5.0	pF
y_2 plate to all, less y_1 plate	$C_{y2\text{-all, less y1}}$	5.0	pF
x_1, x_2 plates to y_1, y_2 plates	$C_{x1,\ x2\text{-}y1,\ y2}$	0.8	pF
Grid 1 to x_1, x_2, y_1, y_2 plates	$C_{g1\text{-}x1,x2,y1,y2}$	1.4	pF

TYPICAL OPERATION - Voltages with respect to cathode

Fourth anode voltage	V_{a4}	3.0	kV
Mean deflector plate potential		1000	V
Third anode voltage for optimum astigmatism correction	V_{a3}	1000*	V
Second anode voltage for optimum focus	V_{a2}	160 to 320	V
First anode voltage	V_{a1}	1000	V
Shield voltage for optimum raster shape	V_s	1000*	V
Control grid voltage for cut-off	V_{g1}	-27 to -54	V
x deflection coefficient	D_x	18 to 23.0	V/cm
y deflection coefficient	D_y	9.0 to 11.5	V/cm
Line width at 10 μA beam current shrinking raster measurement at centre		0.26	mm
Grid drive to 10 μA beam current (approx.)		14	V

* The required voltage will not differ from the quoted value by more than ± 50 V.

RASTER DISTORTION AND ALIGNMENT

The undeflected spot will fall in a circle of 5 mm radius about the centre of the tube face.

Raster distortion: the edges of a test raster will fall between two concentric rectangles 10 cm x 8 cm and 9.75 cm x 7.8 cm.

Rectangularity of x and y axes is 90° ± 1°. The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield approximately 140 mm from the face and should not extend more than 160 mm from the face. 26 ampere turns will suffice, with provision for reversing the current if necessary.

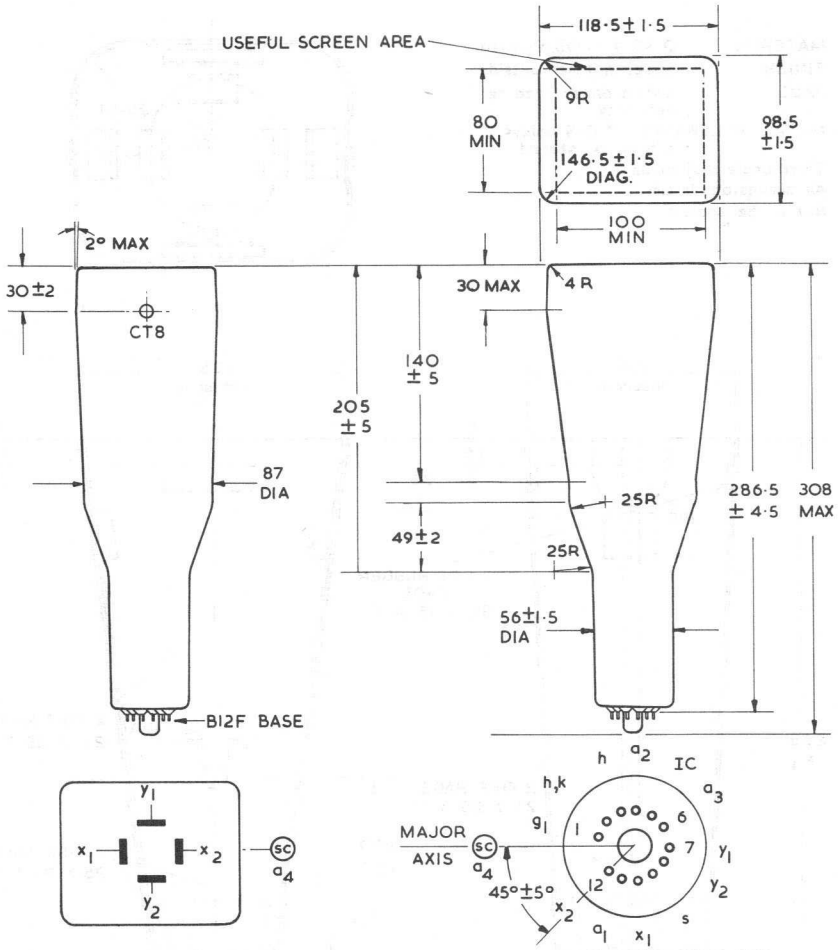
It is preferable that the mean x and y plate potentials are equal otherwise some deterioration in performance will occur. Under any circumstances the mean y plate potential should never differ from the mean x plate potential by more than 50V when the tube is operated at 3 kV.

MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT (approximate) 1.0 kg

MOUNTING POSITION - unrestricted.



All dimensions in mm Third angle projection Not to be scaled

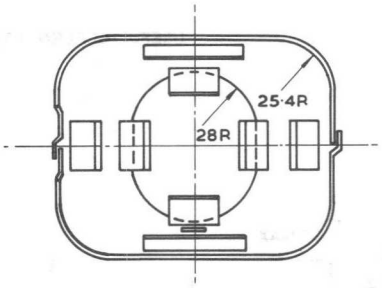
It is advisable to support the tube near the screen, and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base. Connecting leads should not be soldered directly to the tube pins.

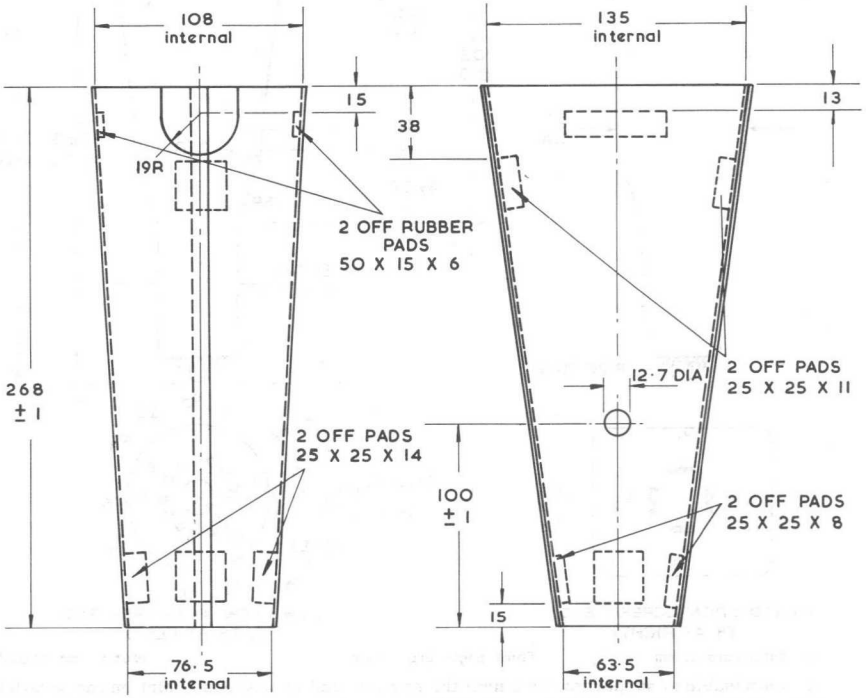
D14-350..

Magnetic Shield MS15

MATERIAL	0·35 ± 0·05 Mumetal
FINISH	Silver hammer outside
PADS	Soft sponge closed cell neoprene
METAL TOLERANCES	± 0·5 Unless otherwise stated

Third angle projection
All dimensions in mm
Not to be scaled

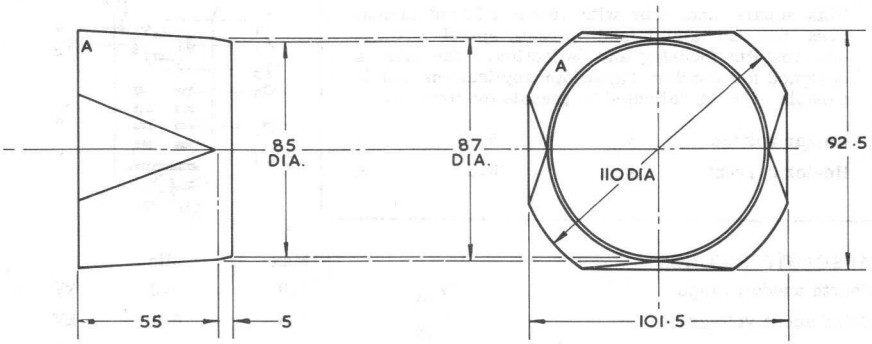




BRIMAR

Tube Coil TW26 D14-350..

MANDREL FOR TWIST COIL TW26



All dimensions in mm

Not to be scaled

MANDREL

Shaped from wood in the form of a shaped truncated circular cone, dimensions above.

SHIELD

This twist coil is designed to be used in conjunction with magnetic shield MS15 for D14-350..

WINDING

2500 turns of 0.125 mm Lewmex Grade 1 or 2 wire, or approved alternative, layer wound on the adhesive side of adhesive backed crepe paper to give 5 mm margins between the coil and each edge of the mandrel.
Start and finish of winding to be brought out on 450 mm long thin flexible lead wires at position A on drawing.
Varnish, if necessary, cover with adhesive backed crepe paper and ensure that the edges of the coil are sealed in place.

ELECTRICAL CHARACTERISTICS

Resistance approx. 1060 Ω. Current required for ± 5° twist is ± 10 mA measured on typical D14-350.. with Va4 = 3 kV and Va1 = 1.0 kV.

FITTING

The completed twist coil should be pushed onto the tube from the base end as far as it will travel and locked in position with adhesive tape.

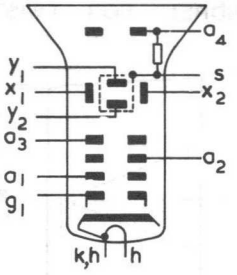
D16-111..

Oscilloscope Tube

GENERAL

This square faced tube with 10 cm x 10 cm display area has an aluminised screen, spiral p.d.a., electrostatic focusing and deflection. The tube is designed for medium bandwidth applications and is capable of being deflected by transistor circuits.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS

		Max	Min	
Fourth anode voltage	V_{a4}	7.0	5.0	kV
Third anode voltage	V_{a3}	1.8	0.6	kV
Second anode voltage	V_{a2}	1.0	0	kV
First anode voltage	V_{a1}	1.8	0.6	kV
Negative grid voltage	$-V_{g1}$	200	1.0	V
Peak x plate to third anode voltage	$V_{x-a3(pk)}$	500	-	V
Peak y plate to third anode voltage	$V_{y-a3(pk)}$	500	-	V
x plate to third anode resistance		100	-	kΩ
y plate to third anode resistance		100	-	kΩ
Control grid to cathode resistance		1.5	-	MΩ
Second anode current		10	-	μA
P.D.A. ratio (V_{a4}/V_{a3})		4.2. 1		
Helix resistance		-	50	MΩ

All voltages referred to cathode unless otherwise stated.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (D16-111GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

This data should be read in conjunction with Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

Grid 1 to all	$c_{g1\text{-all}}$	12	pF
Heater and cathode to all	$c_{h,k\text{-all}}$	7.0	pF
x_1 plate to x_2 plate	$c_{x1\text{-}x2}$	2.4	pF
y_1 plate to y_2 plate	$c_{y1\text{-}y2}$	1.5	pF
x_1 plate to all, less x_2 plate	$c_{x1\text{-all, less x2}}$	6.3	pF
x_2 plate to all, less x_1 plate	$c_{x2\text{-all, less x1}}$	6.6	pF
y_1 plate to all, less y_2 plate	$c_{y1\text{-all, less y2}}$	5.0	pF
y_2 plate to all, less y_1 plate	$c_{y2\text{-all, less y1}}$	5.0	pF
x_1, x_2 plates to y_1, y_2 plates	$c_{x1,x2\text{-}y1,y2}$	0.7	pF
Grid 1 to x_1, x_2, y_1, y_2 plates	$c_{g1\text{-}x1,x2,y1,y2}$	1.4	pF

TYPICAL OPERATION - voltages with respect to cathode

Fourth anode voltage	V_{a4}	6.0	kV
Mean deflector plate potential		1500	V
Third anode voltage for optimum astigmatism correction	V_{a3}	1500*	V
Second anode voltage for optimum focus	V_{a2}	260 to 600	V
First anode voltage	V_{a1}	1500	V
Shield voltage for optimum raster shape	V_s	1500*	V
Control grid voltage for cut-off	V_{g1}	-40 to -80	V
x deflection coefficient	D_x	21.8 to 27.8	V/cm
y deflection coefficient	D_y	12.8 to 16.1	V/cm
Minimum screen area		10 x 10	cm^2
Line width at 10μA beam current Shrinking raster measurement at centre		0.24	mm
Grid drive to 10μA beam current		17	V

* The required voltage will not differ from the quoted value by more than ± 50V

RASTER DISTORTION AND ALIGNMENT

The following data applies for the typical operation conditions.

The undeflected spot will fall in a circle of 6 mm radius about the centre of the tube face.

Raster distortion: the edges of a test raster will fall between two concentric squares 10 cm x 10 cm and 9.7 cm x 9.7 cm.

Orthogonality of x and y axes is 90° ± 1°.

The horizontal trace will be parallel with the axis of the rectangular face-plate to within ± 5°. A twist coil will be required to effect accurate alignment. This should be mounted inside the magnetic shield approximately 160mm from the face and should not extend more than 215 mm from the face. The ampere turns required will be equal to $13\sqrt{V_{a4}}$ (where V_{a4} is quoted in kV) with provision for reversing the current. The sensitivity (for both x and y plates) at 75% deflection of the useful scan will not differ by more than 2% from the sensitivity over 10% deflection.

It is not advisable that the deflector plates be run asymmetrically, or severe raster distortion may result and the focus quality cannot be guaranteed. It is preferable that the tube be operated with mean x and y potentials equal, otherwise the raster distortion and focus quality will suffer and the limits for V_{a3} and V_s will differ from specification.

It is recommended that the maximum p.d.a. ratio is not exceeded as this may reduce scan area.

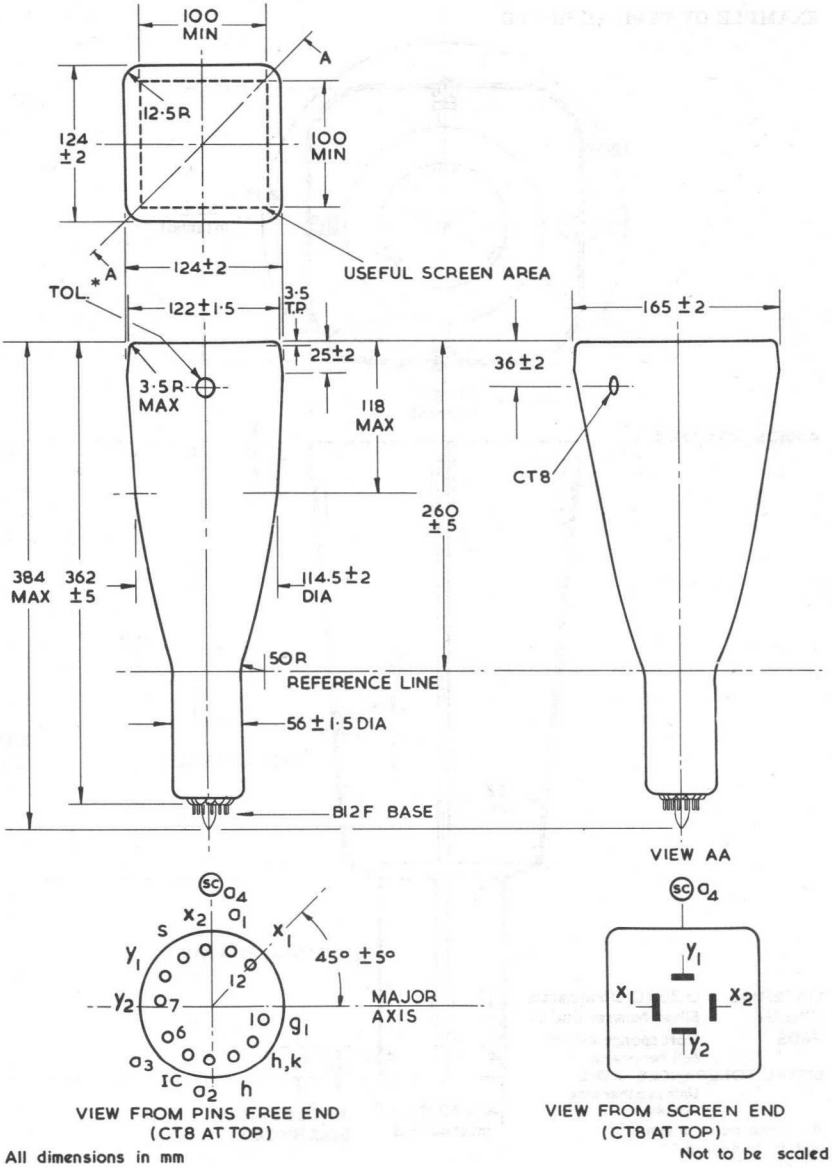
MAGNETIC SHIELDING

Adequate magnetic shielding is required. In addition due attention should be paid to the position of the tube relative to transformers and chokes.

TUBE WEIGHT (approximate) 1.2 kg.

MOUNTING POSITION - unrestricted

It is advisable to support the tube near the screen and at a second point on the parallel neck near the base. The tube should not be subjected to any stress from the use of clamps and should not be suspended by the base.



All dimensions in mm

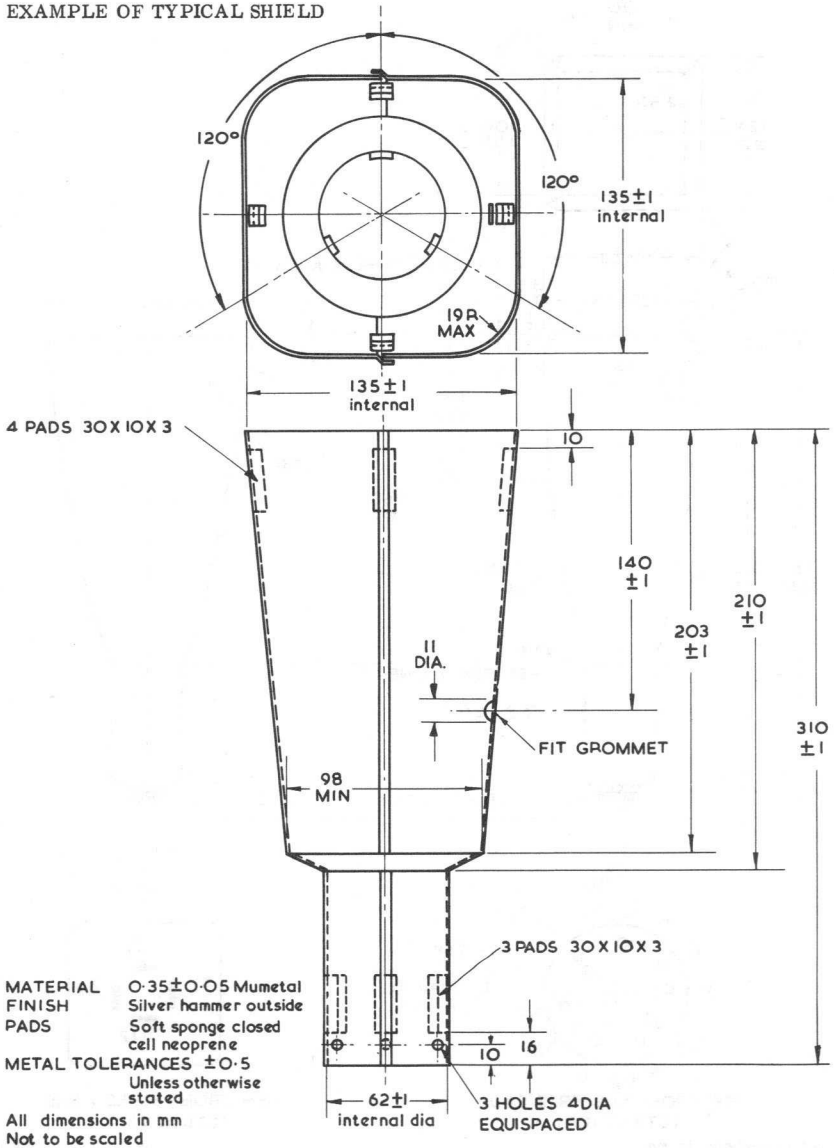
Not to be scaled

* CT8 symmetrical tolerance ± 3 mm about centre line of 122 dimension on CT8 side.

D16-111..

Magnetic Shield MS63

EXAMPLE OF TYPICAL SHIELD



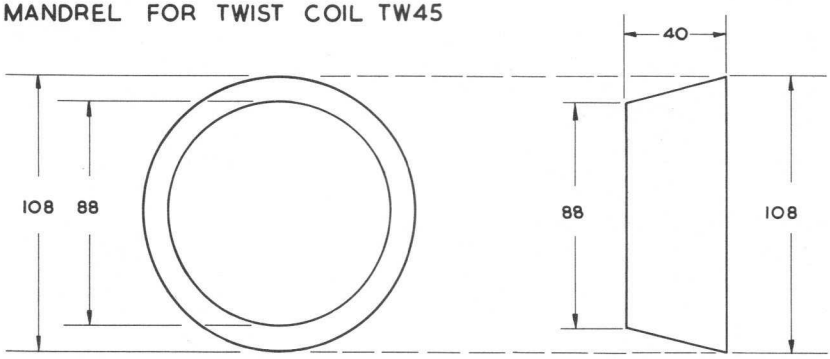
MATERIAL	0·35±0·05 Mumetal
FINISH	Silver hammer outside
PADS	Soft sponge closed cell neoprene
METAL TOLERANCES	±0·5 Unless otherwise stated

All dimensions in mm
Not to be scaled

BRIMAR

Tube Coil TW 45 D16-111..

