

## TENTATIVE DATA

### QUICK REFERENCE DATA

61 cm (24in) direct viewing television tube with metal backed screen and reinforced envelope. A separate safety screen is not required. Suitable for use in receivers with push-through presentation. This tube is fitted with a ring trap base.

Deflection angle	110	deg
Focusing	Electrostatic	
Light transmission (approx.)	42	%
Maximum overall length	370	mm

This data should be read in conjunction with GENERAL OPERATIONAL RECOMMENDATIONS - TELEVISION PICTURE TUBES

### HEATER

Suitable for series or parallel operation

$V_h$	6.3	V
$I_h$	300	mA

The limits of heater voltage and current are contained in 'General Operational Recommendations - Television Picture Tubes.

Note - applies to series operation only

The surge heater voltage must not exceed 9.5V r.m.s. when the supply is switched on. A current limiting device may be necessary in the circuit, to ensure that this voltage is not exceeded.

### OPERATING CONDITIONS

$V_{a2+a4}$	20	20	kV
$V_{a3}$ (focus electrode control range)	0 to 400	0 to 400	V
$V_{a1}$	400	500	V
$V_g$ for visual extinction of focused raster	-40 to -77	-50 to -93	V
* $V_k$ for visual extinction of focused raster	36 to 66	45 to 80	V

\*For cathode modulation, all voltages are measured with respect to the grid.

### SCREEN (metal backed)

Fluorescent colour	White
Light transmission (approx.)	42 %
Useful screen area	See page 6

## FOCUSING (Electrostatic)

The range of focus voltage shown in 'Operating Conditions' results in optimum overall focus at a beam current at  $250\mu\text{A}$ .

## DEFLECTION (Magnetic)

Diagonal deflection angle	110	deg
Horizontal deflection angle	98	deg
Vertical deflection angle	81	deg

The deflection coils should be designed to provide a pull-back of 4.0mm on a nominal tube.

## CAPACITANCES

$c_{g\text{-all}}$	7.0	pF
$c_{k\text{-all}}$	5.0	pF
$c_{a2+a4-M}$	1700 to 2500	pF
$c_{a2+a4-B}$	600	pF

## EXTERNAL CONDUCTIVE COATING

This tube has an external conductive coating, M, and in accordance with the General Operating Recommendations this should be connected directly to pin 5 and not to chassis. The electrical connection to this coating must be made within the area specified on the tube outline drawing. The capacitance of this coating to the final anode is used to provide smoothing for the e.h.t. supply.

## RING TRAP

For flashover protection of the receiver, parallel spark gaps are included for all the electrodes in the base of this tube, and the common connection is made to pin 5. These spark gaps are intended as part of a system for full flashover protection. A direct connection must always be made from pin 5 to chassis, and the external conductive coating returned to chassis only via pin 5, using short leads. Any electrode supplied directly from a high energy source (such as the h.t. line) should be provided with a series resistor.

## RASTER CENTRING

See note under this heading in 'General Operational Recommendations - Television Picture Tubes'.

Centring magnet field intensity	0 to 800	A/m
Maximum distance of centre of centring field from reference line	57	mm

Adjustment of the centring magnet should not be such that a general reduction in the brightness of the raster occurs.

## REFERENCE LINE GAUGE

J.E.D.E.C. 126. For details see 'General Operational Recommendations - Television Picture Tubes'.

## MOUNTING POSITION

Any. The tube socket should not be rigidly mounted but should have flexible leads and be allowed to move freely. The bottom circumference of the base shell will fall within a circle of 40mm diameter which is centred on the perpendicular from the centre of the face.

This tube is fitted with a pin protector in order to avoid damage to the glass base due to bending of the base pins whilst handling the tube.

It is advisable to keep this pin protector on the base until it can be replaced by the socket after installation of the tube in any equipment.

