PHILIPS

Data handbook

Electronic components and materials

Electron tubes

Part 8 July 1979

TV picture tubes

Monitor tubes

Components

ELECTRON TUBES

PART 8 — JULY 1979

PICTURE TUBES AND COMPONENTS

DATA HANDBOOK SYSTEM

Our Data Handbook System is a comprehensive source of information on electronic components, sub-assemblies and materials; it is made up of three series of handbooks each comprising several parts.

ELECTRON TUBES	BLUE
SEMICONDUCTORS AND INTEGRATED CIRCUITS	RED
COMPONENTS AND MATERIALS	GREEN

The several parts contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

Where ratings or specifications differ from those published in the preceding edition they are pointed out by arrows. Where application information is given it is advisory and does not form part of the product specification.

If you need **confirmation** that the published data about any of our products are the latest available, please contact our representative. He is at your service and will be glad to answer your inquiries.

ELECTRON TUBES (BLUE SERIES)

Part 1a	December 1975	ET1a 12-75	**Transmitting tubes for communication, tubes for r.f. heating** Types PE05/25 to TBW15/25
Part 1b	August 1977	ET1b 08-77	**Transmitting tubes for communication, tubes for r.f. heating, amplifier circuit assemblies**
Part 2a	November 1977	ET2a 11-77	**Microwave tubes** Communication magnetrons, magnetrons for microwave heating, klystrons, travelling-wave tubes, diodes, triodes T-R switches
Part 2b	May 1978	ET2b 05-78	**Microwave semiconductors and components** Gunn, Impatt and noise diodes, mixer and detector diodes, backward diodes, varactor diodes, Gunn oscillators, sub-assemblies, circulators and isolators
Part 3	January 1975	ET3 01-75	**Special Quality tubes, miscellaneous devices**
Part 4	March 1975	ET4 03-75	**Receiving tubes**
Part 5a	March 1978	ET5a 03-78	**Cathode-ray tubes** Instrument tubes, monitor and display tubes, C.R. tubes for special applications
Part 5b	December 1978	ET5b 12-78	**Camera tubes and accessories, image intensifiers**
Part 6	January 1977	ET6 01-77	**Products for nuclear technology** Channel electron multipliers, neutron tubes, Geiger-Müller tubes
Part 7a	March 1977	ET7a 03-77	**Gas-filled tubes** Thyratrons, industrial rectifying tubes, ignitrons, high-voltage rectifying tubes
Part 7b	May 1979	ET7b 05-79	**Gas-filled tubes** Segment indicator tubes, indicator tubes, switching diodes, dry reed contact units
Part 8	July 1979	ET8 07-79	**Picture tubes and components** Colour TV picture tubes, black and white TV picture tubes, monitor tubes, components for colour television, components for black and white television.
Part 9	March 1978	ET9 03-78	**Photomultiplier tubes; phototubes**

SEMICONDUCTORS AND INTEGRATED CIRCUITS (RED SERIES)

Part 1a	August 1978	SC1a 08-78	**Rectifier diodes, thyristors, triacs** Rectifier diodes, voltage regulator diodes (> 1,5 W), transient suppressor diodes, rectifier stacks, thyristors, triacs
Part 1b	May 1977	SC1b 05-77	**Diodes** Small signal germanium diodes, small signal silicon diodes, special diodes, voltage regulator diodes (< 1,5 W), voltage reference diodes, tuner diodes
Part 2	November 1977	SC2 11-77	**Low-frequency and dual transistors***
Part 2	June 1979	SC2 06-79	**Low-frequency power transistors**
Part 3	January 1978	SC3 01-78	**High-frequency, switching and field-effect transistors**
Part 4a	December 1978	SC4a 12-78	**Transmitting transistors and modules**
Part 4b	September 1978	SC4b 09-78	**Devices for optoelectronics** Photosensitive diodes and transistors, light emitting diodes, photocouplers, infrared sensitive devices, photoconductive devices
Part 4c	July 1978	SC4c 07-78	**Discrete semiconductors for hybrid thick and thin-film circuits**
Part 5a	November 1978	SC5a 11-76	**Professional analogue integrated circuits**
Part 5b	March 1977	SC5b 03-77	**Consumer integrated circuits** Radio-audio, television
Part 6	October 1977	SC6 10-77	**Digital integrated circuits** LOCMOS HE4000B family
Signetics integrated circuits 1978			Bipolar and MOS memories Bipolar and MOS microprocessors Analogue circuits Logic - TTL

* Low-frequency general purpose transistors will be transferred to SC3 later in 1979. The old book SC2 11-77 should be kept until then.

COMPONENTS AND MATERIALS (GREEN SERIES)

Part 1	July 1979	CM1 07-79	**Assemblies for industrial use** PLC modules, high noise immunity logic FZ/30-series, NORbits 60-series, 61-series, 90-series, input devices, hybrid integrated circuits, peripheral devices
Part 2a	October 1977	CM2a 10-77	**Resistors** Fixed resistors, variable resistors, voltage dependent resistors (VDR), light dependent resistors (LDR), negative temperature coefficient thermistors (NTC), positive temperature coefficient thermistors (PTC), test switches
Part 2b	February 1978	CM2b 02-78	**Capacitors** Electrolytic and solid capacitors, film capacitors, ceramic capacitors, variable capacitors
Part 3a	September 1978	CM3a 09-78	**FM tuners, television tuners, surface acoustic wave filters**
Part 3b	October 1978	CM3b 10-78	**Loudspeakers**
Part 4a	November 1978	CM4a 11-78	**Soft ferrites** Ferrites for radio, audio and television, beads and chokes, Ferroxcube potcores and square cores, Ferroxcube transformer cores
Part 4b	February 1979	CM4b 02-79	**Piezoelectric ceramics, permanent magnet materials**
Part 6	April 1977	CM6 04-77	**Electric motors and accessories** Small synchronous motors, stepper motors, miniature direct current motors
Part 7	September 1971	CM7 09-71	**Circuit blocks** Circuit blocks 100 kHz-series, circuit blocks 1-series, circuit blocks 10-series, circuit blocks for ferrite core memory drive
Part 7a	January 1979	CM7a 01-79	**Assemblies** Circuit blocks 40-series and CSA70 (L), counter modules 50-series, input/output devices
Part 8	June 1979	CM8 06-79	**Variable mains transformers**
Part 9	March 1976	CM9 03-76	**Piezoelectric quartz devices**
Part 10	April 1978	CM10 04-78	**Connectors**

GENERAL SECTION

TV PICTURE TUBES AND MONITOR TUBES

LIST OF SYMBOLS

Symbols denoting electrodes/elements and electrode/element connections

f	Heater
k	Cathode
g	Grid: Grids are distinguished by means of an additional numeral; the electrode nearest to the cathode having the lowest number.
a	Anode
m	External conductive coating
m^1	Rim band
ℓ	Fluorescent screen
i.c.	Tube pin which must not be connected externally
n.c.	Tube pin which may be connected externally

Symbols denoting voltages

Unless otherwise stated, the reference point for electrode voltages is the cathode.

V	Symbol for voltage, followed by a subscript denoting the relevant electrode/element
V_f	Heater voltage
V_{pp}	Peak-to-peak value of a voltage
V_p	Peak value of a voltage
V_{GR}	Grid 1 voltage for visual extinction of focused raster (grid drive service)
V_{KR}	Cathode voltage for visual extinction of focused raster (cathode drive service)

Symbols denoting currents

I	Symbol for current followed by a subscript denoting the relevant electrode
I_f	Heater current (r.m.s. value)

Note: The symbols quoted represent the average value of the current, unless otherwise stated.

Symbols denoting powers

P_ℓ	Dissipation of the fluorescent screen
P_g	Grid dissipation

Symbols denoting capacitances

See IEC publication 100

Symbols denoting resistances and impedances

R	Symbol for resistance followed by a subscript for the relevant electrode pair. When only one subscript is given the second electrode is the cathode.
Z	Symbol for impedance followed by a subscript for the relevant electrode pair. When only one subscript is given the second electrode is the cathode.

Symbols denoting various quantities

L	Luminance
f	Frequency
H	Magnetic field strength

GENERAL OPERATIONAL RECOMMENDATIONS

INTRODUCTION

Equipment design should be based on the characteristics as stated in the data sheets. Where deviations from these general recommendations are permissible or necessary, statements to that effect will be made.

If applications are considered which are not referred to in the data sheets of the relevant tube type extra care should be taken with circuit design to prevent the tube being overloaded due to unfavourable operating conditions.

SPREAD IN TUBE CHARACTERISTICS

The spread in tube characteristics is the difference between maximum and minimum values. Values not qualified as maximum or minimum are nominal ones. It is evident that average or nominal values, as well as spread figures, may differ according to the number of tubes of a certain type that are being checked. No guarantee is given for values of characteristics in settings substantially differing from those specified in the data sheets.

SPREAD AND VARIATION IN OPERATING CONDITIONS

The operating conditions of a tube are subject to spread and/or variation.

Spread in an operating condition is a **permanent** deviation from an average condition due to, e.g., component value deviations. The average condition is found from such a number individual cases taken at random that an increase of the number will have a negligible influence.

Variation in an operating condition is **non-permanent** (occurs as a function of time), e.g., due to supply voltage fluctuations. The average value is calculated over a period such that a prolongation of that period will have negligible influence.

LIMITING VALUES

Limiting values are in accordance with the applicable rating system as defined by IEC publication 134. Reference may be made to one of the following 3 rating systems.

Absolute maximum rating system. Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.
These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

The equipment manufacturer should design so that, initially and throughout life, no absolute maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply voltage variation, equipment components spread and variation, equipment control adjustment, load variations, signal variation, environmental conditions, and spread or variations in characteristics of the device under considerations and of all other electronic devices in the equipment.

Design-maximum rating system. Design-maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device* of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and thoughout life, no design-maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

Design-centre rating system. Design-centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device* of a specified type as defined by its published data, and should not be exceeded under average conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply-voltage variation, equipment component spread and variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations or spread in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design-centre value for the intended service is exceeded with a bogey electronic device* in equipment operating at the stated normal supply voltage.
If the tube data specify limiting values according to more than one rating system the circuit has to be designed so that none of these limiting values is exceeded under the relevant conditions.

In addition to the limiting values given in the individual data sheets the directives in the following paragraphs should be observed.

HEATER SUPPLY

For maximum cathode life it is recommended that the heater supply be stabilized at the nominal heater voltage. Any deviation from this heater voltage has a detrimental effect on tube performance and life, and should therefore be kept to a minimum. Such deviations may be caused by:

- mains voltage fluctuations;
- spread in the characteristics of components such as transformers, resistors, capacitors, etc.;
- spread in circuit adjustments;
- operational variations.

Supply from mains transformer

The maximum deviation of the heater voltage must not exceed ± 15% (Design Maximum Value). A mains transformer will generally fulfil this condition at mains voltage fluctuations not exceeding ± 10%.

Supply from line output transformer

A deviation from the nominal heater voltage due to spread in component characteristics and adjustments should not exceed ± 7,5%. Considering all other possible deviations, due to mains voltage variations, beam current variations, VCR-operation, etc., the total spread in heater voltage must not exceed ± 15%.

* A bogey tube is a tube whose characteristics have the published nominal values for the type. A bogey tube for any particular application can be obtained by considering only those characteristics which are directly related to the application.

Standby (instant-on circuits)

The majority of tubes employ quick-heating cathodes and therefore an instant-on circuit is superfluous. If used, it is recommended to that the heater voltage of the tubes be reduced during standby operation to 75% of the nominal value.

Notes: If series connection of the heater circuit has to be used, and only parallel connection is quoted in the data sheet, please contact your local supplier.

Picture tubes with quick-heating cathodes should not be used in series with receiving tubes.

CATHODE TO HEATER VOLTAGE

The voltage between cathode and heater should be as low as possible and never exceed the limiting values given in the data sheets of the individual tubes. The limiting values relate to that side of the heater where the voltage between cathode and heater is greatest. The voltage between cathode and heater may be d.c., a.c., or a combination of both. Unless otherwise stated, the maximum values quoted indicate the maximum permissible d.c. voltage. If a combination of d.c. and a.c. voltages is applied, the peak value may be twice the rated V_{kf}; however, unless otherwise stated, this peak value shall never exceed 315 V. Unless otherwise stated, the V_{kf} max. holds for both polarities of the voltage; however, a positive cathode is usually the most favourable in view of insulation during life.

In order to avoid excessive hum the a.c. component of the heater to cathode voltage should be as low as possible and never exceed 20 V r.m.s. (mains frequency). A d.c. connection should always be present between heater and cathode. Unless otherwise specified the maximum resistance should not exceed 1 MΩ; the maximum impedance at mains frequency should be less than 100 kΩ.

INTERMEDIATE ELECTRODES (between cathode and final accelerator)

In no circumstances should the tube be operated without a d.c. connection between each electrode and the cathode. The total effective impedance between each electrode and the cathode should never exceed the published maximum value. However, no electrode should be connected directly to a high energy source. When such a connection is required, it should be made via a series resistor of not less then 1 kΩ.

CUT-OFF VOLTAGE

Curves showing the limits of the cut-off voltage as a function of grid 2 voltage are generally included in the data. The brightness control should be so dimensioned that it can handle any tube within the limits shown, at the appropriate grid 2 voltage.

The published limits are determined at an ambient illumination level of 10 lux. Because the brightness of a spot is in general greater than that of a raster of the same current, the cut-off voltage determined with the aid of a focused spot will be more negative by about 5 V as compared with that of a focused raster.

FOCUSING ELECTRODE VOLTAGE

Individual tubes will have satisfactory focus over the entire screen at some value within the published range of the focusing voltage.

Due to their flat focus characteristics, black and white picture tubes can generally be operated at a fixed focusing voltage within the published range. Colour picture tubes and monitor tubes for data display should have adjustable focus.

LUMINESCENT SCREEN

To prevent permanent screen damage, care should be taken:

– not to operate the tube with a stationary picture at high beam currents for extended periods;
– not to operate the tube with a stationary or slowly moving spot except at extremely low beam currents;
– if no e.h.t. bleeder is used, to choose the time constants of the cathode, grid 1, grid 2, and deflection circuits, such that sufficient beam current is maintained to discharge the e.h.t. capacitance before deflection has ceased after equipment has been switched off.

EXTERNAL CONDUCTIVE COATING

The external conductive coating must be connected to the chassis. The capacitance of this coating to the final accelerating electrode may be used to provide smoothing for the e.h.t. supply.

The coating is not a perfect conductor and in order to reduce electromagnetic radiation caused by the line time base and the picture content it may be necessary to make multiple connections to the coating. See also 'Flashover'.

METAL RIMBAND

An appreciable capacitance exists between the metal rimband and the internal conductive coating of the tube; its value is quoted in the individual data sheets.To avoid electric shock, a d.c. connection should be provided between the metal band and the external conductive coating. In receivers where the chassis can be connected directly to the mains there is a risk of electric shock if access is made to the metal band. To reduce the shock to the safe limit, it is suggested that a 2 MΩ resistor capable of handling the peak voltages be inserted between the metal band and the point of contact with the external conductive coating. This safety arrangement will provide the necessary insulation from the mains but in the event of flashover high voltages will be induced on the metal band. It is therefore recommended that the 2 MΩ resistor be bypassed by a 4,7 nF capacitor capable of withstanding the peak voltage determined by the voltage divider formed by this capacitor and the capacitance of the metal rimband to the internal conductive coating, and the anode voltage. The 4,7 nF capacitor also serves to improve e.h.t. smoothing by adding the rimband capacitance to the capacitance of the outer conductive coating.

FLASHOVER

High electric field strengths are present between the gun electrodes of picture tubes. Voltages between gun electrodes may reach values of 20 kV over approx. 1 mm. Although the utmost precautions are taken in the design and manufacture of the tubes, there is always a chance that flashover will occur. The resulting transient currents and voltages may be of sufficient magnitude to cause damage to the tube itself and to various components on the chassis. Arcing terminates when the e.h.t. capacitor is discharged. Therefore it is of vital importance to provide protective circuits with spark gaps and series resistors, which should be connected according to Fig. 1. No other connections between the outer conductive coating and the chassis are permissible.

In picture tubes which are manufactured in Soft-Flash technology, the peak discharge currents are limited to approx. 60 A, offering higher set reliability, optimum circuit protection and component savings (see also Technical Note 039). However this limited value of 60 A is still too high for the circuitry which is directly connected to the tube socket. Therefore Soft-Flash picture tubes should also be provided with spark gaps.

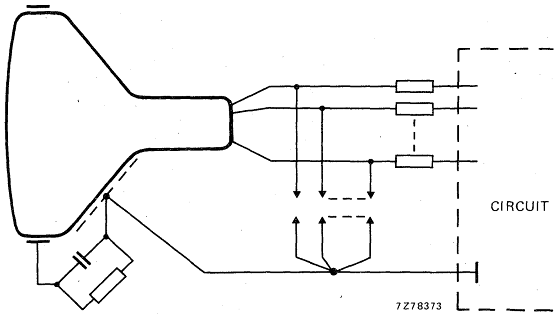


Fig. 1.

IMPLOSION PROTECTION

All picture tubes employ integral implosion protection and must be replaced with a tube of the same type number or recommended replacement to assure continued safety.

HANDLING

Although all picture tubes are provided with integral implosion protection, which meets the intrinsic safety requirements stipulated in the relevant part of IEC 65, care should be taken not to scratch or knock any part of the tube. **Stress on the tube neck must be avoided.**

When lifting a tube from the edge-down position, one hand should be placed around the parabola section of the cone and the other hand should be placed under the rim band (Fig. 2).

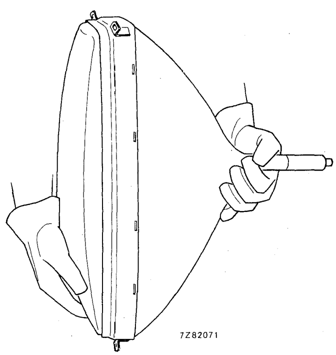


Fig. 2 Lifting picture tube from edge-down position.

When placing a tube face downwards ensure that the screen rests on a soft pad of suitable material, kept free from abrasive substances. When lifting from the face-down position the hand should be placed under the areas of the faceplate close to the mounting lugs at diagonally opposite corners of the faceplate (Fig. 3).

When lifting from the face-up position the hands should be placed under the areas of the cone close to the mounting lugs at diagonally opposite corners of the cone (Fig. 4).

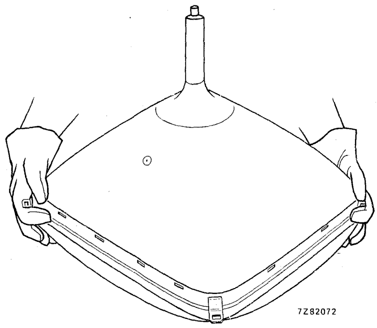


Fig. 3 Lifting picture tube from face-down position.

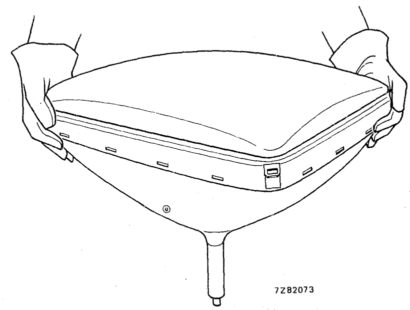


Fig. 4 Lifting tube from face-up position.

In all handling procedures prior to insertion in the receiver cabinet there is a risk of personal injury as a result of severe accidental damage to the tube. It is therefore recommended that protective clothing should be worn, **particularly eye shielding.**

If suspending the tube from the mounting lugs ensure that a **minimum of 2** are used; UNDER NO CIRCUMSTANCES HANG THE TUBE FROM ONE LUG.

The slots in the rimband of colour picture tubes are used in the mounting of the degaussing coils. It is not recommended to suspend the tube from one or more of these slots as permanent deformation to the rimband can occur.

Remember when replacing or servicing the picture tube that a residual electrical charge may be carried by the anode contact and also the external coating if not earthed. Before removing the tube from the equipment, earth the external coating and short the anode contact to the coating.

PACKING

The packing provides protection against tube damage under normal conditions of shipment or handling. Observe any instructions given on the packing and handle accordingly. The tube should under no circumstances be subjected to accelerations greater than 35 g.

MOUNTING

Unless otherwise specified on the data sheets for individual tubes there are no restrictions on the position of mounting.

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

The mass of the socket and additional circuitry should not be more than 150 g. The socket of tubes with a 7-pin miniature base may not be used for mounting components.

It is very desirable that tubes should not be exposed to strong electrostatic and magnetic fields.

DIMENSIONS

In designing the equipment the tolerances given on the dimensional drawings should be considered. Under no circumstances should the equipment be designed around dimensions taken from individual tubes.

REFERENCE LINE

Where a reference line is indicated on the tube outline drawing, it is determined by means of a gauge. Drawings of the gauges are given in this section under "Reference line gauges"

TYPE DESIGNATION

PRO ELECTRON TYPE DESIGNATION CODE

The type number of the picture tubes consists of:
Single letter, group of figures, hyphen, group of figures, letter or letter group.

The first letter indicates the prime application of the tube:
A – Television display tube for domestic application.
M – Monitor tube for video and data display.

First group of figures: diameter or diagonal of the face in cm.

Second group of figures: design number.

Final letter or letter group: properties of the phosphor screen.
The first letter denotes the colour of the fluorescence; the second letter, if any, denotes other specific differences in screen properties.
W – White screen for television and data display tubes.
X – Three-colour screen for television display tubes.
GH – Green screen for video and data display tubes (medium-short persistence).
GR – Green screen for video and data display tubes (long persistence).

Example

A66-540X

television display tube for domestic application | face diagonal (66 cm) | design number | three-colour screen

SCREEN PHOSPHORS

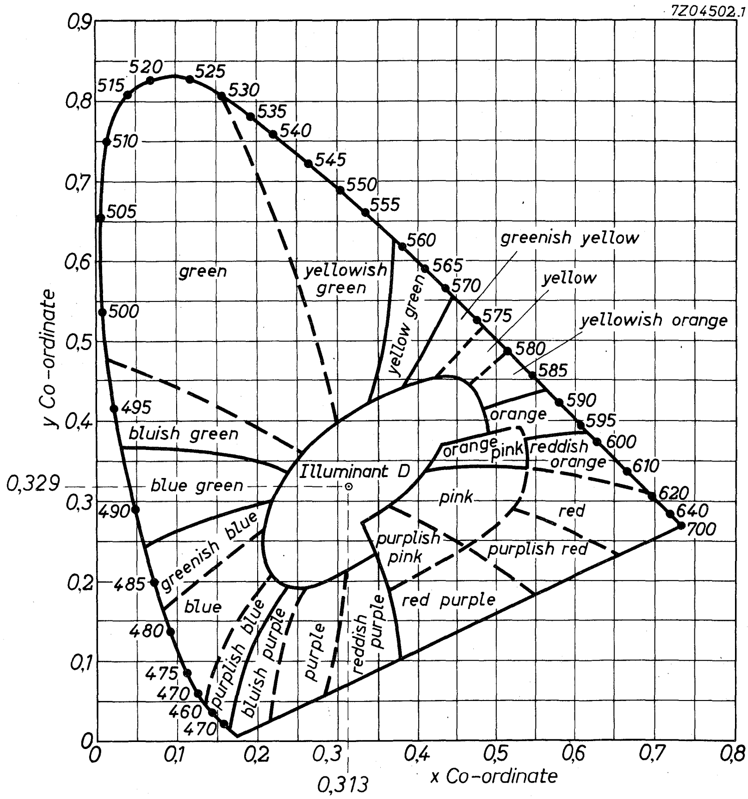


Fig. 1 Kelly chart.

Note: For screen phosphors for colour picture tubes, see the relevant data sheets.

Survey of screen phosphors

type	JEDEC designation	fluorescent colour	phosphorescent colour	persistence	relative level of luminance 10%	1%	0,1%	
W	P4	white	–	–	1,3 ms	23 ms	210 ms	(yellow component)
					1,3 ms	20 ms	180 ms	(blue component)
GH	P31	green	green	medium short	600 μs	8 ms	90 ms	
GR	P39	green	green	long	100 ms	1,4 s	9 s	
X	–	colour screen	–	–	–	–	–	

The values in the table are measured under the following operation conditions.

Final accelerator voltage	10 to 18 kV
Screen current	0,1 $\mu A/cm^2$
Focusing	defocused
Excitation	sufficient for complete build-up

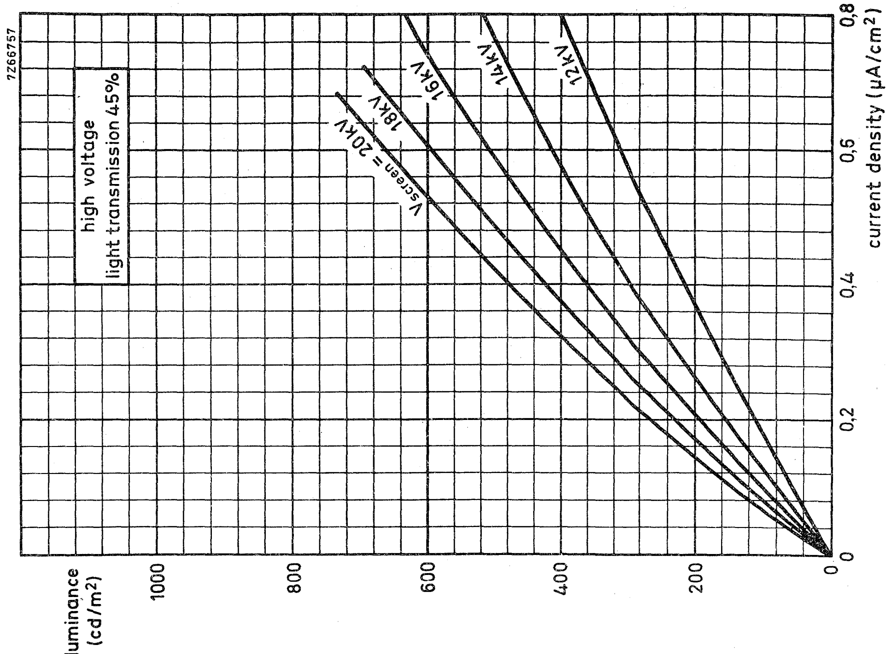


Fig. 3 Luminance as a function of current density for W phosphor.

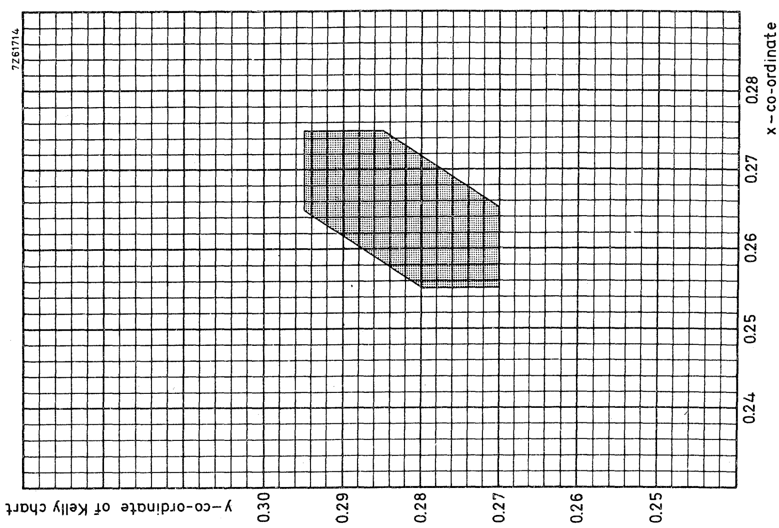


Fig. 2 Colour point tolerance area for W phosphor.

REFERENCE LINE GAUGES

REFERENCE LINE GAUGE C (JEDEC 126) (IEC67-IV-3)

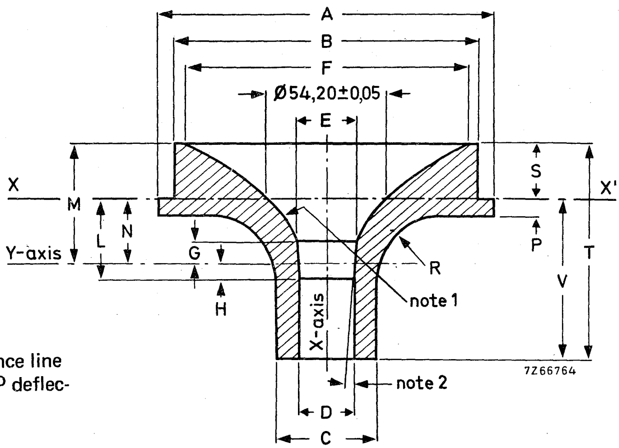


Fig. 1 Reference line gauge for 110° deflection angle.

The millimetre dimensions are derived from the original inch dimensions.

ref.	inches			millimetres			notes
	min.	nom.	max.	min.	nom.	max.	
A	–	5,000	–	–	127,00	–	–
B	–	4,500	–	–	114,30	–	–
C	–	2,000	–	–	50,80	–	–
D	1,168	1,168	1,171	29,668	29,668	29,743	–
E	1,241	1,242	1,243	31,522	31,547	31,572	–
F	4,248	4,250	4,252	107,900	107,950	108,000	–
G	–	0,279	–	–	7,09	–	2
H	–	0,250	–	–	6,35	–	–
L	1,165	1,170	1,175	29,60	29,72	29,84	2
M	–	1,634	–	–	41,50	–	–
N	–	0,920	–	–	23,37	–	1
P	–	0,250	–	–	6,35	–	–
R	–	1,000r	–	–	25,40r	–	–
S	0,712	0,714	0,716	18,085	18,136	18,186	–
T	–	3,214	–	–	81,64	–	–
V	2,490	2,500	2,510	63,25	63,50	63,75	–

Notes
1. $y = 0,58\,x^2 + 0,576$ inches ($0,0228\,x^2 + 14,630$ mm) 'y' values must be held to ±0,002" (0,05 mm). The Y-axis is 0,920" (23,368 mm) below the X-X' reference plane.
2. 4° ± 30' taper between planes G and L.

REFERENCE LINE GAUGE D

Dimensions in mm

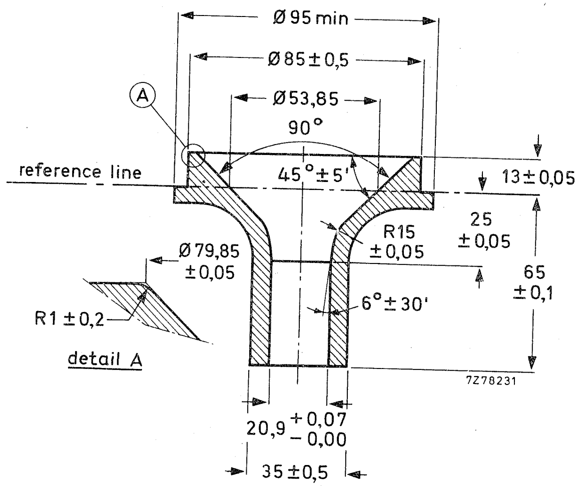


Fig. 2 Reference line gauge for 90° deflection angle.

REFERENCE LINE GAUGE G (JEDEC G148)

Dimensions in mm

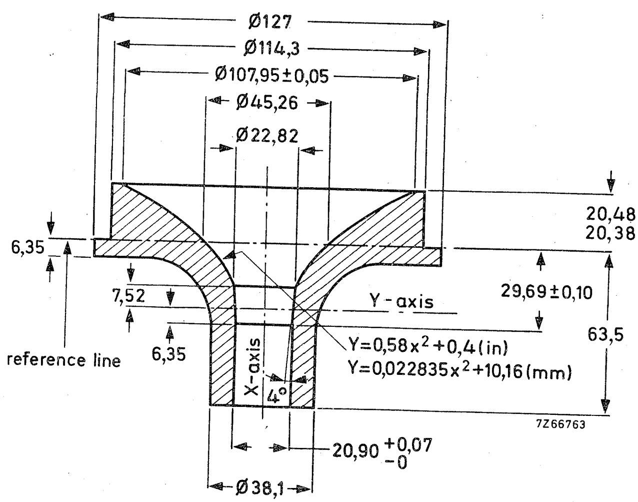


Fig. 3 Reference line gauge for 110° deflection angle.

Dimensions in mm

Reference line gauge GR90CJ4

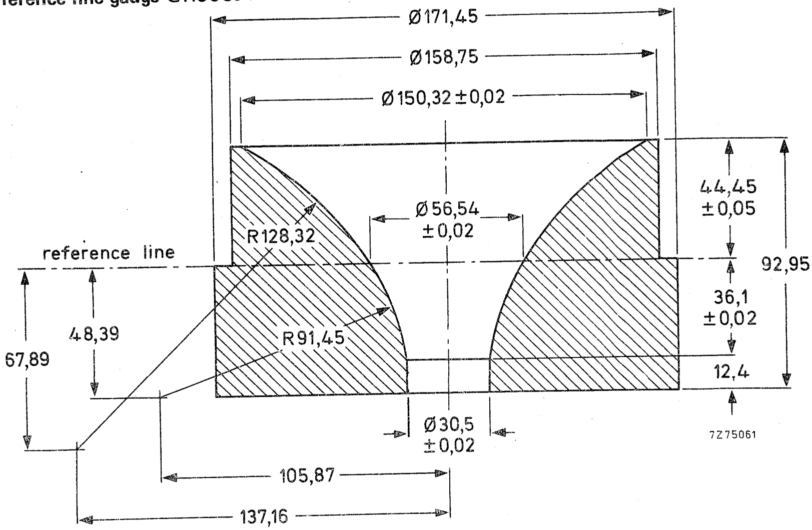


Fig. 4 Reference line gauge for 90° deflection angle.

BASES

SMALL-BUTTON NEO EIGHTAR BASE IEC 67-1-31
JEDEC B7-208

Dimensions in mm

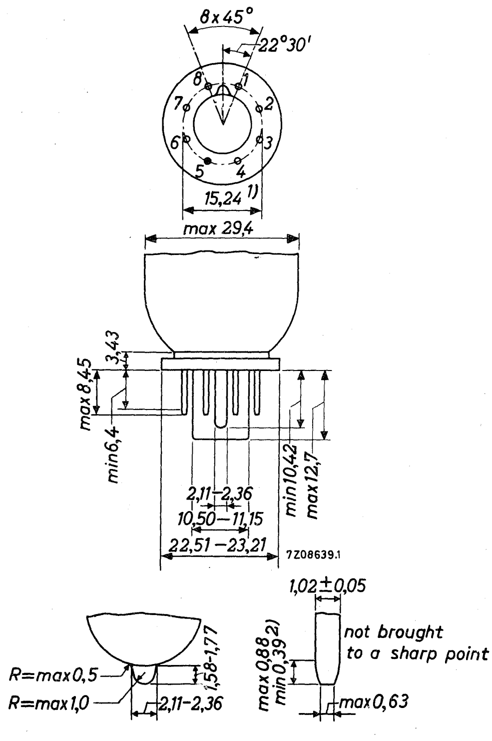


Fig. 1.

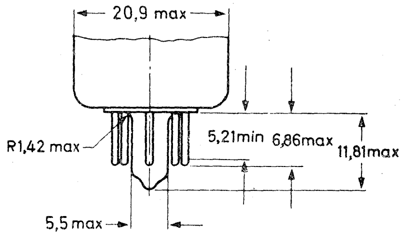
Notes

1. Base-pin positions are held to tolerances such that the base will fit a flat-plate gauge having a thickness of 9,53 and eight equally spaced holes of 1,40 ± 0,01 diameter located on a 15,24 ± 0,01 diameter circle. The gauge is also provided with a centre hole to provide 0,25 diametric clearance for the lug and key. Pin fit in the gauge shall be such that the entire length of pins will, without undue force, pass into and disengage from the gauge.
2. This dimension may vary within the limits shown around the periphery of any individual pin.

7-PIN MINIATURE BASE WITH PUMPING STEM

Dimensions in mm

Dimensions of this base are within the JEDEC E7-91 dimensions



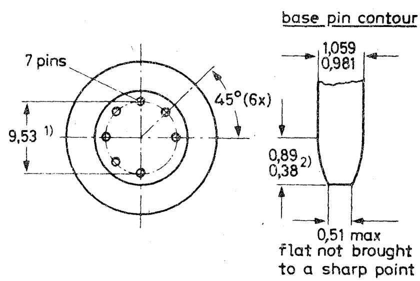


Fig. 2.

Notes

1. Base-pin and pumping stem positions are held to tolerances such that entire length of pins and stem will without undue force pass into and disengage from a flat-plate gauge having a thickness of 6,35 mm and eight holes with diameters of 1,27 ± 0,013 mm so located on a 9,525 ± 0,013 mm diameter circle that the distance along the chord between any two adjacent hole centres is 3,645 ± 0,013 mm and a centre hole of 5,97 + 0,025 mm being chamfered at the top over 1,52 mm with an angle of 45 degrees.
2. This dimension around the periphery of any individual pin may vary within the limits shown.

Dimensions in mm

12-PIN BASE JEDEC B12-246, IEC-67-I-47a

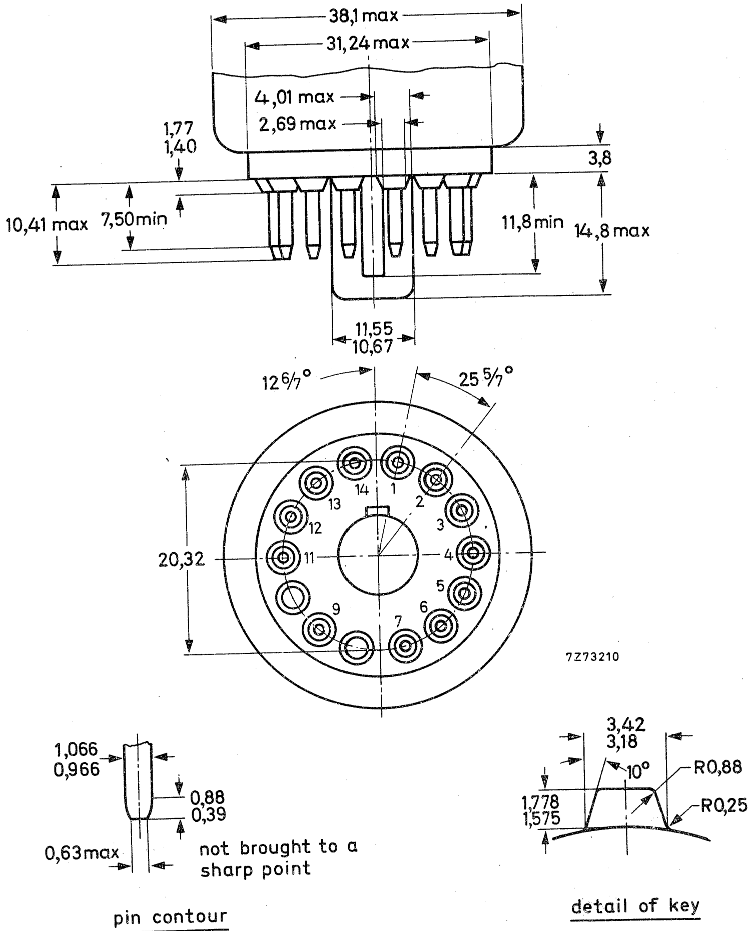


Fig. 3.

12-pin Base JEDEC B12-262

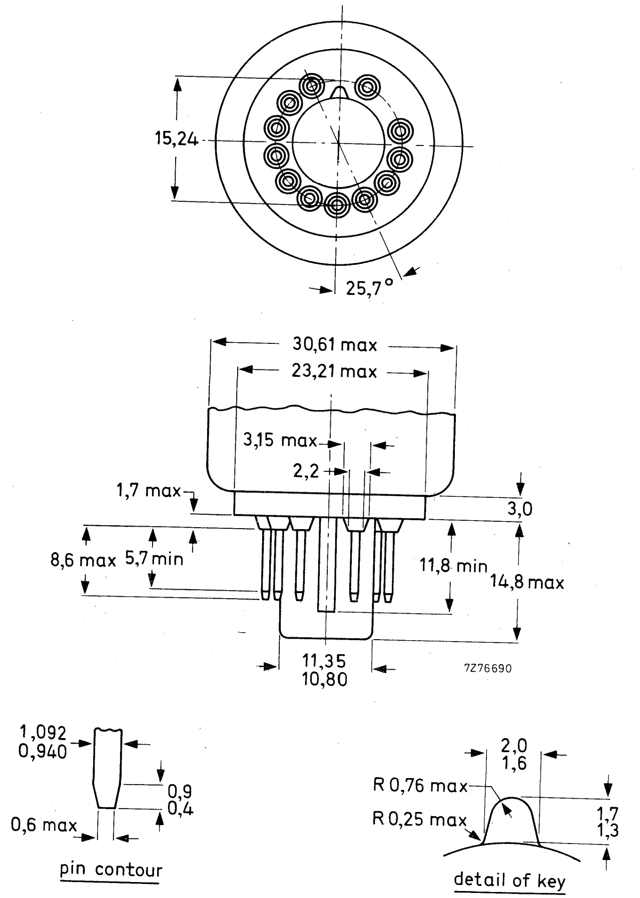


Fig. 4.

COLOUR TV PICTURE TUBES

SURVEY

type number	deflection angle	face diagonal	neck diameter	remarks
A51-570X	90°	51 cm (20 in)	29,1 mm	
A51-500X	110°	51 cm (20 in)	36,5 mm	obsolete type
A51-510X				
A51-540X				development type
A56-140X		56 cm (22 in)	36,5 mm	obsolete type
A56-410X				maintenance type
A56-500X				obsolete type
A56-510X				
A56-540X				development type
A66-140X		66 cm (26 in)	36,5 mm	obsolete type
A66-410X				maintenance type
A66-500X				obsolete type
A66-510X				
A66-540X				development type

COLOUR PICTURE TUBE

Replacement type A51-510X.

20AX Hi-Bri COLOUR PICTURE TUBE

- Short overall length
- In-line gun
- Standard neck
- Hi-Bri screen for increased brightness
- Slotted shadow mask optimized for minimum moiré
- Fine constant pitch over entire screen
- Quick-heating cathodes
- Internal magnetic shield
- Reinforced envelope for push-through mounting
- Picture tube and deflection unit (e.g. AT1085) form an inherently self-converging system
- Interchangeable with colour picture tube A51-500X

QUICK REFERENCE DATA

Deflection angle	110°
Face diagonal	51 cm
Overall length	35 cm
Neck diameter	36,5 mm
Heating	6,3 V, 720 mA
Focusing	bi-potential

ELECTRICAL DATA

Capacitances		
final accelerator to external conductive coating	$C_{a,g5,g4/m}$	max. 1400 pF min. 900 pF
final accelerator to metal rimband	$C_{a,g5,g4/m}$	250 pF
grid 1 of a gun to all other electrodes		
red gun	C_{g1R}	7 pF
green gun	C_{g1G}	7 pF
blue gun	C_{g1B}	7 pF
cathodes of all guns (connected in parallel) to all other electrodes	C_k	12 pF
cathode of any gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}	4 pF
grid 3 (focusing electrode) to all other electrodes	C_{g3}	7 pF
Focusing		electrostatic (bi-potential)
Deflection method		magnetic
Deflection angles		
diagonal		110°
horizontal		97°
vertical		77°
Heating	indirect by a.c. or d.c.	
heater voltage	V_f	6,3 V*
heater current	I_f	720 mA

OPTICAL DATA

Screen	metal-backed vertical phosphor stripes
Screen finish	satinized
Phosphor	
red	europium activated rare earth
green	sulphide type
blue	sulphide type
Centre-to-centre distance of vertical identical colour phosphor stripes	0,8 mm
Light transmission of face glass	64 %

* For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V; see also graph on the last page of this data sheet.

MECHANICAL DATA (see also the figures on the following pages)

Overall length	351,4 ± 6,5 mm
Neck diameter	$36{,}5 ^{+1{,}6}_{-0}$ mm
Bulb dimensions	
diagonal	max. 515,5 mm
width	max. 442,5 mm
height	max. 343,8 mm
Useful screen dimensions	
diagonal	min. 480,0 mm
horizontal axis	min. 404,4 mm
vertical axis	min. 303,3 mm
area	min. 1199 cm^2
Net mass	approx. 12 kg
Base	12-pin base IEC 67-I-47a, type 2
Anode contact	small cavity contact J1-21, IEC 67-III-2
Mounting position	any

Handling

During shipment and handling the tube should not be subjected to accelerations greater than 35g in any direction.

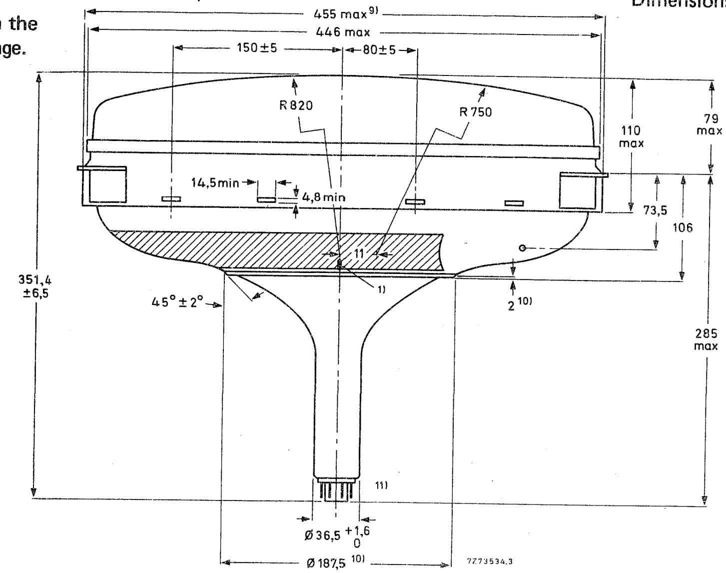
Notes to outline drawings on the following pages

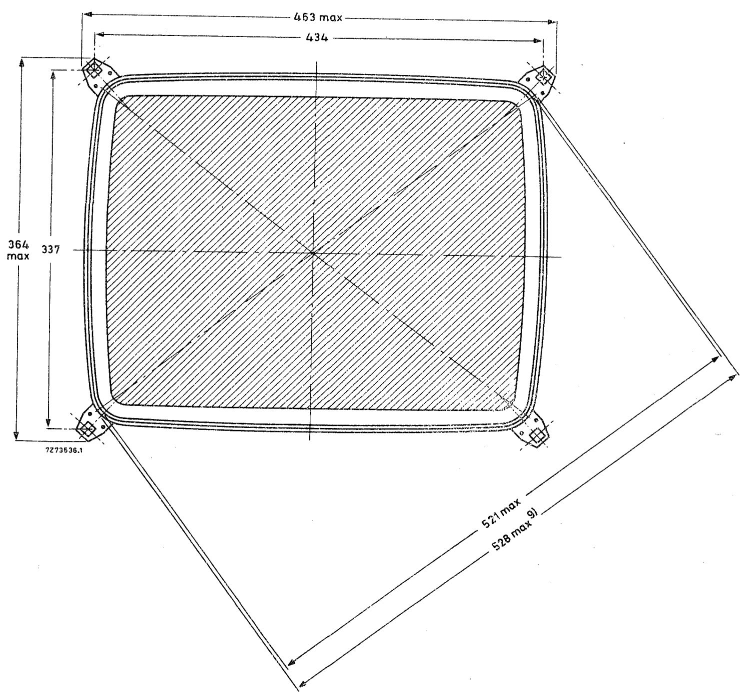
1. This ridge can be used as an orientation for the deflection unit.
2. Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.
3. To clean this area, wipe only with a soft lintless cloth.
4. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
5. Minimum space to be reserved for mounting lug.
6. The position of the mounting screw in the cabinet must be within a circle of 8 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 434 mm x 337 mm.
7. Co-ordinates for radius R = 13,1 mm: x = 184,58 mm, y = 131,93 mm.
8. Distance from point z to any hardware.
9. Maximum dimensions in plane of lugs.
10. Centring ring for deflection unit.
11. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 55 mm.
12. Minimum distance between glass and rimband in plane of centre line of apertures.

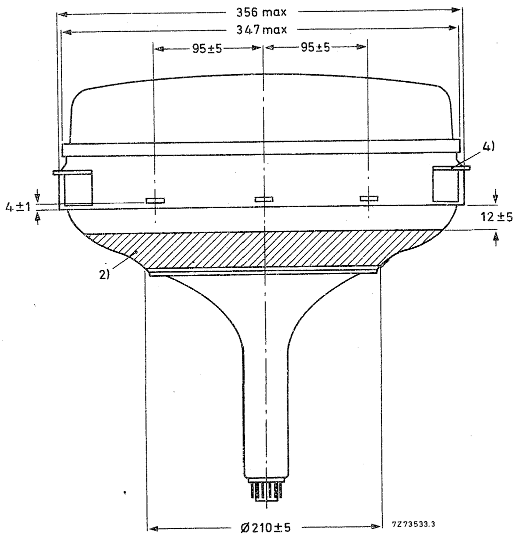
MECHANICAL DATA (continued)

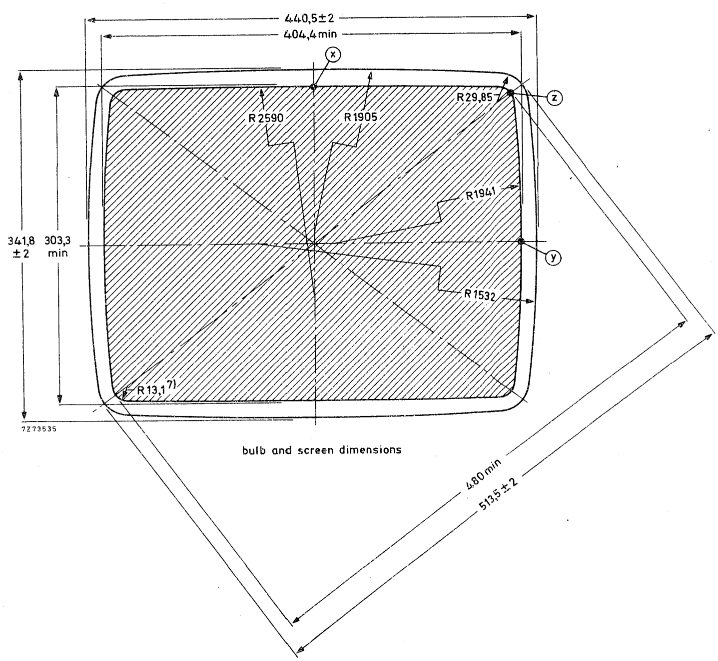
Dimensions in mm

Notes are on the preceding page.



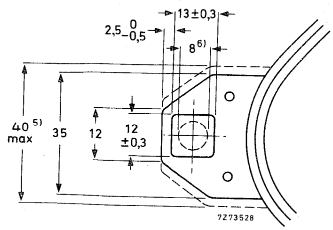


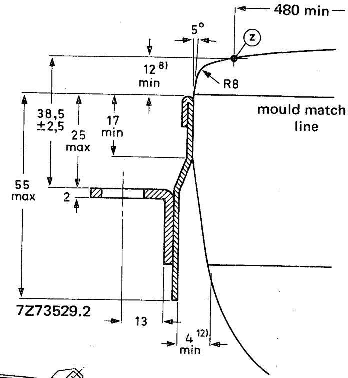


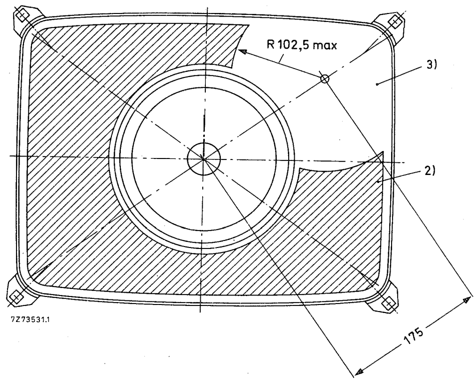


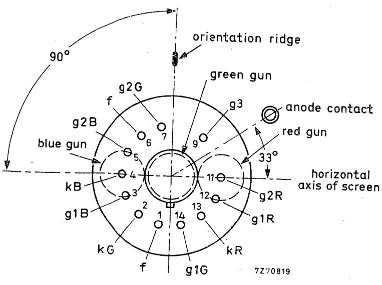
bulb and screen dimensions

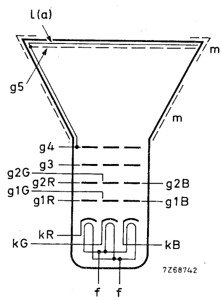
MECHANICAL DATA (continued)

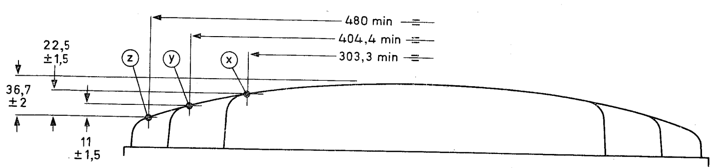




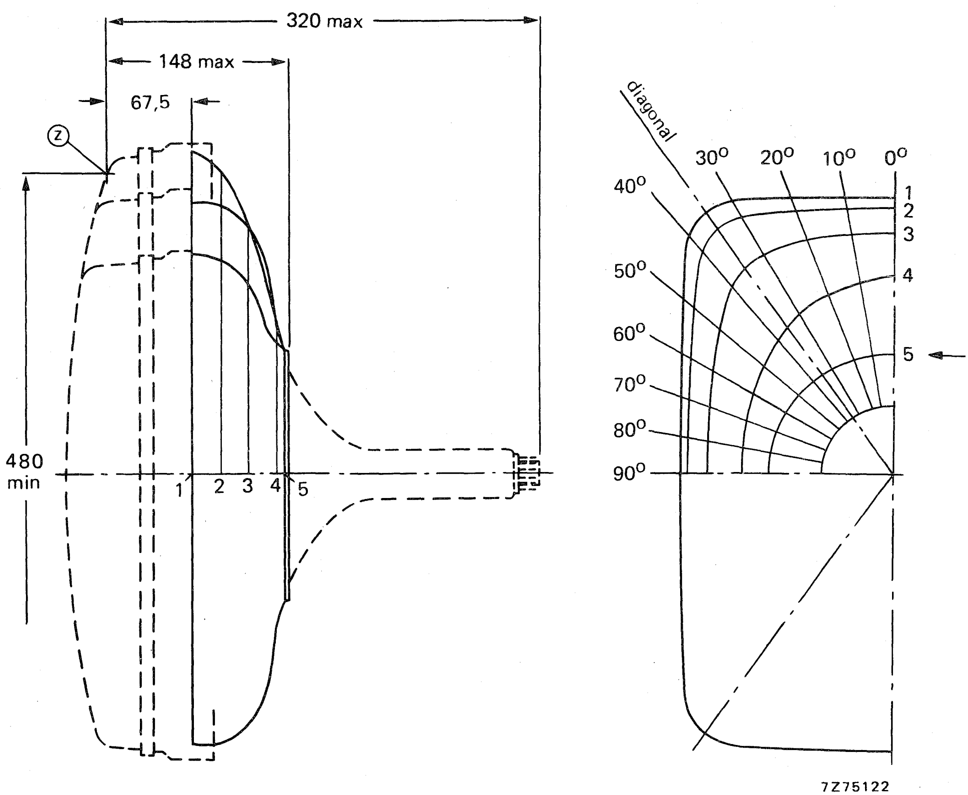








Maximum cone contour



Sec-tion	Nom. distance from section 1	Distance from centre (max. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
1	0	222	225	236	254	258	252	217	193	178	172	170
2	20	216	217	226	240	244	238	205	185	172	165	163
3	40	195	195	200	204	205	198	180	166	156	150	148
4	60	162	158	154	148	144	141	134	128	123	121	121
5	74	98	98	98	98	98	98	98	98	98	98	98

TYPICAL OPERATING CONDITIONS

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a,g5,g4}$	25 kV	
Grid 3 (focusing electrode) voltage	V_{g3}	4,0 to 4,8 kV	
Grid 2 voltage for a spot-cut-off voltage V_k = 140 V	V_{g2}	465 to 705 V	note 1
Cathode voltage for spot cut-off at V_{g2} = 555 V	V_k	110 to 165 V	note 2
Luminance at the centre of the screen	L	155 cd/m²	note 3

EQUIPMENT DESIGN VALUES (each gun if applicable)

The values are valid for final accelerator voltages between 20 kV and 27,5 kV.

The voltages are specified with respect to grid 1.

Grid 3 (focusing electrode) voltage	V_{g3}	16 to 19,2% of final accelerator voltage
Grid 2 voltage	V_{g2}	see cut-off design chart
Cathode voltage for visual extinction of focused spot	V_k	see cut-off design chart
Difference in cut-off voltages between guns in one tube	ΔV_k	lowest value is min. 75% of highest value
Grid 3 (focusing electrode) current	I_{g3}	−5 to + 5 µA
Grid 2 current	I_{g2}	−5 to + 5 µA
Grid 1 current at V_k = 150 V	I_{g1}	−5 to + 5 µA

Notes

1. This range of V_{g2} has to be used when in circuit design fixed values for cut-off of the three guns are used.
2. This range of V_k has to be used when in circuit design fixed values for V_{g2} of the three guns are used.
3. Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 µA/cm². See also Technical Note 065.

EQUIPMENT DESIGN VALUES (continued)

				white "D"
To produce white of the following CIE co-ordinates:	x	0,265	0,281	0,313
	y	0,290	0,311	0,329
Percentage of total anode current supplied by each gun (typical)				
red gun		26,4	30,6	41,2
green gun		34,3	35,4	32,2
blue gun		39,3	34,0	26,6
Ratio of anode currents	>	0,60	0,65	0,95
red gun to green gun	av.	0,75	0,85	1,30
	<	1,00	1,15	1,70
Ratio of anode currents	>	0,50	0,65	1,15
red gun to blue gun	av.	0,65	0,90	1,55
	<	0,90	1,20	2,05

LIMITING VALUES (each gun if applicable)

Design maximum rating system unless otherwise specified.

The voltages are specified with respect to grid 1.

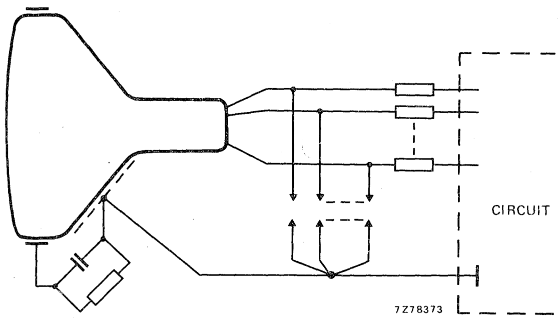
Final accelerator voltage	$V_{a,g5,g4}$	max.	27,5	kV	notes 1,2,3
		min.	20	kV	notes 1,4
Long term average current for three guns	I_a	max.	1000	μA	note 5
Grid 3 (focusing electrode) voltage	V_{g3}	max.	6	kV	
Grid 2 voltage	V_{g2}	max.	1000	V	
Cathode voltage					
positive	V_k	max.	400	V	
positive, operating cut-off	V_k	max.	200	V	
negative	$-V_k$	max.	0	V	
negative peak	$-V_{kp}$	max.	2	V	
Cathode to heater voltage					
positive	V_{kf}	max.	250	V	
positive peak	V_{kfp}	max.	300	V	note 1
negative	$-V_{kf}$	max.	135	V	
negative peak	$-V_{kfp}$	max.	180	V	note 1

Notes

1. Absolute maximum rating system.
2. The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values.
3. During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.
4. Operation of the tube at lower voltages impairs the luminance and resolution.
5. 1500 μA permitted provided a current limiting circuit is used.

REMARK

With the high voltage used with this tube (max. 27,5 kV) internal flashovers may occur. These may destroy the cathode(s) of the tube. Therefore it is necessary to provide protective circuits, using spark gaps. The spark gaps should be connected according to the figure below.



No other connections between the outer conductive coating and the chassis are permissible.

BEAM CORRECTIONS

When the tube is used with the deflection unit AT1085 the following corrections should be applied:

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of the multi-pole unit AT1081.*	45 μm
Static convergence deviations must be corrected by a static multi-pole unit AT1081 providing adjustable four-pole and six-pole fields centred around the tube axis.	
Maximum required compensation for static convergence	
4-pole device: red to blue (in any direction)	5 mm
6-pole device: red and blue to green (in any direction)	2,5 mm

North-South raster shape correction circuitry is not required.

To obtain a symmetrical shape for the horizontal lines at the upper part and the lower part of the screen, the unit AT1081 comprises an additional dipole correction magnet giving a displacement of the beam in the centre of the screen in vertical direction of maximum	± 4 mm
Maximum centring error in any direction after colour purity, static convergence, and horizontal centre line correction	4,5 mm

* Purity adjustment in vertical direction is not required.

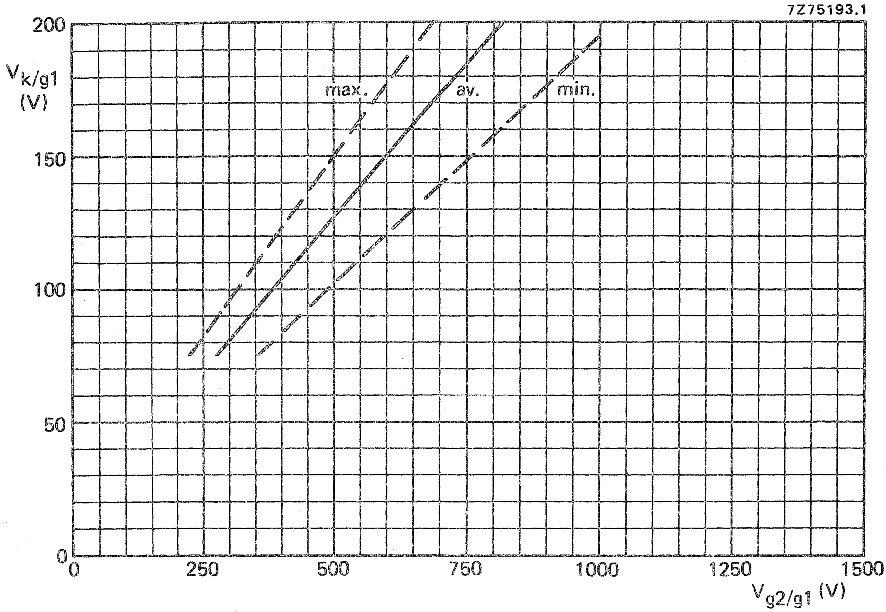
With respect to dynamic convergence, the display system, consisting of picture tube A51-510X and deflection unit AT1085, is inherently self-converging. However, a small fixed correction of 1,3 mm (note 1) is required on the horizontal axis and also small corrections should be made to compensate for tolerances and asymmetries in the tube and deflection unit combination (using a recommended circuit, see also Technical Note 043). For this purpose two types of dynamic magnetic four-pole fields can be used. One is generated by additional windings on the yoke ring of the delfection unit, and energized by adjustable currents synchronized with scanning. The other type is generated by adjustable balancing currents through the deflection coils.

Compensation to be provided by these corrections:

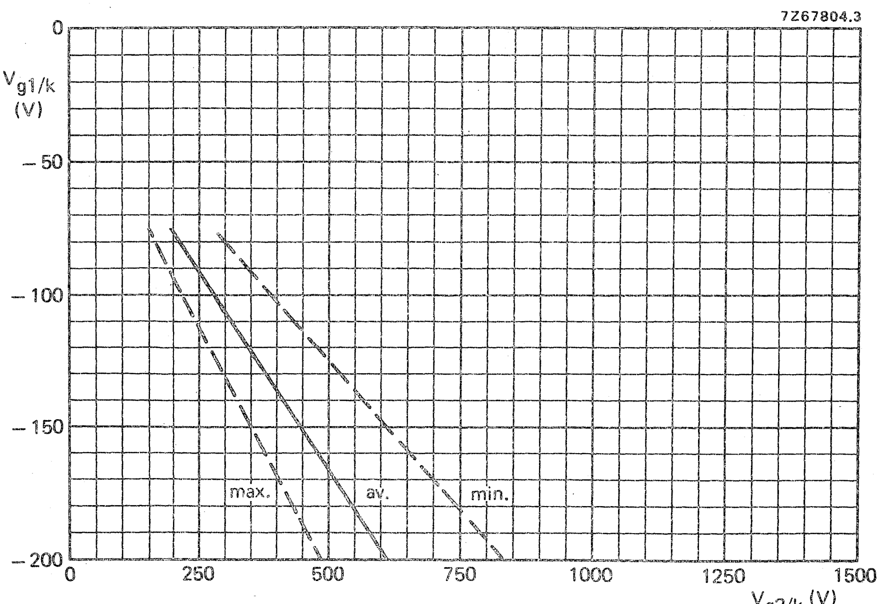
horizontal red-to-blue distance at the ends of the horizontal axis in opposite directions (line symmetry)	0 ± 1,5 mm	note 2
horizontal red-to-blue distance at the ends of the vertical axis in opposite directions (field symmetry)	0 ± 1,5 mm	note 3
vertical red-to-blue distance at the ends of the horizontal axis in opposite directions (line balance)	0 ± 1,0 mm	note 4
vertical red-to-blue distance at the ends of the vertical axis (field balance)	0 ± 1,0 mm	note 5

Notes

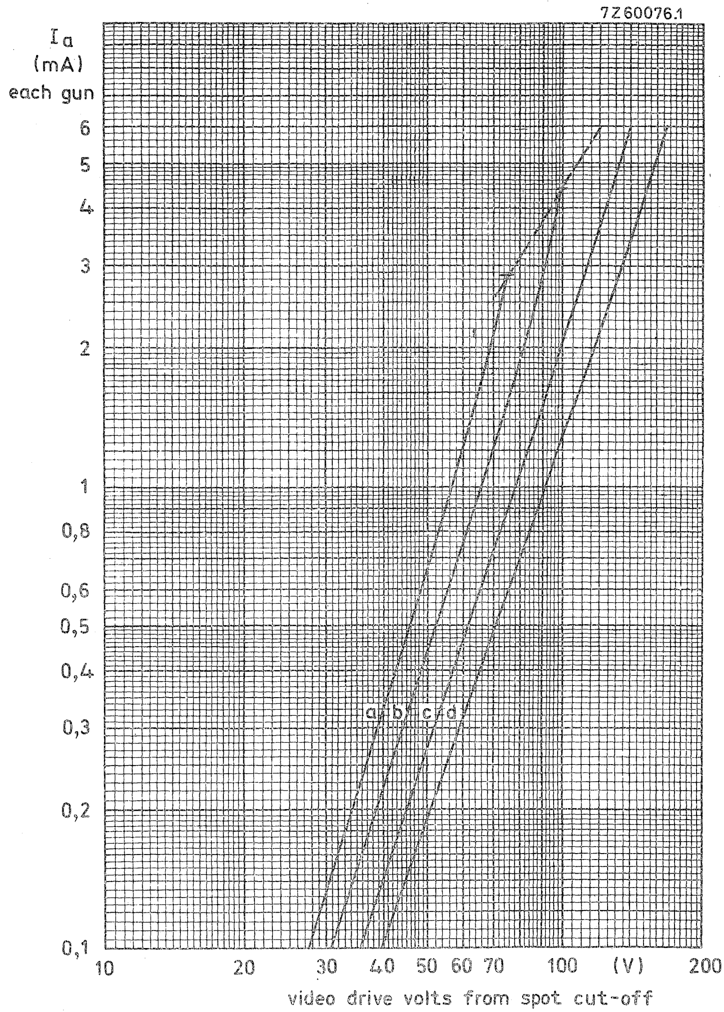
1. This correction is made by feeding a fixed parabolic current of line frequency through the additional four-pole windings on the deflection unit.
2. This correction is made by feeding a sawtooth current of line frequency through the additional four-pole windings on the deflection unit.
3. This correction is made by feeding a sawtooth current of field frequency through the additional windings on the deflection unit.
4. This correction is made by unbalancing the line deflection coil halves.
5. This correction is made by unbalancing the field deflection coil halves.



Spot cut-off design chart (cathode drive), V_{g3} adjusted for focus, $V_{a,g5,g4}$ = 20 to 27,5 kV.



Spot cut-off design chart (grid drive), V_{g3} adjusted for focus, $V_{a,g5,g4}$ = 20 to 27,5 kV.



Typical cathode drive characteristics

$V_{a,g5,g4}$ = 20 kV to 27,5 kV

V_{g3} adjusted for focus

V_{g2} (each gun) adjusted to provide spot cut-off for desired fixed V_k

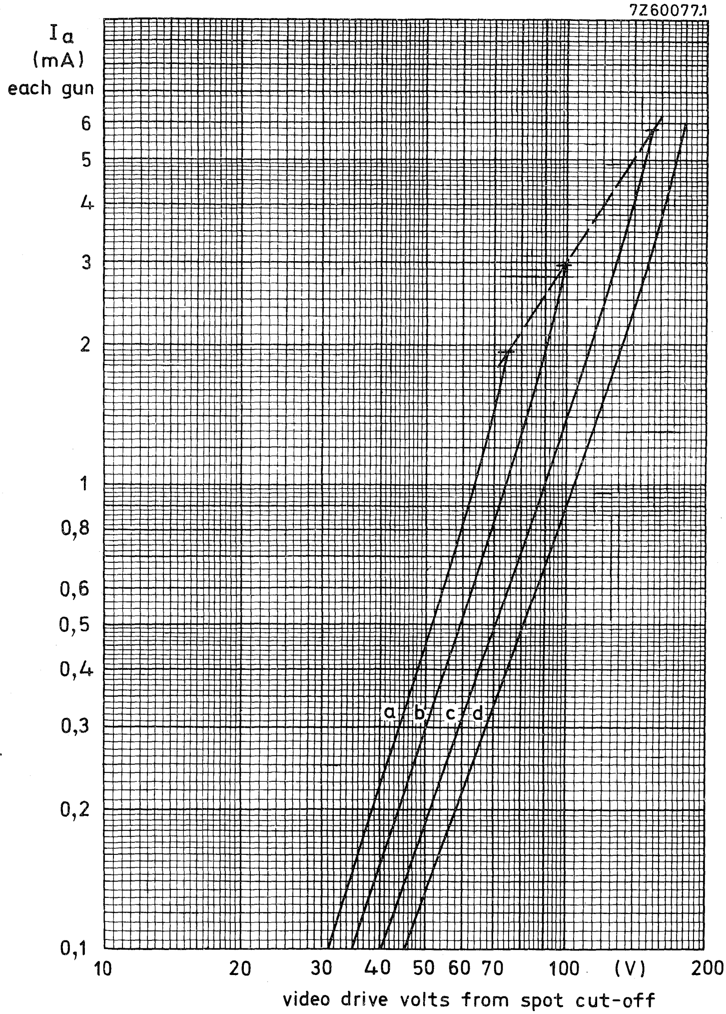
- - - - zero bias point

a = spot cut-off = 75 V

b = spot cut-off = 100 V

c = spot cut-off = 150 V

d = spot cut-off = 200 V

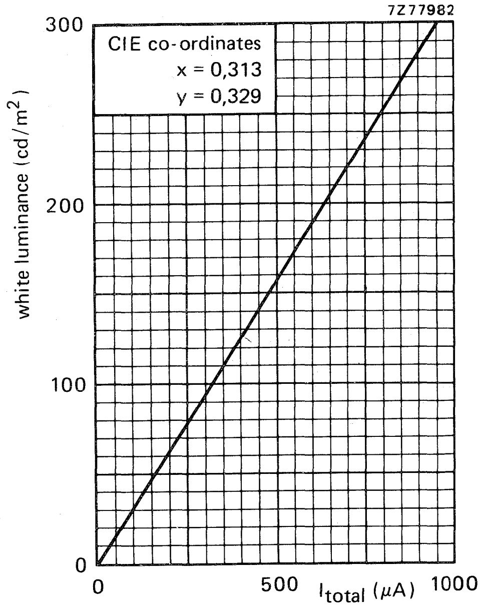


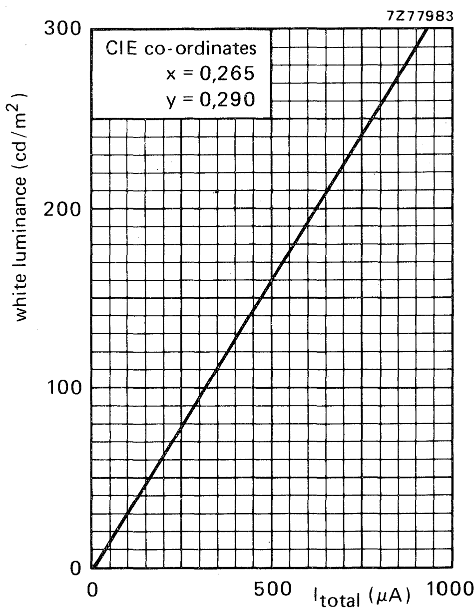
Typical grid drive characteristics

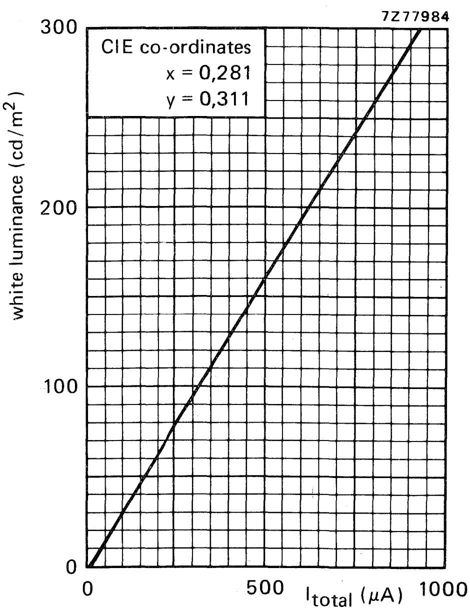
$V_{a,g5,g4}$ = 20 kV to 27,5 kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for desired fixed V_{g1}
---- zero bias point

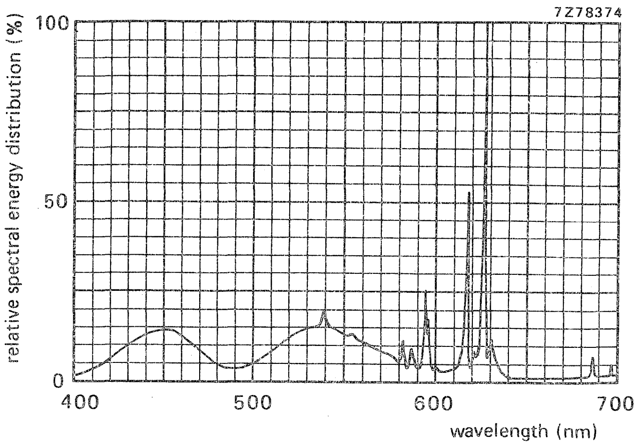
a = spot cut-off = –75 V
b = spot cut-off = –100 V
c = spot cut-off = –150 V
d = spot cut-off = –200 V

Luminance at the centre of the screen as a function of I_{total}. Scanned area 404,4 mm x 303,3 mm.



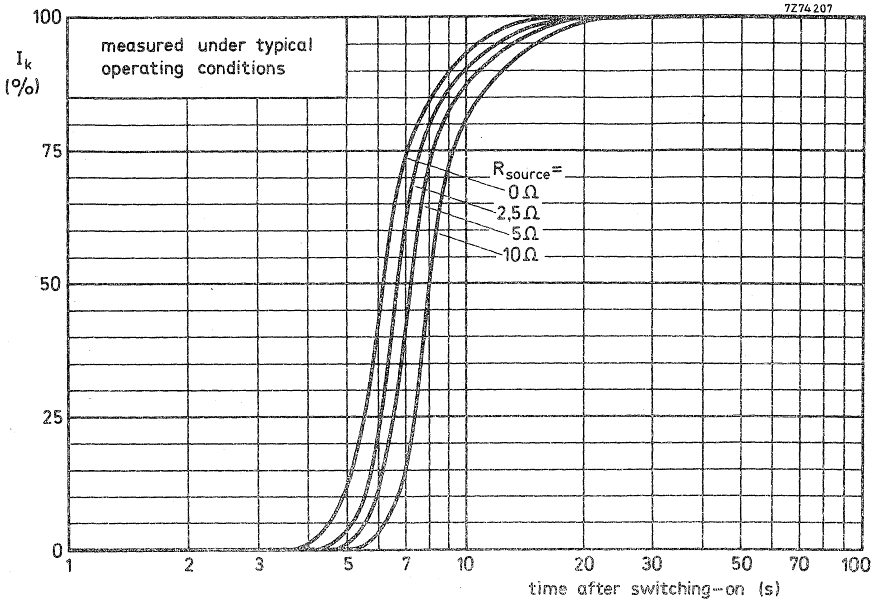






Simultaneous excitation of red, green and blue phosphor, measured in a tube, to produce white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,065



Cathode heating time after switching on, measured under typical operating conditions.

DEGAUSSING

The tube is provided with an internal magnetic shield. The internal magnetic shield and the shadow-mask with its suspension system may be provided with an automatic degaussing system, consisting of two coils covering top and bottom cone parts. For proper degaussing an initial m.m.f. of 250 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate circuitry. To prevent beam landing disturbances by line-frequency currents induced in the degaussing coils, these coils should be shunted by a capacitor of sufficiently high value. In the steady state, no significant m.m.f. should remain in the coils (≤ 0,25 A.t.). To ease the mounting of the coils, the rimband is provided with rectangular holes. See also Technical Note 042.

30AX COLOUR PICTURE TUBE

- Automatic snap-in raster orientation
- Push-on axial purity positioning
- Internal magneto-static beam alignment
- Hi-Bi gun with quadruple cathode lens
- When combined with deflection unit AT1250 it forms a self-aligning, self-converging assembly with low power consumption
- 110° deflection
- Hi-Bri screen
- Pigmented phosphors: improved contrast
- Curved line mask
- In-line gun
- Standard 36,5 mm neck
- Soft-Flash technology
- Slotted shadow mask optimized for minimum moiré
- Fine pitch over entire screen
- Quick-heating cathodes
- Internal magnetic shield
- Reinforced envelope for push-through mounting

QUICK REFERENCE DATA

Deflection angle	110°
Face diagonal	51 cm
Overall length	36 cm
Neck diameter	36,5 mm
Heating	6,3 V, 720 mA
Focusing	hi-bi-potential

ELECTRICAL DATA

Capacitances		
final accelerator to external conductive coating	$C_{a, g5, g4/m}$	max. 1400 pF min. 900 pF
final accelerator to metal rimband	$C_{a, g5, g4/m'}$	250 pF
grid 1 of a gun to all other electrodes		
red gun	$C_{g\,1R}$	7 pF
green gun	$C_{g\,1G}$	7 pF
blue gun	$C_{g\,1B}$	7 pF
cathodes of all guns (connected in parallel) to all other electrodes	C_k	12 pF
cathode of any gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}	4 pF
grid 3 (focusing electrode) to all other electrodes	C_{g3}	7 pF
Focusing	hi-bi-potential	
Deflection method	magnetic	
Deflection angles		
diagonal	110°	
horizontal	97°	
vertical	77°	
Heating: indirect by a.c. (preferably mains or line frequency) or d.c.		
heater voltage	V_f	6,3 V *
heater current	I_f	720 mA

OPTICAL DATA

Screen	metal-backed vertical phosphor stripes
Screen finish	satinized
Phosphor	
red	europium activated rare earth
green	sulphide type
blue	sulphide type
Centre-to-centre distance of identical colour phosphor stripes	0,8 mm
Light transmission of face glass	64%

* For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V. For heating time as a function of source impedance see graph on the last page but one of this data sheet.

DEVELOPMENT SAMPLE DATA

MECHANICAL DATA (see also the figures on the following pages)

Overall length	361,4 ± 6 mm
Neck diameter	$36{,}5\ ^{+1{,}3}_{-0}$ mm
Bulb dimensions	
diagonal	max. 515,5 mm
width	max. 442,5 mm
height	max. 343,8 mm
Useful screen dimensions	
diagonal	min. 480,0 mm
horizontal axis	min. 404,4 mm
vertical axis	min. 303,3 mm
Net mass	approx. 12 kg
Base	12-pin base IEC 67-I-47a, type 2
Anode contact	small cavity contact J1-21, IEC 67-III-2
Mounting position	anode contact on top

Handling

During shipment and handling the tube should not be subjected to accelerations greater than 35g in any direction.

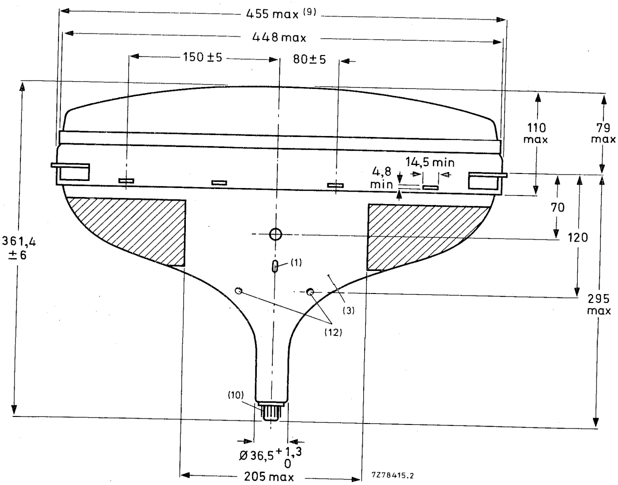
Notes to outline drawings on the following pages

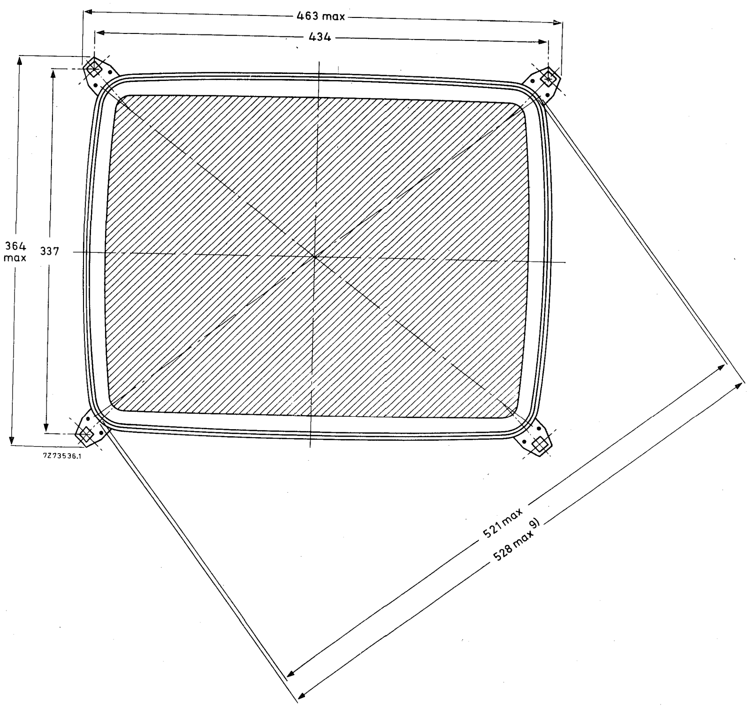
1. This ridge can be used as an orientation for the deflection unit.
2. Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.
3. To clean this area, wipe only with a soft lintless cloth.
4. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
5. Minimum space to be reserved for mounting lug.
6. The position of the mounting screw in the cabinet must be within a circle of 8 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 434 mm x 337 mm.
7. Co-ordinates for radius R = 13,1 mm: x = 184,58 mm, y = 131,93 mm.
8. Distance from point z to any hardware.
9. Maximum dimensions in plane of lugs.
10. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 55 mm.
    The mass of the mating socket with circuitry should not be more than 150 g.
11. Minimum distance between glass and rimband in plane of centre line of apertures.
12. Centring bosses for deflection unit.