MANDREL FOR TWIST COIL TW45



All dimensions in mm

Not to be scaled

SHIELD

This twist coil is designed to be used in conjunction with Magnetic Shield MS63 for D16-111..

WINDING

1500 turns of 0.140 mm Lewmex Grade 1 or 2 wire, or approved alternative, layer wound on the adhesive side of adhesive backed crepe paper to give 5 mm margins between the coil and each edge of the mandrel.
Start and finish of winding to be brought out on 450 mm long thin flexible lead wires from smaller end of winding.
Varnish, if necessary, cover with adhesive backed crepe paper and ensure that the edges of the coil are sealed in place.

ELECTRICAL CHARACTERISTICS

Resistance approx. 590 Ω. Twist coefficient approx. 4.0 mA/degree measured on a typical D16-111.. with V_{a1} = 1.5kV and V_{a4-k} = 6.0kV.

FITTING

The completed twist coil should be pushed hard on to the tube and secured in two places with suitable adhesive tape.

OSCILLOSCOPE TUBES

BRIMAR

RADAR TUBES

The facilities and organisation provided by Thorn Brimar Limited meet the requirements of the M.O.D. (P.E.) Defence Standard 05-21 and BS9000.

HEALTH AND SAFETY AT WORK ACT, 1974

Attention is drawn to the recommendations under this heading in the Operational Recommendations.

WARNING

These tubes should be used in accordance with their published ratings, and in conformity with the Operational Recommendations of the Company's data handbook. The Company will not entertain claims for loss or damage where this advice has been disregarded.

Thorn Brimar Limited
Mollison Avenue - Brimsdown - Enfield - Middlesex EN3 7NS

BRIMAR

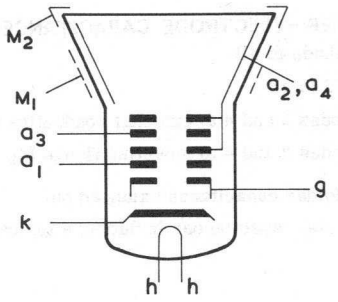
Radar Tube

F41-142..

GENERAL

Round face, 41 cm tube, 50° deflection
Metal mounting flange
Electrostatic focus, magnetic deflection
Straight gun, non ion trap
Clear glass
External conductive coating
Aluminised screen
35.5 mm maximum neck diameter

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS (voltages referred to cathode)

Maximum second and fourth anode voltage	$V_{a2+a4(max)}$	20	kV
Minimum second and fourth anode voltage	$V_{a2+a4(min)}$	10	kV
Maximum third anode voltage	$V_{a3(max)}$	± 500	V
Maximum first anode voltage	$V_{a1(max)}$	500	V
Maximum negative grid voltage	$-V_{g(max)}$	200	V
Minimum negative grid voltage	$-V_{g(min)}$	1.0	V
Maximum heater to cathode voltage heater negative (d.c.)	$V_{h-k(max)}$	200	V
Maximum peak heater to cathode voltage heater negative	$V_{h-k(pk)max}$	400*	V

* During a warming up period not exceeding one minute.

PHOSPHOR SCREEN

This tube is usually supplied with LC phosphor (F41-142LC) giving an orange trace of very long persistence. Other phosphors can be made available to special order.

RADAR TUBES

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

		*	†	
Cathode to all	c_{k-all}	3.5	4.5	pF
Grid to all	c_{g-all}	7.0	7.5	pF
Anodes 2 and 4 to external conductive coating, M_1	$c_{a2+a4-M1}$		1400	pF
Anodes 2 and 4 to mounting flange M_2	$c_{a2+a2-M2}$		250	pF

* Holder capacitance balanced out.

† Total capacitances including a typical B12A duodecal holder.

TYPICAL OPERATION - Grid modulation (voltages referred to cathode)

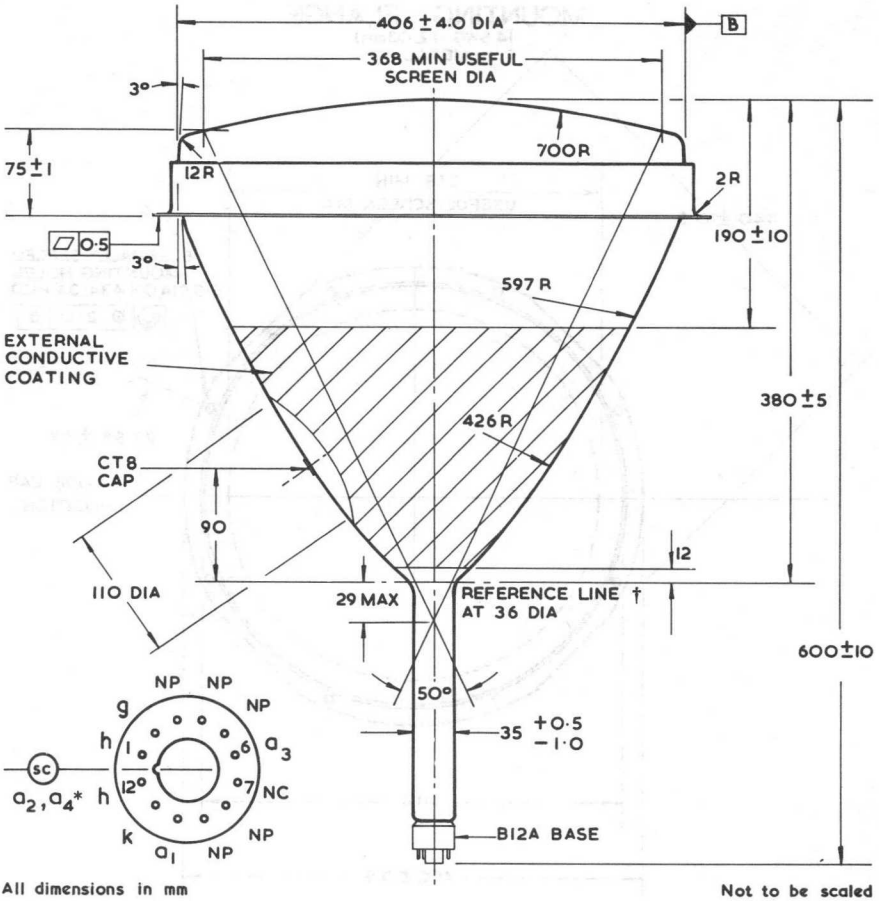
Second and fourth anode voltage	V_{a2+a4}	18	kV
Third anode voltage range for focus	V_{a3}	-300 to +300	V
First anode voltage	V_{a1}	300	V
Grid to cathode voltage for cut-off of raster	V_g	-40 to -80	V
Average peak to peak modulating voltage for modulation up to 150 μA.		24	V
Line width at 50 μA beam current microscope measurement		0.5 to 0.7	mm
LC screen persistence to 10% (approximate)		25	s

The LC screen is liable to burn even at low value of beam current if operated with stationary or slow moving spot.

It this tube is operated at voltages in excess of 16kV, x-ray radiation shielding may be necessary to avoid possible danger of personal injury from prolonged exposure at close range. The normal glass protective viewing window may provide such a safeguard. If the radiation measured in contact with this window does not exceed 0.5 millirontgens per hour, the window will normally provide adequate protection.

TUBE WEIGHT (approximate) - 11kg

MOUNTING POSITION - unrestricted

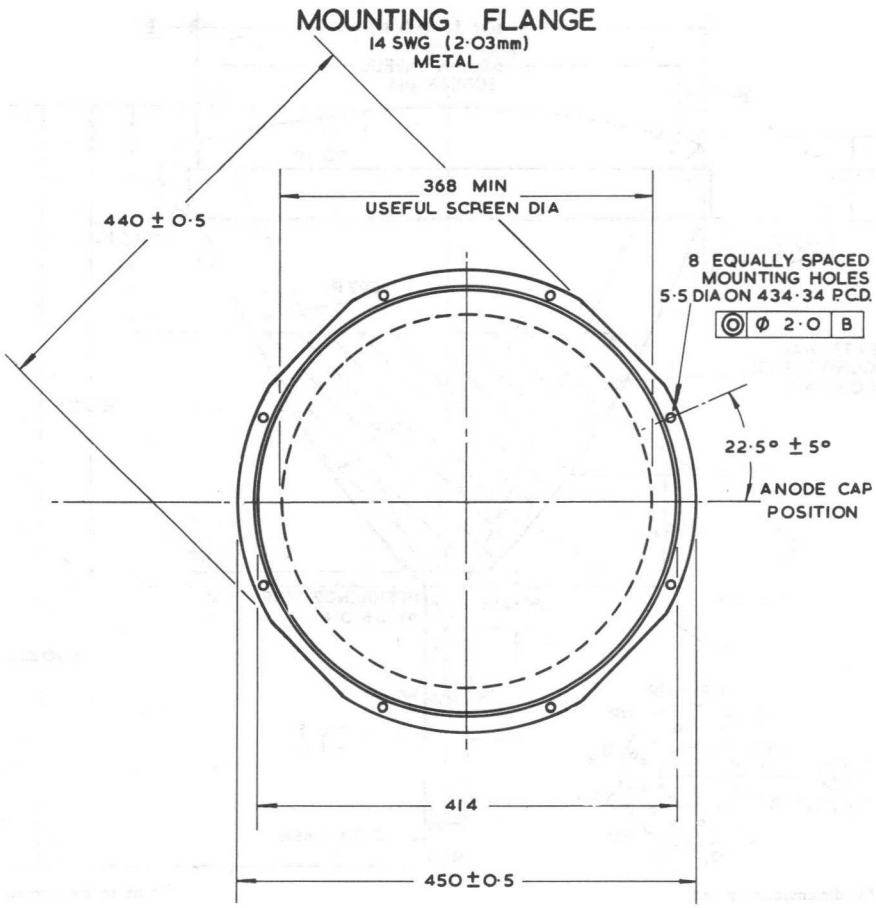


* Anode cap in line with spigot ± 15°

† Gauge 36 I/D x 100 long to slide freely over neck.

There is an annular region of anti-corona coating with an external diameter of 75 mm surrounding the CT8 cap, the tube should not be handled in this region.

The projected neck axis shall pass within 4.0 mm of the geometric centre of the tube face. The eccentricity of the neck axis with respect to a line perpendicular to the geometric centre of the tube face shall not exceed 4.5 mm at the deflection centre and 5.0 mm at a point 102 mm from the reference line.



All dimensions in mm

Not to be scaled

DATA DISPLAY & MONITOR TUBES

The facilities and organisation provided by Thorn Brimar Limited meet the requirements of the M.O.D. (P.E.) Defence Standard 05-21 and BS9000.

HEALTH AND SAFETY AT WORK ACT, 1974

Attention is drawn to the recommendations under this heading in the Operational Recommendations.

WARNING

These tubes should be used in accordance with their published ratings, and in conformity with the Operational Recommendations of the Company's data handbook. The Company will not entertain claims for loss or damage where this advice has been disregarded.

Thorn Brimar Limited
Mollison Avenue - Brimsdown - Enfield - Middlesex EN3 7NS

BRIMAR

Data Display or Monitor Tube

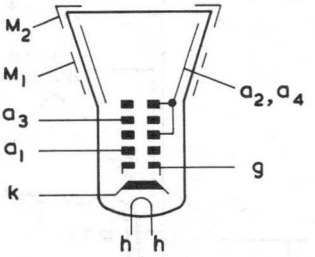
M14-101..

PRELIMINARY DATA

GENERAL

The M14-101.. is the M14-100.. with the addition of mounting lugs.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M14-101GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) 400 g.

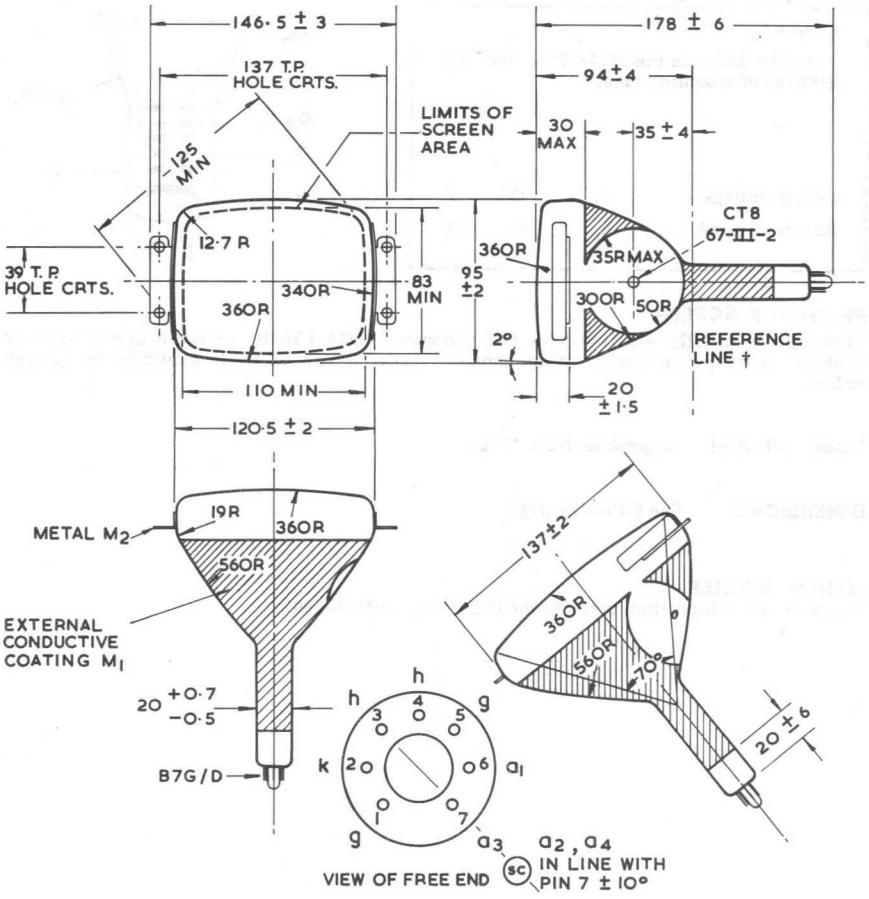
DIMENSIONS See following page

OTHER DETAILS

For all other information refer to the data for type M14-100..

DATA DISPLAY AND MONITOR TUBES

BRIMAR



All dimensions in mm

Not to be scaled

Note:- The bolts used for mounting the tube must lie within circles of 3.6mm diameter centred on the true positions.

† Determined by reference line gauge No. 23

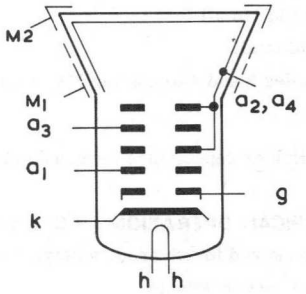
Data Display or Monitor Tube M14-110..

TENTATIVE DATA

GENERAL

Rectangular face, 14 cm, 70° diagonal.
Anti-reflection treated laminated face-plate.
Integral mounting frame.
Strengthened structure electrode assembly.
Electrostatic focus, magnetic deflection.
Aluminised screen.
Grey glass, 42% transmission (approx.).
20.7 mm maximum neck diameter.
External conductive coating.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4\,(max)}$	13.5	kV
Minimum second and fourth anode voltage	$V_{a2+a4\,(min)}$	8	kV
Maximum third anode voltage	$V_{a3\,(max)}$	-50 to +500	V
Maximum first anode voltage	$V_{a1\,(max)}$	350	V
Maximum negative grid voltage	$-V_{g\,(max)}$	100	V
Minimum negative grid voltage	$-V_{g\,(min)}$	1.0	V
Maximum heater to cathode voltage heater negative (d.c.)	$V_{h-k\,(max)}$	110	V
Maximum peak heater to cathode voltage heater negative	$v_{h-k\,(pk)\,max}$	130	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k\,(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k\,(max)}$	1.5	MΩ

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M14-110GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

DATA DISPLAY AND MONITOR TUBES

BRIMAR

INTER-ELECTRODE CAPACITANCES

Cathode to all	C_{k-all}	3.0*	pF
Grid to all	C_{g-all}	4.0*	pF
Anodes 2 and 4 to coating M1 (min)	$C_{a2+a4-M1\,(min)}$	200	pF

* Holder capacitance balanced out.

TYPICAL OPERATION - Grid modulation (Voltages referred to cathode)

Second and fourth anode voltage	$V_{a2+a4-k}$	10	kV
First anode voltage	V_{a1-k}	250	V
Third anode voltage range for focus	V_{a3-k}	0 to 350	V
Average peak to peak picture modulating voltage up to 100μA		24	V
Grid to cathode voltage for cut-off of raster	V_{g-k}	-35 to -69	V

TYPICAL OPERATION - Cathode modulation (Voltages referred to grid)

Second and fourth anode voltage	$V_{a2+a4-g}$	10	kV
First anode voltage	V_{a1-g}	250	V
Third anode voltage range for focus	V_{a3-g}	0 to 350	V
Average peak to peak picture modulating voltage up to 100μA		20	V
Cathode to grid voltage for cut-off of raster	V_{k-g}	32 to 58	V

MOUNTING

There is an annular region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

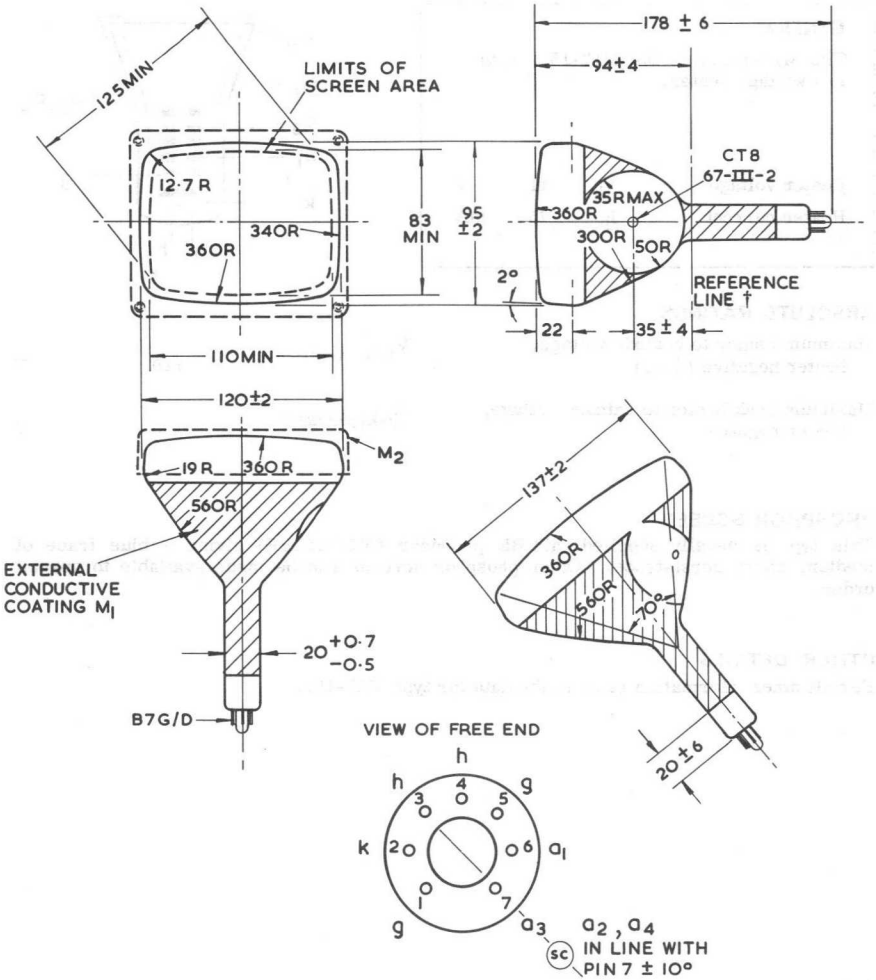
The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

Characteristic curves as M14-100..



All dimensions in mm

Not to be scaled

† Determined by reference line gauge No. 23

Details of metal mounting frame can be obtained on request.

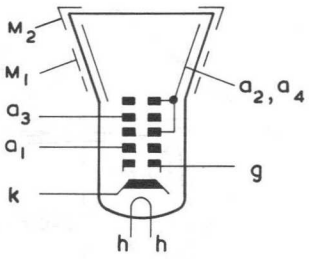
DATA DISPLAY AND MONITOR TUBES

M17-151.. Data Display or Monitor Tube

GENERAL

The M17-151.. is the M17-15.. with a low wattage heater.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



ABSOLUTE RATINGS

Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k\,(max)}$	110	V
Maximum peak heater to cathode voltage, heater negative	$V_{h-k(pk)\,max}$	130	V

PHOSPHOR SCREEN

This type is usually supplied with BE phosphor (M17-151BE) giving a blue trace of medium short persistence. Other phosphor screens can be made available to special order.