## RATINGS (DESIGN CENTRE SYSTEM)

$V_{a2+a4}$ max. (at $I_{a2+a4} = 0$ ) (see note 1)	20	kV
$V_{a2+a4}$ min.	13	kV
$+V_{a3}$ max.	1.0	kV
$-V_{a3}$ max.	500	V
$V_{a1}$ max.	700	V
$V_{a1}$ min.	350	V
$-v_g$ (pk) max. (see note 2)	400	V
$-V_g$ max. (see note 3)	150	V
$\pm I_{a3}$ max.	25	$\mu A$
$\pm I_{a1}$ max.	5	$\mu A$
$V_{h-k}$ (see note 4)		
Cathode positive		
d.c. max.	250	V
pk max.	300	V
Cathode negative		
d.c. max.	135	V
pk max.	180	V
$R_{h-k}$ max.	1.0	$M\Omega$
$Z_{k-e}$ max. ( $f = 50\text{Hz}$ )	100	$k\Omega$
$R_{g-k}$ max.	1.5	$M\Omega$
$Z_{g-k}$ max. ( $f = 50\text{Hz}$ )	500	$k\Omega$

## NOTES

1. Adequate precautions should be taken to ensure that the receiver is protected from damage which may be caused by a possible high voltage flash-over within the cathode ray tube.
2. Maximum pulse duration 22% of one cycle with a maximum of 1.5ms.
3. The d.c. value of bias must not be such as to allow the grid to become positive with respect to the cathode, except during the period immediately after switching the receiver on or off when it may be allowed to rise to +2V.

It is advisable to limit the positive excursion of the video signal to +5V(pk) max. This may be achieved automatically by the series connection of a 10k $\Omega$  resistor.

4. During an equipment warm-up period not exceeding 15 seconds  $v_{h-k}(pk)$  max. (cathode positive) is allowed to rise to 410V. Between 15 and 45 seconds after switching on, a decrease in  $v_{h-k}(pk)$  max. (cathode positive) proportional with time from 410V to 250V is permissible.
5. The metal band (B) should be connected directly to the chassis in an a.c. receiver operating from an isolating transformer, or via a suitable leakage path in an a.c./d.c. receiver, for example 2.0M $\Omega$ .

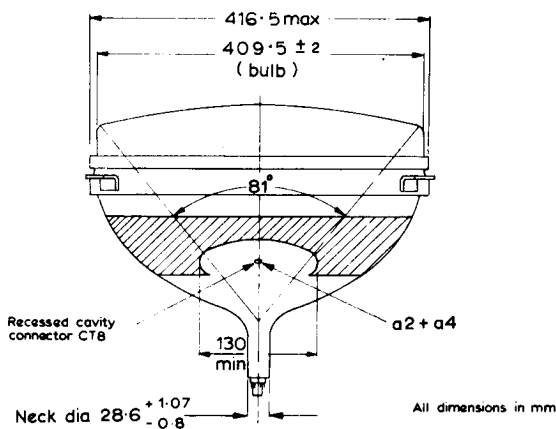
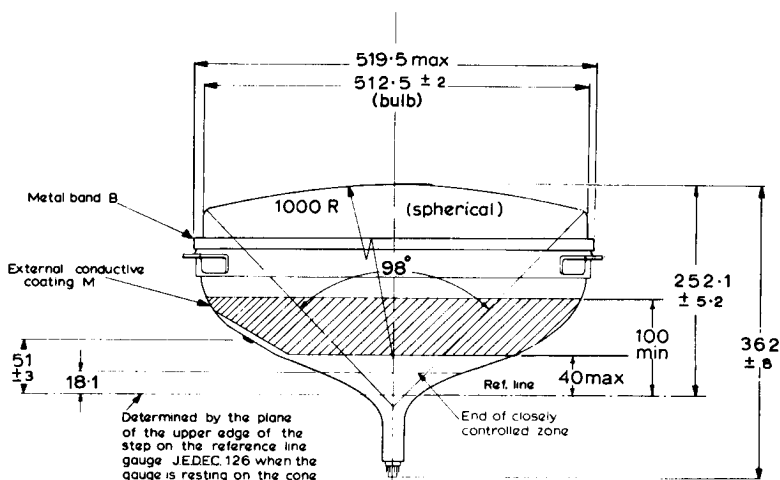
The mounting lugs will be in electrical contact with the metal band.