MECHANICAL DATA (continued)

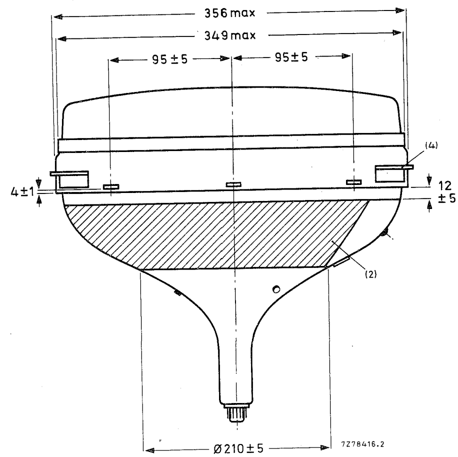
Notes are on the preceding page

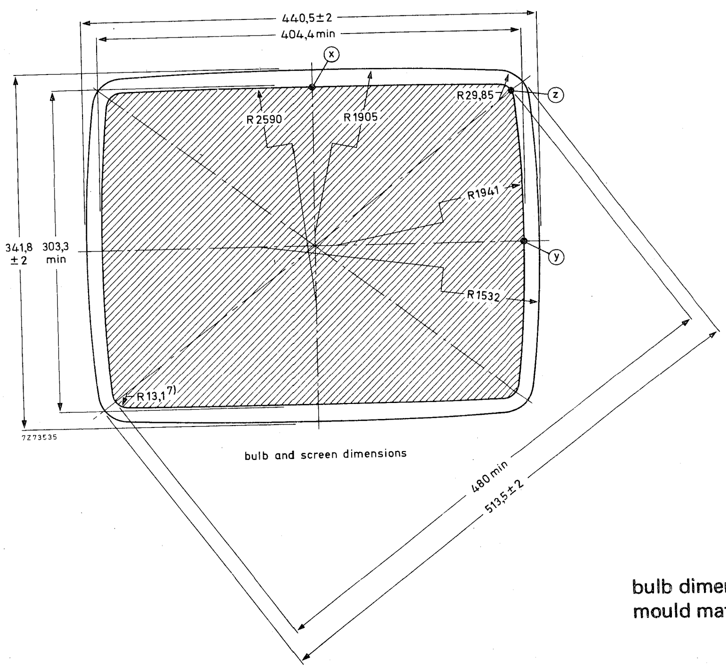
Dimensions in mm





DEVELOPMENT SAMPLE DATA

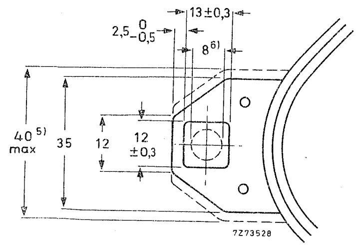


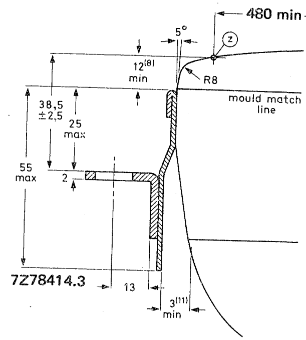


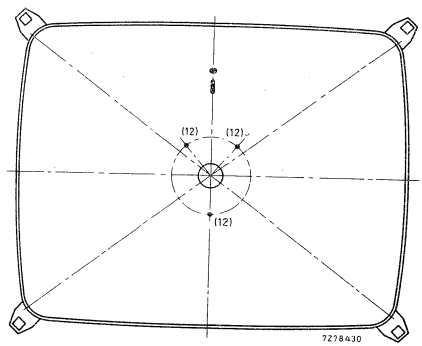
bulb and screen dimensions

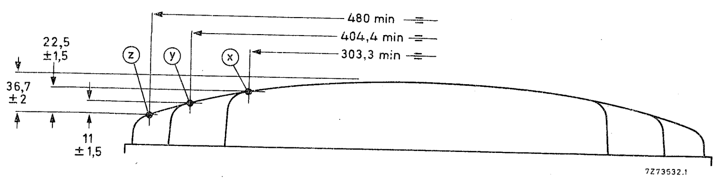
bulb dimensions at mould match line.

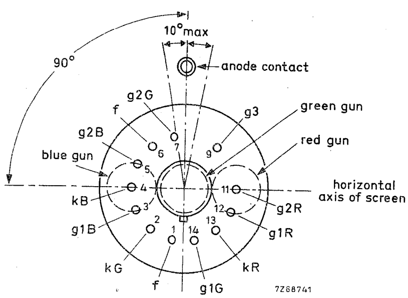
MECHANICAL DATA (continued)

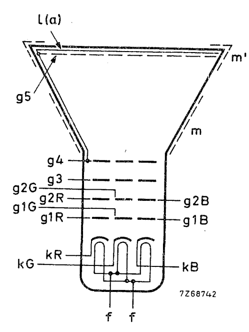




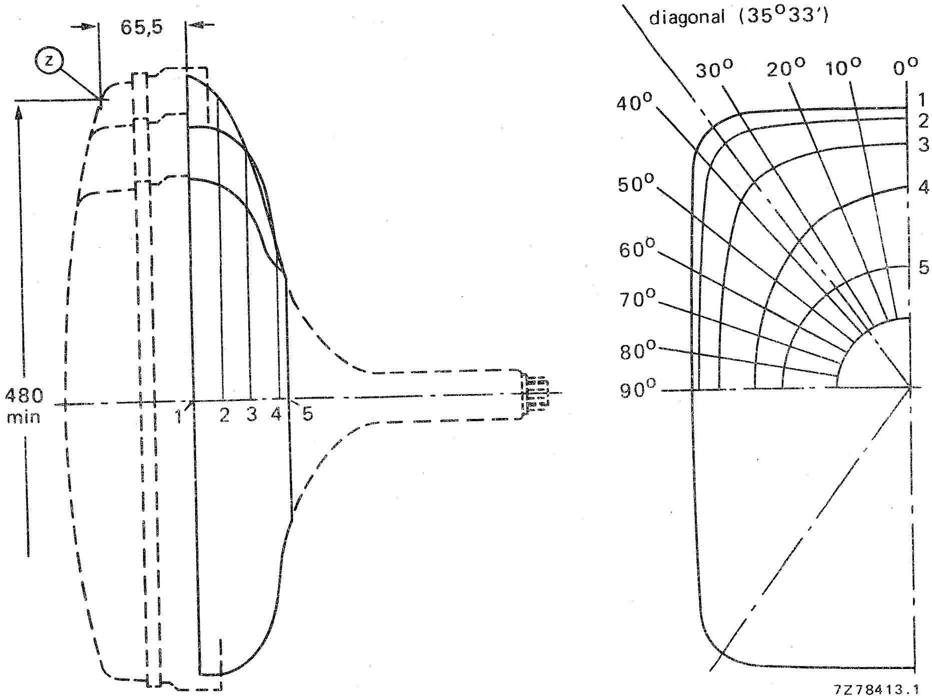








Maximum cone contour



DEVELOPMENT SAMPLE DATA

		distance from centre (max. values)										
section	nom. distance from section 1	0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
1	0	222	225	236	254	258	252	217	193	178	172	170
2	20	216	217	226	240	244	238	205	185	172	165	163
3	40	195	195	200	204	205	198	180	166	156	150	148
4	60	162	158	154	148	144	141	134	128	123	121	121
5	74	98	98	98	98	98	98	98	98	98	98	98

RECOMMENDED OPERATING CONDITIONS (cathode drive)

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a, g5, g4}$	25 kV	
Grid 3 (focusing electrode) voltage	V_{g3}	6,5 to 7,45 kV	
Grid 2 voltage for a spot cut-off voltage V_k = 140 V	V_{g2}	560 to 800 V	
Cathode voltage for spot cut-off at V_{g2} = 680 V	V_k	120 to 160 V	
Luminance at the centre of the screen	L	155 cd/m²	note 1

EQUIPMENT DESIGN VALUES (each gun if applicable)

The values are valid for final accelerator voltages between 22,5 and 27,5 kV.
The voltages are specified with respect to grid 1.

Grid 3 (focusing electrode) voltage	V_{g3}	26 to 29,8% of final accelerator voltage
Difference in cut-off voltage between guns in one tube	ΔV_k	lowest value is min. 80% of highest value
Grid 3 (focusing electrode) current	I_{g3}	−5 to + 5 μA
Grid 2 current	I_{g2}	−5 to + 5 μA
Grid 1 current at V_k = 140 V	I_{g1}	−5 to + 5 μA

To produce white D, CIE co-ordinates x = 0,313, y = 0,329.

Percentage of the total anode current supplied by each gun (typical)

red gun	41,2%
green gun	32,2%
blue gun	26,6%

Ratio of anode current

	min.	av.	max.
red gun to green gun	0,95	1,30	1,70
red gun to blue gun	1,15	1,55	2,05

Maximum centring error in any direction 4,5 mm

Notes

1. Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 μA/cm².

LIMITING VALUES (each gun if applicable)

Design maximum rating system unless otherwise stated.

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a, g5, g4}$	max. min.	27,5 kV 22,5 kV	notes 1, 2, 3 notes 1, 4
Long-term average current for three guns	I_a	max.	1000 μA	note 5
Grid 3 (focusing electrode) voltage	V_{g3}	max.	9 kV	
Grid 2 voltage	V_{g2}	max.	1200 V	note 6
Cathode voltage				
positive	V_k	max.	400 V	
positive operating cut-off	V_k	max.	200 V	
negative	$-V_k$	max.	0 V	
negative peak	$-V_{kp}$	max.	2 V	
Cathode to heater voltage				
positive	V_{kf}	max.	250 V	
positive peak	V_{kfp}	max.	300 V	note 1
negative	$-V_{kf}$	max.	135 V	
negative peak	$-V_{kfp}$	max.	180 V	note 1

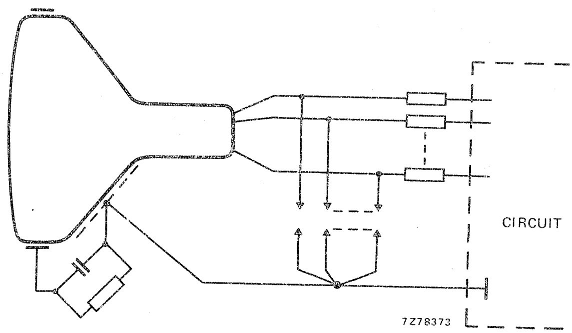
DEVELOPMENT SAMPLE DATA

Notes
1. Absolute maximum rating system.
2. The X-ray dose rate remains below the acceptable value of 0,5 mR/h (36 pA/kg), measured with ionization chamber when the tube is used within its limiting values.
3. During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.
4. Operation of the tube at lower voltages impairs the luminance, resolution and could impair convergence.
5. 1500 μA permitted provided a current limiting circuit is used.
6. During adjustment on the production line max. 1500 V is permitted.

REMARKS

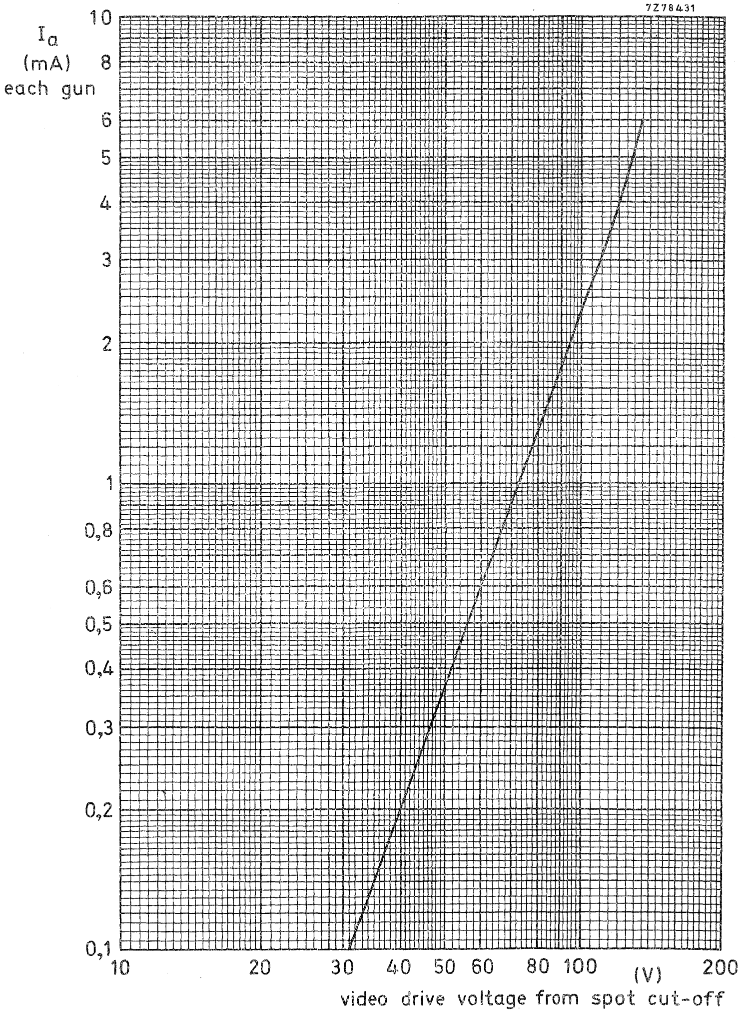
With the high voltage used with this tube (max. 27,5 kV) internal flashovers may occur. As a result of the new Soft-Flash technology these flashover currents are limited to approx. 60 A offering higher set reliability, optimum circuit protection and component savings.

Primary protective circuitry using spark gaps is still necessary to prevent tube damage. The spark gaps should be connected according to the figure below.



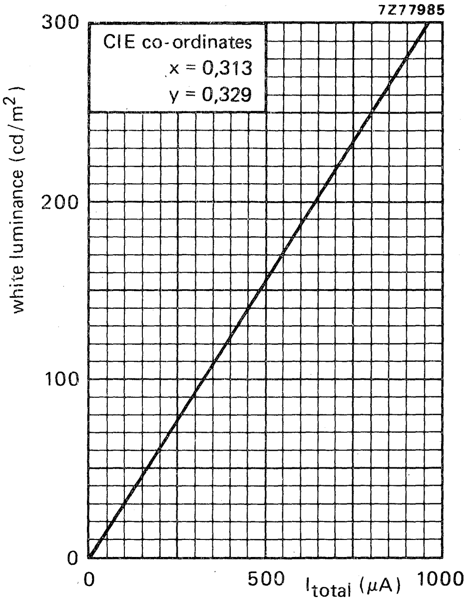
No other connections between the outer conductive coating and the chassis are permissible. Additional information available on request.

DEVELOPMENT SAMPLE DATA

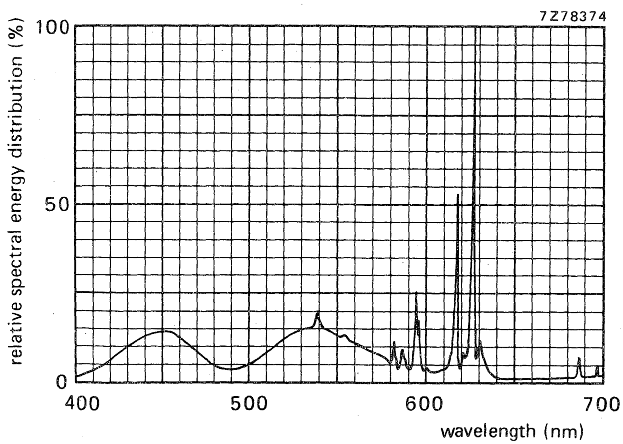


Typical cathode drive characteristic.

V_f = 6,3 V
$V_{a,g5,g4}$ = 25 kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for V_K = 140 V.

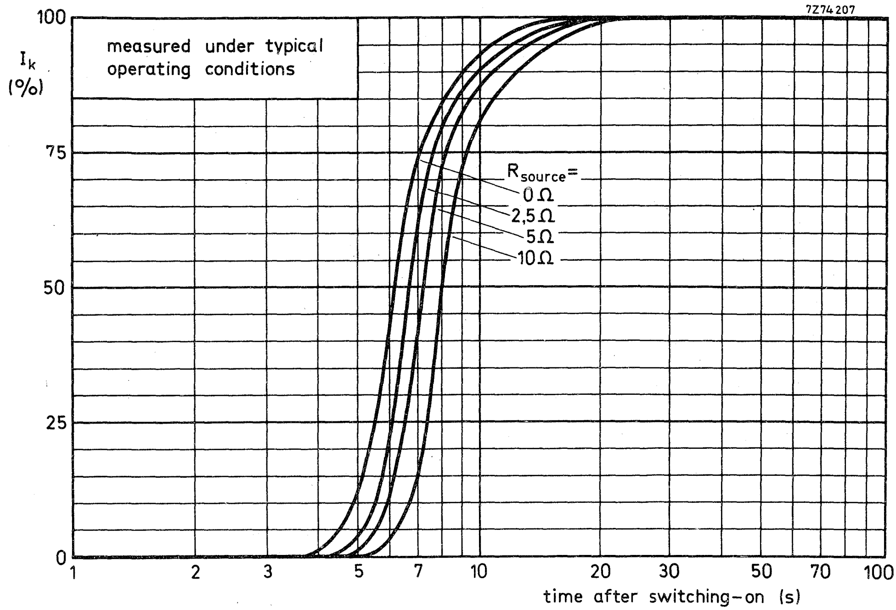


Luminance at the centre of the screen as a function of I_{total}. Scanned area 404,4 mm x 303,3 mm.



Simultaneous excitation of red, green and blue phosphor, measured in a tube, to provide white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,065

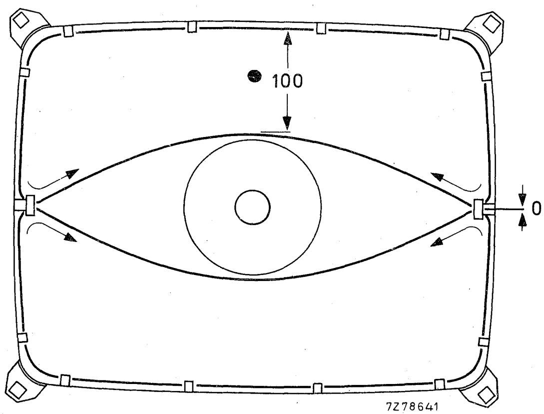


Cathode heating time to attain a certain percentage of the cathode current at equilibrium conditions.

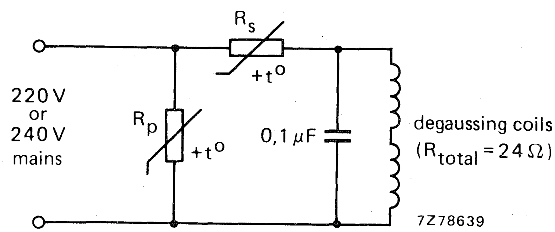
DEVELOPMENT SAMPLE DATA

DEGAUSSING

The picture tube is provided with an internal magnetic shield. This shield and the shadow mask with its suspension system may be provided with an automatic degaussing system, consisting of two coils covering top and bottom cone parts.
For proper degaussing an initial magnetomotive force (m.m.f.) of 250 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate circuitry. To prevent beam landing disturbances by line-frequency currents induced in the degaussing coils, these coils should be shunted by a capacitor of sufficiently high value. In the steady state, no significant m.m.f. should remain in the coils ($\leqslant$ 0,25 ampere turns). To ease the mounting of the coils, the rimband is provided with rectangular holes.
An example is given below.



Position of degaussing coils on the picture tube.



Degaussing circuit using dual PTC thermistor 2322 662 98009.

Data of each degaussing coil

Circumference	120 cm
Number of turns	50
Copper-wire diameter	0,35 mm
Aluminium-wire diameter	0,45 mm
Resistance	12 Ω

Hi-Bri COLOUR PICTURE TUBE

- 90° deflection
- In-line gun, electrostatic bi-potential focus
- 29,1 mm neck diameter
- Hi-Bri screen featuring high brightness and a high contrast performance
- Soft-Flash technology offering improved set reliability
- Slotted shadow mask optimized for minimum moire
- Fine constant pitch over entire screen
- Quick-heating cathodes
- Internal magnetic shield
- Reinforced envelope for push-through mounting
- When combined with an appropriate hybrid saddle toroidal deflection unit (e.g. AT1235), it forms a self-converging assembly; dynamic convergence is not required.

QUICK REFERENCE DATA

Deflection angle	90°
Face diagonal	51 cm
Overall length	424 mm
Neck diameter	29,1 mm
Heating	6,3 V, 685 mA
Focusing voltage	20% of final accelerator voltage

ELECTRICAL DATA

Capacitances		
final accelerator to external conductive coating including rimband	$C_{a(m + m')}$	max. 2300 pF min. 1500 pF
grid 1 to all other electrodes	C_{g1}	15 pF
cathode of each gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}	5 pF
focusing electrode to all other electrodes	C_{g3}	6 pF
Electron guns		unitized triple-aperture electrodes
Focusing method		electrostatic
Focus lens		bi-potential
Deflection method		magnetic
Deflection angles		
diagonal		approx. 90°
horizontal		approx. 78°
vertical		approx. 60°
Heating		indirect by a.c. or d.c.
heater voltage	V_f	6,3 V *
heater current	I_f	685 mA

OPTICAL DATA

Screen	metal-backed vertical phosphor stripes
Screen finish	satinized
Phosphor	
red	europium activated rare earth
green	sulphide type
blue	sulphide type
Centre-to-centre distance of vertical identical colour phosphor stripes	0,8 mm
Light transmission of face glass at centre	64%

* For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V. For heating time as a function of source impedance see graph on the last page but one of this data sheet.

MECHANICAL DATA (see also the figures on the following pages)

Overall length	424 ± 9,5 mm
Neck diameter	$29{,}1\,^{+1{,}4}_{-0{,}7}$ mm
Bulb dimensions	
diagonal	max. 515,5 mm
width	max. 442,5 mm
height	max. 343,8 mm
Useful screen dimensions	
diagonal	min. 480,0 mm
horizontal axis	min. 404,4 mm
vertical axis	min. 303,3 mm
area	min. 1190 cm^2
Nett mass	approx. 13 kg
Base	12-pin base JEDEC B12-262
Anode contact	small cavity contact J1-21, IEC 67-III-2
Mounting position	anode contact on top

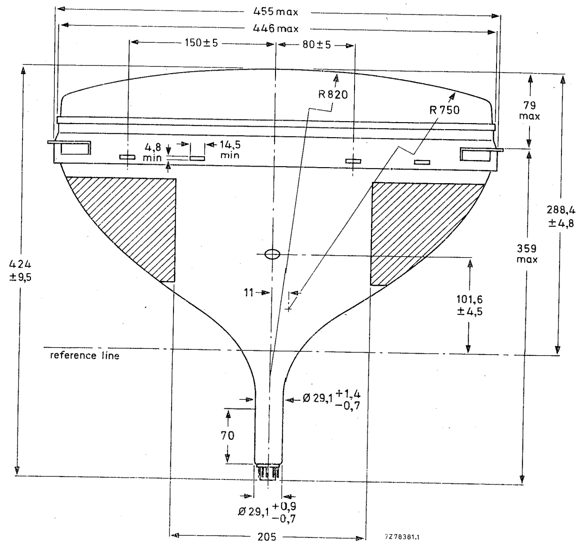
Handling

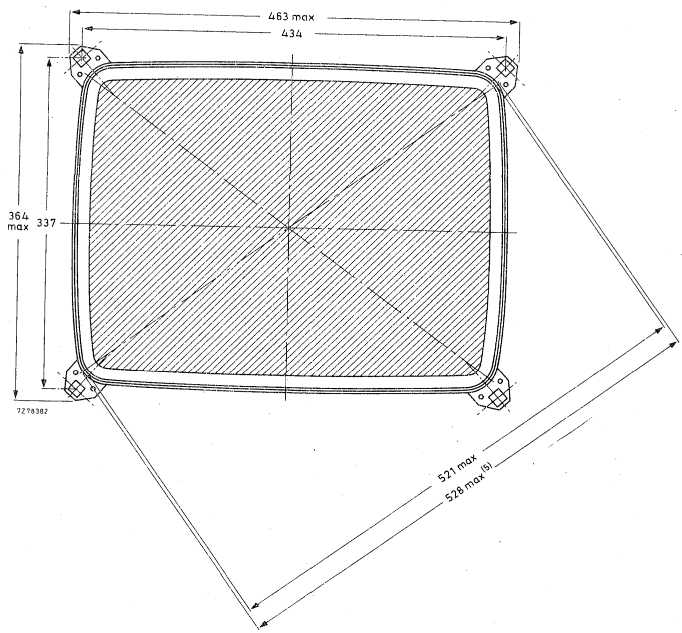
During shipment and handling the tube should not be subjected to accelerations greater than 35 g in any direction.

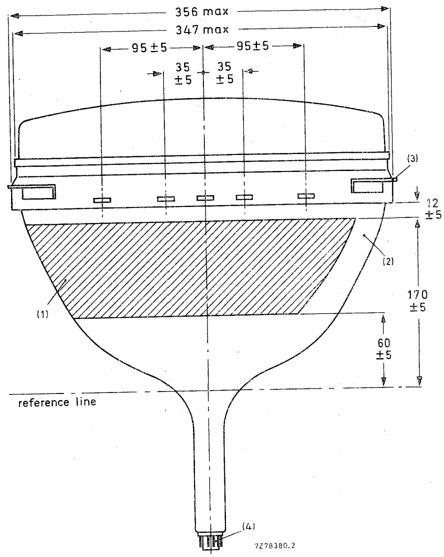
MECHANICAL DATA (continued)

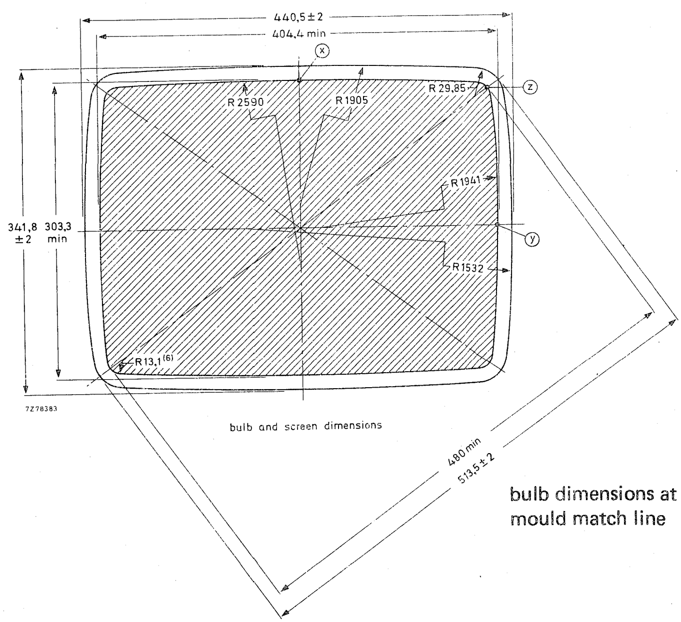
Dimensions in mm

Notes are given after the drawings.





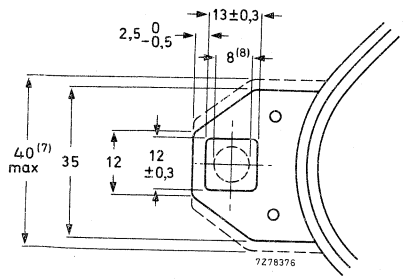


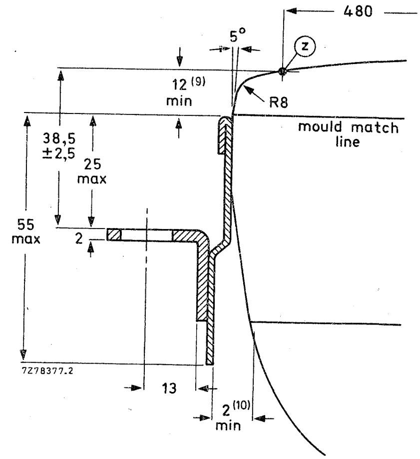


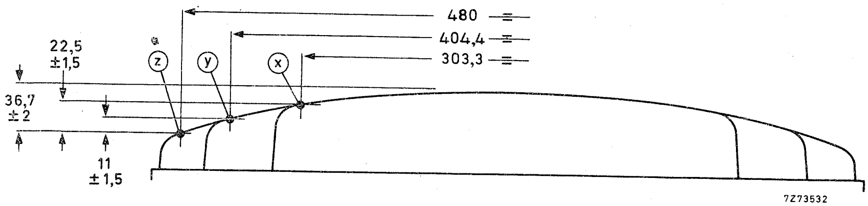
bulb and screen dimensions

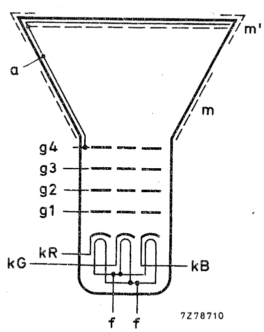
bulb dimensions at mould match line

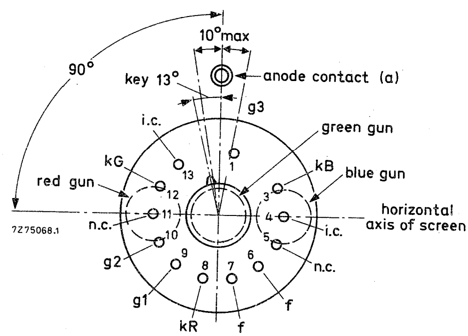
MECHANICAL DATA (continued)







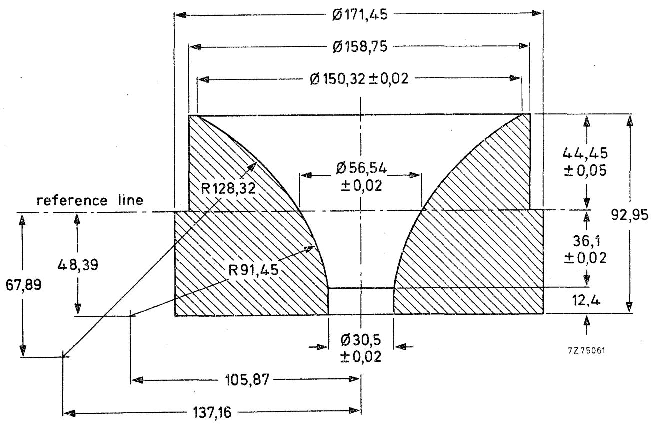




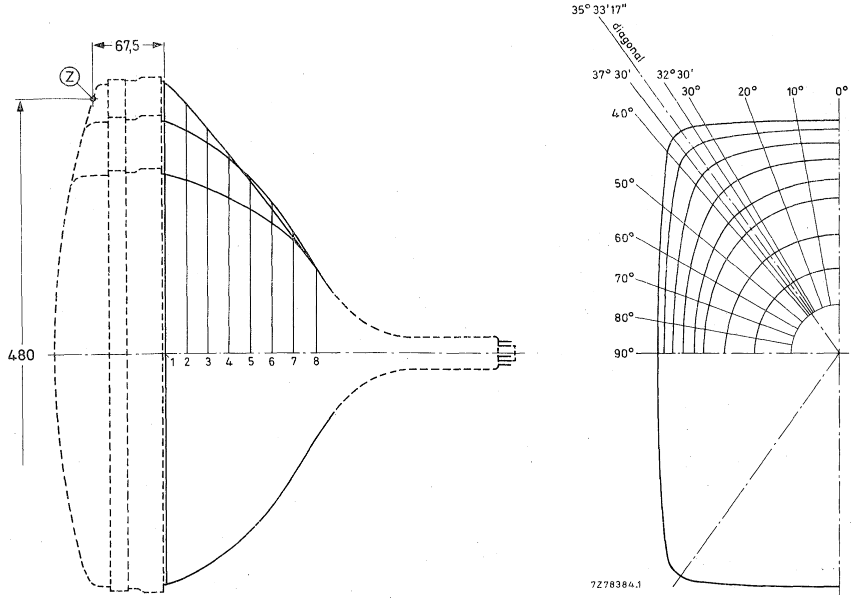
Notes to outline drawings on the preceding pages

1. Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.
2. To clean this area, wipe only with a soft lintless cloth.
3. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
4. The socket for this base should not be rigidly mounted: it should have flexible leads and be allowed to move freely. The bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 50 mm.
5. Maximum dimensions in plane of lugs.
6. Co-ordinates for radius R = 13,1 mm: x = 184,58 mm, y = 131,93 mm.
7. Minimum space to be reserved for mounting lug.
8. The position of the mounting screw in the cabinet must be within a circle of 8 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 434 mm x 337 mm.
9. Distance from point z to any hardware.
10. Minimum distance between glass and rimband in plane of centre line apertures.

Reference line gauge; GR90CJ4

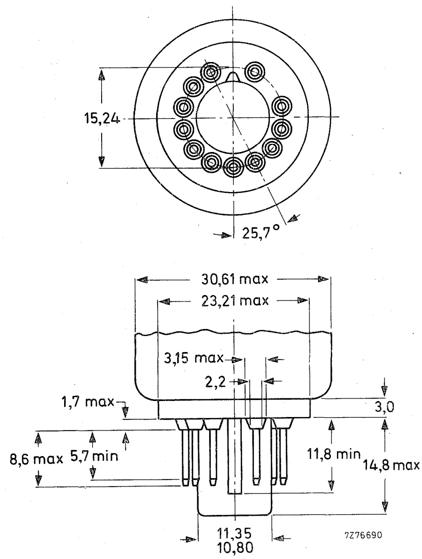


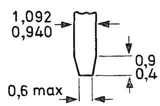
Maximum cone contour



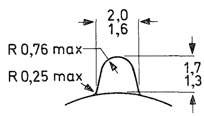
section	nom. distance from section 1	distance from centre (max. values)														
		0°	10°	20°	25°	30°	32° 30′	diag. axes	37° 30′	40°	45°	50°	60°	70°	80°	90°
1	0	218,7	221,9	231,2	238,5	247,5	252,2	255,9	254,6	247,7	230,1	215,1	193,0	179,2	171,5	169
2	20	209,8	212,4	220,3	226,0	232,5	235,3	236,5	235,0	230,2	216,9	204,4	184,9	172,3	165,3	163,
3	40	197,5	199,4	204,7	208,1	211,1	211,9	211,4	210,0	207,0	198,6	189,5	173,9	163,2	157,1	155,
4	60	182,2	183,2	185,8	187,1	187,7	187,4	186,4	185,3	183,3	178,2	172,1	160,7	152,4	147,4	145,
5	80	163,2	163,5	163,9	163,7	163,1	162,4	161,4	160,6	159,3	156,3	152,9	145,8	140,1	136,6	135,
6	100	146,1	146,1	145,7	145,1	144,2	143,6	142,8	142,2	141,4	139,5	137,5	133,3	129,7	127,3	126,
7	120	112,3	112,3	111,9	111,7	111,3	111,1	110,9	110,7	110,5	110,0	109,5	108,6	107,8	107,3	107,
8	141,7	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,8	79,

12-pin base; JEDEC B12-262





pin contour



detail of key

TYPICAL OPERATING CONDITIONS

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a, g4}$	25 kV
Grid 3 (focusing electrode) voltage	V_{g3}	4,7 to 5,5 kV
Grid 2 voltage for a spot cut-off voltage V_k = 120 V	V_{g2}	310 to 560 V
Luminance at the centre of the screen*	L	165 cd/m²

* Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 μA/cm^2.

EQUIPMENT DESIGN VALUES

The values are valid for final accelerator voltages between 20 and 27,5 kV.
The voltages are specified with respect to grid 1.

Grid 3 (focusing electrode) voltage	V_{g3}	18,8 to 22% of final accelerator voltage
Grid 2 voltage and cathode voltage for visual extinction of focused spot	V_{g2} and V_k	see cut-off design chart *
Difference in cut-off voltages between guns in any tube	ΔV_k	lowest value > 80% of highest value
Video drive characteristics		see graphs **
Grid 3 (focusing electrode) current	I_{g3}	−5 to + 5 μA
Grid 2 current	I_{g2}	−5 to + 5 μA
Grid 1 current under cut-off conditions	I_{g1}	−5 to + 5 μA

To produce white D, CIE co-ordinates x = 0,313, y = 0,329.

Percentage of the total anode current supplied by each gun (typical)

red gun	41,8%
green gun	36,1%
blue gun	22,1%

Ratio of anode current

	min.	av.	max.
red gun to green gun	0,80	1,15	1,60
red gun to blue gun	1,50	1,90	2,40

* The common V_{g2} should be adjusted as follows:
Set the cathode voltage, V_k, for each gun at 120 V. Increase the V_{g2} from about 300 V to the value at which the raster of one of the guns becomes just visible. Now decrease the V_k of the remaining guns so that the rasters of these guns also become visible.

** For optimum picture performance it is recommended that the cathodes are not driven below + 10 V.

LIMITING VALUES (Design maximum rating system unless otherwise stated)

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a,\,g4}$	max.	27,5	kV	notes 1, 2 and 3
		min.	20	kV	notes 1 and 4
Long-term average current for three guns	I_a	max.	1000	μA	note 5
Grid 3 (focusing electrode) voltage	V_{g3}	max.	7	kV	
Grid 2 voltage, peak	V_{g2p}	max.	1000	V	
Cathode voltage					
positive	V_k	max.	400	V	
positive operating cut-off	V_k	max.	200	V	
negative	$-V_k$	max.	0	V	
negative peak	$-V_{kp}$	max.	2	V	
Cathode to heater voltage					
positive	V_{kf}	max.	250	V	note 6
positive peak	V_{kfp}	max.	300	V	note 1
negative	$-V_{kf}$	max.	135	V	
negative peak	$-V_{kfp}$	max.	180	V	note 1

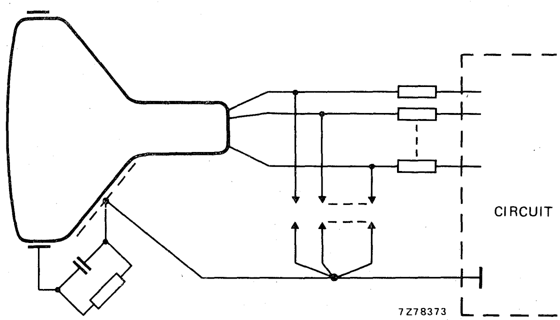
Notes

1. Absolute maximum rating system.
2. The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values.
3. During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.
4. Operation of the tube at lower voltages impairs the luminance and resolution.
5. 1500 μA permitted provided a current limiting circuit is used.
6. During an equipment warm-up period not exceeding 15 s V_{kf} is allowed to rise to 385 V. Between 15 s and 45 s after switching on a decrease in V_{kf} proportional with time from 385 V to 250 V is permissible.

REMARKS

With the high voltage used with this tube (max. 27,5 kV) internal flashovers may occur. As a result of the new Soft-Flash technology these flashover currents are limited to approx. 60 A offering higher set reliability, optimum circuit protection and component savings.

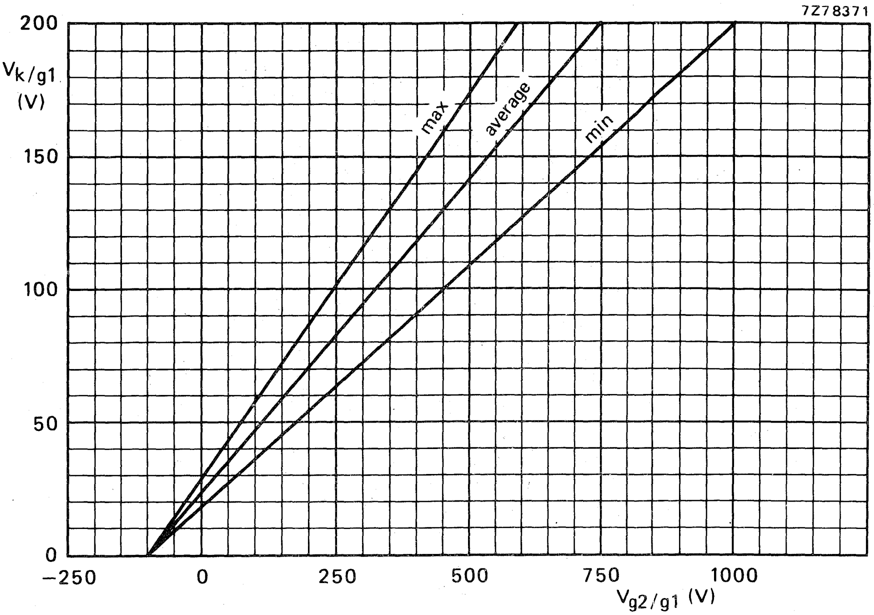
Primary protective circuitry using spark gaps is still necessary to prevent tube damage. The spark gaps should be connected according to the figure below.



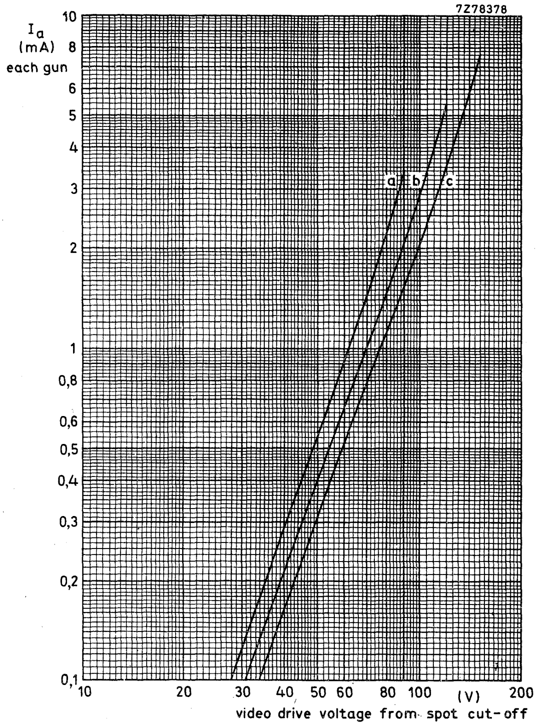
No other connections between the outer conductive coating and the chassis are permissible. Additional information available on request.

BEAM CORRECTIONS

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of a multipole unit	80 μm
Maximum required compensation for static convergence by	
4-pole device: red to blue (in any direction)	5 mm
6-pole device: red and blue to green (in any direction)	2,5 mm
Maximum centring error in any direction after colour purity, static convergence, and horizontal centre line correction, measured with deflection coils in nominal position	5 mm



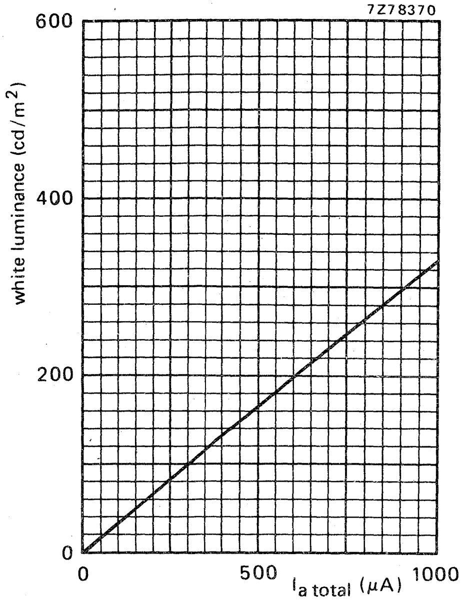
Spot cut-off design chart (cathode drive), V_{g3} adjusted for focus, $V_{a,\ g4}$ = 25 kV.



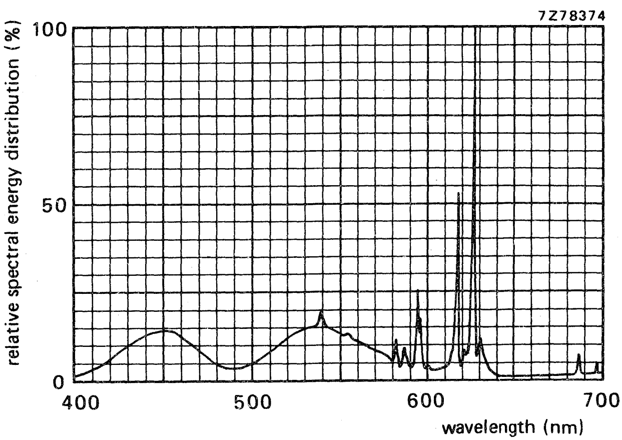
Typical cathode drive characteristics

$V_f = 6{,}3$ V
$V_{a,\,g4} = 25$ kV
V_{g3} adjusted for focus
V_{g2} adjusted to provide spot cut-off for desired fixed V_K

a = spot cut-off = 90 V
b = spot cut-off = 120 V
c = spot cut-off = 150 V

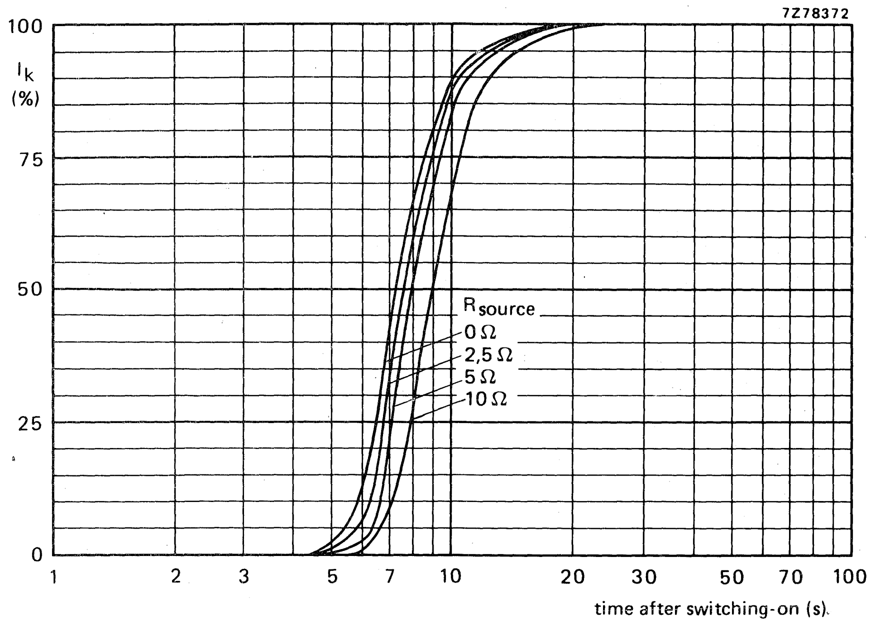


Luminance at the centre of the screen as a function of I_{total}.
$V_{a,\ g4}$ = 25 kV.
Scanned area = 404,4 mm x 303,3 mm;
CIE co-ordinates x = 0,313, y = 0,329.



Simultaneous excitation of red, green and blue phosphor, measured in a tube, to produce white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

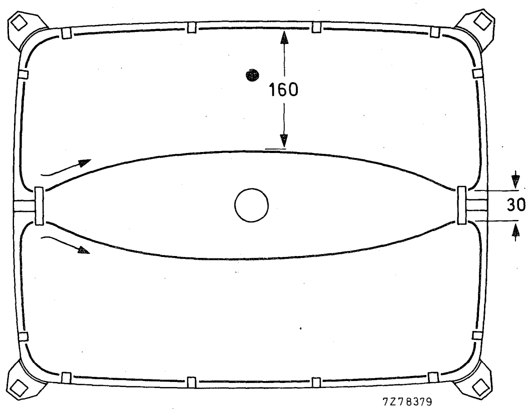
Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,060



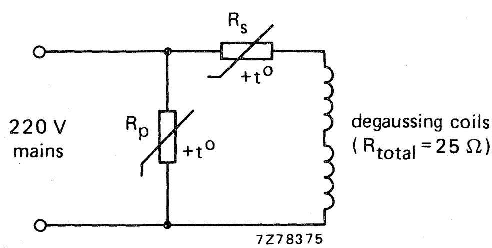
Cathode heating time after switching on , measured under typical operating conditions.

DEGAUSSING

The picture tube is provided with an internal magnetic shield. This shield and the shadow mask with its suspension system may be provided with an automatic deguassing system, consisting of two coils covering top and bottom cone parts.
For proper degaussing an initial magnetomotive force (m.m.f.) of 300 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate degaussing circuitry. In the steady state, no significant m.m.f. should remain in the coils (≤ 0,3 ampere-turns). An example is given below.



Position of degaussing coils on the picture tube.



Degaussing circuit using dual PTC thermistor 2322 662 98009.

Data of each degaussing coil

Circumference	117 cm
Number of turns	60
Copper-wire diameter	0,35 mm
Resistance	12,5 Ω

COLOUR PICTURE TUBE

Replacement type A56-410X.

A circuit modification may be necessary to compensate for the 170 mA lower heater current of the A56-410X.

COLOUR PICTURE TUBE

QUICK REFERENCE DATA

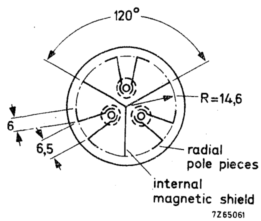
Temperature compensated shadow-mask designed for minimum moiré

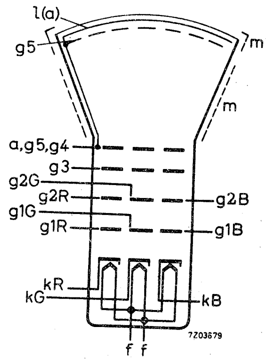
High white luminance at unity current ratio

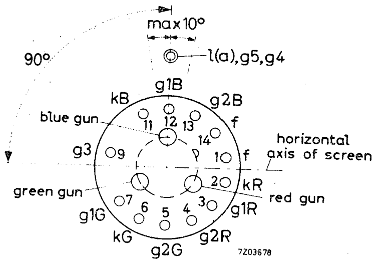
Face diagonal	56 cm
Deflection angle	110°
Neck diameter	36,5 mm
Envelope	reinforced; suitable for push-through
Magnetic shield	internal
Focusing	bi-potential
Deflection	magnetic
Convergence	magnetic
Heating	6,3 V, 730 mA
Light transmission of face glass	54,5 %
Quick heating cathode	with a typical tube a legible picture will appear within approx. 5 s

MECHANICAL DATA

Overall length	387,3 to 400,3 mm
Neck diameter	36,5 mm
Diagonal of bulb	max. 566,2 mm
Horizontal axis of bulb	max. 486,3 mm
Vertical axis of bulb	max. 381,8 mm
Useful screen	
diagonal	min. 533 mm
horizontal axis	min. 447 mm
vertical axis	min. 337 mm
Base	12 pin base IEC 67-I-47a, type 2
Anode contact	Small cavity contact J1-21, IEC 67-III-2







TYPICAL OPERATING CONDITIONS

Final accelerator voltage	$V_{a,g5,g4}$	25 kV
Grid 3 (focusing electrode) voltage	V_{g3}	4,2 to 5 kV
Grid 2 voltage for a spot cut-off at $V_{g1} = -105$ V	V_{g2}	212 to 495 V
Grid 1 voltage for spot cut-off at $V_{g2} = 300$ V	V_{g1}	−70 to −140 V

COLOUR PICTURE TUBE

Replacement type A56-510X.

20AX Hi-Bri COLOUR PICTURE TUBE
in Soft-Flash technology

- 110°
- In-line

This picture tube, which is electrically and mechanically interchangeable with type A56-500X, features increased brightness (Hi-Bri), effectively improved flashover behaviour due to the new Soft-Flash technology, quick-heating cathodes, internal magnetic shield and a very short overall length. The shadow-mask has a fine constant pitch over the entire screen and is optimized for minimum moiré. The system of picture tube and deflection unit AT1083/01 is inherently self-converging.

QUICK REFERENCE DATA

Deflection angle	110°	
Face diagonal	56	cm
Overall length	37	cm
Inherently self-converging system with deflection unit AT1083/01		
Quick-heating cathode	with a typical tube a picture will appear within 5 s	
Heating	6,3 V, 720	mA
Magnetic shield	internal	
Envelope	reinforced, suitable for push-through	
Focusing	bi-potential	

SCREEN

Metal-backed vertical phosphor stripes

Red	Europium activated rare earth
Green	Sulphide type
Blue	Sulphide type

Screen finish	satinized	
Centre-to-centre distance of identical colour phosphor stripes	0,8	mm
Light transmission of face glass	68	%

HEATING : indirect by a.c. (preferably mains or line frequency) or d.c.

Heater voltage	V_f	6,3	V
Heater current	I_f	720	mA

For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V.

For heating time as a function of source impedance see graph on the last page of this data sheet.

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g5,g4/m}$	<	1800	pF
		>	1300	pF
Final accelerator to metal rimband	$C_{a,g5,g4/m'}$		250	pF
Grid no. 1 of a gun to all other electrodes				
red gun	C_{g1R}		7	pF
green gun	C_{g1G}		7	pF
blue gun	C_{g1B}		7	pF
Cathodes of all guns (connected in parallel) to all other electrodes	C_k		12	pF
Cathode of any gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}		4	pF
Grid no. 3 (focusing electrode) to all other electrodes	C_{g3}		7	pF

FOCUSING electrostatic (bi-potential)

DEFLECTION magnetic

Diagonal deflection angle	110	deg
Horizontal deflection angle	97	deg
Vertical deflection angle	77	deg

MECHANICAL DATA

Overall length		367,3 to 380,3	mm
Neck diameter		$36,5\ ^{+1,6}_{-0}$	mm
Diagonal of bulb	≤	566,2	mm
Width of bulb	≤	486,3	mm
Height of bulb	≤	381,8	mm
Useful screen			
diagonal	≥	530,6	mm
horizontal axis	≥	444,2	mm
vertical axis	≥	334,2	mm

Mounting position : any

Net mass : approx. 14,5 kg

Base : 12 pin base IEC 67-I-47a, type 2

Anode contact : Small cavity contact J1-21, IEC 67-III-2

Magnetic shielding, degaussing: The tube is provided with an internal magnetic shield.

The internal magnetic shield and the shadow-mask with its suspension system may be provided with an automatic degaussing system, consisting of two coils covering top and bottom cone parts. For proper degaussing an initial m.m.f. of 250 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate circuitry. To prevent beam landing disturbances by line-frequency currents induced in the degaussing coils, these coils should be shunted by a capacitor of sufficiently high value. In the steady state, no significant m.m.f. should remain in the coils (< 0,25 A.t.). To ease the mounting of the coils, the rimband is provided with rectangular holes. See also Technical Note 042.

Notes to outline drawings on the following pages

1) This ridge can be used as an orientation for the deflection unit.

2) Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.

3) To clean this area wipe only with a soft lintless cloth.

4) The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.

5) Minimum space to be reserved for mounting lug.

6) The position of the mounting screw in the cabinet must be within a circle of 9,5 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 476,5 mm x 370 mm.

7) Co-ordinates for radius R = 14,8 mm: x = 203,9 mm, y = 145,5 mm.

8) Distance from point z to any hardware.

9) Maximum dimensions in plane of lugs.

10) Centring ring for deflection unit.

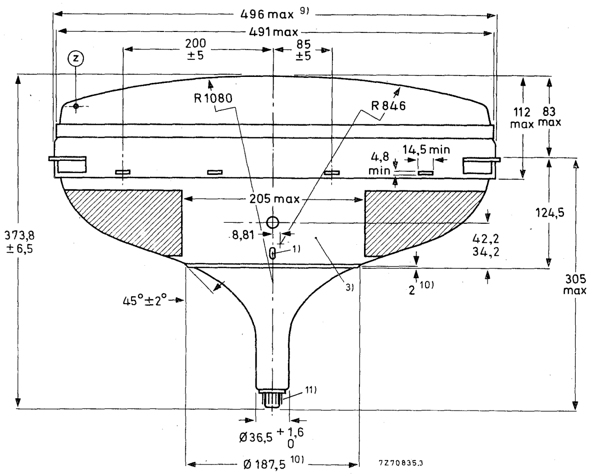
11) The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 55 mm.

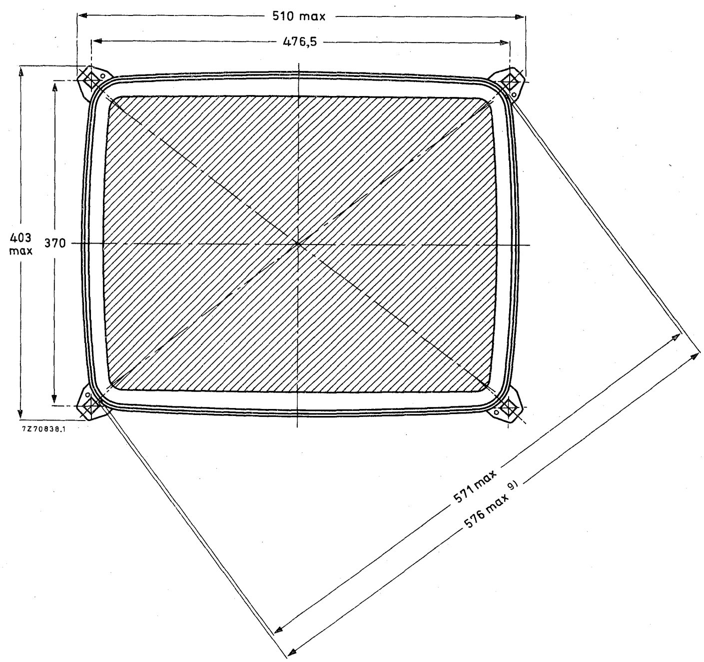
12) Minimum distance between glass and rimband in plane of centre line of the apertures.

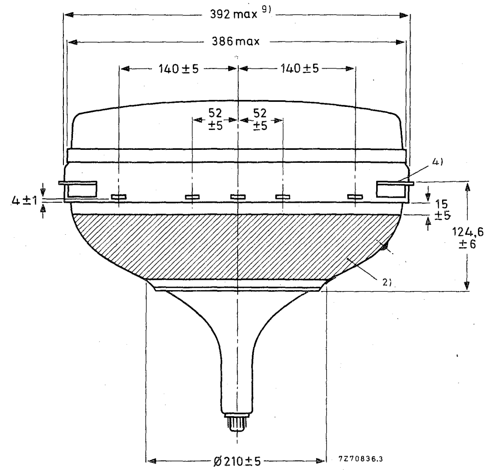
MECHANICAL DATA (continued)

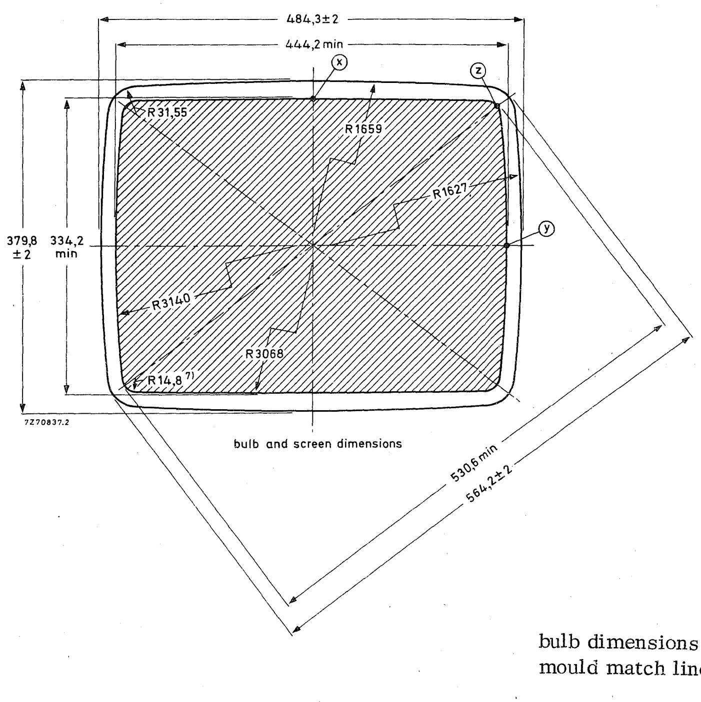
Dimensions in mm

Notes are on the preceding page





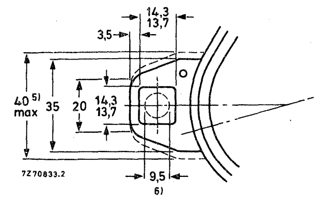


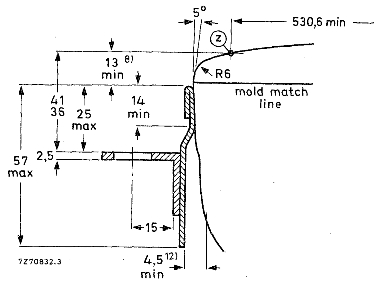


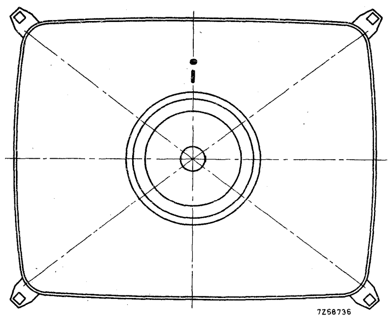
bulb and screen dimensions

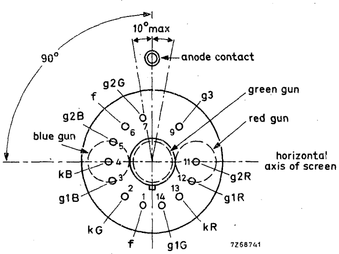
bulb dimensions at
mould match line.

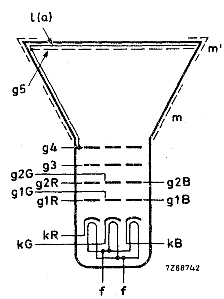
MECHANICAL DATA (continued) Dimensions in mm

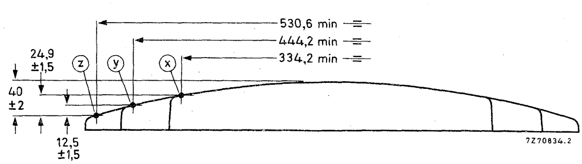












TYPICAL OPERATING CONDITIONS cathode drive, voltages with respect to g1.

Final accelerator voltage	$V_{a,\,g5,\,g4}$	25	kV
Grid no. 3 (focusing electrode) voltage	V_{g3}	4,0 to 4,8	kV
Grid no. 2 voltage for a spot cut-off voltage V_k = 140 V	V_{g2}	465 to 705	V [1]
Cathode voltage for spot cut-off at V_{g2} = 555 V	V_k	110 to 165	V [2]
Luminance at the centre of the screen [3]	L	170	cd/m^2

EQUIPMENT DESIGN VALUES (each gun if applicable), voltages with respect to g1
Valid for final accelerator voltages between 20 kV and 27,5 kV

Grid no. 3 (focusing electrode) voltage	V_{g3}	16 to 19,2% of final accelerator voltage	
Grid no. 2 voltage	V_{g2}	see cut-off design chart	
Cathode voltage for visual extinction of focused spot	V_k	see cut-off design chart	
Difference in cut-off voltages between guns in any tube	ΔV_k	lowest value is min. 75% of highest value	
Grid no. 3 (focusing electrode) current	I_{g3}	−5 to +5	μA
Grid no. 2 current	I_{g2}	−5 to +5	μA
Grid no. 1 current at V_k = 150 V	I_{g1}	−5 to +5	μA

[1]) This range of V_{g2} has to be used when in circuit design fixed values for cut-off of the three guns are used.

[2]) This range of V_k has to be used when in circuit design fixed values for V_{g2} of the three guns are used.

[3]) Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 $\mu A/cm^2$. See also Technical Note 065.

EQUIPMENT DESIGN VALUES (continued)

				white "D"
To produce white of the following CIE co-ordinates:	x	0,265	0,281	0,313
	y	0,290	0,311	0,329
Percentage of total anode current supplied by each gun (typical)				
red gun		26,4	30,6	41,2
green gun		34,3	35,4	32,2
blue gun		39,3	34,0	26,6
Ratio of anode currents red gun to green gun	>	0,60	0,65	0,95
	av.	0,75	0,85	1,30
	<	1,00	1,15	1,70
Ratio of anode currents red gun to blue gun	>	0,50	0,65	1,15
	av.	0,65	0,90	1,55
	<	0,90	1,20	2,05

LIMITING VALUES (each gun if applicable), voltages with respect to g1
(Design maximum rating system unless otherwise specified)

Final accelerator voltage	$V_{a, g5, g4}$	max.	27,5	kV [1][2][3]
		min.	20	kV [1][4]
Long term average current for three guns	I_a	max.	1000	μA [5]
Grid no. 3 (focusing electrode) voltage	V_{g3}	max.	6	kV
Grid no. 2 voltage	V_{g2}	max.	1000	V
Cathode voltage, positive	V_k	max.	400	V
positive, operating cut-off	V_k	max.	200	V
negative	$-V_k$	max.	0	V
negative peak	$-V_{kp}$	max.	2	V
Cathode to heater voltage, positive	V_{kf}	max.	250	V
positive peak	V_{kfp}	max.	300	V [1]
negative	$-V_{kf}$	max.	135	V
negative peak	$-V_{kfp}$	max.	180	V [1]

[1]) Absolute max. rating system.

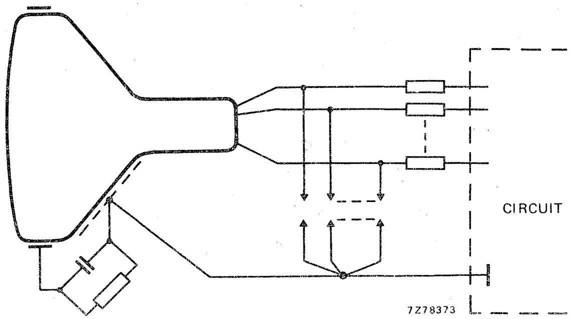
[2]) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values.

Continued on the next page.

REMARKS

With the high voltage used with this tube (max. 27, 5 kV) internal flashovers may occur. As a result of the new Soft-Flash technology these flashover currents are limited to approx. 60 A offering higher set reliability, optimum circuit protection and component savings.

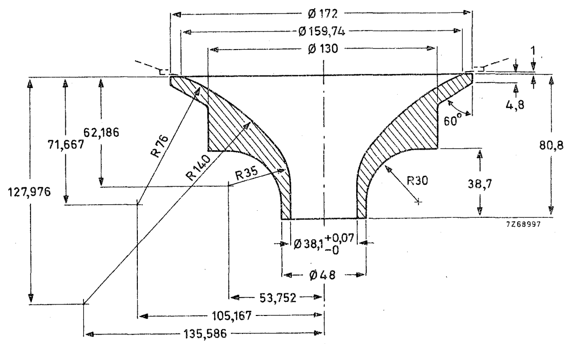
Primary protective circuitry using spark gaps is still necessary to prevent tube damage. The spark gaps should be connected according to the figure below.



No other connections between the outer conductive coating and the chassis are permissible. See also Technical Note 039.

During shipment and handling the tube should not be subjected to accelerations greater than 35g in any direction.

CONTOUR GAUGE



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3) During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.

4) Operation of the tube at lower voltages impairs the luminance and resolution.

5) 1500 μA permitted provided a current limiting circuit is used.

BEAM CORRECTIONS

When the tube is used with the deflection unit AT1083/01 the following corrections should be applied:

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of the multi-pole unit AT1081 [1]	45 μm
Static convergence deviations must be corrected by a static multi-pole unit AT1081 providing adjustable four-pole and six-pole fields centred around the tube axis	
Maximum required compensation for static convergence	
4-pole device: red-to-blue (in any direction)	5,5 mm
6-pole device: red and blue to green (in any direction)	2,8 mm

North-South raster shape correction circuitry is not required.

To obtain a symmetrical shape for the horizontal lines at the upper part and the lower part of the screen, the unit AT1081 comprises an additional dipole correction magnet giving a displacement of the beam in the centre of the screen in vertical direction of maximum	±4,5 mm
Maximum centring error in any direction after colour purity, static convergence, and horizontal centre line correction	4,5 mm

With respect to dynamic convergence the display system, consisting of picture tube A56-510X and deflection unit AT1083/01, is inherently self-converging. However, small corrections should be made to compensate for tolerances and asymmetries in the tube and deflection unit combination.
For this purpose two types of dynamic magnetic four-pole fields can be used.
One is generated by additional windings on the yoke ring of the deflection unit, and energized by adjustable currents synchronized with scanning.
The other type is generated by adjustable balancing currents through the deflection coils.

Compensation to be provided by these corrections:

- horizontal red-to-blue distance at the ends of the horizontal axis in opposite directions (line symmetry)	[2]	0 ± 1,5 mm
- horizontal red-to-blue distance at the ends of the vertical axis in opposite directions (field symmetry)	[3]	0 ± 1,5 mm
- vertical red-to-blue distance at the ends of the horizontal axis in opposite directions (line balance)	[4]	0 ± 1,0 mm
- vertical red-to-blue distance at the ends of the vertical axis (field balance)	[5]	0 ± 1,0 mm

Notes see the next page.

Notes

1) Purity adjustment in vertical direction is not required.

2) This correction is made by feeding a sawtooth current of line frequency through the additional four-pole windings on the deflection unit.

3) This correction is made by feeding a sawtooth current of field frequency through the additional four-pole windings on the deflection unit.

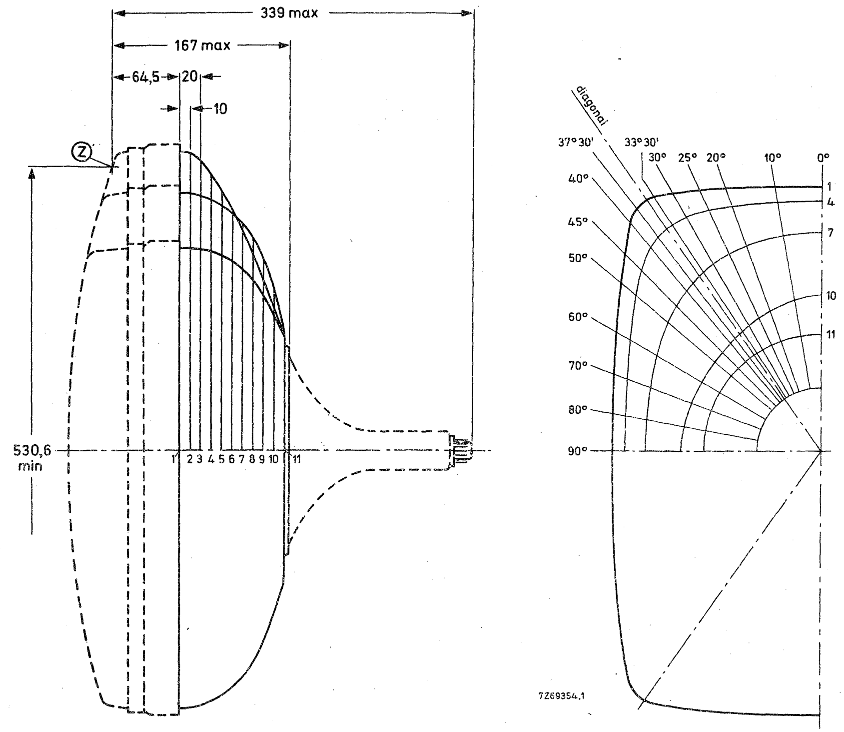
4) This correction is made by unbalancing the line deflection coil halves.

5) This correction is made by unbalancing the field deflection coil halves.

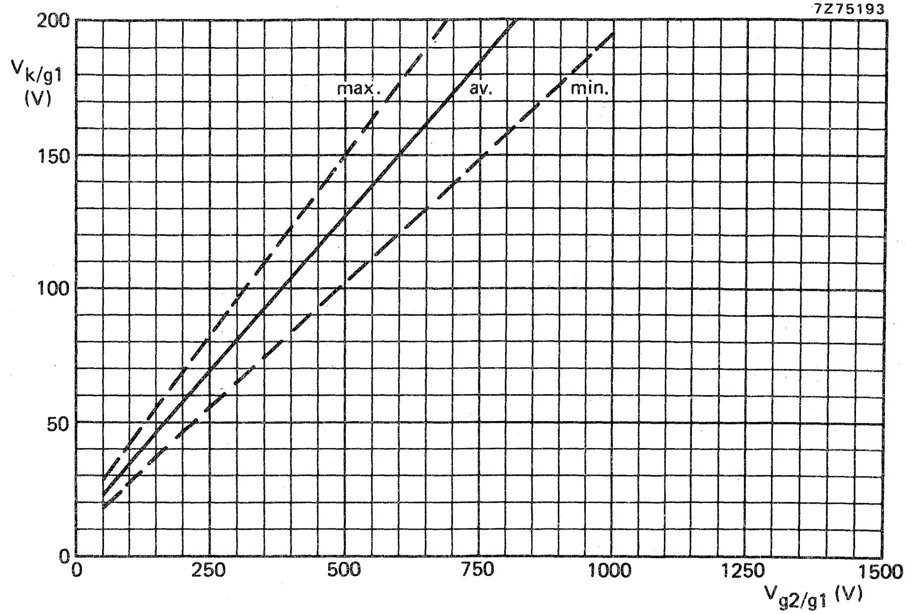
See also Technical Note 043.

MAXIMUM CONE CONTOUR DRAWING

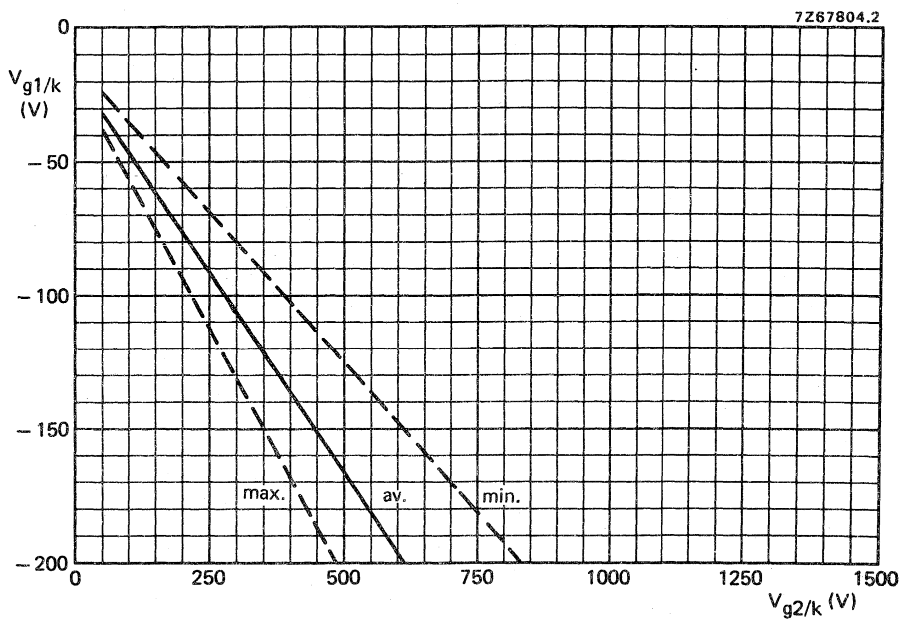
Dimensions in mm



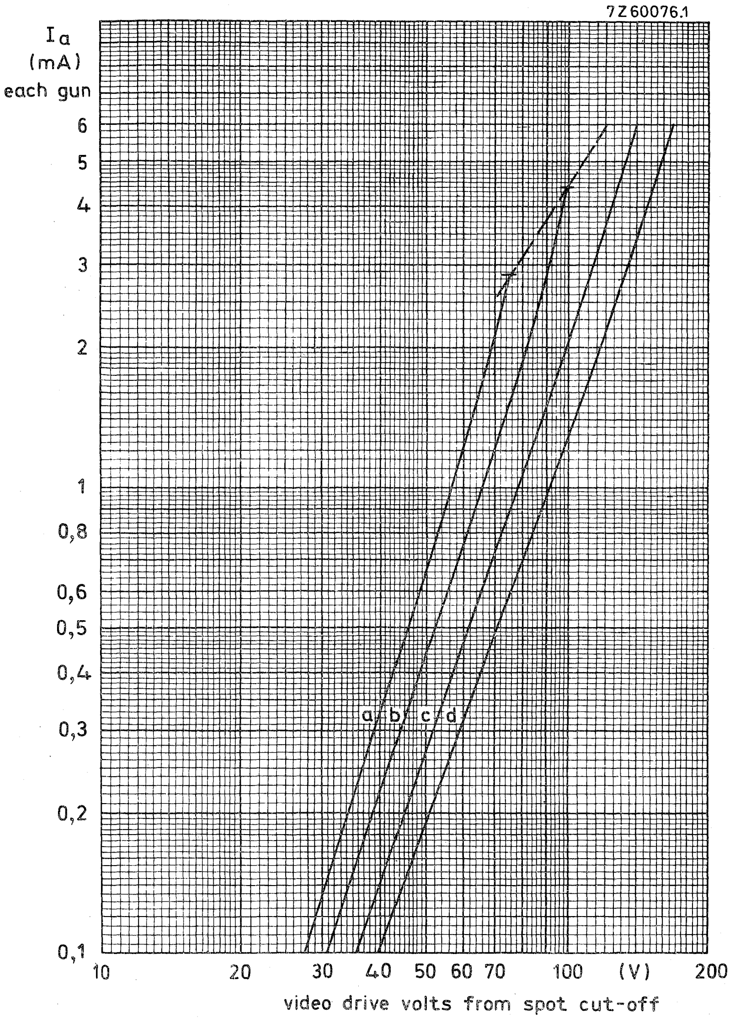
Section	Distance from centre (max. values)															
	Nom. distance from section 1	0°	10°	20°	25°	30°	30° 30'	diag.	37° 30'	40°	45°	50°	60°	70°	80°	90°
1	0	248,0	251,2	261,3	269,3	279,5	286,8	288,0	286,8	281,7	262,3	245,9	222,0	207,0	198,7	196,0
2	10	244,4	247,6	257,6	265,4	275,3	282,3	283,3	282,0	276,8	257,8	241,6	218,0	203,2	195,0	192,4
3	20	240,5	243,6	252,9	259,6	267,0	271,2	271,3	269,7	265,3	250,6	236,6	214,2	199,6	191,4	188,8
4	30	235,0	237,8	245,5	250,2	254,4	255,7	255,0	253,3	249,9	239,5	228,3	208,6	194,8	186,9	184,3
5	40	227,7	229,9	235,2	237,8	239,1	238,7	237,6	236,0	233,3	225,8	217,3	201,0	188,8	181,6	179,2
6	50	218,2	219,6	222,2	222,9	222,3	220,8	219,6	218,1	215,8	210,1	203,6	190,9	180,9	174,7	172,6
7	60	206,4	206,8	206,8	205,9	204,0	202,2	200,9	199,5	197,5	193,2	188,4	179,2	171,6	166,8	165,2
8	70	191,6	190,9	188,5	186,6	184,1	182,2	181,0	179,8	178,2	175,0	171,7	165,7	160,8	157,7	156,6
9	80	172,5	170,9	166,8	164,4	161,9	160,1	159,1	158,2	157,0	154,8	152,9	149,7	145,6	146,5	146,2
10	90	147,0	144,8	140,5	138,3	136,3	135,0	134,3	133,6	132,9	131,7	130,8	130,0	130,3	131,3	132,0
11	99,1	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0



Spot cut-off design chart (cathode drive), V_{g3} adjusted for focus, $V_{a,\,g5,\,g4}$ = 20 to 27,5 kV



Spot cut-off design chart (grid drive), V_{g3} adjusted for focus, $V_{a,\,g5,\,g4}$ = 20 to 27,5 kV

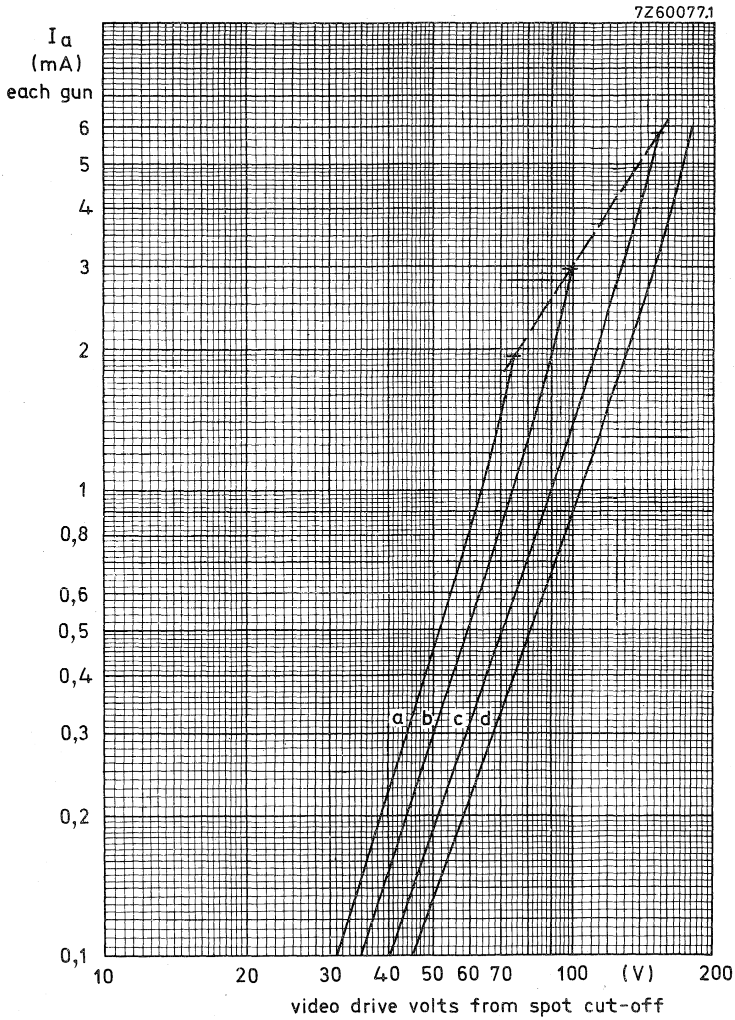


Typical cathode drive characteristics.

$V_{a,\ g5,\ g4}$ = 20 kV to 27,5 kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for desired fixed V_k

– – – zero bias point

a = spot cut-off = 75 V
b = spot cut-off = 100 V
c = spot cut-off = 150 V
d = spot cut-off = 200 V

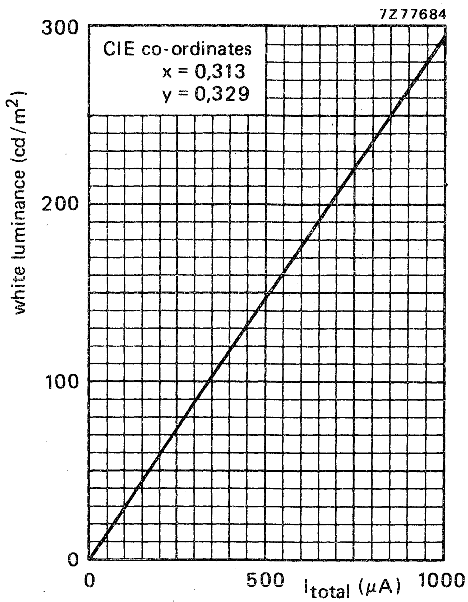


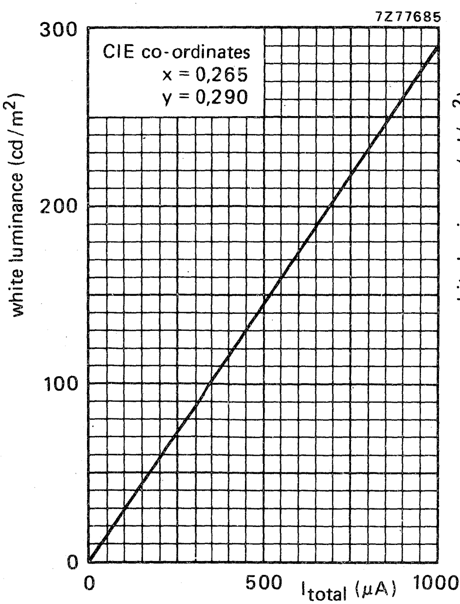
Typical grid drive characteristics.