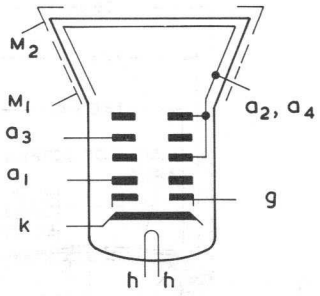
OTHER DETAILS

For all other information refer to the data for type M17-15..

Data Display or Monitor Tube M19-101..

GENERAL
The M19-101.. is the M19-100.. with a flat, neutral density, laminated face-plate giving a total glass transmission of 30%. The external surface is treated to reduce specular reflection. A harness is incorporated with integral mounting lugs.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

PHOSPHOR SCREEN
This type is usually supplied with GH phosphor (M19-101GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) - net 1.25kg.

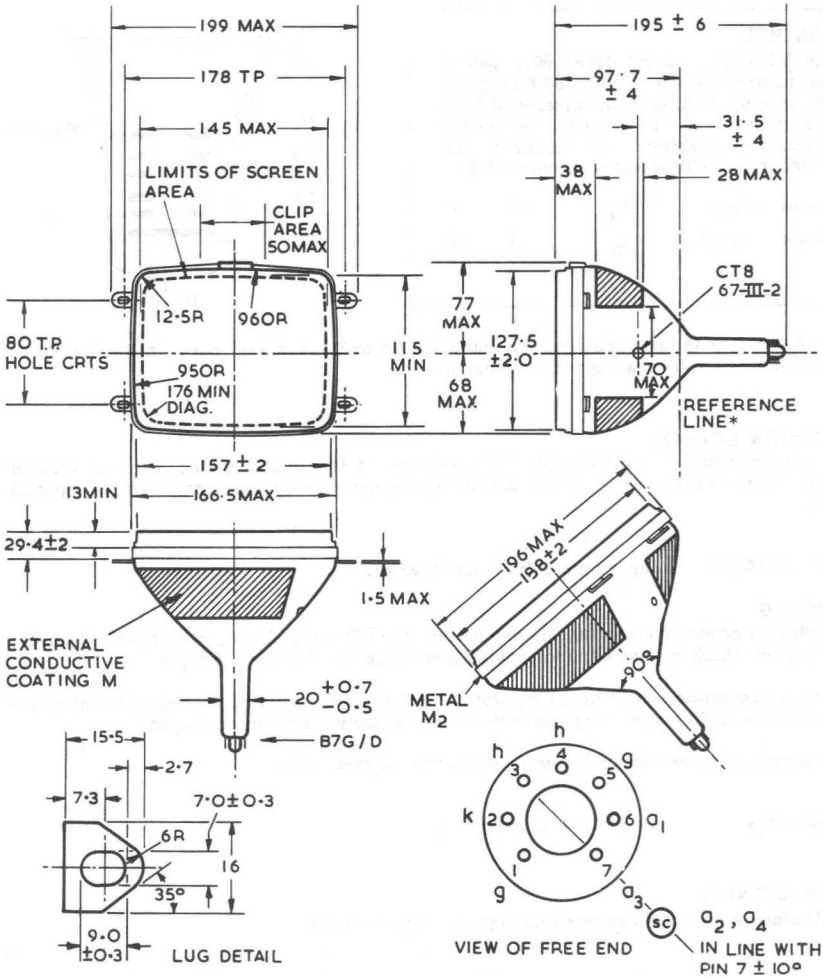
MOUNTING
The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

DIMENSIONS See following page.

OTHER DETAILS
For all other information refer to the data for type M19-100..



All dimensions in mm * Determined by reference line gauge No. 21 Not to be scaled

The major axis of each lug hole lies at an angle of 2.4° to the major axis of the tube face.

The bolts used for mounting the tube must lie within circles of 4.0mm diameter centred on the true position.

The mid-point between the hole centres of each pair of lugs on the shorter sides of the tube face will not deviate from the major axis of the face by more than 2.5mm.

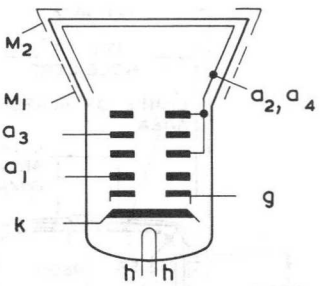
One of the four lugs may deviate 2.0mm maximum from the plane through the other three lugs.

Data Display or Monitor Tube M19-102..

GENERAL

The M19-102.. is the M19-100.. with a mounting harness and integral mounting lugs.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M19-102GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) - net 900g.

MOUNTING

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

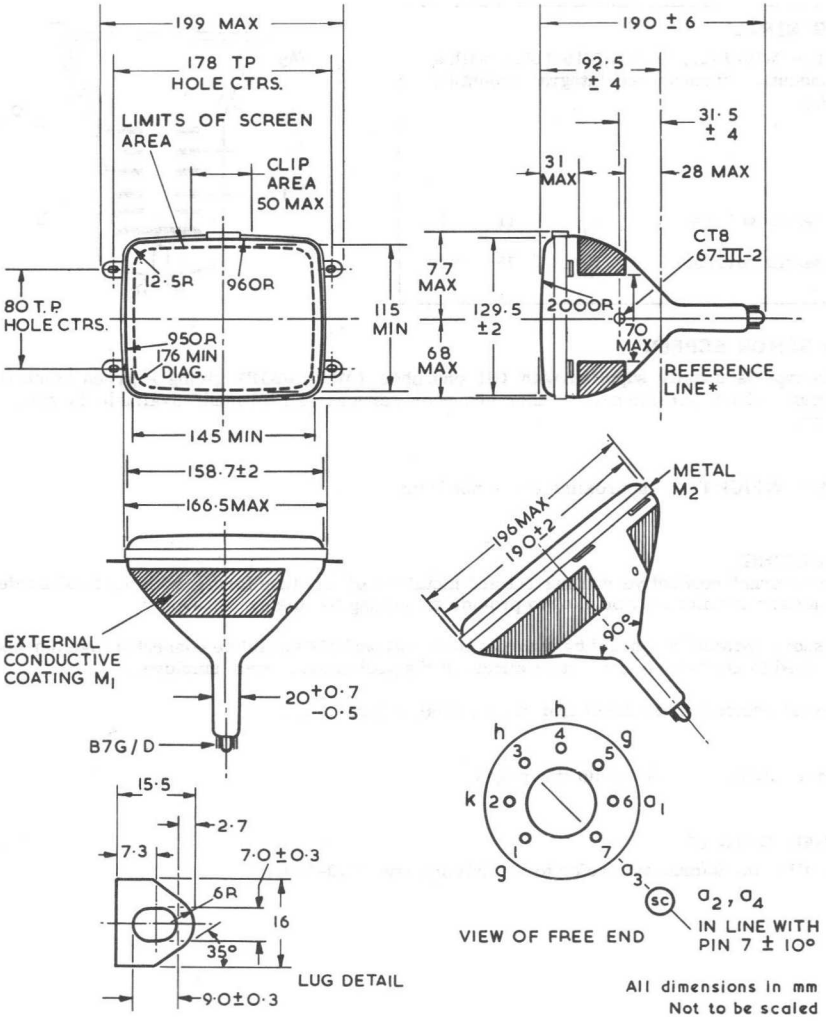
General principles are described in Investigation Report L137.

DIMENSIONS See following pages

OTHER DETAILS

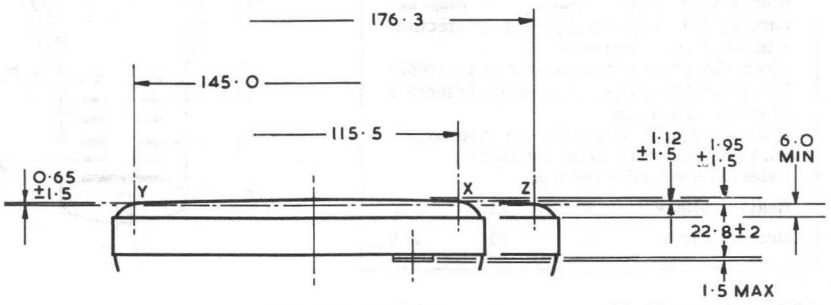
For all other information refer to the data for type M19-100..

DATA DISPLAY AND MONITOR TUBES



Notes:- See page 3.

* Determined by reference line gauge No. 21.



All dimensions in mm

Not to be scaled

NOTES

1. The major axis of each lug hole lies at an angle of 2.4° to the major axis of the tube face.
2. The bolts used for mounting the tube must lie within circles of 4.0mm diameter centred on the true position.
3. The mid-point between the hole centres of each pair of lugs on the shorter sides of the tube face will not deviate from the major axis of the face by more than 2.5mm.
4. One of the four lugs may deviate 2.0mm maximum from the plane through the other three lugs.

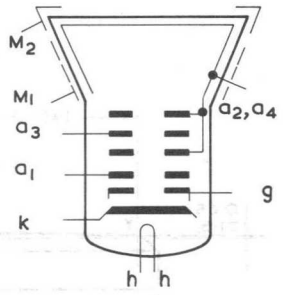
M19-111.. Data Display or Monitor Tube

PRELIMINARY DATA

GENERAL

Rectangular face, 19 cm, 90° diagonal
Laminated face-plate implosion protection
Integral mounting frame
Strengthened structure electrode assembly
Electrostatic focus, magnetic deflection
Aluminised screen
Grey glass, 36% transmission (approx.)
20.7 mm maximum neck diameter
External conductive coating

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4\,(max)}$	13.5	kV
Minimum second and fourth anode voltage	$V_{a2+a4\,(min)}$	8.0	kV
Maximum third anode voltage	$V_{a3\,(max)}$	-50 to +500	V
Maximum first anode voltage	$V_{a1\,(max)}$	350	V
Maximum negative grid voltage	$-V_{g\,(max)}$	100	V
Minimum negative grid voltage	$-V_{g\,(min)}$	1.0	V
Maximum heater to cathode voltage heater negative (d.c.)	$V_{h-k\,(max)}$	110	V
Maximum peak heater to cathode voltage heater negative	$V_{h-k\,(pk)\,max}$	130	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k\,(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k\,(max)}$	1.5	MΩ

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M19-111GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximate) - 1.4kg

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

Cathode to all	c_{k-all}	3.0 *	pF
Grid to all	c_{g-all}	4.0 *	pF
Anodes 2 and 4 to coating M_1 (approx)	$c_{a2+a4-M_1}$	220	pF
Anodes 2 and 4 to frame M_2 (approx.)	$c_{a2+a4-M_2}$	120	pF

* Holder capacitance balanced out.

TYPICAL OPERATION - Grid modulation (Voltages referred to cathode)

Second and fourth anode voltage	$V_{a2+a4-k}$	10	kV
First anode voltage	V_{a1-k}	250	V
Third anode voltage range for focus	V_{a3-k}	0 to 350	V
Average peak to peak picture modulating voltage up to 100μA		24	V
Grid to cathode voltage for cut-off of raster	V_{g-k}	-35 to -69	V

TYPICAL OPERATION - Grid modulation (Voltages referred to grid)

Second and fourth anode voltage	$V_{a2+a4-g}$	10	kV
First anode voltage	V_{a1-g}	250	V
Third anode voltage range for focus	V_{a3-g}	0 to 350	V
Average peak to peak picture modulating voltage up to 100μA		20	V
Cathode to grid voltage for cut-off of raster	V_{k-g}	32 to 58	V

MOUNTING

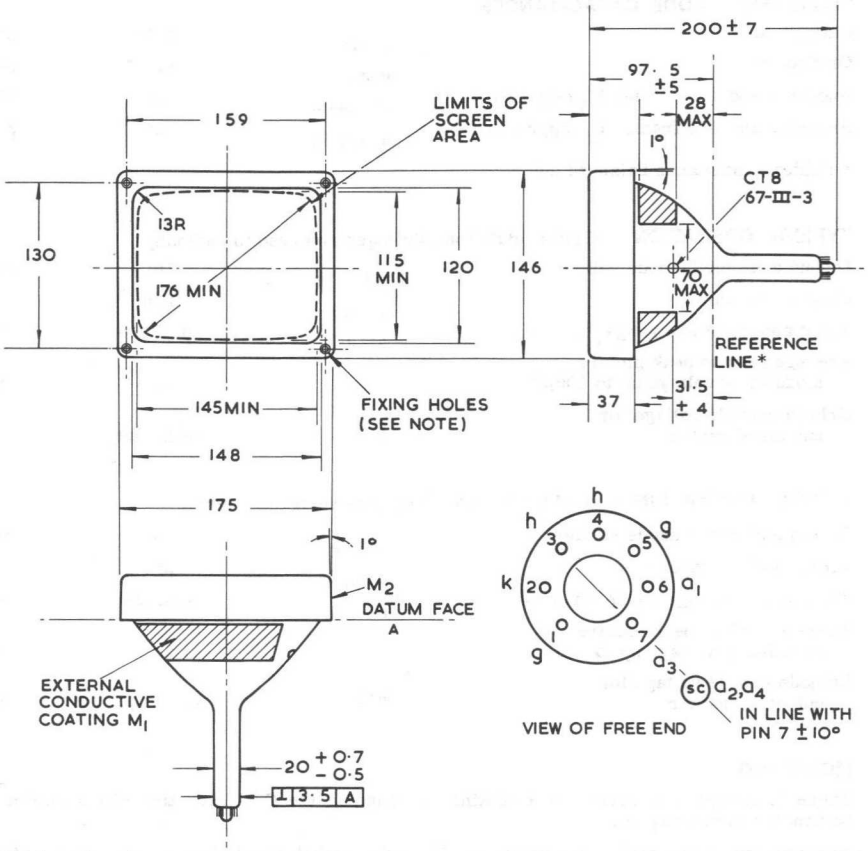
There is a region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated, M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.



All dimensions in mm

Not to be scaled

Note:- Four fixing holes through thickness of frame 4.8mm diameter, counterbored 7.6mm diameter 5mm deep from the front face.

* Determined by reference line gauge No. 21.

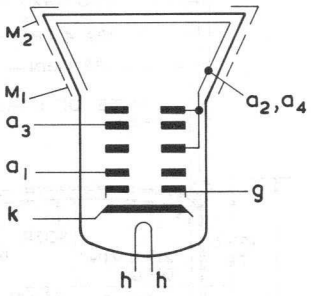
Data Display or Monitor Tube

M23-114..

GENERAL

The M23-114.. is the M23-112.. having a laminated face-plate with green filter giving a total face-plate transmission at the centre of approximately 32%. The external surface is treated to reduce specular reflection.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M23-114GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

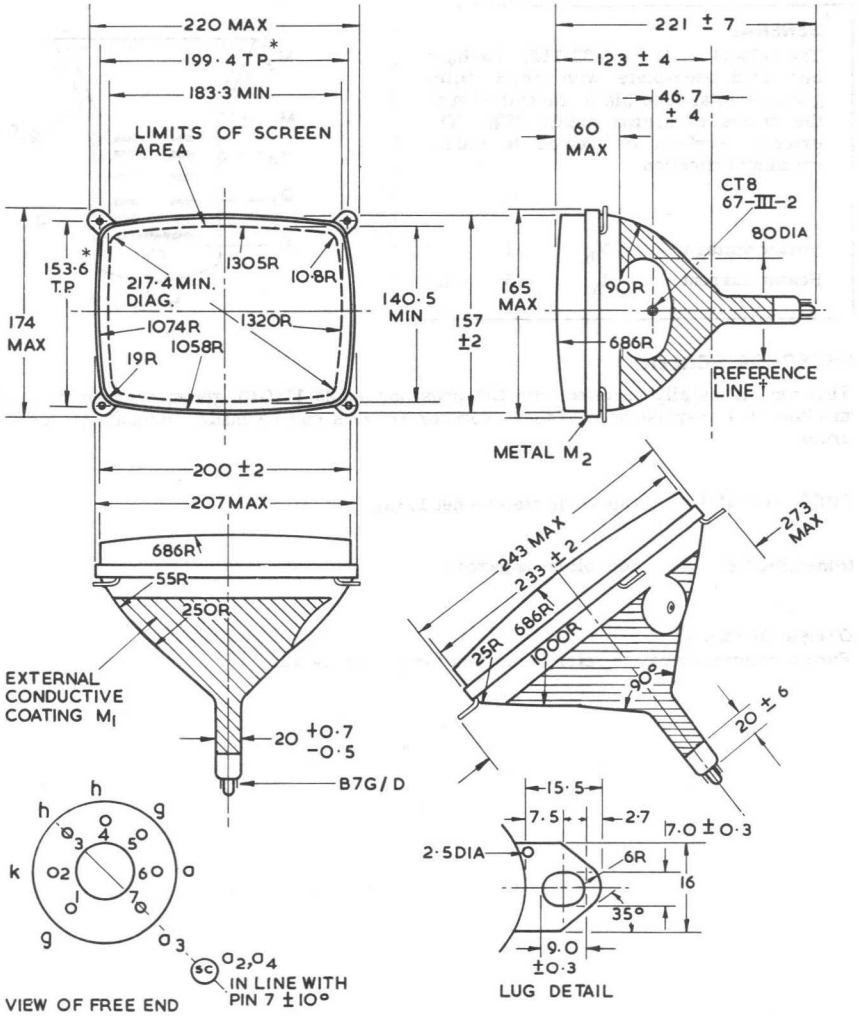
TUBE WEIGHT (approximately) - net 1.8kg.

DIMENSIONS See following pages.

OTHER DETAILS

For all other information refer to the data for type M23-112..

DATA DISPLAY AND MONITOR TUBES

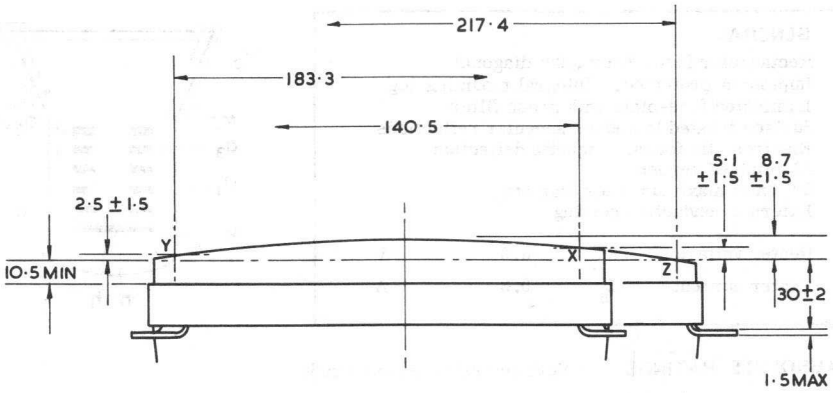


All dimensions in mm

Not to be scaled

* The bolts to be used for mounting the tube must lie within circles of 4.0mm diameter centred on these true positions. One of the four lugs may deviate 2.0mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 21.



All dimensions in mm

Not to be scaled

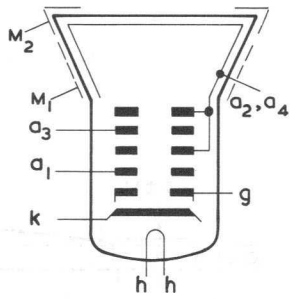
M23-130.. Data Display or Monitor Tube

PRELIMINARY DATA

GENERAL

Rectangular face, 23 cm, 90° diagonal
Implosion protected. Integral mounting lugs
Laminated face-plate with green filter
Surface treated to reduce specular reflections
Electrostatic focus, magnetic deflection
Aluminised screen
29.4 mm maximum neck diameter
External conductive coating

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4(max)}$	18	kV
Minimum second and fourth anode voltage	$V_{a2+a4(min)}$	10	kV
Maximum third anode voltage range	$V_{a3(max)}$	± 700	V
Maximum first anode voltage	$V_{a1(max)}$	600	V
Minimum first anode voltage	$V_{a1(min)}$	200	V
Maximum negative grid voltage	$-V_{g(max)}$	200	V
Minimum negative grid voltage	$-V_{g(min)}$	1.0	V
Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k(max)}$	200	V
Maximum peak heater to cathode voltage heater negative	$v_{h-k(pk)max}$	250	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k(max)}$	1.5	MΩ

If this tube is operated at voltages in excess of 16 kV, x-ray radiation shielding may be necessary to avoid possible danger of personal injury from prolonged exposure at close range.

PHOSPHOR SCREEN

This type is supplied with GH phosphor (M23-130GH) giving a green trace of medium short persistence.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

INTER-ELECTRODE CAPACITANCES

		*	†	
Cathode to all	c_{k-all}	3.0	3.5	pF
Grid to all	c_{g-all}	6.5	7.5	pF
Anodes 2 and 4 to coating M_1 (approx.)	$c_{a2+a4-M1}$		600	pF
Anodes 2 and 4 to metal M_2 (approx.)	$c_{a2+a4-M2}$		100	pF

* Holder capacitance balanced out.