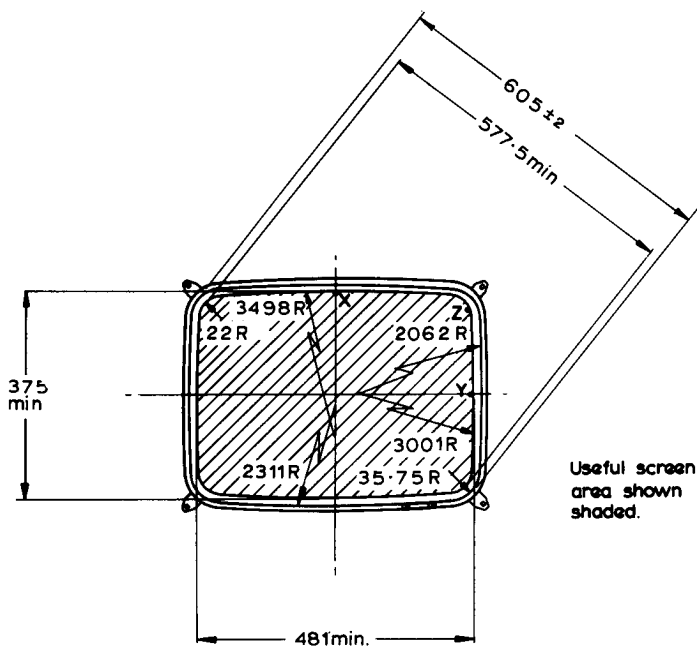
## WARNING

X-ray shielding is advisable to give protection against possible danger of personal injury arising from prolonged exposure at close range to this tube when operated above 20kV.

## WEIGHT

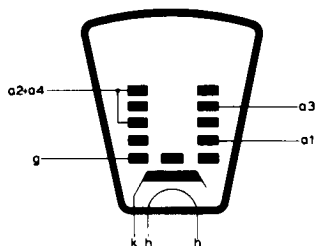
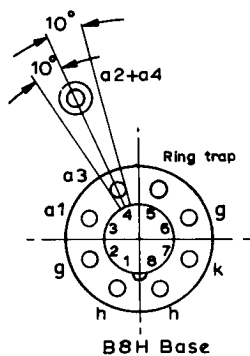
Tube alone (approx.)	13.5	kg
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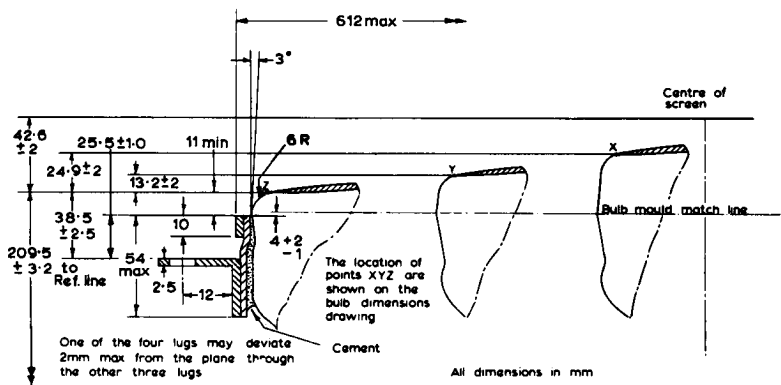
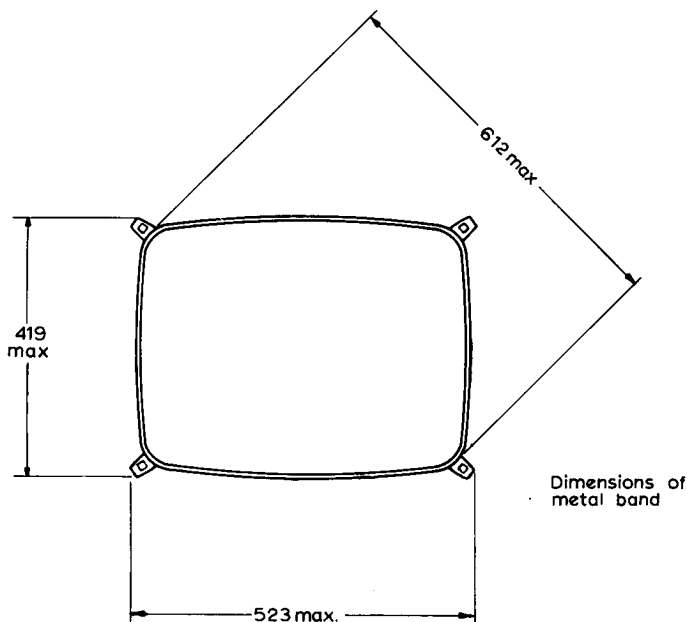