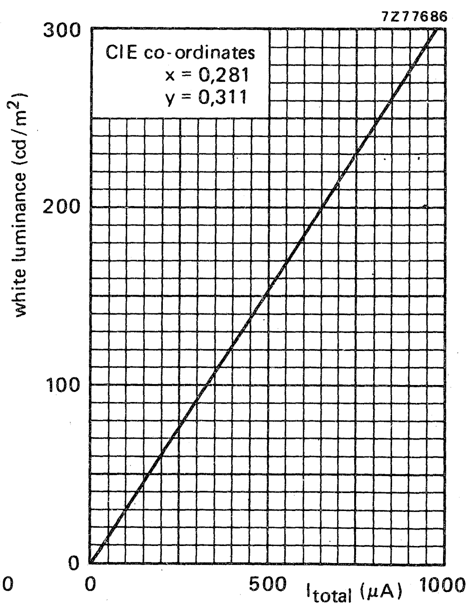
$V_{a, g5, g4}$ = 20 kV to 27,5 kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for desired fixed V_{g1}
– – – zero bias point

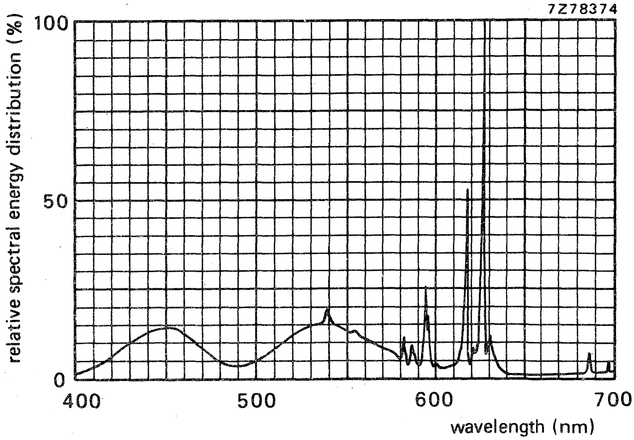
a = spot cut-off = –75 V
b = spot cut-off = –100 V
c = spot cut-off = –150 V
d = spot cut-off = –200 V

Luminance at the centre of the screen as a function of I_{total}. Scanned area 444,2 mm x 334,2 mm.



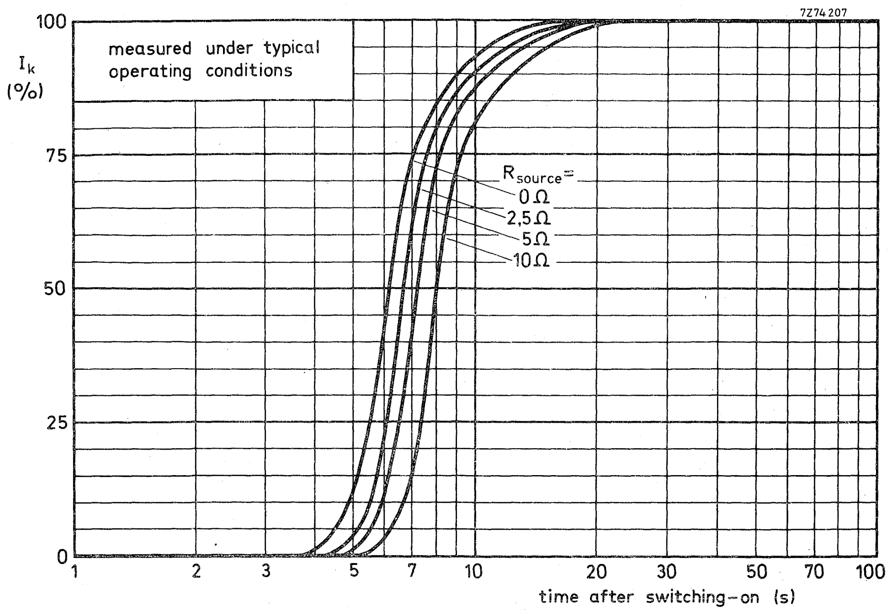






Simultaneous excitation of red, green and blue phosphor, measured in a tube, to produce white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,065



Cathode heating time to attain a certain percentage of the cathode current at equilibrium conditions.

30AX COLOUR PICTURE TUBE

- Automatic snap-in raster orientation
- Push-on axial purity positioning
- Internal magneto-static beam alignment
- Hi-Bi gun with quadrupole cathode lens
- When combined with deflection unit AT1260 it forms a self-aligning, self-converging assembly with low power consumption

- 110° deflection
- Hi-Bri screen
- Pigmented phosphors: improved contrast
- Curved line mask
- In-line gun
- Standard 36,5 mm neck
- Soft-Flash technology
- Slotted shadow mask optimized for minimum moiré
- Fine pitch over entire screen
- Quick-heating cathodes
- Internal magnetic shield
- Reinforced envelope for push-through mounting

QUICK REFERENCE DATA

Deflection angle	110°
Face diagonal	56 cm
Overall length	38 cm
Neck diameter	36,5 mm
Heating	6,3 V, 720 mA
Focusing	hi-bi-potential

ELECTRICAL DATA

Capacitances		
final accelerator to external conductive coating	$C_{a,\,g5,\,g4/m}$	max. 1800 pF min. 1300 pF
final accelerator to metal rimband	$C_{a,\,g5,\,g4/m'}$	250 pF
grid 1 of a gun to all other electrodes		
red gun	$C_{g\,1R}$	7 pF
green gun	$C_{g\,1G}$	7 pF
blue gun	$C_{g\,1B}$	7 pF
cathodes of all guns (connected in parallel) to all other electrodes	C_k	12 pF
cathode of any gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}	4 pF
grid 3 (focusing electrode) to all other electrodes	C_{g3}	7 pF
Focusing	hi-bi-potential	
Deflection method	magnetic	
Deflection angles		
diagonal	110°	
horizontal	97°	
vertical	77°	
Heating: indirect by a.c. (preferably mains or line frequency) or d.c.		
heater voltage	V_f	6,3 V *
heater current	I_f	720 mA

OPTICAL DATA

Screen	metal-backed vertical phosphor stripes
Screen finish	satinized
Phosphor	
red	europium activated rare earth
green	sulphide type
blue	sulphide type
Centre-to-centre distance of identical colour phosphor stripes	0,8 mm
Light transmission of face glass	68%

* For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V. For heating time as a function of source impedance see graph on the last page but one of this data sheet.

DEVELOPMENT SAMPLE DATA

MECHANICAL DATA (see also the figures on the following pages)

Overall length	383,8 ± 6 mm
Neck diameter	$36{,}5\ ^{+1,3}_{-0}$ mm
Bulb dimensions	
diagonal	max. 566,2 mm
width	max. 486,3 mm
height	max. 381,8 mm
Useful screen dimensions	
diagonal	min. 530,6 mm
horizontal axis	min. 444,2 mm
vertical axis	min. 334,2 mm
Net mass	approx. 14,5 kg
Base	12-pin base IEC 67-I-47a, type 2
Anode contact	small cavity contact J1-21, IEC 67-III-2
Mounting position	anode contact on top

Handling

During shipment and handling the tube should not be subjected to accelerations greater than 35g in any direction.

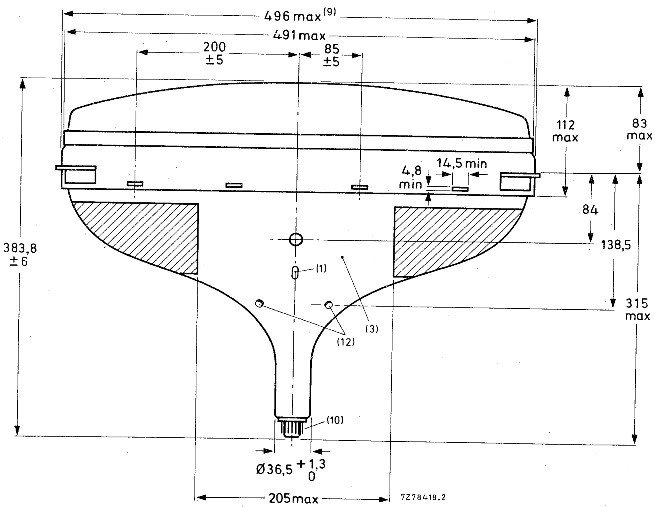
Notes to outline drawings on the following pages

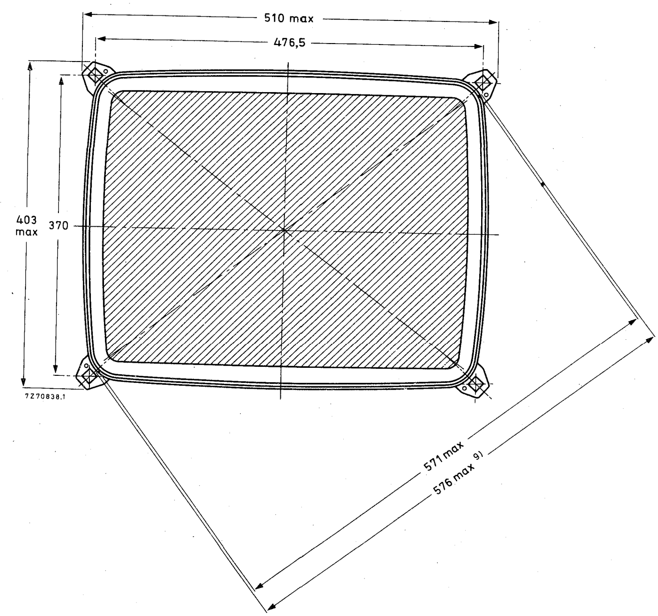
1. This ridge can be used as an orientation for the deflection unit.
2. Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.
3. To clean this area wipe only with a soft lintless cloth.
4. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
5. Minimum space to be reserved for mounting lug.
6. The position of the mounting screw in the cabinet must be within a circle of 9,5 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 476,5 mm x 370 mm.
7. Co-ordinates for radius R = 14,8 mm: x = 203,9 mm, y = 145,5 mm.
8. Distance from point z to any hardware.
9. Maximum dimensions in plane of lugs.
10. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 55 mm.
    The mass of the mating socket with circuitry should not be more than 150 g.
11. Minimum distance between glass and rimband in plane of centre line of the apertures.
12. Centring bosses for deflection unit.

MECHANICAL DATA (continued)

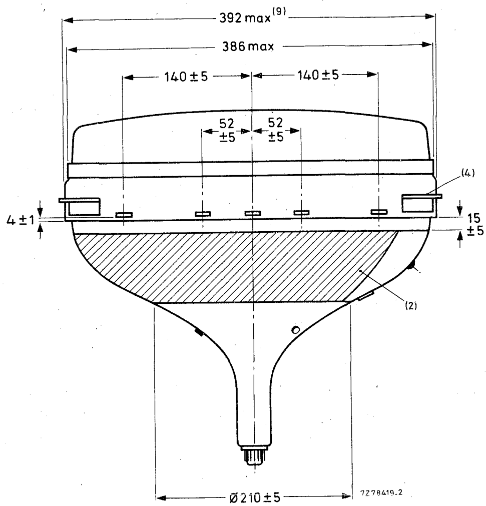
Dimensions in mm

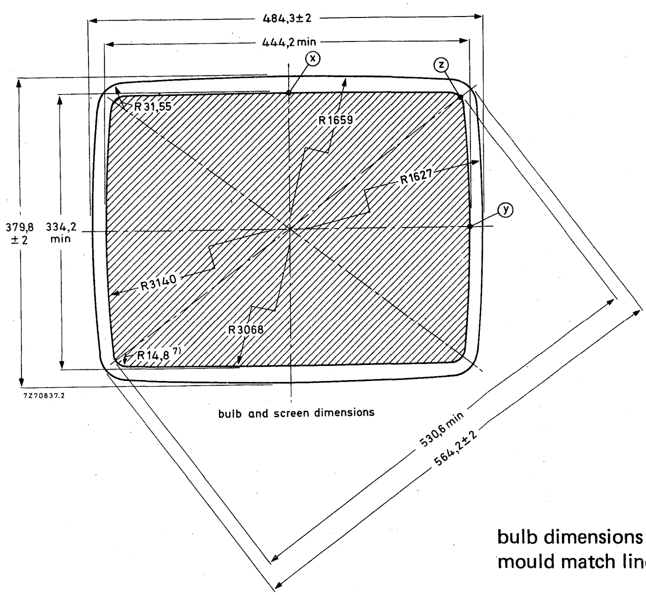
Notes are on the preceding page





DEVELOPMENT SAMPLE DATA

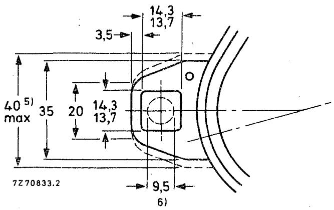


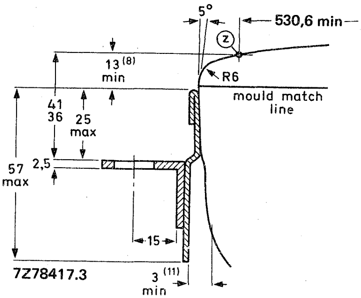


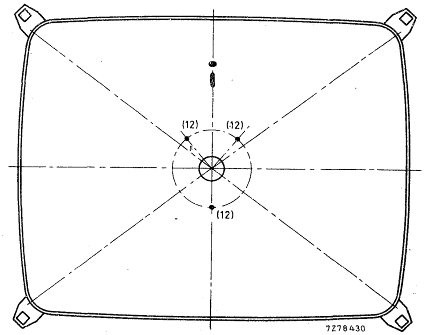
bulb and screen dimensions

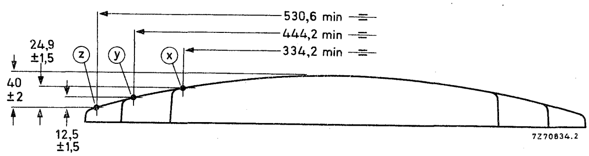
bulb dimensions at mould match line.

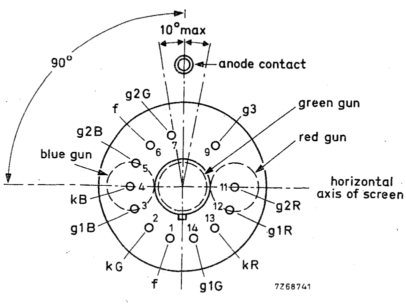
MECHANICAL DATA (continued)

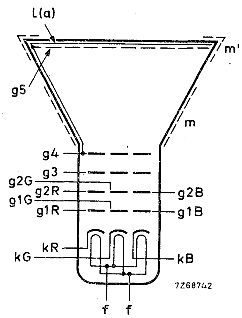




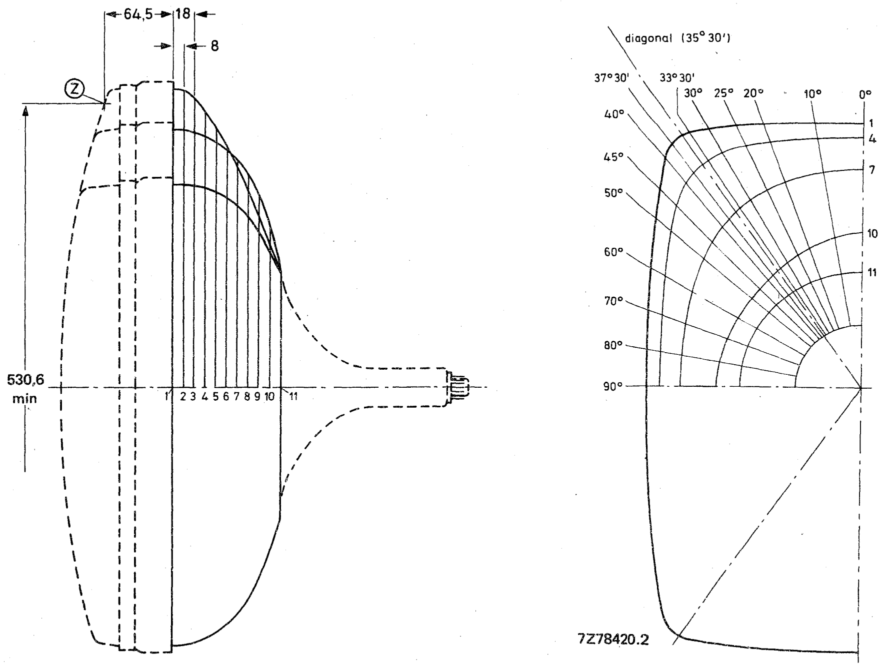








Maximum cone contour



DEVELOPMENT SAMPLE DATA

section	distance from centre (max. values)														
	nom. distance from section 1	0°	10°	20°	25°	30°	33° 30'	diag.	37° 30'	40°	45°	50°	60°	70°	80°	90°
1		248,0	251,2	261,3	269,3	279,5	286,8	288,0	286,8	281,7	262,3	245,9	222,0	207,0	198,7	196,0
2	8	244,4	247,6	257,6	265,4	275,3	282,3	283,3	282,0	276,8	257,8	241,6	218,0	203,2	195,0	192,4
3	18	240,5	243,6	252,9	259,6	267,0	271,2	271,3	269,7	265,3	250,6	236,6	214,2	199,6	191,4	188,8
4	28	235,0	237,8	245,5	250,2	254,4	255,7	255,0	253,3	249,9	239,5	228,3	208,6	194,8	186,9	184,3
5	38	227,7	229,9	235,2	237,8	239,1	238,7	237,6	236,0	233,3	225,8	217,3	201,0	188,8	181,6	179,2
6	48	218,2	219,6	222,2	222,9	222,3	220,8	219,6	218,1	215,8	210,1	203,6	190,9	180,9	174,7	172,6
7	58	206,4	206,8	206,8	205,9	204,0	202,2	200,9	199,5	197,5	193,2	188,4	179,2	171,6	166,8	165,2
8	68	191,6	190,9	188,5	186,6	184,1	182,2	181,0	179,8	178,2	175,0	171,7	165,7	160,8	157,7	156,6
9	78	172,5	170,9	166,8	164,4	161,9	160,1	159,1	158,2	157,0	154,8	152,9	149,7	145,6	146,5	146,2
10	88	147,0	144,8	140,5	138,3	136,3	135,0	134,3	133,6	132,9	131,7	130,8	130,0	130,3	131,3	132,0
11	97,1	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0

RECOMMENDED OPERATING CONDITIONS (cathode drive)

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a,\,g5,\,g4}$	25 kV	
Grid 3 (focusing electrode) voltage	V_{g3}	6,5 to 7,45 kV	
Grid 2 voltage for a spot cut-off voltage V_k = 140 V	V_{g2}	560 to 800 V	
Cathode voltage for spot cut-off at V_{g2} = 680 V	V_k	120 to 160 V	
Luminance at the centre of the screen	L	170 cd/m^2	note 1

EQUIPMENT DESIGN VALUES (each gun if applicable)

The values are valid for final accelerator voltages between 22,5 and 27,5 kV.

The voltages are specified with respect to grid 1.

Grid 3 (focusing electrode) voltage	V_{g3}	26 to 29,8% of final accelerator voltage
Difference in cut-off voltage between guns in one tube	ΔV_k	lowest value is min. 80% of highest value
Grid 3 (focusing electrode) current	I_{g3}	−5 to + 5 μA
Grid 2 current	I_{g2}	−5 to + 5 μA
Grid 1 current at V_k = 140 V	I_{g1}	−5 to + 5 μA

To produce white D, CIE co-ordinates x = 0,313, y = 0,329.

Percentage of the total anode current supplied by each gun (typical)

red gun	41,2%
green gun	32,2%
blue gun	26,6%

Ratio of anode current

	min.	av.	max.
red gun to green gun	0,95	1,30	1,70
red gun to blue gun	1,15	1,55	2,05

Maximum centring error in any direction 4,5 mm

Notes

1. Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 μA/cm^2.

LIMITING VALUES (each gun if applicable)

Design maximum rating system unless otherwise stated.

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a, g5, g4}$	max.	27,5 kV	notes 1, 2, 3
		min.	22,5 kV	notes 1, 4
Long-term average current for three guns	I_a	max.	1000 μA	note 5
Grid 3 (focusing electrode) voltage	V_{g3}	max.	9 kV	
Grid 2 voltage	V_{g2}	max.	1200 V	note 6
Cathode voltage				
positive	V_k	max.	400 V	
positive operating cut-off	V_k	max.	200 V	
negative	$-V_k$	max.	0 V	
negative peak	$-V_{kp}$	max.	2 V	
Cathode to heater voltage				
positive	V_{kf}	max.	250 V	
positive peak	V_{kfp}	max.	300 V	note 1
negative	$-V_{kf}$	max.	135 V	
negative peak	$-V_{kfp}$	max.	180 V	note 1

DEVELOPMENT SAMPLE DATA

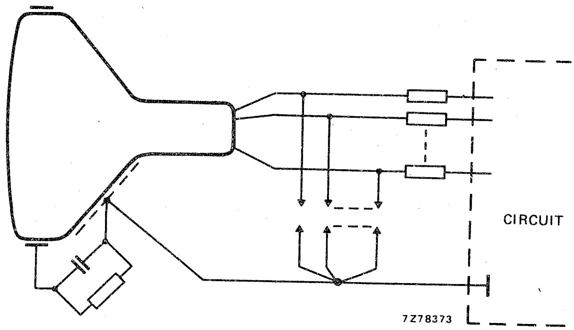
Notes

1. Absolute maximum rating system.
2. The X-ray dose rate remains below the acceptable value of 0,5 mR/h (36 pA/kg), measured with ionization chamber when the tube is used within its limiting values.
3. During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.
4. Operation of the tube at lower voltages impairs the luminance, resolution and could impair convergence.
5. 1500 μA permitted provided a current limiting circuit is used.
6. During adjustment on the production line max. 1500 V is permitted.

REMARKS

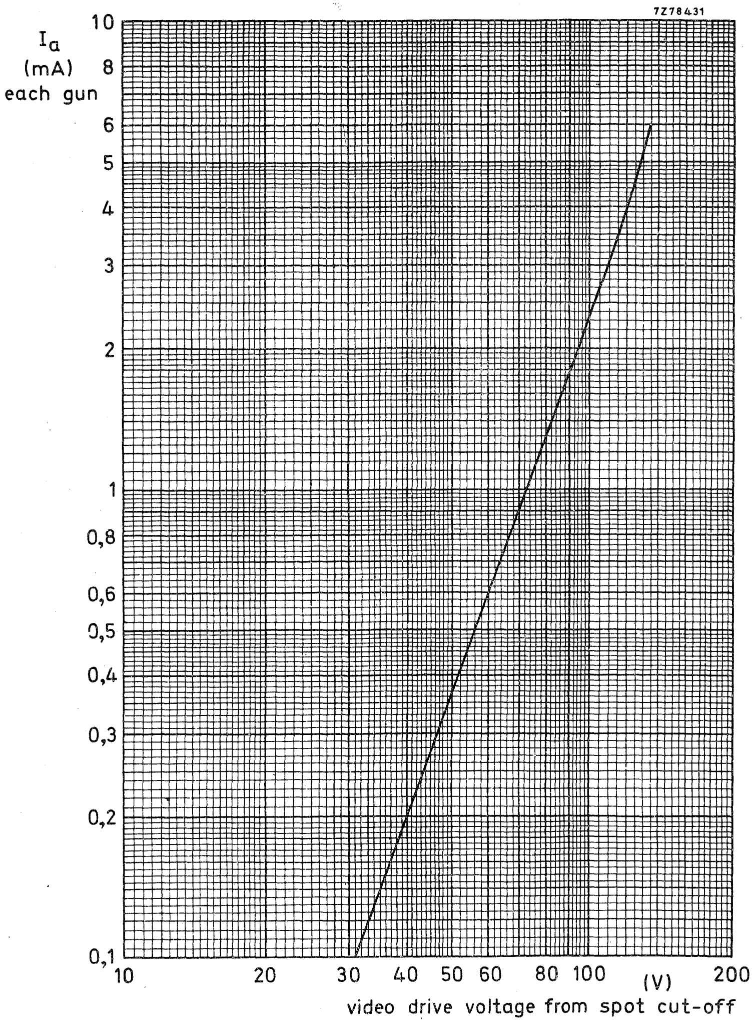
With the high voltage used with this tube (max. 27,5 kV) internal flashovers may occur. As a result of the new Soft-Flash technology these flashover currents are limited to approx. 60 A offering higher set reliability, optimum circuit protection and component savings.

Primary protective circuitry using spark gaps is still necessary to prevent tube damage. The spark gaps should be connected according to the figure below.



No other connections between the outer conductive coating and the chassis are permissible. Additional information available on request.

DEVELOPMENT SAMPLE DATA



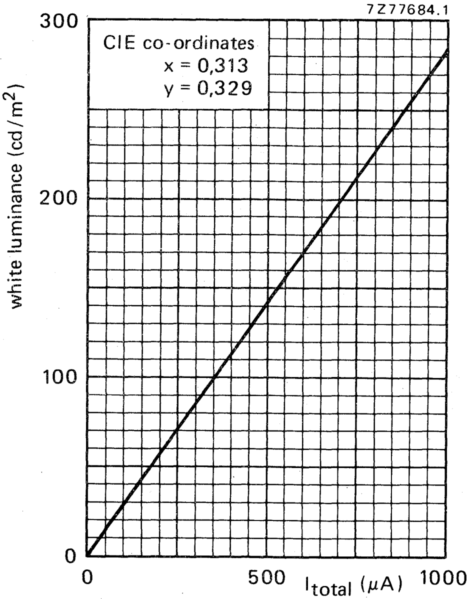
Typical cathode drive characteristic.

V_f = 6,3 V

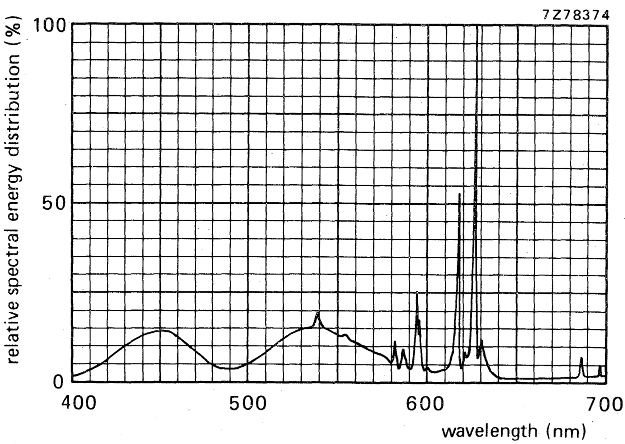
$V_{a,\,g5,\,g4}$ = 25 kV

V_{g3} adjusted for focus

V_{g2} (each gun) adjusted to provide spot cut-off for V_K = 140 V.

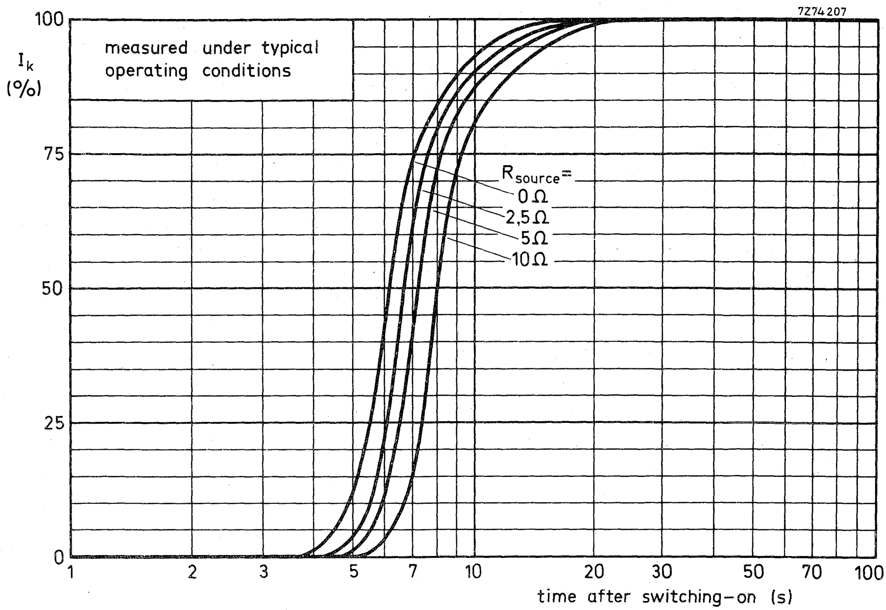


Luminance at the centre of the screen as a function of I_{total}. Scanned area 444,2 mm x 334,2 mm.



Simultaneous excitation of red, green and blue phosphor, measured in a tube, to produce white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,065

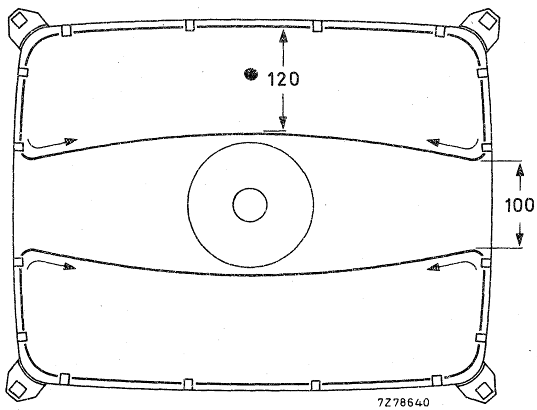


Cathode heating time to attain a certain percentage of the cathode current at equilibrium conditions.

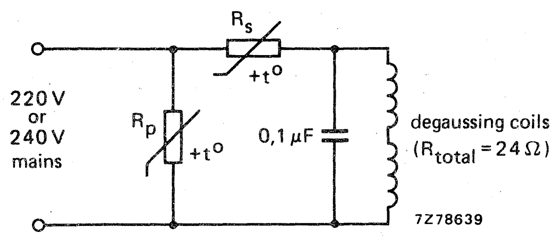
DEVELOPMENT SAMPLE DATA

DEGAUSSING

The picture tube is provided with an internal magnetic shield. This shield and the shadow mask with its suspension system may be provided with an automatic degaussing system, consisting of two coils covering top and bottom cone parts.
For proper degaussing an initial magnetomotive force (m.m.f.) of 250 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate circuitry. To prevent beam landing disturbances by line-frequency currents induced in the degaussing coils, these coils should be shunted by a capacitor of sufficiently high value. In the steady state, no significant m.m.f. should remain in the coils ($\leqslant$ 0,25 ampere-turns). To ease the mounting of the coils, the rimband is provided with rectangular holes.
An example is given below.



Position of degaussing coils on the picture tube.



Degaussing circuit using dual PTC thermistor 2322 662 98009.

Data of each degaussing coil

Circumference	120 cm
Number of turns	50
Copper-wire diameter	0,35 mm
Aluminium-wire diameter	0,45 mm
Resistance	12 Ω

COLOUR PICTURE TUBE

Replacement type A66-410X.

A circuit modification may be necessary to compensate for the 170 mA lower heater current of the A66-410X.

COLOUR PICTURE TUBE

QUICK REFERENCE DATA

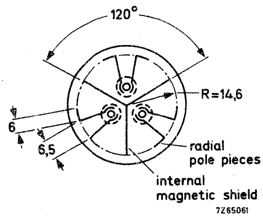
Temperature compensated shadow-mask designed for minimum moiré

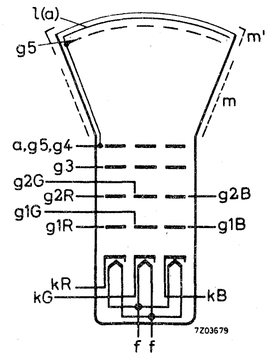
High white luminance at unity current ratio

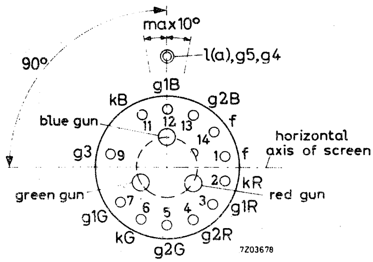
Face diagonal	66 cm
Deflection angle	110°
Neck diameter	36,5 mm
Envelope	reinforced; suitable for push-through
Magnetic shield	internal
Focusing	bi-potential
Deflection	magnetic
Convergence	magnetic
Heating	6,3 V, 730 mA
Light transmission of face glass	52,5 %
Quick heating cathode	with a typical tube a legible picture will appear within approx. 5 s

MECHANICAL DATA

Overall length	425,1 to 438,1 mm
Neck diameter	36,5 mm
Diagonal of bulb	max. 657,6 mm
Horizontal axis of bulb	max. 556,4 mm
Vertical axis of bulb	max. 435,3 mm
Useful screen	
diagonal	min. 617,8 mm
horizontal axis	min. 518 mm
vertical axis	min. 390 mm
Base	12 pin base JEDEC B12-246
Anode contact	Small cavity contact J1-21, IEC 67-III-2







TYPICAL OPERATING CONDITIONS

Final accelerator voltage	$V_{a,g5,g4}$	25 kV
Grid 3 (focusing electrode) voltage	V_{g3}	4,2 to 5 kV
Grid 2 voltage for a spot cut-off at $V_{g1} = -105$ V	V_{g2}	212 to 495 V
Grid 1 voltage for spot cut-off at $V_{g2} = 300$ V	V_{g1}	-70 to -140 V

COLOUR PICTURE TUBE

Replacement type A66-510X.

20AX Hi-Bri COLOUR PICTURE TUBE
in Soft-Flash technology

- **110°**
- **In-line**

This picture tube, which is electrically and mechanically interchangeable with type A66-500X, features increased brightness (Hi-Bri), effectively improved flashover behaviour due to the new Soft-Flash technology, quick-heating cathodes, internal magnetic shield and a very short overall length. The shadow-mask has a fine constant pitch over the entire screen and is optimized for minimum moiré. The system of picture tube and deflection unit AT1080 is inherently self-converging.

QUICK REFERENCE DATA

Deflection angle	110°	
Face diagonal	66	cm
Overall length	41	cm
Inherently self-converging system with deflection unit AT1080		
Quick-heating cathode	with a typical tube a picture will appear within 5 s	
Heating	6,3 V, 720	mA
Magnetic shield	internal	
Envelope	reinforced suitable for push-through	
Focusing	bi-potential	

SCREEN

Metal-backed vertical phosphor stripes

Red	Europium activated rare earth
Green	Sulphide type
Blue	Sulphide type

Screen finish	satinized	
Centre-to-centre distance of identical colour phosphor stripes	0,8	mm
Light transmission of face glass	68	%

HEATING: indirect by a.c. (preferably mains or line frequency) or d.c.

Heater voltage	V_f	6,3	V
Heater current	I_f	720	mA

For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V.

For heating time as a function of source impedance see graph on the last page of this data sheet.

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g5,g4/m}$	<	2000	pF
		>	1500	pF
Final accelerator to metal rimband	$C_{a,g5,g4/m'}$		300	pF
Grid no. 1 of a gun to all other electrodes				
red gun	C_{g1R}		7	pF
green gun	C_{g1G}		7	pF
blue gun	C_{g1B}		7	pF
Cathodes of all guns (connected in parallel) to all other electrodes	C_k		12	pF
Cathode of any gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}		4	pF
Grid no. 3 (focusing electrode) to all other electrodes	C_{g3}		7	pF

FOCUSING electrostatic (bi-potential)

DEFLECTION magnetic

Diagonal deflection angle	110	deg
Horizontal deflection angle	97	deg
Vertical deflection angle	77	deg

MECHANICAL DATA

Overall length		405,1 to 418,1	mm
Neck diameter		$36,5^{+1,6}_{-0}$	mm
Diagonal of bulb	≤	657,6	mm
Width of bulb	≤	556,4	mm
Height of bulb	≤	435,3	mm
Useful screen			
diagonal	≥	617,8	mm
horizontal axis	≥	518	mm
vertical axis	≥	390	mm

Mounting position: any

Net mass : approx. 20 kg

Base : 12 pin base IEC67-I-47a, type 2

Anode contact : Small cavity contact J1-21, IEC 67-III-2

Magnetic shielding, degaussing: The tube is provided with an internal magnetic shield. The internal magnetic shield and the shadow-mask with its suspension system may be provided with an automatic degaussing system, consisting of two coils covering top and bottom cone parts. For proper degaussing an initial m.m.f. of 300 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate circuitry. To prevent beam landing disturbances by line-frequency currents induced in the degaussing coils, these coils should be shunted by a capacitor of sufficiently high value. In the steady state, no significant m.m.f. should remain in the coils (≤0,3 A.t.). To ease the mounting of the coils, the rimband is provided with rectangular holes. See also Technical Note 042.

Notes to outline drawings on the following pages

1) This ridge can be used as an orientation for the deflection unit.

2) Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.

3) To clean this area, wipe only with a soft lintless cloth.

4) The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.

5) Minimum space to be reserved for mounting lug.

6) The position of the mounting screw in the cabinet must be within a circle of 9,5 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 549 mm x 422 mm.

7) Co-ordinates for radius R = 18,2 mm: x = 236,6 mm, y = 168,9 mm.

8) Distance from point z to any hardware.

9) Maximum dimensions in plane of lugs.

10) Centring ring for the deflection unit.

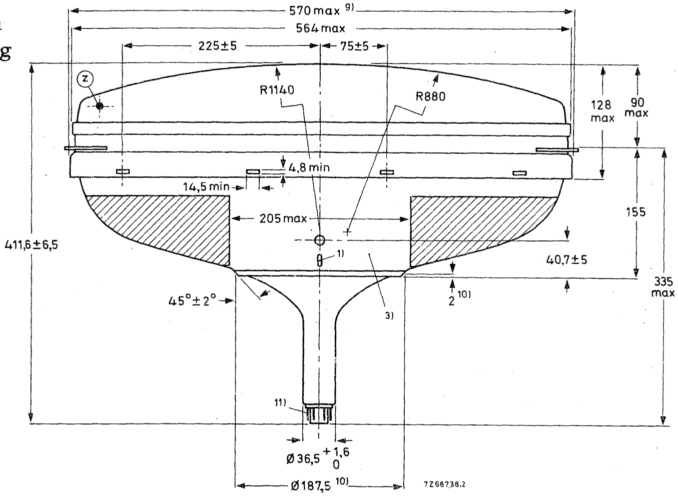
11) The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 55 mm.

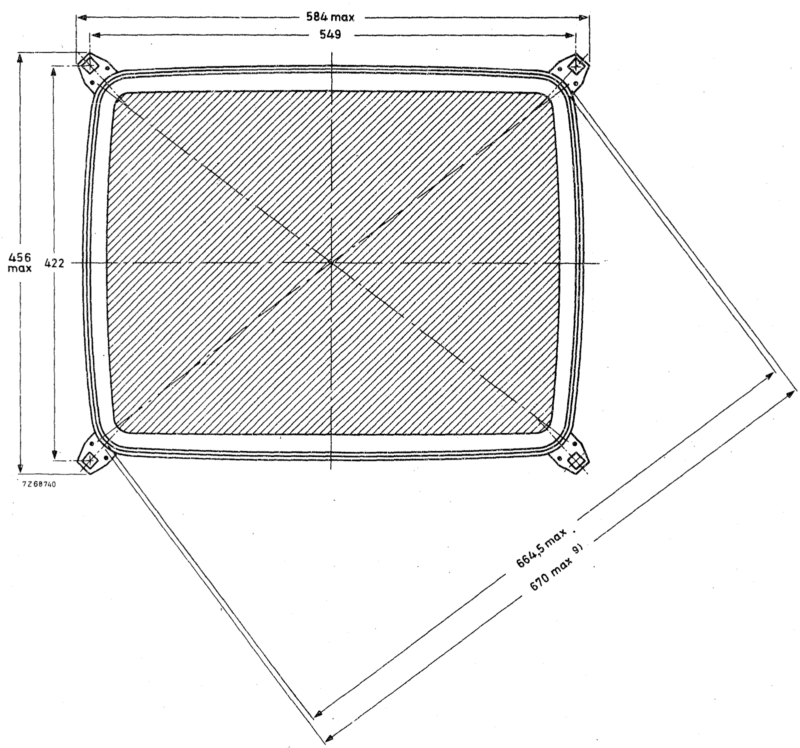
12) Minimum distance between glass and rimband in plane of the apertures.

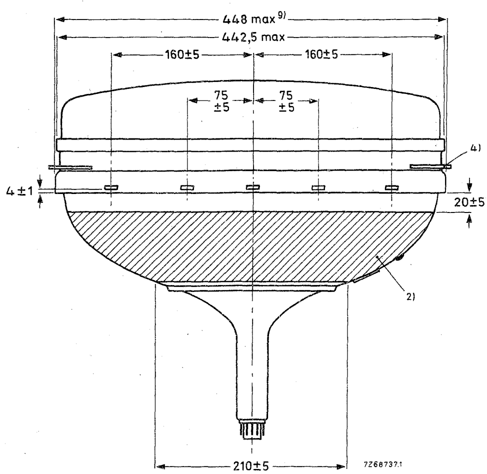
MECHANICAL DATA (continued)

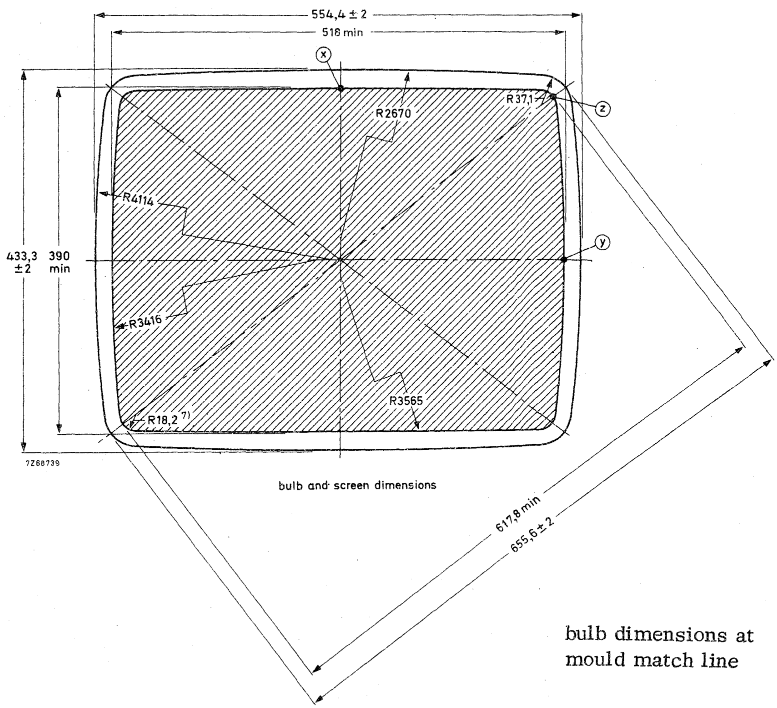
Dimensions in mm

Notes are on the preceding page.





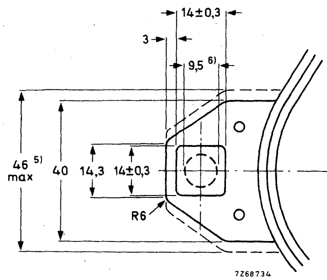


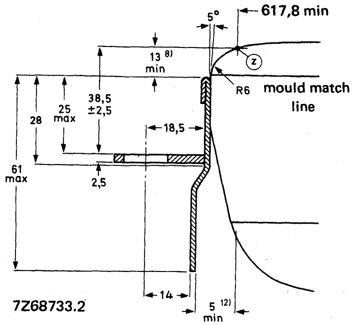


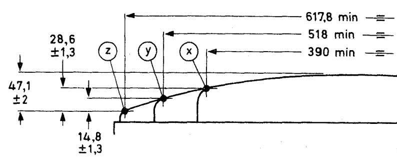
bulb and screen dimensions

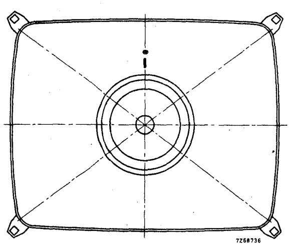
bulb dimensions at mould match line

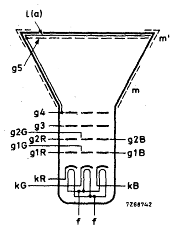
MECHANICAL DATA (continued) Dimensions in mm

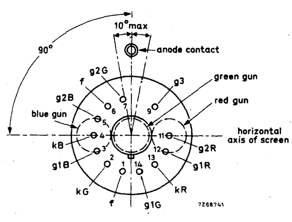












TYPICAL OPERATING CONDITIONS cathode drive, voltages with respect to g1.

Final accelerator voltage	$V_{a, g5, g4}$	25	kV
Grid no. 3 (focusing electrode) voltage	V_{g3}	4,0 to 4,8	kV
Grid no. 2 voltage for a spot cut-off voltage V_k = 140 V	V_{g2}	465 to 705	V [1]
Cathode voltage for spot cut-off at V_{g2} = 555 V	V_k	110 to 165	V [2]
Luminance at the centre of the screen [3]	L	170	cd/m^2

EQUIPMENT DESIGN VALUES (each gun if applicable), voltages with respect to g1
Valid for final accelerator voltages between 20 kV and 27,5 kV

Grid no. 3 (focusing electrode) voltage	V_{g3}	16 to 19,2% of final accelerator voltage	
Grid no. 2 voltage	V_{g2}	see cut-off design chart	
Cathode voltage for visual extinction of focused spot	V_k	see cut-off design chart	
Difference in cut-off voltage between guns in any tube	ΔV_k	lowest value is min. 75% of highest value	
Grid no. 3 (focusing electrode) current	I_{g3}	−5 to +5	μA
Grid no. 2 current	I_{g2}	−5 to +5	μA
Grid no. 1 current at V_k = 150 V	I_{g1}	−5 to +5	μA

1) This range of V_{g2} has to be used when in circuit design fixed values for cut-off of the three guns are used.

2) This range of V_k has to be used when in circuit design fixed values for V_{g2} of the three guns are used.

3) Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 μA/cm^2. See also Technical Note 065.

EQUIPMENT DESIGN VALUES (continued)

				white "D"
To produce white of the following CIE co-ordinates :	x	0,265	0,281	0,313
	y	0,290	0,311	0,329
Percentage of total anode current supplied by each gun (typical)				
red gun		26,4	30,6	41,2
green gun		34,3	35,4	32,2
blue gun		39,3	34,0	26,6
Ratio of anode currents red gun to green gun	min.	0,60	0,65	0,95
	av.	0,75	0,85	1,30
	max.	1,00	1,15	1,70
Ratio of anode currents red gun to blue gun	min.	0,50	0,65	1,15
	av.	0,65	0,90	1,55
	max.	0,90	1,20	2,05

LIMITING VALUES (each gun if applicable), voltages with respect to g1
(design maximum rating system unless otherwise specified)

Final accelerator voltage	$V_{a, g5, g4}$	max.	27,5	kV 1)2)3)
		min.	20	kV 1)4)
Long term average current for three guns	I_a	max.	1000	µA 5)
Grid no. 3 (focusing electrode) voltage	V_{g3}	max.	6	kV
Grid no. 2 voltage	V_{g2}	max.	1000	V
Cathode voltage, positive	V_k	max.	400	V
positive, operating cut-off	V_k	max.	200	V
negative	$-V_k$	max.	0	V
negative peak	$-V_{kp}$	max.	2	V
Cathode to heater voltage, positive	V_{kf}	max.	250	V
positive peak	V_{kfp}	max.	300	V 1)
negative	$-V_{kf}$	max.	135	V
negative peak	$-V_{kfp}$	max.	180	V 1)

1) Absolute max. rating system.

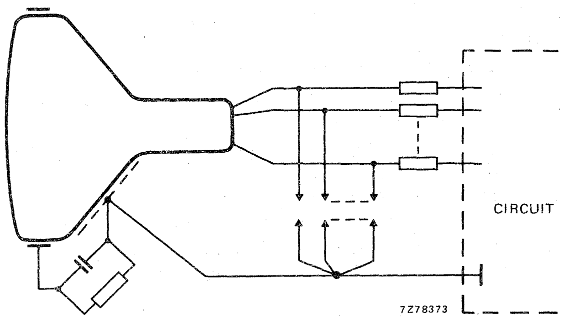
2) The X-ray dose rate remains below the acceptable value of 0,5 mR/h measured with ionization chamber when the tube is used within its limiting values.

Continued on the next page.

REMARKS

With the high voltage used with this tube (max. 27, 5 kV) internal flashovers may occur. As a result of the new Soft-Flash technology these flashover currents are limited to approx. 60 A offering higher set reliability, optimum circuit protection and component savings.

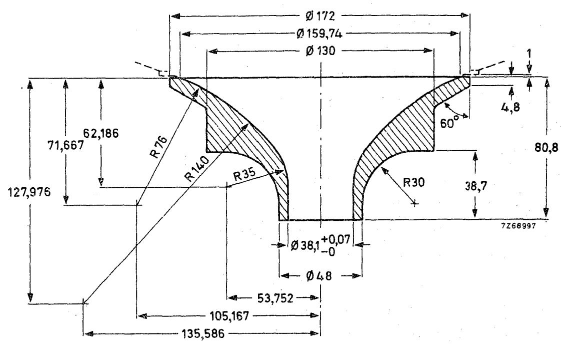
Primary protective circuitry using spark gaps is still necessary to prevent tube damage. The spark gaps should be connected according to the figure below.



No other connections between the outer conductive coating and the chassis are permissible. See also Technical Note 039.

During shipment and handling the tube should not be subjected to accelerations greater than 35g in any direction.

CONTOUR GAUGE



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3) During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.

4) Operation of the tube at lower voltages impairs the luminance and resolution.

5) 1500 μA permitted provided a current limiting circuit is used.

BEAM CORRECTIONS

When the tube is used with the deflection unit AT1080 the following corrections should be applied:

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of the multi-pole unit AT1081 [1]		45 μm
Static convergence deviations must be corrected by a static multi-pole unit AT1081 providing adjustable four-pole and six-pole fields centred around the tube axis		
Maximum required compensation for static convergence		
4-pole device: red to blue (in any direction)		6 mm
6-pole device: red and blue to green (in any direction)		3 mm

North-South raster shape correction circuitry is not required.

To obtain symmetrical shape for the horizontal lines at the upper part and the lower part of the screen, the unit AT1081 comprises an additional dipole correction magnet giving a displacement of the beam in the centre of the screen in vertical direction of maximum		± 5,5 mm
Maximum centring error in any direction after colour-purity, static convergence, and horizontal centre line correction		5 mm

With respect to dynamic convergence the display system, consisting of picture tube A66-510X and deflection unit AT1080, is inherently self-converging. However, a small systematic correction is required on the vertical axis and also small corrections should be made to compensate for tolerances and asymmetries in the tube and deflection unit combination (using a recommended circuit).

For this purpose two types of dynamic magnetic four-pole fields can be used. One is generated by additional windings on the yoke ring of the deflection unit, and energized by adjustable currents synchronized with scanning. The other type is generated by adjustable balancing currents through the deflection coils.

Compensation to be provided by these corrections:

- horizontal red-to-blue distance at the ends of the horizontal axis in opposite directions (line symmetry)	[2]	0 ± 2 mm
- horizontal red-to-blue distance at the top of the vertical axis (field symmetry top)	[3]	3,5 ± 1,5 mm
- horizontal red-to-blue distance at the bottom of the vertical axis (field symmetry bottom)	[3]	3,5 ± 1,5 mm
- vertical red-to-blue distance at the ends of the horizontal axis in opposite directions (line balance)	[4]	0 ± 1,5 mm
- vertical red-to-blue distance at the ends of the vertical axis (field balance)	[5]	0 ± 1,2 mm

Notes see the next page.

Notes

1) Purity adjustment in vertical direction is not required.

2) This correction is made by feeding a sawtooth current of line frequency through the additional four-pole windings on the deflection unit.

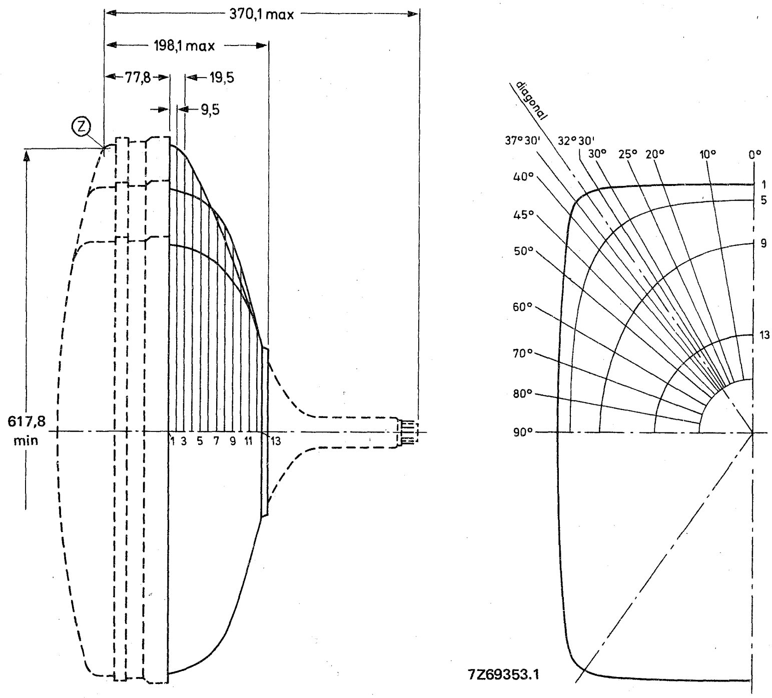
3) This correction is made by feeding a rectified sawtooth current of field frequency through the additional four-pole windings on the deflection unit.

4) This correction is made by unbalancing the line deflection coil halves.

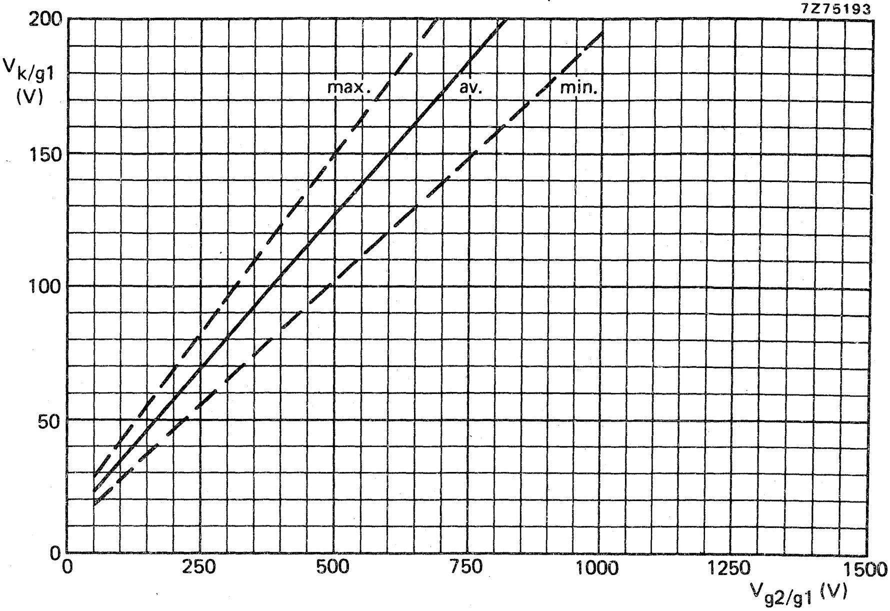
5) This correction is made by unbalancing the field deflection coil halves.

See also Technical Note 043.

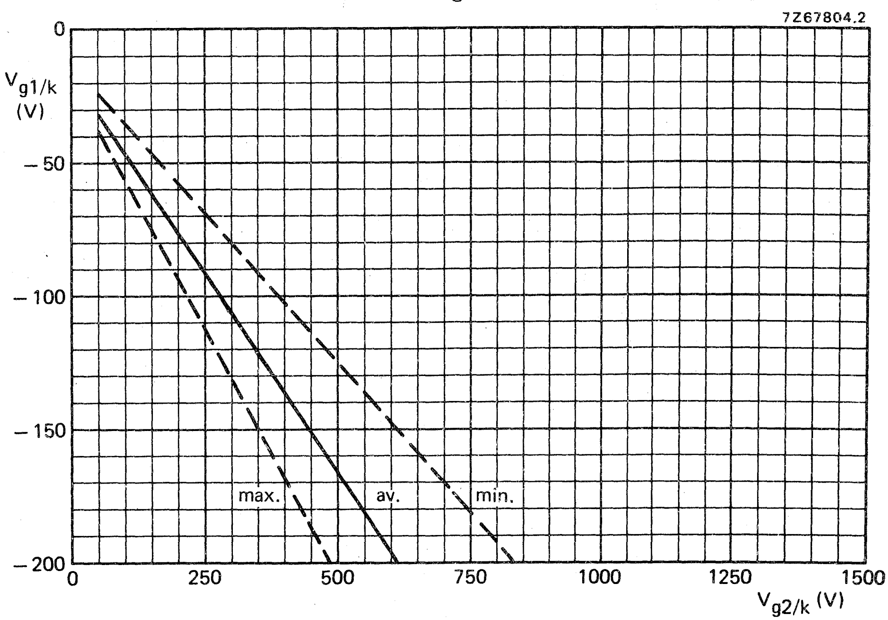
MAXIMUM CONE CONTOUR DRAWING



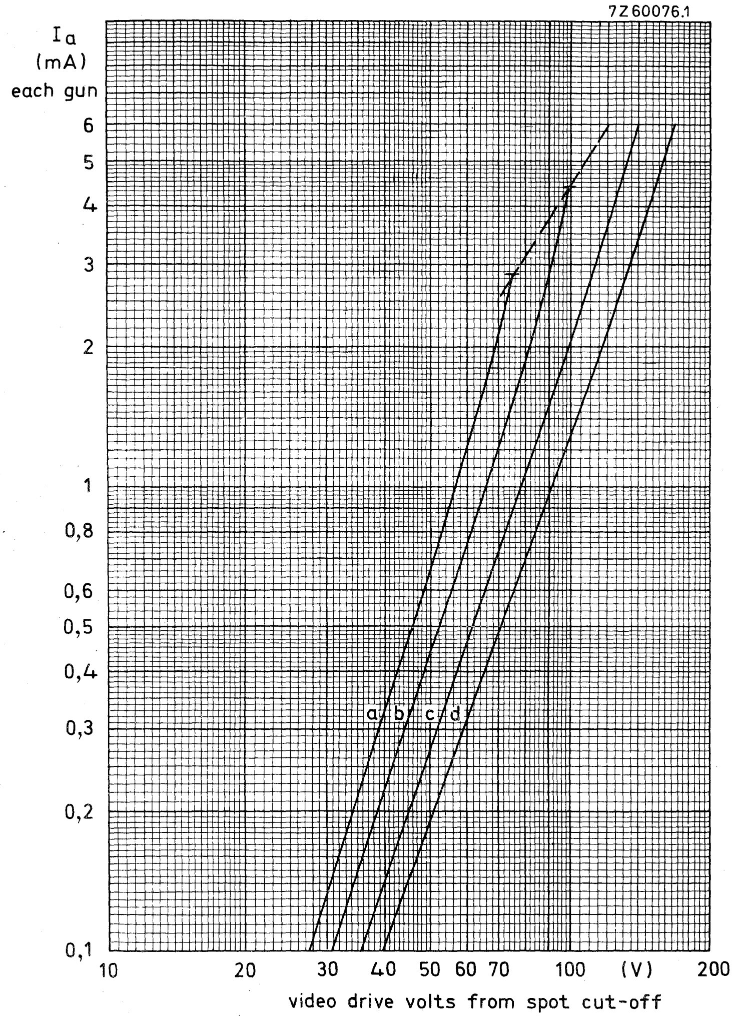
Sec-tion	Distance from centre (max. values)														
	Nominal distance from section 1	0^o	10^o	20^o	25^o	30^o	$32^o 30'$	diag.	$37^o 30'$	40^o	45^o	50^o	60^o	70^o	80^o	90^o
1	0	279, 0	283, 0	295, 4	305, 2	318, 0	325, 4	329, 0	327, 5	320, 7	296, 5	276, 7	248, 3	230, 7	221, 1	218, 0
2	9, 5	276, 4	280, 3	292, 5	302, 0	313, 8	320, 4	323, 1	321, 3	314, 8	292, 5	273, 5	245, 6	228, 1	218, 5	215, 5
3	19, 5	273, 4	277, 1	288, 2	296, 2	304, 8	308, 7	309, 2	307, 0	301, 9	285, 1	268, 8	242, 5	225, 3	215, 8	212, 8
4	29, 5	268, 8	272, 1	281, 5	287, 4	292, 7	294, 3	293, 4	291, 3	287, 1	274, 6	261, 1	237, 5	221, 3	212, 1	209, 1
5	39, 5	262, 3	265, 1	272, 0	275, 7	277, 9	278, 0	276, 4	274, 4	270, 9	261, 4	250, 5	230, 4	215, 7	207, 2	204, 3
6	49, 5	254, 0	255, 9	260, 0	261, 4	261, 2	260, 2	258, 1	256, 2	253, 2	245, 8	237, 4	221, 1	208, 5	201, 0	198, 4
7	59, 5	243, 5	244, 5	245, 3	244, 6	242, 7	241, 2	238, 8	237, 0	234, 4	228, 5	222, 1	209, 6	199, 7	193, 4	191, 3
8	69, 5	230, 1	229, 8	227, 8	225, 7	222, 8	221, 0	218, 6	217, 0	214, 8	210, 1	205, 3	196, 2	188, 9	184, 3	184, 6
9	79, 5	213, 3	211, 9	207, 8	204, 9	201, 7	199, 9	197, 7	196, 3	194, 5	190, 9	187, 4	181, 2	176, 4	173, 4	172, 4
10	89, 5	194, 0	191, 4	185, 6	182, 3	178, 9	177, 3	175, 4	174, 2	172, 8	170, 1	167, 8	164, 3	162, 1	161, 1	161, 0
11	99, 5	172, 8	168, 1	161, 4	158, 0	154, 9	153, 5	152, 0	151, 1	150, 0	148, 2	146, 9	145, 7	146, 0	147, 3	148, 2
12	109, 5	142, 1	139, 1	133, 9	131, 5	129, 4	128, 4	127, 5	126, 9	126, 3	125, 4	124, 9	125, 2	126, 9	129, 5	131, 1
13	119, 5	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0	110, 0



Spot cut-off design chart (cathode drive), V_{g3} adjusted for focus, $V_{a, g5, g4}$ = 20 to 27,5 kV



Spot cut-off design chart (grid drive), V_{g3} adjusted for focus, $V_{a, g5, g4}$ = 20 to 27,5 kV

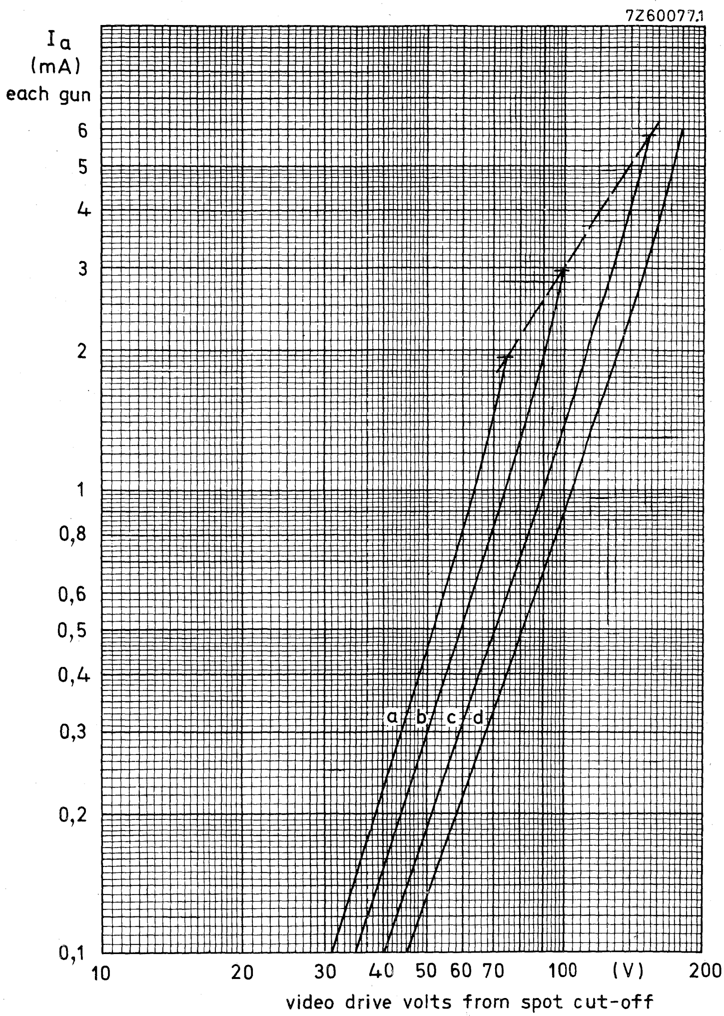


Typical cathode drive characteristics

$V_{a,\,g5,\,g4}$ = 20 kV to 27,5 kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for desired fixed V_k

– – – zero bias point

a = spot cut-off = 75 V
b = spot cut-off = 100 V
c = spot cut-off = 150 V
d = spot cut-off = 200 V



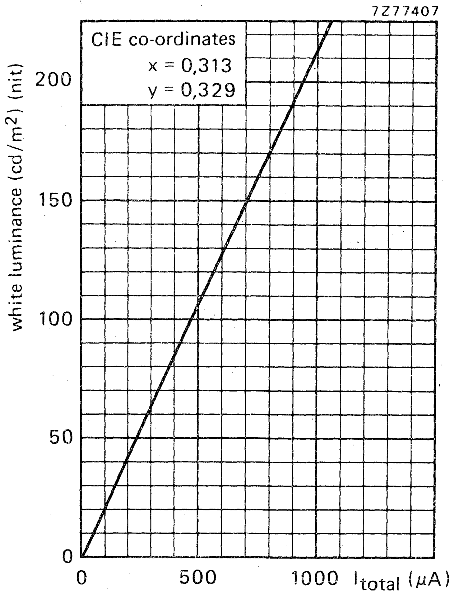
Typical grid drive characteristics

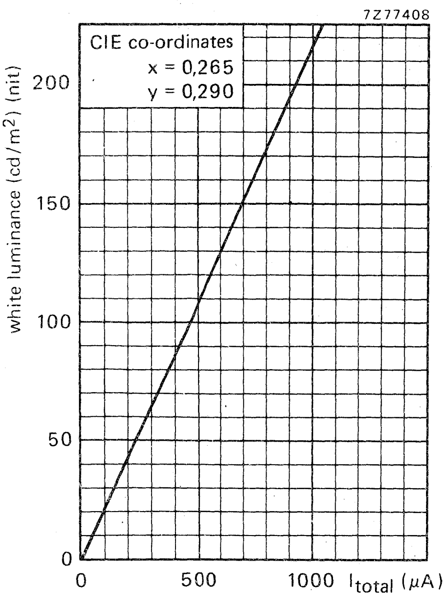
$V_{a, g5, g4}$ = 20 kV to 27,5 kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for desired fixed V_{g1}

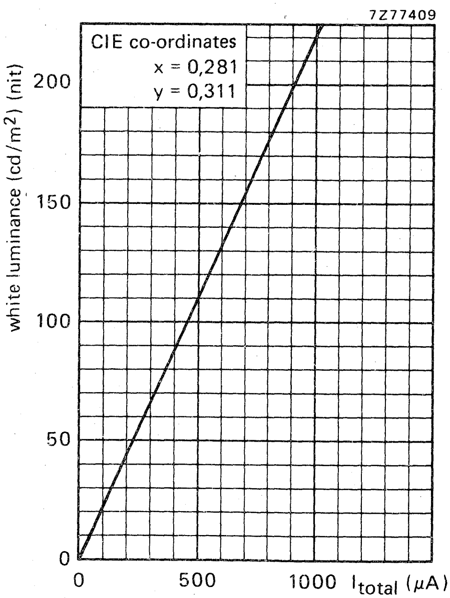
– – – zero bias point

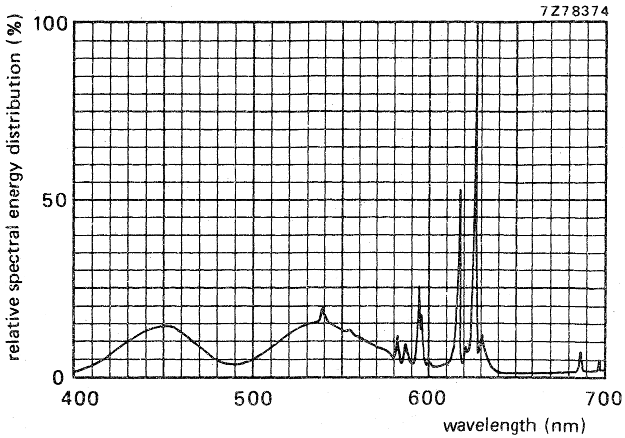
a = spot cut-off = –75 V
b = spot cut-off = –100 V
c = spot cut-off = –150 V
d = spot cut-off = –200 V

Luminance in the centre of the screen as a function of I_{total}. Scanned area 518 mm x 390 mm.



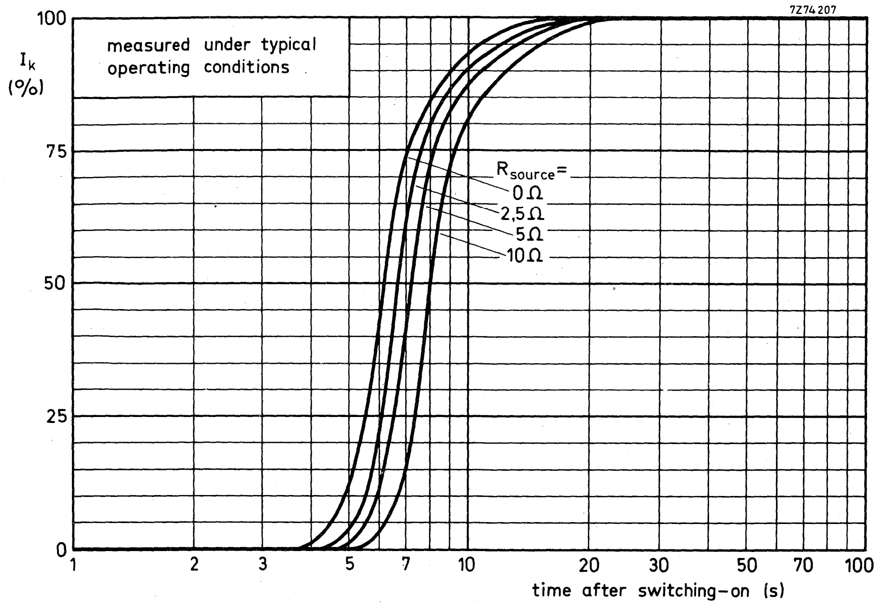






Simultaneous excitation of red, green and blue phosphor, measured in a tube, to produce white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,065



Cathode heating time to attain a certain percentage of the cathode current at equilibrium conditions.

30AX COLOUR PICTURE TUBE

- Automatic snap-in raster orientation
- Push-on axial purity positioning
- Internal magneto-static beam alignment
- Hi-Bi gun with quadrupole cathode lens
- When combined with deflection unit AT1270 it forms a self-aligning, self-converging assembly with low power consumption
- 110° deflection
- Hi-Bri screen
- Pigmented phosphors: improved contrast
- Curved line mask
- In-line gun
- Standard 36,5 mm neck
- Soft-Flash technology
- Slotted shadow mask optimized for minimum moiré
- Fine pitch over entire screen
- Quick-heating cathodes
- Internal magnetic shield
- Reinforced envelope for push-through mounting

QUICK REFERENCE DATA

Deflection angle	110°
Face diagonal	66 cm
Overall length	42 cm
Neck diameter	36,5 mm
Heating	6,3 V, 720 mA
Focusing	hi-bi-potential

ELECTRICAL DATA

Capacitances		
final accelerator to external conductive coating	$C_{a,\,g5,\,g4/m}$	max. 2000 pF min. 1500 pF
final accelerator to metal rimband	$C_{a,\,g5,\,g4/m'}$	300 pF
grid 1 of a gun to all other electrodes		
red gun	C_{g1R}	7 pF
green gun	C_{g1G}	7 pF
blue gun	C_{g1B}	7 pF
cathodes of all guns (connected in parallel) to all other electrodes	C_k	12 pF
cathode of any gun to all other electrodes	C_{kR}, C_{kG}, C_{kB}	4 pF
grid 3 (focusing electrode) to all other electrodes	C_{g3}	7 pF
Focusing	hi-bi-potential	
Deflection method	magnetic	
Deflection angles		
diagonal	110°	
horizontal	97°	
vertical	77°	

Heating: indirect by a.c. (preferably mains or line frequency) or d.c.

heater voltage	V_f	6,3 V *
heater current	I_f	720 mA

OPTICAL DATA

Screen	metal-backed vertical phosphor stripes
Screen finish	satinized
Phosphor	
red	europium activated rare earth
green	sulphide type
blue	sulphide type
Centre-to-centre distance of identical colour phosphor stripes	0,8 mm
Light transmission of face glass	68%

* For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V. For heating time as a function of source impedance see graph on the last page but one of this data sheet.

DEVELOPMENT SAMPLE DATA

MECHANICAL DATA (see also the figures on the following pages)

Overall length	421,6 ± 6 mm
Neck diameter	$36{,}5\ ^{+1{,}3}_{-0}$ mm
Bulb dimensions	
diagonal	max. 657,6 mm
width	max. 556,4 mm
height	max. 435,3 mm
Useful screen dimensions	
diagonal	min. 618 mm
horizontal axis	min. 518 mm
vertical axis	min. 390 mm
Net mass	approx. 20 kg
Base	12-pin base IEC 67-I-47a, type 2
Anode contact	small cavity contact J1-21, IEC 67-III-2
Mounting position	anode contact on top

Handling

During shipment and handling the tube should not be subjected to accelerations greater than 35g in any direction.

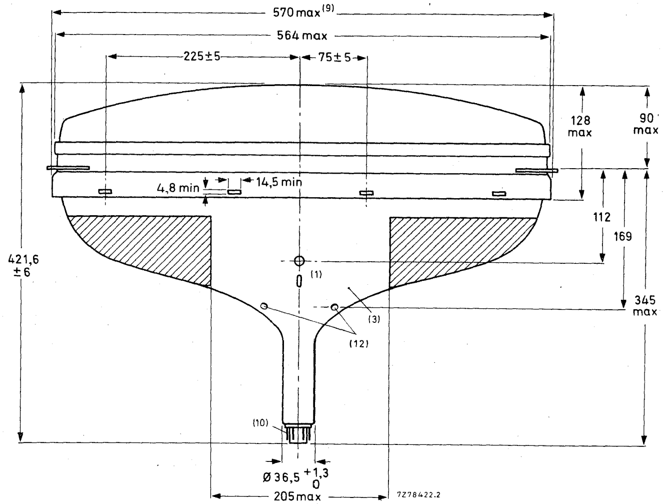
Notes to outline drawings on the following pages

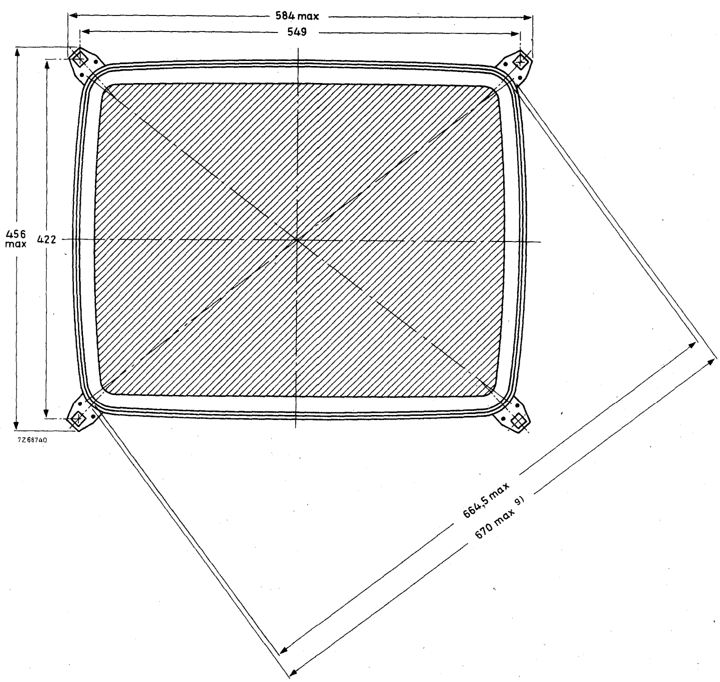
1. This ridge can be used as an orientation for the deflection unit.
2. Configuration of outer conductive coating may be different, but will contain the contact area as shown in the drawing.
3. To clean this area, wipe only with a soft lintless cloth.
4. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
5. Minimum space to be reserved for mounting lug.
6. The position of the mounting screw in the cabinet must be within a circle of 9,5 mm diameter drawn around the true geometrical positions, i.e. the corners of a rectangle of 549 mm x 422 mm.
7. Co-ordinates for radius R = 18,2 mm: x = 236,6 mm, y = 168,9 mm.
8. Distance from point z to any hardware.
9. Maximum dimensions in plane of lugs.
10. The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a circle concentric with the tube axis and having a diameter of 55 mm.
    The mass of the mating socket with circuitry should not be more than 150 g.
11. Minimum distance between glass and rimband in plane of the apertures.
12. Centring bosses for deflection unit.

MECHANICAL DATA (continued)

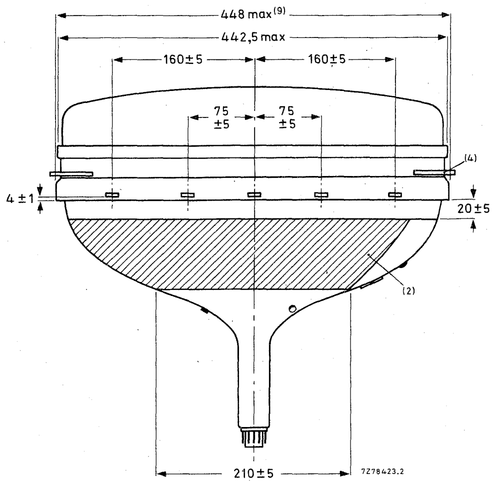
Dimensions in mm

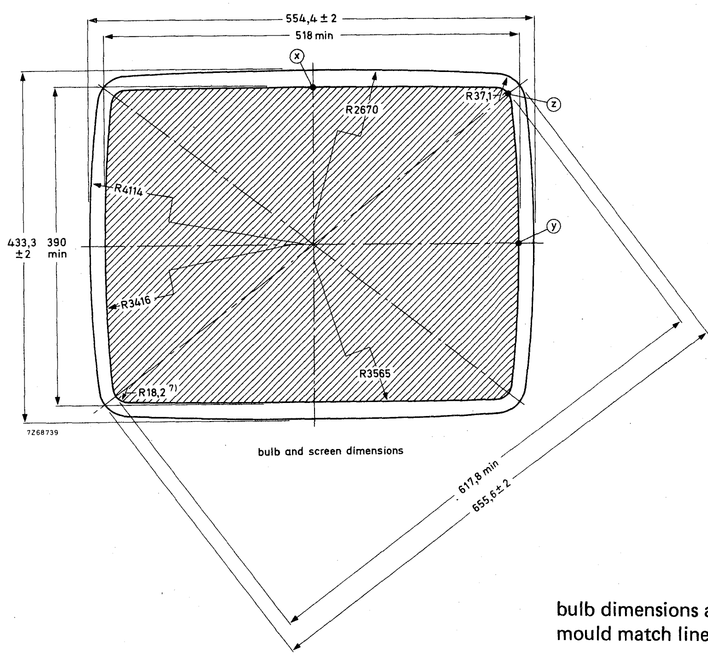
Notes are on the preceding page





DEVELOPMENT SAMPLE DATA

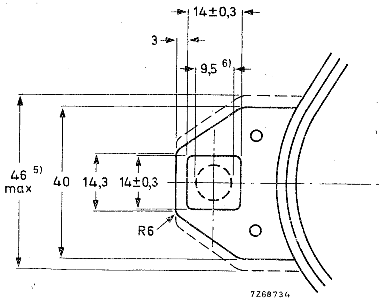


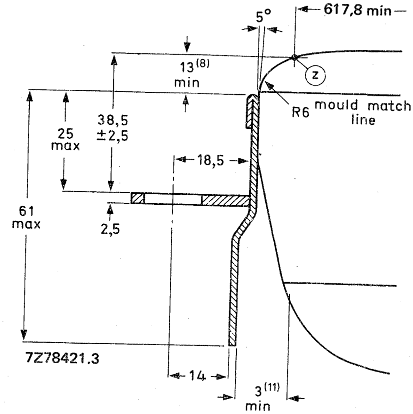


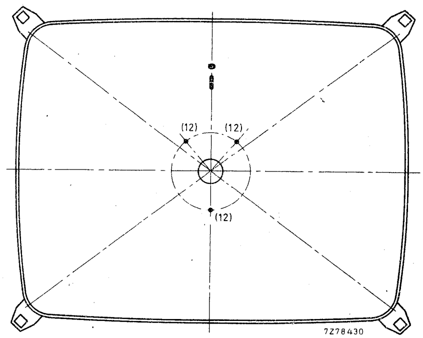
bulb and screen dimensions

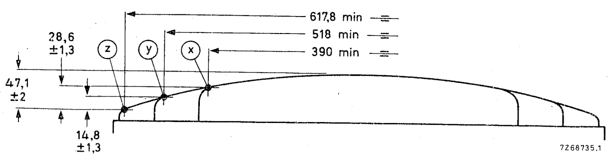
bulb dimensions at mould match line.

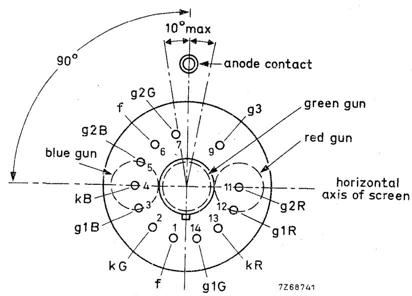
MECHANICAL DATA (continued)

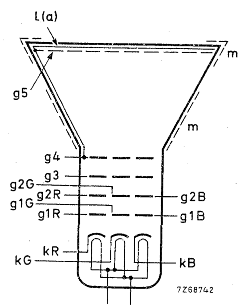




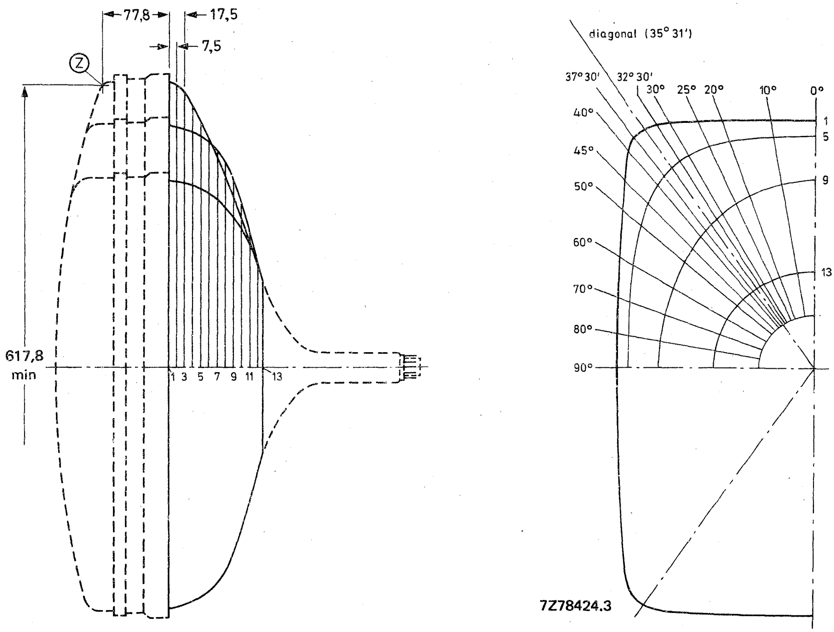








Maximum cone contour



7Z78424.3

DEVELOPMENT SAMPLE DATA

section	distance from centre (max. values)															
	nominal distance from section 1	0°	10°	20°	25°	30°	32° 30'	diag.	37° 30'	40°	45°	50°	60°	70°	80°	90°
1	0	279,0	283,0	295,4	305,2	318,0	325,4	329,0	327,5	320,7	296,5	276,7	248,3	230,7	221,1	218,0
2	7,5	276,4	280,3	292,5	302,0	313,8	320,4	323,1	321,3	314,8	292,5	273,5	245,6	228,1	218,5	215,5
3	17,5	273,4	277,1	288,2	296,2	304,8	308,7	309,2	307,0	301,9	285,1	268,8	242,5	225,3	215,8	212,8
4	27,5	268,8	272,1	281,5	287,4	292,7	294,3	293,4	291,3	287,1	274,6	261,1	237,5	221,3	212,1	209,1
5	37,5	262,3	265,1	272,0	275,7	277,9	278,0	276,4	274,4	270,9	261,4	250,5	230,4	215,7	207,2	204,3
6	47,5	254,0	255,9	260,0	261,4	261,2	260,2	258,1	256,2	253,2	245,8	237,4	221,1	208,5	201,0	198,4
7	57,5	243,5	244,5	245,3	244,6	242,7	241,2	238,8	237,0	234,4	228,5	222,1	209,6	199,7	193,4	191,3
8	67,5	230,1	229,8	227,8	225,7	222,8	221,0	218,6	217,0	214,8	210,1	205,3	196,2	188,9	184,3	184,6
9	77,5	213,3	211,9	207,8	204,9	201,7	199,9	197,7	196,3	194,5	190,9	187,4	181,2	176,4	173,4	172,4
10	87,5	194,0	191,4	185,6	182,3	178,9	177,3	175,4	174,2	172,8	170,1	167,8	164,3	162,1	161,1	161,0
11	97,5	172,8	168,1	161,4	158,0	154,9	153,5	152,0	151,1	150,0	148,2	146,9	145,7	146,0	147,3	148,2
12	107,5	142,1	139,1	133,9	131,5	129,4	128,4	127,5	126,9	126,3	125,4	124,9	125,2	126,9	129,5	131,1
13	117,5	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0	110,0

RECOMMENDED OPERATING CONDITIONS (cathode drive)

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a,\,g5,\,g4}$	25 kV	
Grid 3 (focusing electrode) voltage	V_{g3}	6,5 to 7,45 kV	
Grid 2 voltage for a spot cut-off voltage V_k = 140 V	V_{g2}	560 to 800 V	
Cathode voltage for spot cut-off at V_{g2} = 680 V	V_k	120 to 160 V	
Luminance at the centre of the screen	L	170 cd/m^2	note 1

EQUIPMENT DESIGN VALUES (each gun if applicable)

The values are valid for final accelerator voltages between 22,5 and 27,5 kV.