† Total capacitances including a typical B8H holder.

TYPICAL OPERATION - Grid modulation, voltages referred to cathode

Second and fourth anode voltage	V_{a2+a4}	12 to 16	kV
First anode voltage	V_{a1}	400	V
Third anode voltage range for focus	V_{a3}	0 to 400 §	V
Grid to cathode voltage for cut-off of raster	V_g	-38 to -82	V
Typical line width at 75 μA (Shrinking raster)		0.25	mm

§ The change of spot size with variation of focus voltage is small and the limit of 0 to 400 V is such that an acceptable focus quality is obtained within this range. If it is required to pass through the point of focus a voltage range of at least -100 V to +500 V will be required.

MOUNTING

If a mask is used with this tube it should be flexible enough to take up small variations in fixing and bulb contours.

There is a region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

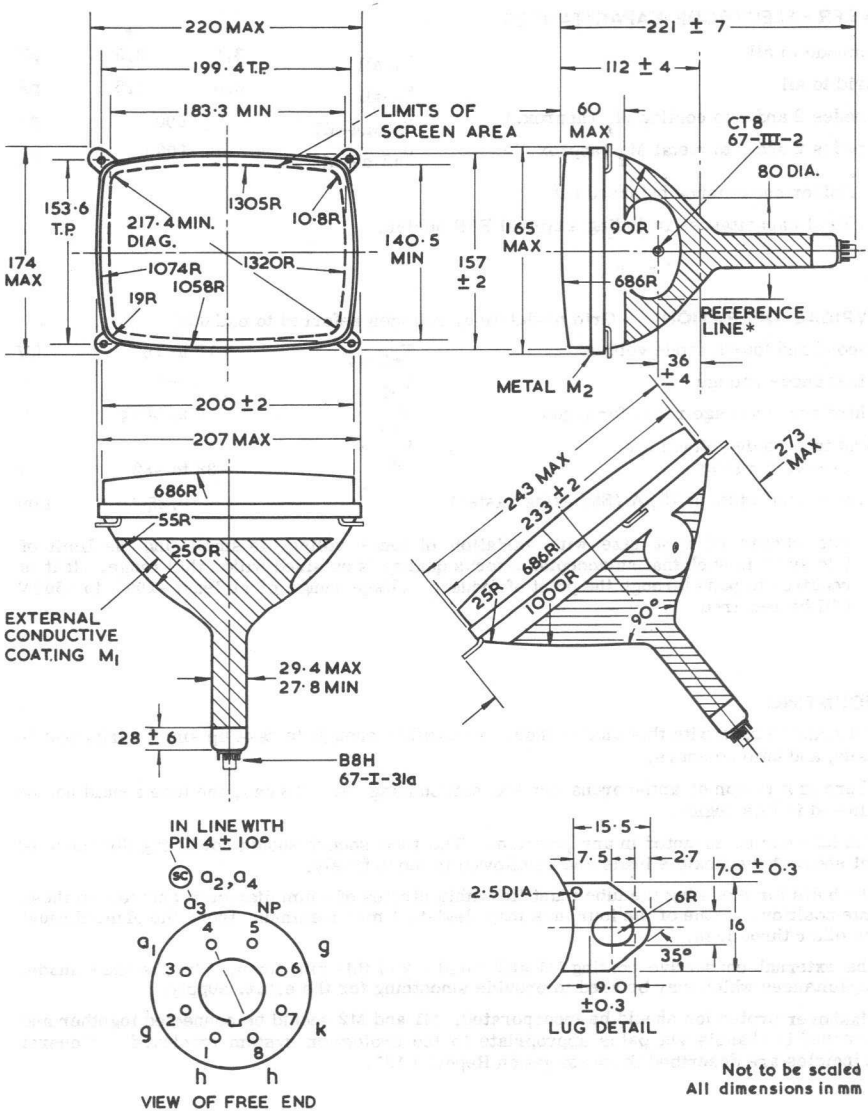
The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

The bolts for mounting the tube must lie within circles of 4 mm diameter centred on these true positions. One of the four lugs may deviate 2 mm maximum from the plane through the other three lugs.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

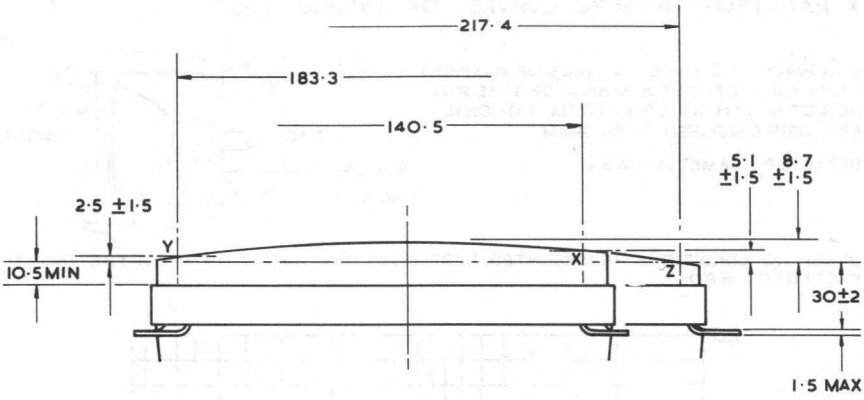
Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed. General principles are described in Investigation Report L137.

TUBE WEIGHT (approximate) 1.8 kg.



* Determined by reference line gauge No. 15.

Data Display or Monitor Tube M23-130..



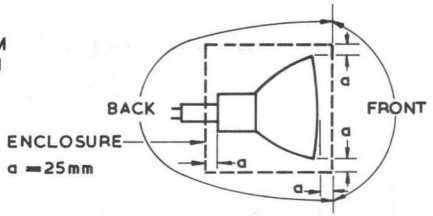
All dimensions in mm

Not to be scaled

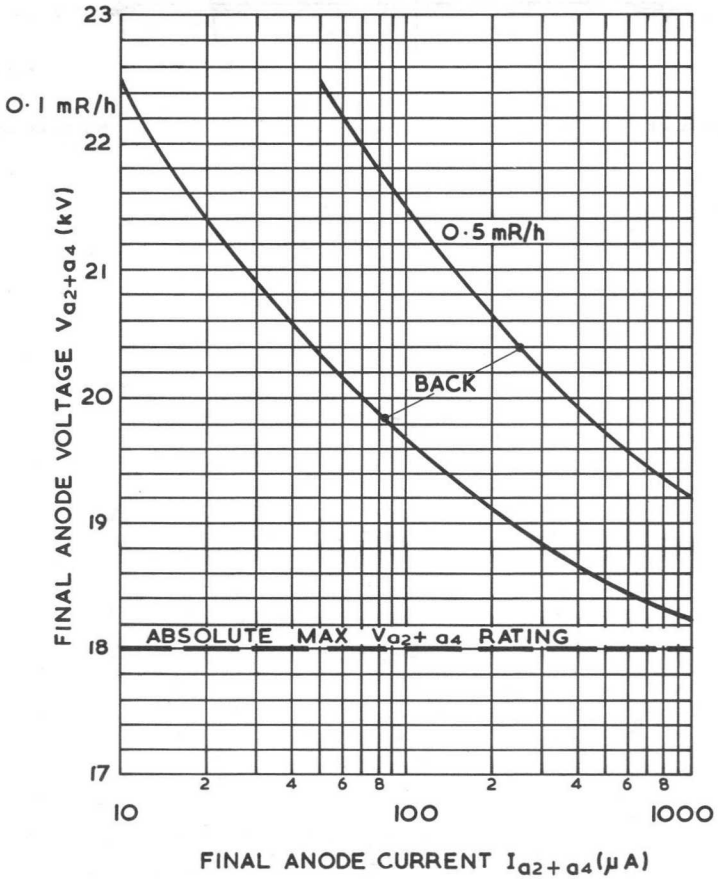
X RAY ISO-EXPOSURE CURVES OF TYPICAL TUBE

MEASUREMENTS MADE ON LINES OF MAXIMUM RADIATION AT FRONT AND BACK OF TUBE WITH DETECTOR CENTRE 50mm FROM NOTIONAL ENCLOSURE DEFINED BY DIAGRAM

DETECTOR DIAMETER: 16 mm



UNDER NO CONDITIONS REPRESENTED HERE DOES THE RADIATION FROM THE FRONT EXCEED 0·1 mR/h

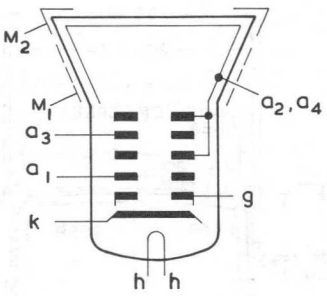


Data Display or Monitor Tube M24-124..

GENERAL

The M24-124.. is the M24-120.. with a neutral density laminated face-plate giving a total glass transmission of approximately 30 %. Surface treated to reduce specular reflection.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M24-124GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

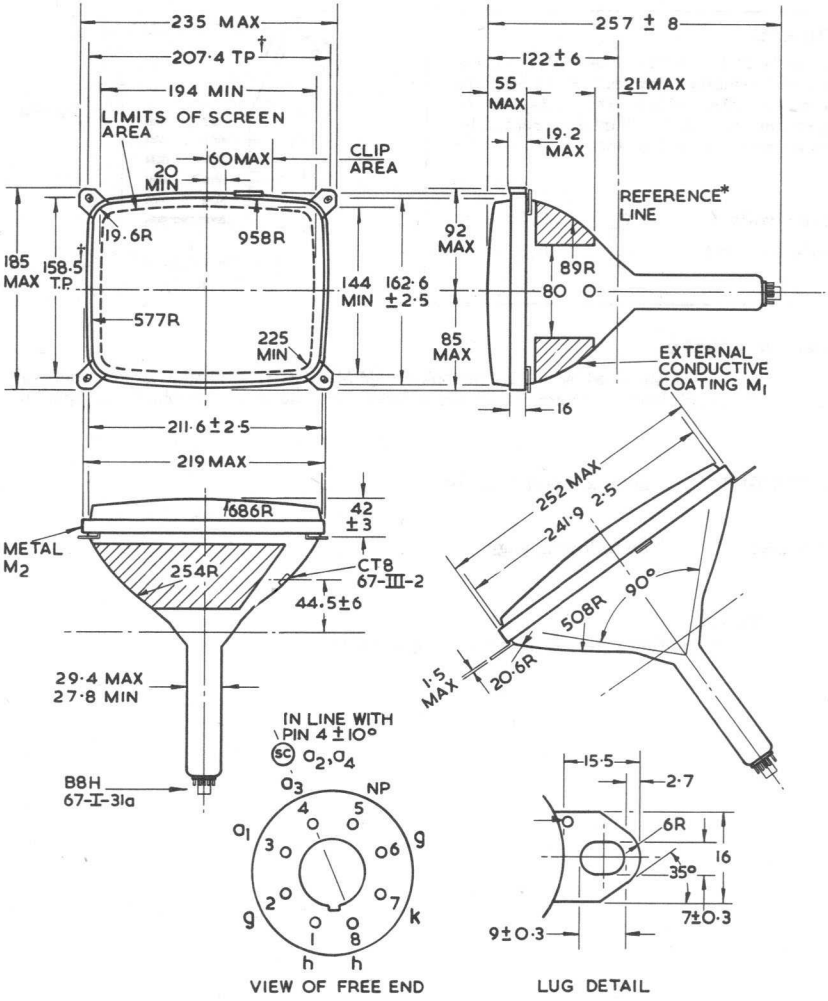
TUBE WEIGHT (approximately) 2.2kg.

DIMENSIONS See following page.

OTHER DETAILS

For all other information refer to the data for type M24-120..

Data Display or Monitor Tube



All dimensions in mm

Not to be scaled

* Determined by reference line gauge No. 15.

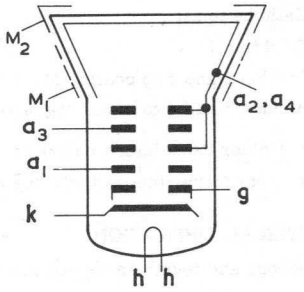
† The bolts for mounting the tube must lie within circles of 4mm diameter centred on these true positions. One of the four lugs may deviate 2mm maximum from the plane through the other three lugs.

Data Display or Monitor Tube M24-150..

GENERAL

Rectangular tube with 2:1 glass aspect ratio.
24 cm diagonal. Implosion protection*.
Laminated grey glass face-plate 30% transmission (approx.)
Surface treated to reduce specular reflection
Integral mounting lugs
Electrostatic focus, magnetic deflection.
29.4 mm maximum neck diameter.
Aluminised screen.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4(max)}$	20	kV
Minimum second and fourth anode voltage	$V_{a2+a4(min)}$	10	kV
Maximum third anode voltage range	$V_{a3(max)}$	±700	V
Maximum first anode voltage	$V_{a1(max)}$	600	V
Minimum first anode voltage	$V_{a1(min)}$	200	V
Maximum negative grid voltage	$-V_{g(max)}$	200	V
Minimum negative grid voltage	$-V_{g(min)}$	1.0	V
Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k(max)}$	200	V
Maximum peak heater to cathode voltage heater negative	$v_{h-k(pk)max}$	250	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k(max)}$	1.5	MΩ

If this tube is operated at voltages in excess of 16kV, x-ray radiation shielding may be necessary to avoid possible danger of personal injury from prolonged exposure at close range.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M24-150GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

* This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

		*	†	
Cathode to all	c_{k-all}	3.0	3.5	pF
Grid to all	c_{g-all}	6.5	7.5	pF
Anodes 2 and 4 to coating M_1 (approx.)	$c_{a2+a4-M1}$	550		pF
Anodes 2 and 4 to metal M_2 (approx.)	$c_{a2+a4-M2}$	100		pF

* Holder capacitance balanced out.

† Total capacitances including a typical B8H socket.

TYPICAL OPERATION - Grid modulation, voltages referred to cathode

Second and fourth anode voltage	V_{a2+a4}	12 to 16	kV
First anode voltage	V_{a1}	400	V
Third anode voltage range for focus	V_{a3}	0 to 400§	V
Grid to cathode voltage for cut-off of raster	V_g	-38 to -82	V
Typical line width at 14kV, 50 μA (Shrinking raster)		0.22	mm

§ The change of spot size with variation of focus voltage is small and the limit of 0 to 400 V is such that an acceptable focus quality is obtained within this range. If it is required to pass through the point of focus a voltage range of at least -100V to +500V will be required.

MOUNTING

If a mask is used with this tube it should be flexible enough to take up small variations in fixing and bulb contours.

There is a region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

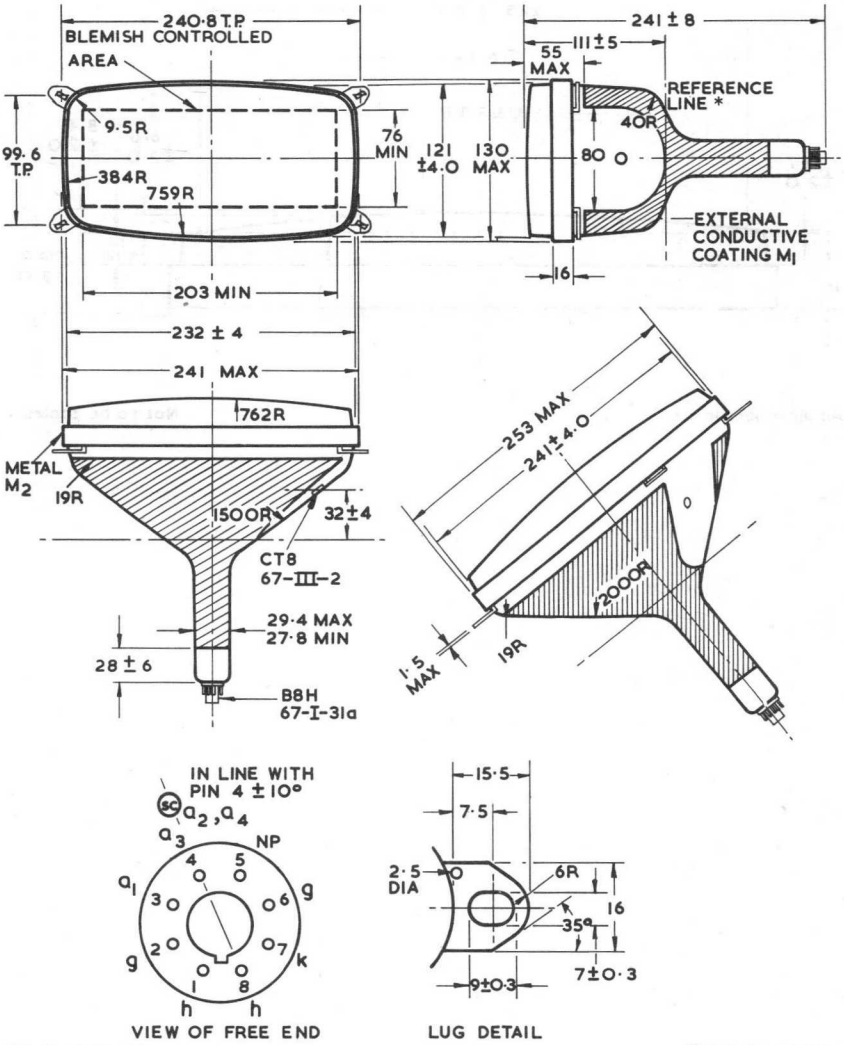
The bolts for mounting the tube must lie within circles of 3.5 mm diameter centred on the true positions. One of the four lugs may deviate 2 mm maximum from the plane through the other three lugs.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

TUBE WEIGHT (approximate) 1.8 kg

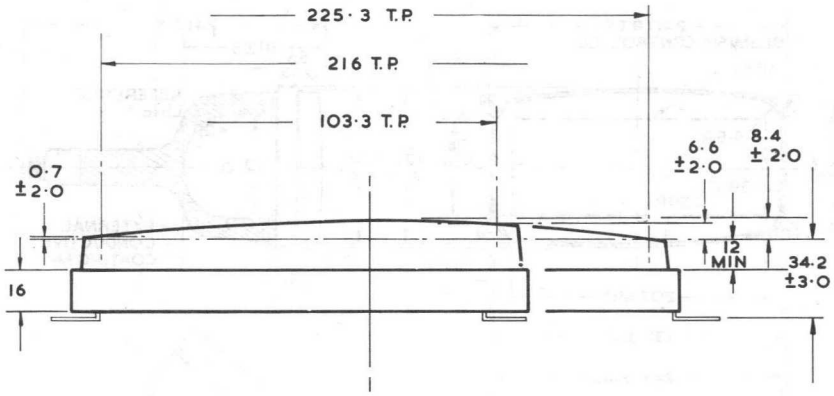


All dimensions in mm

Not to be scaled

* Determined by reference line No. 16 (BS. RL4: IEC. 67-IV-3: JEDEC 126)

This tube has a 110° cone flare and a 90° diagonal deflection.



All dimensions in mm

Not to be scaled

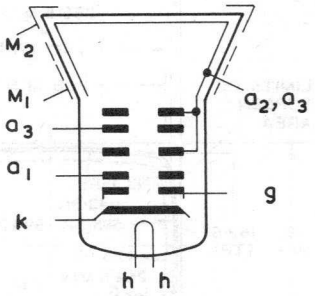
Data Display or Monitor Tube

M28-134..

GENERAL

The M28-134.. is the M28-13.. with a neutral density laminated face-plate giving a total glass transmission of approximately 58%.

Heater voltage	V_h	11.5	V
Heater current	I_h	0.15	A



PHOSPHOR SCREEN

This type is usually supplied with W phosphor (M28-134W) giving a television white trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximate) - 2.5kg.

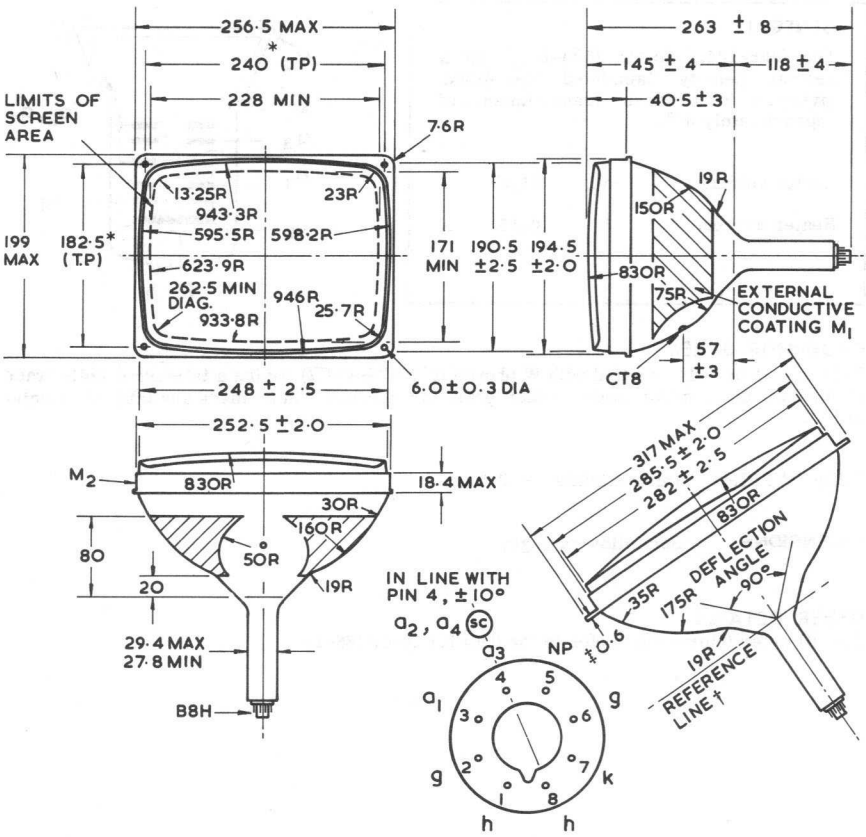
DIMENSIONS See following page.