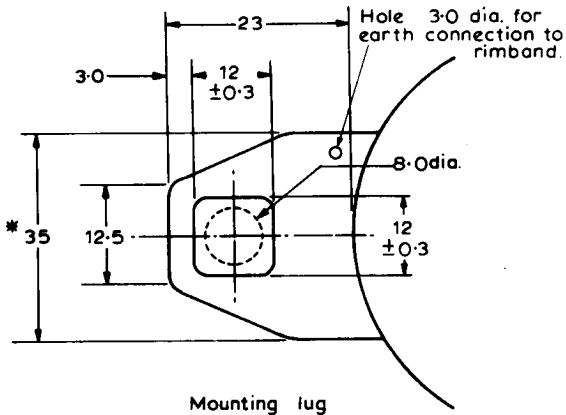
Bulb dimensions

All dimensions in mm

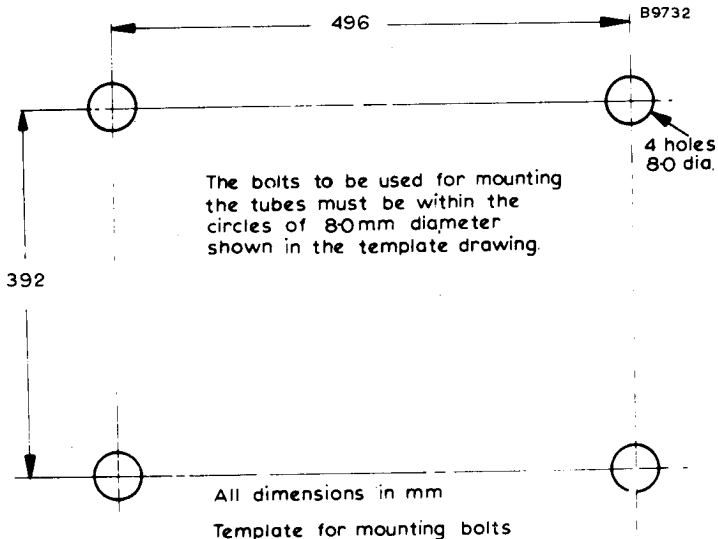




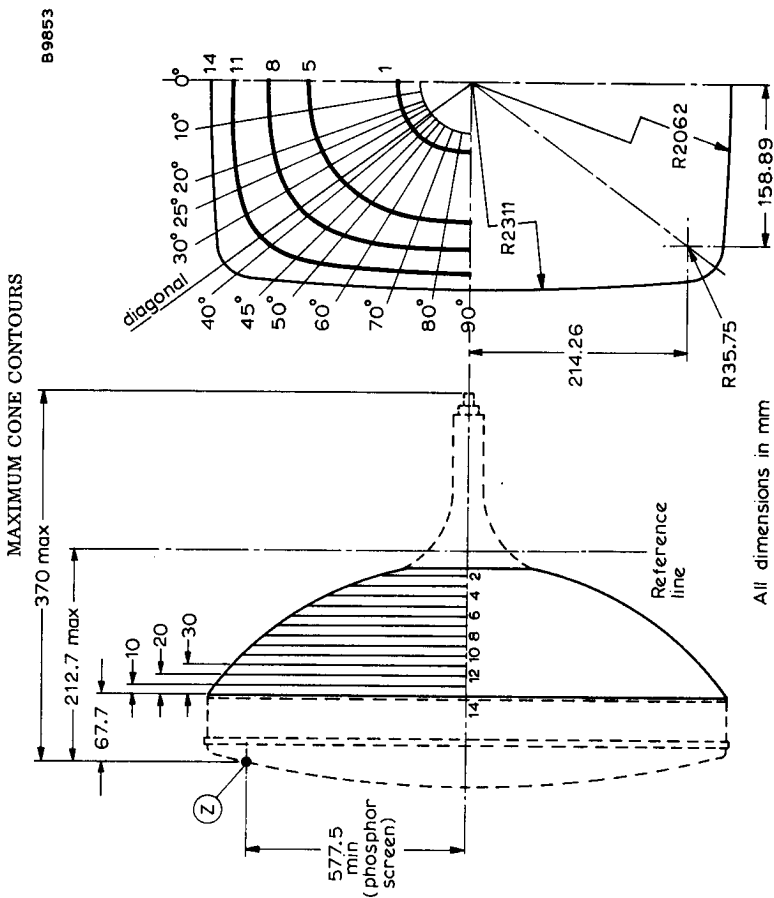
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\* Minimum space to be reserved for mounting lug=39