The voltages are specified with respect to grid 1.

Grid 3 (focusing electrode) voltage	V_{g3}	26 to 29,8% of final accelerator voltage
Difference in cut-off voltage between guns in one tube	ΔV_k	lowest value is min. 80% of highest value
Grid 3 (focusing electrode) current	I_{g3}	−5 to + 5 μA
Grid 2 current	I_{g2}	−5 to + 5 μA
Grid 1 current at V_k = 140 V	I_{g1}	−5 to + 5 μA

To produce white D, CIE co-ordinates x = 0,313, y = 0,329.

Percentage of the total anode current supplied by each gun (typical)

red gun	41,2%
green gun	32,2%
blue gun	26,6%

Ratio of anode current

	min.	av.	max.
red gun to green gun	0,95	1,30	1,70
red gun to blue gun	1,15	1,55	2,05

Maximum centring error in any direction 5 mm

Notes

1. Tube settings adjusted to produce white D (x = 0,313, y = 0,329), focused raster, current density 0,4 $\mu A/cm^2$.

DEVELOPMENT SAMPLE DATA

LIMITING VALUES (each gun if applicable)

Design maximum rating system unless otherwise stated.

The voltages are specified with respect to grid 1.

Final accelerator voltage	$V_{a, g5, g4}$	max.	27,5 kV	notes 1, 2, 3
		min.	22,5 kV	notes 1, 4
Long-term average current for three guns	I_a	max.	1000 μA	note 5
Grid 3 (focusing electrode) voltage	V_{g3}	max.	9 kV	
Grid 2 voltage	V_{g2}	max.	1200 V	note 6
Cathode voltage				
positive	V_k	max.	400 V	
positive operating cut-off	V_k	max.	200 V	
negative	$-V_k$	max.	0 V	
negative peak	$-V_{kp}$	max.	2 V	
Cathode to heater voltage				
positive	V_{kf}	max.	250 V	
positive peak	V_{kfp}	max.	300 V	note 1
negative	$-V_{kf}$	max.	135 V	
negative peak	$-V_{kfp}$	max.	180 V	note 1

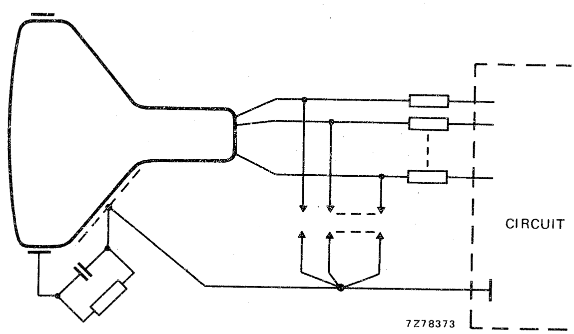
Notes

1. Absolute maximum rating system.
2. The X-ray dose rate remains below the acceptable value of 0,5 mR/h (36 pA/kg), measured with ionization chamber when the tube is used within its limiting values.
3. During adjustment on the production line this value is likely to be surpassed considerably. It is therefore strongly recommended to first make the necessary adjustments for normal operation without picture tube.
4. Operation of the tube at lower voltages impairs the luminance, resolution and could impair convergence.
5. 1500 μA permitted provided a current limiting circuit is used.
6. During adjustment on the production line max. 1500 V is permitted.

REMARKS

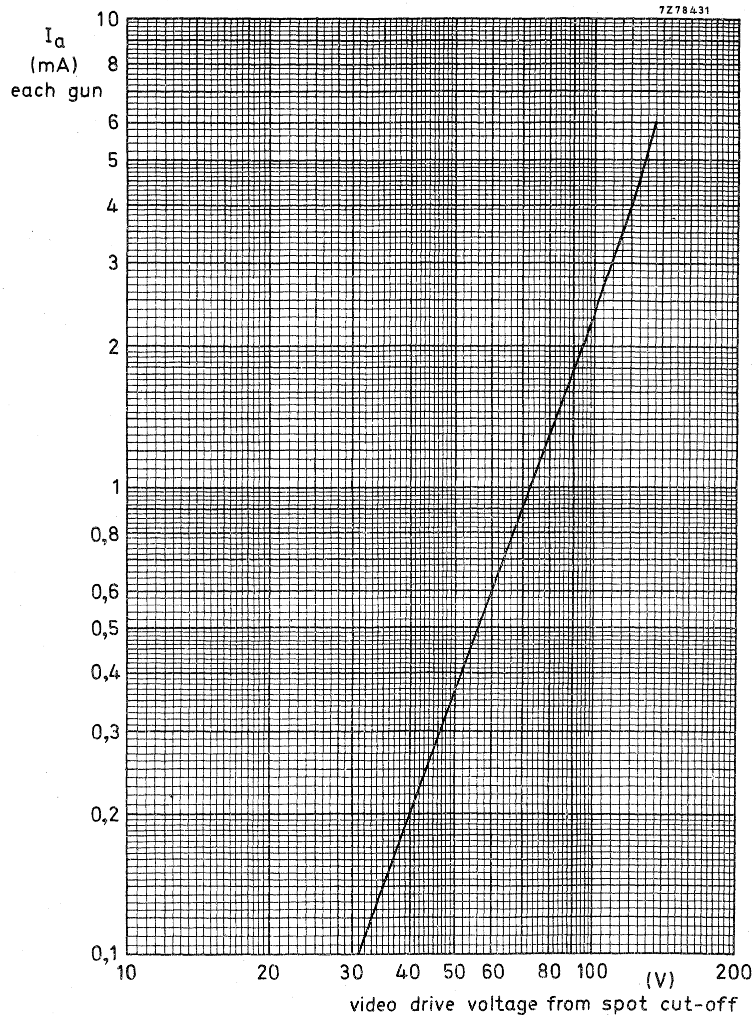
With the high voltage used with this tube (max. 27,5 kV) internal flashovers may occur. As a result of the new Soft-Flash technology these flashover currents are limited to approx. 60 A offering higher set reliability, optimum circuit protection and component savings.

Primary protective circuitry using spark gaps is still necessary to prevent tube damage. The spark gaps should be connected according to the figure below.



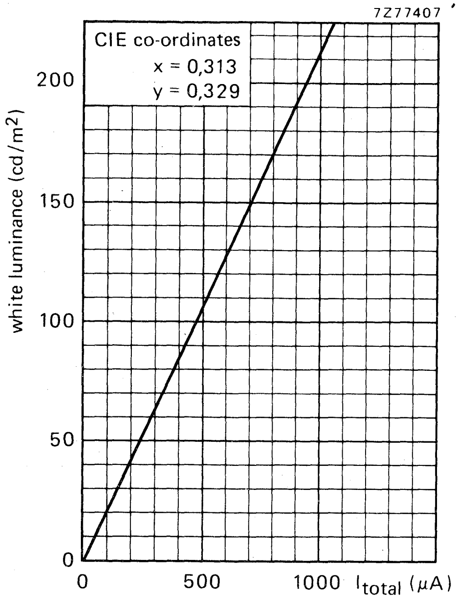
No other connections between the outer conductive coating and the chassis are permissible. Additional information available on request.

DEVELOPMENT SAMPLE DATA

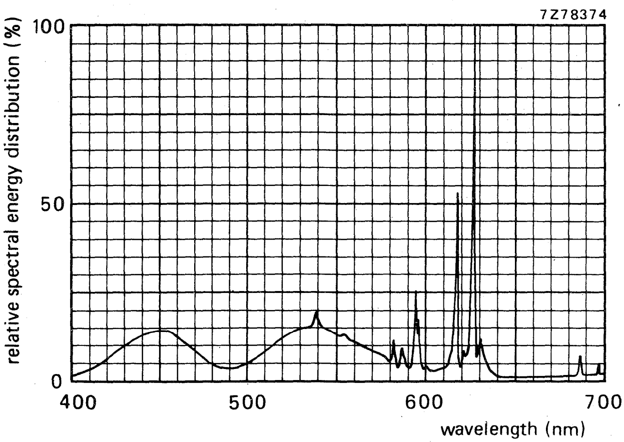


Typical cathode drive characteristic.

$V_f = 6{,}3$ V
$V_{a,\,g5,\,g4} = 25$ kV
V_{g3} adjusted for focus
V_{g2} (each gun) adjusted to provide spot cut-off for $V_K = 140$ V

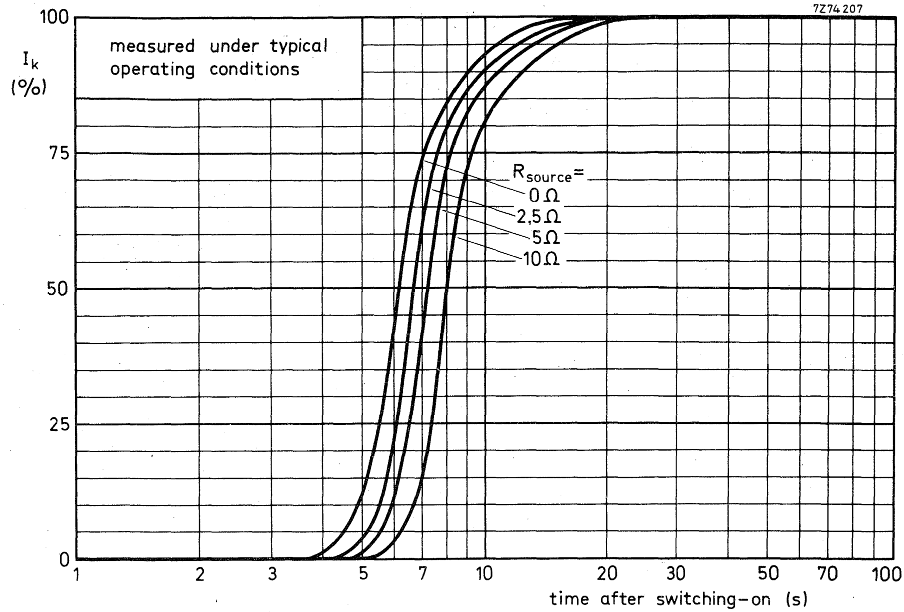


Luminance in the centre of the screen as a function of I_{total}. Scanned area 518 mm x 390 mm.



Simultaneous excitation of red, green and blue phosphor, measured in a tube, to produce white of x = 0,313, y = 0,329. Exact shape of the peaks depends on the resolution of the measuring apparatus.

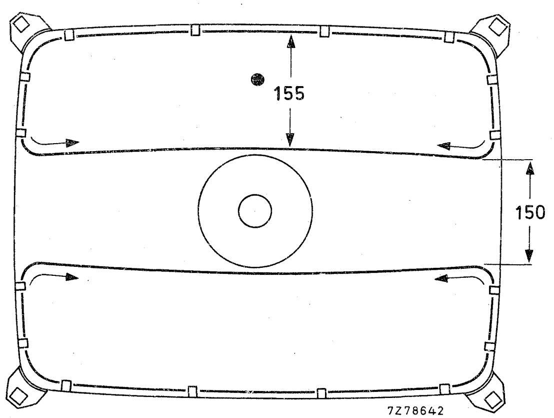
Colour co-ordinates:	x	y
red	0,630	0,340
green	0,315	0,600
blue	0,150	0,065



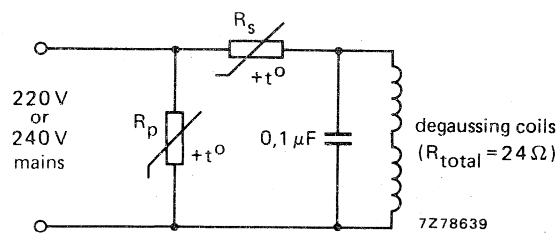
Cathode heating time to attain a certain percentage of the cathode current at equilibrium conditions.

DEGAUSSING

The picture tube is provided with an internal magnetic shield. This shield and the shadow mask with its suspension system may be provided with an automatic degaussing system, consisting of two coils covering top and bottom cone parts.
For proper degaussing an intial magnetomotive force (m.m.f.) of 300 ampere-turns is required in each of the coils. This m.m.f. has to be gradually decreased by appropriate circuitry. To prevent beam landing disturbances by line-frequency currents induced in the degaussing coils, these coils should be shunted by a capacitor of sufficiently high value. In the steady state, no significant m.m.f. should remain in the coils (≤ 0,3 ampere-turns). To ease the mounting of the coils, the rimband is provided with rectangular holes.
An example is given below.



Position of degaussing coils on the picture tube.



Degaussing circuit using
dual PTC thermistor
2322 662 98009.

Data of each degaussing coil

Circumference	135 cm
Number of turns	60
Copper-wire diameter	0,4 mm
Aluminium-wire diameter	0,5 mm
Resistance	12 Ω

BLACK AND WHITE TV PICTURE TUBES

SURVEY

type number	deflection angle	face diagonal	neck diameter	V_{g2}	remarks
A24-510W	90°	24 cm (9 in)	20 mm	130 V	quick-heating cathode
A31-322W		31 cm (12 in)			
A31-410W A31-510W	110°	31 cm (12 in)	20 mm	250 V 130 V	quick-heating cathode
A34-510W		34 cm (14 in)	20 mm	130 V	quick-heating cathode
A44-120W A44-510W A44-520W		44 cm (17 in)	28,6 mm 20 mm 28,6 mm	400 V 130 V 130 V	 quick-heating cathode quick-heating cathode
A50-120W A50-520W		50 cm (20 in)	28,6 mm	400 V 130 V	 quick-heating cathode
A61-120W A61-520W		61 cm (24 in)	28,6 mm	400 V 130 V	 quick-heating cathode

TV PICTURE TUBE

24 cm (9 in), 90°, rectangular direct vision picture tube with integral protection for black and white TV. The 20 mm neck diameter ensures a low deflection energy. A special feature of this tube is its short cathode-heating time.

QUICK REFERENCE DATA			
Face diagonal		24	cm (9 in)
Deflection angle		90	deg
Overall length	max.	227	mm
Neck diameter		20	mm
Heating		11 V, 140	mA
Grid no. 2 voltage		130	V
Final accelerator voltage		10	kV
Quick-heating cathode	with a typical tube a legible picture will appear within 5 s.		

SCREEN

Metal-backed phosphor			
Luminescence	white		
Light transmission of face glass		53	%
Useful diagonal	min.	228,6	mm
Useful width	min.	198,4	mm
Useful height	min.	149,2	mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage		V_f	11	V
Heater current		I_f	140	mA
Limits (Absolute max. rating system) of r.m.s. heater voltage	V_f	max.	12,7	V [1]
		min.	9,3	V

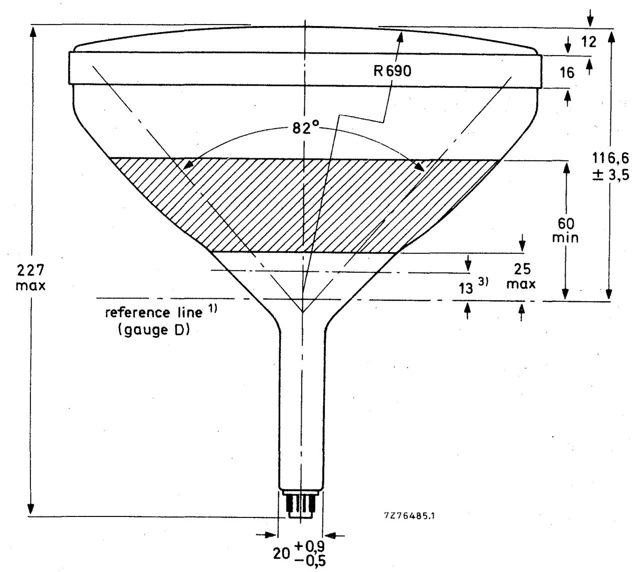
For heating time as a function of source impedance see last page of this data sheet.

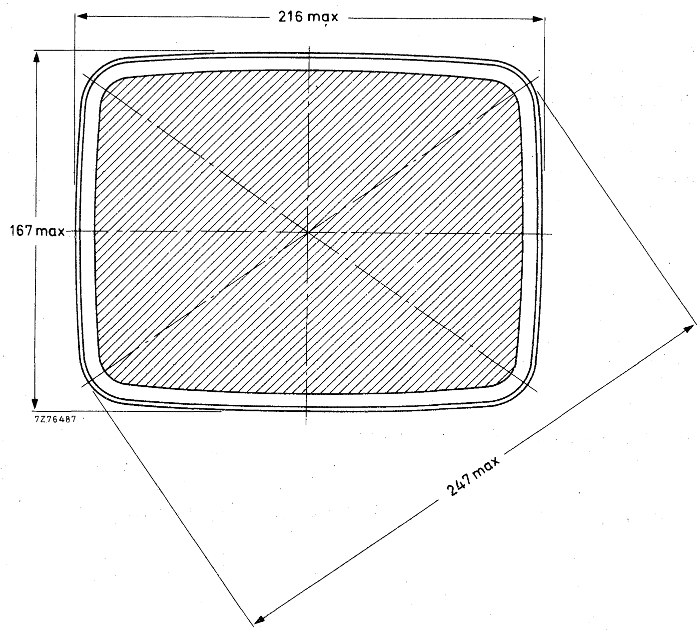
[1] Measured during any 20 ms.

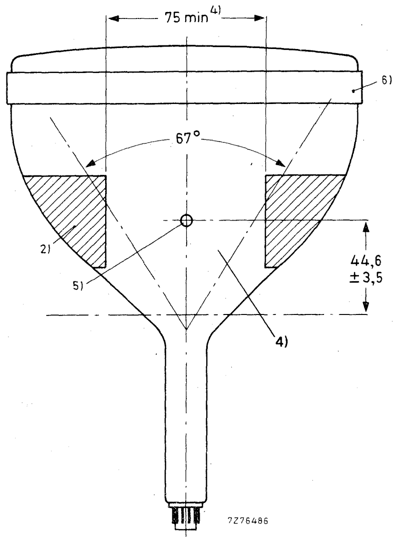
MECHANICAL DATA

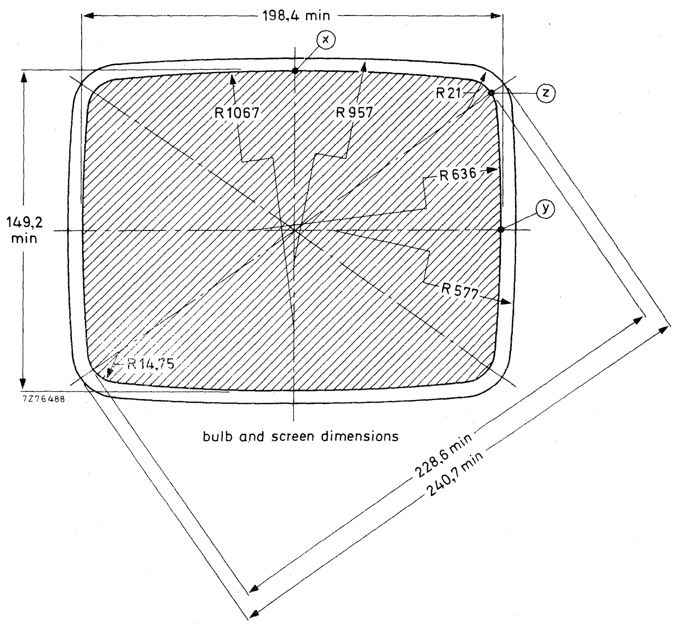
Dimensions in mm

Notes are given after the drawings.

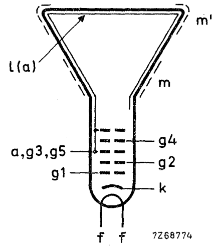


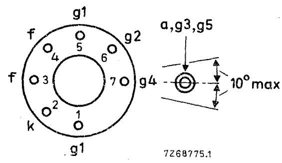






bulb and screen dimensions





<u>Mounting position</u> : any

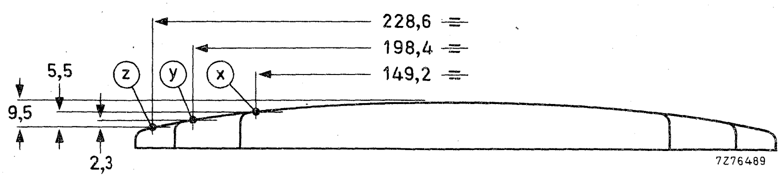
<u>Net mass</u> : approx. 1,8 kg

<u>Base</u> : JEDEC E7-91

The socket for this base should not be mounted rigidly, it should have flexible leads and be allowed to move freely.

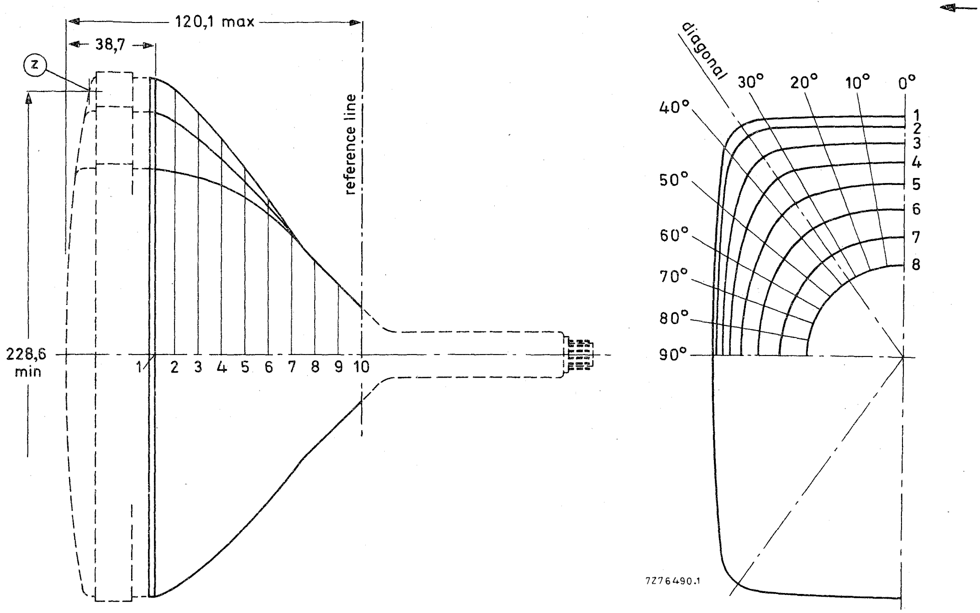
NOTES TO OUTLINE DRAWINGS

1. The reference line is determined by the plane of the upper edge of the flange of the reference line gauge when the gauge is resting on the cone (Gauge D).
2. The configuration of the external conductive coating may be different, but covers the contact area shown in the drawing.
   The external conductive coating must be earthed.
3. End of guaranteed contour. The maximum neck and cone contour is given by the reference line gauge D.
4. This area must be kept clean.
5. Recessed cavity contact IEC 67-III-2.
6. The rimband must be earthed.



MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from section 1	Distance from centre (max. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
10	87,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5
9	77,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5
8	67,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5
7	57,5	52,8	52,9	53,1	53,5	53,6	53,4	53,0	52,5	52,1	51,9	52,0
6	47,5	64,8	65,2	66,4	67,8	67,9	67,7	66,2	64,0	62,4	61,5	61,2
5	37,5	75,5	76,2	78,1	80,8	81,2	80,7	77,4	73,2	70,3	68,6	68,1
4	27,5	85,0	86,0	88,8	93,6	93,6	92,7	86,6	80,4	76,3	73,9	73,2
3	17,5	93,6	94,7	98,1	104,1	105,3	103,7	93,7	85,8	80,6	77,7	76,9
2	7,5	101,3	102,7	106,9	114,4	116,3	113,8	99,7	89,9	83,6	80,3	79,3
1	0	104,7	106,2	110,3	117,9	120,0	117,2	102,0	91,4	84,8	81,2	80,3

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 750 > 300	pF pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	100	pF
Cathode to all	C_k	3	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	90°
Horizontal deflection angle	82°
Vertical deflection angle	67°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe). Maximum distance between centre of field of this magnet and reference line : 55 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	10	kV
Focusing electrode voltage	V_{g4}	0 to 130	V [1]
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	30 to 50	V

[1]) Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 and +130 V (e.g. two taps; 0 V and 130 V).
The optimum focusing voltage of individual tubes may be between −100 V and +200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage	$V_{a,g3,g5}$	max.	14	kV [1]
		min.	8	kV
Grid no. 4 voltage				
positive	V_{g4}	max.	500	V
negative	$-V_{g4}$	max.	200	V
Grid no. 2 voltage	V_{g2}	max.	200	V
Cathode to grid no. 1 voltage				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1p}$	max.	400	V [2]
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1p}$	max.	2	V
Cathode-to-heater voltage	$V_{k/f}$	max.	200	V

CIRCUIT DESIGN VALUES

Grid no. 4 current				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid no. 2 current				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

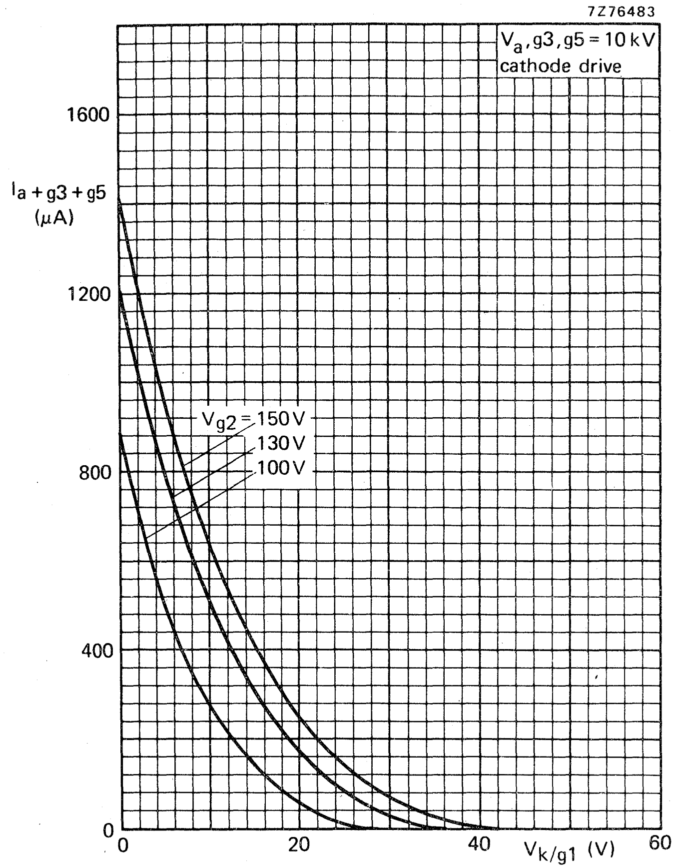
MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	$R_{k/f}$	max.	1	MΩ
Impedance between cathode and heater	$Z_{k/f}$(50 Hz)	max.	0,1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid no. 1 circuit impedance	Z_{g1}(50 Hz)	max.	0,5	MΩ

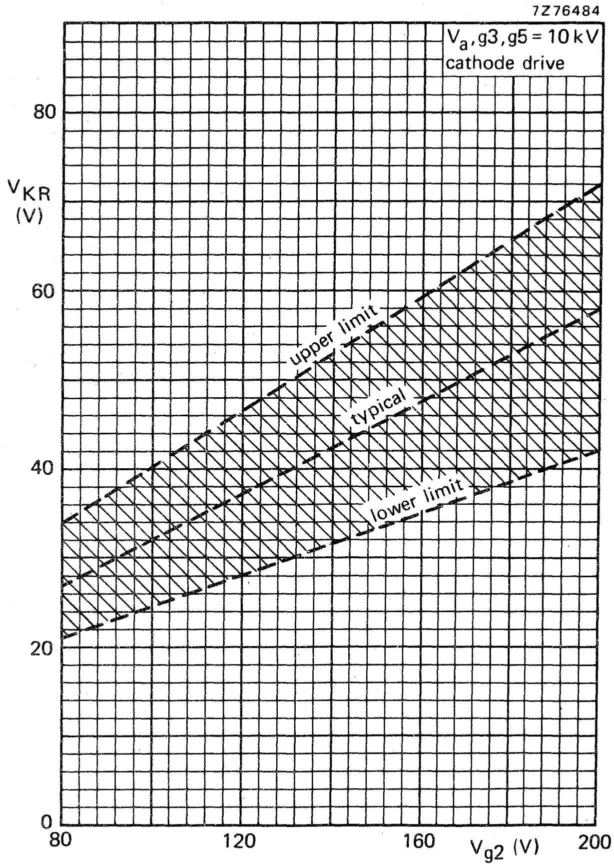
---

1) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

2) Maximum pulse duration 22% of a cycle but max. 1,5 ms.

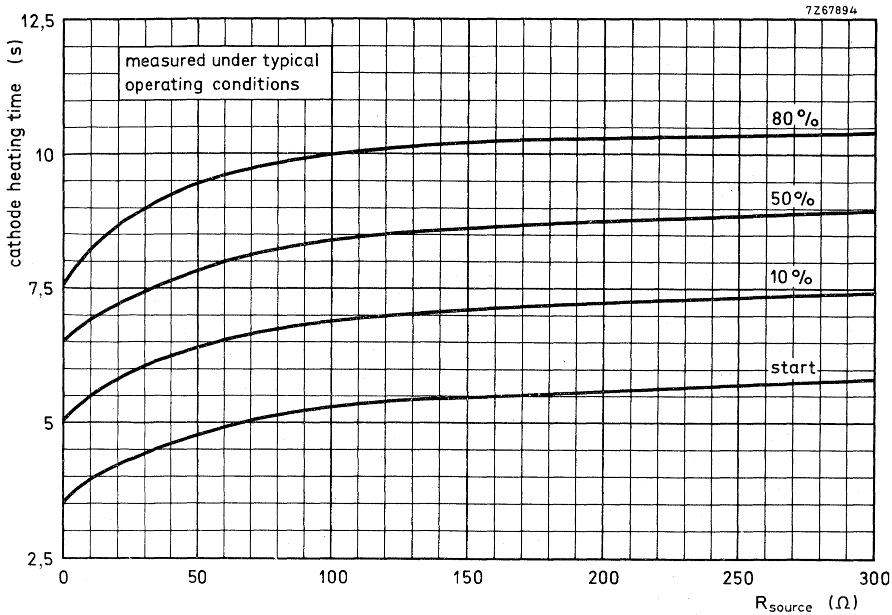


Final accelerator current as a function of cathode voltage.



$$\frac{\Delta V_{KR}}{\Delta V_{a,\,g3,\,g5}} = 0,3 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage.



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

31 cm (12 in), 90°, rectangular direct vision picture tube with integral protection for black and white TV. The 20 mm neck diameter ensures a low deflection energy. A special feature of this tube is its short cathode heating time.

QUICK REFERENCE DATA

Face diagonal	31 cm (12 in)
Deflection angle	90°
Overall length	max. 280 mm
Neck diameter	20 mm
Heating	11 V, 140 mA
Grid 2 voltage	130 V
Final accelerator voltage	12 kV
Quick heating cathode	with a typical tube a legible picture will appear within 5 s

SCREEN

Metal-backed phosphor	P4		
Luminescence	white		
Light transmission of face glass		50	%
Useful diagonal	min.	292,2	mm
Useful width	min.	254,1	mm
Useful height	min.	201,7	mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	11 V			
Heater current	I_f	140 mA			
Limits (Absolute max. rating system) of r.m.s. heater voltage, measured in any 20 ms	V_f	max.	12,7	V	*
		min.	9,3	V	

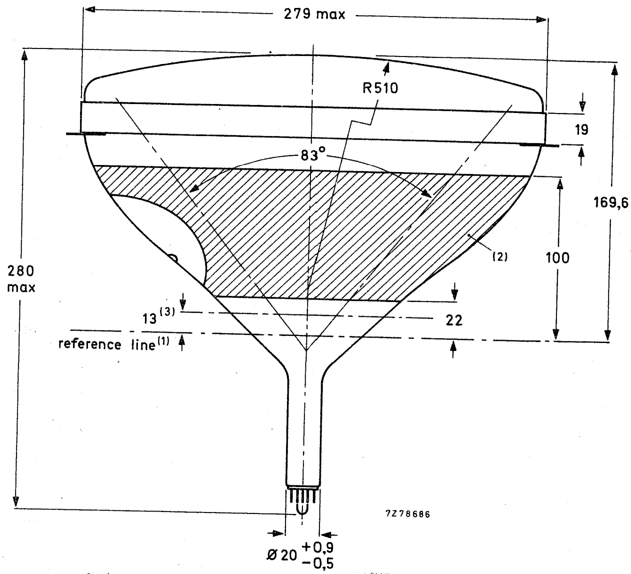
For heating time as a function of source impedance see last page of this data sheet.

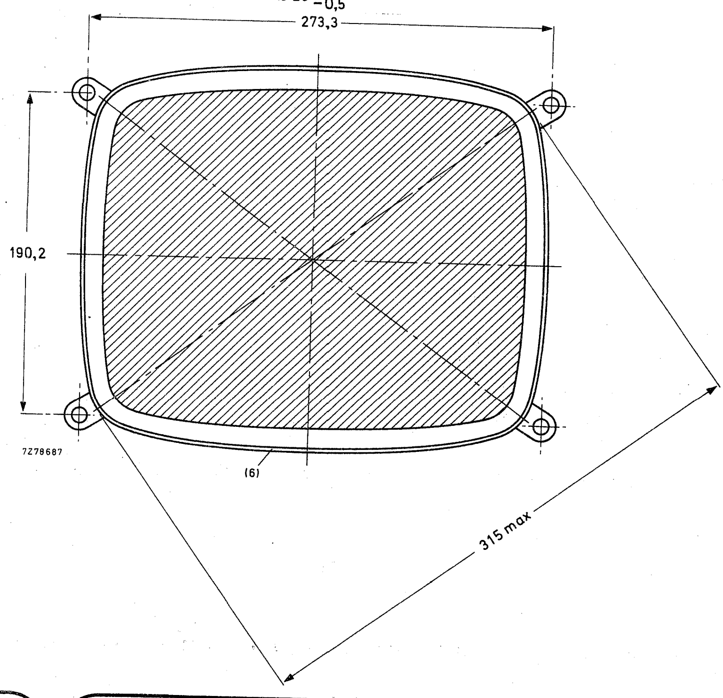
* This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

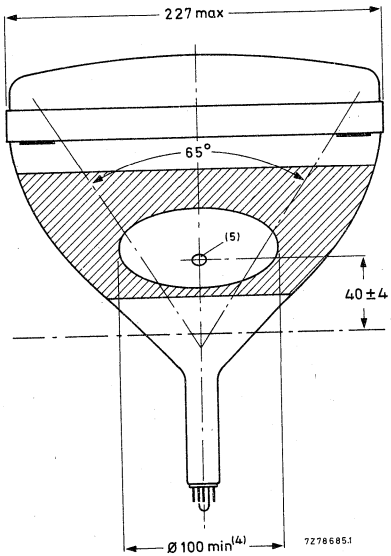
MECHANICAL DATA

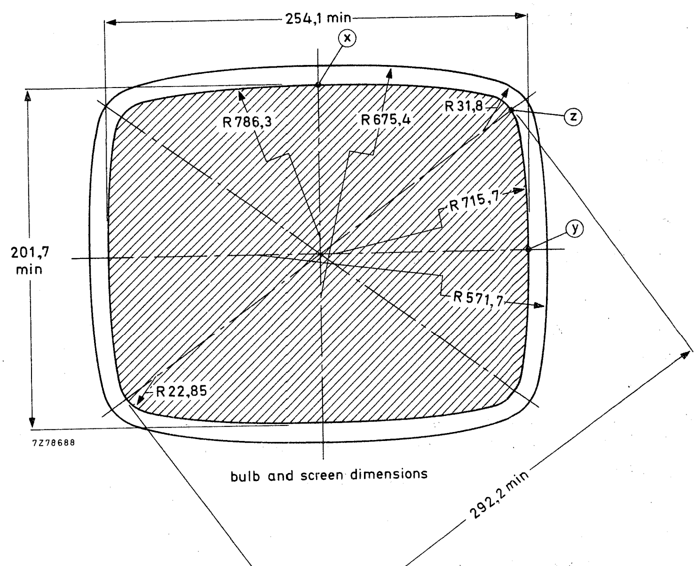
Notes are given after the drawings.

Dimensions in mm

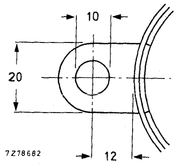


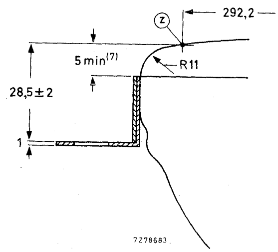


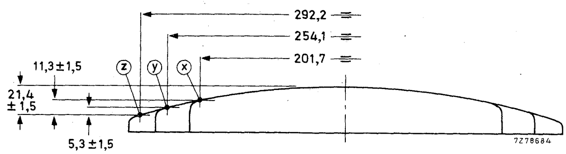


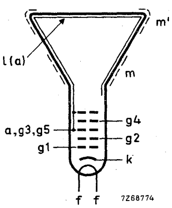


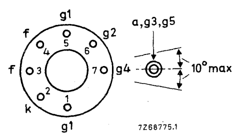
bulb and screen dimensions











Mounting position	any
Net mass	approx. 2,9 kg
Base designation	JEDEC E7-91

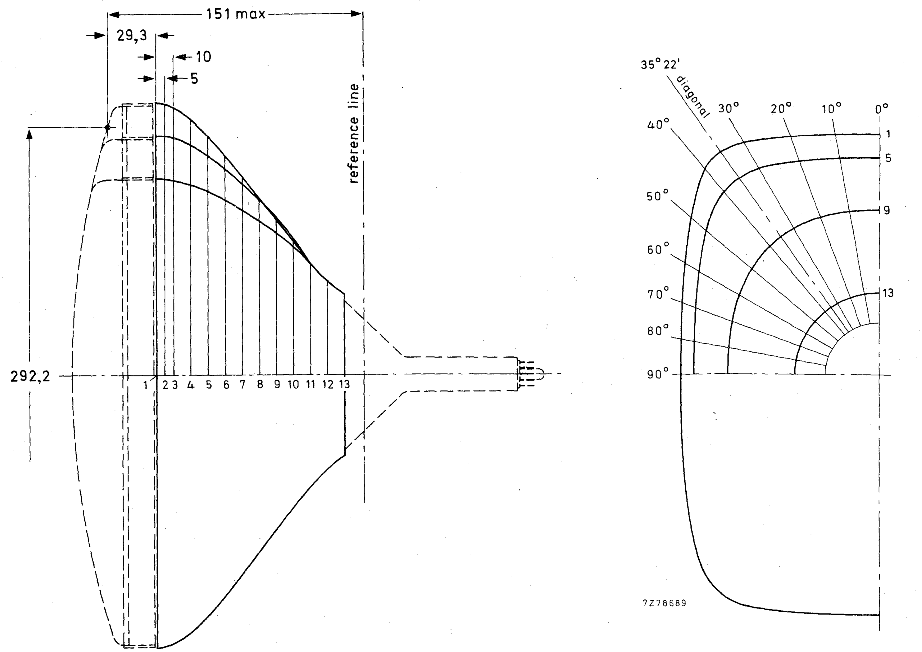
The socket for the base should not be rigidly mounted; it should have flexible leads and be allowed to move freely.

Notes to outline drawings

1. The reference line is determined by the plane of the upper edge of the reference line gauge when the gauge is resting on the cone (gauge D).
2. The configuration of the external conductive coating may be different but contains the contact area shown in the drawing. The external conductive coating must be earthed.
3. End of guaranteed contour. The maximum neck and cone contour is given by the reference line gauge D.
4. This area must be kept clean.
5. Recessed cavity contact IEC 67-III-2; JEDEC J1-21.
6. The metal band must be earthed.
7. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from section 1	Distance from centre (max. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
13	105,9	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4
12	99	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3
11	90	66,1	66,0	65,8	65,6	65,4	65,4	65,3	65,3	65,3	65,4	65,4
10	80	79,7	79,5	79,0	78,4	78,1	77,8	77,3	76,9	76,6	76,5	76,4
9	70	91,8	92,0	92,1	91,8	91,4	90,9	89,6	87,9	86,2	84,9	84,3
8	60	102,3	103,0	104,2	104,8	104,5	103,9	101,4	97,8	94,4	91,8	90,9
7	50	111,8	112,8	115,1	117,1	117,2	116,5	112,3	106,5	101,3	98,0	96,9
6	40	120,4	121,6	124,9	128,6	129,3	128,5	122,1	113,7	107,3	103,5	102,3
5	30	128,2	129,6	133,7	139,1	140,6	139,6	130,3	119,9	112,6	108,4	107,1
4	20	135,0	136,5	141,3	148,3	150,8	149,4	136,9	125,0	117,1	112,6	111,1
3	10	140,0	141,7	146,8	154,9	158,1	156,3	141,5	128,7	120,3	115,6	114,1
2	5	140,9	142,6	147,9	156,0	159,2	157,3	142,4	129,6	121,1	116,4	114,9
1	0	141,3	143,0	148,3	156,5	159,6	157,6	142,7	129,9	121,5	116,8	115,3

CAPACITANCES

Final accelerator to external conductive coating	$C_{a, g3, g5/m}$	$<$900 pF $>$450 pF
Final accelerator to metal band	$C_{a, g3, g5/m'}$	150 pF
Cathode to all	C_k	3 pF
Gird 1 to all	C_{g1}	7 pF

FOCUSING

electrostatic

DEFLECTION

magnetic

Diagonal deflection angle	90°
Horizontal deflection angle	83°
Vertical deflection angle	65°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe). Maximum distance between centre of field of this magnet and reference line: 55 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid 1

Final accelerator voltage	$V_{a, g3, g5}$	12 kV
Focusing electrode voltage	V_{g4}	0 to 130 V*
Grid 2 voltage	V_{g2}	130 V
Cathode voltage for visual extinction of focused raster	V_{KR}	45 to 65 V

* Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 and + 130 V (e.g. two taps: 0 V and 130 V). The optimum focusing voltage of individual tubes may be between −100 and + 200 V.

LIMITING VALUES (Design maximum rating system)

Voltages are specified with respect to grid 1 unless stated otherwise.

Final accelerator voltage	$V_{a, g3, g5}$	max.	15 kV*
		min.	9 kV
Grid 4 voltage			
positive	V_{g4}	max.	500 V
negative	$-V_{g4}$	max.	200 V
Grid 2 voltage	V_{g2}	max.	200 V
		min.	80 V
Cathode to grid 1 voltage			
positive	V_k	max.	200 V
positive peak	V_{kp}	max.	400 V**
negative	$-V_k$	max.	0 V
negative peak	$-V_{kp}$	max.	2 V
Cathode-to-heater voltage	$V_{k/f}$	max.	200 V

CIRCUIT DESIGN VALUES

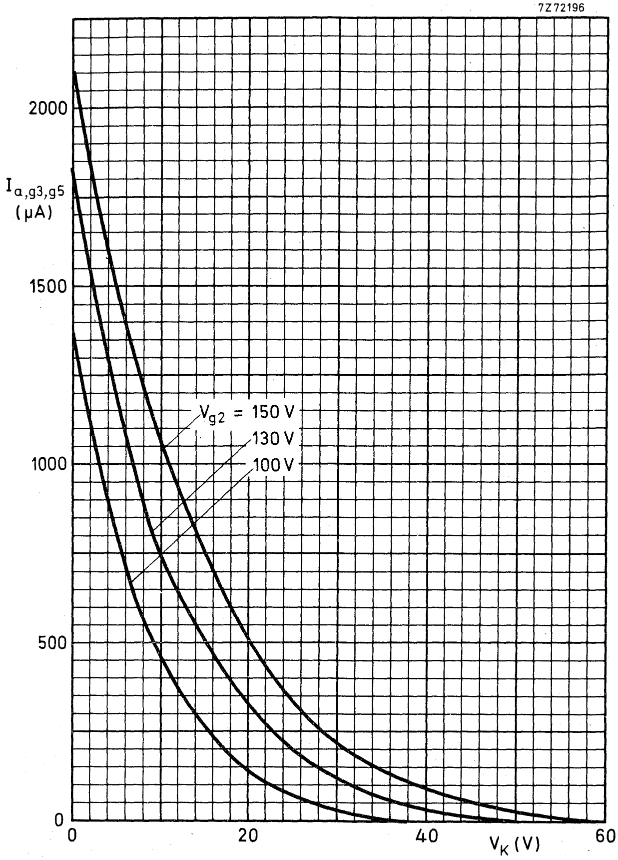
Grid 4 current			
positive	I_{g4}	max.	25 μA
negative	$-I_{g4}$	max.	25 μA
Grid 2 current			
positive	I_{g2}	max.	5 μA
negative	$-I_{g2}$	max.	5 μA

MAXIMUM CIRCUIT VALUES

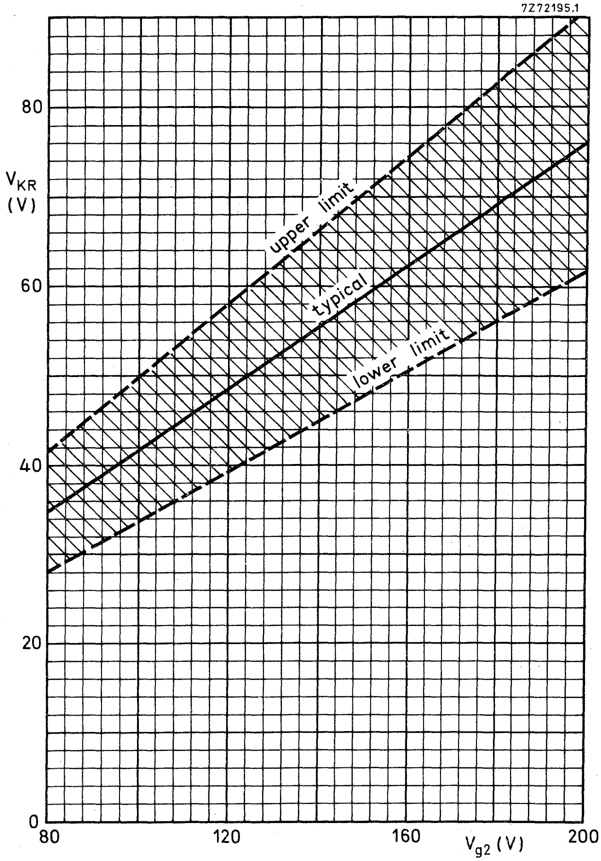
Resistance between cathode and heater	$R_{k/f}$	max.	1 MΩ
Impedance between cathode and heater	$Z_{k/f}$ (50 Hz)	max.	0,1 MΩ
Grid 1 circuit resistance	R_{g1}	max.	1,5 MΩ
Grid 1 circuit impedance	Z_{g1} (50 Hz)	max.	0,5 MΩ

* The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

** Maximum pulse duration 22% of a cycle but max. 1,5 ms.

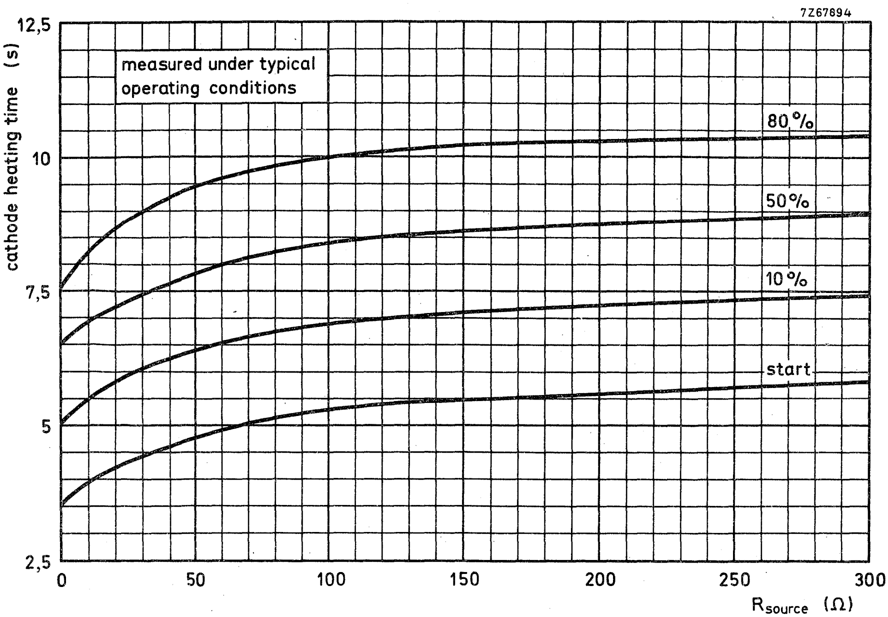


Final accelerator current as a function of cathode voltage.
Cathode drive; $V_{a,g3,g5}$ = 12 kV.



Limits of cathode cut-off voltage as a function of grid 2 voltage.
Cathode drive; $V_{a,g3,g5}$ = 12 kV.

$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,3 \times 10^{-3}$$



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

31 cm (12in), 110°, rectangular direct vision picture tube with integral protection for black and white TV. The 20 mm neck diameter ensures a low deflection energy.
A special feature of this tube is its short cathode heating time.

QUICK REFERENCE DATA			
Face diagonal		31	cm (12 in)
Deflection angle		110°	
Overall length	max.	233	mm
Neck diameter		20	mm
Heating	11 V,	140	mA
Grid no. 2 voltage		250	V
Final accelerator voltage		12 to 15	kV
Quick heating cathode	with a typical tube a legible picture will appear within 5 s.		

SCREEN

Metal-backed phosphor

Luminescence	white		
Light transmission of face glass	≈	50	%
Useful diagonal	≥	295	mm
Useful width	≥	257	mm
Useful height	≥	195	mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f		11	V	
Heater current	I_f		140	mA	
Limits (Absolute max. rating system) of r.m.s. heater voltage, measured in any 20 ms	V_f	max.	12,7	V	*)
		min.	9,3	V	

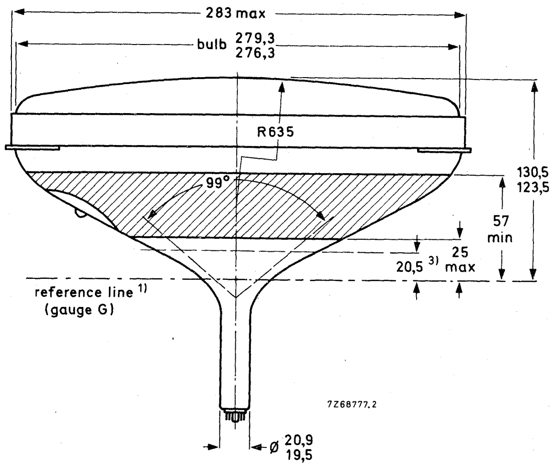
For heating time as a function of source impedance see last page of this data sheet.

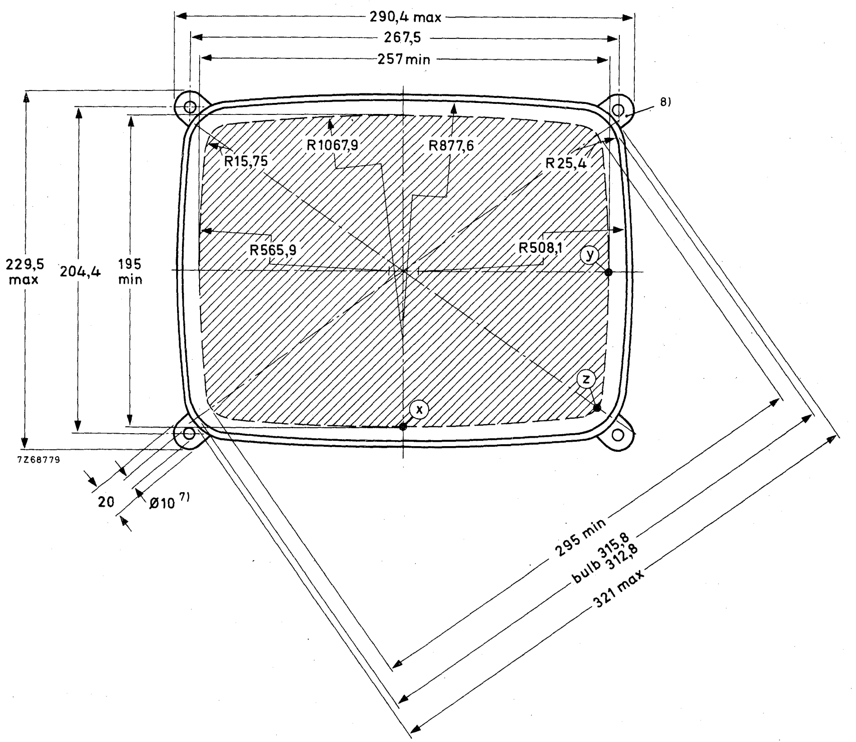
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

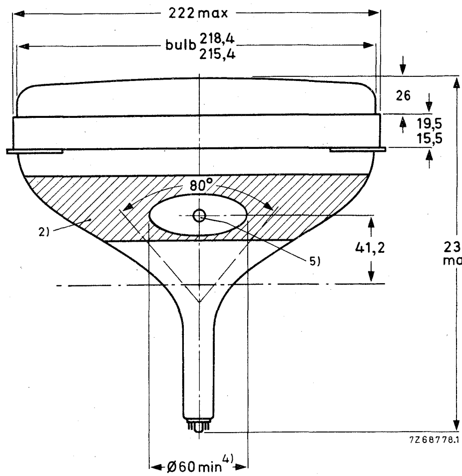
MECHANICAL DATA

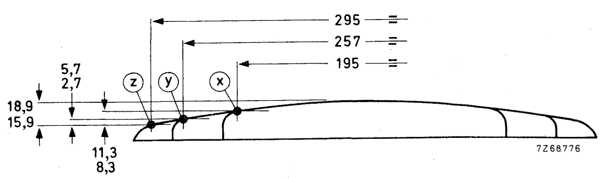
Dimensions in mm

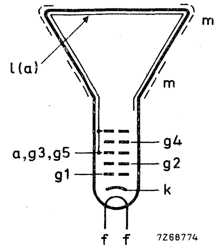
Notes are given after the drawings.

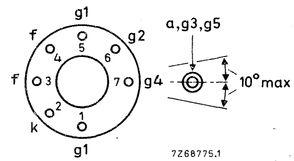


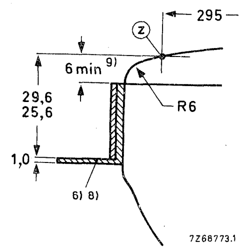



222 max
bulb 218,4 215,4
26
19,5
15,5
80°
2)
5)
41,2
233 max
7Z68778.1
Ø60 min 4)


295
257
195
5,7
2,7
18,9
15,9
z
y
x
11,3
8,3
7Z68776







Mounting position : any

Net mass : approx. 2, 8 kg.

Base : JEDEC E7-91

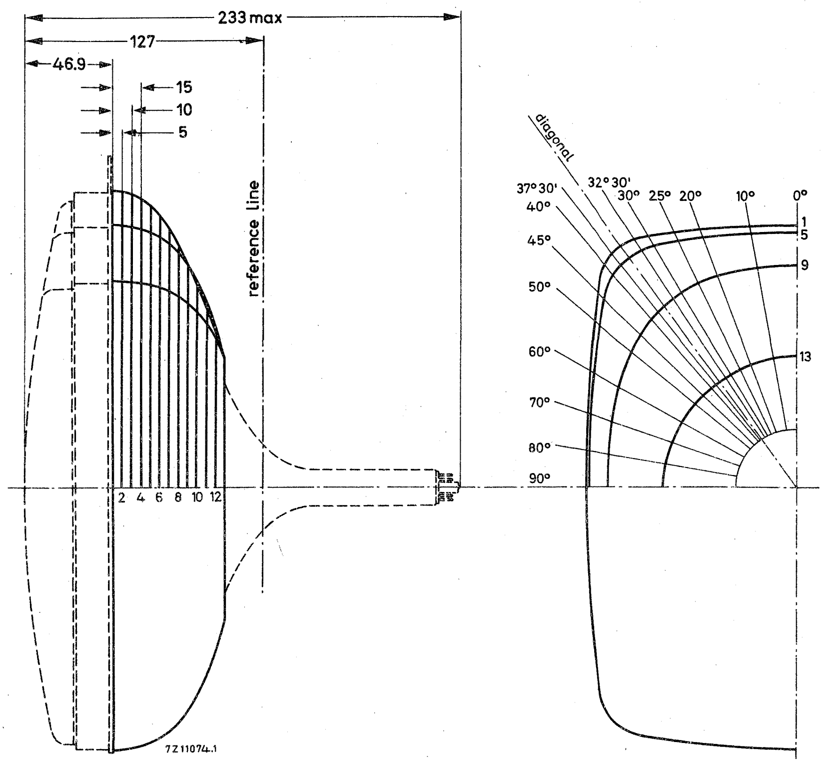
The socket for the base should not be rigidly mounted, it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. The reference line is determined by the plane of the upper edge of the flange of the reference line gauge when the gauge is resting on the cone. (Gauge G).
2. The configuration of the external conductive coating may be different but contains the contact area shown in the drawing.
   The external conductive coating must be earthed.
3. End of guaranteed contour. The maximum neck and cone contour is given by the reference line gauge G.
4. This area must be kept clean.
5. Recessed cavity contact IEC 67-III-2.
6. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
7. The mounting screws in the cabinet must be situated inside a circle of 7 mm diameter drawn around the true geometrical positions, i.e. at the corners of a rectangle of 267, 5 mm x 204, 4 mm.
8. The metal band must be earthed.
   Electrical contact between the metal band and the mounting lugs is guaranteed.
9. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from section 1	Distance from centre (max. values)														
		0°	10°	20°	25°	38'	32°30'	diag.	37°30'	40°	45°	50°	60°	70°	80°	90°
13	59, 6	72, 2	72, 0	71, 7	71, 4	71; 2	71, 1	71, 0	71, 0	70, 9	70, 8	70, 7	70, 6	70, 7	70, 8	70, 8
12	55	85, 9	85, 6	84, 9	84, 4	84, 0	83, 8	83, 5	83, 3	83, 1	82, 7	82, 4	81, 9	81, 6	81, 5	81, 5
11	50	99, 5	99, 4	98, 9	98, 5	97, 9	97, 5	97, 1	96, 8	96, 3	95, 4	94, 4	92, 4	90, 7	89, 5	89, 1
10	45	112, 3	112, 4	112, 2	111, 7	110, 9	110, 4	109, 7	109, 1	108, 3	106, 6	104, 7	100, 9	97, 7	95, 5	94, 7
9	40	121, 3	121, 3	122, 8	122, 9	122, 4	121, 9	121, 2	120, 5	119, 5	117, 1	114, 3	108, 6	103, 8	100, 8	99, 7
8	35	127, 9	128, 9	131, 2	132, 1	140, 8	132, 3	131, 7	130, 9	129, 7	126, 5	122, 7	114, 9	108, 8	105, 0	103, 7
7	30	132, 6	134, 0	137, 4	139, 3	147, 2	141, 2	140, 9	140, 2	138, 8	134, 6	129, 5	119, 7	112, 5	108, 2	106, 8
6	25	136, 0	137, 5	141, 7	144, 4	151, 6	148, 3	148, 5	147, 9	146, 5	140, 9	134, 3	122, 9	115, 0	110, 5	109, 0
5	20	138, 4	140, 0	144, 5	147, 8	154, 6	153,2	153, 7	153, 2	151, 7	144, 8	137, 1	124, 7	116, 5	111, 8	110, 3
4	15	140, 3	141, 9	146, 6	150, 2	156, 5	156, 6	157, 4	156, 9	155, 1	147, 1	138, 5	125, 4	117, 0	112, 3	110, 8
3	10	141, 6	143, 2	148, 0	151, 8	154, 6	158, 7	159, 5	159, 0	157, 1	148, 5	139, 4	126, 0	117, 6	112, 9	111, 4
2	5	142, 4	143, 9	148, 8	152, 6	157, 4	159, 5	160, 7	160, 2	158, 2	149, 4	140, 1	126, 6	118, 1	113, 4	111, 9
1	0	142, 8	144, 4	149, 3	153, 1	157, 9	160, 2	161, 1	160, 6	158, 7	149, 9	140, 6	127, 1	118, 5	113, 8	112, 3

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 900 pF > 450 pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	150 pF
Cathode to all	C_k	3 pF
Grid no. 1 to all	C_{g1}	7 pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	110°
Horizontal deflection angle	99°
Vertical deflection angle	80°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe).
Maximum distance between centre of field of this magnet and reference line : 47 mm.

TYPICAL OPERATING CONDITIONS

Grid drive service

Final accelerator voltage	$V_{a,g3,g5}$	12 to 15	kV
Focusing electrode voltage	V_{g4}	0 to 350	V [1]
Grid no. 2 voltage	V_{g2}	250	V
Grid no. 1 voltage for visual extinction of focused raster	V_{GR}	-35 to -69	V

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	12 to 15	kV
Focusing electrode voltage	V_{g4}	0 to 350	V [1]
Grid no. 2 voltage	V_{g2}	250	V
Cathode voltage for visual extinction of focused raster	V_{KR}	32 to 58	V

[1] Individual tubes will have optimum focus within this range. In general an acceptable picture will be obtained with a fixed focus voltage.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage	$V_{a,g3,g5}$	max.	17	kV*)
		min.	9	kV
Grid No. 4 voltage				
positive	V_{g4}	max.	500	V
negative	$-V_{g4}$	max.	50	V
Grid No. 2 voltage	V_{g2}	max.	350	V
		min.	200	V
Grid No. 2 to grid No. 1 voltage	$V_{g2/g1}$	max.	450	V
Cathode to grid No. 1 voltage				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1p}$	max.	400	V**)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1p}$	max.	2	V
Cathode-to-heater voltage	$V_{k/f}$	max.	200	V

CIRCUIT DESIGN VALUES

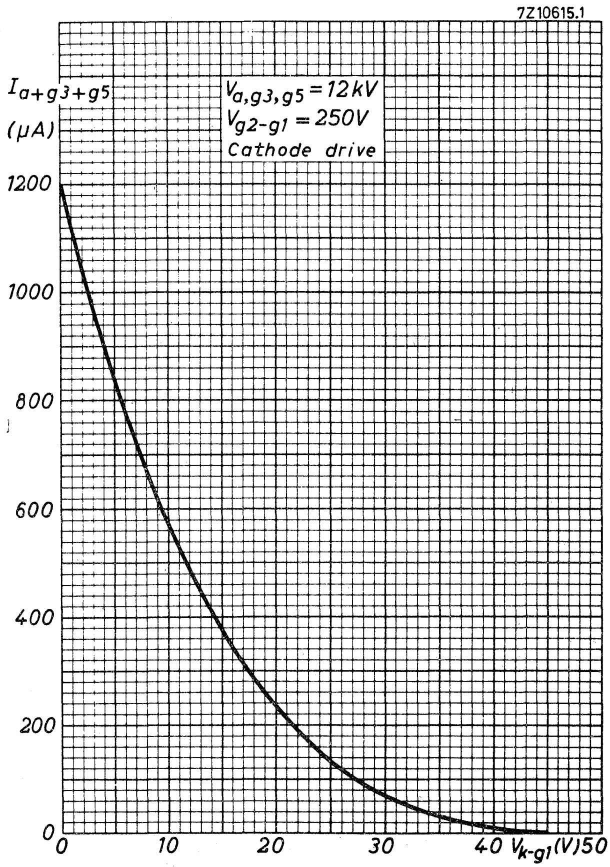
Grid No. 4 current				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid No. 2 current				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

MAXIMUM CIRCUIT VALUES

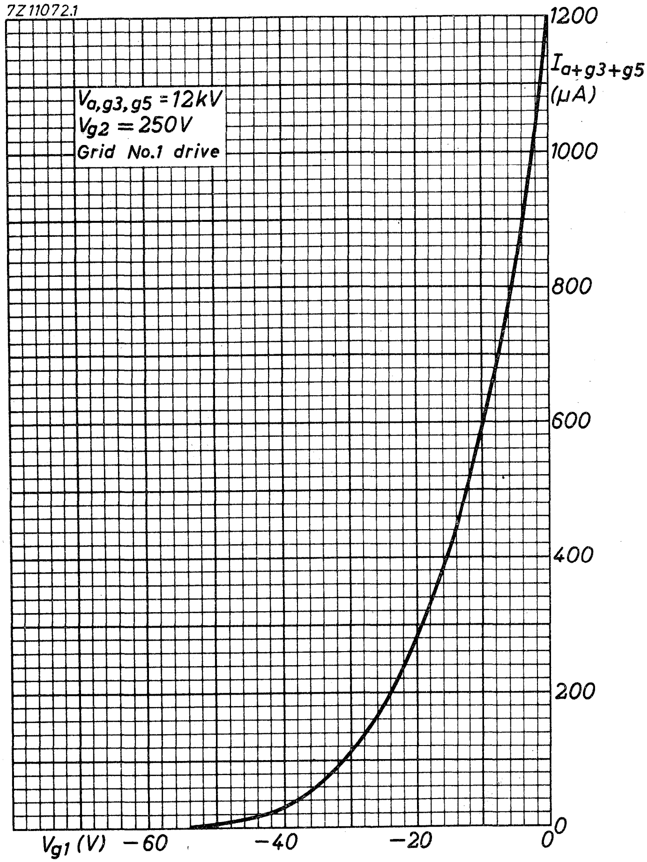
Resistance between cathode and heater	$R_{k/f}$	max.	1	MΩ
Impedance between cathode and heater	$Z_{k/f}$ (50 Hz)	max.	0,1	MΩ
Grid No. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid No. 1 circuit impedance	Z_{g1} (50 Hz)	max.	0,5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

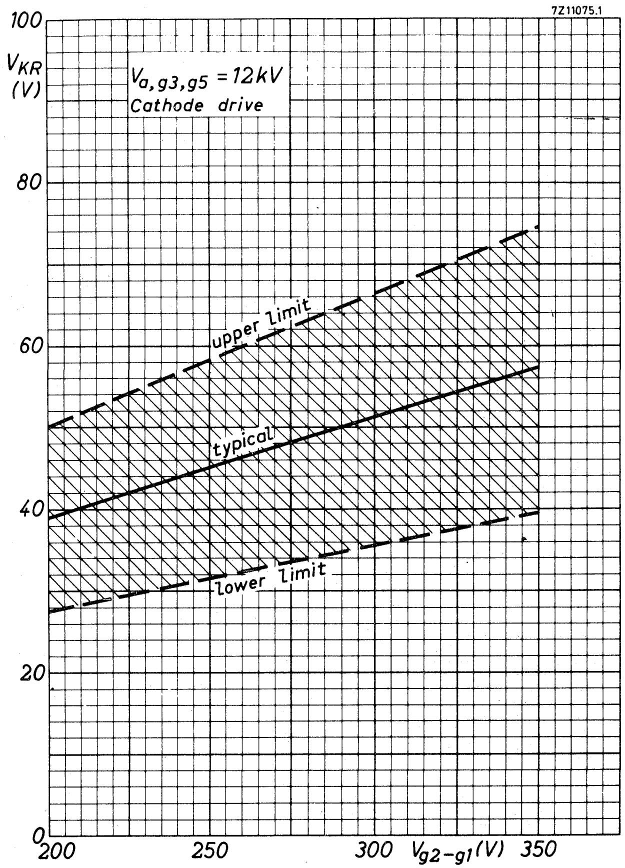
**) Maximum pulse duration 22% of a cycle but max. 1,5 ms.



Final accelerator current as a function of cathode voltage

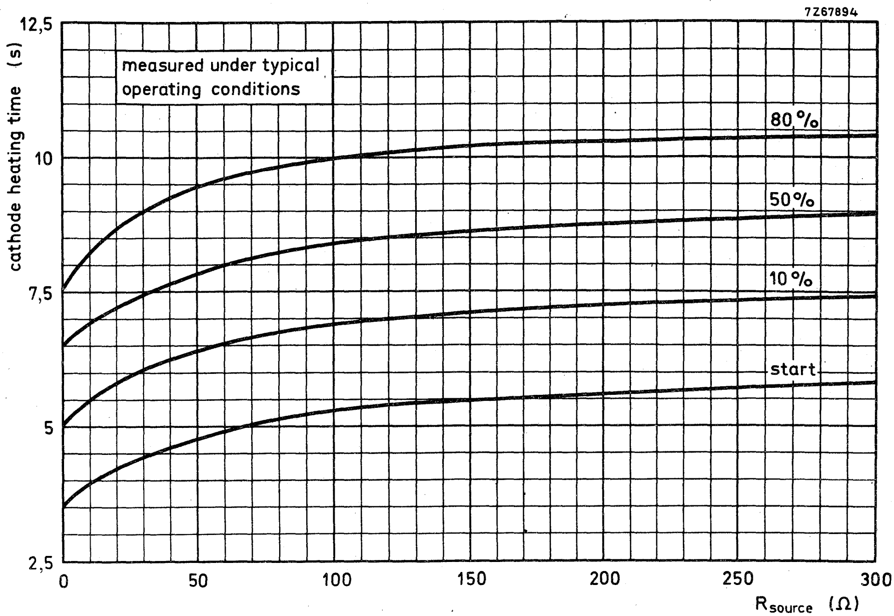


Final accelerator voltage as a function of grid no. 1 voltage



$$\frac{\Delta V_{KR}}{\Delta V_{a,\,g3,\,g5}} = 0,3 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

31 cm (12 in), 110°, rectangular direct vision picture tube with integral protection for black and white TV. The 20 mm neck diameter ensures a low deflection energy.
A special feature of this tube is its short cathode heating time.

QUICK REFERENCE DATA			
Face diagonal		31	cm (12 in)
Deflection angle		110 °	
Overall length	max.	233	mm
Neck diameter		20	mm
Heating		11 V, 140	mA
Grid no. 2 voltage		130	V
Final accelerator voltage		12 to 15	kV
Quick heating cathode	with a typical tube a legible picture will appear within 5 s.		

SCREEN

Metal-backed phosphor			
Luminescence	white		
Light transmission of face glass	≈	50	%
Useful diagonal	≥	295	mm
Useful width	≥	257	mm
Useful height	≥	195	mm

HEATING

Indirect by a.c. or d.c.; parallel supply

Heater voltage	V_f	11	V
Heater current	I_f	140	mA

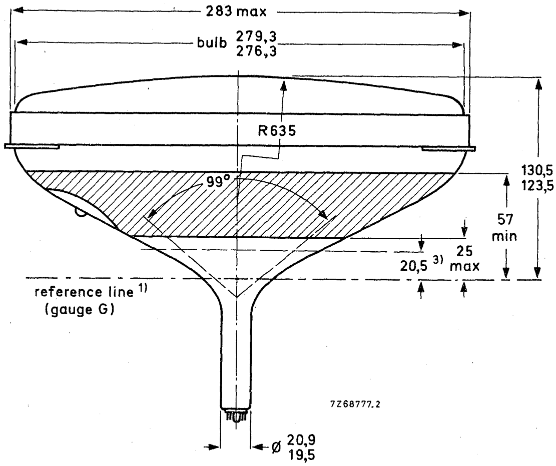
Limits (Absolute max. rating system) of r.m.s. heater voltage	V_f	max.	12,7	V *)
		min.	9,3	V

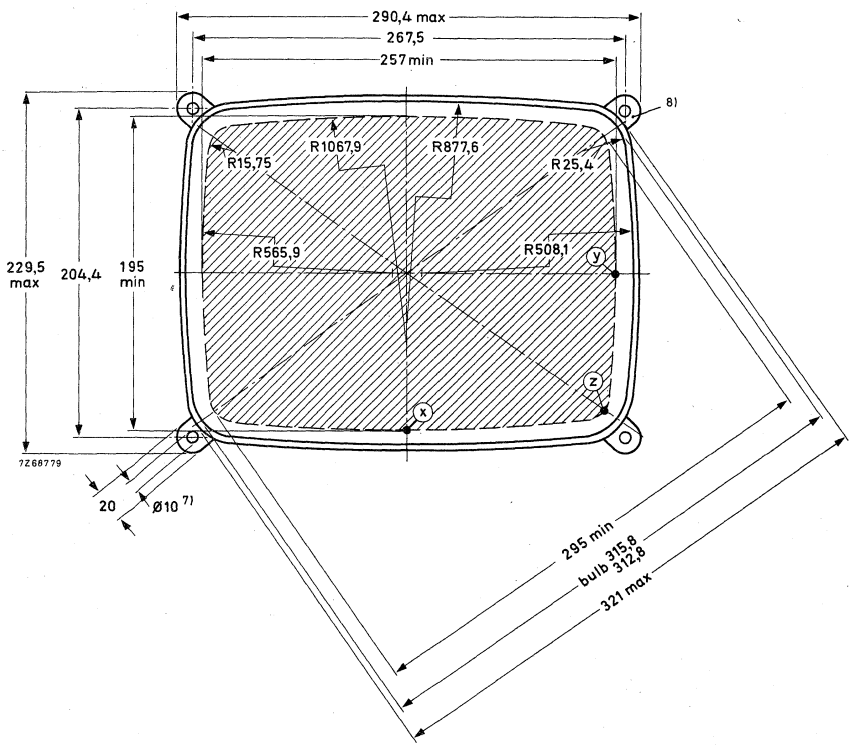
For heating time as a function of source impedance see last page of this data sheet.

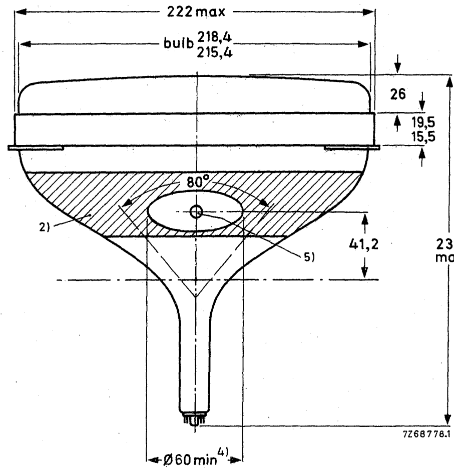
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

MECHANICAL DATA Dimensions in mm

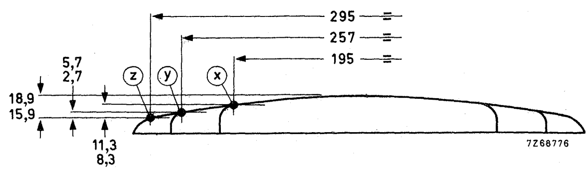
Notes are given after the drawings.



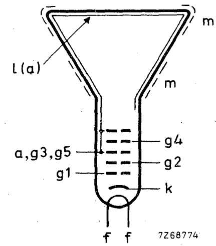


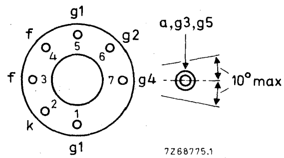


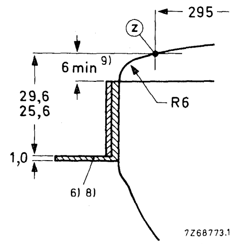
222 max
bulb 218,4 215,4
26
19,5
15,5
80°
2)
5)
41,2
233 max
7Z68778.1
Ø60 min 4)



295
257
195
5,7
2,7
z
y
x
18,9
15,9
11,3
8,3
7Z68776







Mounting position : any

Net mass : approx. 2, 8 kg

Base : JEDEC E7-91

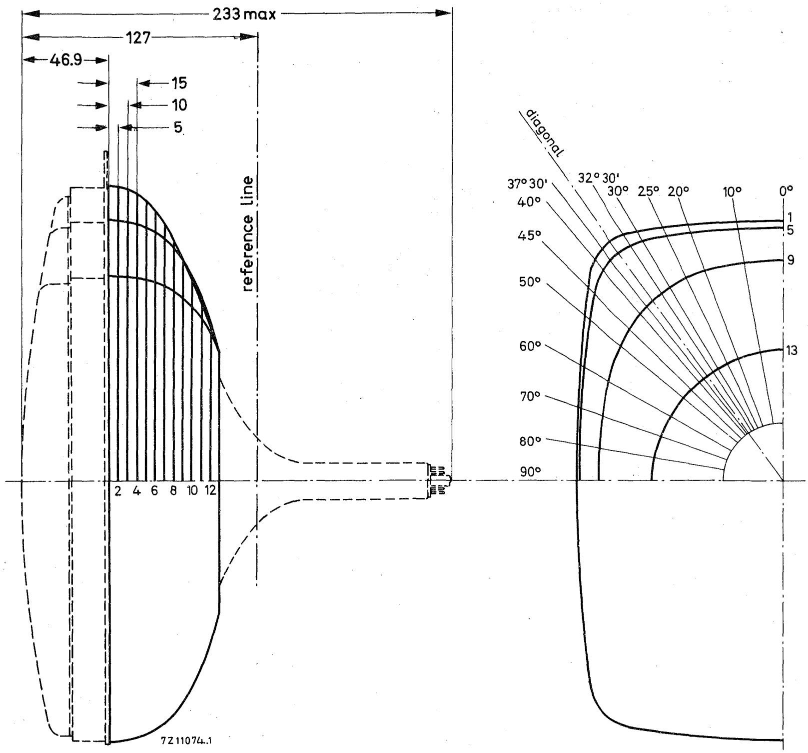
The socket for this base should not be mounted rigidly, it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. The reference line is determined by the plane of the upper edge of the flange of the reference line gauge when the gauge is resting on the cone (Gauge G).
2. The configuration of the external conductive coating may be different, but covers the contact area shown in the drawing.
   The external conductive coating must be earthed.
3. End of guaranteed contour. The maximum neck and cone contour is given by the reference line gauge G.
4. This area must be kept clean.
5. Recessed cavity contact IEC 67-III-2.
6. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
7. The mounting screws in the cabinet must be situated inside a circle of 7 mm diameter drawn around the true geometrical positions, i.e. at the corners of a rectangle of 267, 5 mm x 204, 4 mm.
8. Electrical contact between the metal band and the mounting lugs is guaranteed.
9. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from section 1	Distance from centre (max. values)														
		0°	10°	20°	25°	38'	32°30'	diag.	37°30'	40°	45°	50°	60°	70°	80°	90°
13	59.6	72,2	72,0	71,7	71,4	71,2	71,1	71,0	71,0	70,9	70,8	70,7	70,6	70,7	70,8	70,8
12	55	85,9	85,6	84,9	84,4	84,0	83,8	83,5	83,3	83,1	82,7	82,4	81,9	81,6	81,5	81,5
11	50	99,5	99,4	98,9	98,5	97,9	97,5	97,1	96,8	96,3	95,4	94,4	92,4	90,7	89,5	89,1
10	45	112,3	112,4	112,2	111,7	110,9	110,4	109,7	109,1	108,3	106,6	104,7	100,9	97,7	95,5	94,7
9	40	121,3	121,3	122,8	122,9	122,4	121,9	121,2	120,5	119,5	117,1	114,3	108,6	103,8	100,8	99,7
8	35	127,9	128,9	131,2	132,1	140,8	132,3	131,7	130,9	129,7	126,5	122,7	114,9	108,8	105,0	103,7
7	30	132,6	134,0	137,4	139,3	147,2	141,2	140,9	140,2	138,8	134,6	129,5	119,7	112,5	108,2	106,8
6	25	136,0	137,5	141,7	144,4	151,6	148,3	148,5	147,9	146,5	140,9	134,3	122,9	115,0	110,5	109,0
5	20	138,4	140,0	144,5	147,8	154,6	153,2	153,7	153,2	151,7	144,8	137,1	124,7	116,5	111,8	110,3
4	15	140,3	141,9	146,6	150,2	156,5	156,6	157,4	156,9	155,1	147,1	138,5	125,4	117,0	112,3	110,8
3	10	141,6	143,2	148,0	151,8	154,6	158,7	159,5	159,0	157,1	148,5	139,4	126,0	117,6	112,9	111,4
2	5	142,4	143,9	148,8	152,6	157,4	159,5	160,7	160,2	158,2	149,4	140,1	126,6	118,1	113,4	111,9
1	0	142,8	144,4	149,3	153,1	157,9	160,2	161,1	160,6	158,7	149,9	140,6	127,1	118,5	113,8	112,3

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 900 > 450	pF pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	150	pF
Cathode to all	C_k	3	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	110°
Horizontal deflection angle	99°
Vertical deflection angle	80°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe). Maximum distance between centre of field of this magnet and reference line: 47 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	**12 to 15**	kV
Focusing electrode voltage	V_{g4}	0 to 130	V *)
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	30 to 50	V

*) Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 and +130 V (e.g. two taps; 0 V and 130 V).
The optimum focusing voltage of individual tubes may be between -100 V and +200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage	$V_{a,g3,g5}$	max. / min.	17 / 9	kV*) / kV
Grid no. 4 voltage				
positive	V_{g4}	max.	500	V
negative	$-V_{g4}$	max.	200	V
Grid no. 2 voltage	V_{g2}	max.	200	V
Cathode to grid no. 1 voltage				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1_p}$	max.	400	V**)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1_p}$	max.	2	V
Cathode-to-heater voltage	$V_{k/f}$	max.	200	V

CIRCUIT DESIGN VALUES

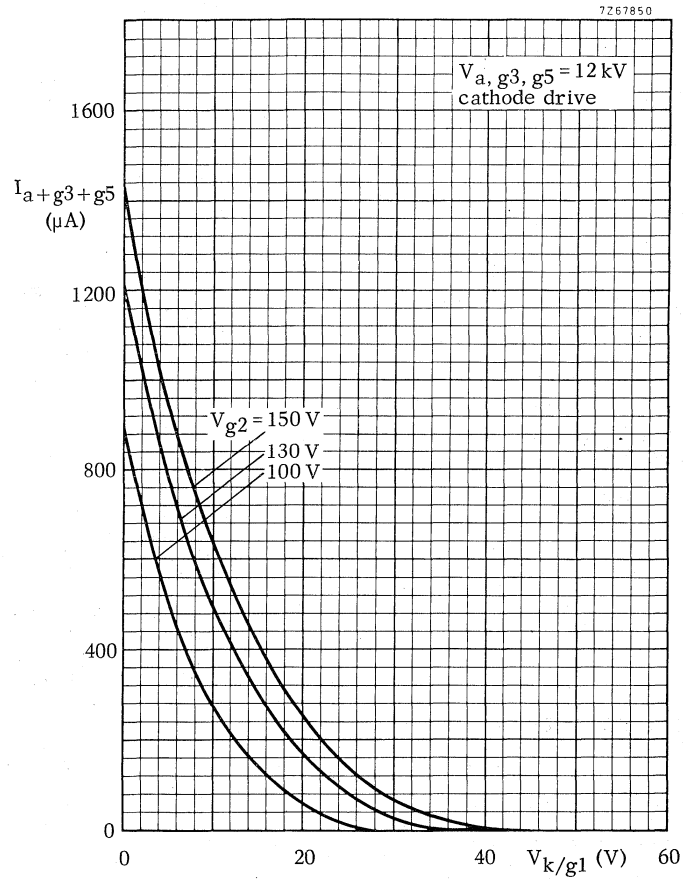
Grid no. 4 current				
positive	I_{g4}	max.	25	µA
negative	$-I_{g4}$	max.	25	µA
Grid no. 2 current				
positive	I_{g2}	max.	5	µA
negative	$-I_{g2}$	max.	5	µA

MAXIMUM CIRCUIT VALUES

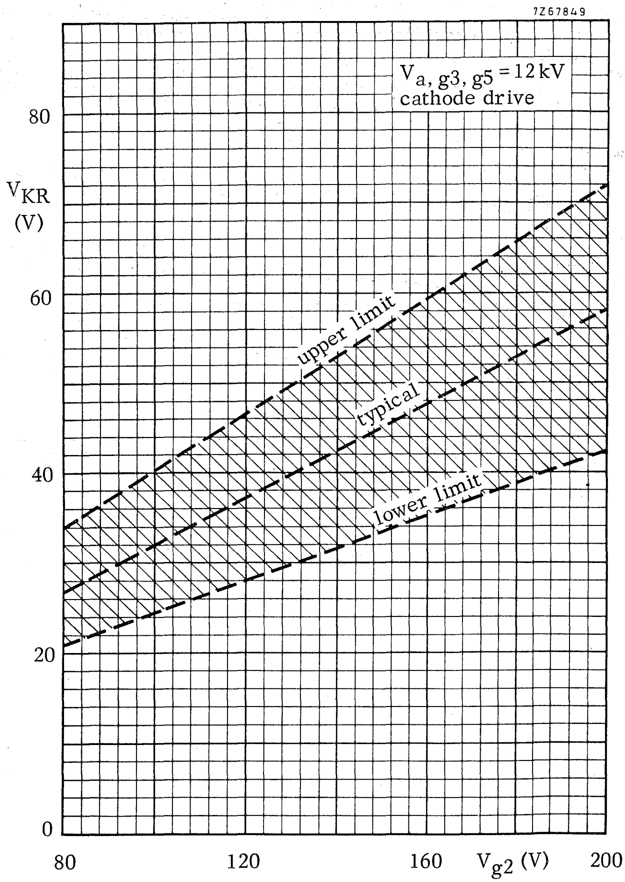
Resistance between cathode and heater	$R_{k/f}$	max.	1	MΩ
Impedance between cathode and heater	$Z_{k/f}$(50Hz)	max.	0, 1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1, 5	MΩ
Grid no. 1 circuit impedance	Z_{g1}(50Hz)	max.	0, 5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0, 5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

**) Maximum pulse duration 22% of a cycle but max. 1, 5 ms.

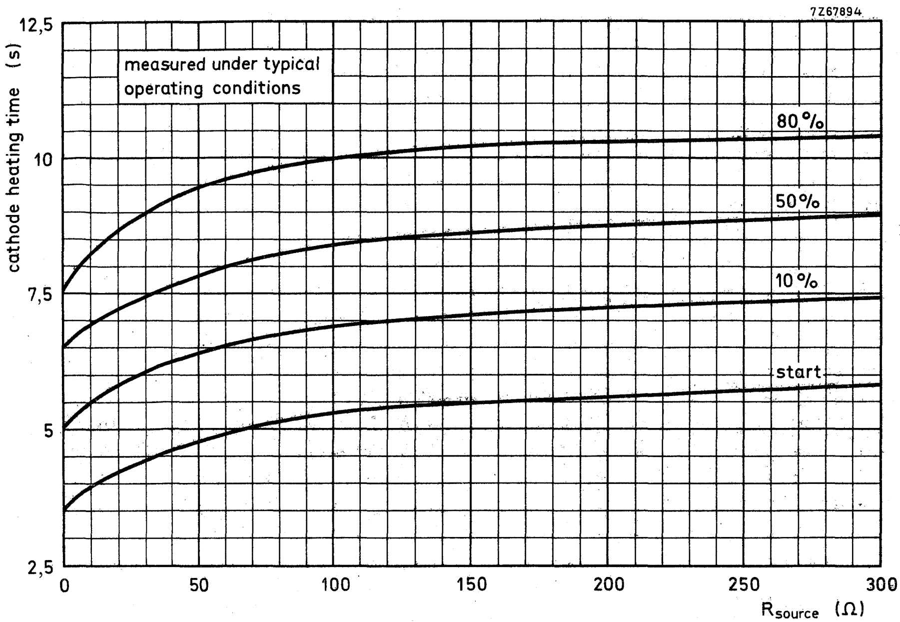


Final accelerator current as a function of cathode voltage



$$\frac{\Delta V_{KR}}{\Delta V_{a,\,g3,\,g5}} = 0,3 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no.2 voltage



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

34 cm (14 in), 110^{o}, rectangular direct vision picture tube with integral protection for black and white TV. The 20 mm neck diameter ensures a low deflection energy.
A special feature of this tube is its short cathode heating time.
The tube is designed for "push through" application and is provided with four metal lugs for mounting into a cabinet.