OTHER DETAILS

For all other information refer to the data for type M28-13..

DATA DISPLAY AND MONITOR TUBES

BRIMAR



All dimensions in mm VIEW OF FREE END Not to be scaled

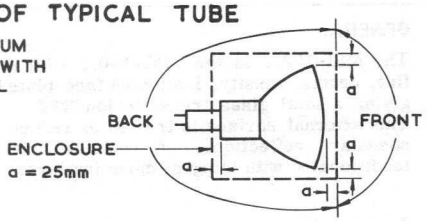
* The bolts to be used for mounting the tube must lie within the circles of 5.0 mm diameter centred on these true positions.

† Determined by reference line gauge No. 15

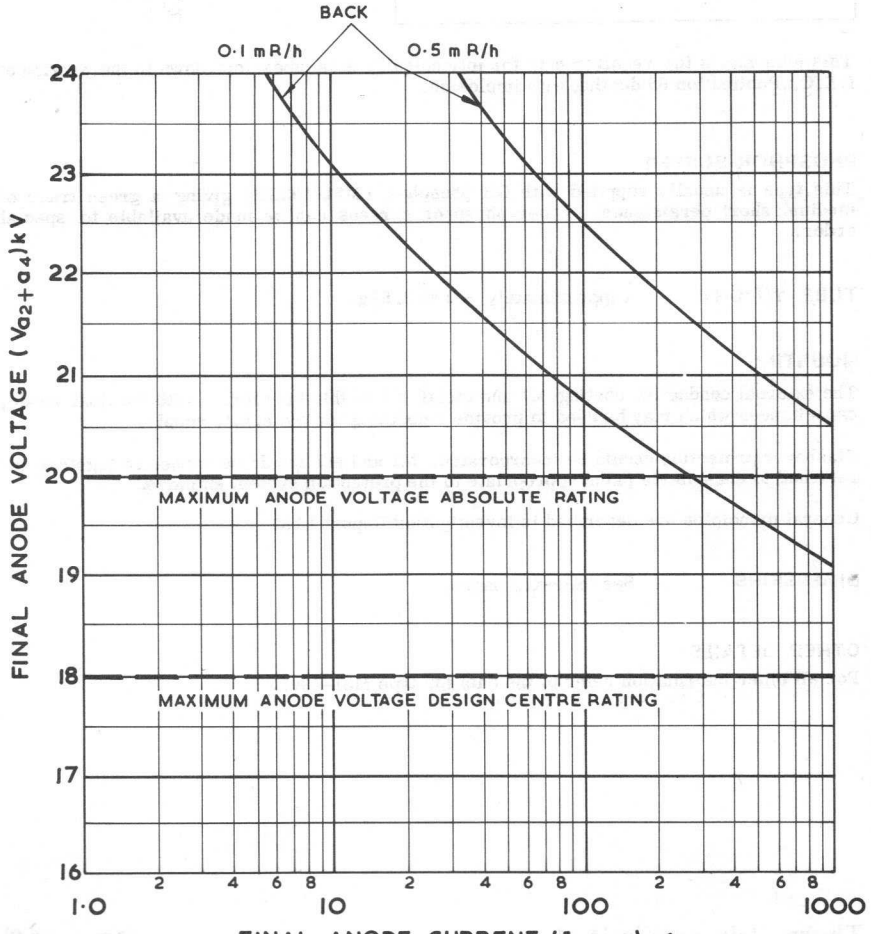
‡ Maximum unflatness of the rim is 1.0 mm.

X-RAY ISO-EXPOSURE CURVES OF TYPICAL TUBE

MEASUREMENTS MADE ON LINES OF MAXIMUM RADIATION AT FRONT AND BACK OF TUBE WITH DETECTOR CENTRE 50mm FROM NOTIONAL ENCLOSURE DEFINED BY DIAGRAM



UNDER NO CONDITION REPRESENTED HERE DOES THE RADIATION FROM THE TUBE FRONT EXCEED 0·1 mR/h

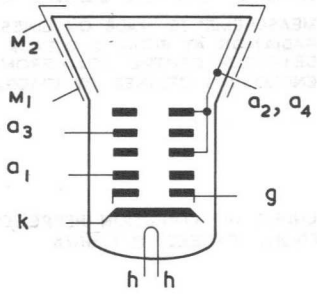


M31-193.. Data Display or Monitor Tube

GENERAL

The M31-193.. is the M31-190.. with a flat, neutral density, laminated face-plate giving a total glass transmission 30%. The external surface is treated to reduce specular reflection. A harness is incorporated with integral mounting lugs.

Heater voltage	V_h	11	V
Heater current	I_h	75	mA



This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M31-193GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT

(approximately) - nett 3.6kg.

MOUNTING

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

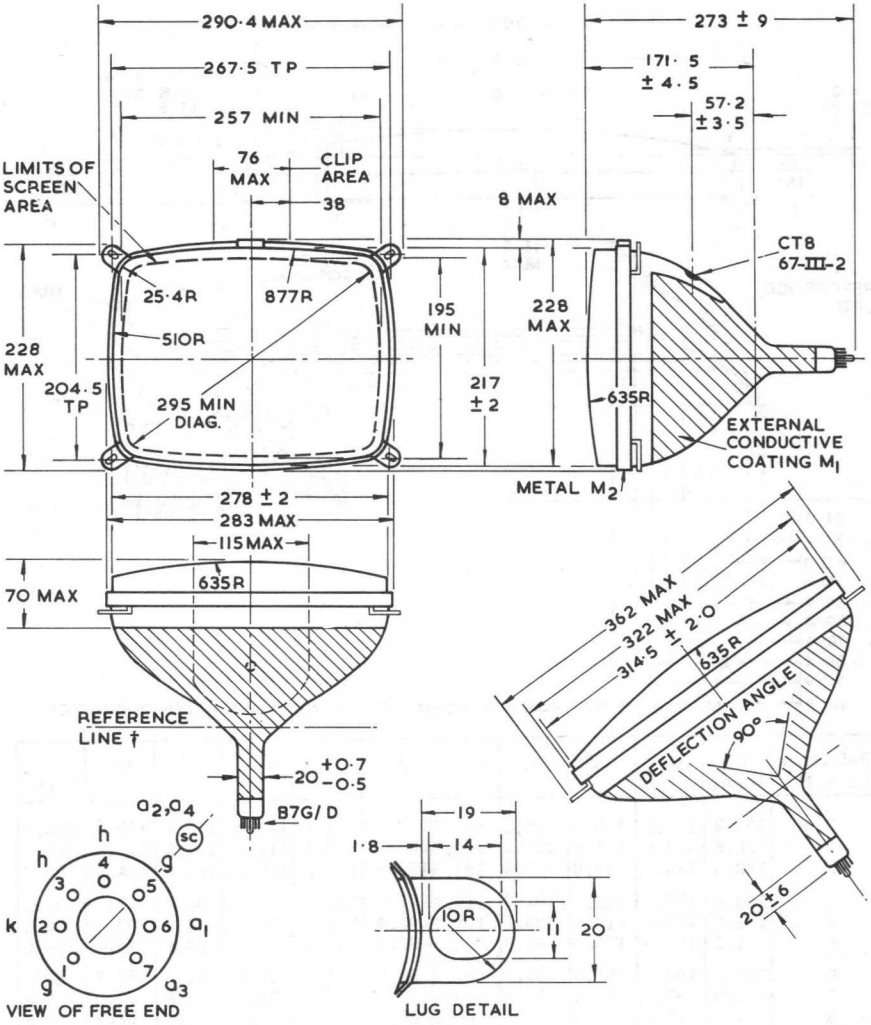
General principles are described in Investigation Report L137.

DIMENSIONS

See following pages.

OTHER DETAILS

For all other information refer to the data for type M31-190..

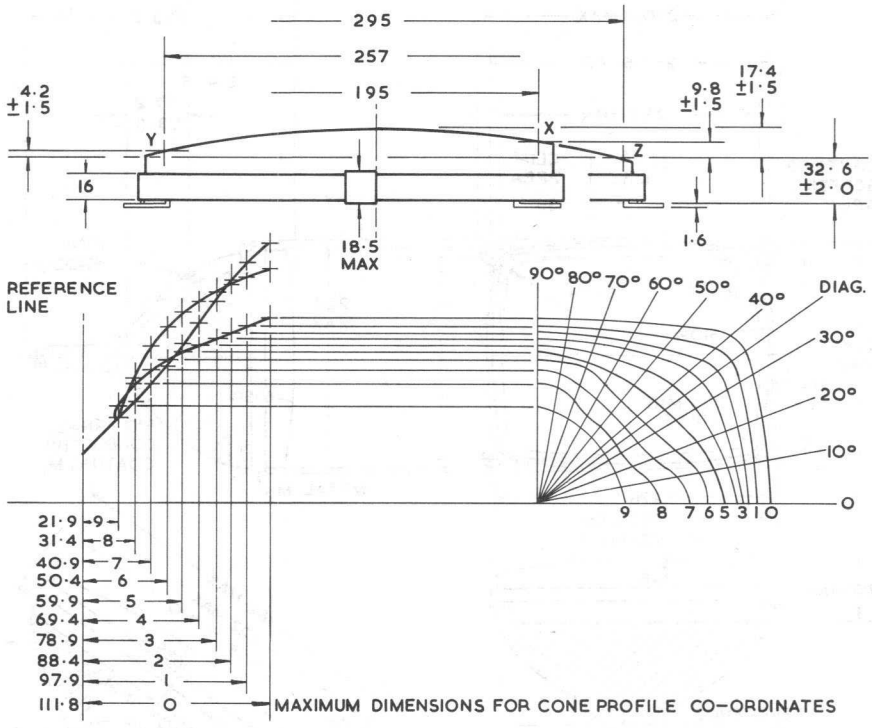


All dimensions in mm

Not to be scaled

Minimum screen area 477 cm^2

† Determined by reference line gauge No. 20.



Reference Plane No.	0° Major	10°	20°	30°	Diag	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

All dimensions in mm

Not to be scaled

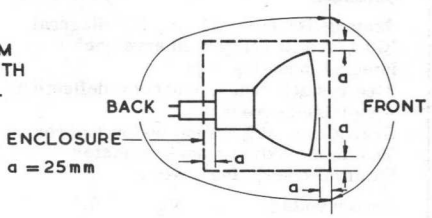
MOUNTING

The bolts to be used for mounting the tube must lie within circles of 7.0mm diameter centred on the lug holes true positions. One of the four lugs may deviate 2.0 mm maximum from the plane through the other three lugs.

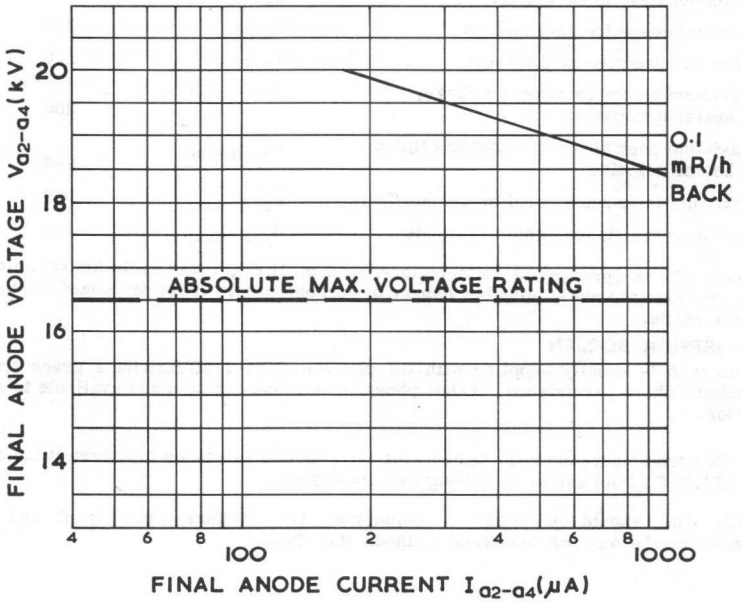
X RAY ISO-EXPOSURE CURVES OF TYPICAL TUBE

MEASUREMENTS MADE ON LINES OF MAXIMUM RADIATION AT FRONT AND BACK OF TUBE WITH DETECTOR CENTRE 50mm FROM NOTIONAL ENCLOSURE DEFINED BY DIAGRAM

DETECTOR DIAMETER: 16 mm



UNDER NO CONDITION REPRESENTED HERE DOES THE RADIATION FROM THE TUBE FRONT EXCEED 0·1 mR/h



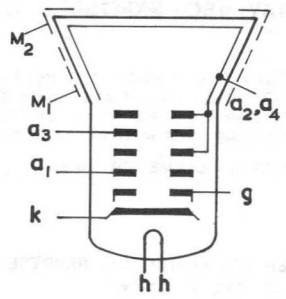
M31-220.. Data Display or Monitor Tube

PRELIMINARY DATA

GENERAL

Rectangular face, 31 cm, 90° diagonal
Rimguard III reinforced envelope*
Integral mounting lugs
Electrostatic focus, magnetic deflection
Aluminised screen
Grey glass, 50% transmission (approx.)
29.4 mm maximum neck diameter
External conductive coating

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4(max)}$	18	kV
Minimum second and fourth anode voltage	$V_{a2+a4(min)}$	10	kV
Maximum third anode voltage range	$V_{a3(max)}$	± 700	V
Maximum first anode voltage	$V_{a1(max)}$	600	V
Minimum first anode voltage	$V_{a1(min)}$	200	V
Maximum negative grid voltage	$-V_{g(max)}$	200	V
Minimum negative grid voltage	$-V_{g(min)}$	1.0	V
Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k(max)}$	200	V
Maximum peak heater to cathode voltage heater negative	$V_{h-k(pk)max}$	250	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k(max)}$	1.5	MΩ

If this tube is operated at voltages in excess of 16 kV, x-ray radiation shielding may be necessary to avoid possible danger of personal injury from prolonged exposure at close range.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M31-220GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

* This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

		*	†	
Cathode to all	C_{k-all}	3.0	3.5	pF
Grid to all	C_{g-all}	6.5	7.5	pF
Anodes 2 and 4 to coating M_1 (approx.)	$C_{a2+a4-M1}$	750		pF
Anodes 2 and 4 to metal M_2 (approx.)	$C_{a2+a4-M2}$	200		pF

* Holder capacitance balanced out.

† Total capacitances including a typical B8H holder.

TYPICAL OPERATION - Grid modulation, voltages referred to cathode

Second and fourth anode voltage	V_{a2+a4}	12 to 16	kV
First anode voltage	V_{a1}	400	V
Third anode voltage range for focus	V_{a3}	0 to 400 §	V
Grid to cathode voltage for cut-off of raster	V_g	-38 to -82	V
Typical line width at 50 μA (Shrinking raster)		0.37	mm

§ The change of spot size with variation of focus voltage is small and the limit of 0 to 400 V is such that an acceptable focus quality is obtained within this range. If it is required to pass through the point of focus a voltage range of at least -100V to +500V will be required.

MOUNTING

If a mask is used with this tube it should be flexible enough to take up small variations in fixing and bulb contours.

There is a region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

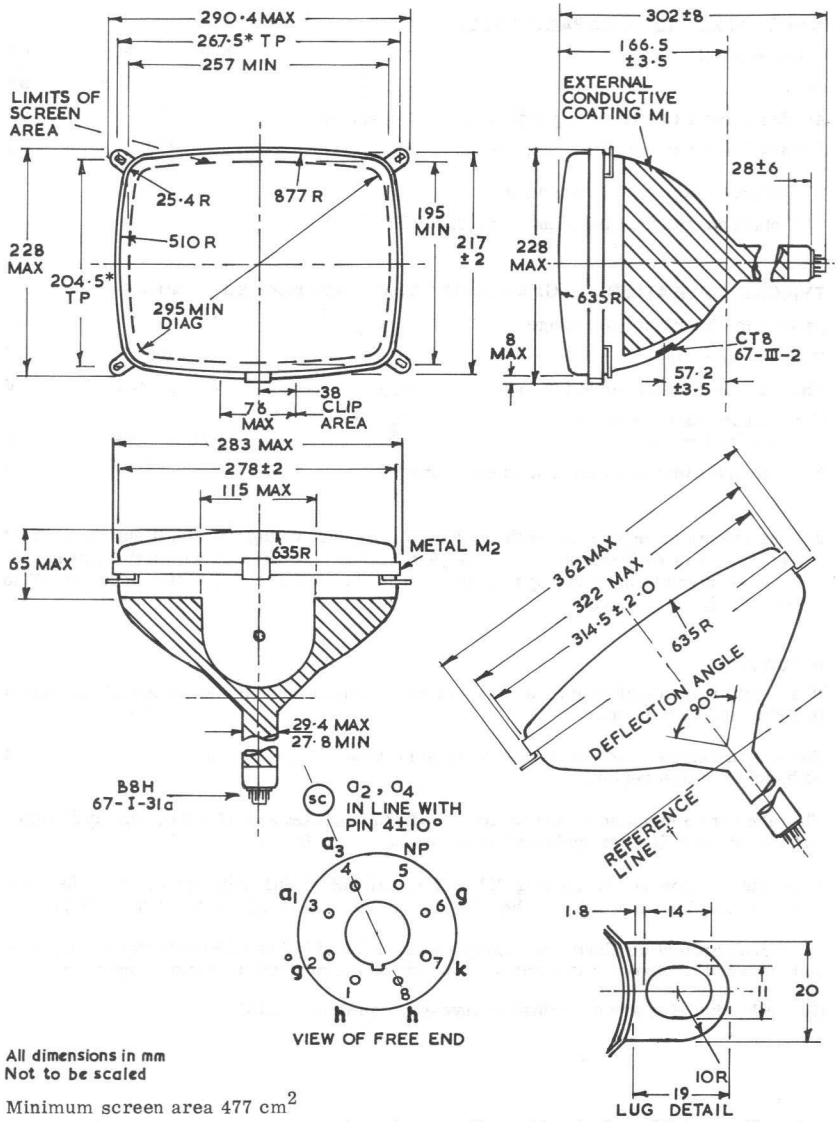
The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

TUBE WEIGHT (approximate) 3.2kg

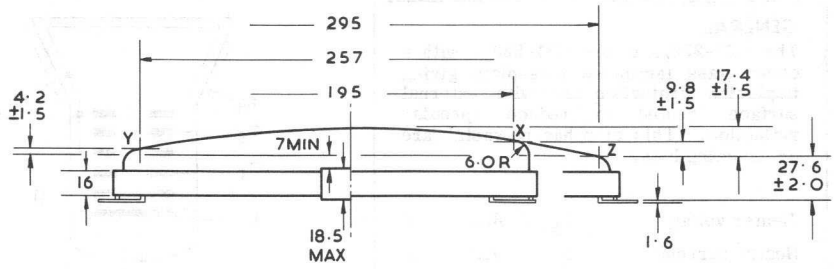


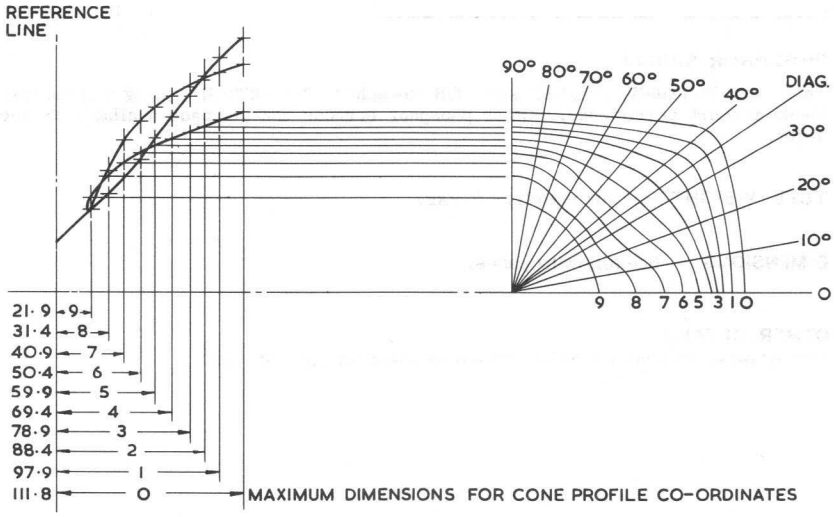
All dimensions in mm
Not to be scaled

Minimum screen area 477 cm^2

* The bolts to be used for mounting the tube must lie within circles of 7.0 mm diameter centred on these true positions. One of the four lugs may deviate 2.0 mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 15