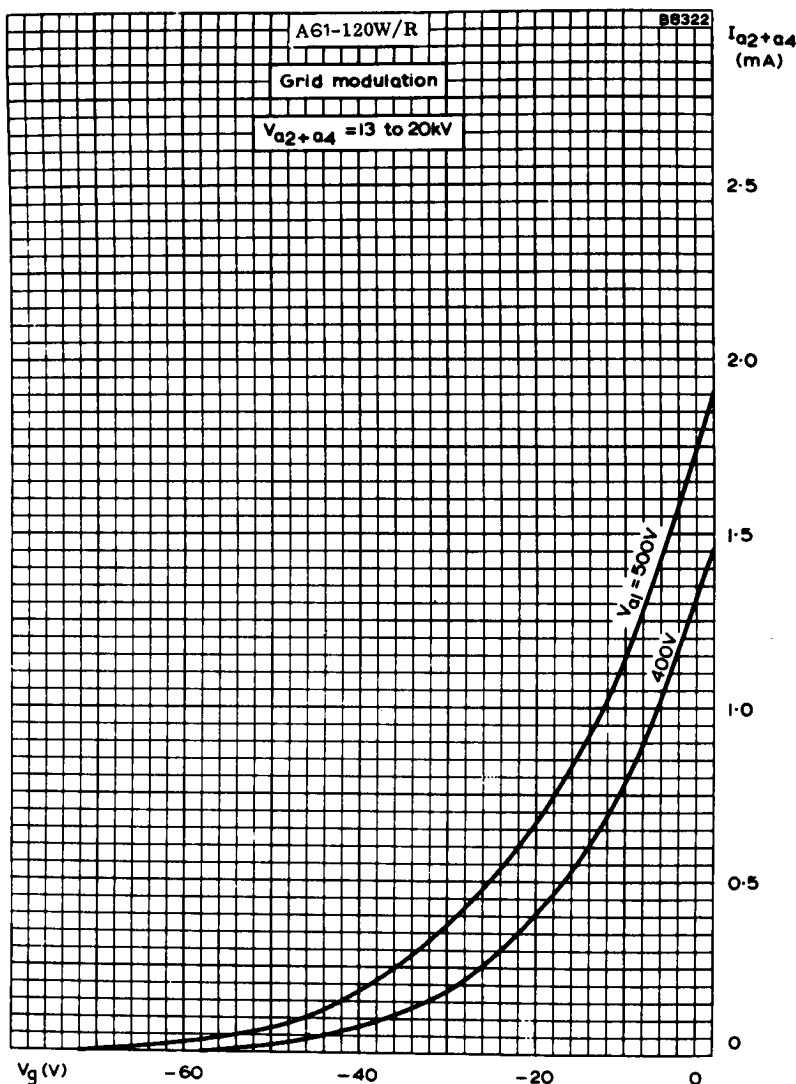


DIMENSIONS FOR MAXIMUM CONE CONTOUR DRAWING

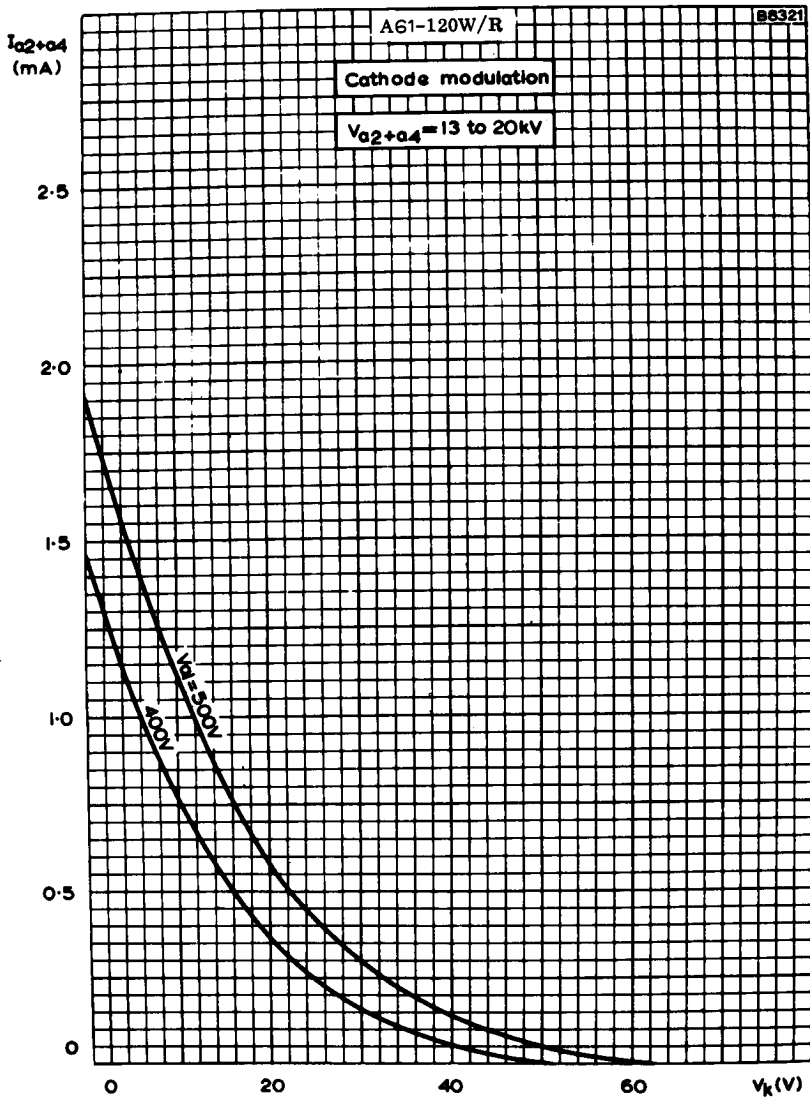
Section	Nominal distance from point 'Z'	Distance from centre (max. values)												90° Short axis
		Diagonal												
		0°	10°	20°	25°	30°	36°34'	40°	45°	50°	60°	70°	80°	
1	194.4	74.6	72.5	71.1	70.8	70.3	70.6	70.9	71.4	72.1	73.3	72.3	73.0	72.8
2	187.7	100.0	95.6	93.1	92.0	91.3	91.2	91.0	91.0	90.8	90.7	91.8	93.2	95.5
3	177.7	130.4	126.5	121.3	119.6	118.2	117.1	116.4	115.1	114.1	114.3	114.7	115.8	118.0
4	167.7	152.8	149.8	145.0	143.1	141.8	140.0	138.8	137.0	135.3	133.4	131.9	132.4	133.7
5	157.7	172.1	169.2	165.6	164.3	163.1	160.4	158.8	156.2	153.8	150.3	146.9	145.6	146.0