QUICK REFERENCE DATA			
Face diagonal		34	cm (14 in)
Deflection angle		110^{o}	
Overall length	max.	247	mm
Neck diameter		20	mm
Heating		11 V, 140	mA
Grid no. 2 voltage		130	V
Final accelerator voltage		12 to 15	kV
Quick heating cathode	with a typical tube a legible picture will appear within 5 s.		

SCREEN

Metal-backed phosphor			
Luminance	white		
Light transmission of face glass	≈	48	%
Useful diagonal	≥	322, 3	mm
Useful width	≥	270, 2	mm
Useful height	≥	210, 7	mm

HEATING

Indirect by a.c. or d.c.

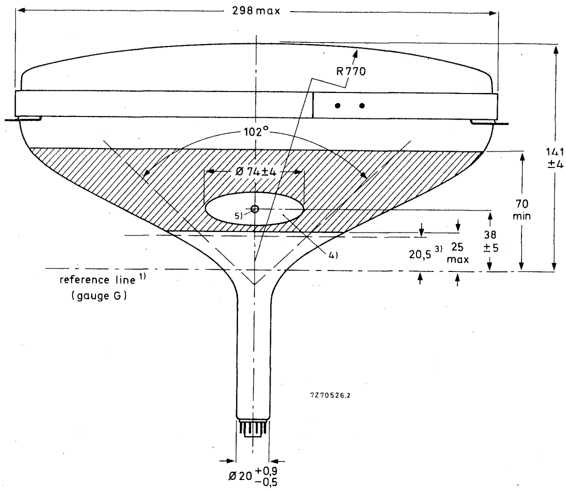
Heater voltage	V_f		11	V	
Heater current	I_f		140	mA	
Limits (Absolute max. rating system) of r.m.s. heater voltage measured in any 20 ms	V_f	max.	12, 7	V	*)
		min.	9, 3	V	

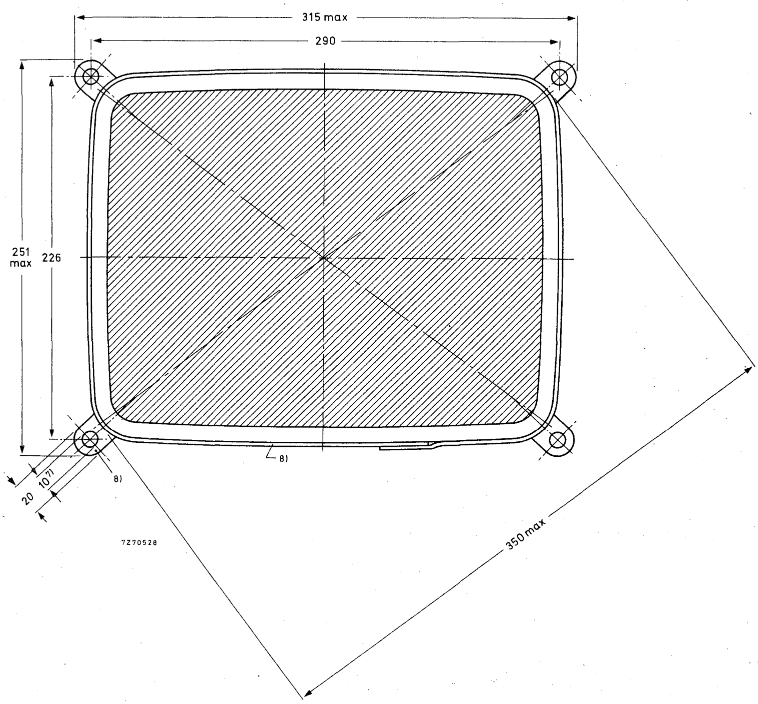
For heating time as a function of source impedance see last page of this data sheet.

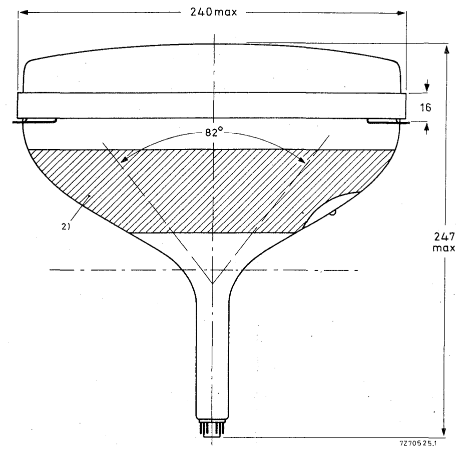
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

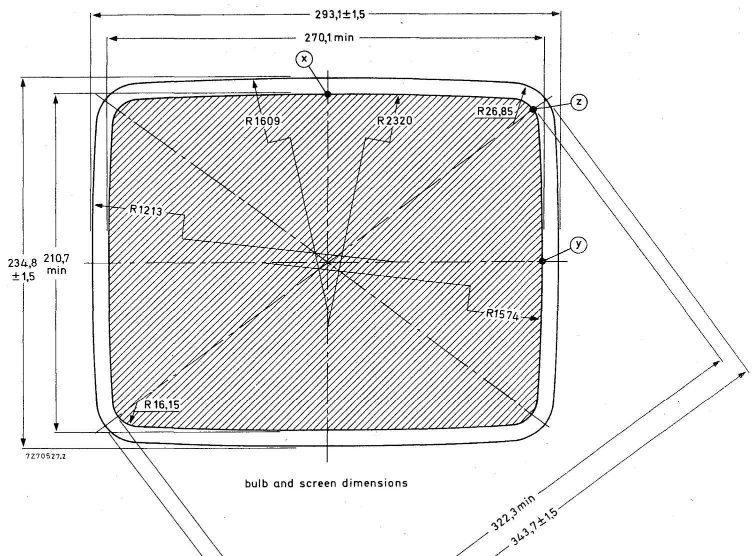
MECHANICAL DATA Dimensions in mm

Notes are given after the drawings.

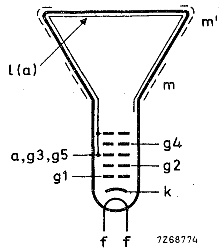


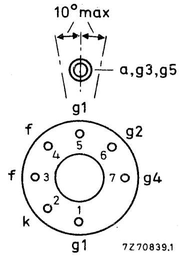


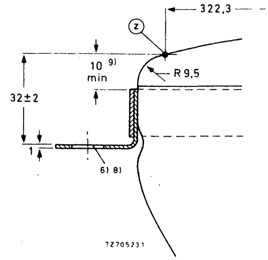


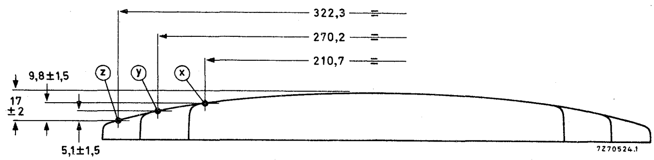


bulb and screen dimensions









Mounting position : any

Netmass : approx. 3,2 kg

Base : JEDEC E7-91

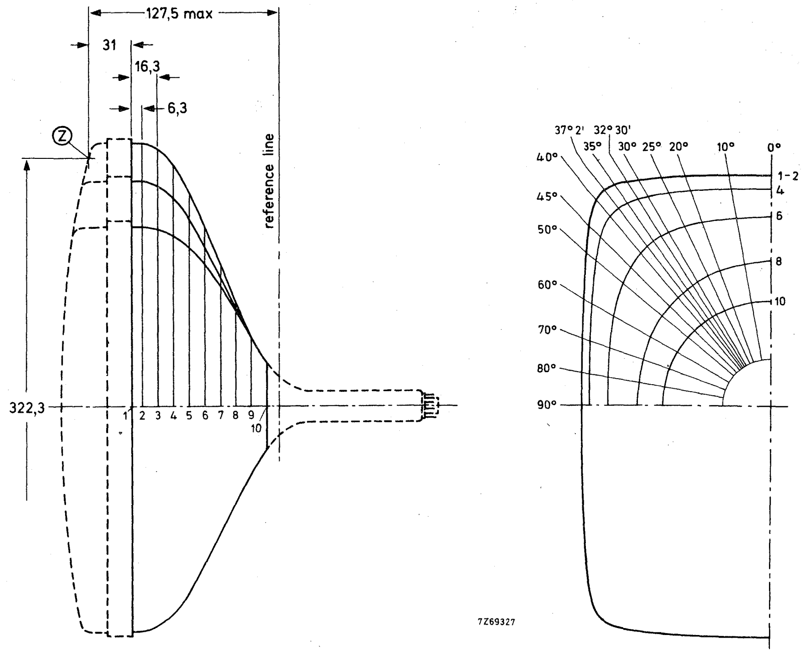
The socket for this base should not be mounted rigidly it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. The reference line is determined by the plane of the upper edge of the flange of the reference line gauge when the gauge is resting on the cone (gauge G).
2. The configuration of the external conductive coating may be different, but covers the contact area shown in the drawing.
   The external conductive coating must be earthed.
3. End of guaranteed contour. The maximum neck and cone contour is given by the reference line gauge G.
4. This area must be kept clean.
5. Recessed cavity contact IEC67-III-2.
6. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
7. The mounting screws in the cabinet must be situated inside a circle of 7 mm drawn around the true geometrical positions i.e. at the corners of a rectangle of 290 mm x 226 mm.
8. Electrical contact between the metal band and mounting lugs is guaranteed.
9. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Sec-tion	Nom. distance from section 1	Distance from centre (max. values)														
		0^o	10^o	20^o	25^o	30^o	$32^o30'$	35^o	$37^o2'$	40^o	45^o	50^o	60^o	70^o	80^o	90^o
1	0	150, 6	152, 7	159, 3	164, 4	170, 4	173, 4	175, 7	176, 5	174, 8	165, 3	154, 6	138, 6	128, 6	123, 2	121, 4
2	6, 3	150, 6	152, 7	159, 3	164, 4	170, 4	173, 4	175, 7	176, 5	174, 8	165, 3	154, 6	138, 6	128, 6	123, 2	121, 4
3	16, 3	148, 1	150, 2	156, 6	161, 6	167, 6	170, 6	173, 0	173, 9	172, 6	163, 7	153, 2	137, 3	127, 4	121, 9	120, 2
4	26, 3	141, 6	143, 5	149, 3	153, 6	158, 3	160, 3	161, 8	162, 2	161, 3	155, 5	147, 2	132, 8	123, 5	118, 3	116, 7
5	36, 3	133, 5	135, 2	139, 9	142, 9	145, 7	146, 7	147, 3	147, 3	146, 4	142, 8	137, 4	126, 1	117, 7	113, 0	111, 5
6	46, 3	124, 0	125, 3	128, 5	130, 1	131, 2	131, 4	131, 4	131, 1	130, 3	127, 9	124, 6	116, 9	110, 3	106, 2	104, 9
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9	71, 3	84, 5	84, 1	83, 3	82, 8	82, 2	81, 9	81, 7	81, 4	81, 1	80, 6	80, 1	79, 3	78, 8	78, 5	78, 5
10	76, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0	69, 0.

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	<900 >450	pF pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	200	pF
Cathode to all	C_k	3	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	110^o
Horizontal deflection angle	102^o
Vertical deflection angle	82^o

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe).
Maximum distance between centre of field of this magnet and reference line: 47 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1.

Final accelerator voltage	$V_{a,g3,g5}$	12 to 15	kV
Focusing electrode voltage	V_{g4}	0 to 130	V *)
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	30 to 50	V

*) Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 V and +130 V (e.g. two taps, 0 V and 130 V).
The optimum focus voltage of individual tubes may be between −100 V and +200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a, g3, g5} = 0$	$V_{a, g3, g5}$	max. min.	17 9	kV*) kV
Grid no. 4 voltage,				
positive	V_{g4}	max.	500	V
negative	$-V_{g4}$	max.	200	V
Grid no. 2 voltage	V_{g2}	max.	200	V
Cathode to grid no. 1 voltage,				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1p}$	max.	400	V**)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1p}$	max.	2	V
Cathode-to-heater voltage	$V_{k/f}$	max.	200	V

CIRCUIT DESIGN VALUES

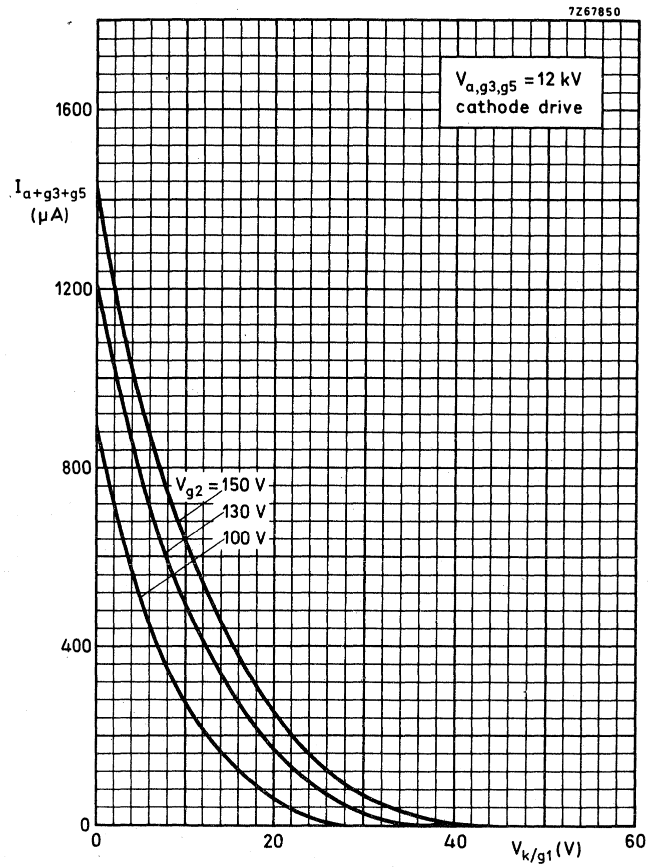
Grid no. 4 current				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid no. 2 current				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

MAXIMUM CIRCUIT VALUES

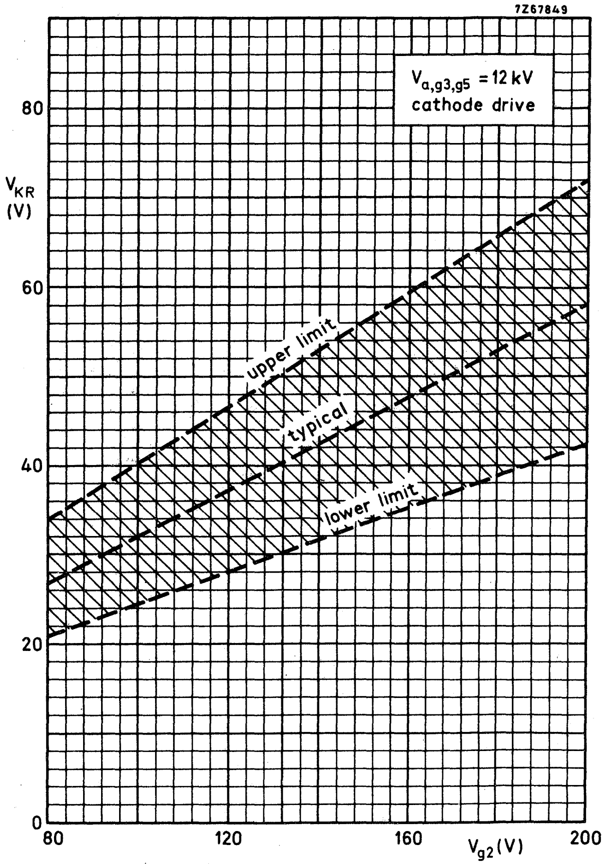
Resistance between cathode and heater	$R_{k/f}$	max.	1	MΩ
Impedance between cathode and heater	$Z_{f/k}$(50 Hz)	max.	0, 1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1, 5	MΩ
Grid no. 1 circuit impedance	Z_{g1}(50 Hz)	max.	0, 5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0, 5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

**) Maximum pulse duration 22% of a cycle but max. 1, 5 ms.

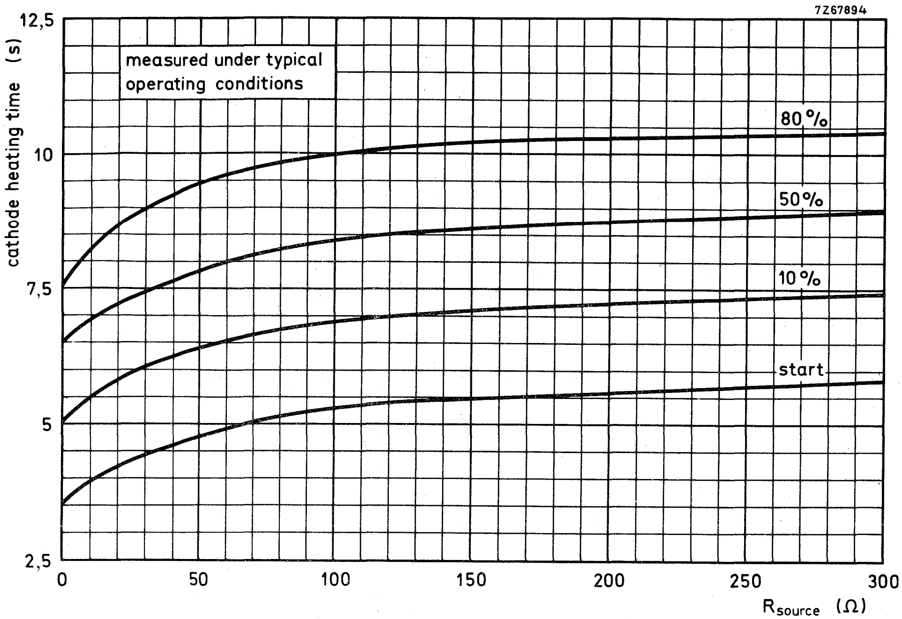


Final accelerator current as a function of cathode voltage.



$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,3 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage.



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

44 cm (17 in), 110°, rectangular direct vision picture tube with integral protection for black-and-white TV.

QUICK REFERENCE DATA	
Face diagonal	44 cm
Deflection angle	110°
Overall length	284,5 mm
Neck diameter	28,6 mm
Heating	6,3 V, 300 mA
Grid no. 2 voltage	400 V
Final accelerator voltage	20 kV

SCREEN

Metal-backed phosphor

Luminescence		white
Light transmission of face glass	≈	48 %
Useful diagonal	≥	413 mm
Useful width	≥	346 mm
Useful height	≥	270 mm

HEATING

Indirect by a.c. or d.c.; series or parallel supply

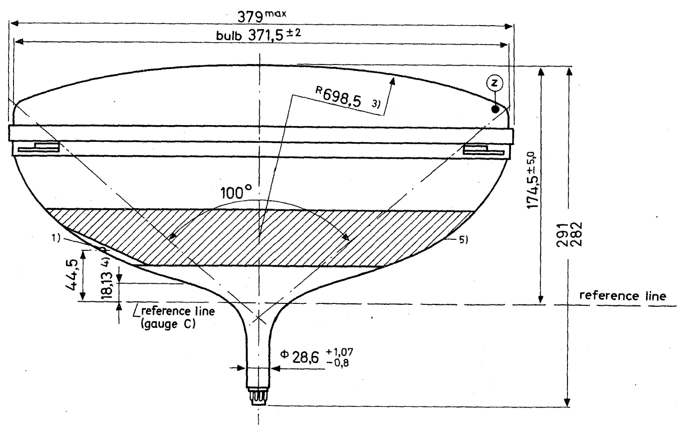
Heater current	I_f	300 mA
Heater voltage	V_f	6,3 V

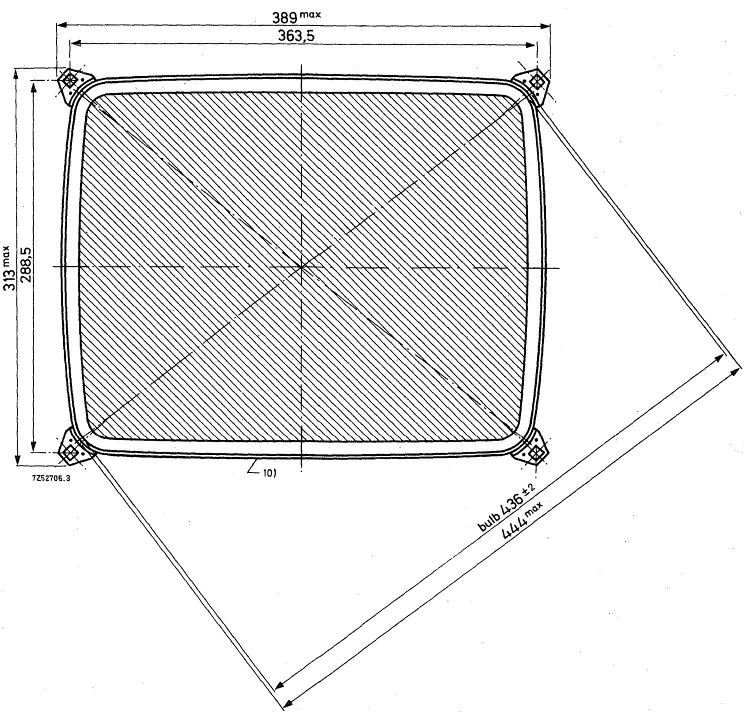
If the tube is connected in a series heater chain the surge heater voltage must not exceed an r.m.s. value of 9,5 V when the supply is switched on.

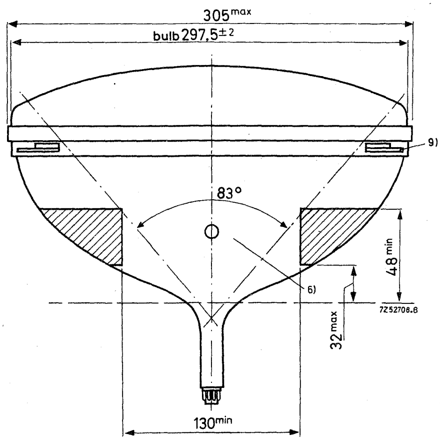
MECHANICAL DATA

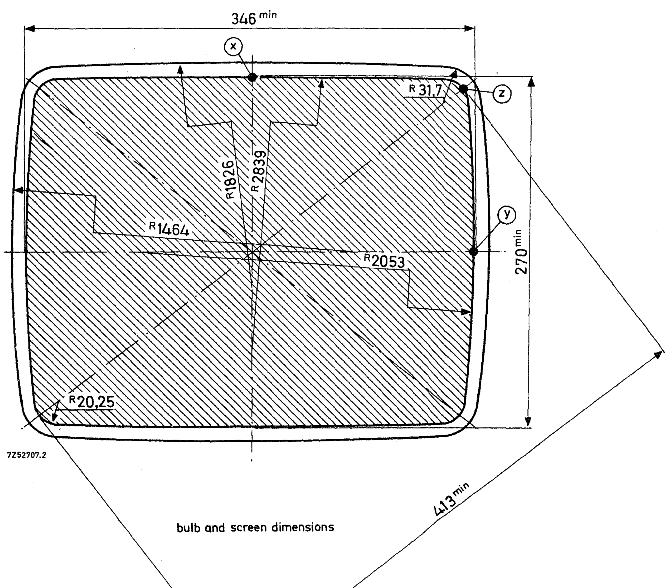
Dimensions in mm

Notes are given after the drawings.



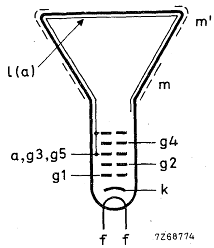


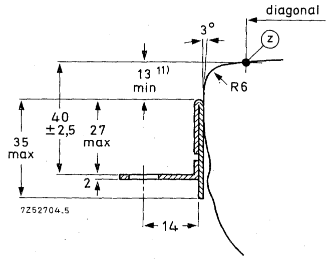


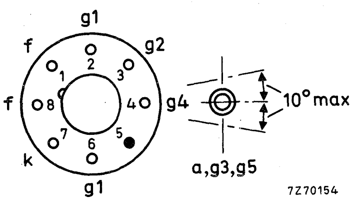


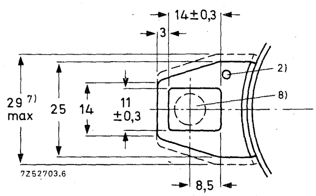
bulb and screen dimensions

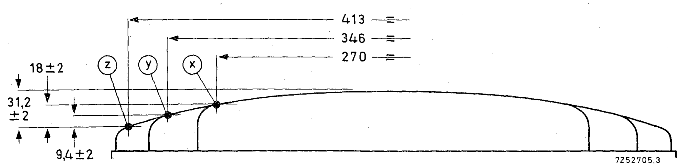
Dimensions in mm











Mounting position : any

Base : neo eightar 7 pin JEDEC B7-208, B8H, IEC-67-I-31a

Net mass : approx. 6 kg

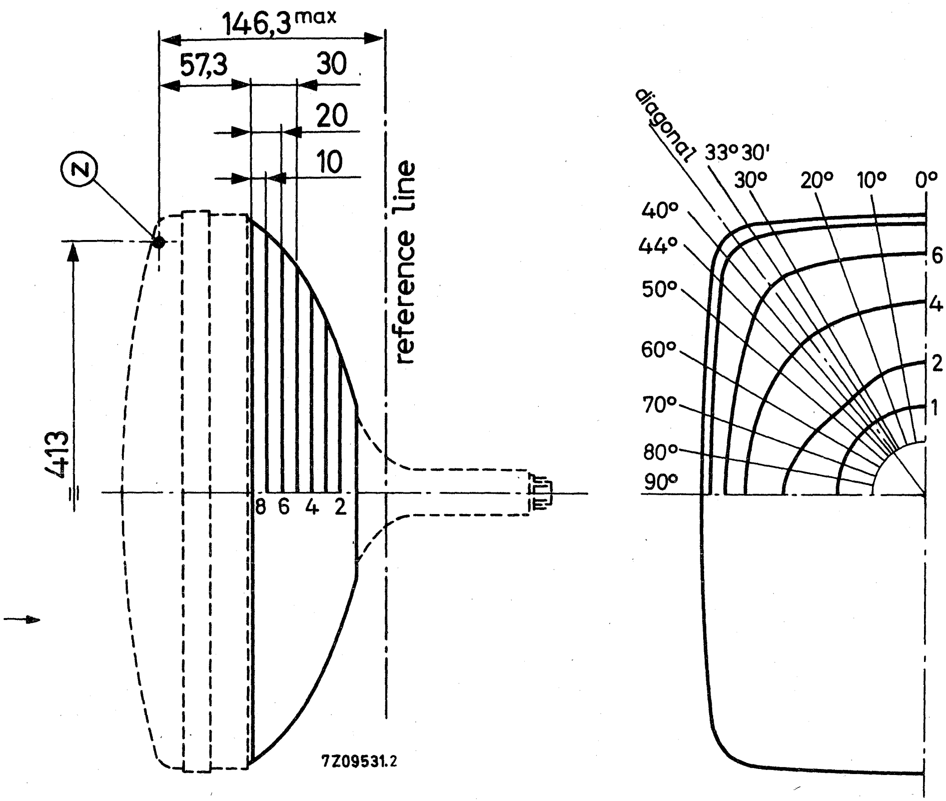
The bottom circumference of the base wafer will fall within a circle concentric with the tube axis and having a diameter of 40 mm.
The socket for the base should not be rigidly mounted: it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. Small cavity contact IEC-67-III-2.
2. The metal rim-band must be earthed. The hole of 3 mm dia in each lug is provided for this purpose.
3. Spherical face-plate.
4. End of guaranteed contour. The maximum contour from reference line towards screen is given by the reference line gauge C (18, 13 mm).
5. The configuration of the external conductive coating may be different but contains the contact area as shown in the drawing.
   The external conductive coating must be earthed.
6. This area must be kept clean.
7. Minimum space to be reserved for mounting lug.
8. The mounting screws in the cabinet must be situated inside a circle of 7,5 mm diameter drawn around the true geometrical positions i.e. at the corners of a rectangle of 363,5 mm x 288,5 mm.
9. The displacement of any lug with respect to the plane through the other three lugs is max. 2 mm.
10. Max. curvatures of the outside rim-band are nominal bulb radius + 4 mm.
11. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from point "Z"	Distance from centre (max. values) 0° Long	10°	20°	30°	33°30'	36°30' Diagonal	40°	44°	50°	60°	70°	80°	90° Short
1	128,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0
2	117,3	95,9	95,2	93,0	92,3	92,1	92,1	92,3	92,6	93,1	93,8	94,6	94,9	95,1
3	107,3	118,1	117,8	118,3	118,3	118,6	119,2	117,8	117,7	117,2	115,5	113,3	111,2	109,8
4	97,3	135,0	136,1	138,3	139,9	141,0	141,6	141,1	138,5	135,4	130,5	125,6	121,8	120,8
5	87,3	149,5	151,1	155,1	159,1	161,3	162,0	161,5	157,5	151,0	142,0	135,8	130,8	129,5
6	77,3	162,5	164,0	168,8	176,0	179,0	179,5	178,0	173,5	163,4	150,8	143,3	138,3	136,4
7	67,3	172,5	174,4	180,1	190,0	194,1	196,3	194,9	186,8	174,5	159,1	149,3	143,9	141,7
8	57,3	179,7	183,1	189,3	201,1	207,4	210,9	206,1	196,0	182,8	165,5	154,0	147,9	145,6

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	<	1300	pF
		>	700	pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$		200	pF
Cathode to all	C_k		5	pF
Grid no. 1 to all	C_{g1}		7	pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	110°
Horizontal deflection angle	100°
Vertical deflection angle	83°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe).

Maximum distance between centre of field of this magnet and reference line: 57 mm.

TYPICAL OPERATING CONDITIONS

Grid drive service

Final accelerator voltage	$V_{a,g3,g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 400	V [1]
Grid no. 2 voltage	V_{g2}	400	V
Grid no. 1 voltage for visual extinction of focused raster	V_{GR}	−40 to −77	V

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 400	V [1]
Grid no. 2 voltage	V_{g2}	400	V
Cathode voltage for visual extinction of focused raster	V_{KR}	36 to 66	V

[1]) Individual tubes will have optimum focus within this range. In general an acceptable picture will be obtained with a fixed focus voltage.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a,g3,g5} = 0$	$V_{a,g3,g5}$	max. min.	23 12	kV*) kV
Grid no. 4 voltage,				
positive	V_{g4}	max.	1000	V
negative	$-V_{g4}$	max.	500	V
Grid no. 2 voltage	V_{g2}	max. min.	700 350	V***) V
Grid no. 2 to grid no. 1 voltage	$V_{g2/g1}$	max.	850	V
Grid no. 1 voltage				
positive	V_{g1}	max.	0	V
positive peak	V_{g1p}	max.	2	V
negative	$-V_{g1}$	max.	200	V
negative peak	$-V_{g1p}$	max.	400	V**)
Cathode to heater voltage,				
positive	$V_{k/f}$	max.	250	V
positive peak	$V_{k/fp}$	max.	300	V
negative	$-V_{k/f}$	max.	200	V
positive during equipment warm-up period not exceeding 15 s	$V_{k/f}$	max.	450	V****)

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

**) Maximum pulse duration 22% of a cycle but maximum 1,5 ms.

***) At $V_{g1/k} = 0$ V.

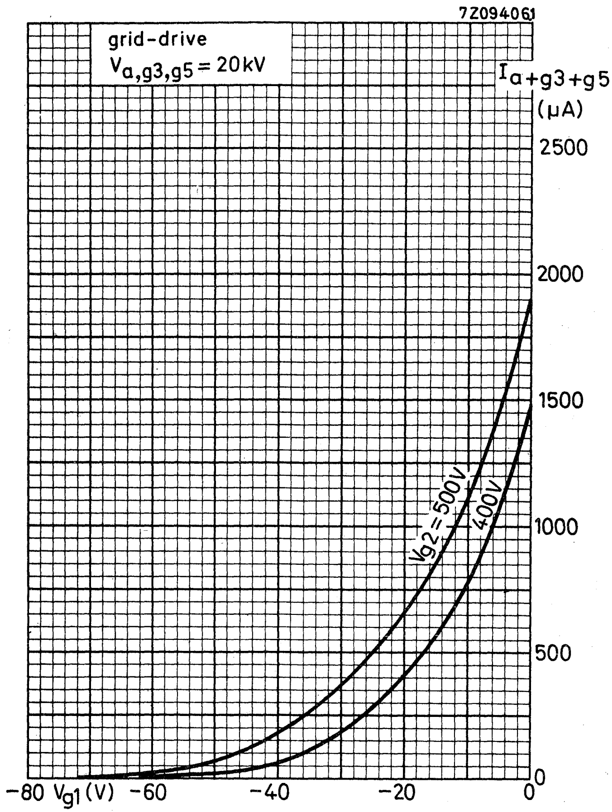
****) Between 15 s and 45 s after switching on a decrease in k/f voltage from 450 V to 250 V, linearly proportional with time, is permissible.

CIRCUIT DESIGN VALUES

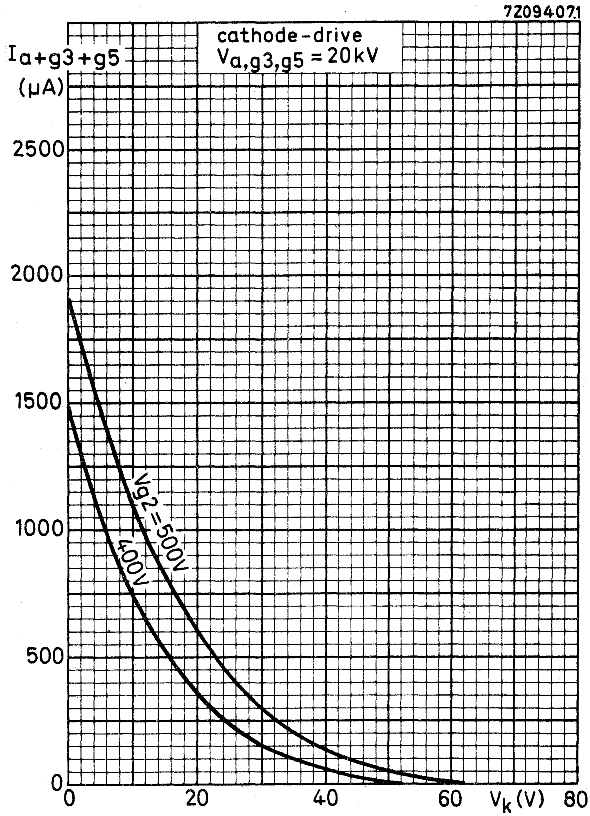
Grid no. 4 current,				
positive	I_{g4}	<	25	µA
negative	$-I_{g4}$	<	25	µA
Grid no. 2 current,				
positive	I_{g2}	<	5	µA
negative	$-I_{g2}$	<	5	µA

MAXIMUM CIRCUIT VALUES

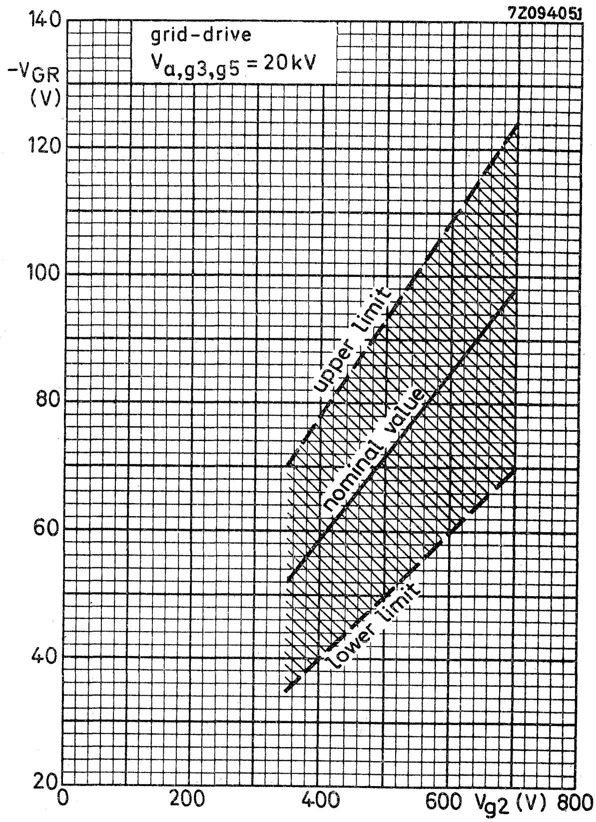
Resistance between cathode and heater	$R_{k/f}$	max.	1,0	MΩ
Impedance between cathode and heater	$Z_{k/f}$(50 Hz)	max.	0,1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid no. 1 circuit impedance	Z_{g1}(50 Hz)	max.	0,5	MΩ



Final accelerator current as a function of grid no. 1 voltage

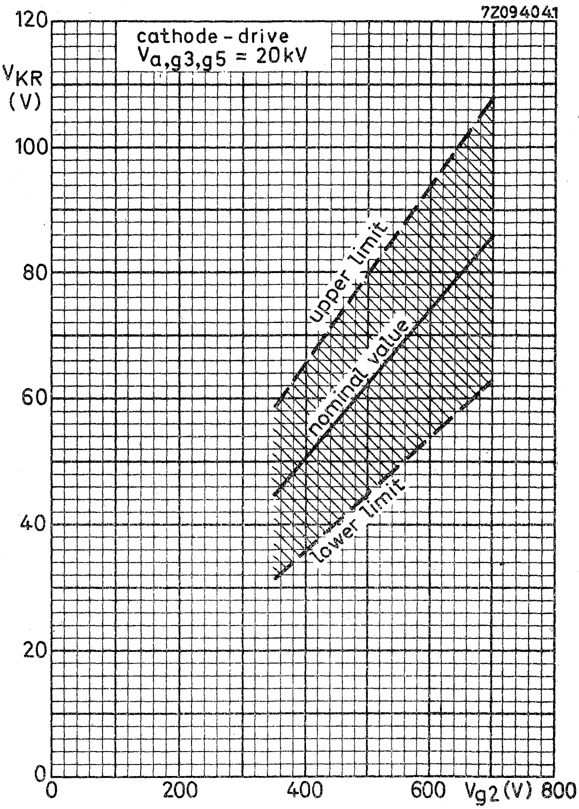


Final accelerator current as a function of cathode voltage



$$\frac{\Delta V_{GR}}{\Delta V_{a,g3,g5}} = 0,15 \times 10^{-3}$$

Limits of grid No. 1 cut-off voltage as a function of grid no. 2 voltage



$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,15 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage

TV PICTURE TUBE

44 cm (17 in), 110°, rectangular direct vision picture tube with integral protection for black and white TV. The 20 mm neck diameter ensures a low deflection energy.
A special feature of this tube is its short cathode heating time.
The tube is designed for "push through" application and is provided with four metal lugs for mounting into a cabinet.

QUICK REFERENCE DATA			
Face diagonal		44	cm (17 in)
Deflection angle		110°	
Overall length	max.	288	mm
Neck diameter		20	mm
Heating		11 V, 140	mA
Grid no. 2 voltage		130	V
Final accelerator voltage		12 to 15	kV
Quick heating cathode	with a typical tube a legible picture will appear within 5 s.		

SCREEN

Metal-backed phosphor			
Luminescence	white		
Light transmission of face glass	≈	48	%
Useful diagonal	≥	413	mm
Useful width	≥	346	mm
Useful height	≥	270	mm

HEATING

Indirect by a.c. or d.c.

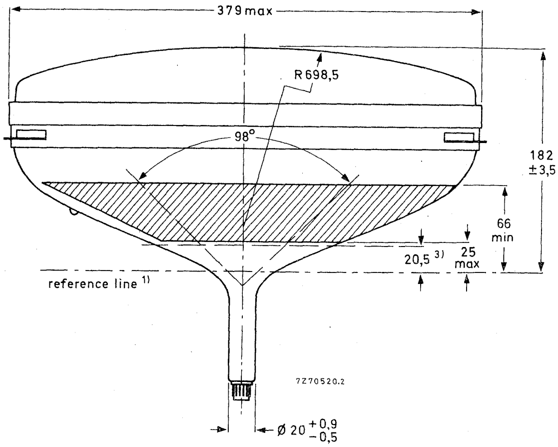
Heater voltage	V_f		11	V
Heater current	I_f		140	mA
Limits (Absolute max. rating system) of r.m.s. heater voltage measured in any 20 ms	V_f	max.	12,7	V *)
		min.	9,3	V

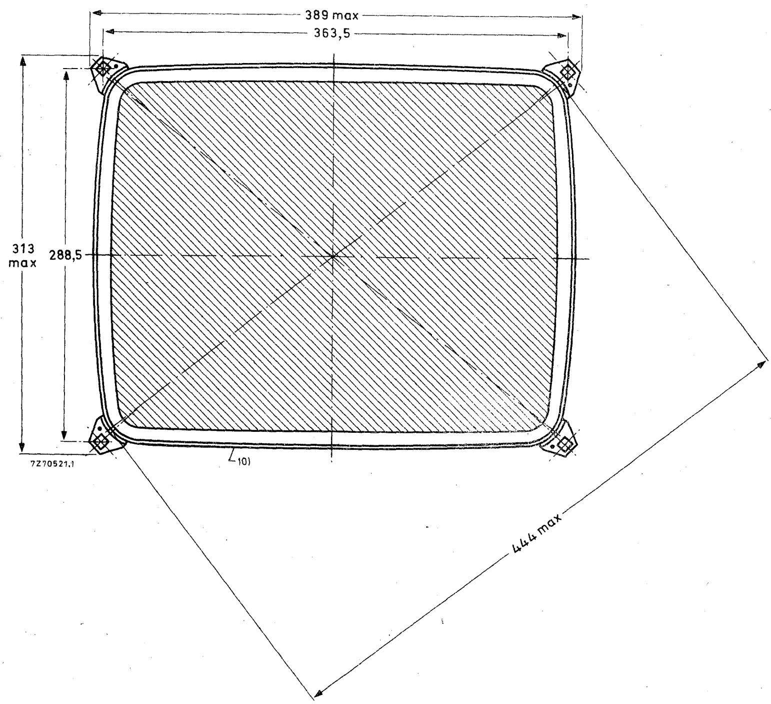
For heating time as a function of source impedance see last page of this data sheet.

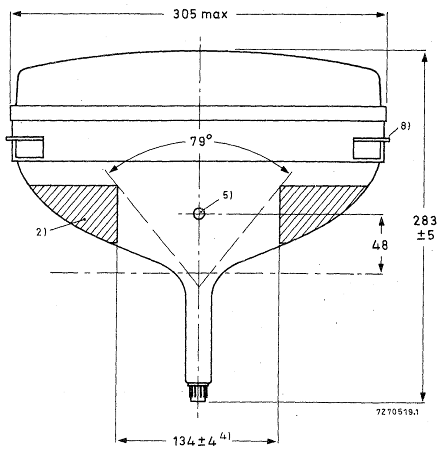
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

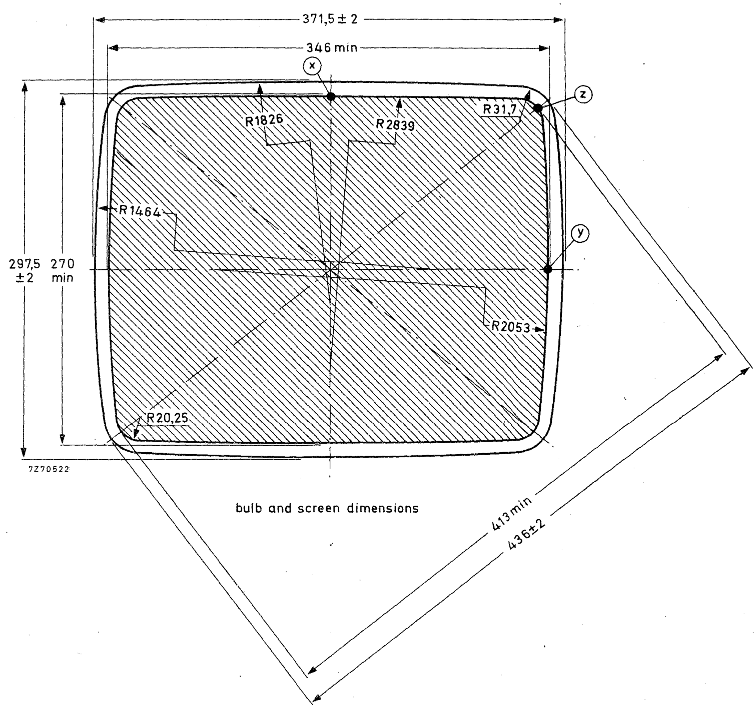
MECHANICAL DATA

Notes are given after the drawings.

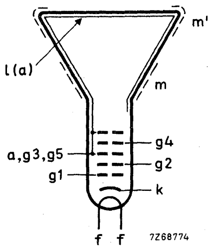


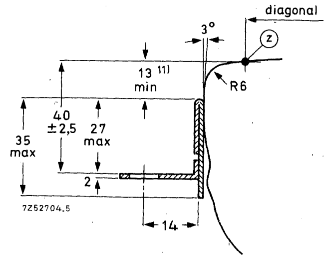


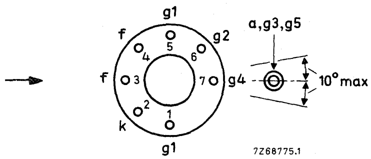


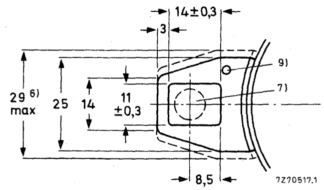


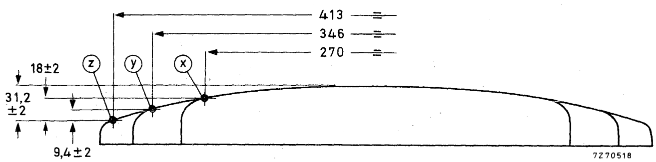
bulb and screen dimensions











Mounting position: any

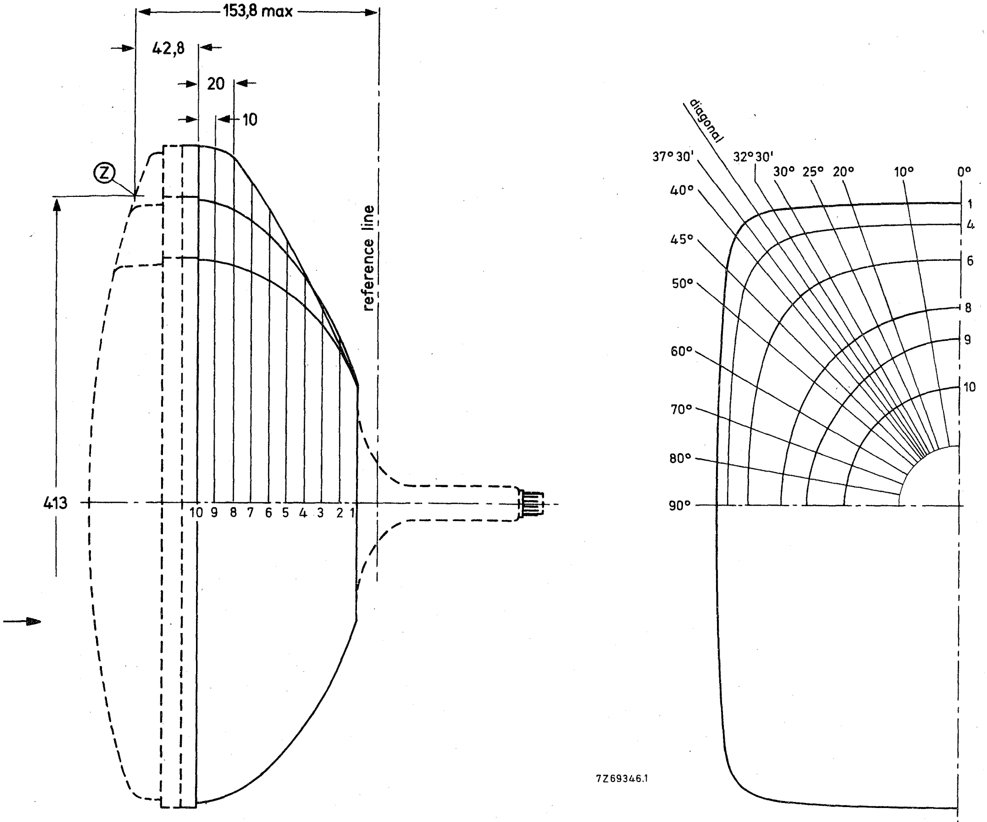
Net mass : approx. 6 kg

Base : JEDEC E7-91

The socket for the base should not be mounted rigidly, it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWING

1. The reference line is determined by the plane of the upper edge of the flange of the reference line gauge when the gauge is resting on the cone (gauge G).
2. The configuration of the external conductive coating may be different, but covers the contact area shown in the drawing.
   The external conductive coating must be earthed.
3. End of guaranteed contour. The maximum neck and cone contour is given by the reference line gauge G.
4. This area must be kept clean.
5. Recessed cavity contact IEC67-III 2.
6. Minimum space to be reserved for mounting lug.
7. The mounting screws in the cabinet must be situated inside a circle of 7,5 mm drawn around the true geometrical positions i.e. at the corners of a rectangle of 363,5 mm x 288,5 mm.
8. The displacement of any lug with respect to the plane through the three other lugs is max. 2 mm.
9. The metal rim-band must be earthed. The hole of 3 mm dia in each lug is provided for this purpose. Electrical contact between the metal band and mounting lugs is guaranteed.
10. Max. curvatures of the outside rim-band are: nominal bulb radius +4 mm.
11. Distance from reference point Z to any hardware.



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A44-510W

Section	Nom. distance from section 1	Distance from centre (max values)														
		0°	10°	20°	25°	30°	32°30'	diag.	37°30'	40°	45°	50°	60°	70°	80°	90°
10	90	73,8	73,6	73,1	72,9	72,6	72,5	72,3	72,2	72,1	71,9	71,8	71,7	71,7	71,8	71,9
9	80	104,7	103,9	102,1	101,0	99,9	99,4	98,6	98,4	98,0	97,2	96,5	95,6	95,2	95,2	95,3
8	70	123,9	124,0	123,8	123,5	123,0	122,6	122,0	121,8	121,2	120,1	118,7	116,0	113,5	111,7	111,1
7	60	140,4	141,3	143,3	144,1	144,5	144,5	144,0	143,8	143,2	141,2	138,6	132,7	127,3	123,8	122,5
6	50	154,8	156,3	160,3	162,5	164,3	164,9	164,7	164,5	163,7	160,5	156,0	146,1	138,1	133,2	131,5
5	40	166,9	168,9	174,5	178,1	181,6	183,1	183,4	183,2	182,1	177,2	170,2	156,6	146,6	140,8	138,9
4	30	176,8	179,1	185,9	190,9	196,3	198,9	200,0	199,8	198,4	191,2	181,2	164,4	153,0	146,7	144,6
3	20	184,1	186,6	194,4	200,4	208,0	212,0	214,6	214,3	212,6	202,0	189,0	169,6	157,4	150,8	148,6
2	10	188,6	191,2	199,3	205,6	213,9	218,4	221,3	221,2	219,2	207,2	193,1	172,9	160,4	153,6	151,4
1	0	190,0	192,6	200,7	207,1	215,3	219,9	222,7	222,5	220,5	208,6	194,4	174,1	161,5	154,7	152,5

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 1300 > 700	pF pF
Final accelerator to metal rimband	$C_{a,g3,g5/m'}$	200	pF
Cathode to all	C_k	3	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	110°
Horizontal deflection angle	98°
Vertical deflection angle	79°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe). Maximum distance between centre of filed of this magnet and reference line: 47 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	12 to 15	kV
Focusing electrode voltage	V_{g4}	0 to 130	V *)
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	30 to 50	V

*) Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 V and + 130 V (e.g. two taps, 0 V and 130 V).
The optimum focus voltage of individual tubes may be between − 100 V and + 200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a,g3,g5} = 0$	$V_{a,g3,g5}$	max.	17	kV*)
		min.	9	kV
Grid no. 4 voltage				
Positive	V_{g4}	max.	500	V
Negative	$-V_{g4}$	max.	200	V
Grid no. 2 voltage	$V_{g2/k}$	max.	200	V
Cathode to grid no. 1 voltage,				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1p}$	max.	400	V**)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1p}$	max.	2	V
Cathode-to-heater voltage	$V_{k/f}$	max.	200	V

CIRCUIT DESIGN VALUES

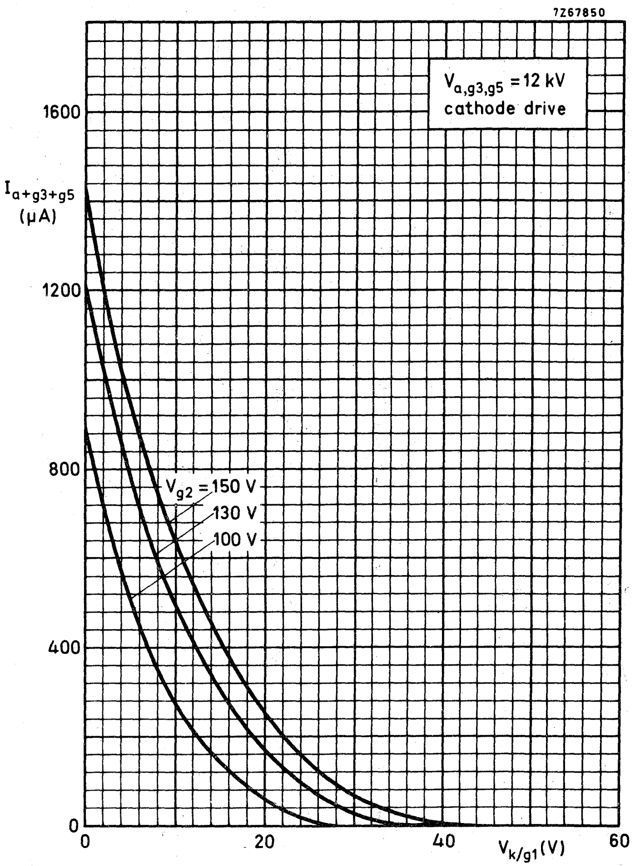
Grid no. 4 current				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid no. 2 current				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

MAXIMUM CIRCUIT VALUES

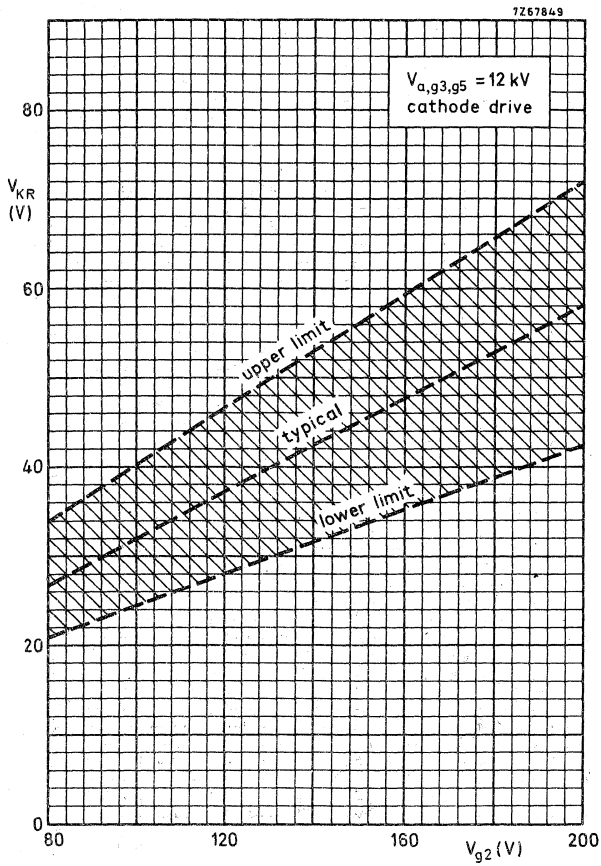
Resistance between cathode and heater	$R_{k/f}$	max.	1	MΩ
Impedance between cathode and heater	$Z_{f/k}$(50 Hz)	max.	0,1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid no. 1 impedance	Z_{g1}(50 Hz)	max.	0,5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

**) Maximum pulse duration 22% of a cycle but max. 1,5 ms.

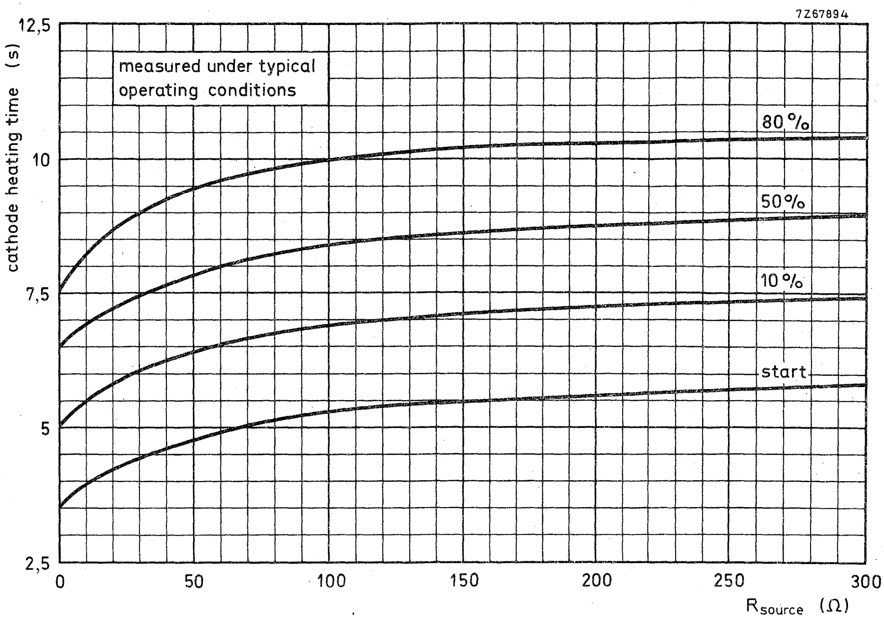


Final accelerator current as a function of cathode voltage.



$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,3 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage.



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

44 cm (17 in), 110°, rectangular direct vision picture tube with integral protection for black and white TV. A special feature of this tube is its short cathode heating time.

QUICK REFERENCE DATA		
Face diagonal		44 cm
Deflection angle		110°
Overall length	max.	291 mm
Neck diameter		28,6 mm
Heating		6,3 V, 240 mA
Grid no. 2 voltage		130 V
Final accelerator voltage		20 kV
Quick heating cathode	with a typical tube a legible picture will appear within 5 s.	

SCREEN

Metal-backed phosphor

Luminescence	white	
Light transmission of face glass	≈	48 %
Useful diagonal	≥	413 mm
Useful width	≥	346 mm
Useful height	≥	270 mm

HEATING

Indirect by a.c. or d.c.

Heater voltage	V_f		6,3 V
Heater current	I_f		240 mA
Limits (Absolute max. rating system) of r.m.s. heater voltage measured in any 20 ms	V_f	max.	7,3 V *)
		min.	5,3 V

For heating time as a function of source impedance see last page of this data sheet.

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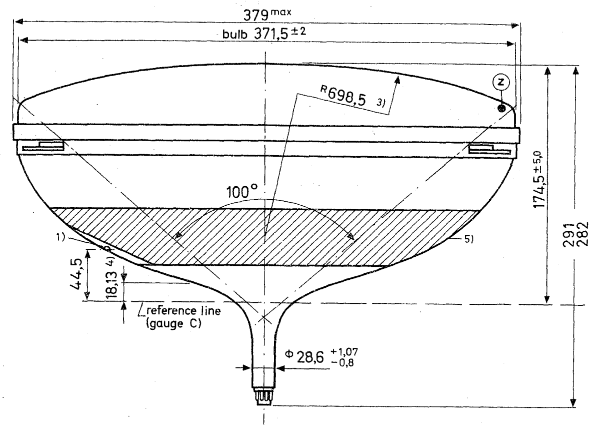
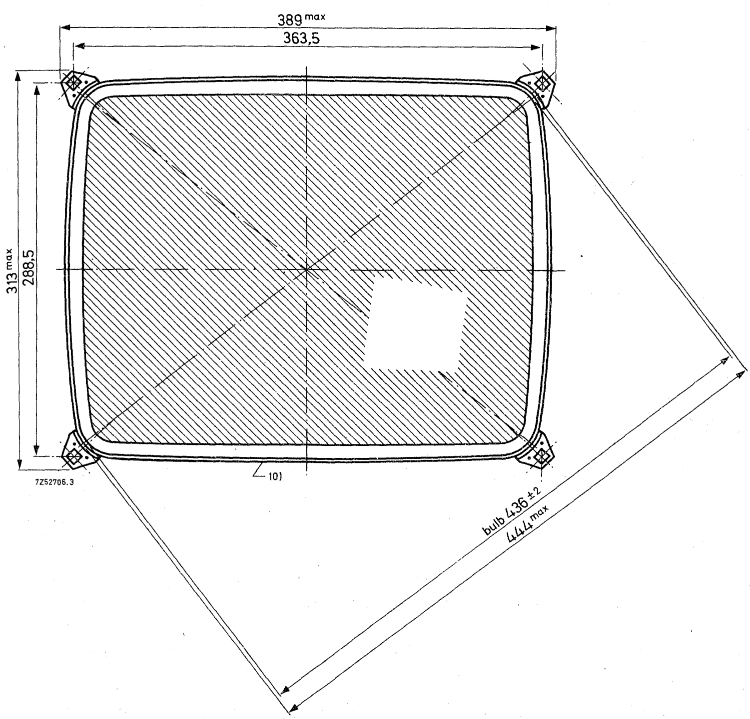
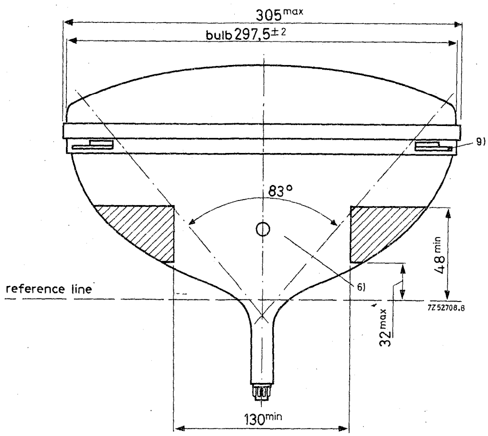
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

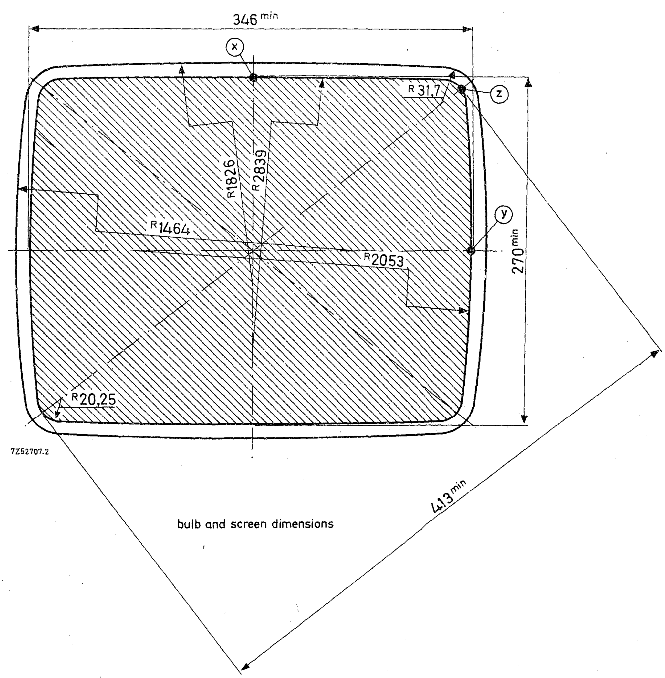
MECHANICAL DATA Dimensions in mm

Notes are given after the drawings.

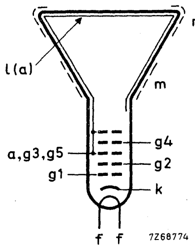


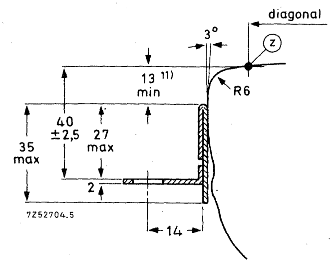


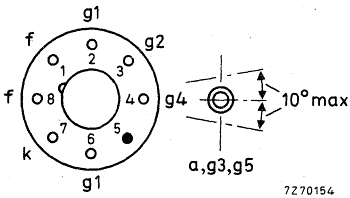


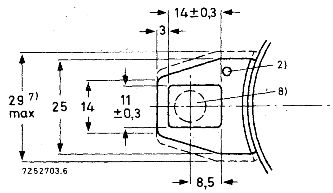


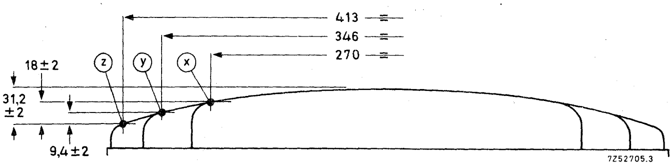
bulb and screen dimensions











Mounting position: any

Base : neo eightar 7 pin JEDEC B7-208, B8H, IEC 67-I-31a

Net mass : approx. 6 kg

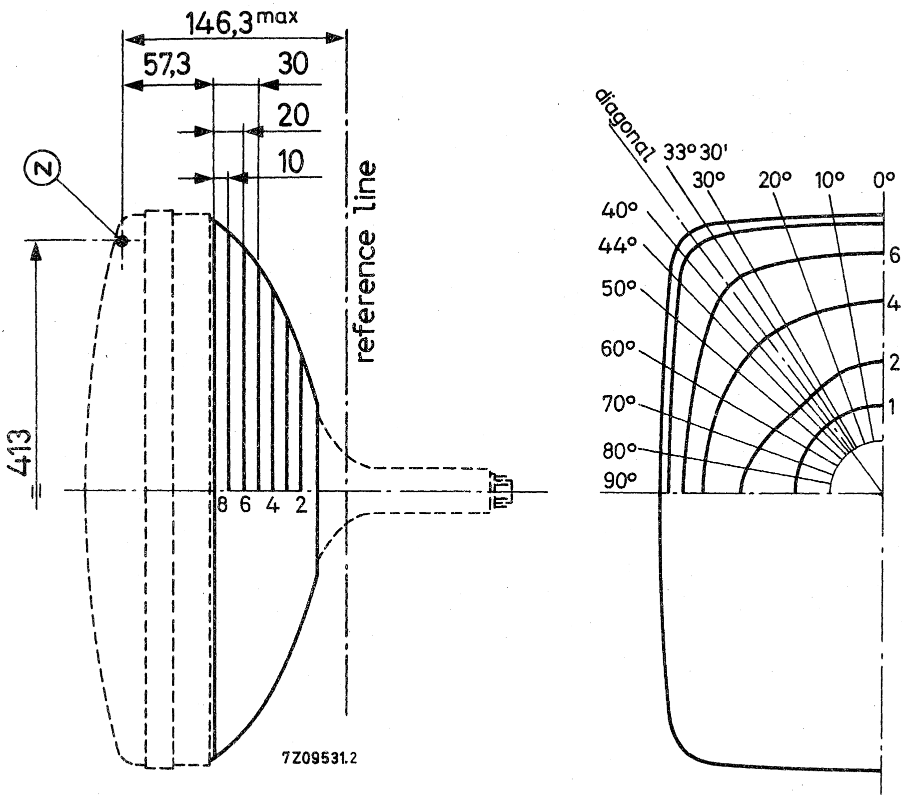
The bottom circumference of the base wafer will fall within a circle concentric with the tube axis and having a diameter of 40 mm.
The socket for the base should not be rigidly mounted: it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWING

1. Small cavity contact IEC 67-III-2.
2. The metal rim-band must be earthed. The hole of 3 mm dia in each lug is provided for this purpose.
3. Spherical face-plate.
4. End of guaranteed contour. The maximum contour from reference line towards screen is given by the reference line gauge C (18, 13 mm).
5. The configuration of the external conductive coating may be different but contains the contact area as shown in the drawing.
   The external conductive coating must be earthed.
6. This area must be kept clean.
7. Minimum space to be reserved for mounting lug.
8. The mounting screws in the cabinet must be situated inside a circle of 7,5 mm diameter drawn around the true geometrical positions i.e. at the corners of a rectangle of 363,5 mm x 288,5 mm.
9. The displacement of any lug with respect to the plane through the other three lugs is max. 2 mm.
10. Max. curvatures of the outside rim-band are nominal bulb radius +4 mm.
11. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Sec-tion	Nom. distance from point "Z"	Distance from centre (max. values)												
		0° Long	10°	20°	30°	33°30'	36°30' Diagonal	40°	44°	50°	60°	70°	80°	90° Short
1	128,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0
2	117,3	95,9	95,2	93,0	92,3	92,1	92,1	92,3	92,6	93,1	93,8	94,6	94,9	95,1
3	107,3	118,1	117,8	118,3	118,3	118,6	119,2	117,8	117,7	117,2	115,5	113,3	111,2	109,8
4	97,3	135,0	136,1	138,3	139,9	141,0	141,6	141,1	138,5	135,4	130,5	125,6	121,8	120,8
5	87,3	149,5	151,1	155,1	159,1	161,3	162,0	161,5	157,5	151,0	142,0	135,8	130,8	129,5
6	77,3	162,5	164,0	168,8	176,0	179,0	179,5	178,0	173,5	163,4	150,8	143,3	138,3	136,4
7	67,3	172,5	174,4	180,1	190,0	194,1	196,3	194,9	186,8	174,5	159,1	149,3	143,9	141,7
8	57,3	179,7	183,1	189,3	201,1	207,4	210,9	206,1	196,0	182,8	165,5	154,0	147,9	145,6

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 1300 > 700	pF pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	200	pF
Cathode to all	C_k	3	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

Diagonal deflection angle	110°
Horizontal deflection angle	100°
Vertical deflection angle	83°

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe). Maximum distance between centre of field of this magnet and reference line: 57 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 130	V [1]
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	42 to 62	V

[1]) Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 and + 130 V (e.g. two taps, 0 V and 130 V).
The optimum focus voltage of individual tubes may be between − 100 V and + 200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a,g3,g5} = 0$	$V_{a,g3,g5}$	max. min.	23 12	kV*) kV
Grid no. 4 voltage,				
positive	V_{g4}	max.	1000	V
negative	$-V_{g4}$	max.	500	V
Grid no. 2 voltage	V_{g2}	max. min.	200 80	V**) V
Cathode to grid no. 1 voltage,				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1p}$	max.	400	V***)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1p}$	max.	2	V
Cathode-to-heater voltage	V_{kf}	max.	200	V

CIRCUIT DESIGN VALUES

Grid no. 4 current,				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid no. 2 current,				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

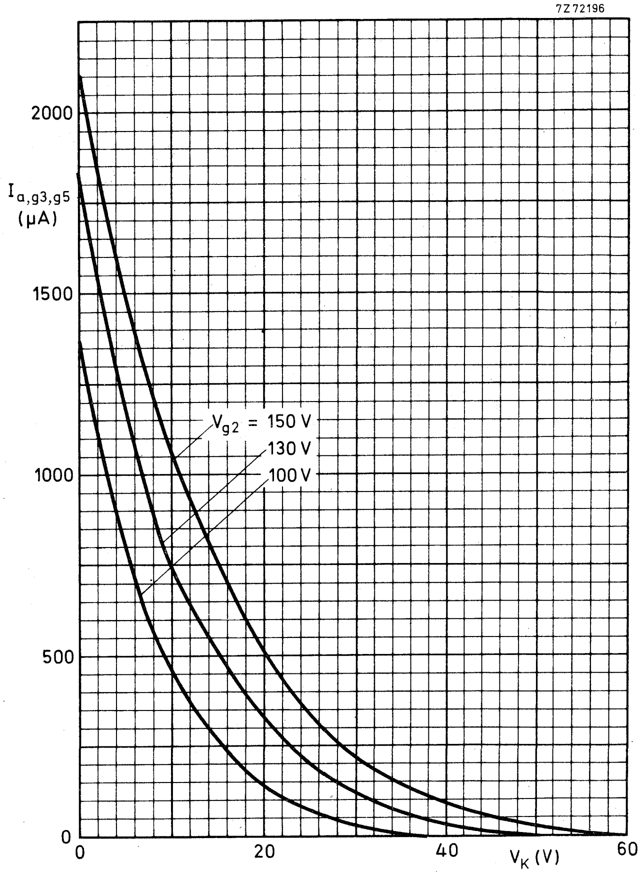
MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	$R_{k/f}$	max.	1,0	MΩ
Impedance between cathode and heater	$Z_{k/f}$ (50 Hz)	max.	0,1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid no. 1 circuit impedance	Z_{g1} (50 Hz)	max.	0,5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

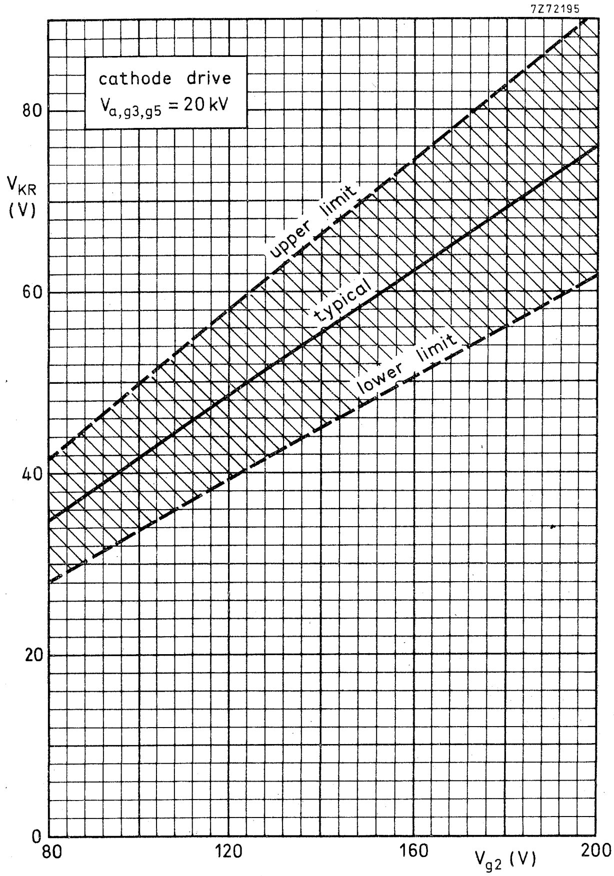
**) At $V_{k/g1} = 0$ V.

***) Maximum pulse duration 22% of a cycle but maximum 1,5 ms.



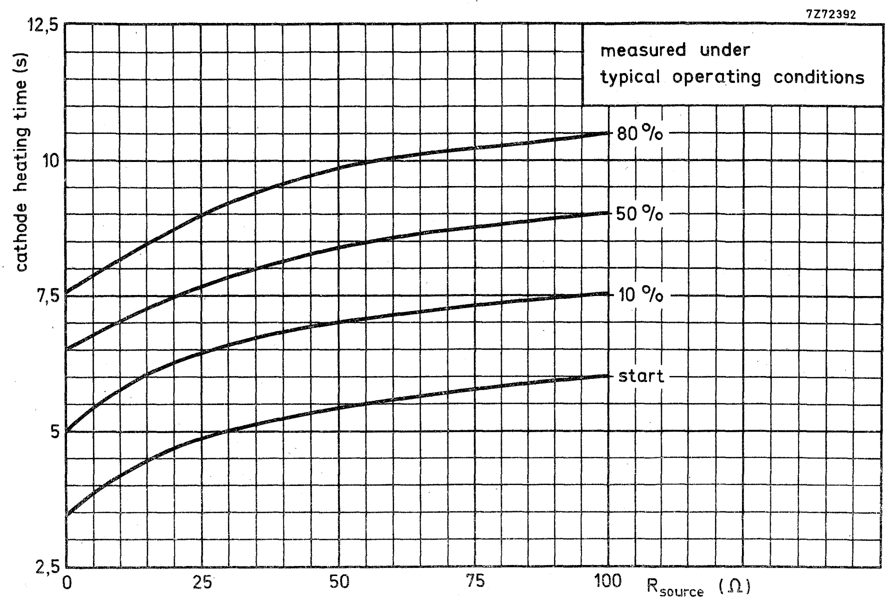
Final accelerator current as a function of cathode voltage

Cathode drive $\quad V_{a,g_3,g_5} = 20$ kV



$$\frac{\Delta V_{KR}}{\Delta V_{a,\,g3,\,g5}} = 0,75 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

50 cm (20 in), 110°, rectangular direct vision picture tube with integral protection for black-and-white TV.

QUICK REFERENCE DATA	
Face diagonal	50 cm (20 in)
Deflection angle	110°
Overall length	312,5 mm
Neck diameter	28,6 mm
Heating	6,3 V, 300 mA
Grid no. 2 voltage	400 V
Final accelerator voltage	20 kV

SCREEN

Metal-backed phosphor

Luminescence	white		
Light transmission of face glass	≈	45	%
Useful diagonal	≥	473	mm
Useful width	≥	394	mm
Useful height	≥	308	mm

HEATING

Indirect by a.c. or d.c.; series or parallel supply

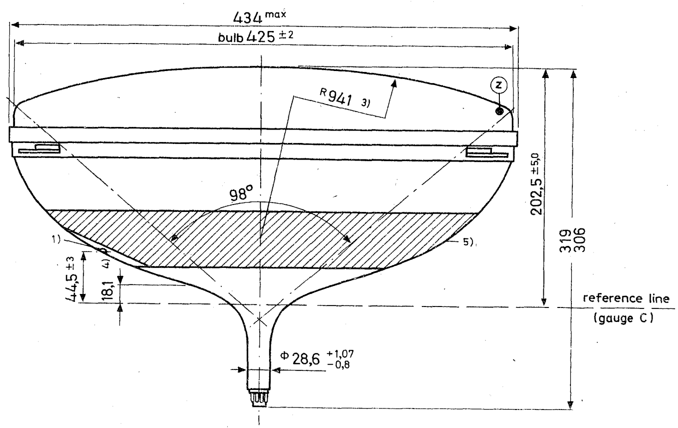
Heater current	I_f	300	mA
Heater voltage	V_f	6,3	V

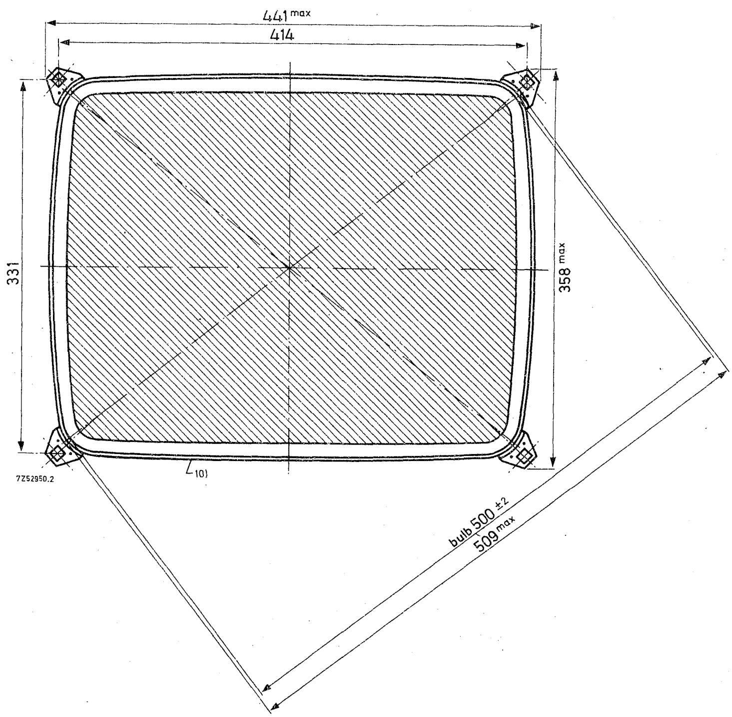
If the tube is connected in a series heater chain the surge heater voltage must not exceed an r.m.s. value of 9,5 V when the supply is switched on.