Reference Plane No.	0° Major	10°	20°	30°	Diag	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

All dimensions in mm

Not to be scaled

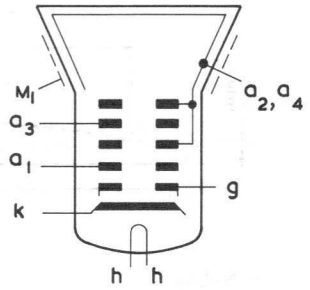
M31-222.. Data Display or Monitor Tube

PRELIMINARY DATA

GENERAL

The M31-222.. is the M31-220.. with a clear glass laminated face-plate giving implosion protection and with external surface treated to reduce specular reflection. This tube has no metalware or mounting lugs.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



PHOSPHOR SCREEN

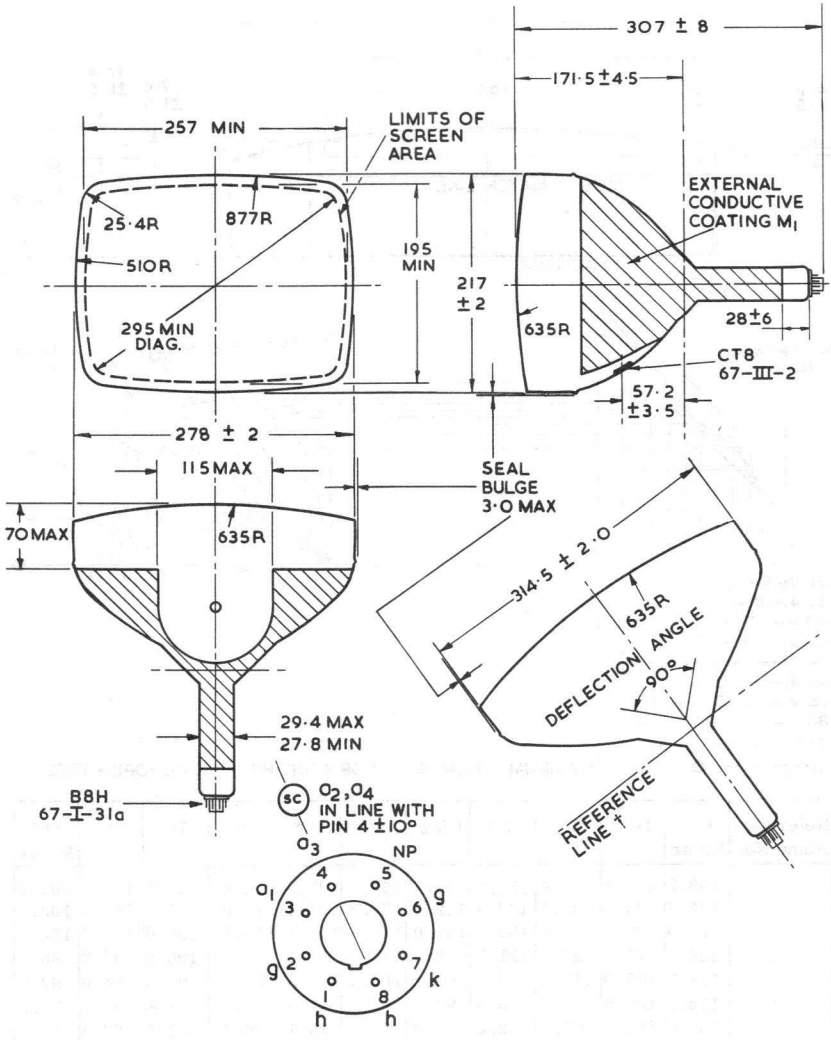
This type is usually supplied with GH phosphor (M31-222GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) - 3.9kg.

DIMENSIONS See following pages.

OTHER DETAILS

For all other information refer to the data sheet for type M31-220..



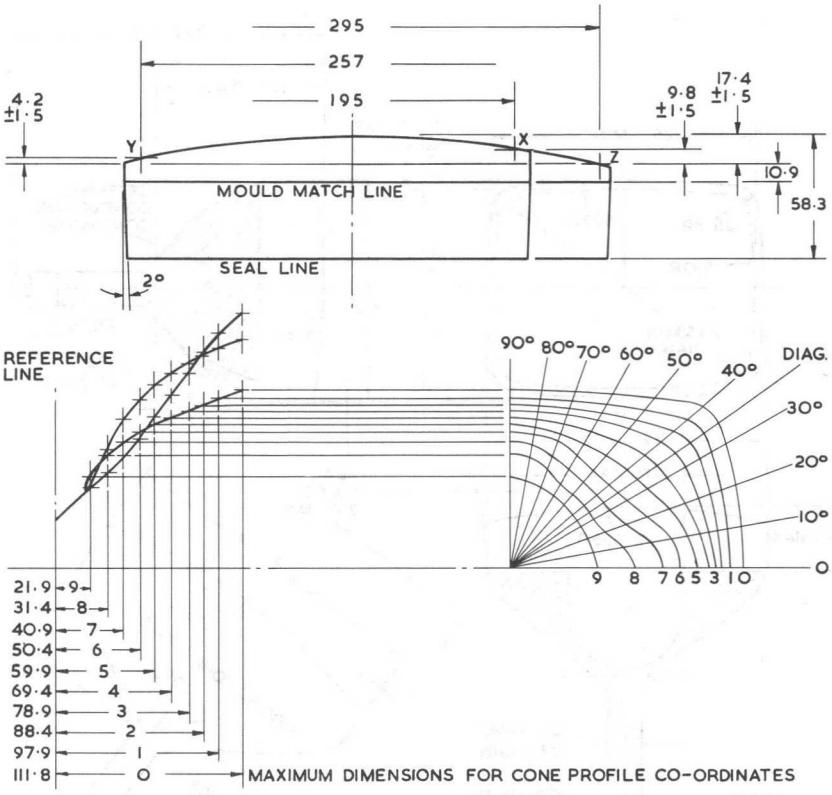
All dimensions in mm

Not to be scaled

Minimum screen area 477 cm^2

† Determined by reference line gauge No. 15.

Data Display or Monitor Tube



Reference Plane No.	0° Major	10°	20°	30°	Diag	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

All dimensions in mm

Not to be scaled

Data Display or Monitor Tube

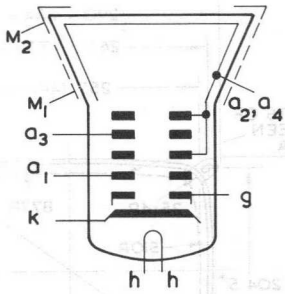
M31-223..

PRELIMINARY DATA

GENERAL

The M31-223.. is the M31-220.. with a, neutral density, laminated face-plate giving implosion protection. The overall transmission of the face-plate is approximately 30% and the external surface is treated to reduce specular reflection.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



PHOSPHOR SCREEN

This type is usually supplied with a GH phosphor (M31-223GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) 3.9kg.

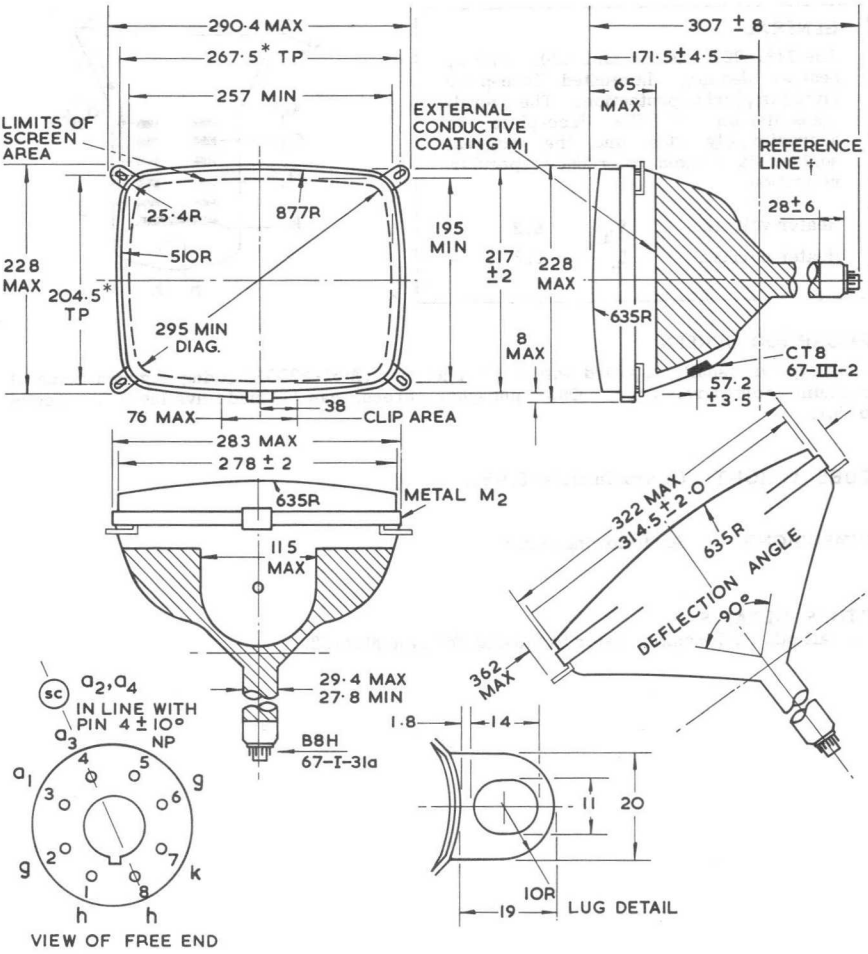
DIMENSIONS See following pages

OTHER DETAILS

For all other information refer to the data for type M31-220..

DATA DISPLAY AND MONITOR TUBES

Data Display or Monitor Tube



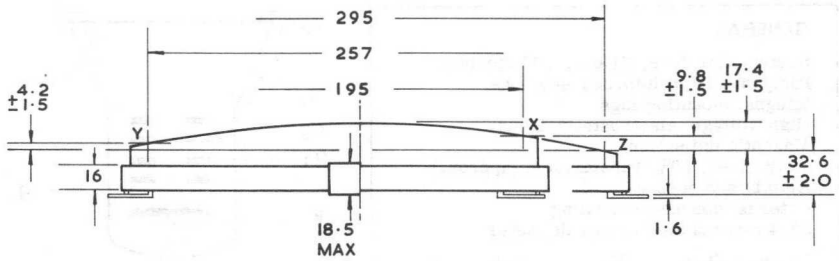
All dimensions in mm

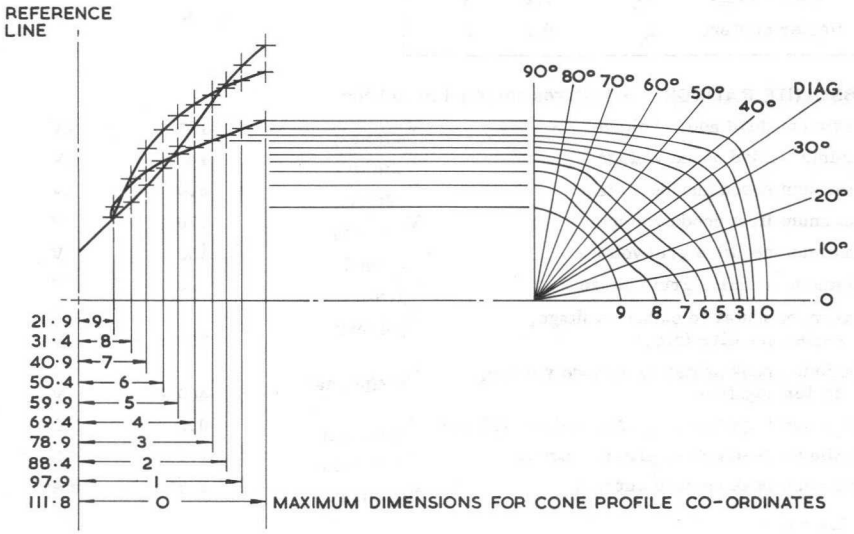
Not to be scaled

Minimum screen area 477 cm^2

* The bolts to be used for mounting the tube must lie within circles of 7.0 mm diameter centred on these true positions. One of the four lugs may deviate 2.0 mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 15.





Reference Plane No.	0° Major	10°	20°	30°	Diag.	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

All dimensions in mm

Not to be scaled

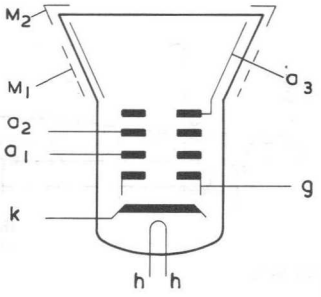
M31-230.. Data Display or Monitor Tube

PRELIMINARY DATA

GENERAL

Rectangular face, 31 cm, 90° diagonal
Rimguard III reinforced envelope
Integral mounting lugs
High voltage electrostatic focus
Magnetic deflection
Grey glass, 50% transmission (approx.)
Aluminised screen
External conductive coating
29.4 mm maximum neck diameter

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum third anode voltage	$V_{a3(max)}$	18*	kV
Minimum third anode voltage	$V_{a3(min)}$	14	kV
Maximum second anode voltage	$V_{a2(max)}$	5.0	kV
Maximum first anode voltage	$V_{a1(max)}$	770	V
Maximum negative grid voltage	$-V_{g(max)}$	155	V
Minimum negative grid voltage	$-V_{g(min)}$	1.0	V
Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k(max)}$	250	V
Maximum peak heater to cathode voltage, heater negative	$v_{h-k(pk)max}$	400 §	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k(max)}$	1.5	MΩ
Maximum peak cathode current	$i_{k(pk)max}$	0.5	mA

* $I_{a3} = 0$

§ During a warming-up period not exceeding 45 seconds.

If this tube is operated at voltages in excess of 16kV, x-ray radiation shielding may be necessary to avoid possible danger of personal injury from prolonged exposure at close range.

PHOSPHOR SCREEN

This type is usually supplied with a GH phosphor (M31-230GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

INTER-ELECTRODE CAPACITANCES

Cathode to all (max)	$c_{k\text{-all (max)}}$	7.0	pF
Grid to all (max)	$c_{g\text{-all (max)}}$	10	pF
Anode 3 to coating M_1	$c_{a3\text{-}M1}$	700	pF
Anode 3 to shell M_2 (Approx.)	$c_{a3\text{-}M2}$	200	pF

TYPICAL OPERATION - Grid modulation, voltages referred to cathode.

Third anode voltage	V_{a3}	16	kV
First anode voltage	V_{a1}	450	V
Second anode voltage for centre focus(nom)	V_{a2}*	4.0	kV
Grid to cathode voltage for cut-off of raster	V_g	-35 to -85	V
Typical line width at 50 μA beam current shrinking raster measurements at face centre		0.2	mm

Note: To obtain best overall performance, a dynamic focus voltage variation of approximately 450V is required between the centre of the screen and any corner.

* In operation the second anode current will vary with beam current. To avoid focus variation the supply impedance should be kept low.

MOUNTING

There is an annular region of anti-corona coating with external diameter of 75 mm surrounding the CT8 cap, the tube should not be handled in this region.

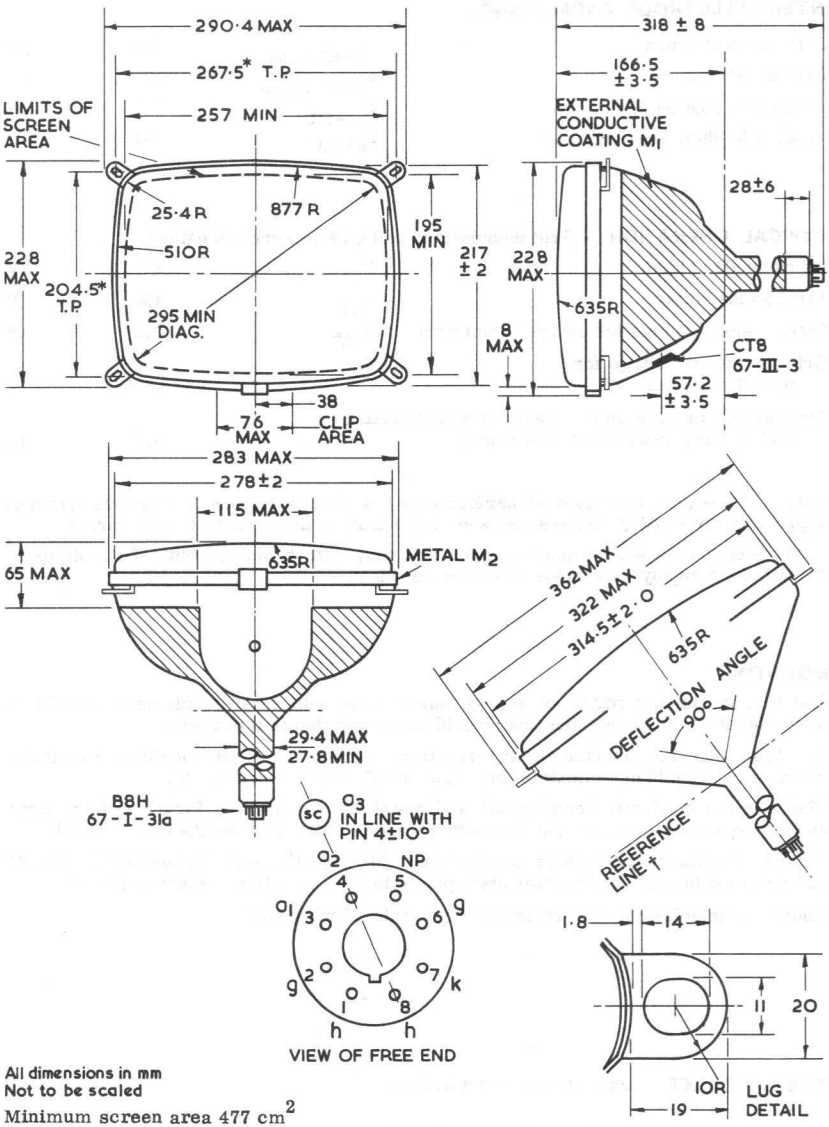
The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

TUBE WEIGHT (approximate) - net 3.3 kg.

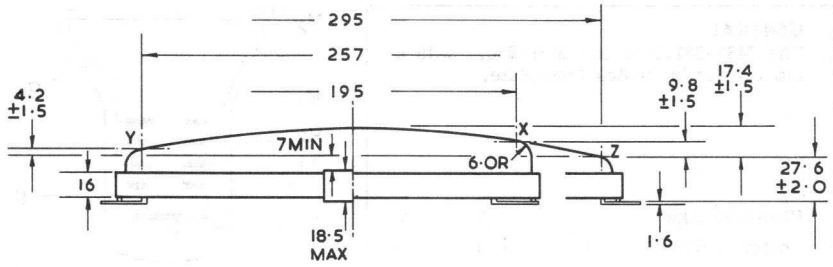


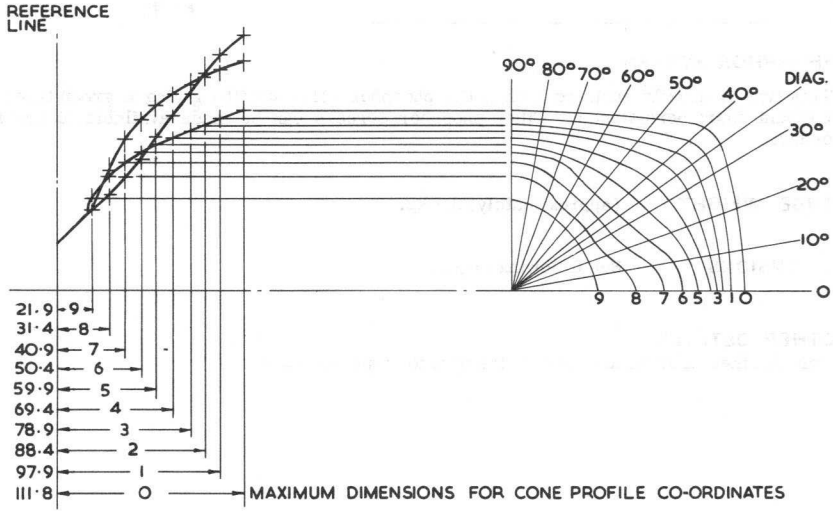
All dimensions in mm
Not to be scaled

Minimum screen area 477 cm^2

* The bolts to be used for mounting the tube must lie within circles of 7.0 mm diameter centred on these true positions. One of the four lugs may deviate 2.0 mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 15.