6	147.7	188.1	186.4	184.8	183.9	182.7	179.4	177.3	173.8	170.7	163.9	158.6	156.0	155.8
7	137.7	202.1	201.2	201.8	201.8	201.3	197.0	194.1	190.1	185.2	176.2	168.7	164.9	164.2
8	127.7	214.0	214.5	217.0	217.9	217.8	213.3	210.0	205.0	198.6	187.3	177.6	172.8	171.5
9	117.7	223.7	225.1	229.0	231.3	233.0	229.1	225.3	219.2	211.2	197.6	185.8	180.2	178.2
10	107.7	231.9	233.0	239.0	242.9	246.4	243.9	240.2	232.8	223.6	206.7	193.6	186.8	184.3
11	97.7	238.6	240.2	247.6	253.0	258.7	258.6	255.1	245.7	234.8	215.2	200.5	193.1	190.1
12	87.7	244.6	246.9	256.4	262.4	269.4	272.6	268.9	257.7	244.5	222.3	206.7	198.6	195.5
13	77.7	250.6	253.4	263.4	270.8	279.2	286.0	282.6	268.5	253.0	228.5	212.2	203.4	200.2
14	67.7	255.6	259.1	269.6	278.0	288.4	298.6	294.9	277.2	259.3	233.3	216.3	207.2	204.2