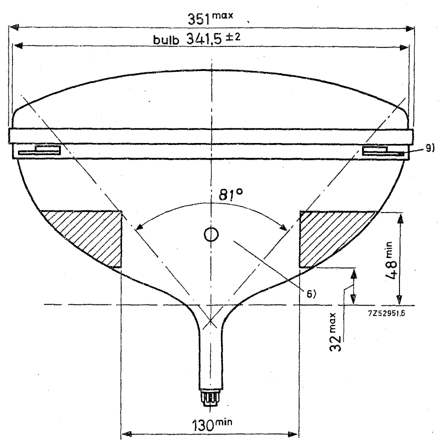
MECHANICAL DATA

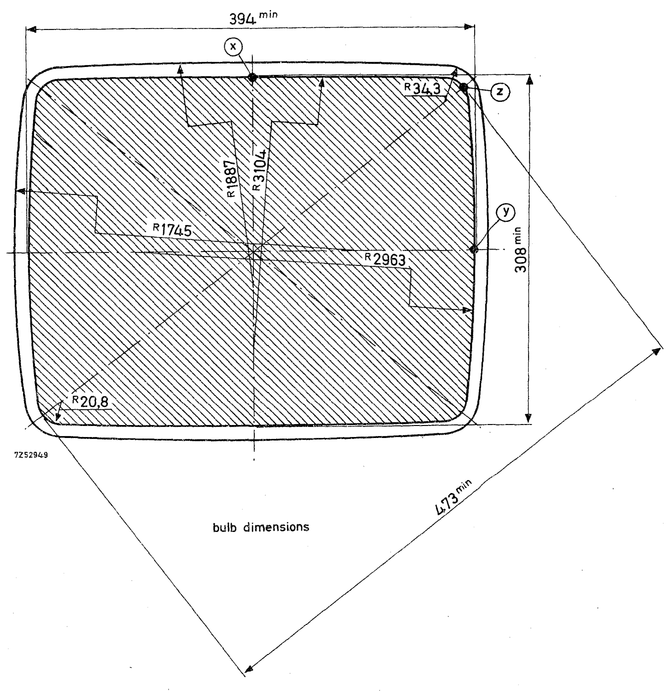
Dimensions in mm

Notes are given after the drawings.

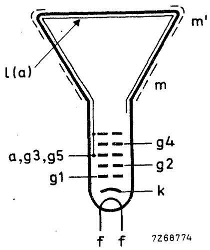


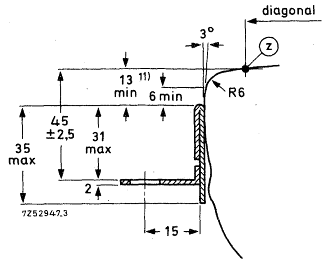


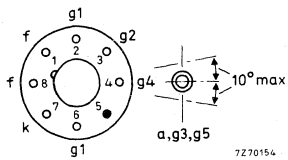


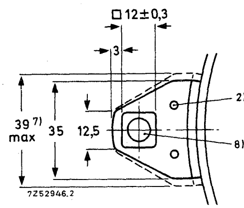


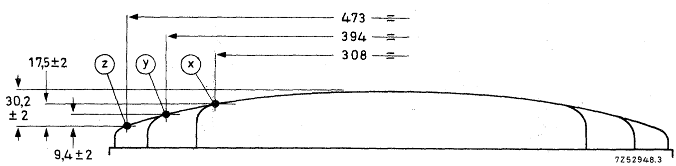
bulb dimensions











Mounting position: any

Base : neo eightar 7 pin JEDEC B7-208, B8H, IEC67-1-31a

Net mass : approx. 8, 5 kg

The bottom circumference of the base wafer will fall within a circle concentric with the tube axis and having a diameter of 40 mm.

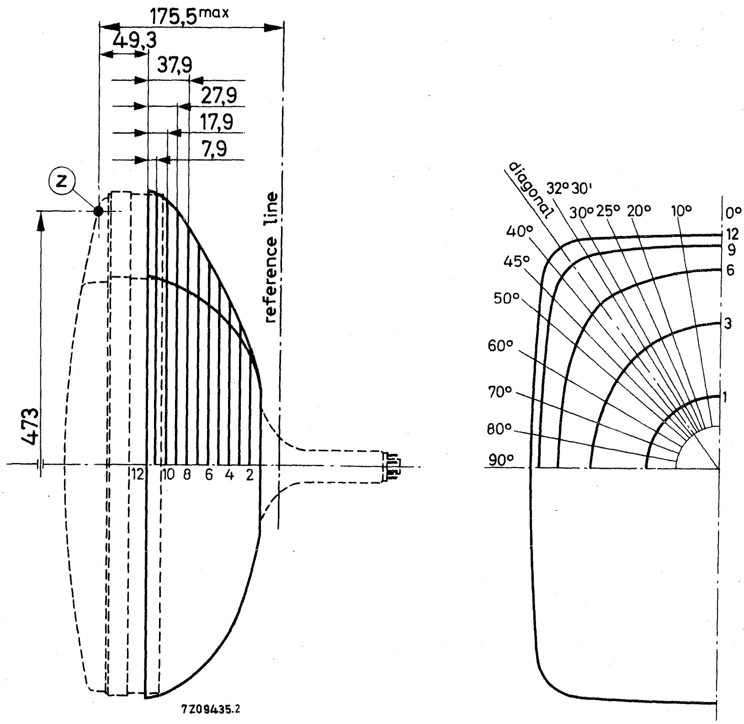
The socket for the base should not be rigidly mounted: it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. Small cavity contact IEC67-III-2.
2. The metal rim-band must be earthed. The holes of 3 mm dia in each lug are provided for this purpose.
3. Spherical face-plate.
4. End of guaranteed contour. The maximum neck-and-cone contour is given by the reference line gauge C (18, 13 mm).
5. The configuration of the external conductive coating may be different but contains the contact area as shown in the drawing.
   The external conductive coating must be earthed.
6. This area must be kept clean.
7. Minimum space to be reserved for mounting lug.
8. The mounting screws in the cabinet must be situated inside a circle of 8 mm diameter drawn around the true geometrical position i.e. at the corners of a rectangle of 414 mm x 331 mm.
9. The displacement of any lug with respect to the plane through the other three lugs is max. 2 mm.
10. Max. curvatures of the outside rim-band are: nominal bulb radius +4 mm.
11. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



A50-120W A50-520W

Section	Nom distance from point "Z"	Distance from centre (max. values) 0° Long	10°	20°	25°	30°	32° 30'	36° 30' Diagonal	40°	45°	50°	60°	70°	80°	90° Short
1	157,2	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0
2	147,2	109,2	107,8	107,1	106,4	106,0	105,9	105,5	105,0	104,5	103,9	102,8	102,6	102,8	103,4
3	137,2	136,7	134,5	133,7	133,0	132,3	131,8	130,7	129,3	127,5	125,3	121,9	120,7	120,2	120,2
4	127,2	157,2	156,5	155,7	154,8	153,8	153,0	151,5	150,0	147,5	144,7	138,7	134,9	133,4	132,5
5	117,2	174,2	174,0	174,4	174,3	173,4	172,8	171,0	169,3	165,7	160,8	152,0	146,5	143,7	142,3
6	107,2	185,8	186,3	188,4	190,0	191,2	191,2	189,5	186,7	181,7	174,7	163,2	156,0	151,7	150,4
7	97,2	194,5	195,7	202,2	203,8	206,9	207,3	206,4	203,5	196,4	187,4	173,0	163,5	158,6	156,9
8	87,2	201,7	203,8	210,2	215,4	220,6	222,1	222,2	218,8	210,5	198,8	181,2	170,3	164,7	162,7
9	77,2	208,2	210,6	218,5	224,8	231,4	234,8	236,5	233,5	222,2	208,5	188,5	176,6	169,9	167,9
10	67,2	213,1	215,9	225,2	231,9	239,8	244,3	248,5	244,8	230,3	216,0	194,7	181,6	174,5	172,0
11	57,2	215,6	219,0	228,2	235,4	244,5	249,6	253,7	250,2	235,7	220,5	198,6	184,8	177,2	174,7
12	49,3	217,0	219,8	229,3	236,6	246,0	251,2	254,5	251,7	237,2	222,0	199,6	185,6	177,8	175,7

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 1500 > 1000	pF pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	250	pF
Cathode to all	C_k	5	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

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

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe).

Maximum distance between centre of field of this magnet and reference line: 57 mm.

TYPICAL OPERATING CONDITIONS

Grid drive service

Final accelerator voltage	$V_{a,g3,g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 400	V *)
Grid no. 2 voltage	V_{g2}	400	V
Grid no. 1 voltage for visual extinction of focused raster	V_{GR}	−40 to −77	V

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 400	V *)
Grid no. 2 voltage	V_{g2}	400	V
Cathode voltage for visual extinction of focused raster	V_{KR}	36 to 66	V

*) Individual tubes will have optimum focus within this range. In general an acceptable picture will be obtained with a fixed focus voltage.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a,\,g3,\,g5} = 0$	$V_{a,\,g3,\,g5}$	max. min.	23 12	kV*) kV
Grid no. 4 voltage				
positive	V_{g4}	max.	1000	V
negative	$-V_{g4}$	max.	500	V
Grid no. 2 voltage	V_{g2}	max. min.	700 350	V***) V
Grid no. 2 to grid no. 1 voltage	$V_{g2/g1}$	max.	850	V
Grid no. 1 voltage,				
positive	V_{g1}	max.	0	V
positive peak	V_{g1p}	max.	2	V
negative	$-V_{g1}$	max.	200	V
negative peak	$-V_{g1p}$	max.	400	V**)
Cathode-to-heater voltage				
positive	$V_{k/f}$	max.	250	V
positive peak	$V_{k/fp}$	max.	300	V
negative	$-V_{k/f}$	max.	200	V
positive during equipment warm-up period not exceeding 15 s	$V_{k/f}$	max.	450	V****)

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

**) Maximum pulse duration 22% of a cycle but maximum 1,5 ms.

***) At $V_{g1/k} = 0$ V.

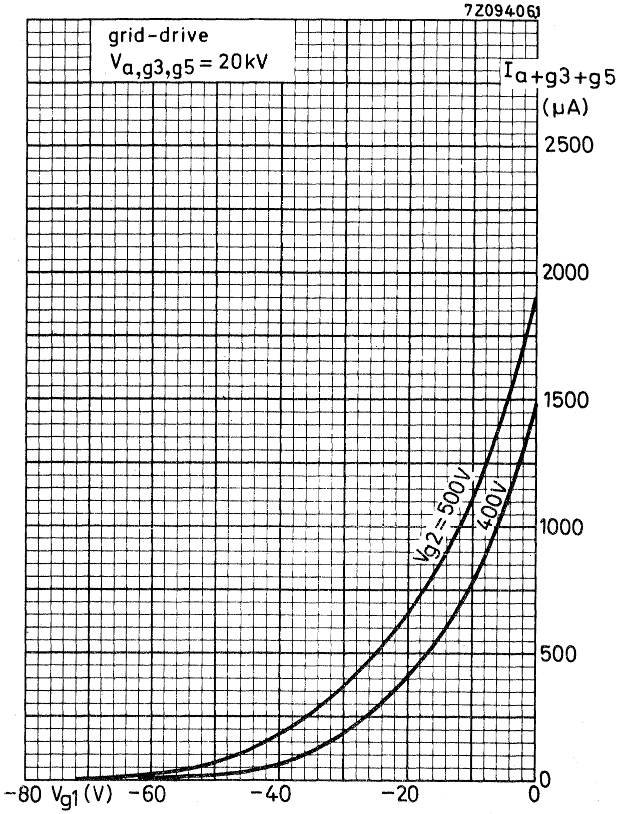
****) Between 15 s and 45 s after switching on a decrease in k/f voltage from 450 V to 250 V, linearly proportional with time, is permissible.

CIRCUIT DESIGN VALUES

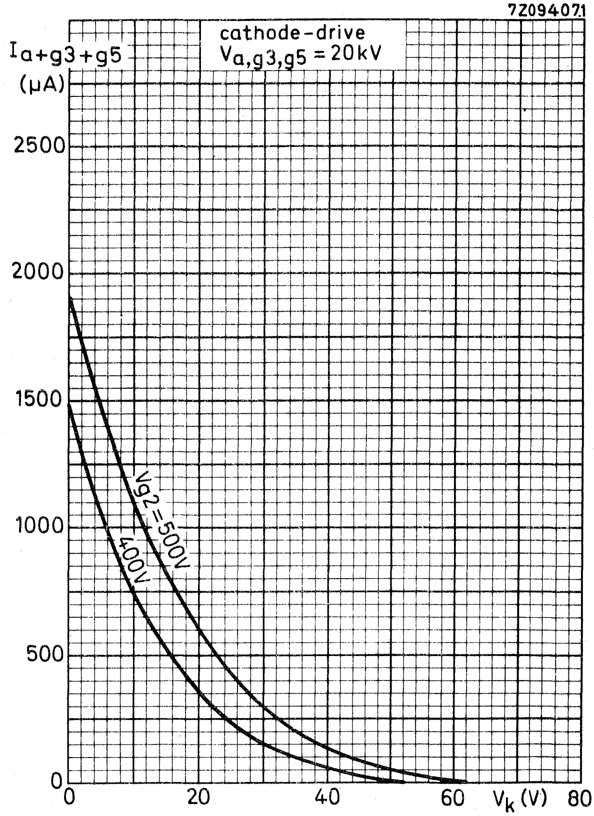
Grid no. 4 current				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid no. 2 current				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

MAXIMUM CIRCUIT VALUES

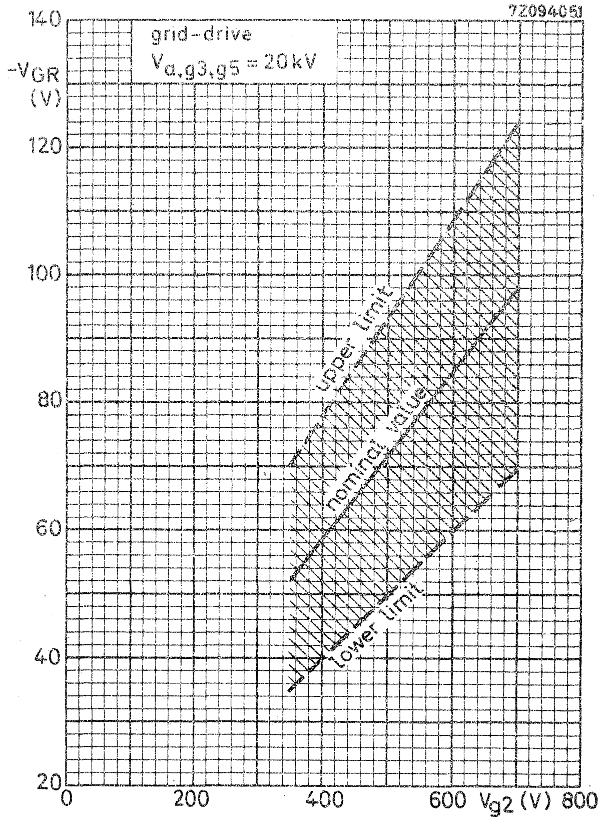
Resistance between cathode and heater	$R_{k/f}$	max.	1,0	MΩ
Impedance between cathode and heater	$Z_{k/f}$ (50 Hz)	max.	0,1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid no. 1 circuit impedance	Z_{g1} (50 Hz)	max.	0,5	MΩ



Final accelerator current as a function of grid no. 1 voltage

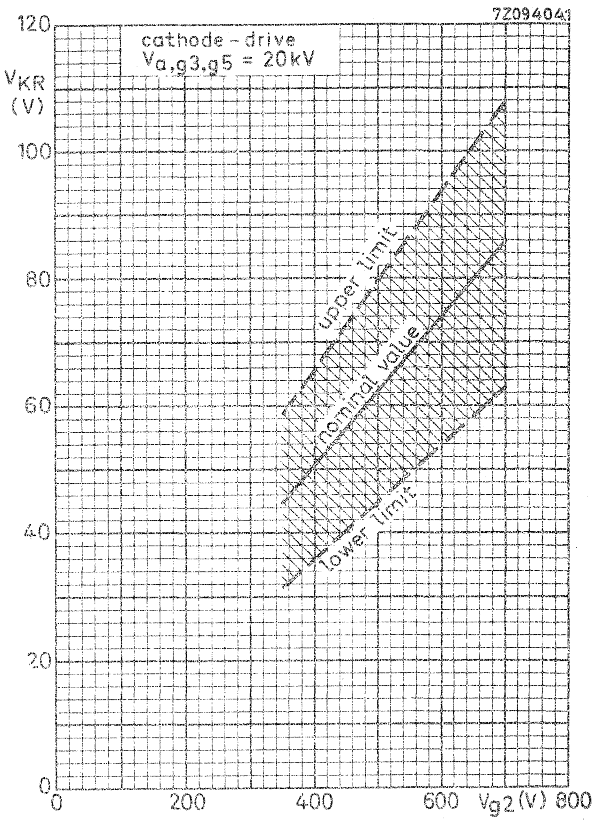


Final accelerator current as a function of cathode voltage



$$\frac{\Delta V_{GR}}{\Delta V_{a,\,g3,\,g5}} = 0,15 \times 10^{-3}$$

Limits of grid no. 1 cut-off voltage as a function of grid no. 2 voltage



$$\frac{\Delta V_{KR}}{\Delta V_{a,\,g3,\,g5}} = 0,15 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage

TV PICTURE TUBE

50 cm (20 in), 110°, rectangular direct vision picture tube with integral protection for black and white TV. A special feature of this tube is its short cathode heating time.

QUICK REFERENCE DATA		
Face diagonal		50 cm
Deflection angle		110°
Overall length	max.	319 mm
Neck diameter		28,6 mm
Heating		6,3 V, 240 mA
Grid no. 2 voltage		130 V
Final accelerator voltage		20 kV
Quick heating cathode		with a typical tube a legible picture will appear within 5 s.

SCREEN

Metal-backed phosphor		
Luminescence	white	
Light transmission of face glass	≈	45 %
Useful diagonal	≥	473 mm
Useful width	≥	394 mm
Useful height	≥	308 mm

HEATING

Indirect by a.c. or d.c.

Heater voltage	V_f		6,3 V
Heater current	I_f		240 mA
Limits (Absolute max. rating system) of r.m.s. heater voltage measured in any 20 ms	V_f	max. min.	7,3 V *) 5,3 V

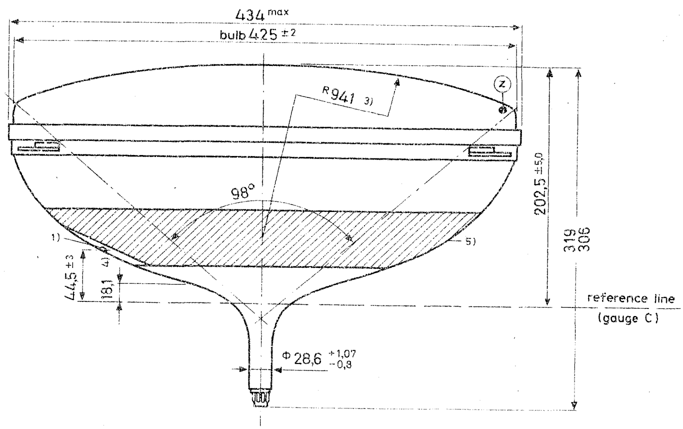
For heating time as a function of source impedance see last page of this data sheet.

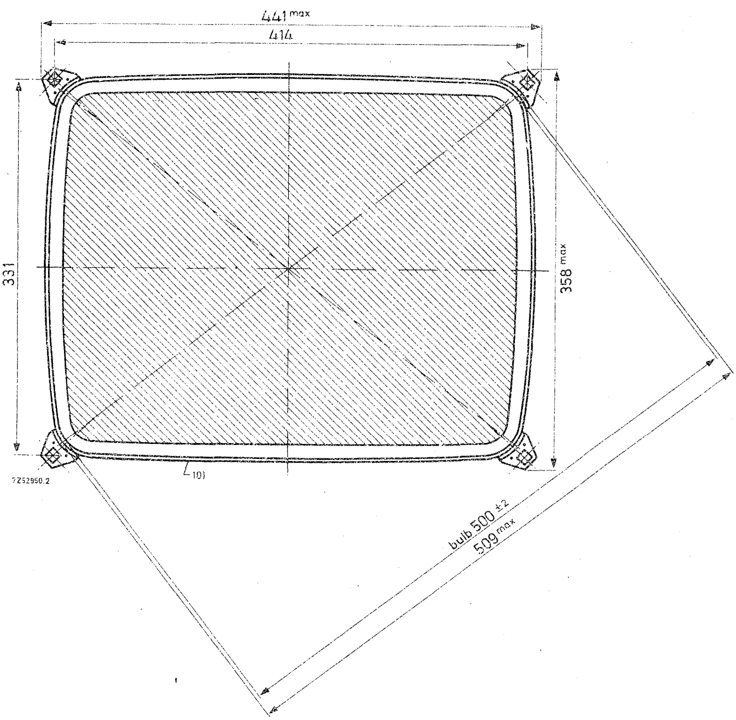
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain it not allowed.

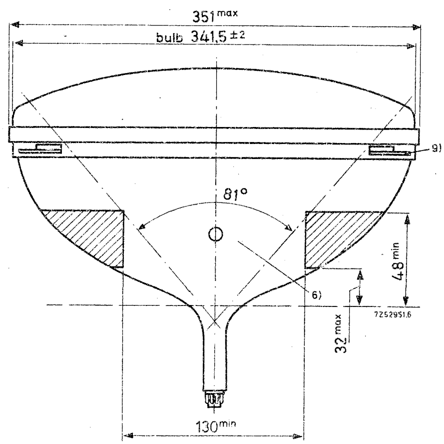
MECHANICAL DATA

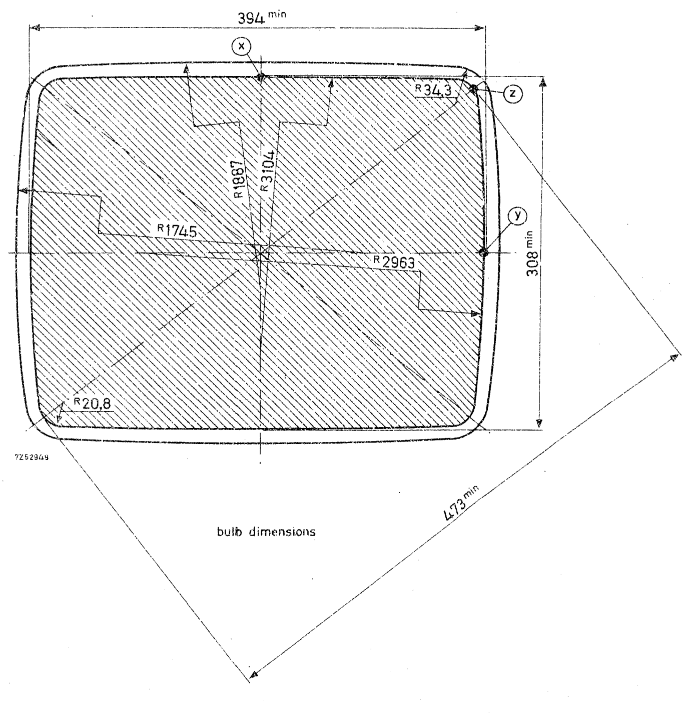
Dimensions in mm

Notes are given after the drawings.

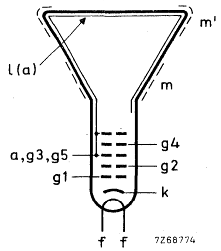


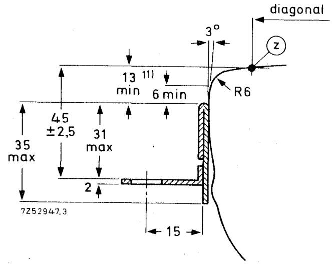


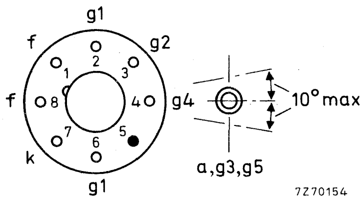


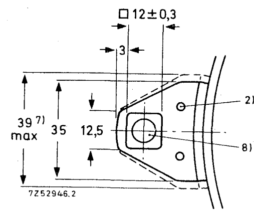


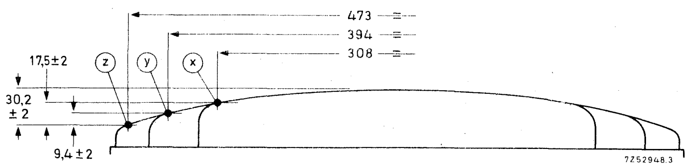
bulb dimensions











Mounting position : any

Base : neo eightar 7 pin JEDEC B7-208, B8H, IEC 67-1-31a

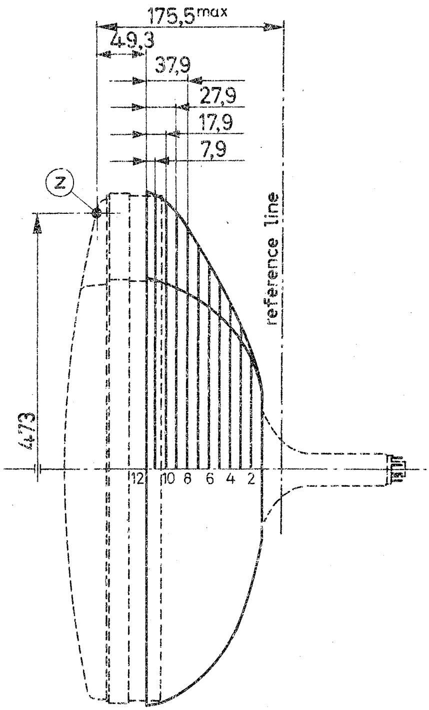
Net mass : approx. 8,5 kg

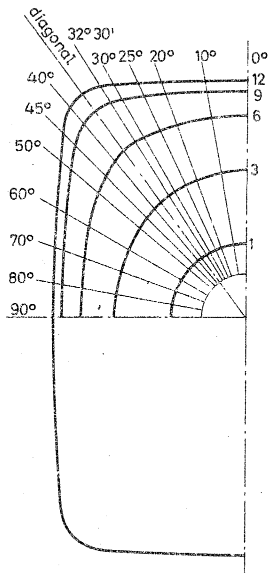
The bottom circumference of the base wafer will fall within a circle concentric with the tube axis and having a diameter of 40 mm.

NOTES TO OUTLINE DRAWINGS

1. Small cavity contact IEC 67-III-2.
2. The metal rim-band must be earthed. The holes of 3 mm dia in each lug are provided for this purpose.
3. Spherical face plate.
4. End of guaranteed contour. The maximum neck-and-cone contour is given by the reference line gauge C (18, 13 mm).
5. The configuration of the external conductive coating may be different but contains the the contact area as shown in the drawing.
   The external conductive coating must be earthed.
6. This area must be kept clean.
7. Minimum space to be reserved for mounting lug.
8. The mounting screws in the cabinet must be situated inside a circle of 8 mm diameter drawn around the true geometrical position i.e. at the corners of a rectangle of 414 mm x 331 mm.
9. The displacement of any lug with respect to the plane through the other three lugs is max. 2 mm.
10. Max. curvatures of the outside rim-band are: nominal bulb radius + 4 mm.
11. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING





7Z09435.2

A50-120W A50-520W

Distance from centre (max. values)															
Section	Nom distance from point "Z"	0° Long	10°	20°	25°	30°	32° 30'	36° 30' Diagonal	40°	45°	50°	60°	70°	80°	90° Short
1	157,2	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0	69,0
2	147,2	109,2	107,8	107,1	106,4	106,0	105,9	105,5	105,0	104,5	103,9	102,8	102,6	102,8	103,4
3	137,2	136,7	134,5	133,7	133,0	132,3	131,8	130,7	129,3	127,5	125,3	121,9	120,7	120,2	120,2
4	127,2	157,2	156,5	155,7	154,8	153,8	153,0	151,5	150,0	147,5	144,7	138,7	134,9	133,4	132,5
5	117,2	174,2	174,0	174,4	174,3	173,4	172,8	171,0	169,3	165,7	160,8	152,0	146,5	143,7	142,3
6	107,2	185,8	186,3	188,4	190,0	191,2	191,2	189,5	186,7	181,7	174,7	163,2	156,0	151,7	150,4
7	97,2	194,5	195,7	202,2	203,8	206,9	207,3	206,4	203,5	196,4	187,4	173,0	163,5	158,6	156,9
8	87,2	201,7	203,8	210,2	215,4	220,6	222,1	222,2	218,8	210,5	198,8	181,2	170,3	164,7	162,7
9	77.2	208,2	210,6	218,5	224,8	231,4	234,8	236,5	233,5	222,2	208,5	188,5	176,6	169,9	167,9
10	67,2	213,1	215,9	225,2	231,9	239,8	244,3	248,5	244,8	230,3	216,0	194,7	181,6	174,5	172,0
11	57,2	215,6	219,0	228,2	235,4	244,5	249,6	253,7	250,2	235,7	220,5	198,6	184,8	177,2	174,7
12	49,3	217,0	219,8	229,3	236,6	246,0	251,2	254,5	251,7	237,2	222,0	199,6	185,6	177,8	175,7

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 1500	pF	←
		> 1000	pF	←
Final accelerator to metal band	$C_{a,g3,g5/m'}$	250	pF	
Cathode to all	C_k	3	pF	
Grid no. 1 to all	C_{g1}	7	pF	

FOCUSING electrostatic

DEFLECTION magnetic

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

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe).
Maximum distance between centre of field of this magnet and reference line: 57 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 130	V *)
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	42 to 62	V

*) Because of the flat focus characteristic it is sufficient to choose a focusing voltage between 0 and + 130 V (e.g. two taps, 0 V and 130 V).
The optimum focus voltage of individual tubes may be between − 100 V and + 200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a,g3,g5} = 0$	$V_{a,g3,g5}$	max.	23	kV*)
		min.	12	kV
Grid no. 4 voltage				
positive	V_{g4}	max.	1000	V
negative	$-V_{g4}$	max.	500	V
Grid no. 2 voltage	V_{g2}	max.	200	V**)
		min.	80	V
Cathode to grid no. 1 voltage				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1p}$	max.	400	V***)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1p}$	max.	2	V
Cathode-to-heater voltage	V_{kf}	max.	200	V

CIRCUIT DESIGN VALUES

Grid no. 4 current,				
positive	I_{g4}	max.	25	µA
negative	$-I_{g4}$	max.	25	µA
Grid no. 2 current,				
positive	I_{g2}	max.	5	µA
negative	$-I_{g2}$	max.	5	µA

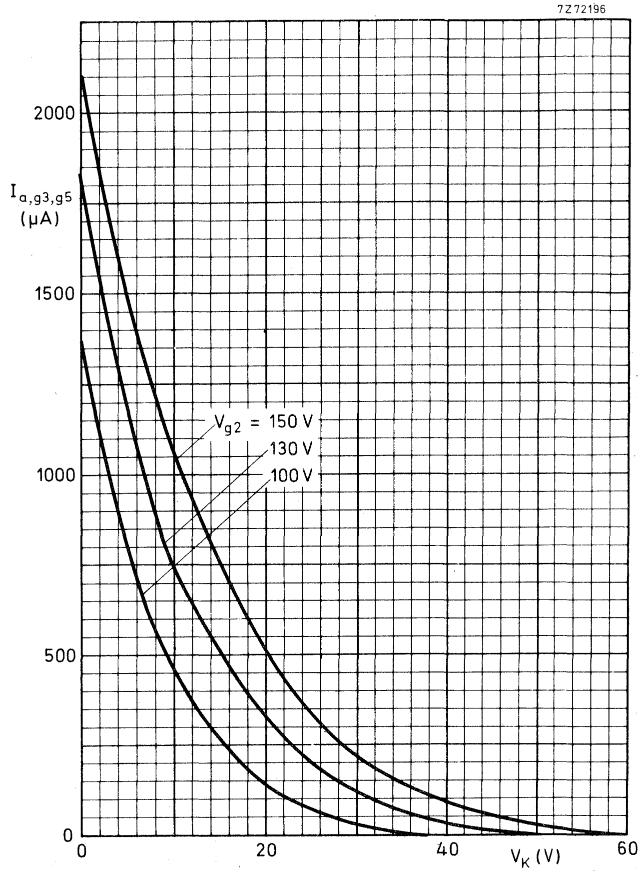
MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	$R_{k/f}$	max.	1,0	MΩ
Impedance between cathode and heater	$Z_{k/f}$ (50 Hz)	max.	0,1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1,5	MΩ
Grid no. 1 impedance	Z_{g1} (50 Hz)	max.	0,5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

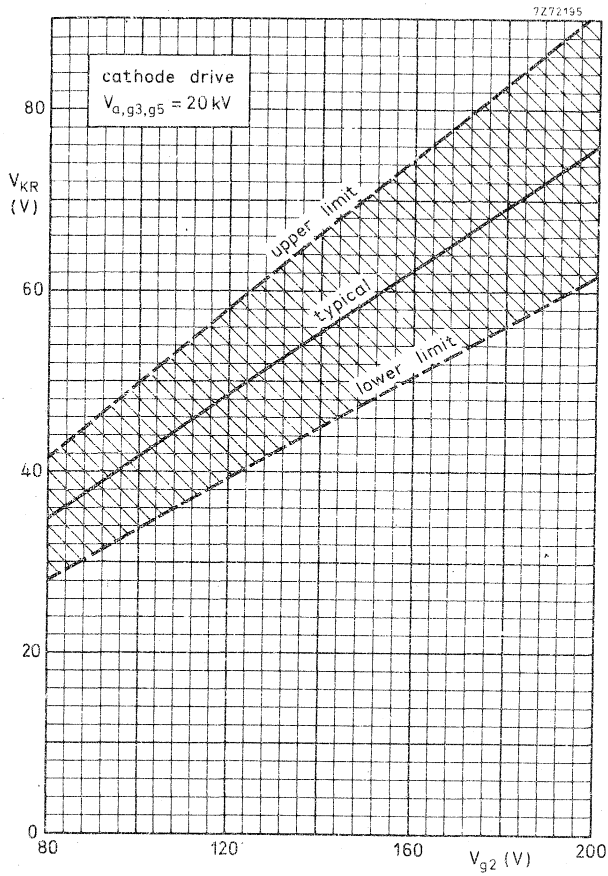
**) At $V_{g1/k} = 0$ V.

***) Maximum pulse duration 22% of a cycle but maximum 1,5 ms.



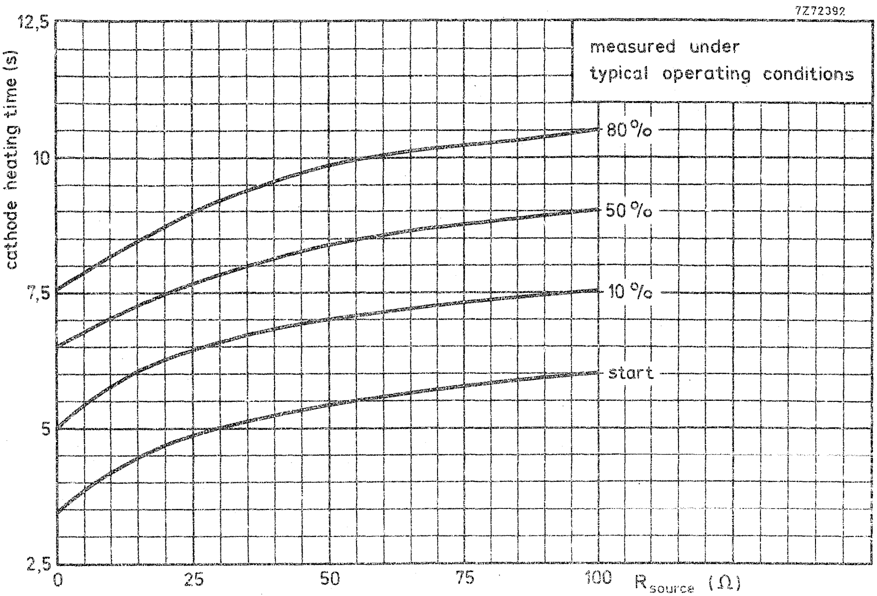
Final accelerator current as a function of cathode voltage

Cathode drive $V_{a,g3,g5} = 20$ kV



$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,75 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

TV PICTURE TUBE

61 cm (24 in), 110°, rectangular direct vision picture tube with integral protection for black and white TV.

QUICK REFERENCE DATA			
Face diagonal		61	cm (24 in)
Deflection angle		110°	
Overall length	max.	370	mm
Neck diameter		28,6	mm
Heating	6,3 V,	300	mA
Grid no. 2 voltage		400	V
Final accelerator voltage		20	kV

SCREEN

Metal-backed phosphor

Luminescence	white		
Light transmission of face glass	≈		42%
Useful diagonal	≥	577,5	mm
Useful width	≥	481	mm
Useful height	≥	375	mm

HEATING

Indirect by a.c. or d.c.; series or parallel supply

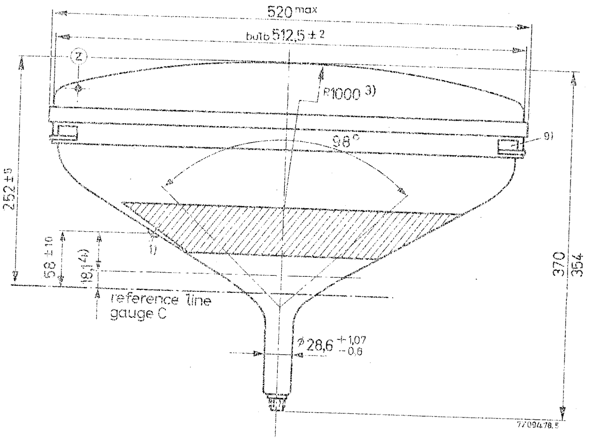
Heater current	I_f	300	mA
Heater voltage	V_f	6,3	V

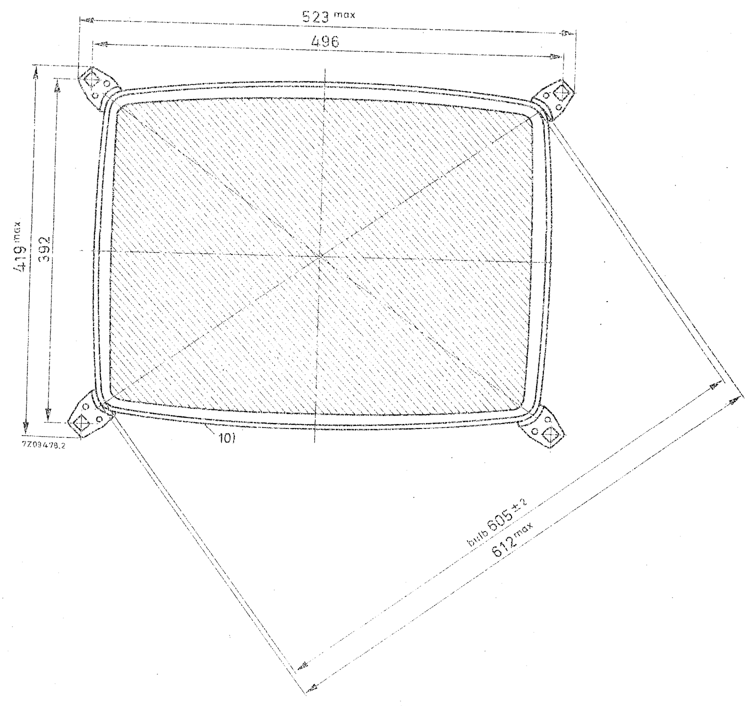
If the tube is connected in a series heater chain the surge heater voltage must not exceed an r.m.s. value of 9,5 V when the supply is switched on.

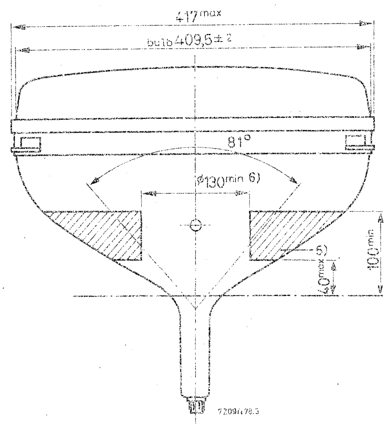
MECHANICAL DATA

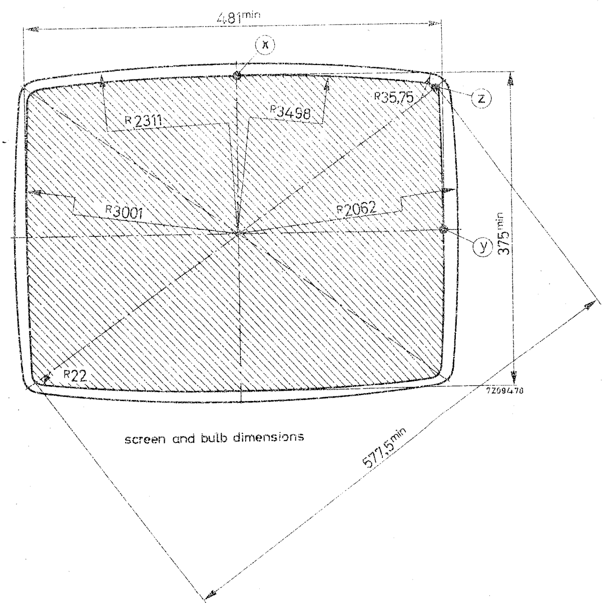
Dimensions in mm

Notes are given after the drawings.

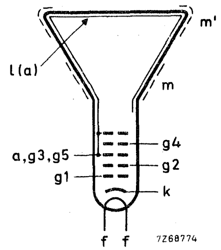


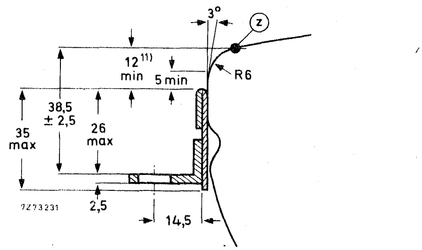


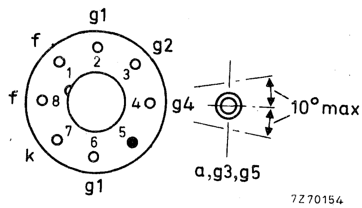


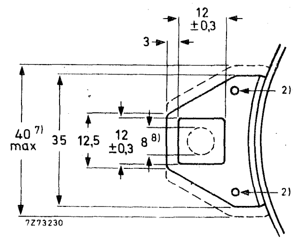


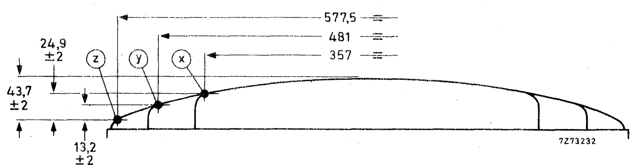
screen and bulb dimensions











Mounting position: any

Base : neo eightar 7 pin JEDEC B7-208, B8H, IEC-67-I-31a

Net mass : approx. 13,5 kg.

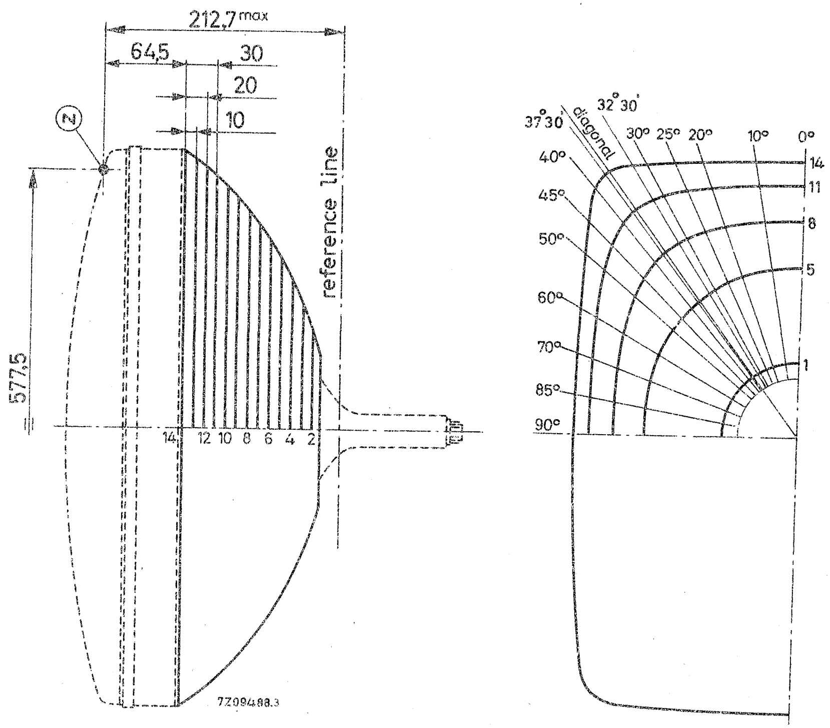
The bottom circumference of the base wafer will fall within a circle concentric with the tube axis and having a diameter of 40 mm.
The socket for the base should not be rigidly mounted: it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. Small cavity contact I E C -67-III-2.
2. The metal rim-band must be earthed. The holes of 3 mm dia in each lug are provided for this purpose.
3. Spherical face plate.
4. End of guaranteed contour. The maximum contour from reference line towards screen is given by the reference line gauge C (18, 13 mm).
5. The configuration of the external conductive coating may be different but contains the contact area as shown in the drawing.
   The external conductive coating must be earthed.
6. This area must be kept clean.
7. Minimum space to be reserved for mounting lug.
8. The mounting screws in the cabinet must be situated inside a circle of 8 mm diameter drawn around the true geometrical position; i.e. at the corners of a rectangle of 496 x 392 mm.
9. The displacement of any lug with respect to the plane through the other three lugs is max. 2 mm.
10. The max. outer contour of the tube with the rim-band is determined by adding 5 mm to the nominal bulb dimensions.
11. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from section 1	Distance from centre (max. values)														
		0°	10°	20°	25°	30°	32°30'	diag.	37°30'	40°	45°	50°	60°	70°	80°	90°
1	130	72,9	72,4	71,6	71,1	70,7	70,5	70,3	70,3	70,2	70,1	70,0	70,2	70,8	71,5	71,8
2	120	104,4	102,6	99,4	97,8	96,5	96,0	95,2	95,1	94,7	94,2	94,0	94,5	96,0	98,0	99,3
3	110	134,3	131,5	126,5	124,2	122,1	121,2	119,9	119,6	119,0	118,0	117,4	117,4	118,7	120,7	122,0
4	100	160,4	157,1	151,1	148,1	145,3	144,1	142,2	141,8	140,8	139,1	137,9	136,7	136,9	137,9	138,7
5	90	178,7	176,9	172,9	170,1	167,5	166,1	164,0	163,5	162,3	159,9	157,8	154,3	151,9	150,7	150,3
6	80	193,3	193,0	191,4	189,9	187,8	186,6	184,4	183,4	182,4	179,2	175,9	169,6	164,4	161,0	159,8
7	70	205,7	206,5	207,6	207,5	206,4	205,5	203,4	202,8	201,1	196,9	192,2	182,7	174,8	169,7	168,0
8	60	216,8	212,5	222,1	223,5	223,8	223,4	221,5	220,9	218,9	213,6	207,2	194,3	183,9	177,6	175,4
9	50	226,9	229,3	235,0	238,1	240,0	240,3	238,9	238,2	235,9	229,0	220,7	204,4	192,1	184,7	182,3
10	40	236,0	238,7	246,3	250,9	254,9	256,1	255,4	254,7	252,4	243,2	232,7	213,3	199,3	191,2	188,6
11	30	243,7	246,8	255,9	262,0	268,1	270,6	271,0	270,3	267,4	256,0	243,1	220,8	205,7	197,1	194,3
12	20	250,0	253,4	263,5	270,9	279,3	283,5	285,5	284,8	281,6	267,2	251,8	227,2	211,1	202,2	199,4
13	10	255,0	258,5	269,3	277,7	288,1	293,9	298,0	297,6	294,1	276,2	258,5	232,1	215,6	206,5	203,6
14	0	258,5	262,0	273,1	281,9	293,2	300,0	305,4	305,1	301,5	281,6	262,7	235,6	218,8	209,6	206,6

CAPACITANCES

Final accelerator to external conductive coating	$C_{a,g3,g5/m}$	< 2500 pF > 1500 pF
Final accelerator to metal band	$C_{a,g3,g5/m'}$	350 pF
Cathode to all	C_k	5 pF
Grid no. 1 to all	C_{g1}	7 pF

FOCUSING electrostatic

DEFLECTION magnetic

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

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe). Maximum distance between centre of field of this magnet and reference line: 57 mm.

TYPICAL OPERATING CONDITIONS

Grid drive service

Final accelerator voltage	$V_{a,g3,g5}$	20 kV
Focusing electrode voltage	V_{g4}	0 to 400 V*)
Grid no. 2 voltage	V_{g2}	400 V
Grid no. 1 voltage for visual exinction of focused raster	V_{GR}	-40 to -77 V

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a,g3,g5}$	20 kV
Focusing electrode voltage	V_{g4}	0 to 400 V*)
Grid no. 2 voltage	V_{g2}	400 V
Cathode voltage for visual extinction of focused raster	V_{KR}	36 to 66 V

*) Individual tubes will have optimum focus within this range. In general an acceptable picture will be obtained with a fixed focus voltage.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at Ia, g3, g5 = 0	Va, g3, g5	max. min.	23 12	kV*) kV
Grid no. 4 voltage,				
positive	Vg4	max.	1000	V
negative	-Vg4	max.	500	V
Grid no. 2 voltage	Vg2	max. min.	700 350	V***) V
Grid no. 2 to grid no. 1 voltage	Vg2/g1	max.	850	V
Grid no. 1 voltage				
positive	Vg1	max.	0	V
positive peak	Vg1p	max.	2	V
negative	-Vg1	max.	200	V
negative peak	-Vg1p	max.	400	V**)
Cathode-to-heater voltage,				
positive	Vk/f	max.	250	V
positive peak	Vk/fp	max.	300	V
negative	-Vk/f	max.	200	V
positive during equipment warm-up period not exceeding 15 s	Vk/f	max.	450	V****)

*) The X-ray dose rate remains below the acceptable value of 0,5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

**) Maximum pulse duration 22% of a cycle but maximum 1,5 ms.

***) At $V_{g1/k} = 0$ V.

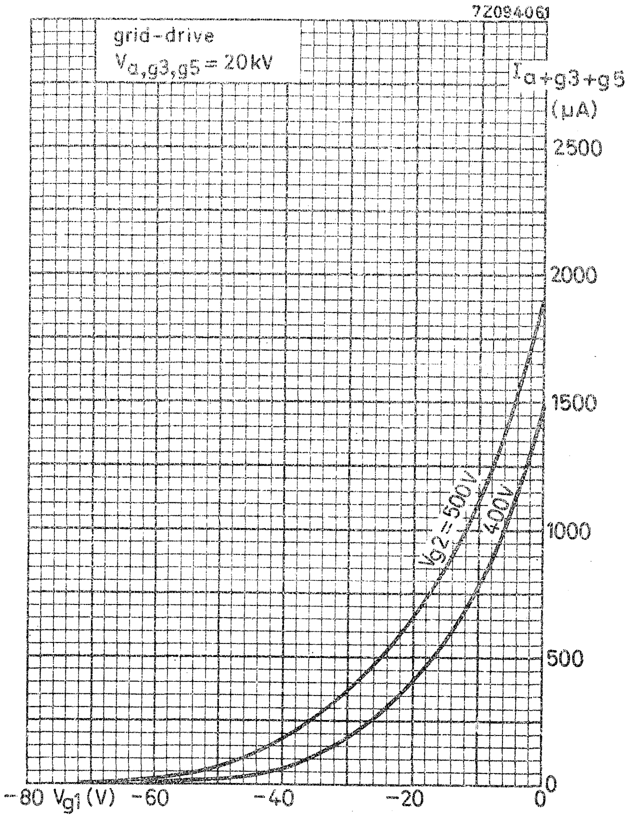
****) Between 15 s and 45 s after switching on a decrease in k/f voltage from 450 V to 250 V, linearly proportional with time, is permissible.

CIRCUIT DESIGN VALUES

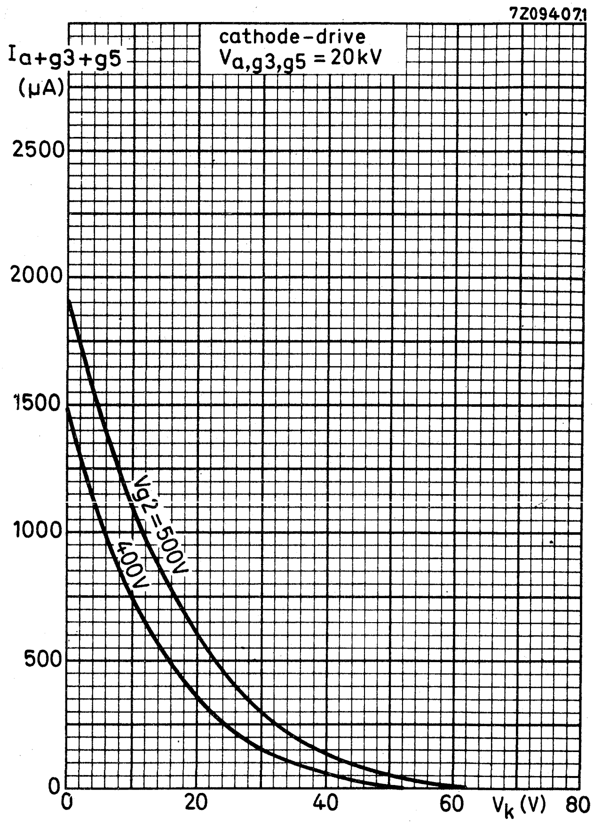
Grid no. 4 current,				
positive	Ig4	max.	25	μA
negative	-Ig4	max.	25	μA
Grid no. 2 current				
positive	Ig2	max.	5	μA
negative	-Ig2	max.	5	μA

MAXIMUM CIRCUIT VALUES

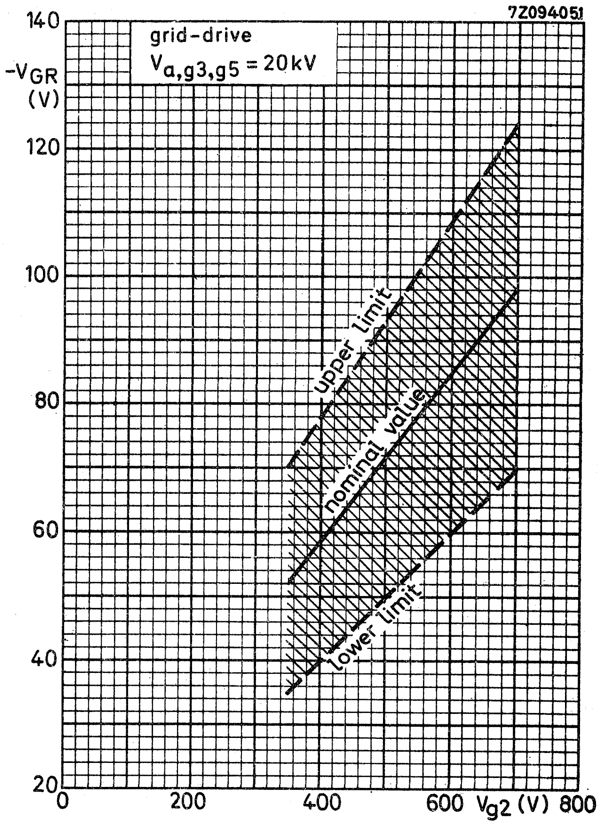
Resistance between cathode and heater	Rk/f	max.	1	MΩ
Impedance between cathode and heater	Zk/f(50 Hz)	max.	0, 1	MΩ
Grid no. 1 circuit resistance	Rg1	max.	1, 5	MΩ
Grid no. 1 circuit impedance	Zg1(50 Hz)	max.	0, 5	MΩ



Final accelerator current as a function of grid no. 1 voltage.

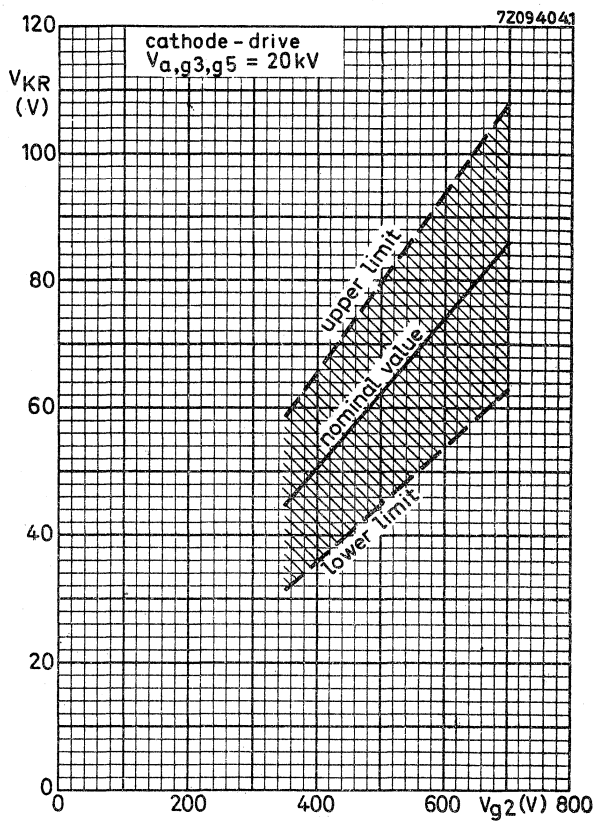


Final accelerator current as a function of cathode voltage.



$$\frac{\Delta V_{GR}}{\Delta V_{a,\,g3,\,g5}} = 0{,}\,15 \times 10^{-3}$$

Limits of grid no. 1 cut-off voltage as a function of grid no. 2 voltage.



$$\frac{\Delta V_{KR}}{\Delta V_{a,\,g3,\,g5}} = 0,15 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage.

TV PICTURE TUBE

61 cm (24 in), 110°, rectangular direct vision picture tube with integral protection for black and white TV. A special feature of this tube is its short cathode heating time.

QUICK REFERENCE DATA		
Face diagonal		61 cm
Deflection angle		110°
Overall length	max.	370 mm
Neck diameter		28, 6 mm
Heating		6, 3 V, 240 mA
Grid no. 2 voltage		130 V
Final accelerator voltage		20 kV
Quick heating cathode		with a typical tube a legible picture will appear within 5 s.

SCREEN

Metal-backed phosphor

Luminescence	white	
Light transmission of face glass	≈	42 %
Useful diagonal	≥	577, 5 mm
Useful width	≥	481 mm
Useful height	≥	375 mm

HEATING

Indirect by a.c. or d.c.,

Heater voltage	V_f		6, 3 V
Heater current	I_f		240 mA
Limits (Absolute max. rating system) of r.m.s. heater voltage measured in any 20 ms	V_f	max. min.	7, 3 V *) 5, 3 V

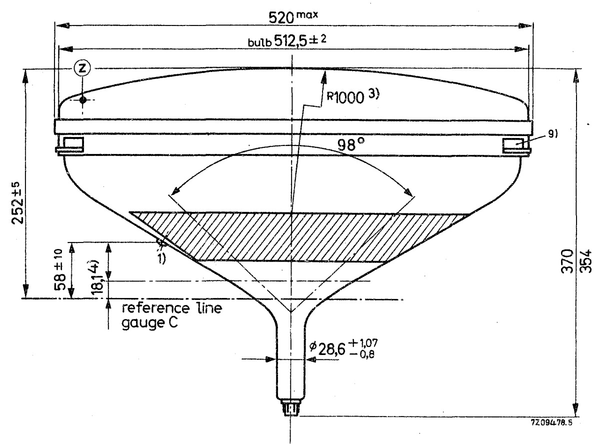
For heating time as a function of source impedance see last page of this data sheet.

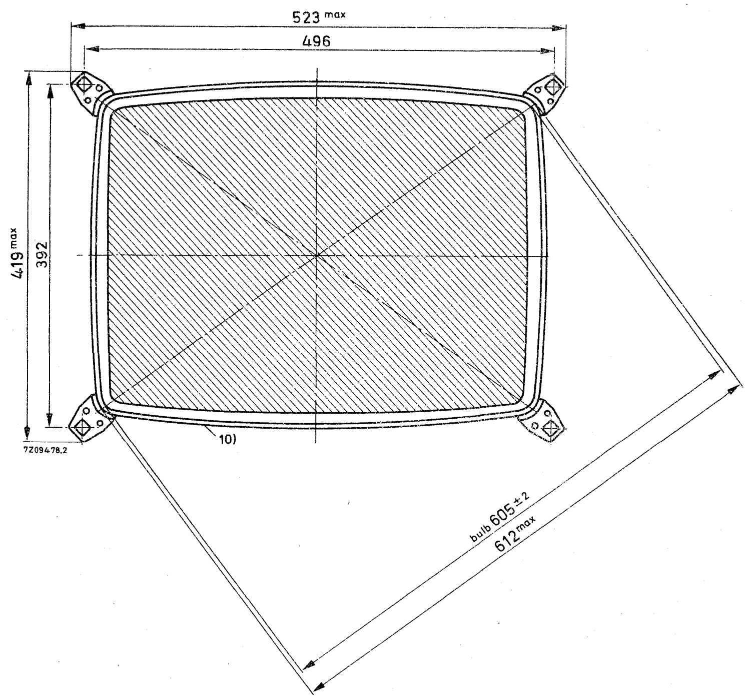
*) This limit also applies during equipment warming-up. Use of the tube in a series heater chain is not allowed.

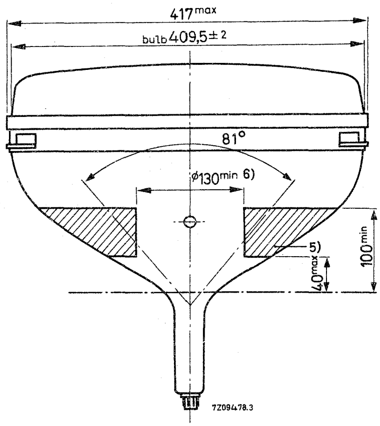
MECHANICAL DATA

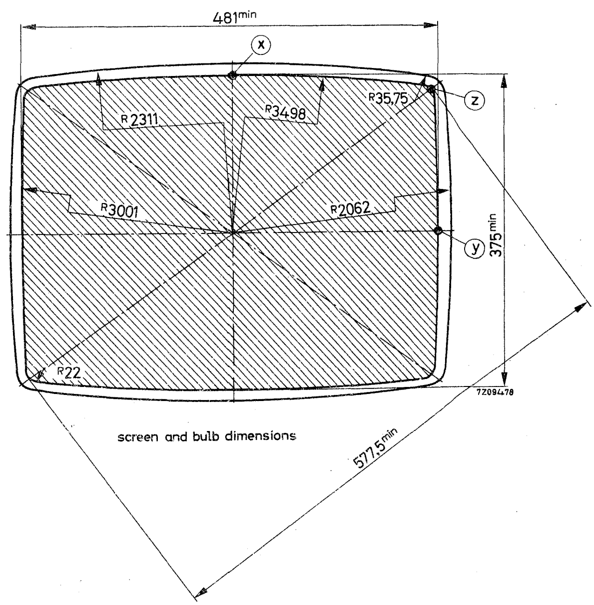
Dimensions in mm

Notes are given after the drawings.

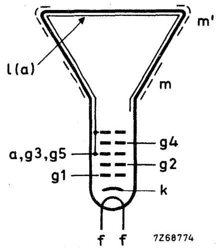


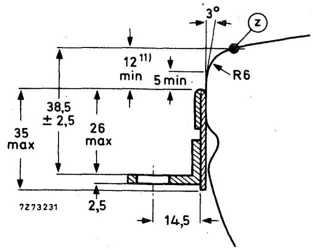


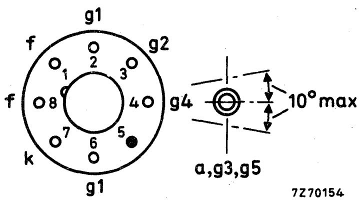


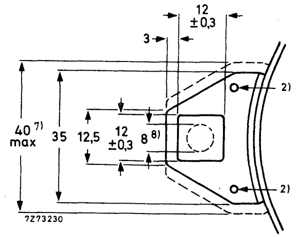


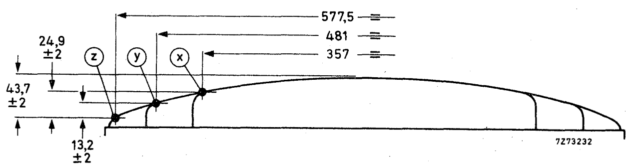
screen and bulb dimensions











Mounting position : any

Base : neo eightar 7 pin JEDEC B7-208, B8H, IEC-67-I-31a

Net mass : approx. 13,5 kg

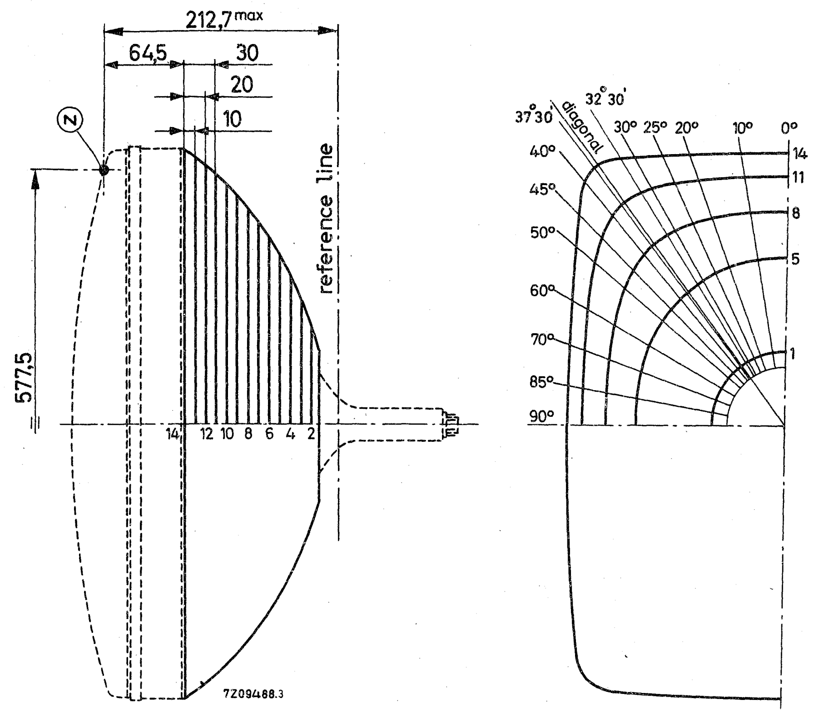
The bottom circumference of the base wafer will fall within a circle concentric with the tube axis and having a diameter of 40 mm.
The socket for the base should not be rigidly mounted: it should have flexible leads and be allowed to move freely.

NOTES TO OUTLINE DRAWINGS

1. Small cavity contact IEC 67-III-2.
2. The metal rim-band must be earthed. The holes of 3 mm dia in each lug are provided for this purpose.
3. Spherical face plate.
4. End of guaranteed contour. The maximum contour from reference line towards screen is given by the reference line gauge C (18, 13 mm).
5. The configuration of the external conductive coating may be different but contains the contact area as shown in the drawing.
   The external conductive coating must be earthed.
6. This area must be kept clean.
7. Minimum space to be reserved for mounting lug.
8. The mounting screws in the cabinet must be situated inside a circle of 8 mm diameter drawn around the true geometrical position; i.e. at the corners of a rectangle of 496 x 392 mm.
9. The displacement of any lug with respect to the plane through the other three lugs is max. 2 mm.
10. The max. outer contour of the tube with the rim-band is determined by adding 5 mm to the nominal bulb dimensions.
11. Distance from reference point Z to any hardware.

MAXIMUM CONE CONTOUR DRAWING

Dimensions in mm



Section	Nom. distance from section 1	Distance from centre (max. values)														
		0°	10°	20°	25°	30°	32°30'	diag.	37°30'	40°	45°	50°	60°	70°	80°	90°
1	130	72,9	72,4	71,6	71,1	70,7	70,5	70,3	70,3	70,2	70,1	70,0	70,2	70,8	71,5	71,8
2	120	104,4	102,6	99,4	97,8	96,5	96,0	95,2	95,1	94,7	94,2	94,0	94,5	96,0	98,0	99,3
3	110	134,3	131,5	126,5	124,2	122,1	121,2	119,9	119,6	119,0	118,0	117,4	117,4	118,7	120,7	122,0
4	100	160,4	157,1	151,1	148,1	145,3	144,1	142,2	141,8	140,8	139,1	137,9	136,7	136,9	137,9	138,7
5	90	178,7	176,9	172,9	170,1	167,5	166,1	164,0	163,5	162,3	159,9	157,8	154,3	151,9	150,7	150,3
6	80	193,3	193,0	191,4	189,9	187,8	186,6	184,4	183,4	182,4	179,2	175,9	169,6	164,4	161,0	159,8
7	70	205,7	206,5	207,6	207,5	206,4	205,5	203,4	202,8	201,1	196,9	192,2	182,7	174,8	169,7	168,0
8	60	216,8	212,5	222,1	223,5	223,8	223,4	221,5	220,9	218,9	213,6	207,2	194,3	183,9	177,6	175,4
9	50	226,9	229,3	235,0	238,1	240,0	240,3	238,9	238,2	235,9	229,0	220,7	204,4	192,1	184,7	182,3
10	40	236,0	238,7	246,3	250,9	254,9	256,1	255,4	254,7	252,4	243,2	232,7	213,3	199,3	191,2	188,6
11	30	243,7	246,8	255,9	262,0	268,1	270,6	271,0	270,3	267,4	256,0	243,1	220,8	205,7	197,1	194,3
12	20	250,0	253,4	263,5	270,9	279,3	283,5	285,5	284,8	281,6	267,2	251,8	227,2	211,1	202,2	199,4
13	10	255,0	258,5	269,3	277,7	288,1	293,9	298,0	297,6	294,1	276,2	258,5	232,1	215,6	206,5	203,6
14	0	258,5	262,0	273,1	281,9	293,2	300,0	305,4	305,1	301,5	281,6	262,7	235,6	218,8	209,6	206,6

CAPACITANCES

Final accelerator to external conductive coating	$C_{a, g3, g5/m}$	< 2500 > 1500	pF pF
Final accelerator to metal band	$C_{a, g3, g5/m'}$	350	pF
Cathode to all	C_k	3	pF
Grid no. 1 to all	C_{g1}	7	pF

FOCUSING electrostatic

DEFLECTION magnetic

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

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis adjustable from 0 to 800 A/m (0 to 10 Oe).

Maximum distance between centre of field of this magnet and reference line: 57 mm.

TYPICAL OPERATING CONDITIONS

Cathode drive service

Voltages are specified with respect to grid no. 1

Final accelerator voltage	$V_{a, g3, g5}$	20	kV
Focusing electrode voltage	V_{g4}	0 to 130	V [1]
Grid no. 2 voltage	V_{g2}	130	V
Cathode voltage for visual extinction of focused raster	V_{KR}	42 to 62	V

[1]) Because of the flat focus characteristic it is suffient to choose a focusing voltage between 0 and 130 V (e.g. two taps, 0 V and 130 V).
The optimum focus voltage of individual tubes may between −100 V and +200 V.

LIMITING VALUES (Design max. rating system)

Final accelerator voltage at $I_{a,g3,g5} = 0$	$V_{a,g3,g5}$	max.	23	kV*)
		min.	12	kV
Grid no. 4 voltage,				
positive	V_{g4}	max.	1000	V
negative	$-V_{g4}$	max.	500	V
Grid no. 2 voltage	V_{g2}	max.	200	V**)
		min.	80	V
Cathode to grid no. 1 voltage				
positive	$V_{k/g1}$	max.	200	V
positive peak	$V_{k/g1_p}$	max.	400	V***)
negative	$-V_{k/g1}$	max.	0	V
negative peak	$-V_{k/g1_p}$	max.	2	V
Cathode-to-heater voltage	V_{kf}	max.	200	V

CIRCUIT DESIGN VALUES

Grid no. 4 current				
positive	I_{g4}	max.	25	μA
negative	$-I_{g4}$	max.	25	μA
Grid no. 2 current				
positive	I_{g2}	max.	5	μA
negative	$-I_{g2}$	max.	5	μA

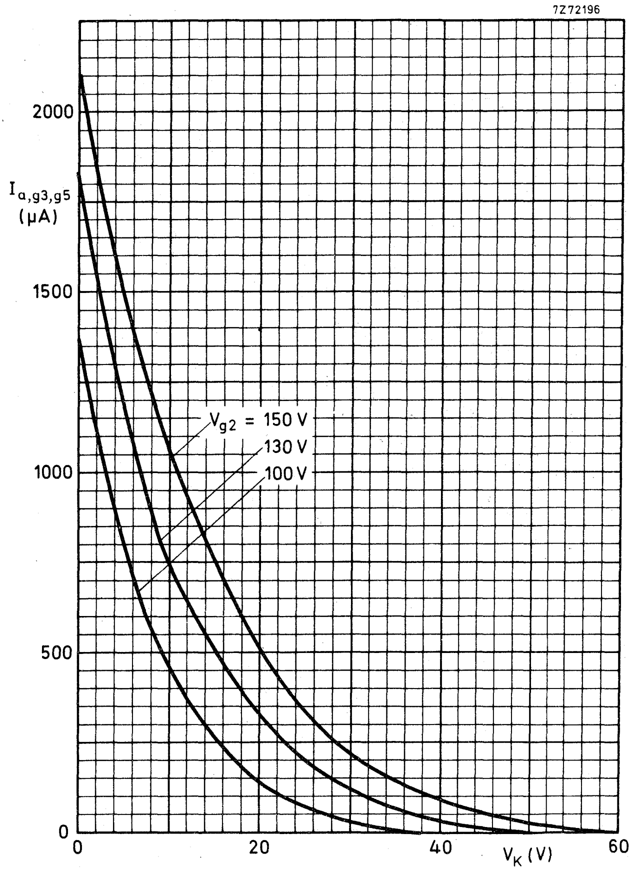
MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	$R_{k/f}$	max.	1	MΩ
Impedance between cathode and heater	$Z_{k/f}$ (50 Hz)	max.	0, 1	MΩ
Grid no. 1 circuit resistance	R_{g1}	max.	1, 5	MΩ
Grid no. 1 circuit impedance	Z_{g1} (50 Hz)	max.	0, 5	MΩ

*) The X-ray dose rate remains below the acceptable value of 0, 5 mR/h, measured with ionization chamber when the tube is used within its limiting values, according to IEC 65.

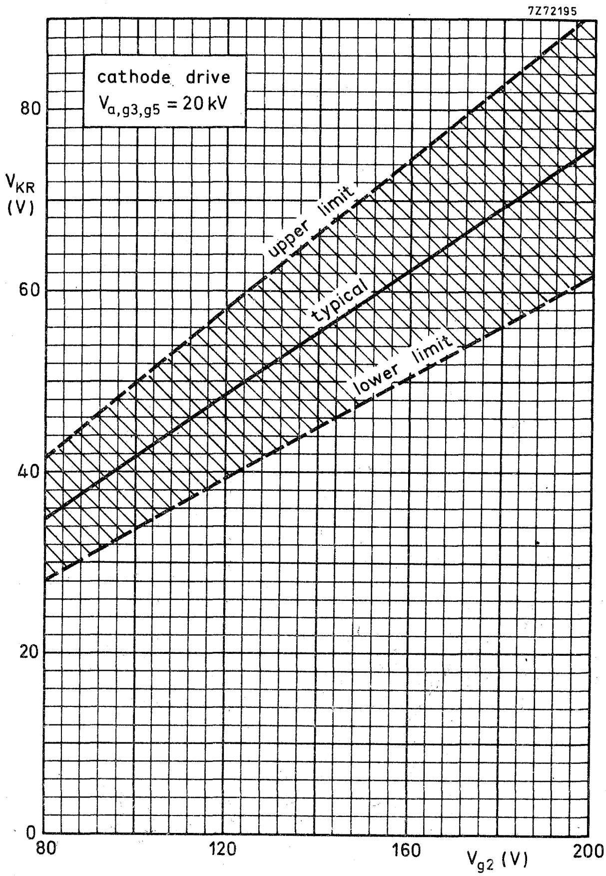
**) At $V_{k/g1} = 0$ V.

***) Maximum pulse duration 22% of a cycle but maximum 1, 5 ms.



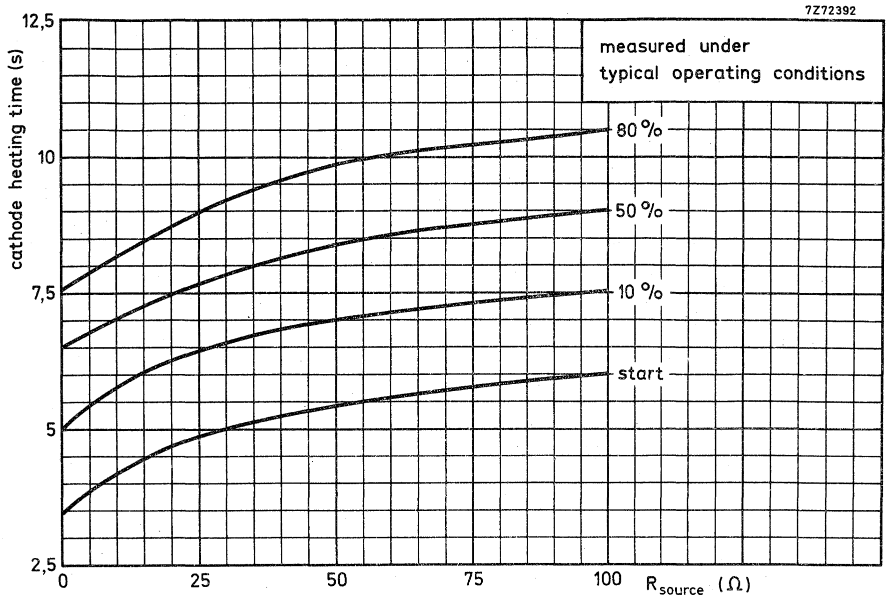
Final accelerator current as a function of cathode voltage.

Cathode drive $V_{a,g3,g5} = 20$ kV



$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,75 \times 10^{-3}$$

Limits of cathode cut-off voltage as a function of grid no. 2 voltage.



Cathode heating time to attain a certain percentage of the cathode current at equilibrium condition.

MONITOR TUBES

SURVEY

type number	deflection angle	face diagonal	neck diameter	basic deflection package and associated components*			
				deflection unit	line output transformer	linearity control unit	line driver transformer
For video (CCTV) and basic data displays							
M24–300 series M31–330 series	90^{o}	24 cm (9 in) 31 cm (12 in)	20 mm	AT1074/01	AT2140/10	AT4042/26	AT4043/56
For half-page alpha-numeric data displays							
M24–300 series M31–330 series	90^{o}	24 cm (9 in) 31 cm (12 in)	20 mm	AT1071/03	AT2102/02	AT4036	AT4043/64
M31–310 series M38–310 series	110^{o}	31 cm (12 in) 38 cm (15 in)	28,6 mm	AT1038/40	AT2102/04	AT4042/08	AT4043/59

* For data on these types see chapter Components for black and white television.

MONITOR TUBES

- 90° deflection angle
- 24 cm (9 in) face diagonal; rectangular glass
- 20 mm neck diameter
- white or green phosphor
- integral protection

QUICK REFERENCE DATA

Deflection angle	90°
Face diagonal	24 cm (9 in)
Overall length	max. 227 mm*
Neck diameter	20 mm
Heating	11 V/140 mA
Grid 2 voltage	130 V
Anode voltage	12 to 15 kV
Quick-heating cathode	with a typical tube a legible picture will appear within 5s

APPLICATION

These monitor tubes are used for information display and data terminals, e.g. in video monitoring equipment, computer terminals, word processors.

The tubes are supplied with different screen phosphors: white (W) or green (GH and GR). They are available with anti-reflective bonded face-plate.

The tubes can be supplied with additional deflection unit.

AVAILABLE VERSIONS

	versions without earthing strip	versions with earthing strip
monitor tubes without anti-reflective face-plate without lugs	M24 - 300W M24 - 300GH M24 - 300GR	M24 - 304W M24 - 304GH M24 - 304GR
monitor tubes with anti-reflective face-plate without lugs	M24 - 301W M24 - 301GH M24 - 301GR	M24 - 305W M24 - 305GH M24 - 305GR
monitor tubes without anti-reflective face-plate with lugs	M24 - 302W M24 - 302GH M24 - 302GR	
monitor tubes with anti-reflective face-plate with lugs	M24 - 303W M24 - 303GH M24 - 303GR	

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

ELECTRICAL DATA

Focusing method	electrostatic
Deflection method	magnetic
Deflection angles	
diagonal	approx. 90°
horizontal	approx. 82°
vertical	approx. 67°
Direct interelectrode capacitances	
cathode to all other electrodes	approx. 3 pF
grid 1 to all other electrodes	approx. 7 pF
External conductive coating to anode	max. 750 pF min. 300 pF
Heater voltage	11 V
Heater current at 11 V	140 mA

OPTICAL DATA

Phosphor number	W, GH and GR (P4, P31 and P39 respectively, according to JEDEC)
Light transmission at centre	
of screen	approx. 53%
of screen with anti-reflective face-plate	approx. 32%

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis is adjustable from 0 to 800 A/m. Maximum distance between centre of field of this magnet and reference line is 47 mm.

MECHANICAL DATA (see also the figures under Dimensional Data)

Overall length	max. 227 mm *
Greatest dimensions of tube	
diagonal	247 mm
width	216 mm
height	167 mm
Minimum useful screen dimensions (projected)	
diagonal	228 mm
horizontal axis	198 mm
vertical axis	149 mm
area	285 cm^2
Recommended useful screen dimensions for alpha-numeric display	
diagonal	210 mm
horizontal axis	168 mm
vertical axis	126 mm
Implosion protection	T-band and/or anti-reflective face-plate
Bulb	EIA-J240A1
Bulb contact designation	IEC67-III-2; JEDEC J1-21
Base designation	JEDEC E7-91
Basing	7GR
Mass, without anti-reflective face-plate	approx. 1,8 kg

RATINGS (Absolute Maximum System); cathode drive

Unless otherwise specified voltage values are positive and measured with respect to grid 1.