MAXIMUM DIMENSIONS FOR CONE PROFILE CO-ORDINATES

Reference Plane No.	0° Major	10°	20°	30°	Diag	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

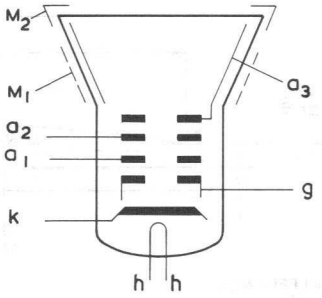
All dimensions in mm

Not to be scaled

M31-231.. Data Display or Monitor Tube

GENERAL
The M31-231.. is the M31-230.. with a clear glass laminated face-plate.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



PHOSPHOR SCREEN

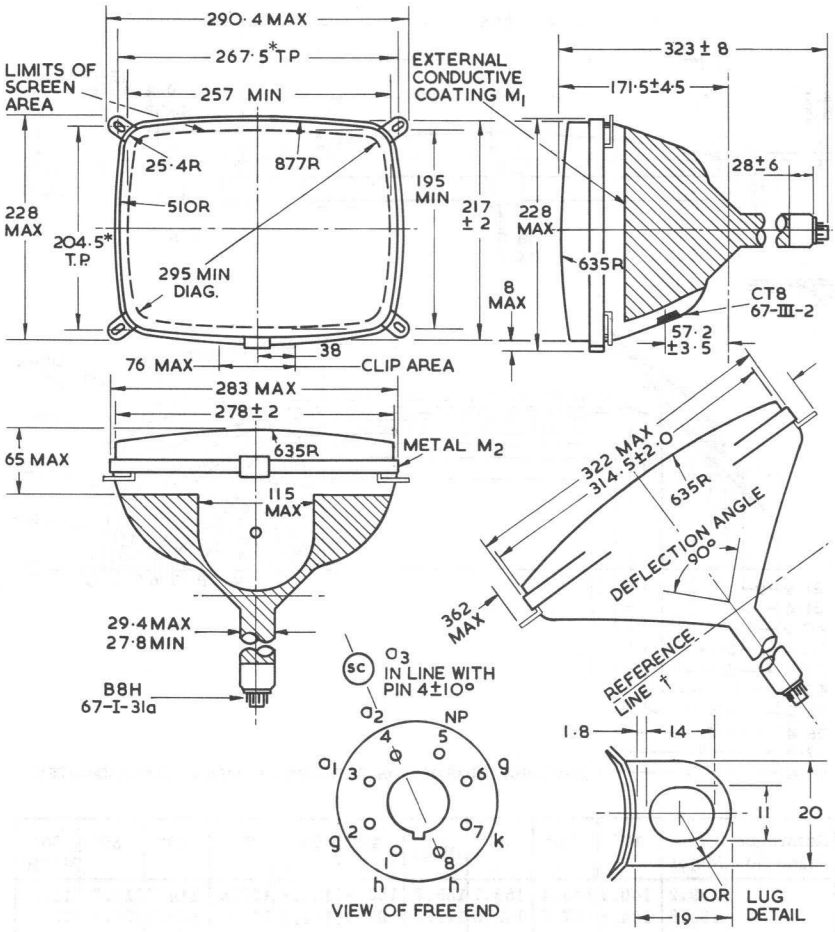
This type is usually supplied with a GH phosphor (M31-231GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) 3.9 kg.

DIMENSIONS See following pages.

OTHER DETAILS
For all other information refer to the data for type M31-230..

BRIMAR



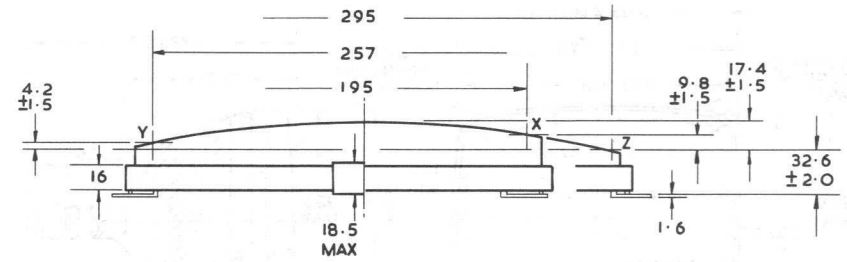
All dimensions in mm

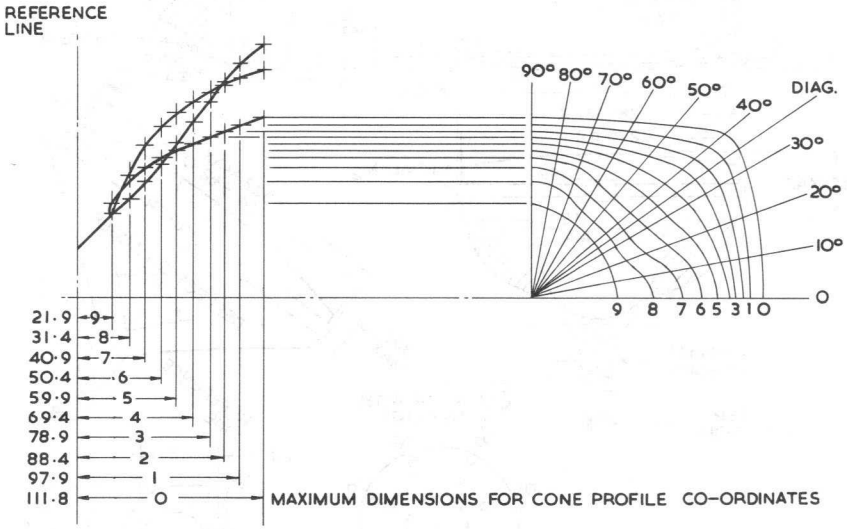
Not to be scaled

Minimum screen area 477 cm^2

* The bolts to be used for mounting the tube must lie within circles of 7.0 mm diameter centred on these true positions. One of the four lugs may deviate 2.0 mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 15.





Reference Plane No.	0° Major	10°	20°	30°	Diag.	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

All dimensions in mm

Not to be scaled

Data Display or Monitor Tube

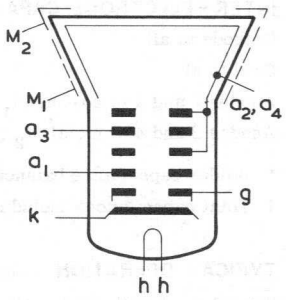
M31-260..

PRELIMINARY DATA

GENERAL

Rectangular face, 31 cm, 90° diagonal
Ruggedised construction. Mounting frame.
Laminated face-plate giving total glass transmission of 15% (approx.) and surface treated to reduce specular reflection
Electrostatic focus, magnetic deflection
29.4 mm maximum neck diameter
Flying lead connections for base and anode
External conductive coating

Heater voltage	V_h	11.5	V
Heater current	I_h	0.15	A



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4\,(max)}$	18	kV
Minimum second and fourth anode voltage	$V_{a2+a4\,(min)}$	10	kV
Maximum third anode voltage range	$V_{a3\,(max)}$	±700	V
Maximum first anode voltage	$V_{a1\,(max)}$	600	V
Minimum first anode voltage	$V_{a1\,(min)}$	200	V
Maximum negative grid voltage	$-V_{g\,(max)}$	200	V
Minimum negative grid voltage	$-V_{g\,(min)}$	1.0	V
Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k\,(max)}$	200	V
Maximum peak heater to cathode voltage heater negative	$V_{h-k(pk)\,max}$	250	V
Maximum impedance, grid to cathode (50Hz)	$Z_{g-k\,(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k\,(max)}$	1.5	MΩ

If this tube is operated at voltages in excess of 16kV, x-ray radiation shielding may be necessary to avoid possible danger of personal injury from prolonged exposure at close range.

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M31-260GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

BRIMAR

INTER-ELECTRODE CAPACITANCES

		*	†	
Cathode to all	$c_{k\text{-all}}$	3.0	3.5	pF
Grid to all	$c_{g\text{-all}}$	6.5	7.5	pF
Anodes 2 and 4 to coating M_1 (approx.)	$c_{a2+a4\text{-}M1}$	750		pF
Anodes 2 and 4 to metal M_2 (approx.)	$c_{a2+a4\text{-}M2}$	200		pF

* Holder capacitance balanced out.

† Total capacitances including a typical B8H holder.

TYPICAL OPERATION - Grid modulation, voltages referred to cathode

Second and fourth anode voltage	V_{a2+a4}	12 to 16	kV
First anode voltage	V_{a1}	400	V
Third anode voltage range for focus	V_{a3}	0 to 400§	V
Grid to cathode voltage for cut-off of raster	V_g	-38 to -82	V
Typical line width at 50μA (Shrinking raster)		0.37	mm

§ The change of spot size with variation of focus voltage is small and the limit of 0 to 400V is such that an acceptable focus quality is obtained within this range. If it is required to pass through the point of focus a voltage range of at least -100V to +500V will be required.

MOUNTING

If a mask is used with this tube it should be flexible enough to take up small variations in fixing and bulb contours.

There is a region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

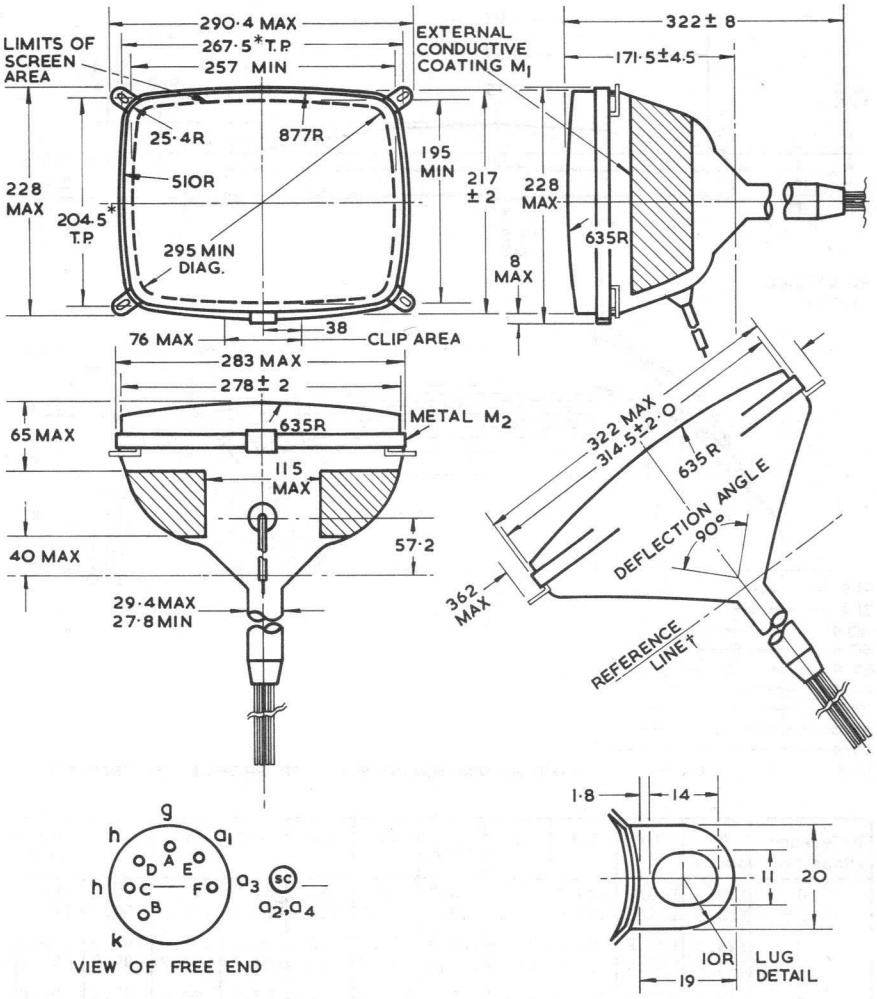
The tube can be mounted in any position.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

TUBE WEIGHT (approximate) 3.5kg.



All dimensions in mm

Not to be scaled

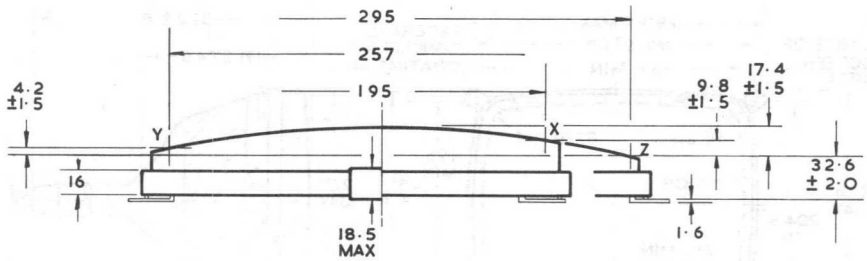
Minimum screen area 477 cm^2

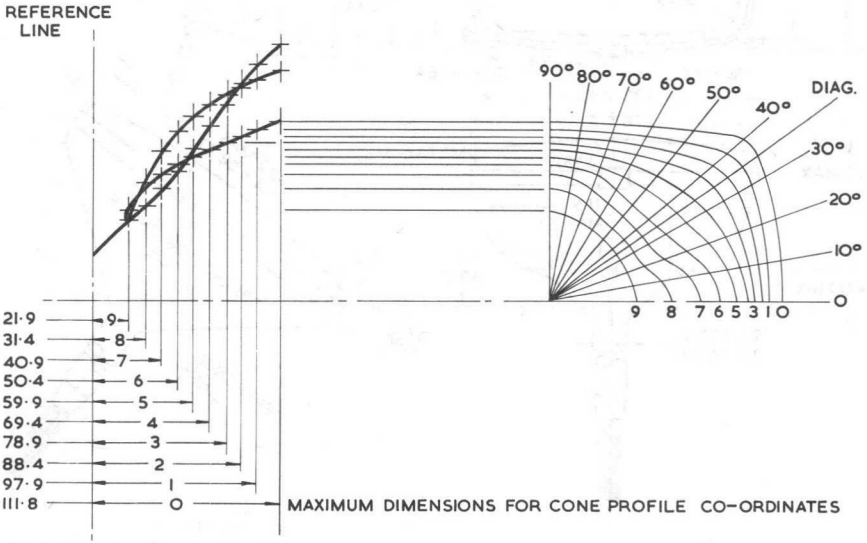
* The bolts to be used for mounting the tube must lie within circles of 7.0 mm diameter centred on these true positions. One of the four lugs may deviate 2.0 mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 15.

DATA DISPLAY AND MONITOR TUBES

Data Display or Monitor Tube





Reference Plane No.	0° Major	10°	20°	30°	Diag	40°	50°	60°	70°	80°	90° Minor
0	139.2	140.7	145.4	153.7	155.7	152.9	135.8	122.8	114.7	110.2	108.8
1	133.6	134.4	137.5	142.5	142.0	139.3	126.4	116.0	109.5	105.5	103.8
2	129.0	129.2	130.6	132.4	131.0	128.8	119.1	110.5	105.0	101.5	100.2
3	124.0	123.5	122.7	121.3	119.8	117.6	110.9	104.4	100.2	97.3	96.5
4	118.5	117.0	113.5	109.2	107.2	105.4	101.3	97.4	94.8	93.0	92.6
5	112.2	109.5	103.0	96.0	93.5	92.2	91.0	89.1	88.8	88.2	88.2
6	103.6	100.5	91.0	82.0	80.2	80.3	79.7	79.9	82.0	82.9	83.6
7	92.2	88.2	77.4	70.0	70.0	70.0	70.0	70.2	74.0	77.0	77.8
8	74.2	71.1	63.7	60.5	60.5	60.5	60.5	60.5	64.5	68.4	69.8
9	52.5	52.0	51.5	51.0	50.6	51.0	51.0	51.0	53.0	55.1	56.5

All dimensions in mm

Not to be scaled

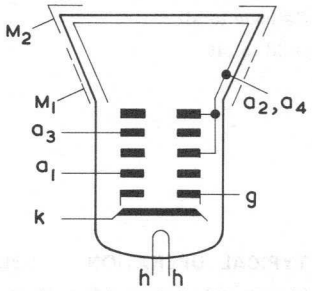
Data Display or Monitor Tube M36-190..

TENTATIVE DATA

GENERAL

Rectangular tube with 2:1 display aspect ratio
36 cm diagonal. Implosion protection*.
Laminated grey glass face-plate 33% transmission (approx.)
Surface treated to reduce specular reflection
Integral mounting lugs.
Electrostatic focus, magnetic deflection
29.4 mm maximum neck diameter
Aluminised screen

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - Voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4\,(max)}$	20	kV
Minimum second and fourth anode voltage	$V_{a2+a4\,(min)}$	10	kV
Maximum third anode voltage range	$V_{a3\,(max)}$	±700	V
Maximum first anode voltage	$V_{a1\,(max)}$	600	V
Minimum first anode voltage	$V_{a1\,(min)}$	200	V
Maximum negative grid voltage	$-V_{g\,(max)}$	200	V
Minimum negative grid voltage	$-V_{g\,(min)}$	1.0	V
Maximum heater to cathode voltage, heater negative (d.c.)	$V_{h-k\,(max)}$	200	V
Maximum peak heater to cathode voltage heater negative	$v_{h-k\,(pk)\,max}$	250	V
Maximum impedance, grid to cathode (50 Hz)	$Z_{g-k\,(max)}$	0.5	MΩ
Maximum resistance, grid to cathode	$R_{g-k\,(max)}$	1.5	MΩ

PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M36-190GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

* This tube meets the requirements for intrinsically safe tubes laid down in the section of I.E.C. Publication 65 dealing with implosion.

This data should be read in conjunction with Brimar Operational and Safety Recommendations for Industrial Cathode Ray Tubes.

INTER-ELECTRODE CAPACITANCES

Cathode to all	c_{k-all}	pF
Grid to all	c_{g-all}	pF

TYPICAL OPERATION - Grid modulation, voltages referred to cathode

Second and fourth anode voltage	V_{a2+a4}	16	kV
First anode voltage	V_{a1}	400	V
Third anode voltage range for focus	V_{a3}	0 to 400 §	V
Grid to cathode voltage for cut-off of raster	V_g	-38 to -82	V

§ The change of spot size with variation of focus voltage is small and the limit of 0 to 400 V is such that an acceptable focus quality is obtained within this range. If it is required to pass through the point of focus a voltage range of at least -100 V to +500 V will be required.

MOUNTING

If a mask is used with this tube it should be flexible enough to take up small variations in fixing and bulb contours.

There is a region of anti-corona coating surrounding the CT8 cap, the tube should not be handled in this region.

The tube can be mounted in any position. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely.

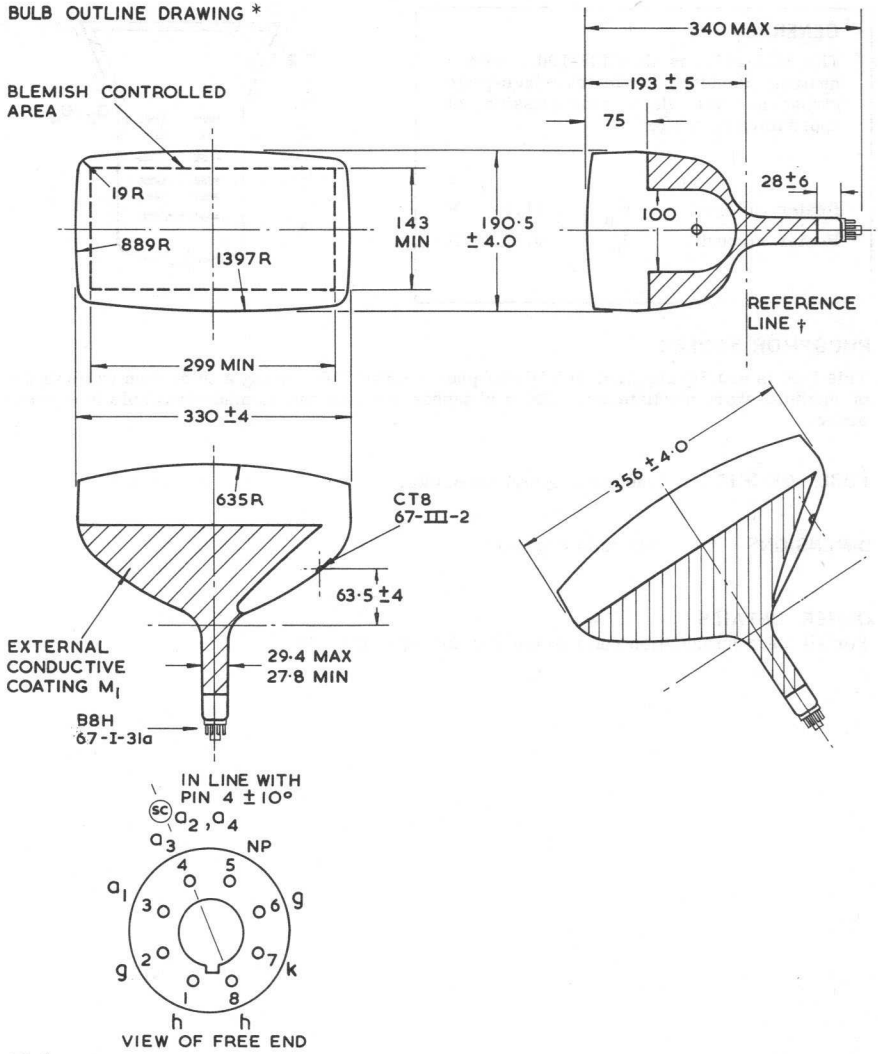
The bolts for mounting the tube must lie within circles of 3.5 mm diameter centred on the true positions. One of the four lugs may deviate 2 mm maximum from the plane through the other three lugs.