All dimensions in mm

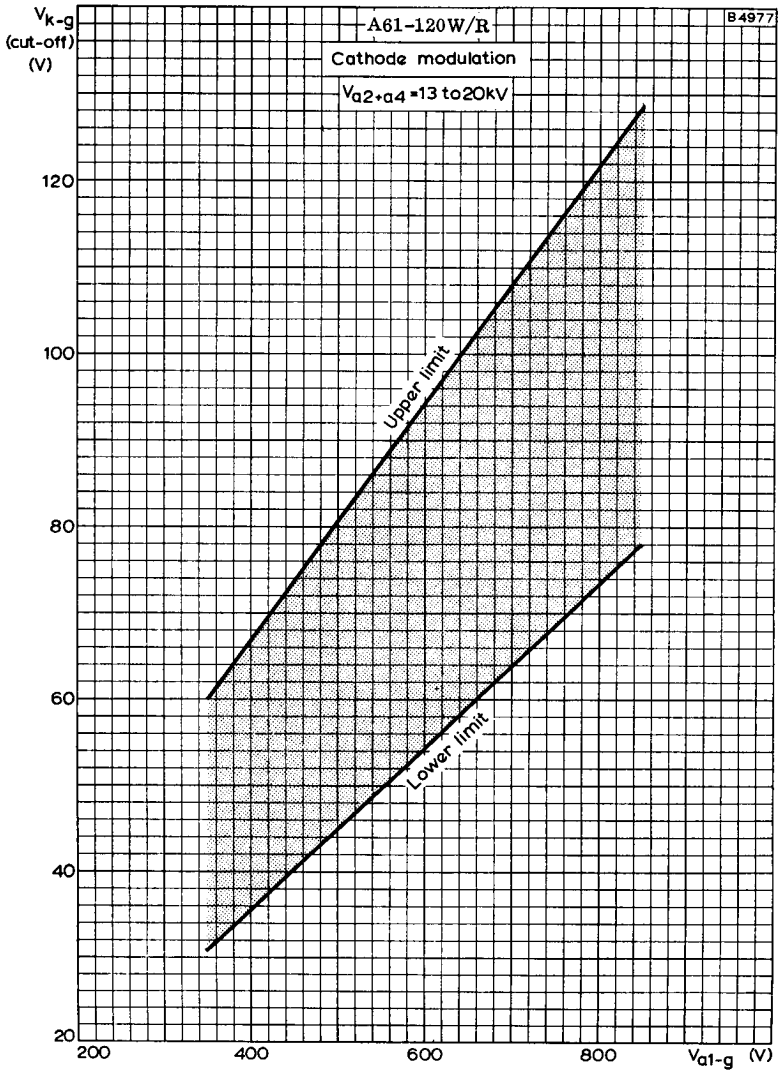




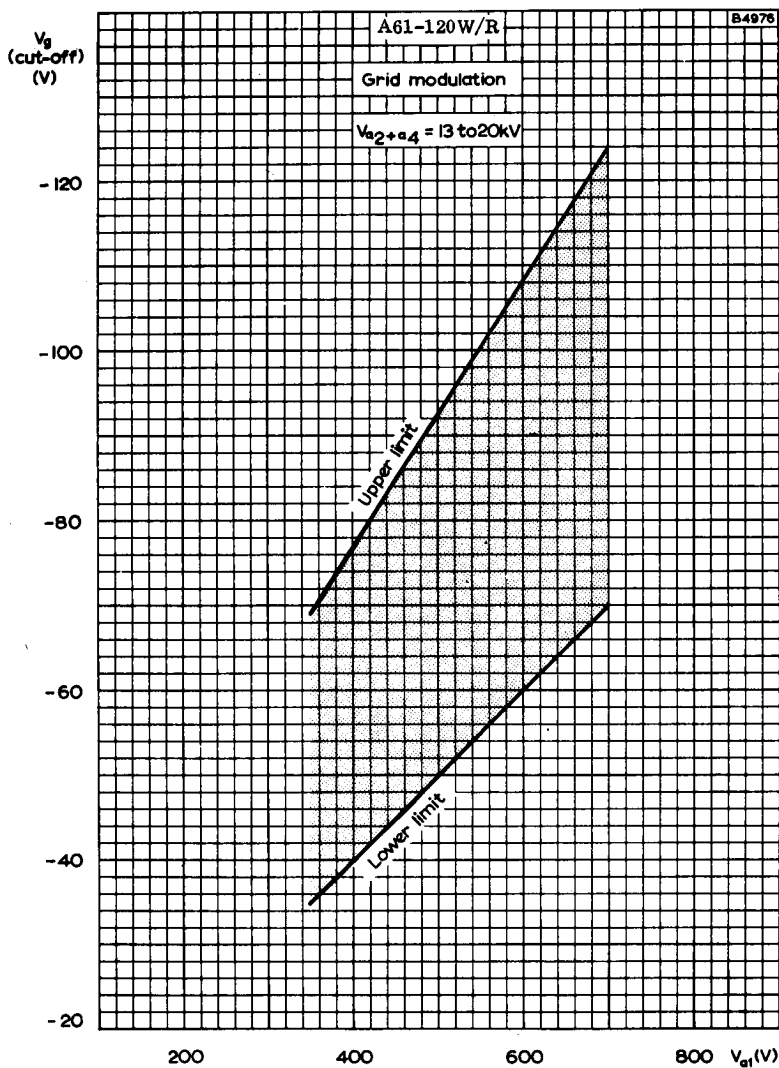
FINAL ANODE CURRENT PLOTTED AGAINST GRID VOLTAGE.  
GRID MODULATION.



FINAL ANODE CURRENT PLOTTED AGAINST CATHODE-TO-GRID VOLTAGE. CATHODE MODULATION.



LIMITS OF CATHODE-TO-GRID CUT-OFF VOLTAGE PLOTTED  
AGAINST FIRST ANODE-TO-GRID VOLTAGE.  
CATHODE MODULATION.



LIMITS OF GRID CUT-OFF VOLTAGE PLOTTED AGAINST  
FIRST ANODE VOLTAGE, GRID MODULATION