Anode voltage	max.	17	kV	
	min.	9	kV	
Grid 4 (focusing electrode) voltage	−200 to + 1000		V	
Grid 2 voltage	max.	200	V	**
Cathode voltage				
negative bias value	max.	0	V	
negative peak value	max.	2	V	
positive bias value	max.	200	V	
positive peak value	max.	400	V	
Heater voltage	max.	12,7	V	***
	min.	9,3	V	***
Cathode-to-heater voltage	max.	200	V	

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

** For alpha-numeric display, i.e. low beam current (< 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 400 V.

*** For maximum cathode life it is recommended that the heater supply be regulated at 11 V.

CIRCUIT DESIGN VALUES

Grid 4 current		
positive	max.	25 μA
negative	max.	25 μA
Grid 2 current		
positive	max.	5 μA
negative	max.	5 μA

MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	max.	1 MΩ
Impedance between cathode and heater	max.	0,1 MΩ
Grid 1 circuit resistance	max.	1,5 MΩ
Grid 1 circuit impedance	max.	0,5 MΩ

TYPICAL OPERATING CONDITIONS; cathode drive

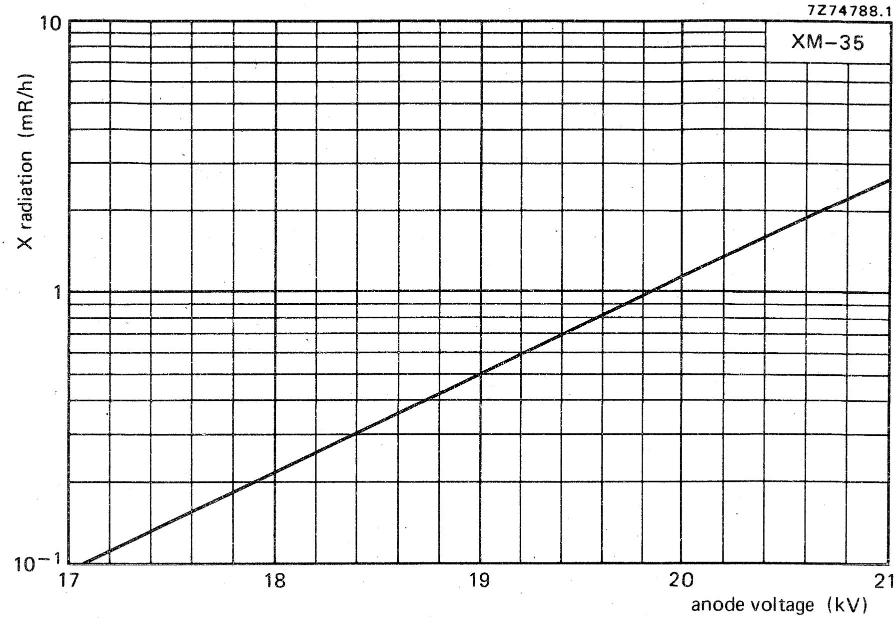
Voltages are specified with respect to grid 1.

Anode voltage	12 to 15 kV
Grid 4 (focusing electrode) voltage	0 to 130 V
Grid 2 voltage	130 V *
Cathode cut-off voltage	45 to 65 V **

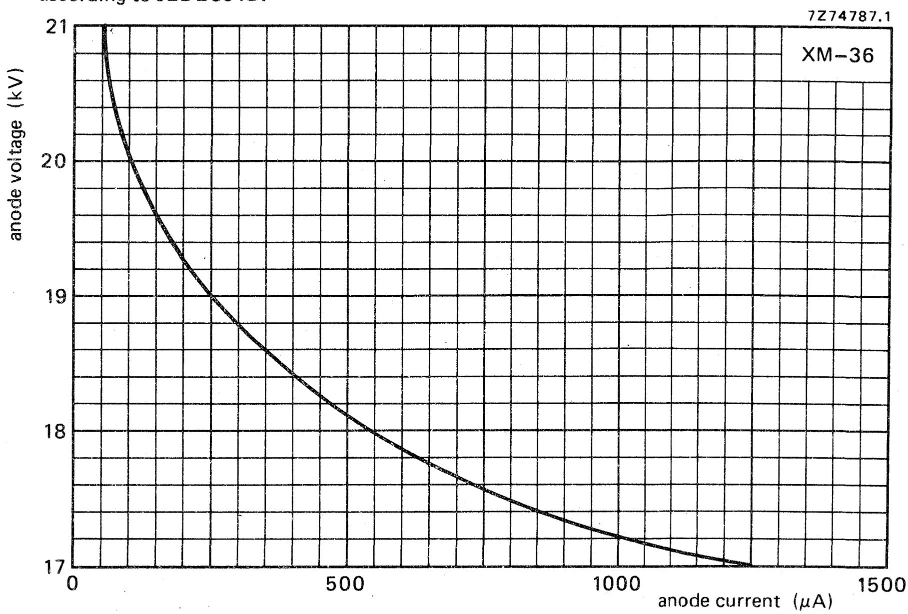
X-RADIATION CHARACTERISTIC

X-radiation emitted will not exceed 0,5 mR/h throughout the useful life of the tube, when operated within the given ratings. See curves on the opposite page.

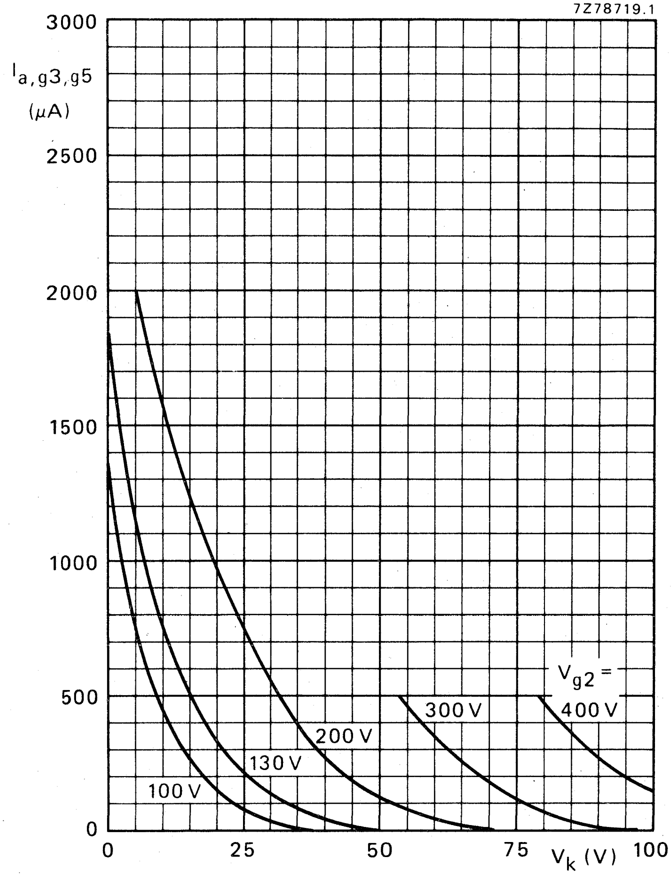
* For alpha-numeric display, i.e. low beam current ($<$ 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 400 V.
** Visual extinction of focused raster.



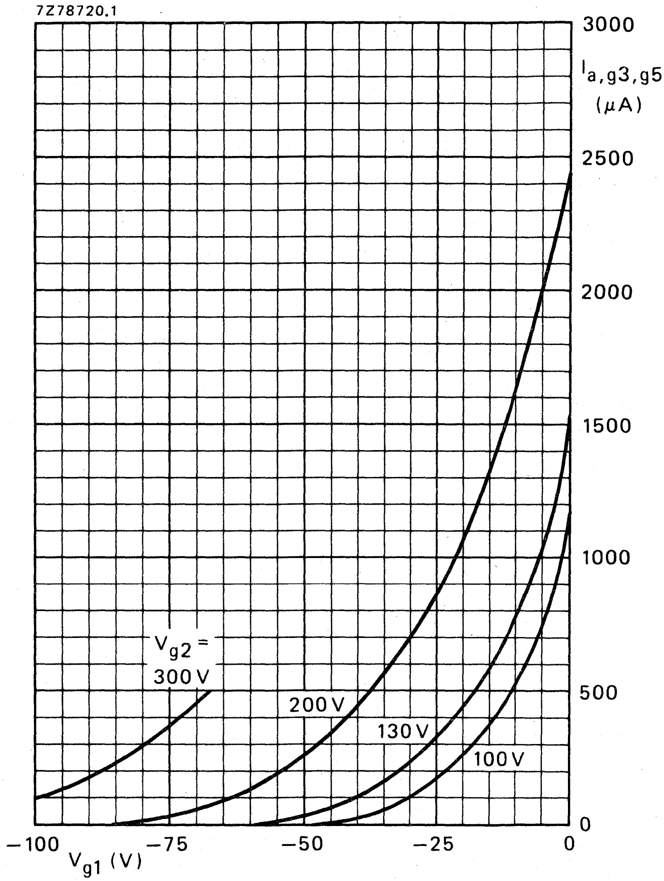
X-radiation limit curve according to JEDEC94, at a constant anode current of 250 μA, measured according to JEDEC64D.



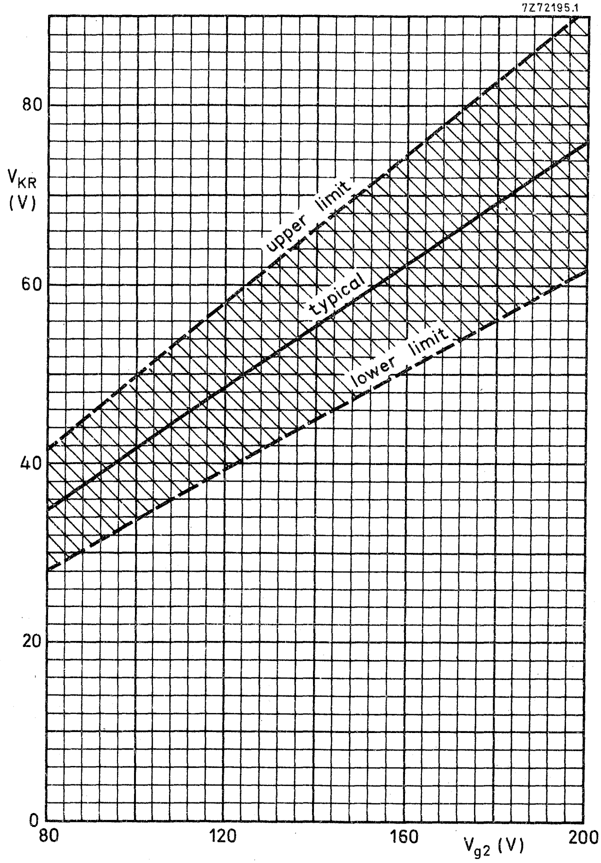
0,5 mR/h isoexposure-rate limit curve, according to JEDEC94, measured according to JEDEC64D.



Anode current as a function of cathode voltage.
Cathode drive; $V_{a,g3,g5}$ = 15 kV.

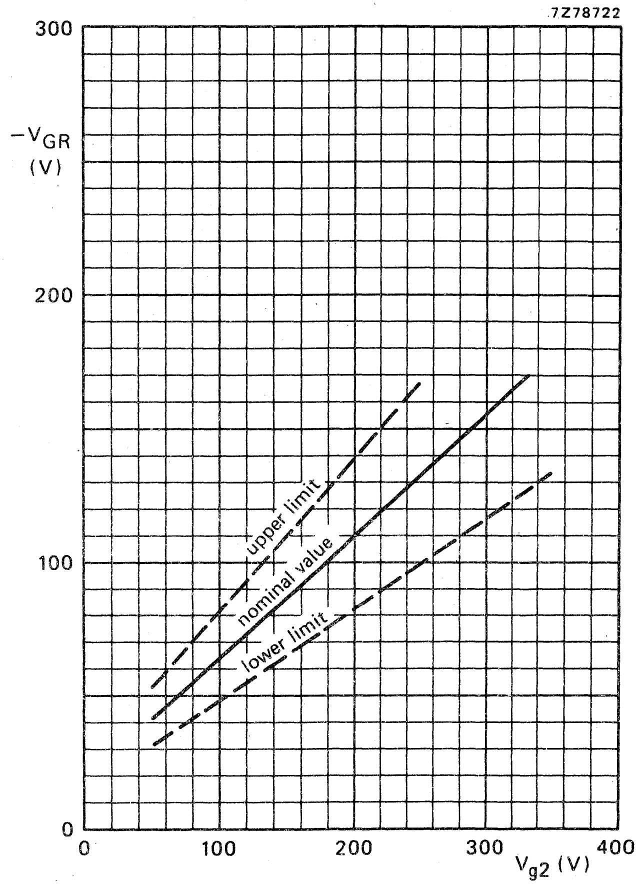


Anode current as a function of grid 1 voltage.
Grid drive; $V_{a,g3,g5}$ = 15 kV.



Limits of cathode cut-off voltage as a function of grid 2 voltage.
Cathode drive; $V_{a,g3,g5}$ = 15 kV.

$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0{,}3 \times 10^{-3}$$

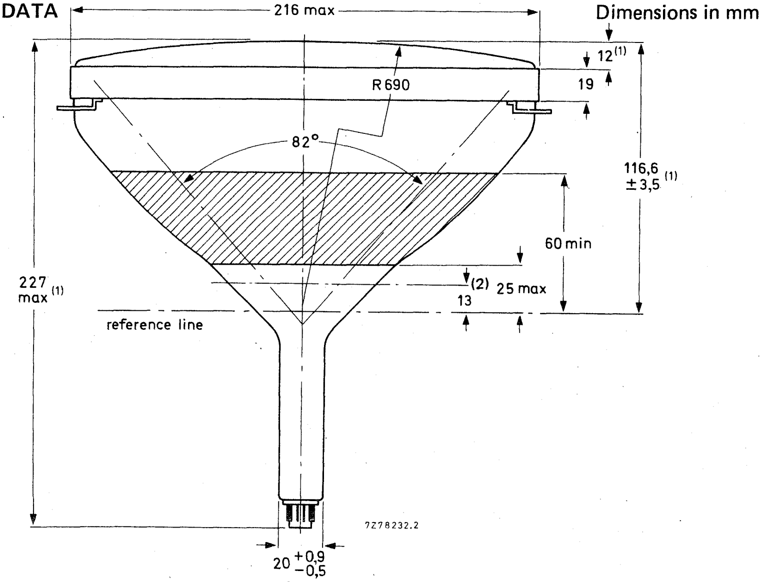


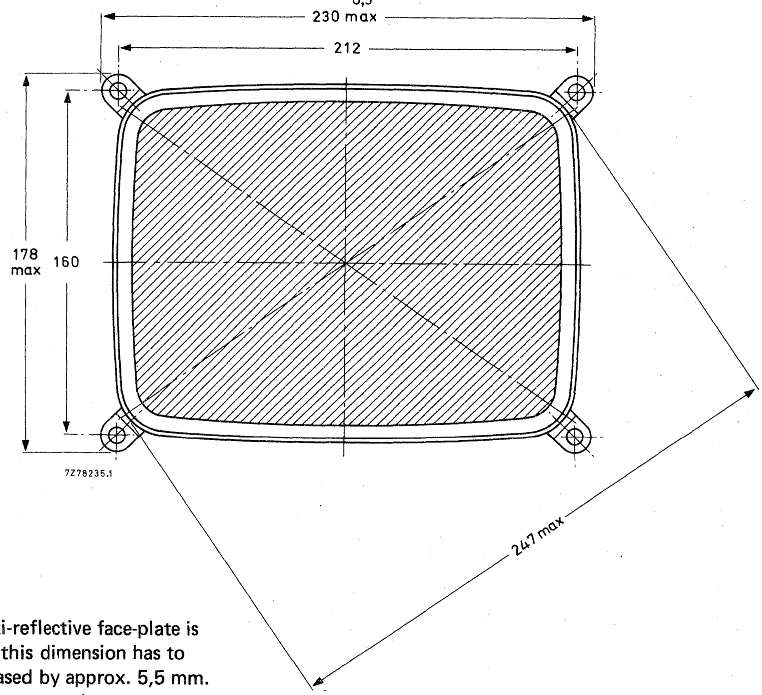
Limits of grid 1 cut-off voltage as a function of grid 2 voltage.
Grid drive; $V_{a,g3,g5}$ = 15 kV.

$$\frac{\Delta V_{GR}}{\Delta V_{a,g3,g5}} = 0{,}3 \times 10^{-3}$$

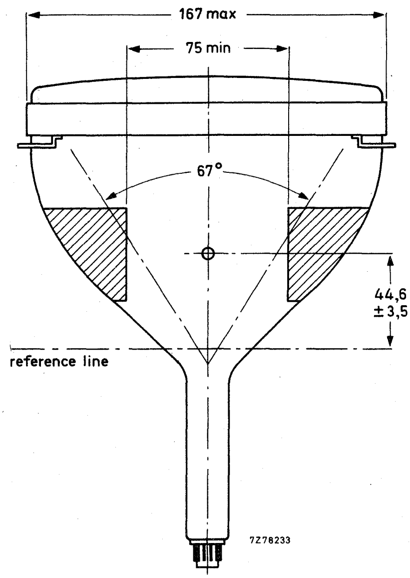
DIMENSIONAL DATA

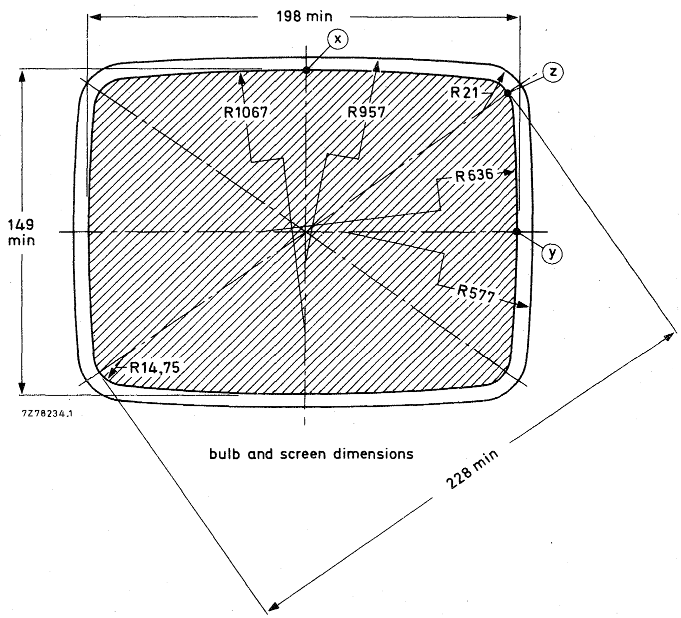
Dimensions in mm



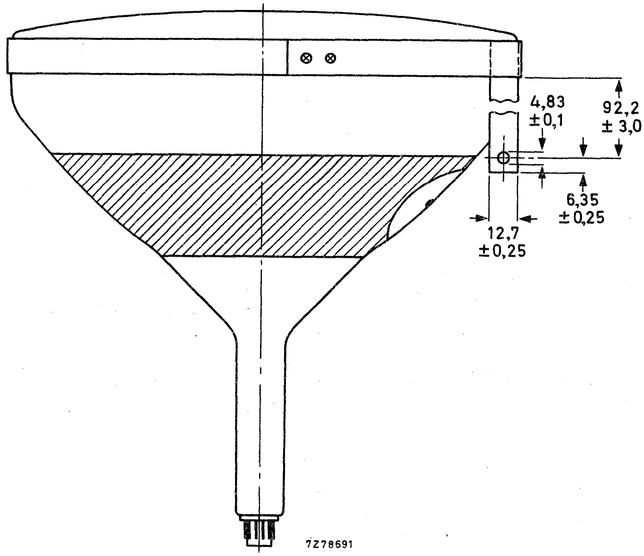


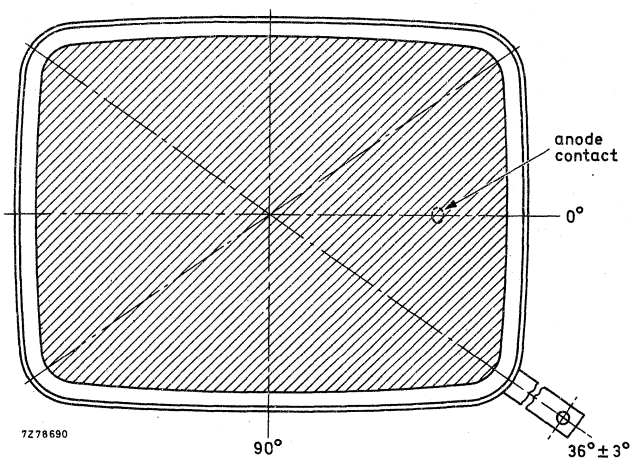
(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.
(2) End of guaranteed contour.



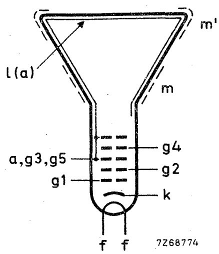


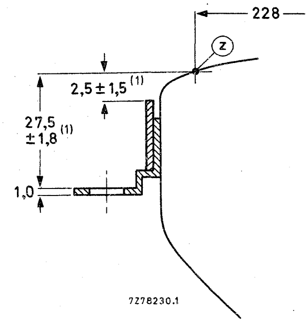
bulb and screen dimensions

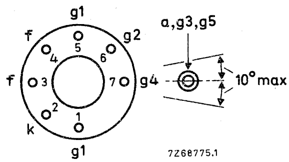


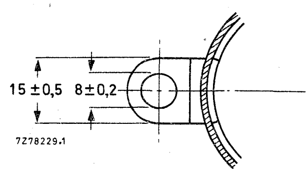


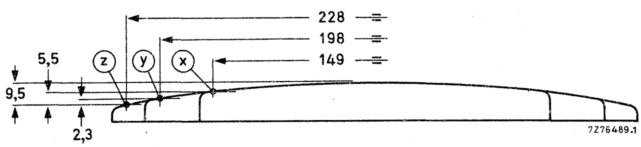
Version with earthing strip. (M24-304 and M24-305). Dimensions are identical with those in the figures on the preceding pages, except as shown.

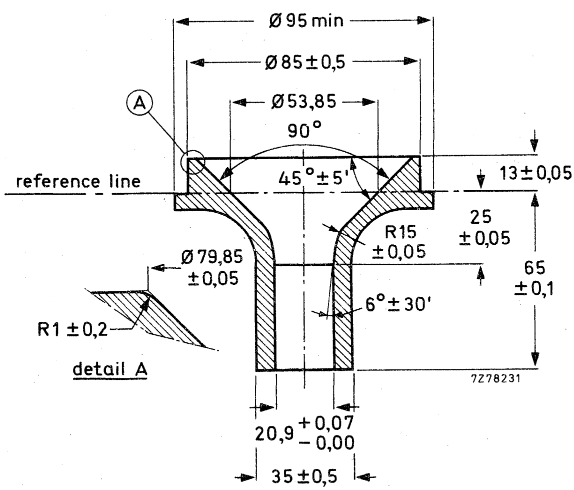








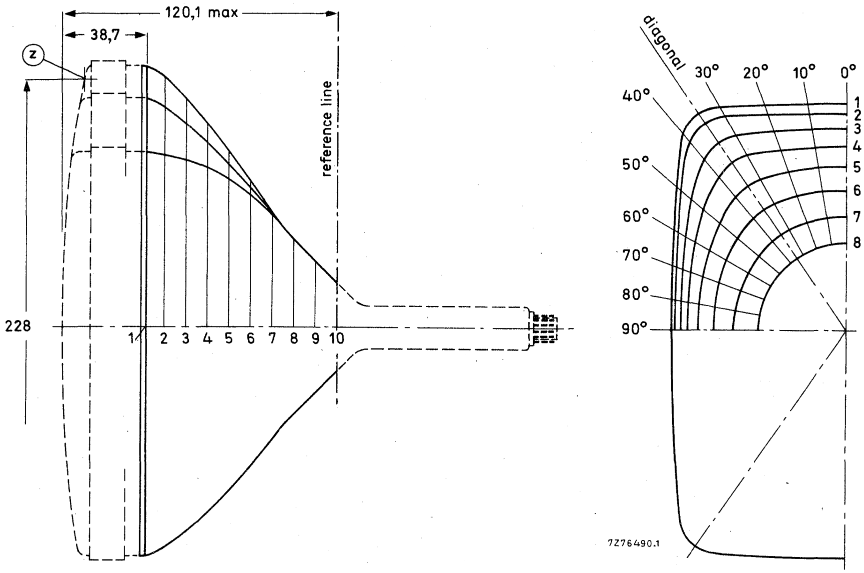




Reference line gauge.

(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

Maximum cone contour



Section	Nom. distance from section 1	Distance from centre (max. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
10	87,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5
9	77,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5	30,5
8	67,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5	40,5
7	57,5	52,8	52,9	53,1	53,5	53,6	53,4	53,0	52,5	52,1	51,9	52,0
6	47,5	64,8	65,2	66,4	67,8	67,9	67,7	66,2	64,0	62,4	61,5	61,2
5	37,5	75,5	76,2	78,1	80,8	81,2	80,7	77,4	73,2	70,3	68,6	68,1
4	27,5	85,0	86,0	88,8	93,6	93,6	92,7	86,6	80,4	76,3	73,9	73,2
3	17,5	93,6	94,7	98,1	104,1	105,3	103,7	93,7	85,8	80,6	77,7	76,9
2	7,5	101,3	102,7	106,9	114,4	116,3	113,8	99,7	89,9	83,6	80,3	79,3
1	0	104,7	106,2	110,3	117,9	120,0	117,2	102,0	91,4	84,8	81,2	80,3

MONITOR TUBES

- 110° deflection angle
- 31 cm (12 in) face diagonal; rectangular glass
- 28,6 mm neck diameter
- white or green screen phosphor
- integral implosion protection

QUICK REFERENCE DATA

Deflection angle	110°
Face diagonal	31 cm (12 in)
Overall length	max. 241 mm*
Neck diameter	28,6 mm
Heating	6,3 V/300 mA
Grid 2 voltage	400 to 700 V
Anode voltage	14 to 17 kV

APPLICATION

These monitor tubes are used for information display and data terminals, e.g. video monitoring equipment, computer terminals, word processors.

The tubes are supplied with different screen phosphors: white (W) or green (GH and GR). They are available with anti-reflective bonded face-plate.

The tubes can be supplied with additional deflection unit.

AVAILABLE VERSIONS

monitor tubes without anti-reflective face-plate with lugs	M31-312W M31-312GH M31-312GR	M31-314W M31-314GH M31-314GR
monitor tubes with anti-reflective face-plate with lugs	M31-313W M31-313GH M31-313GR	M31-315W M31-315GH M31-315GR

The differences between the tubes of the two columns of the table above, can be found in Dimensional Data.

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

ELECTRICAL DATA

Focusing method	electrostatic
Deflection method	magnetic
Deflection angles	
diagonal	approx. 110°
horizontal	approx. 98°
vertical	approx. 81°
Direct interelectrode capacitances	
cathode to all other electrodes	approx. 5 pF
grid 1 to all other electrodes	approx. 7 pF
External conductive coating to anode	max. 900 pF min. 450 pF
Heater voltage	6,3 V
Heater current at 6,3 V	300 mA

OPTICAL DATA

Phosphor number	W, GH and GR (P4, P31 and P39 respectively, according to JEDEC)
Light transmission at centre	
of screen	approx. 50%
of screen with anti-reflective face-plate	approx. 30%

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis is adjustable from 0 to 800 A/m.

Maximum distance between centre of field of this magnet and reference line is 57 mm.

MECHANICAL DATA (see also the figures under Dimensional Data)

Overall length	max. 241 mm*
Greatest dimensions of tube	
diagonal	321 mm
width	283 mm
height	222 mm
Minimum useful screen dimensions (projected)	
diagonal	295 mm
horizontal axis	257 mm
vertical axis	195 mm
area	501 cm^2
Recommended useful screen dimensions for alpha-numeric display	
diagonal	270 mm
horizontal axis	216 mm
vertical axis	162 mm
Implosion protection	T-band and/or anti reflective face-plate
Bulb	J99A1
Bulb contact designation	IEC 67-III-2; JEDEC J1-21
Base designation	IEC 67-I-31a; JEDEC B7-208
Basing	8HR
Mass, without anti-reflective face-plate	approx. 2,8 kg

RATINGS (Absolute Maximum System); cathode drive

Unless otherwise specified voltage values are positive and measured with respect to grid 1.

Anode voltage	max. 19 kV min. 12 kV
Grid 4 (focusing electrode) voltage	−500 to + 1000 V
Grid 2 voltage	max. 700 V**
Cathode voltage	
negative bias value	max. 0 V
negative peak value	max. 2 V
positive bias value	max. 150 V
positive peak value	max. 400 V
Heater voltage	max. 7,3 V*** min. 5,3 V***
Cathode-to-heater voltage	max. 250 V

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

** For alpha-numeric display, i.e. low beam current (< 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 700 V.

*** For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V.

CIRCUIT DESIGN VALUES

Grid 4 current		
positive	max.	25 μA
negative	max.	25 μA
Grid 2 current		
positive	max.	5 μA
negative	max.	5 μA

MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	max.	1,0 MΩ
Impedance between cathode and heater	max.	0,1 MΩ
Grid 1 circuit resistance	max.	1,5 MΩ
Grid 1 circuit impedance	max.	0,5 MΩ

TYPICAL OPERATING CONDITIONS; cathode drive

Voltages are specified with respect to grid 1

Anode voltage	14 to 17 kV
Grid 4 (focusing electrode) voltage	0 to 400 V*
Grid 2 voltage	400 V**
Cathode cut-off voltage	36 to 66 V***

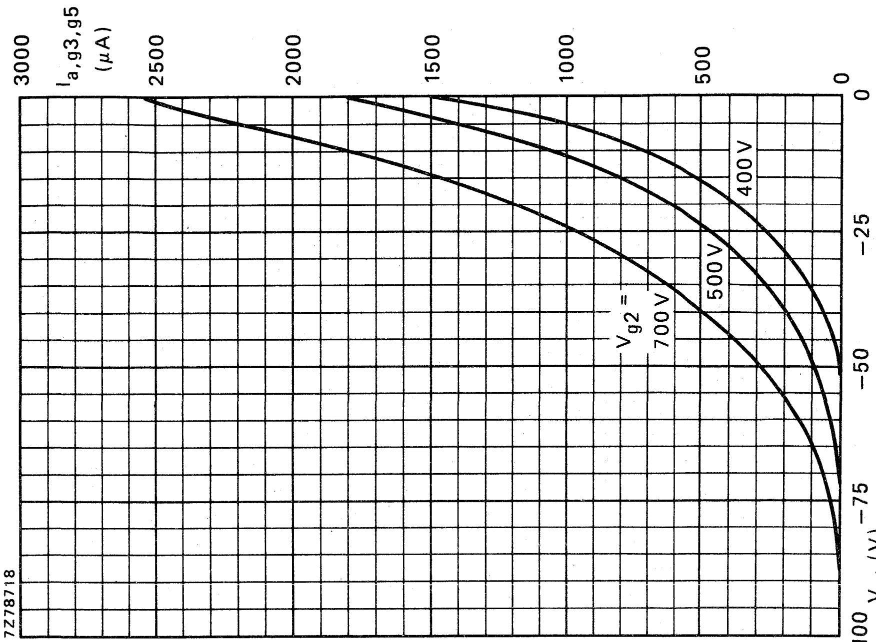
X-RADIATION CHARACTERISTIC

X-radiation emitted will not exceed 0,5 mR/h throughout the useful life of the tube, when operated within the given ratings.

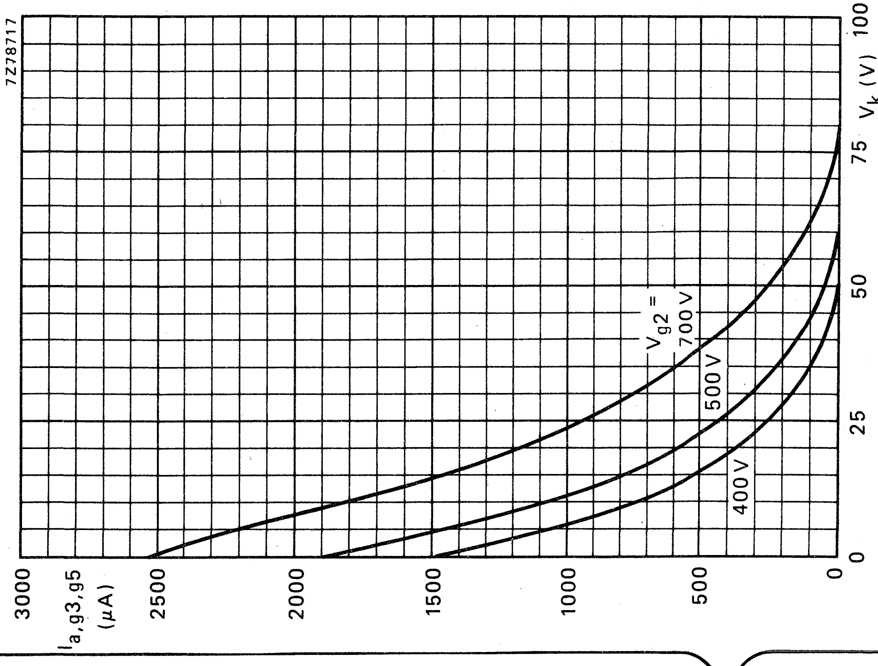
* Individual tubes will have optimum focus voltage within this range. In general an acceptable picture will be obtained with a fixed focus voltage.

** For alpha-numeric display, i.e. low beam current ($<$ 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 700 V.

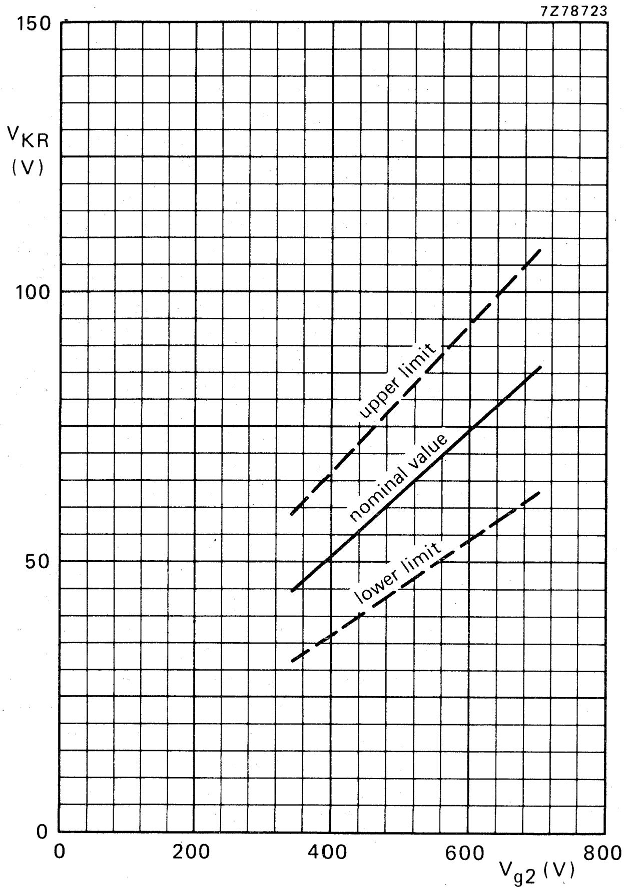
*** Visual extinction of focused raster.



Anode current as a function of grid 1 voltage.
Grid drive; $V_{a,g3,g5}$ = 17 kV.

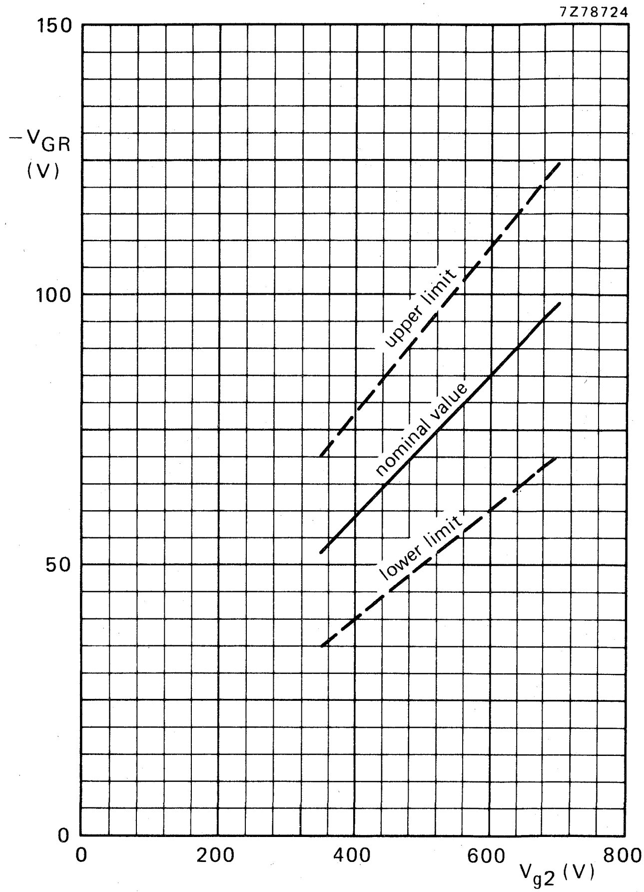


Anode current as a function of cathode voltage.
Cathode drive; $V_{a,g3,g5}$ = 17 kV.



Limits of cathode cut-off voltage as a function of grid 2 voltage.
Cathode drive; $V_{a,g3,g5} = 17$ kV.

$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0{,}75 \times 10^{-3}$$

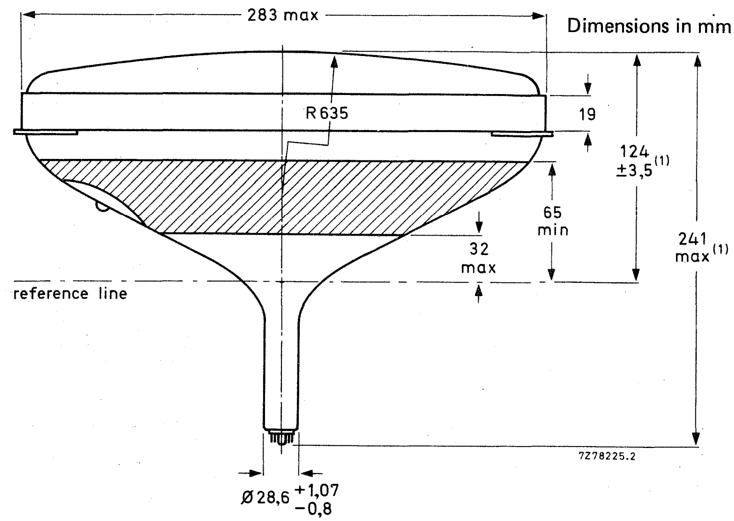


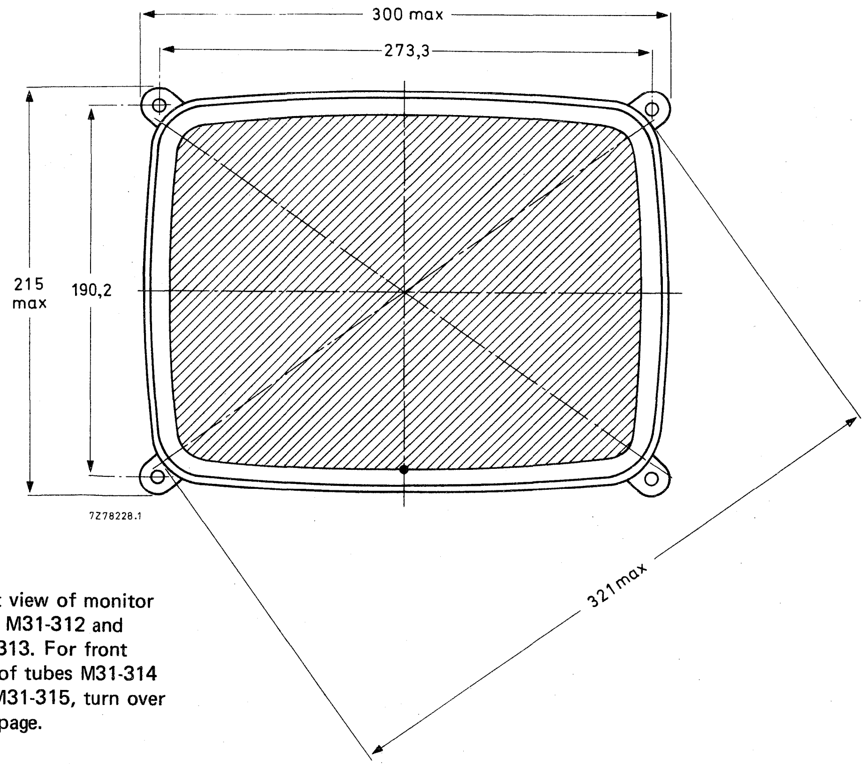
Limits of grid 1 cut-off voltage as a function of grid 2 voltage.
Grid drive; $V_{a,g3,g5}$ = 17 kV.

$$\frac{\Delta V_{GR}}{\Delta V_{a,g3,g5}} = 0{,}75 \times 10^{-3}$$

DIMENSIONAL DATA

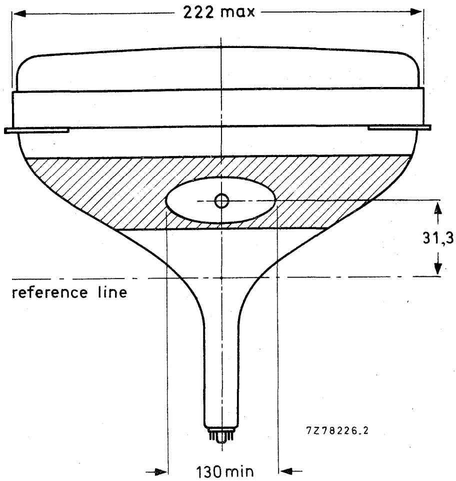
Dimensions in mm

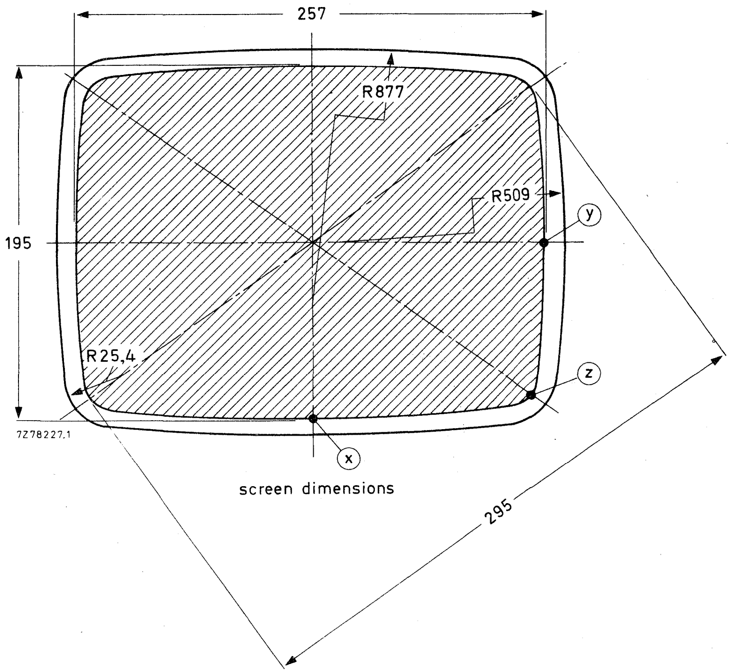




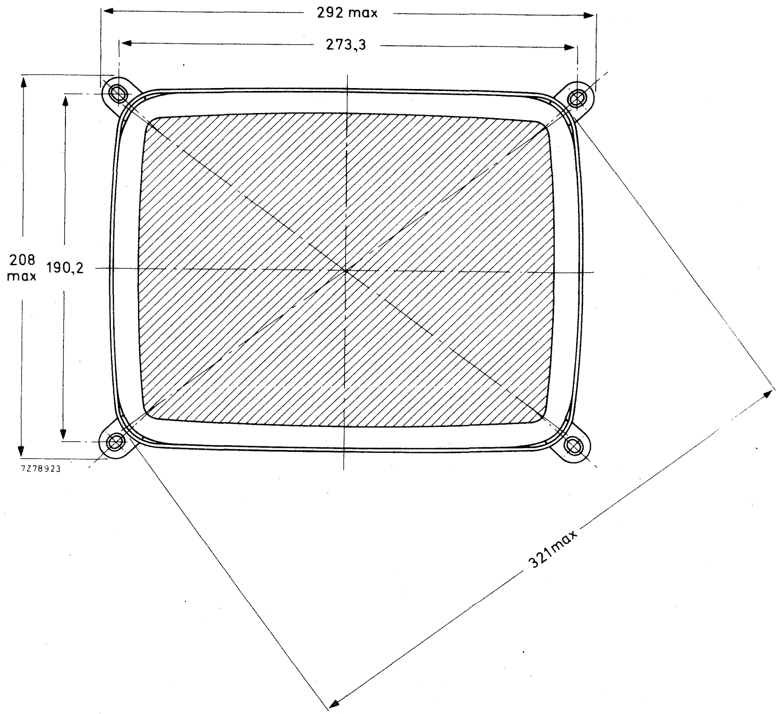
Front view of monitor tubes M31-312 and M31-313. For front view of tubes M31-314 and M31-315, turn over next page.

(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

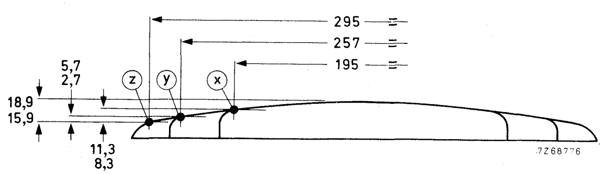


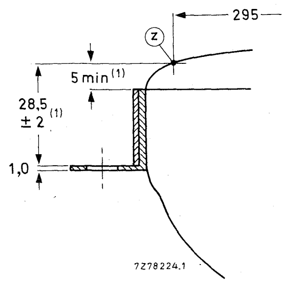


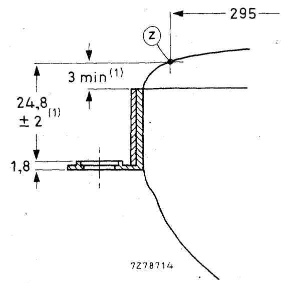
screen dimensions

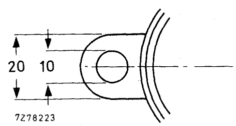


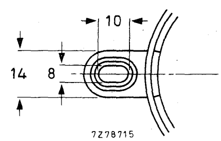
Front view of monitor tubes M31-314 and M31-315.





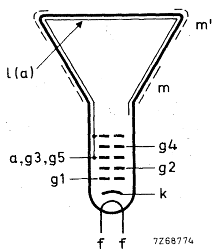


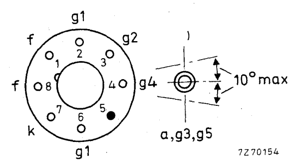




Monitor tubes M31-312 and M31-313.

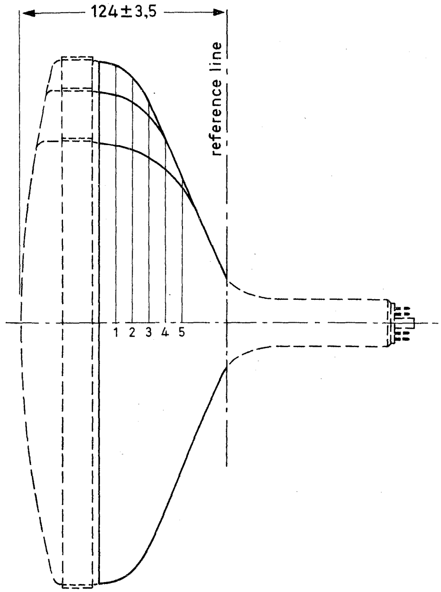
Monitor tubes M31-314 and M31-315.

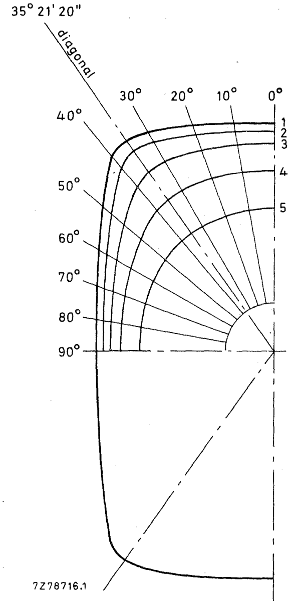




(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

Maximum cone contour





Section	Nom. distance from reference line	Distance from centre (max. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
1	68,3	137,2	138,7	143,4	151,8	155,4	152,5	133,8	120,8	112,6	108,2	106,8
2	58,3	133,0	134,2	138,3	145,8	148,2	142,2	126,6	115,2	108,0	104,1	103,1
3	48,3	125,0	125,8	128,4	131,9	131,9	128,5	117,4	108,5	102,8	99,8	99,1
4	38,3	108,9	109,0	110,4	111,4	111,2	110,0	104,4	98,9	95,4	93,0	92,8
5	28,3	86,8	86,1	86,0	86,6	86,7	86,5	85,1	83,7	82,6	81,8	81,7

MONITOR TUBES

- 90^o deflection angle
- 31 cm (12 in) face diagonal; rectangular glass
- 20 mm neck diameter
- white or green phosphor
- integral protection

QUICK REFERENCE DATA

Deflection angle	90^o
Face diagonal	31 cm (12 in)
Overall length	max. 280 mm*
Neck diameter	20 mm
Heating	11 V/140 mA
Grid 2 voltage	130 V
Anode voltage	12 to 15 kV
Quick-heating cathode	with a typical tube a legible picture will appear within 5s

APPLICATION

These monitor tubes are used for information display and data terminals, e.g. in video monitoring equipment, computer terminals, word processors.

The tubes are supplied with different screen phosphors: white (W) or green (GH or GR). They are available with anti-reflective bonded face-plate.

The tubes can be supplied with additional deflection unit.

AVAILABLE VERSIONS

	non-push-through versions	push-through versions
monitor tubes without anti-reflective face-plate without lugs	M31 - 330W M31 - 330GH M31 - 330GR	
monitor tubes with anti-reflective face-plate without lugs	M31 - 331W M31 - 331GH M31 - 331GR	
monitor tubes without anti-reflective face-plate with lugs	M31 - 334W M31 - 334GH M31 - 334GR	M31 - 332W M31 - 332GH M31 - 332GR
monitor tubes with anti-reflective face-plate with lugs	M31 - 333W M31 - 333GH M31 - 333GR	

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

ELECTRICAL DATA

Focusing method	electrostatic
Deflection method	magnetic
Deflection angles	
diagonal	approx. 90°
horizontal	approx. 83°
vertical	approx. 65°
Direct interelectrode capacitances	
cathode to all other electrodes	approx. 5 pF
grid 1 to all other electrodes	approx. 8 pF
External conductive coating to anode	max. 900 pF min. 450 pF
Heater voltage	11 V
Heater current at 11 V	140 mA

OPTICAL DATA

Phosphor number	W, GH and GR (P4, P31 and P39 respectively, according to JEDEC)
Light transmission at centre	
of screen	approx. 50%
of screen with anti-reflective face-plate	approx. 30%

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis is adjustable from 0 to 800 A/m. Maximum distance between centre of field of this magnet and reference line is 47 mm.

MECHANICAL DATA (see also the figures under Dimensional Data)

Overall length	max. 280 mm *
Greatest dimensions of tube	
diagonal	315 mm
width	279 mm
height	227 mm
Minimum useful screen dimensions (projected)	
diagonal	292 mm
horizontal axis	254 mm
vertical axis	201 mm
area	483 cm^2
Recommended useful screen dimensions for alpha-numeric display	
diagonal	270 mm
horizontal axis	216 mm
vertical axis	162 mm
Implosion protection	T-band and/or anti-reflective face-plate
Bulb	EIA-J97 3/4M
Bulb contact designation	IEC 67-III-2; JEDEC J1-21
Base designation	JEDEC E7-91
Basing	7GR
Mass, without anti-reflective face-plate	approx. 2,9 kg

RATINGS (Absolute Maximum System); cathode drive

Unless otherwise specified voltage values are positive and measured with respect to grid 1.

Anode voltage	max.	17	kV
	min.	9	kV
Grid 4 (focusing electrode) voltage	−200 to + 1000		V
Grid 2 voltage	max.	200	V **
Cathode voltage			
negative bias value	max.	0	V
negative peak value	max.	2	V
positive bias value	max.	200	V
positive peak value	max.	400	V
Heater voltage	max.	12,7	V ***
	min.	9,3	V ***
Cathode-to-heater voltage	max.	200	V

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

** For alpha-numeric display, i.e. low beam current (< 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 400 V.

*** For maximum cathode life it is recommended that the heater supply be regulated at 11 V.

CIRCUIT DESIGN VALUES

Grid 4 current		
positive	max.	25 μA
negative	max.	25 μA
Grid 2 current		
positive	max.	5 μA
negative	max.	5 μA

MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	max.	1 MΩ
Impedance between cathode and heater	max.	0,1 MΩ
Grid 1 circuit resistance	max.	1,5 MΩ
Grid 1 circuit impedance	max.	0,5 MΩ

TYPICAL OPERATING CONDITIONS; cathode drive

Voltages are specified with respect to grid 1.

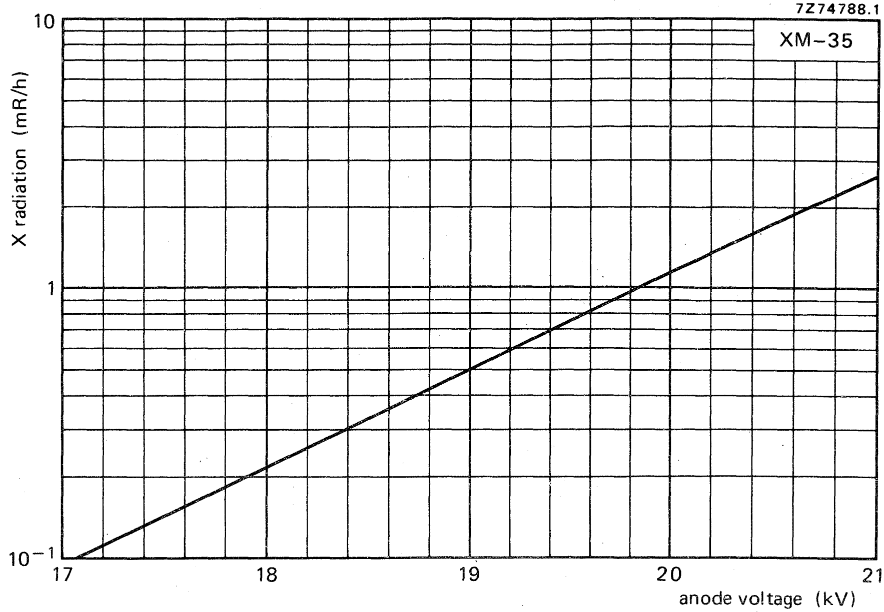
Anode voltage	12 to 15 kV
Grid 4 (focusing electrode) voltage	0 to 130 V
Grid 2 voltage	130 V *
Cathode cut-off voltage	45 to 65 V **

X-RADIATION CHARACTERISTIC

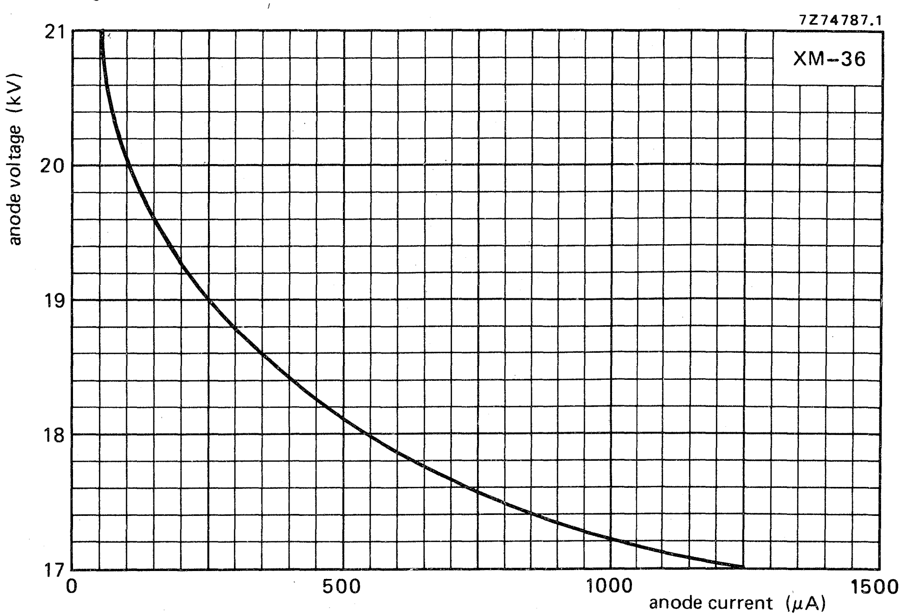
X-radiation emitted will not exceed 0,5 mR/h throughout the useful life of the tube, when operated within the given ratings. See curves on the opposite page.

* For alpha-numeric display, i.e. low beam current ($<$ 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 400 V.

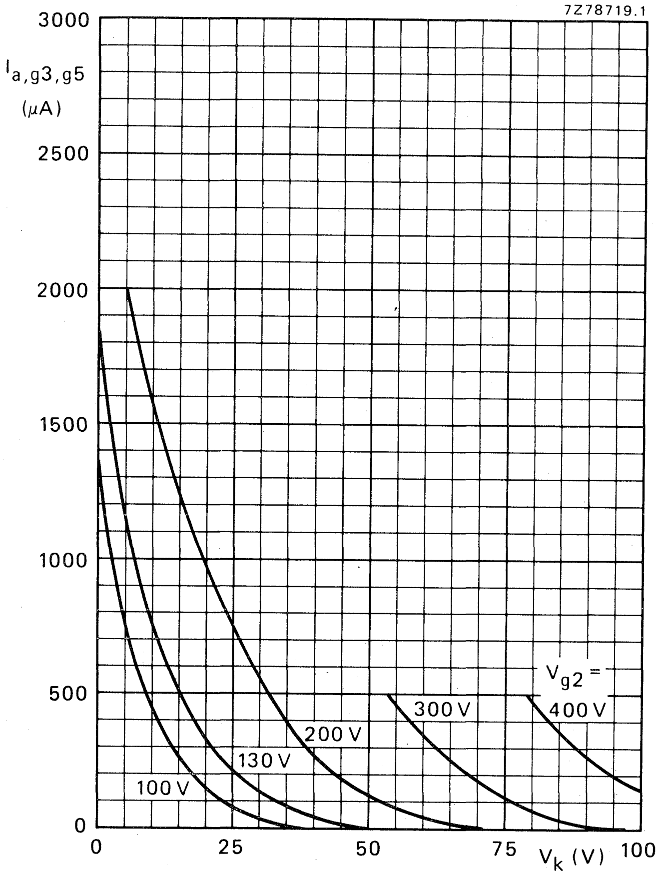
** Visual extinction of focused raster.



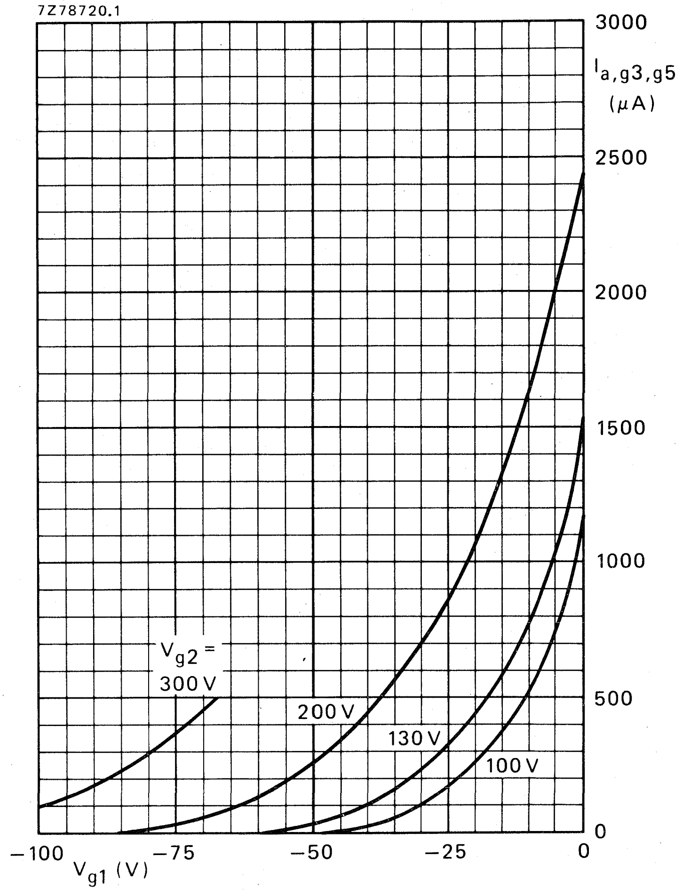
X-radiation limit curve according to JEDEC94, at a constant anode current of 250 μA, measured according to JEDEC64D.



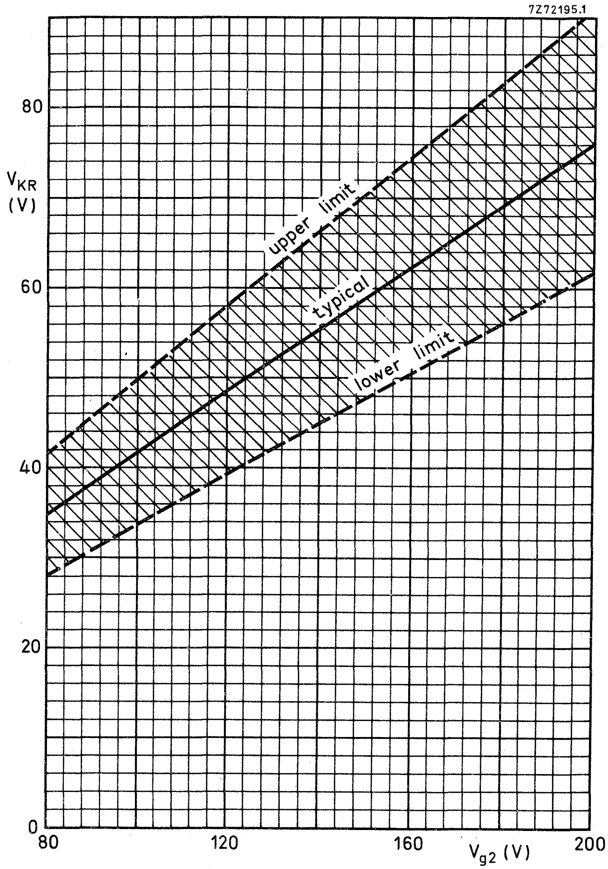
0,5 mR/h isoexposure-rate limit-curve, according to JEDEC94, measured according to JEDEC64D.



Anode current as a function of cathode voltage.
Cathode drive; $V_{a,g3,g5}$ = 15 kV.

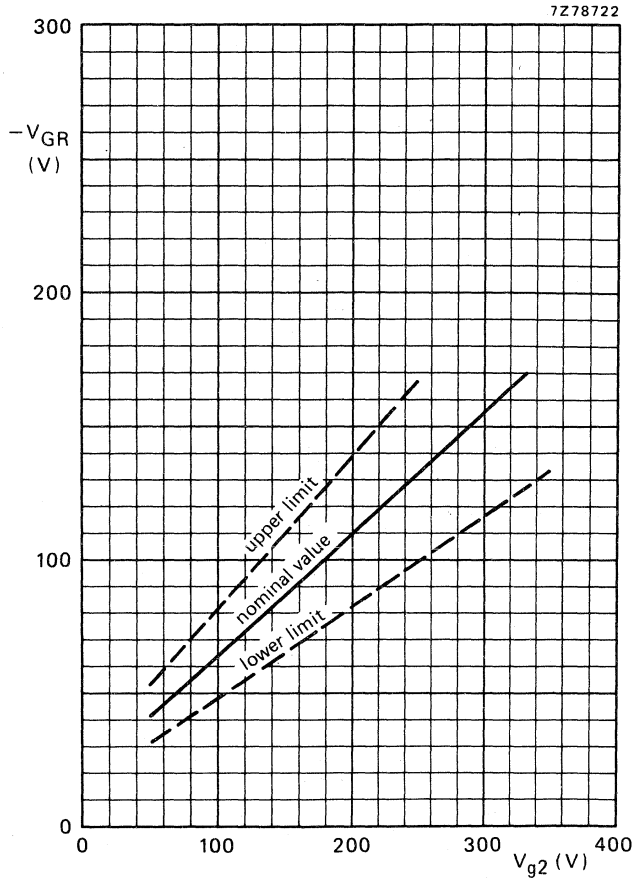


Anode current as a function of grid 1 voltage.
Grid drive; $V_{a,g3,g5}$ = 15 kV.



Limits of cathode cut-off voltage as a function of grid 2 voltage.
Cathode drive; $V_{a,g3,g5}$ = 15 kV.

$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0,3 \times 10^{-3}$$

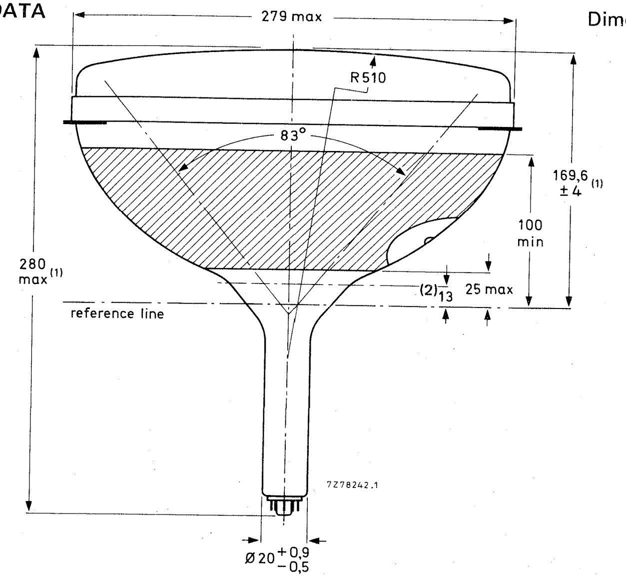


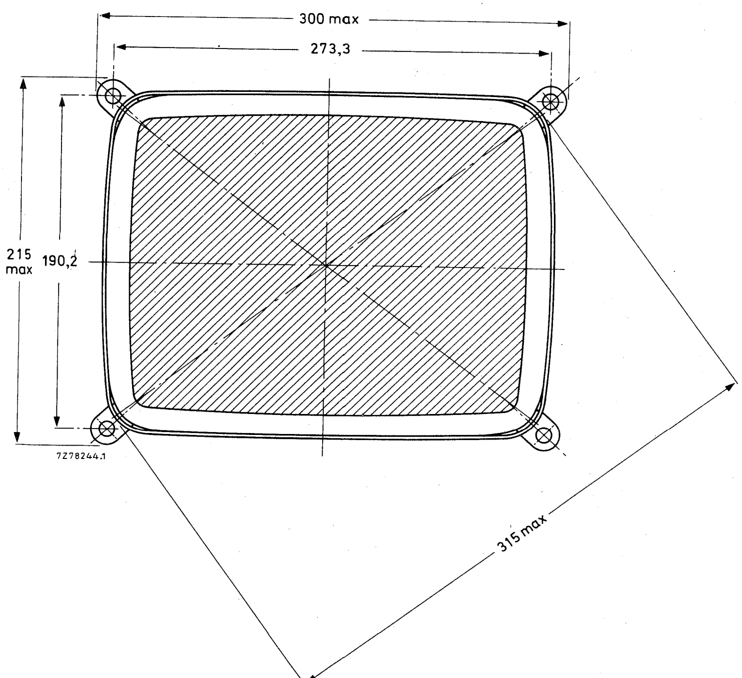
Limits of grid 1 cut-off voltage as a function of grid 2 voltage.
Grid drive; $V_{a,g3,g5}$ = 15 kV.

$$\frac{\Delta V_{GR}}{\Delta V_{a,g3,g5}} = 0,3 \times 10^{-3}$$

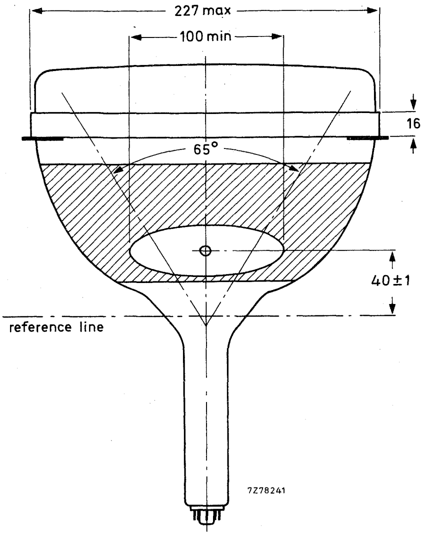
DIMENSIONAL DATA

Dimensions in mm

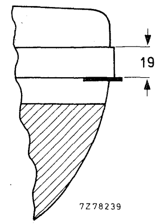




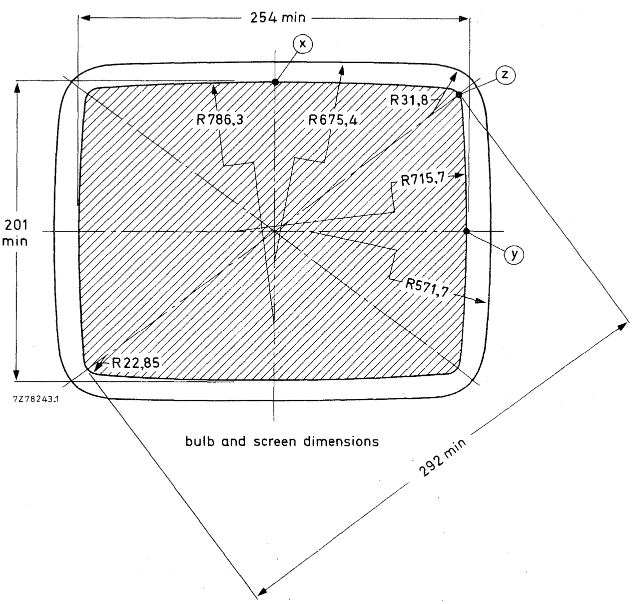
(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.
(2) End of guaranteed contour.



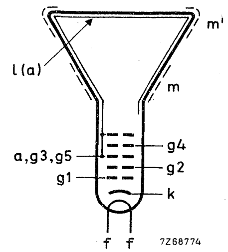
Push-through version.

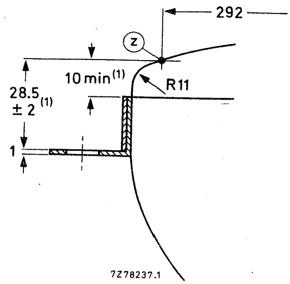


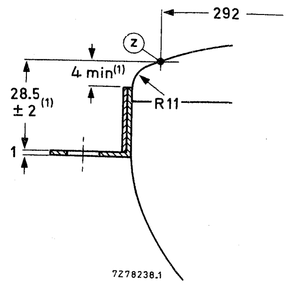
Non-push-through version.

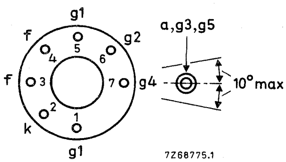


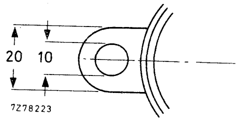
bulb and screen dimensions



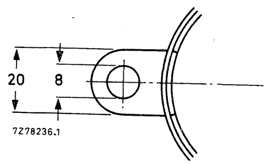




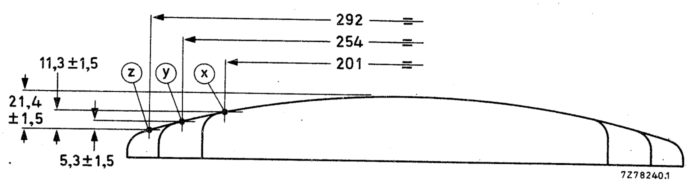


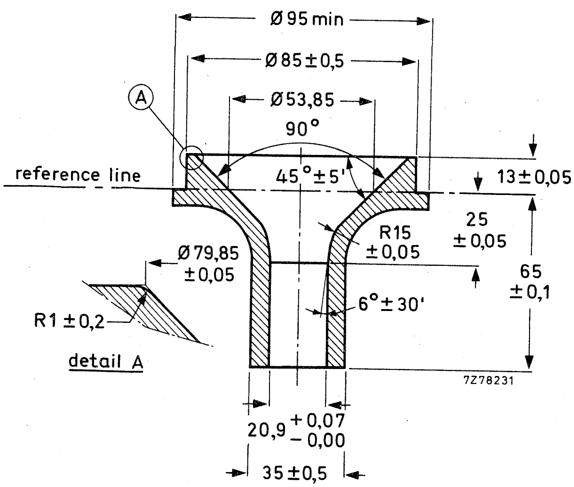


Push-through version.



Non-push-through version.

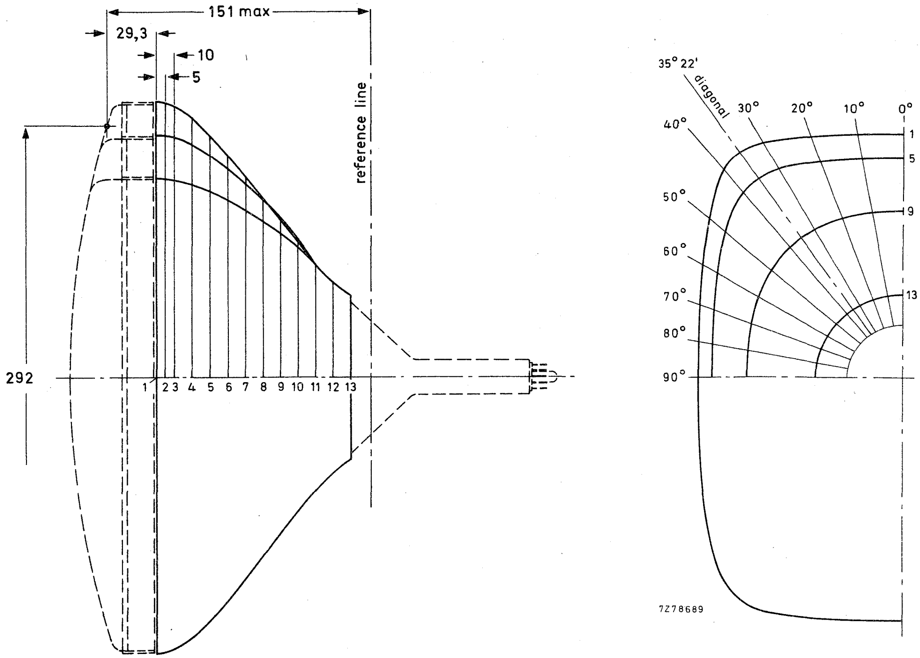




Reference line gauge.

(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

Maximum cone contour



Section	Nom. distance from section 1	Distance from centre (max. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
13	105,9	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4	48,4
12	99	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3	55,3
11	90	66,1	66,0	65,8	65,6	65,4	65,4	65,3	65,3	65,3	65,4	65,4
10	80	79,7	79,5	79,0	78,4	78,1	77,8	77,3	76,9	76,6	76,5	76,4
9	70	91,8	92,0	92,1	91,8	91,4	90,9	89,6	87,9	86,2	84,9	84,3
8	60	102,3	103,0	104,2	104,8	104,5	103,9	101,4	97,8	94,4	91,8	90,9
7	50	111,8	112,8	115,1	117,1	117,2	116,5	112,3	106,5	101,3	98,0	96,9
6	40	120,4	121,6	124,9	128,6	129,3	128,5	122,1	113,7	107,3	103,5	102,3
5	30	128,2	129,6	133,7	139,1	140,6	139,6	130,3	119,9	112,6	108,4	107,1
4	20	135,0	136,5	141,3	148,3	150,8	149,4	136,9	125,0	117,1	112,6	111,1
3	10	140,0	141,7	146,8	154,9	158,1	156,3	141,5	128,7	120,3	115,6	114,1
2	5	140,9	142,6	147,9	156,0	159,2	157,3	142,4	129,6	121,1	116,4	114,9
1	0	141,3	143,0	148,3	156,5	159,6	157,6	142,7	129,9	121,5	116,8	115,3

MONITOR TUBES

- 110° deflection angle
- 38 cm (15 in) face diagonal; rectangular glass
- 28,6 mm neck diameter
- white or green screen phosphor
- integral implosion protection

QUICK REFERENCE DATA

Deflection angle	110°
Face diagonal	38 cm (15 in)
Overall length	max. 279 mm*
Neck diameter	28,6 mm
Heating	6,3 V/300 mA
Grid 2 voltage	400 to 700 V
Anode voltage	14 to 17 kV

APPLICATION

These monitor tubes are used for information display and data terminals, e.g. in video monitoring equipment, computer terminals, word processors.
The tubes are supplied with different screen phosphors: white (W) or green (GH and GR). They are available with anti-reflective bonded face-plate.
The tubes can be supplied with additonal deflection unit.

AVAILABLE VERSIONS

monitor tubes without anti-reflective face-plate with lugs	M38-312W M38-312GH M38-312GR	M38-314W M38-314GH M38-314GR
monitor tubes with anti-reflective face-plate with lugs	M38-313W M38-313GH M38-313GR	M38-315W M38-315GH M38-315GR

The differences between the tubes of the two columns of the table above, can be found in Dimensional Data.

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

ELECTRICAL DATA

Focusing method	electrostatic
Delfection method	magnetic
Deflection angles	
diagonal	approx. 110°
horizontal	approx. 98°
vertical	approx. 81°
Direct interelectrode capacitances	
cathode to all other electrodes	approx. 5 pF
grid 1 to all other electrodes	approx. 7 pF
External conductive coating to anode	max. 1000 pF min. 550 pF
Heater voltage	6,3 V
Heater current at 6,3 V	300 mA

OPTICAL DATA

Phosphor number	W, GH and GR (P4, P31 and P39 respectively, according to JEDEC)
Light transmission at centre	
of screen	approx. 46%
of screen with anti-reflective face-plate	approx. 28%

PICTURE CENTRING MAGNET

Field intensity perpendicular to the tube axis is adjustable from 0 to 800 A/m.

Maximum distance between centre of field of this magnet and reference line is 57 mm.

MECHANICAL DATA (see also the figures under Dimensional Data)

Overall length	max. 279 mm*
Greatest dimensions of tube	
diagonal	383 mm
width	324 mm
height	262 mm
Minimum useful screen dimensions (projected)	
diagonal	352 mm
horizontal axis	292 mm
vertical axis	227 mm
area	665 cm^2
Recommended useful screen dimensions for alpha-numeric display	
diagonal	324 mm
horizontal axis	259 mm
vertical axis	194 mm
Implosion protection	rimband and/or anti-reflective face-plate
Bulb	EIA J-J380A1
Bulb contact designation	IEC 67-III-2; JEDEC J1-21
Base designation	IEC 67-1-31a; JEDEC B7-208
Basing	8 HR
Mass, without anti-reflective face-plate	approx. 4 kg

RATINGS (Absolute Maximum System); cathode drive

Unless otherwise specified voltage values are positive and measured with respect to grid 1.

Anode voltage	max. 19 kV min. 12 kV
Grid 4 (focusing electrode) voltage	−500 to + 1000 V
Grid 2 voltage	max. 700 V**
Cathode voltage	
negative bias value	max. 0 V
negative peak value	max. 2 V
positive bias value	max. 150 V
positive peak value	max. 400 V
Heater voltage	max. 7,3 V*** min. 5,3 V***
Cathode-to-heater voltage	max. 250 V

* If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

** For alpha-numeric display, i.e. low beam current ($< 200\ \mu A$), improved sharpness can be obtained by increasing grid 2 voltage to max. 700 V.

*** For maximum cathode life it is recommended that the heater supply be regulated at 6,3 V.

CIRCUIT DESIGN VALUES

Grid 4 current		
positive	max.	25 μA
negative	max.	25 μA
Grid 2 current		
positive	max.	5 μA
negative	max.	5 μA

MAXIMUM CIRCUIT VALUES

Resistance between cathode and heater	max.	1,0 MΩ
Impedance between cathode and heater	max.	0,1 MΩ
Grid 1 circuit resistance	max.	1,5 MΩ
Grid 1 circuit impedance	max.	0,5 MΩ

TYPICAL OPERATING CONDITIONS; cathode drive

Voltages are specified with respect to grid 1

Anode voltage	14 to 17 kV
Grid 4 (focusing electrode) voltage	0 to 400 V*
Grid 2 voltage	400 V**
Cathode cut-off voltage	36 to 66 V***

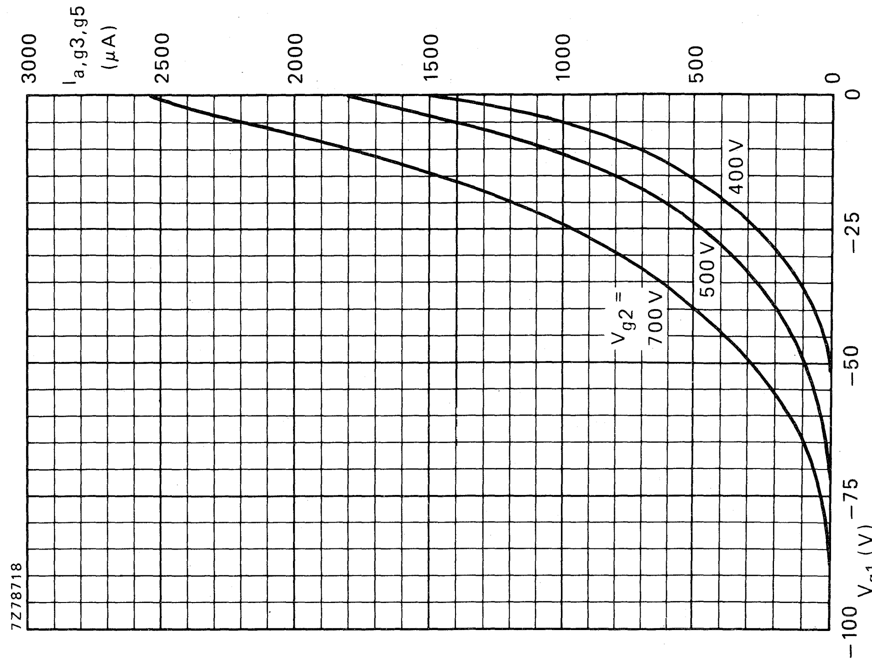
X-RADIATION CHARACTERISTIC

X-radiation emitted will not exceed 0,5 mR/h througout the useful life of the tube, when operated within the given ratings.

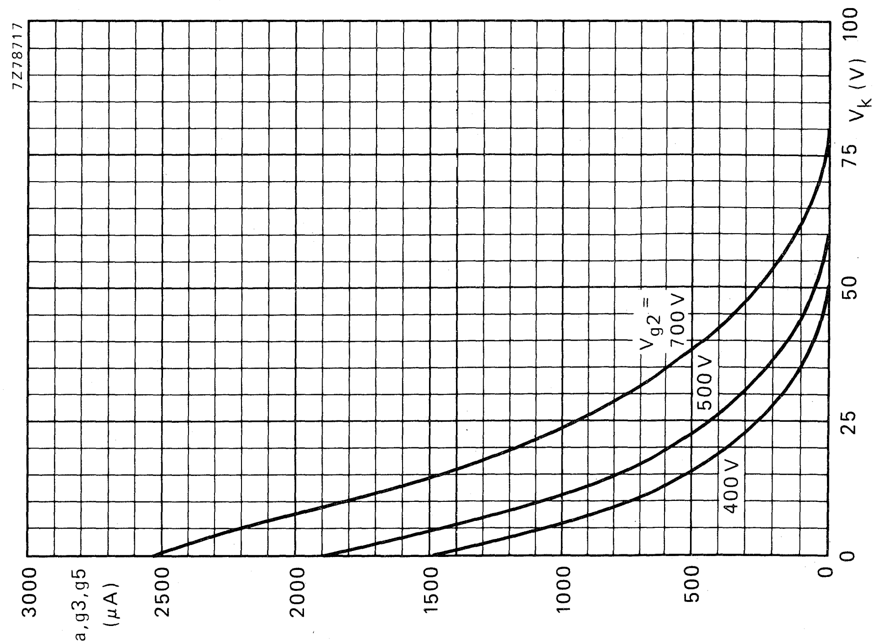
* Individual tubes will have optimum focus voltage within this range. In general an acceptable picture will be obtained with a fixed focus voltage.