The external conductive coating M1 and metal M2 of this tube form, with the final anode, capacitances which may be used to provide smoothing for the e.h.t. supply.

Flashover protection should be incorporated. M1 and M2 should be connected together and returned to chassis via paths appropriate to the protection system employed.

General principles are described in Investigation Report L137.

BULB OUTLINE DRAWING *



All dimensions in mm Not to be scaled

† Determined by reference line No.16 (BS. RL4: IEC. 67-IV-3: JEDEC 126)

This tube has a 110° cone flare and a 90° diagonal deflection.

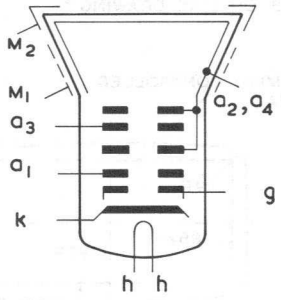
* Details of mounting arrangement can be obtained on request.

M38-107.. Data Display or Monitor Tube

GENERAL

The M38-107.. is the M38-100.. with a neutral density laminated face-plate giving a total glass transmission of approximately 50 %.

Heater voltage	V_h	11.5	V
Heater current	I_h	0.15	A



PHOSPHOR SCREEN

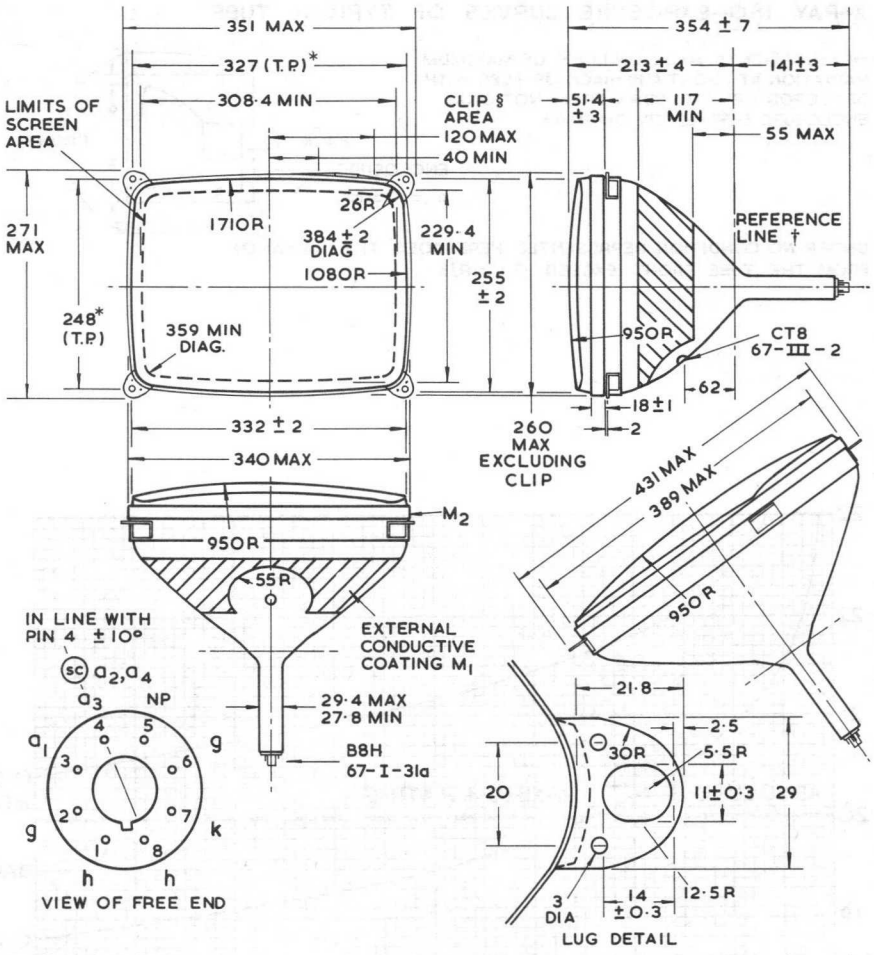
This type is usually supplied with W phosphor (M38-107W) giving a television white trace of medium short persistence. Other phosphor screens can be made available to special order.

TUBE WEIGHT (approximately) net 6.0kg.

DIMENSIONS See following page.

OTHER DETAILS

For all other information refer to the data for type M38-100..



All dimensions in mm

Not to be scaled

* The bolts to be used for mounting the tube must lie within the circles of 6.5 mm diameter centred on these true positions. One of the four lugs may deviate 2 mm maximum from the plane through the other three lugs.

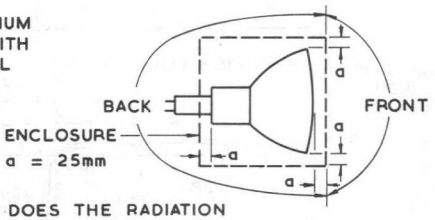
† Determined by reference line gauge No. 15.

§ Total thickness of frame tension band and clip 8 mm maximum. The clip will not project in front of the frame dimension.

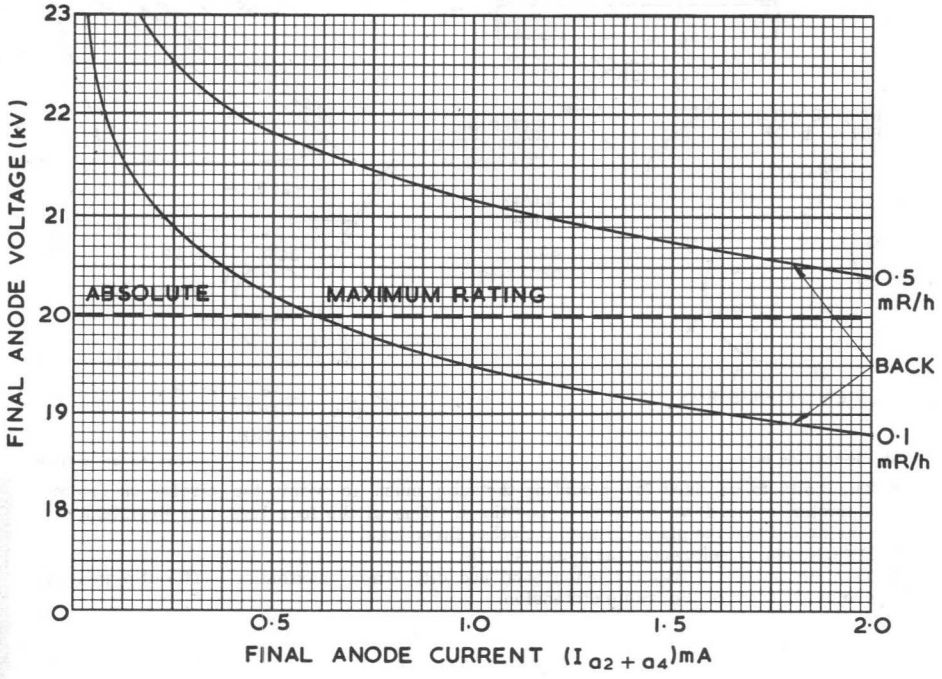
M38–107.. Data Display or Monitor Tube

X–RAY ISO–EXPOSURE CURVES OF TYPICAL TUBE

MEASUREMENTS MADE ON LINES OF MAXIMUM RADIATION AT FRONT AND BACK OF TUBE WITH DETECTOR CENTRE 50mm FROM NOTIONAL ENCLOSURE DEFINED BY DIAGRAM



UNDER NO CONDITION REPRESENTED HERE DOES THE RADIATION FROM THE TUBE FRONT EXCEED 0·1 mR/h

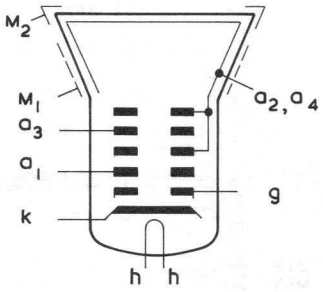


Data Display or Monitor Tube M38-124..

GENERAL

The M38-124.. is the M38-120.. with a, neutral density, laminated face-plate giving implosion protection and with integral mounting lugs. The overall transmission of the face-plate is approximately 30% and the surface is treated to reduce specular reflections. The external conductive coating extends under the deflection coil.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



PHOSPHOR SCREEN

This type is usually supplied with GH phosphor (M38-124GH) giving a green trace of medium short persistence. Other phosphor screens can be made available to special order.

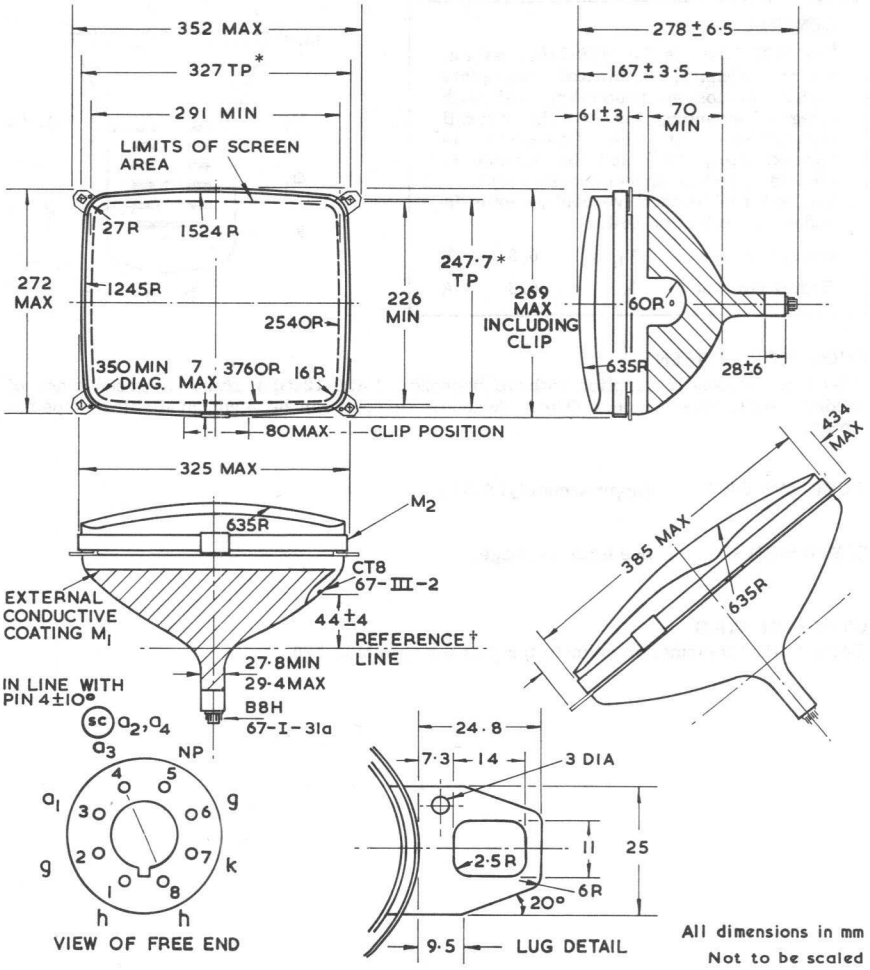
TUBE WEIGHT (approximately) 5.5 kg.

DIMENSIONS See following page.

OTHER DETAILS

For all other information refer to the data for type M38-120..

M38-124.. Data Display or Monitor Tube



* The bolts to be used for mounting the tube must lie within the circles of 7.5 mm diameter centred on these true positions. One of the four lugs may deviate 2 mm maximum from the plane through the other three lugs.

† Determined by reference line gauge No. 16 (B.S. RL4 : IEC 67-IV-3 : JEDEC 126). See TDS No. 91-16.

Minimum useful screen area 646 cm^2.

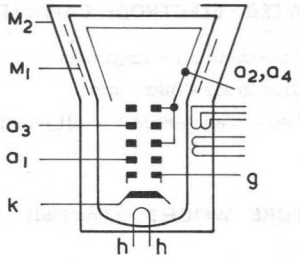
Data Display or Monitor Tube 59-60/09/307

ABRIDGED SPECIFICATION

GENERAL

Ruggedised CRT with coils enclosed by resin filled magnetic shield.
Bonded mounting frame.
Rectangular face-plate, 85 mm x 113 mm min. screen area. Magnetic deflection 70° diagonal.
Laminated panel providing implosion protection, contrast enhancement filter matched to GY phosphor and with anti-reflection coating.

Heater voltage	V_h	6.3	V
Heater current	I_h	0.3	A



ABSOLUTE RATINGS - All voltages referred to cathode

Maximum second and fourth anode voltage	$V_{a2+a4\,(max)}$	18	kV
Maximum third anode voltage	$V_{a3\,(max)}$	±700	V
Maximum first anode voltage	$V_{a1\,(max)}$	600	V
Minimum first anode voltage	$V_{a1\,(min)}$	300	V
Maximum negative grid voltage	$-V_{g\,(max)}$	200	V
Maximum positive grid voltage	$V_{g\,(max)}$	*	V
Maximum peak heater to cathode voltage heater positive or negative	$V_{h-k\,(max)}$	250	V

* Must not become positive.

TYPICAL OPERATION -Grid modulation, voltages with respect to cathode

Second and fourth anode voltage	Va2+a4	14	kV
First anode voltage	V_{a1}	450	V
Third anode voltage for focus	V_{a3}	200	V
Grid to cathode voltage for cut-off of raster	V_g	-40 to -80	V
Resolution (spot size) at centre measured at 50% peak luminance points		0.30	mm

Coil details		X	Y	
Inductance	nom	0.52	36	mH
Resistance	max	0.9	36	Ω
Sensitivity (p-p)	max	2.6	0.33	A

The NATO Stock Number for this tube is 5960-99-038-1877.

DATA DISPLAY AND MONITOR TUBES

BRIMAR

INTER-ELECTRODE CAPACITANCES

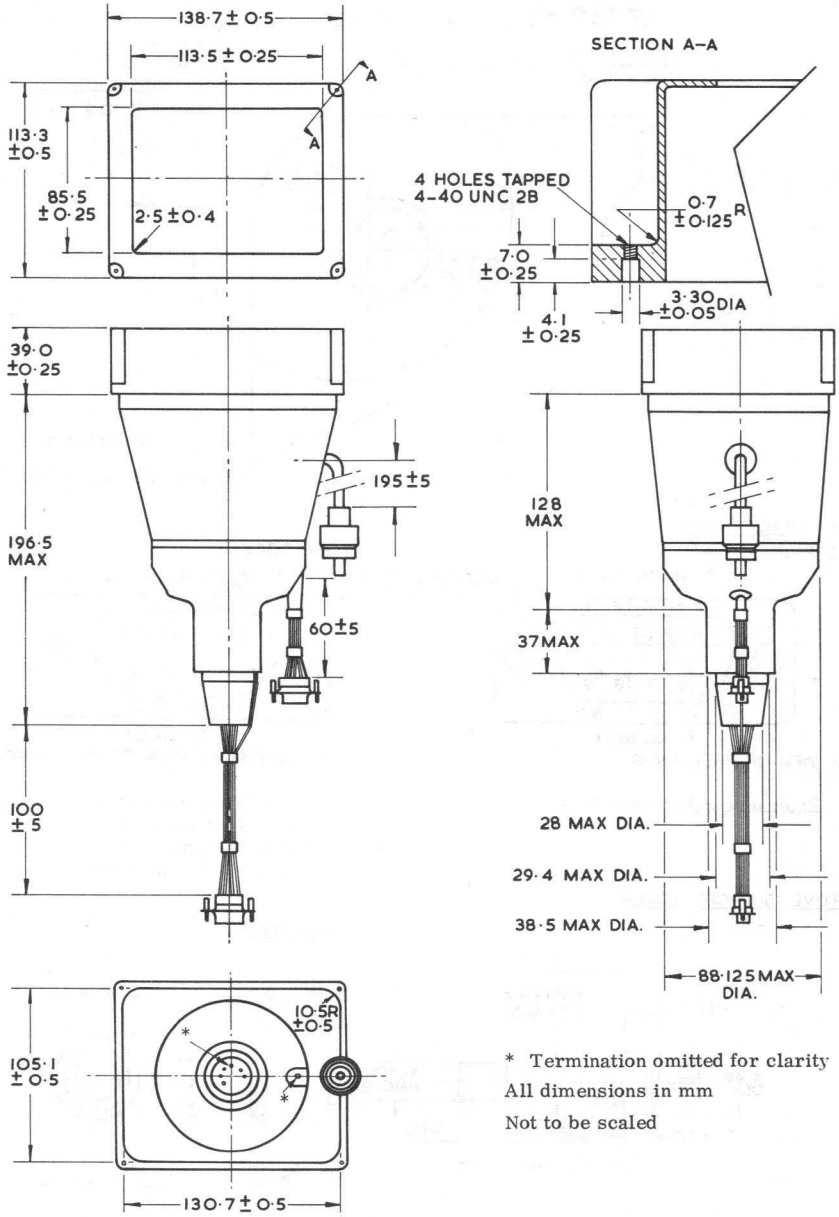
Lead capacitances balanced out

Cathode to all - maximum	$c_{k\text{-all (max)}}$	5.0	pF
Grid to all - maximum	$c_{g\text{-all (max)}}$	16	pF
Anode 2 and anode 4 to all (minimum)	$c_{a2+a4\text{-all (min)}}$	400	pF

TUBE WEIGHT (Nominal) - 1.9kg

ENVIROMENTAL TEST CAPABILITIES

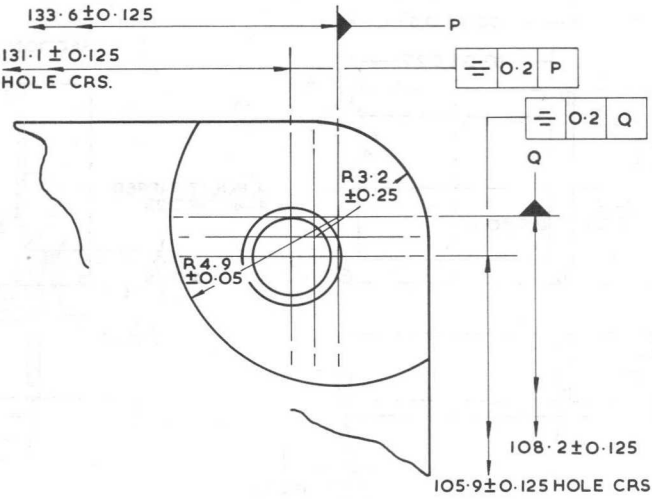
Operational temperature range	-26°C to +70°C
Damp heat	93 % humidity, 40°C for duration of 28 days.
Acceleration	17g along neck axis towards face for 1 minute.
Vibration	Wide band random motion 10 to 60 Hz at 0.02 g^2/Hz 60 to 1000 Hz at 0.01 g^2/Hz all three axes for specified times totalling 50 hours.
Bump	Peak acceleration of 10g in four specified directions totalling 4000 bumps.
Shock	Peak acceleration 50g, half-sine wave duration 11 ms in 4 directions.
Mould growth	BS2011, Part 2.1J 1977 Severity 20 days.
Flammability	BS2011, Part 2 Pa 1970.
Salt mist	BS2011, Part 2.1 Kb 1977 two 7 day cycles.



* Termination omitted for clarity

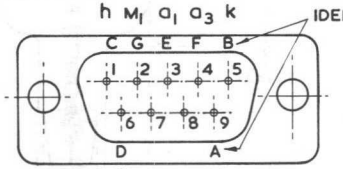
All dimensions in mm

Not to be scaled



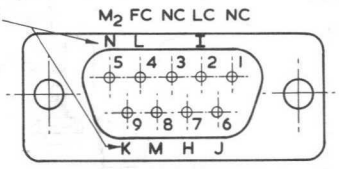
TUBE CONNECTIONS

BASE PLUG



IDENTIFICATION LETTERS

YOKE SOCKET



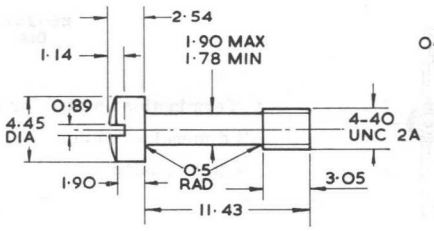
PINS VIEW OF FREE ENDS

CONTACTS VIEW OF FREE END

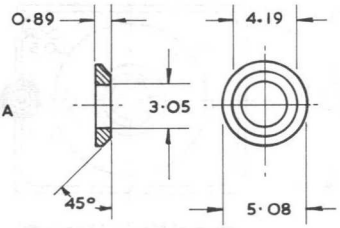
M1 : External conductive coating

* FC : Field centre tap
LC : Line centre tap
NC : No connection
M2 : Module Metalwork

CAPTIVE SUPPORT SCREW



WASHER



BRIMAR

THORN BRIMAR LIMITED
Mollison Avenue, Brimsdown, Enfield,
Middlesex EN3 7NS.
Telephone: 01-804 1201