** For alpha-numeric display, i.e. low beam current ($<$ 200 μA), improved sharpness can be obtained by increasing grid 2 voltage to max. 700 V.

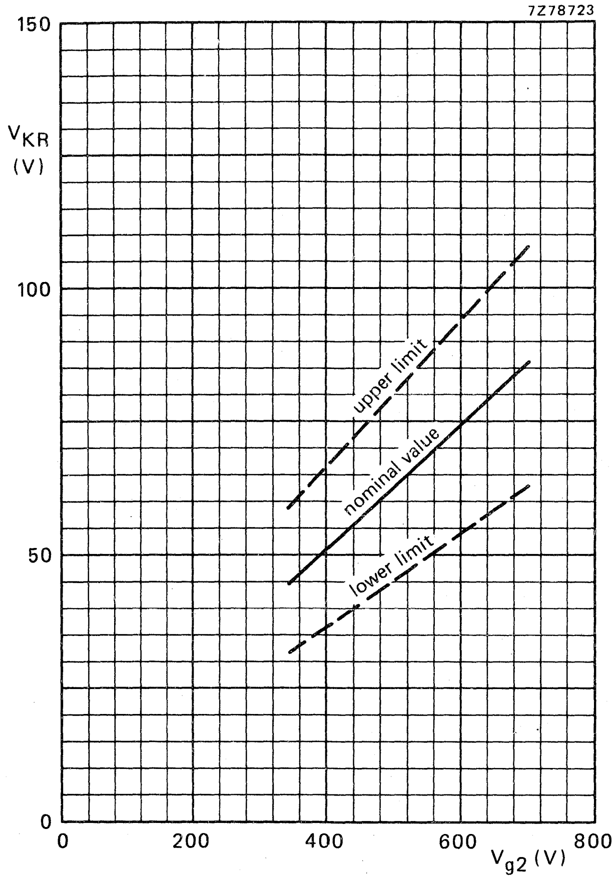
*** Visual extinction of focused raster.



Anode current as a function of grid 1 voltage.
Grid drive; $V_{a,g3,g5}$ = 17 kV.

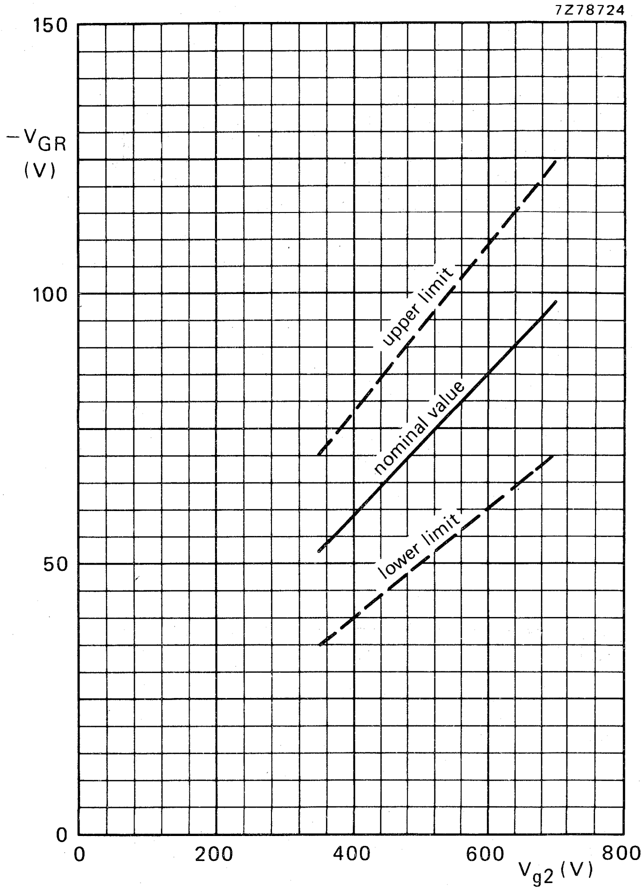


Anode current as a function of cathode voltage.
Cathode drive; $V_{a,g3,g5}$ = 17 kV.



Limits of cathode cut-off voltage as a function of grid 2 voltage.
Cathode drive; $V_{a,g3,g5}$ = 17 kV.

$$\frac{\Delta V_{KR}}{\Delta V_{a,g3,g5}} = 0{,}15 \times 10^{-3}$$

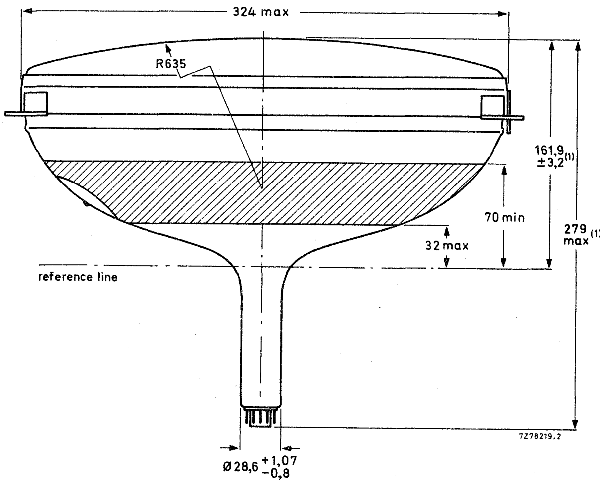


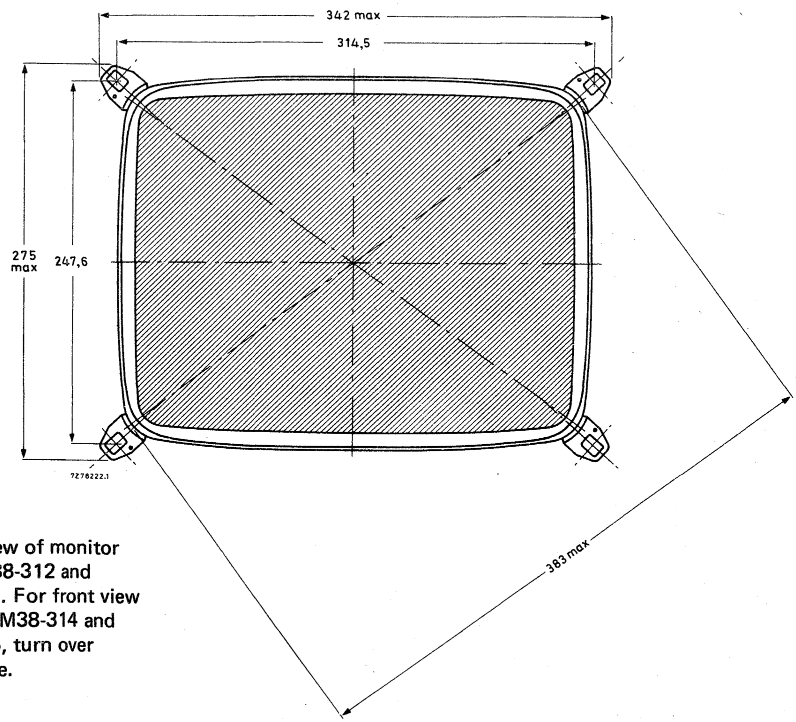
Limits of grid 1 cut-off voltage as a function of grid 2 voltage.
Grid drive; $V_{a,g3,g5} = 17$ kV.

$$\frac{\Delta V_{GR}}{\Delta V_{a,g3,g5}} = 0{,}15 \times 10^{-3}$$

DIMENSIONAL DATA

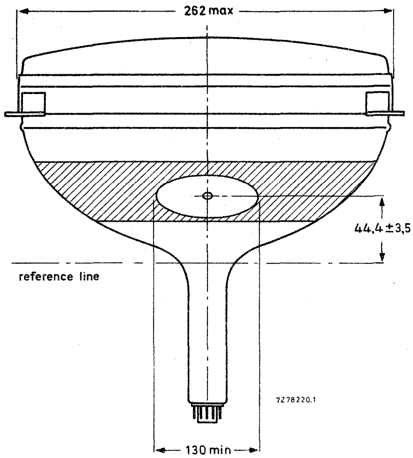
Dimensions in mm

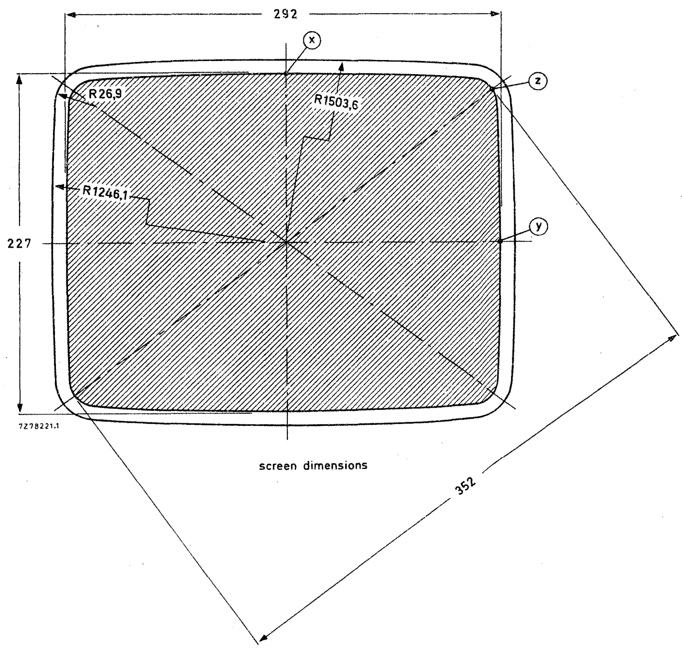




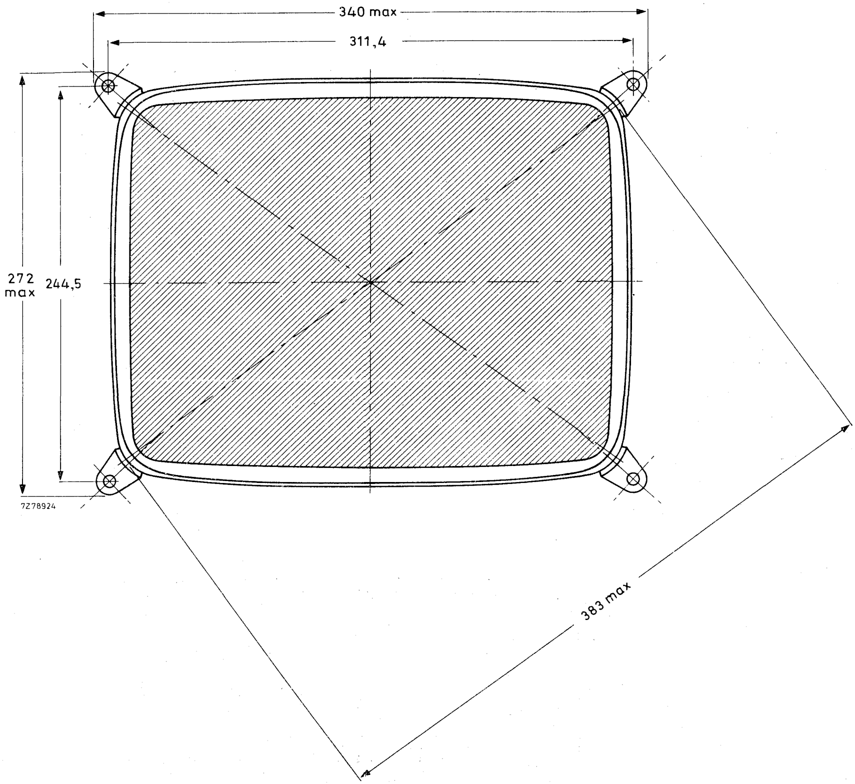
Front view of monitor tubes M38-312 and M38-313. For front view of tubes M38-314 and M38-315, turn over next page.

(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

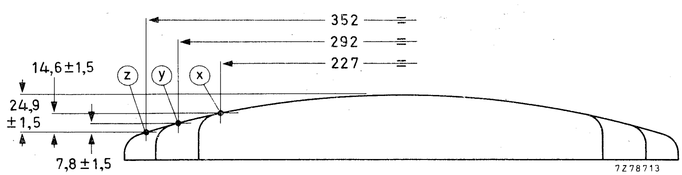


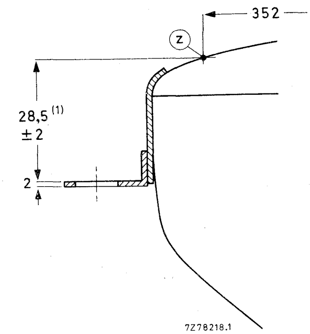


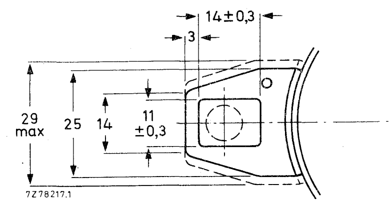
screen dimensions



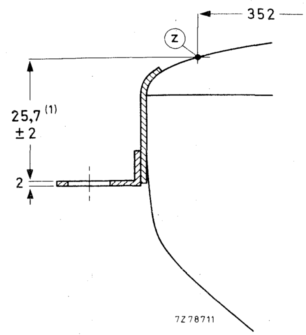
Front view of monitor tubes M38-314 and M38-315.

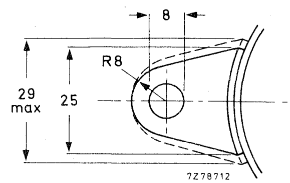




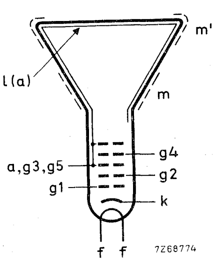


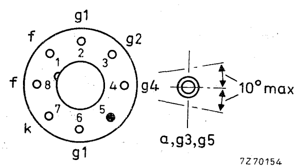
Monitor tubes M38-312 and M38-313.





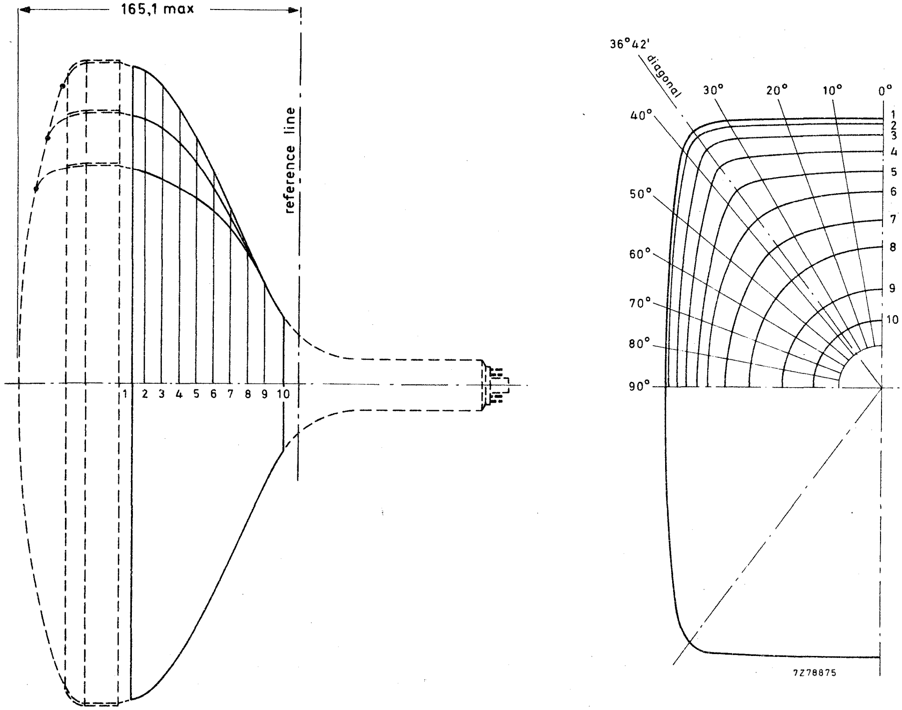
Monitor tubes M38-314 and M38-315.





(1) If an anti-reflective face-plate is present, this dimension has to be increased by approx. 5,5 mm.

Nominal cone contour



sec-tion	nominal distance from ref. line	distance from centre (nom. values)										
		0°	10°	20°	30°	diag.	40°	50°	60°	70°	80°	90°
1	98,4	157,9	160,1	167,1	179,4	186,0	179,2	161,9	144,8	134,1	128,6	126,7
2	90,0	155,6	157,6	164,5	176,6	183,1	175,5	159,0	142,4	131,7	126,3	124,4
3	80,0	148,8	150,4	156,8	168,2	174,3	166,7	151,0	135,9	126,3	121,4	119,8
4	70,0	139,5	140,9	146,3	155,9	160,4	154,4	141,3	128,6	120,4	116,4	114,6
5	60,0	127,3	129,3	133,4	140,8	143,3	138,8	128,1	118,7	112,8	109,6	108,9
6	50,0	114,4	115,1	117,7	122,4	124,5	121,7	114,3	111,3	104,1	102,2	101,7
7	40,0	98,9	98,0	99,7	102,3	104,1	102,6	98,6	95,3	93,3	92,3	92,1
8	30,0	82,6	81,7	82,0	82,4	82,6	81,5	80,8	79,7	79,1	78,7	78,4
9	20,0	59,7	59,7	59,7	59,7	59,7	59,7	59,7	59,7	59,7	59,7	59,7
10	10,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0

COMPONENTS FOR COLOUR TELEVISION

RECOMMENDED COMBINATIONS

The data sheets of the types mentioned in this list are arranged according to their type numbers on the following pages.

Picture tube deflection angle screen diagonal	A51-570X 90° 51 cm	A51-510X 110° 51 cm	A56-510X 110° 56 cm	A66-510X 110° 66 cm	A51-540X 110° 51 cm	A56-540X 110° 56 cm	A66-540X 110° 66 cm
Deflection unit	AT1235/00	AT1085	AT1083/01	AT1080	AT1250	AT1260	AT1270
Multipole unit	AT1052	AT1081					
Degaussing coil single insulation double insulation	3122 138 94440	3122 138 75940		3122 138 75580	3122 138 75940 or 3122 138 94380		3122 138 75580 or 3122 138 94350
Mains filter choke		AT4043/55			AT4043/55		
Filtering coil		AT4043/15					
Switched-mode driver transformer	AT4043/58				AT4043/45		
Switched-mode transformer	AT2097/01						
Mains transformer					TS561/2		
Current sensing transformer					AT4043/46		
Power-pack system supply choke					AT4043/52		
Sync. power-pack transformer					AT2076/70		
Line output transformer	AT2076/30	AT2076/30					
Power-pack system line choke					AT4043/53		
Line driver transformer		AT4043/87			(AT4043/87)**		

Linearity control unit	(AT4042/02)*	AT4042/38	AT4042/41 or AT4042/42
East-West correction			
bridge coil		AT4043/38	
loading coil		AT4044/20	
Tolerance compensation			
line balance coil		AT4044/26	
4-pole adjusting coil		AT4044/27	

Delay lines

System:	
PAL	DL600, DL700
PAL/SECAM	DL610, DL710
Brazilian PAL-M▲	DL63
Argentinian PAL-N▲	DL720
NTSC▲	DL750

Quartz crystal units

Frequency	Catalogue no.
4433, 619 kHz	4322 143 04040
	4322 152 01100
8867, 238 kHz	4322 143 03120
	4322 143 04050

Data will be included in 1979 issue of handbook CM9.

* Optional.
** If separate line drive is required.
▲ Data on these types are available separately.

NON-PREFERRED TYPES

The following types are non-preferred. Data on these types are not included in this handbook, they are available on request.

Deflection units	AT1062/01 AT1063/01
Blue lateral units	AT1068/03 AT1068/04

MULTI-POLE UNIT

QUICK REFERENCE DATA

Horizontal/vertical beam displacement (2-pole)	min.	13 mm
Static convergence		
red opposite to blue in any direction (4-pole)	min.	5 mm
red-blue with respect to green in any direction (6-pole)	min.	2,5 mm

APPLICATION

The unit has been designed for colour picture tubes with a neck diameter of 29,1 mm in conjunction with deflection unit DT1230 or DT1235.

The purpose of the unit is:
- static convergence adjustment by means of the 4 and 6-pole rings;
- colour purity adjustment and adjustment of raster symmetry in N and S by means of the 2-pole rings.

DESCRIPTION

The unit incorporates six ring-shaped permanent magnets, supported by a non-magnetic plastic housing and a collet, which enables the unit to be clamped to the neck of the picture tube.

The magnetic rings comprise:
- one pair of 2-pole magnets
- one pair of 4-pole magnets
- one pair of 6-pole magnets

Rotating the 2 rings of a pair in opposite directions varies the *resultant field strength.* Rotating a pair of rings in the same direction varies the *direction of the resultant field.*

When the adjustment is finished, the rings are fixed in their position by a clamping ring.

MECHANICAL DATA

Outlines

See Fig. 1 on next page.

Dimensions in mm, and in inches between brackets

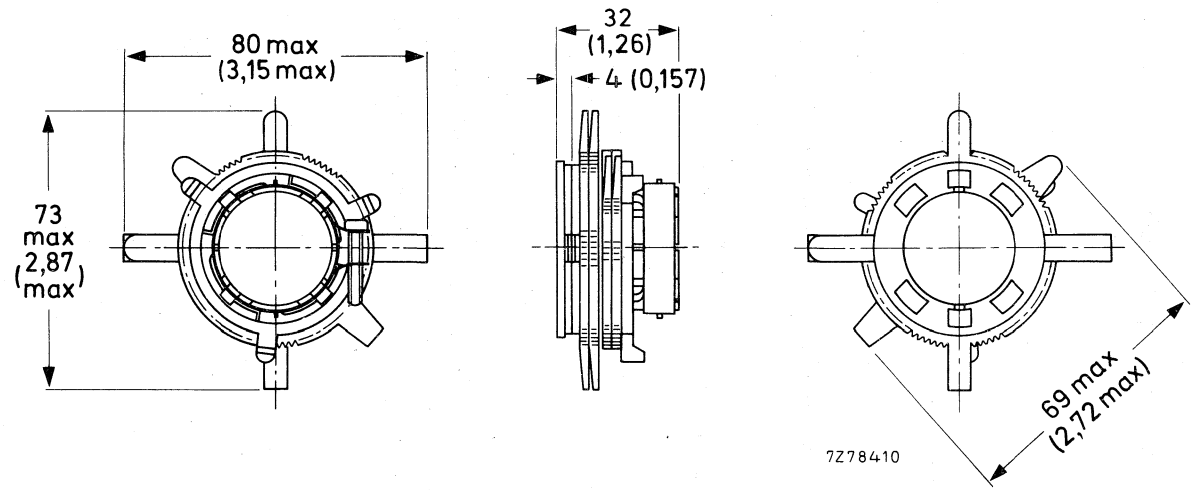


Fig. 1.

The multi-pole unit fits a tube with a neck diameter of $29{,}1\,^{+1{,}5}_{-0{,}7}$ mm ($1{,}146\,^{+0{,}028}_{-0{,}059}$ inch).

Mounting

The unit should be mounted according to Fig. 2. It will be clamped by turning the screw in the metal clamping ring with a torque of 1 Nm.

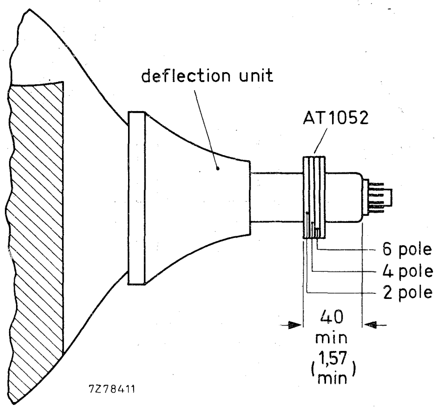


Fig. 2 Relative placement of deflection components on the colour picture tube.

ADJUSTMENTS

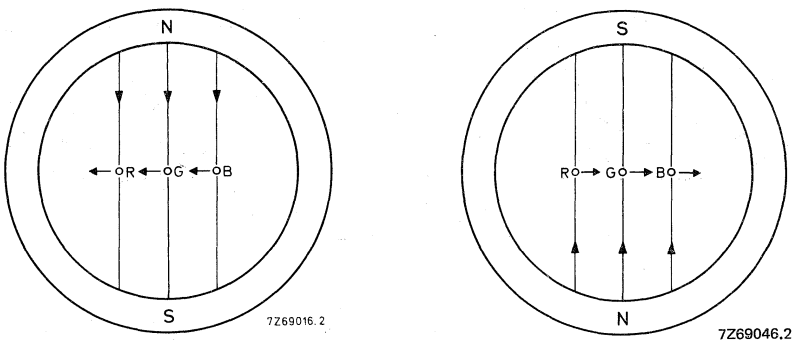
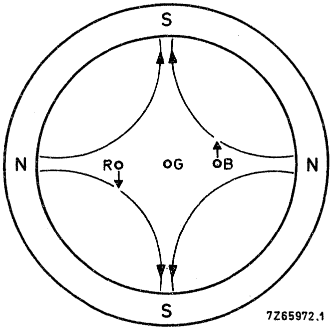


Fig. 3.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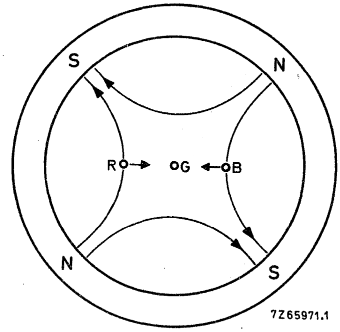
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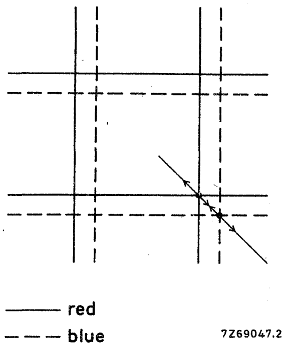
red
blue
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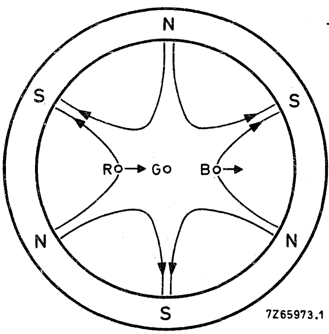
Fig. 4.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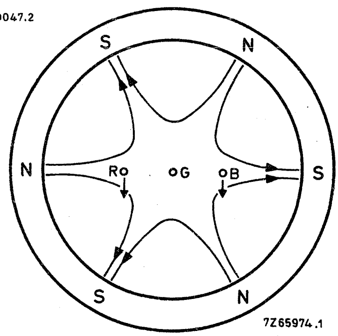
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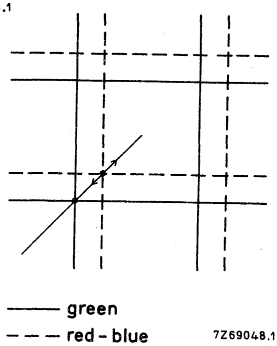

green
red - blue
7Z69048.1

Fig. 5.

3122 137 14000

DEFLECTION UNIT

- with built-in 4-pole coils for symmetrizing of the line and field astigmatism

QUICK REFERENCE DATA

Picture tube, gun arrangement	in line
diagonal	66 cm (26 in)
neck diameter	36,5 mm
Deflection angle	110°
Line deflection current, edge to edge at 25 kV	6,35 A p-p
Inductance of line coils, parallel connected	1,11 mH
Field deflection current, edge to edge at 25 kV	3,4 A p-p
Resistance of field coils, series connected	3,0 Ω
4-pole coils,	
sensitivity for line direction	± max. 34 mm/A
sensitivity for field direction	± max. 23 mm/A
resistance (series connected)	1,6 Ω

APPLICATION

This deflection unit has been designed for use with the 110° colour picture tube types A66-500X and A66-510X in CTV receivers in conjunction with:

diode-split line output transformer	AT2076/30 and
line output transistor	BU208A
linearity control unit	AT4042/38
multipole unit	AT1081

DESCRIPTION (see Fig. 1)

The saddle-shaped line and field deflection coils, and the Ferroxcube yoke ring with 4-pole unit, are supported by a plastic cap. This set is built into a plastic coaxial housing, which is provided with a plastic axial alignment ring. The complete unit is fastened on the neck of the colour picture tube with a clamping ring. The screw of the clamping ring is accessible with a screwdriver via a recess in the axial alignment ring. To correct the raster orientation with the complete unit in position on the picture tube neck, the coil assembly can be rotated by means of the protruding parts on the supporting ring, which can be reached at the top and bottom recesses in the coaxial housing. It is locked against rotation by pushing the two levers completely down. The axial alignment ring enables the set to be axially adjusted over a distance of 5 mm. This should be done by moving the coil assembly from its most forward position backwards until the colour purity is correct. The coil assembly is then locked by pushing one of the locking clamps under the axial alignment ring.
The unit meets the self-extinguishing requirements of IEC 65 para. 14.4 and UL94, SE1.

MECHANICAL DATA

Dimensions in mm

Outlines

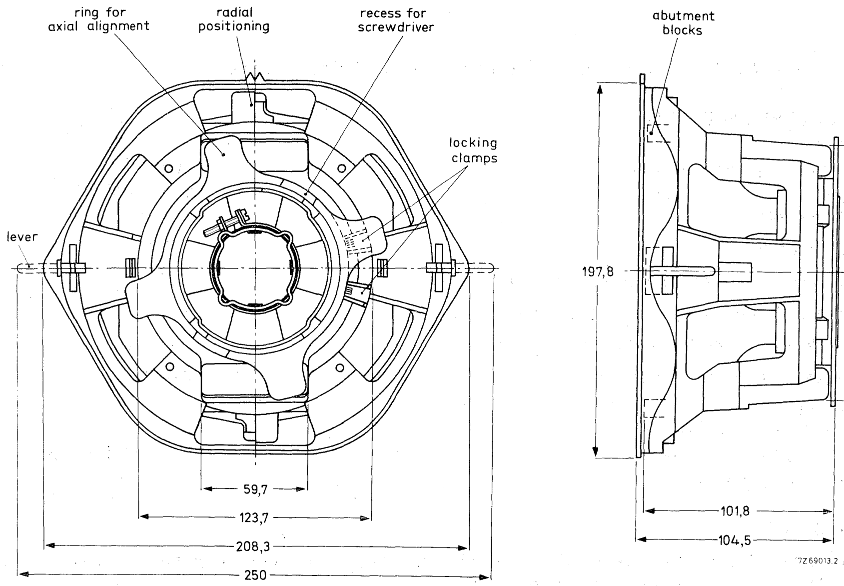


Fig. 1.

The unit is provided with soldering pins for connection.

Mounting

To obtain easily reproducible and accurate alignment of the picture tube and the deflection unit, the cone of the picture tube has a moulded indexing ridge to centre the deflection unit housing. The deflection unit is brought into correct position by alignment of the protrusion on the housing with the location mark on the cone of the tube. The unit must be pressed against the cone, so that the housing is indexed by the moulded ridge on the cone. The unit is then fixed by tightening the screw in the clamping ring at the rear. The screw should be tightened with a torque of 1,2 to 1,4 Nm.

ELECTRICAL DATA

Line coils, parallel connected	
inductance	1,11 mH ± 4%
resistance at 25 °C	1,2 Ω ± 10%
Line deflection current, edge to edge at 25 kV	6,35 A p-p
Field coils, series connected	
inductance	3,5 mH ± 10%
resistance at 25 °C	3,0 Ω ± 7%
Field deflection current, edge to edge at 25 kV	3,35 A p-p
4-pole coils,	
sensitivity for line direction	± max. 34 mm/A
sensitivity for field direction	± max. 23 mm/A
resistance (series connected)	1,6 Ω
Maximum operating temperature	95 °C

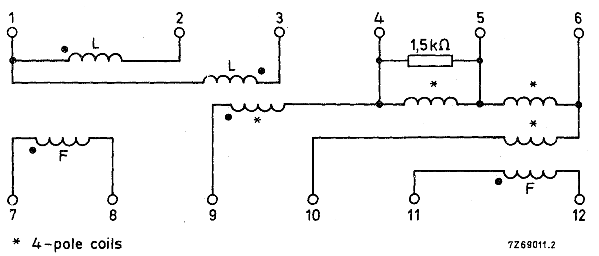


Fig. 2 Connection diagram. L = Line, F = Field.

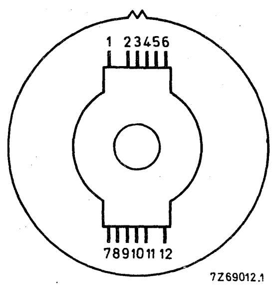


Fig. 3 Terminal location. The pin numbering corresponds to that in Fig. 2.

BEAM CORRECTIONS

With the deflection unit AT1080 and the multipole unit AT1081 mounted on the tube A66-500X or A66-510X, the following corrections may be required:

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of the AT1081 (note 1)	45 μm
Static convergence deviations must be corrected by the adjustable four-pole and six-pole fields of the AT1081 centred around the tube axis.	
Maximum required compensation for static convergence	
4-pole device: red opposite to blue (in any direction)	6 mm
6-pole device: red and blue to green (in any direction)	3 mm

Notes, see page 4.

North-South raster shape correction circuitry is not required.

To obtain a symmetrical shape for the horizontal lines at the upper and lower parts of the screen, the unit AT1081 comprises an additional two-pole correction magnet giving a displacement of the beam in the centre of the screen in vertical direction of maximum 5 mm

Maximum centring error in any direction after colour-purity, static convergence, and horizontal centre line correction 5 mm

With respect to dynamic convergence, the display system, consisting of picture tube A66-500X or A66-510X and deflection unit AT1080, is inherently self converging. However, a small systematic correction is required on the vertical axis, and also small corrections should be made to compensate for tolerances and asymmetries in the tube and deflection unit combination. For this purpose two types of dynamic magnetic four-pole fields can be used. One is generated by additional windings on the yoke ring of the deflection unit energized by adjustable sawtooth currents synchronized with scanning. The other type is generated by sawtooth and parabolic currents which are synchronized with scanning and flow through the deflection coils.

Compensation to be provided by these corrections:

– horizontal red-to-blue distance at the end of the horizontal axis (line symmetry)	(note 2)	0 ± 2 mm
– horizontal red-to-blue distance at the top of the vertical axis (field symmetry top)	(note 3)	3,5 ± 1,5 mm
– horizontal red-to-blue distance at the bottom of the vertical axis (field symmetry bottom)	(note 3)	3,5 ± 1,5 mm
– vertical red-to-blue distance at the ends of the horizontal axis in opposite directions (line balance)	(note 4)	0 ± 1,5 mm
– vertical red-to-blue distance at the ends of the vertical axis (field balance)	(note 5)	0 ± 1,2 mm

Application information available on request.

Notes
1. Purity adjustment in vertical direction is not required.
2. This correction is made by feeding a sawtooth current of line frequency through the additional four-pole windings on the deflection unit.
3. This correction is made by feeding a rectified sawtooth current of field frequency through the additional four-pole windings on the deflection unit.
4. This correction is made by unbalancing the line deflection coils.
5. This correction is made by unbalancing the field deflection coils.

3122 137 56060

MULTIPOLE UNIT

QUICK REFERENCE DATA

Horizontal beam displacement for colour purity (2-pole)	for undeflected beams min.	45	μm
Static convergence			
red opposite to blue in any direction (4-pole)	min.	8	mm
red-blue with respect to green in any direction (6-pole)	min.	4	mm
Vertical displacement for optimum straightness of the horizontal lines (2-pole)	min.	5	mm

APPLICATION

This unit has been designed for the colour picture tubes A66-500X, A66-510X, A56-500X, A56-510X, A51-500X and A51-510X, with in-line gun arrangement and the deflection units AT1080, AT1083/01 and AT1085. Its purpose is threefold:

- horizontal colour-purity adjustment
- static convergence adjustment
- adjustment of raster symmetry in N and S or adjustment of the horizontal axis for optimum straightness.

DESCRIPTION

The unit incorporates four ring-shaped permanent magnets, supported by non-magnetic plastic support rings, and a cam-actuated collet, which enables the unit to be clamped to the neck of the picture tube. The magnetic rings are made up of an inner and an outer ring coupled by non-magnetic pinion gears to form an epicyclic train. The support rings carry the pinion gears. The magnetic rings comprise:

- two pairs of 2-pole magnets
- one pair of 4-pole magnets
- one pair of 6-pole magnets

(each pair consisting of an inner and outer ring of identical magnetic configuration). The support rings of both the 2-pole rings are fixed to the collet, those of the 4- and 6-pole rings are rotatable. Rotating the lug on an outer magnetic ring varies the *resultant field strength.*
Rotating the lug on a support ring varies the *direction of the resultant field.*

MECHANICAL DATA

Outlines

See Fig. 1 on next page.

Dimensions in mm

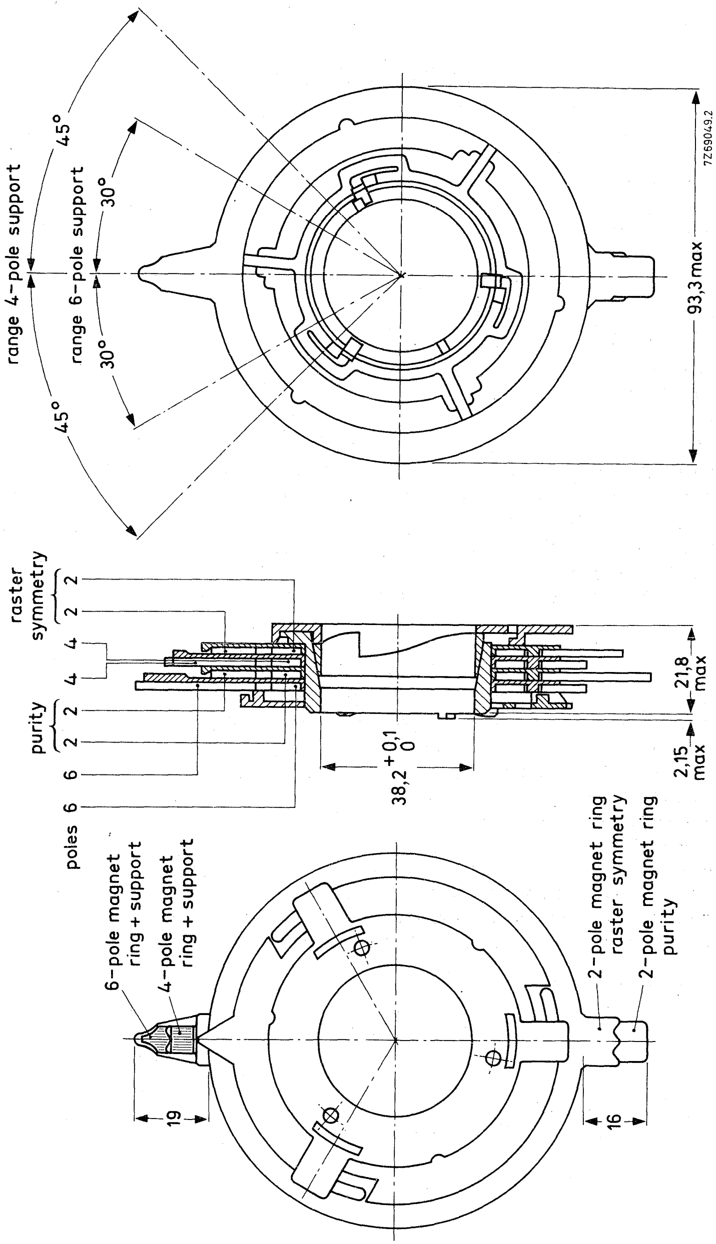


Fig. 1.

Mounting

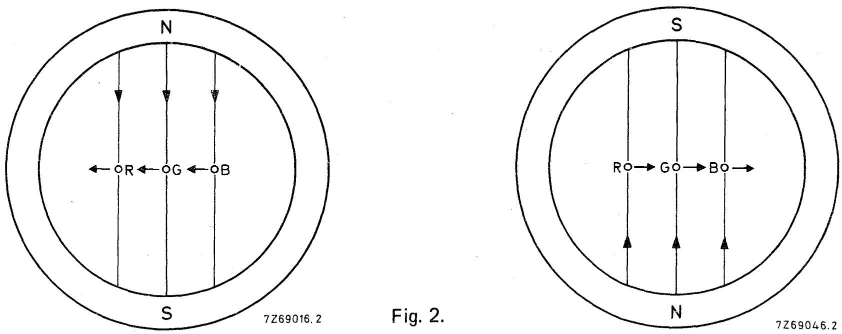
Before mounting the multipole unit, the lug on the rear end of the collet must be rotated anti-clockwise. The unit is slid over the neck of the picture tube and pressed to the deflection unit. Two protrusions on the front of the unit and the corresponding recesses on the back of the deflection unit, will bring the unit into correct position. By rotating the lug on the collet clockwise the unit will be clamped.

ADJUSTMENTS

Horizontal colour purity is obtained by varying the field strength of the 2-pole magnet situated between the 4-pole and 6-pole magnets (see Figs 1 and 2).

Vertical colour purity adjustment is not required (see data on colour picture tubes).

The *static convergence* is adjusted by varying the field strength and direction of the 4-pole and 6-pole. The 4-pole field moves the outer electron beams (red and blue) equally in opposite directions (see Fig. 3). The 6-pole field moves the outer electron beams equally in the same direction (see Fig. 4). The centre beam (green) is unaffected. Horizontal axis or raster symmetry is adjusted by varying the field strength of the 2-pole magnet situated at the rear of the unit (see Fig. 1). All three beams are equally moved in a vertical direction (see Fig. 5).



a

Fig. 2.

b

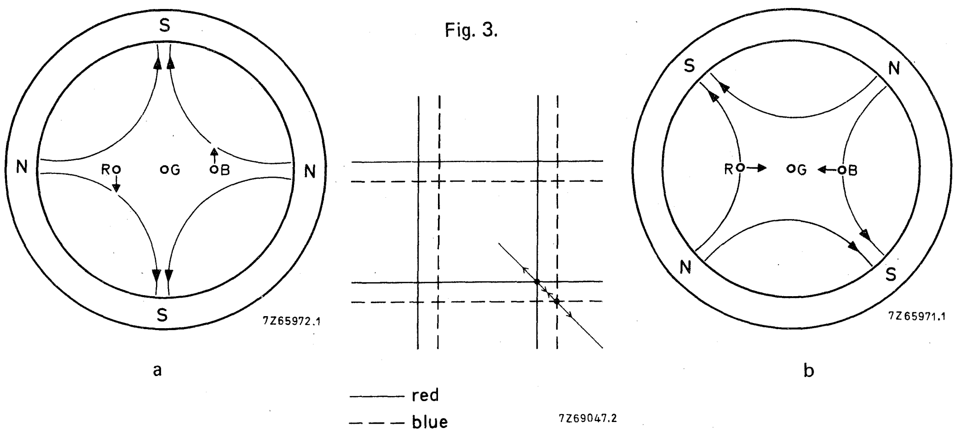
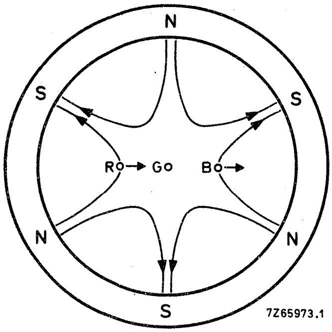


Fig. 3.

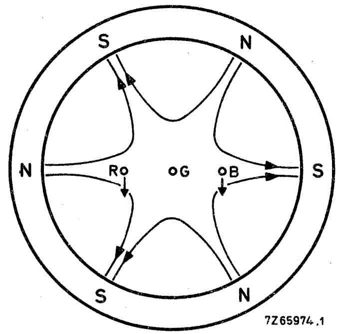
a

b

c

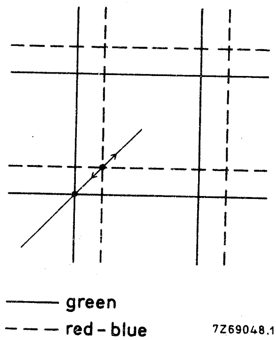


a



b

Fig. 4.



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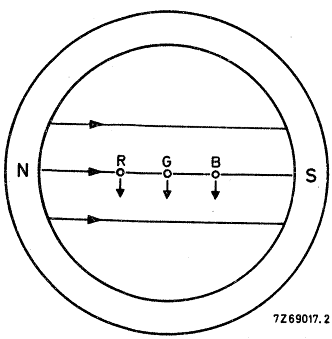
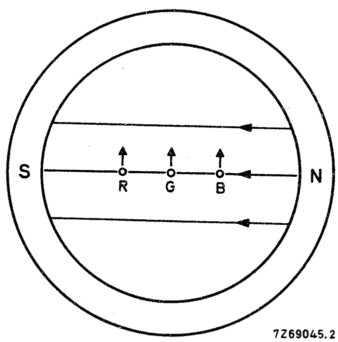


a



b

Fig. 5.

3122 137 15760

DEFLECTION UNIT

- with built-in 4-pole coils for symmetrizing of the line and field astigmatism

QUICK REFERENCE DATA

Picture tube, gun arrangement	in line
diagonal	55 cm (22 in)
neck diameter	36,5 mm
Deflection angle	110°
Line deflection current, edge to edge at 25 kV	6,2 A p-p
Inductance of line coils, parallel connected	1,14 mH
Field deflection current, edge to edge at 25 kV	3,4 A p-p
Resistance of field coils, series connected	3,36 Ω
4-pole coils,	
sensitivity for line direction	± max. 25 mm/A
sensitivity for field direction	± max. 18 mm/A
resistance (series connected)	1,4 Ω

APPLICATION

This deflection unit has been designed for use with the 110° colour picture tube types A56-500X and A56-510X in CTV receivers in conjunction with:

diode-split line output transformer	AT2076/30 and
line output transistor	BU208A
linearity control unit	AT4042/38
multipole unit	AT1081

DESCRIPTION (see Fig. 1)

The saddle-shaped line and field deflection coils, and the Ferroxcube yoke ring with 4-pole unit, are supported by a plastic cap. This set is built into a plastic coaxial housing, which is provided with a plastic axial alignment ring. The complete unit is fastened on the neck of the colour picture tube with a clamping ring. The screw of the clamping ring is accessible with a screwdriver via a recess in the axial alignment ring. To correct the raster orientation with the complete unit in position on the picture tube neck, the coil assembly can be rotated by means of the protruding parts on the supporting ring, which can be reached at the top and bottom recesses in the coaxial housing. It is locked against rotation by pushing the two levers completely down. The axial alignment ring enables the set to be axially adjusted over a distance of 5 mm. This should be done by moving the coil assembly from its most forward position backwards until the colour purity is correct. The coil assembly is then locked by pushing one of the locking clamps under the axial alignment ring.
The unit meets the self-extinguishing requirements of IEC 65 para. 14.4 and UL94, SE1.

MECHANICAL DATA

Dimensions in mm

Outlines

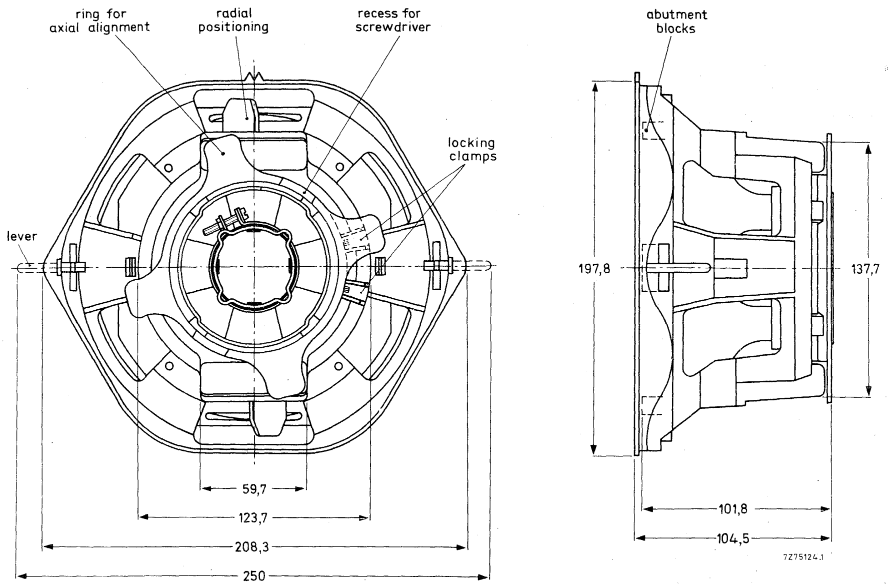


Fig. 1.

The unit is provided with soldering pins for connection.

Mounting

To obtain easily reproducible and accurate alignment of the picture tube and the deflection unit, the cone of the picture tube has a moulded indexing ridge to centre the deflection unit housing. The deflection unit is brought into correct position by alignment of the protrusion on the housing with the location mark on the cone of the tube. The unit must be pressed against the cone, so that the housing is indexed by the moulded ridge on the cone. The unit is then fixed by tightening the screw in the clamping ring at the rear. The screw should be tightened with a torque of 1,2 to 1,4 Nm.

ELECTRICAL DATA

Line coils, parallel connected	
inductance	1,14 mH ± 4%
resistance at 25 °C	0,9 Ω ± 10%
Line deflection current, edge to edge at 25 kV	6,2 A p-p
Field coils, series connected	
inductance	3,9 mH ± 10%
resistance at 25 °C	3,36 Ω ± 7%
Field deflection current, edge to edge at 25 kV	3,4 A p-p
4-pole coils,	
sensitivity for line direction	± max. 25 mm/A
sensitivity for field direction	± max. 18 mm/A
resistance (series connected)	1,4 Ω
Maximum operating temperature	95 °C

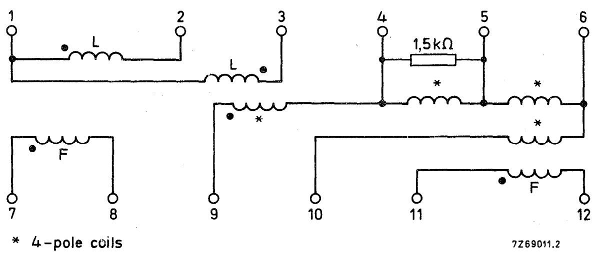


Fig. 2 Connection diagram. L = Line, F = Field.

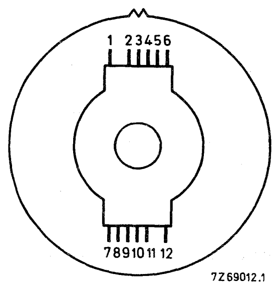


Fig. 3 Terminal location. The pin numbering corresponds to that in Fig. 2.

BEAM CORRECTIONS

With the deflection unit AT1083/01 and the multipole unit AT1081 mounted on the tube A56-500X or A56-510X, the following corrections may be required:

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of the AT1081 (note 1)	45 μm
Static convergence deviations must be corrected by the adjustable four-pole and six-pole fields of the AT1081 centred around the tube axis.	
Maximum required compensation for static convergence	
4-pole device: red opposite to blue (in any direction)	5,5 mm
6-pole device: red and blue to green (in any direction)	2,8 mm

Notes, see page 4.

North-South raster shape correction circuitry is not required

To obtain a symmetrical shape for the horizontal lines at the upper and lower parts of the screen, the unit AT1081 comprises an additional two-pole correction magnet giving a displacement of the beam in the centre of the screen in vertical direction of maximum — 4,5 mm

Maximum centring error in any direction after colour-purity, static convergence, and horizontal centre line correction — 4,5 mm

With respect to dynamic convergence, the display system, consisting of picture tube A56-500X or A56-510X and deflection unit AT1083/01 is inherently self converging. However, small corrections should be made to compensate for tolerances and symmetries in the tube and deflection unit combination. For this purpose two types of dynamic magnetic four-pole fields can be used. One generated by additional windings on the yoke ring of the deflection unit energized by adjustable sawtooth currents synchronized with scanning. The other type is generated by sawtooth and parabolic currents which are synchronized with scanning and flow through the deflection coils.

Compensation to be provided by these corrections:

– horizontal red-to-blue distance at the end of the horizontal axis (line symmetry)	(note 2)	0 ± 1,5 mm
– horizontal red-to-blue distance at the ends of the vertical axis (field symmetry)	(note 3)	0 ± 1,5 mm
– vertical red-to-blue distance at the ends of the horizontal axis in opposite directions (line balance)	(note 4)	0 ± 1,0 mm
– vertical red-to-blue distance at the ends of the vertical axis (field balance)	(note 5)	0 ± 1,0 mm

Application information available on request.

Notes
1. Purity adjustment in vertical direction is not required.
2. This correction is made by feeding a sawtooth current of line frequency through the additional four-pole windings on the deflection unit.
3. This correction is made by feeding a rectified sawtooth current of field frequency through the additional four-pole windings on the deflection unit.
4. This correction is made by unbalancing the line deflection coils.
5. This correction is made by unbalancing the field deflection coils.

3122 137 15660

DEFLECTION UNIT

- with built-in 4-pole coils for symmetrizing of the line and field astigmatism

QUICK REFERENCE DATA

Picture tube, gun arrangement	in line
diagonal	51 cm (20 in)
neck diameter	36,5 mm
Deflection angle	110°
Line deflection current, edge to edge at 25 kV	6,2 A p-p
Inductance of line coils, parallel connected	1,14 mH
Field deflection current, edge to edge at 25 kV	3,4 A p-p
Resistance of field coils, series connected	3,36 Ω
4-pole coils,	
sensitivity for line direction	± max. 23 mm/A
sensitivity for field direction	± max. 16 mm/A
resistance (series connected)	1,4 Ω

APPLICATION

This deflection unit has been designed for use with the 110° colour picture tube types A51-500X and A51-510X in CTV receivers in conjunction with:

diode-split line output transformer	AT2076/30 and
line output transistor	BU208A
linearity control unit	AT4042/38
multipole unit	AT1081

DESCRIPTION (see Fig. 1)

The saddle-shaped line and field deflection coils, and the Ferroxcube yoke ring with 4-pole unit, are supported by a plastic cap. This set is built into a plastic coaxial housing, which is provided with a plastic axial alignment ring. The complete unit is fastened on the neck of the colour picture tube with a clamping ring. The screw of the clamping ring is accessible with a screwdriver via a recess in the axial alignment ring. To correct the raster orientation with the complete unit in position on the picture tube neck, the coil assembly can be rotated by means of the protruding parts on the supporting ring, which can be reached at the top and bottom recesses in the coaxial housing. It is locked against rotation by pushing the two levers completely down. The axial alignment ring enables the set to be axially adjusted over a distance of 5 mm. This should be done by moving the coil assembly from its most forward position backwards until the colour purity is correct. The coil assembly is then locked by pushing one of the locking clamps under the axial alignment ring.
The unit meets the self-extinguishing requirements of IEC 65 para. 14.4 and UL94, SE1.

MECHANICAL DATA

Dimensions in mm

Outlines

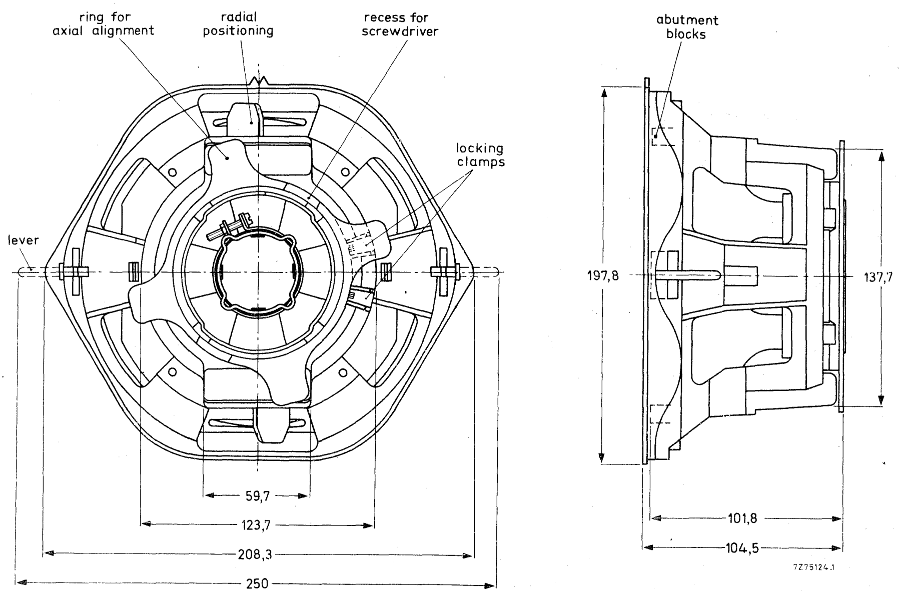


Fig. 1.

The unit is provided with soldering pins for connection.

Mounting

To obtain easily reproducible and accurate alignment of the picture tube and the deflection unit, the cone of the picture tube has a moulded indexing ridge to centre the deflection unit housing. The deflection unit is brought into correct position by alignment of the protrusion on the housing with the location mark on the cone of the tube. The unit must be pressed against the cone, so that the housing is indexed by the moulded ridge on the cone. The unit is then fixed by tightening the screw in the clamping ring at the rear. The screw should be tightened with a torque of 1,2 to 1,4 Nm.

ELECTRICAL DATA

Line coils, parallel connected	
inductance	1,14 mH ± 4%
resistance at 25 °C	0,9 Ω ± 10%
Line deflection current, edge to edge at 25 kV	6,2 A p-p
Field coils, series connected	
inductance	3,9 mH ± 10%
resistance at 25 °C	3,36 Ω ± 7%
Field deflection current, edge to edge at 25 kV	3,4 A p-p
4-pole coils,	
sensitivity for line direction	± max. 23 mm/A
sensitivity for field direction	± max. 16 mm/A
resistance (series connected)	1,4 Ω
Maximum operating temperature	95 °C

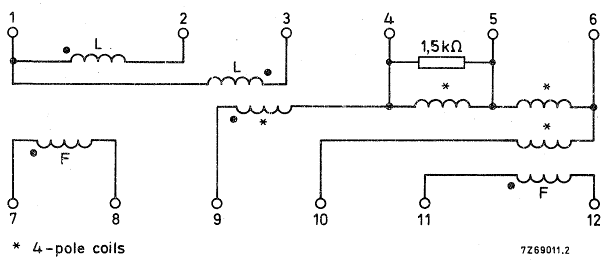


Fig. 2 Connection diagram. L = Line, F = Field.

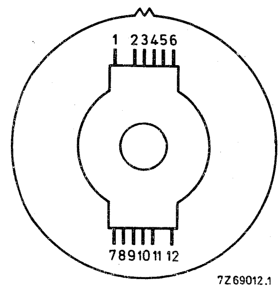


Fig. 3 Terminal location. The pin numbering corresponds to that in Fig. 2.

BEAM CORRECTIONS

With the deflection unit AT1085 and the multipole unit AT1081 mounted on the tube A51-500X or A51-510X the following corrections may be required:

Maximum required horizontal displacement of the electron beams with respect to the phosphor stripes by the purifying magnet of the AT1081 (note 1)	45 μm
Static convergence deviations must be corrected by the adjustable four-pole and six-pole fields of the AT1081 centred around the tube axis.	
Maximum required compensation for static convergence	
4-pole device: red opposite to blue (in any direction)	5 mm
6-pole device: red and blue to green (in any direction)	2,5 mm

Notes, see page 4.

North-South raster shape correction circuitry is not required.

To obtain a symmetrical shape for the horizontal lines at the upper and lower parts of the screen, the unit AT1081 comprises an additional two-pole correction magnet giving a displacement of the beam in the centre of the screen in vertical direction of maximum	4 mm
Maximum centring error in any direction after colour-purity, static convergence, and horizontal centre line correction	4 mm

With respect to dynamic convergence, the display system, consisting of picture tube A51-500X or A51-510X and deflection unit AT1085 is inherently self converging. However, a small fixed line parabola correction of 1,3 mm, is required on the horizontal axis and also small corrections should be made to compensate for tolerances and asymmetries in the tube and deflection unit combination. For this purpose two types of dynamic magnetic four-pole fields can be used. One is generated by additional windings on the yoke ring of the deflection unit energized by adjustable sawtooth currents synchronized with scanning. The other type is generated by sawtooth and parabolic currents which are synchronized with scanning and flow through the deflection coils.

Compensation to be provided by these corrections:

— horizontal red-to-blue distance at the end of the horizontal axis (line symmetry)	(note 2)	0 ± 1,5 mm
— horizontal red-to-blue distance at the ends of the vertical axis (field symmetry)	(note 3)	0 ± 1,5 mm
— vertical red-to-blue distance at the ends of the horizontal axis in opposite directions (line balance)	(note 4)	0 ± 1,0 mm
— vertical red-to-blue distance at the ends of the vertical axis (field balance)	(note 5)	0 ± 1,0 mm

Application information available on request.

Notes
1. Purity adjustment in vertical direction is not required.
2. This correction is made by feeding a sawtooth current of line frequency through the additional four-pole windings on the deflection unit.
3. This correction is made by feeding a rectified sawtooth current of field frequency through the additional four-pole windings on the deflection unit.
4. This correction is made by unbalancing the line deflection coils.
5. This correction is made by unbalancing the field deflection coils.

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube, gun arrangement	in line
diagonal	51 cm (20 in)
neck diameter	29,1 mm
Deflection angle	90°
Line deflection current, edge to edge at 25 kV	2,75 A p-p
Inductance of line coils, parallel connected	2,3 mH
Field deflection current, edge to edge at 25 kV	0,86 A p-p
Resistance of field coils, parallel connected	12,4 Ω

APPLICATION

This deflection unit is designed for 90° in-line colour picture tubes with a neck diameter of 29,1 mm, to operate in conjunction with devices for colour purity and static convergence.

DESCRIPTION

The deflection unit consists of saddle-shape horizontal coils and toroidal wound vertical coils, thus forming a hybrid yoke. The unit is provided with a metal non-magnetic clamping ring at the rear, to fix the deflection unit on the neck of the picture tube. With the deflection unit positioned axially for optimum purity, a clearance is available at the front which permits adjustment of convergence by tilting the unit in the vertical and/or horizontal plane. Wedges are recommended to secure the deflection unit in the chosen position.

MECHANICAL DATA

Outlines

Dimensions in mm

The deflection unit fits a tube with a neck diameter of $29,1 ^{+0,9}_{-0,7}$ mm .

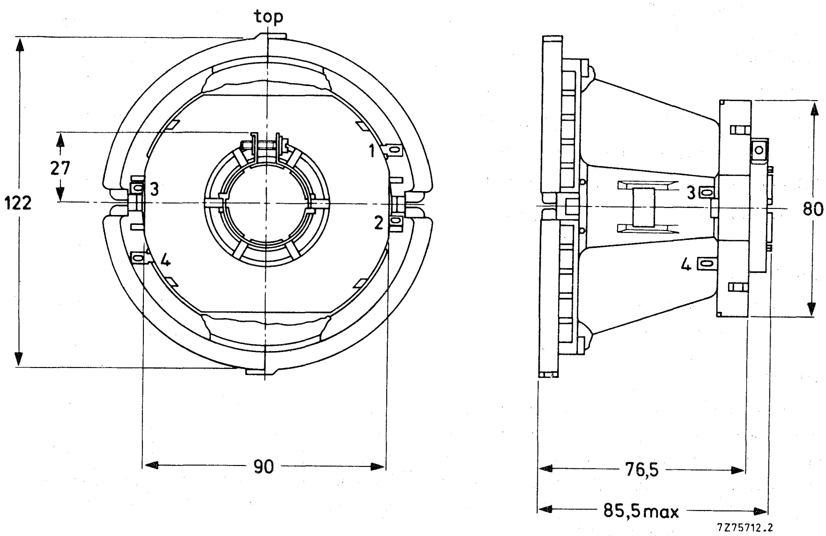


Fig. 1.

Maximum operating temperature (average copper temperature measured with resistance method)	+90 °C
Storage temperature range	−20 to +90 °C
Flame retardent	according to UL test 492.3 V.E.1
Torque on neck clamp screw	1,4 Nm

ENVIRONMENTAL TEST SPECIFICATIONS

Vibration	IEC68-2-6 (test Fc)
Bump	IEC68-2-29 (test Eb)
Cold	IEC68-2-1 (test Ab)
Dry heat	IEC68-2-2 (test Bb)
Damp heat, steady state	IEC68-2-3 (test Ca)
Cyclic damp heat	IEC68-2-30 (test Db)
Change of temperature	IEC68-2-14 (test Na)

ELECTRICAL DATA

Horizontal coils	
Inductance at 1 V (r.m.s.), 1 kHz	2,3 mH ± 5%
Resistance at 25 °C	2,3 Ω ± 10%
Vertical coils	
Inductance at 1 V (r.m.s.), 1 kHz	23,0 mH ± 10%
Resistance at 25 °C	12,4 Ω ± 7%
Typical currents with Ea = 25 kV and full scan	
Horizontal I_H	2,75 A (p-p)
Vertical I_V	0,86 A (p-p)
Cross-talk	a voltage of 10 V, 15 625 Hz applied to horizontal coils causes no more than 0,2 V across the vertical coils (damping resistors included)
Insulation resistance at 1 kV (d.c.)	
between horizontal and vertical coils	> 500 MΩ
between horizontal coil and core clamp	> 500 MΩ
between vertical coil and core clamp	> 10 MΩ

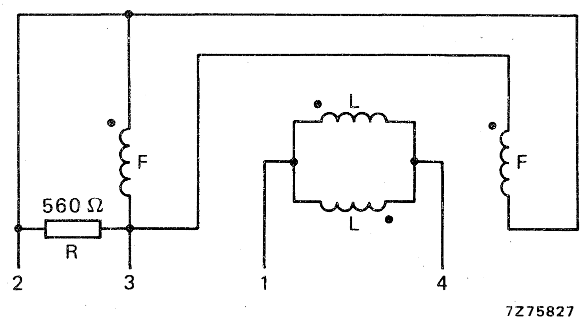


Fig. 2 Connection diagram. L = Line, F = Field.

ADJUSTMENT

- Adjust the static convergence with the four and six-pole magnets of the multipole unit AT1052 for the relative movement of the beams under influence of a four or six-pole magnet.
- Adjust colour purity by axial movement of the deflection yoke and adjustment of the two-pole magnets for centring of the beams.
- Tighten the screw of the clamping ring on the deflection yoke to secure the axial position of the unit on the picture tube.
- Readjust, if necessary, the convergence with the four and six-pole magnets.
- Tilt the unit in either horizontal or vertical direction, or in both directions so that blue, green and red lines converge at the end of the horizontal and vertical axis.
- This position of the unit has to be secured by three rubber wedges placed between the picture tube and the deflection unit. These wedges have to be cemented on to the picture tube.

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube, gun arrangement	in line
diagonal	51 cm (20 in)
neck diameter	29,1 mm
Deflection angle	90°
Line deflection current, edge to edge at 25 kV	3,3 A p-p
Inductance of line coils, parallel connected	1,63 mH
Field deflection current, edge to edge at 25 kV	0,79 A p-p
Resistance of field coils, parallel connected	15 Ω

APPLICATION

This deflection unit is designed for 90° in-line colour pictures tubes with a neck diameter of 29,1 mm, to operate in conjunction with devices for colour purity and static convergence.

DESCRIPTION

The deflection unit consists of saddle-shaped horizontal coils and toroidal wound vertical coils, thus forming a hybrid yoke. The unit is provided with a metal non-magnetic clamping ring at the rear, to fix the deflection unit on the neck of the picture tube. With the deflection unit positioned axially for optimum purity, a clearance is available at the front which permits adjustment of convergence by tilting the unit in the vertical and/or horizontal plane. Wedges are recommended to secure the deflection unit in the chosen position.

MECHANICAL DATA

Outlines

Dimensions in mm

The deflection unit fits a tube with a neck diameter of $29{,}1\,^{+0{,}9}_{-0{,}7}$ mm

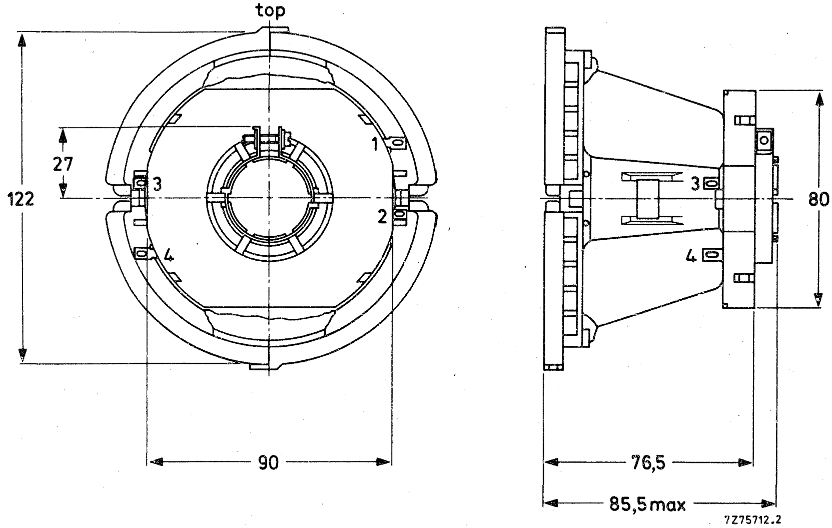


Fig. 1.

Maximum operating temperature (average copper temperature measured with resistance method)	+90 °C
Storage temperature range	–20 to +90 °C
Flame retardent	according to UL test 492.3 V.E.1
Torque on neck clamp screw	1,4 Nm

ENVIRONMENTAL TEST SPECIFICATIONS

Vibration	IEC68-2-6 (test Fc)
Bump	IEC68-2-29 (test Eb)
Cold	IEC68-2-1 (test Ab)
Dry heat	IEC68-2-2 (test Bb)
Damp heat, steady state	IEC68-2-3 (test Ca)
Cyclic damp heat	IEC68-2-30 (test Db)
Change of temperature	IEC68-2-14 (test Na)

ELECTRICAL DATA

Horizontal coils	
Inductance at 1 V (r.m.s.), 1 kHz	1,63 mH ± 5%
Resistance at 25 °C	1,9 Ω ± 10%
Vertical coils	
Inductance at 1 V (r.m.s.), 1 kHz	28,5 mH ± 10%
Resistance at 25 °C	15 Ω ± 7%
Typical currents with Ea = 25 kV and full scan	
Horizontal I_H	3,30 A (p-p)
Vertical I_V	0,79 A (p-p)
Cross-talk	a voltage of 10 V, 15 625 Hz applied to horizontal coils causes no more than 0,2 V across the vertical coils (damping resistors included)
Insulation resistance at 1 kV (d.c.)	
between horizontal and vertical coils	> 500 MΩ
between horizontal coil and core clamp	> 500 MΩ
between vertical coil and core clamp	> 10 MΩ

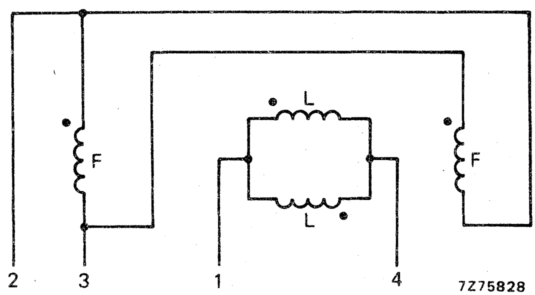


Fig. 2 Connection diagram. L = Line, F = Field.

ADJUSTMENT

- Adjust the static convergence with the four and six-pole magnets of the multipole unit AT1052 for the relative movement of the beams under influence of a four or six-pole magnet.
- Adjust colour purity by axial movement of the deflection yoke and adjustment of the two-pole magnets for centring of the beams.
- Tighten the screw of the clamping ring on the deflection yoke to secure the axial position of the unit on the picture tube.
- Readjust, if necessary, the convergence with the four and six-pole magnets.
- Tilt the unit in either horizontal or vertical direction, or in both directions so that blue, green and red lines converge at the end of the horizontal and vertical axis.
- This position of the unit has to be secured by three rubber wedges placed between the picture tube and the deflection unit. These wedges have to be cemented on to the picture tube.

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube gun arrangement	in line
diagonal	51 cm (20 in)
neck diameter	36,5 mm
Deflection angle	110°
Line deflection current, edge to edge at 25 kV	4,8 A p-p
Inductance of line coils	1,5 mH
Resistance of field coils (damping resistor R1 included)	5,6 Ω

APPLICATION

This deflection unit has been designed for use with a 110° colour picture tube type A51-540X in CTV receivers in conjunction with e.g.:

diode-split line output transformer	AT2076/70
line output transistor	BU208A
linearity control unit	AT4042/41

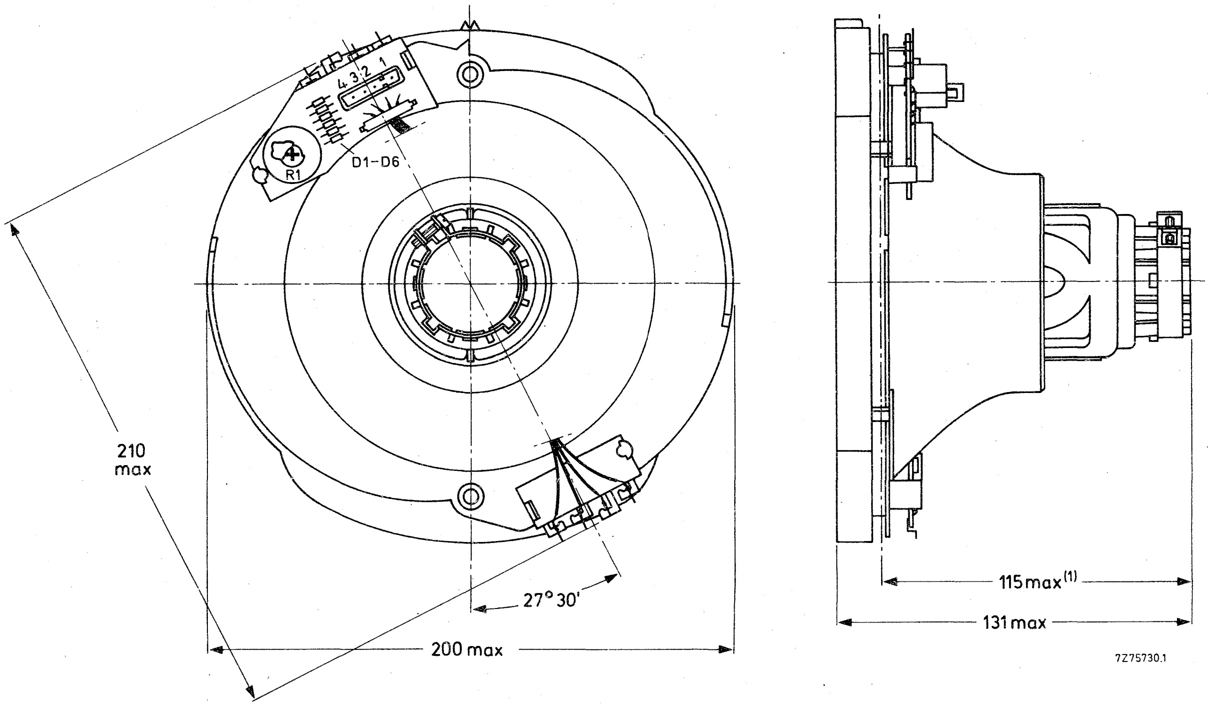
DESCRIPTION

The deflection unit consists of flangeless line and field coils, a one piece ferrite ring and a one piece coil carrier.

MECHANICAL DATA

Outlines

Dimensions in mm



(1) Reference plane of centring bosses.

Fig. 1.

Mounting

The deflection unit can simply be pushed on the neck of a picture tube.

Both on the neck of the tube and on the deflection unit, there are 3 reference surfaces to establish angular and axial positioning.

Once the unit is mounted the combination is perfectly aligned and requires no further adjustment for static convergence, colour purity and raster orientation.

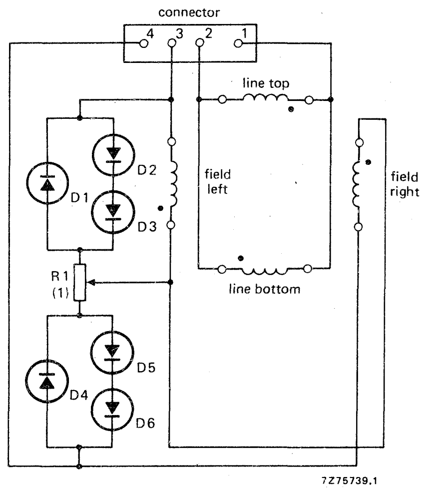
The unit must be pressed against the reference surfaces on the cone of the picture tube with a force of 20 ± 5 N and fixed by tightening the screw in the clamping ring at the rear with a torque of 1,4 Nm. Maximum axial force exerted on the screw is 20 N.

ELECTRICAL DATA

Line coils	
inductance	1,5 mH ± 4%
resistance at 25 °C	1,3 Ω ± 10%
Line deflection current edge to edge at 25 kV	4,8 A p-p
Field coils	
inductance	10,0 mH ± 10%
resistance at 25 °C (damping resistance R1 included)	6,5 Ω ± 7%
Field deflection current edge to edge at 25 kV	2,1 A p-p
Max. operating temperature	90 °C

Connections

(See also Fig. 1).



● Means winding direction.

Fig. 2.

Matching female Stocko connector MKF 804-1-0-404.
D1 to D6 = BAS11, BAX18 or BAX18A.

(1) R1 is factory adjusted and locked with adhesive.

DEVELOPMENT SAMPLE DATA

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube gun arrangement	in line
diagonal	56 cm (22 in)
neck diameter	36,5 mm
Deflection angle	110°
Line deflection current, edge to edge at 25 kV	4,95 A p-p
Inductance of line coils	1,5 mH
Resistance of field coils (damping resistor R1 included)	5,6 Ω

APPLICATION

This deflection unit has been designed for use with a 110° colour picture tube type A56-540X in CTV receivers in conjunction with e.g.:

diode-split line output transformer	AT2076/70
line output transistor	BU208A
linearity control unit	AT4042/41

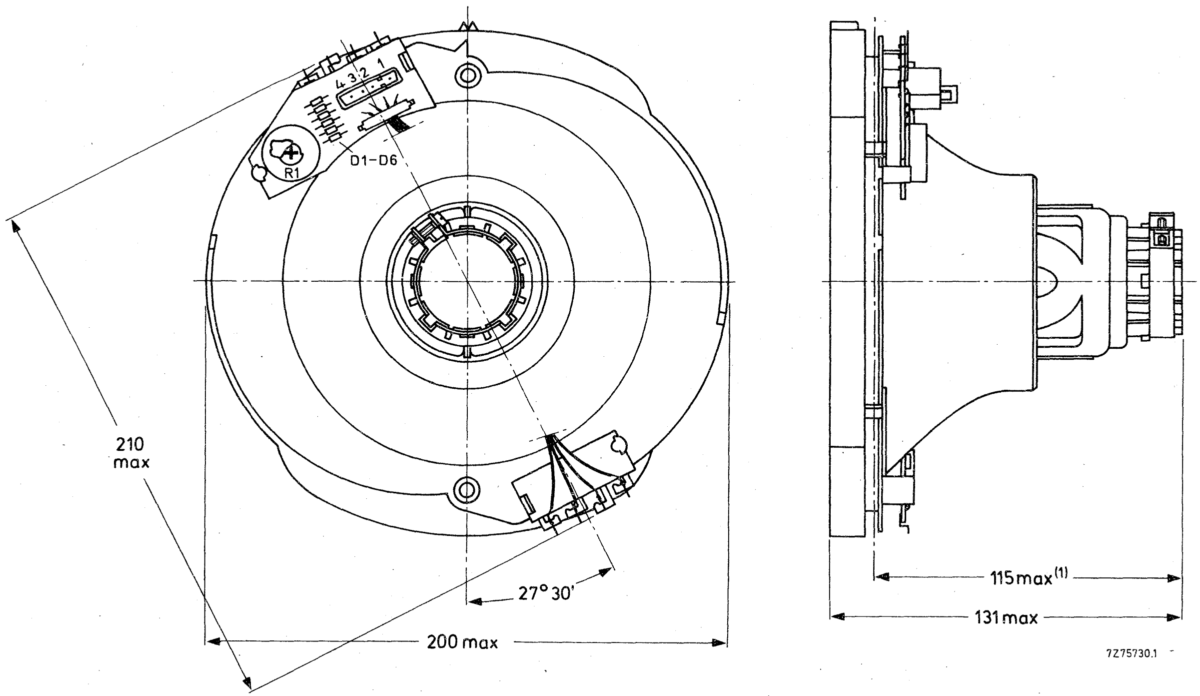
DESCRIPTION

The deflection unit consists of flangeless line and field coils, a one piece ferrite ring and a one piece coil carrier.

MECHANICAL DATA

Outlines

Dimensions in mm



(1) Reference plane of centring bosses.

Fig. 1.

DEVELOPMENT SAMPLE DATA

Mounting

The deflection unit can simply be pushed on the neck of a picture tube.

Both on the neck of the tube and on the deflection unit, there are 3 reference surfaces to establish angular and axial positioning.

Once the unit is mounted the combination is perfectly aligned and requires no further adjustement for static convergence, colour purity and raster orientation.

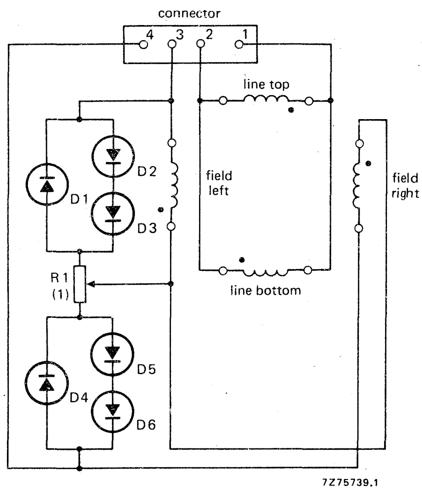
The unit must be pressed against the reference surfaces on the cone of the picture tube with a force of 20 ± 5 N and fixed by tightening the screw in the clamping ring at the rear with a torque of 1,4 Nm. Maximum axial force exerted on the screw is 20 N.

ELECTRICAL DATA

Line coils	
inductance	1,5 mH ± 4%
resistance at 25 °C	1,3 Ω ± 10%
Line deflection current edge to edge at 25 kV	4,95 A p-p
Field coils	
inductance	9,6 mH ± 10%
resistance at 25 °C (damping resistance R1 included)	6,5 Ω ± 7%
Field deflection current edge to edge at 25 kV	2,05 A p-p
Max. operating temperature	90 °C

Connections

(See also Fig. 1).



● Means winding direction.

Fig. 2.

Matching female Stocko connector MKF 804-1-0-404.
D1 to D6 = BAS11, BAX18 or BAX18A.

(1) R1 is factory adjusted and locked with adhesive.

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube gun arrangement	in line
diagonal	66 cm (26 in)
neck diameter	36,5 mm
Deflection angle	110°
Line deflection current, edge to edge at 25 kV	5,1 A p-p
Inductance of line coils	1,5 mH
Resistance of field coils (damping resistor R1 included)	6,3 Ω

APPLICATION

This deflection unit has been designed for use with a 110° colour picture tube type A66-540X in CTV receivers in conjunction with e.g.:

diode-split line output transformer	AT2076/70
line output transistor	BU208A
linearity control unit	AT4042/41

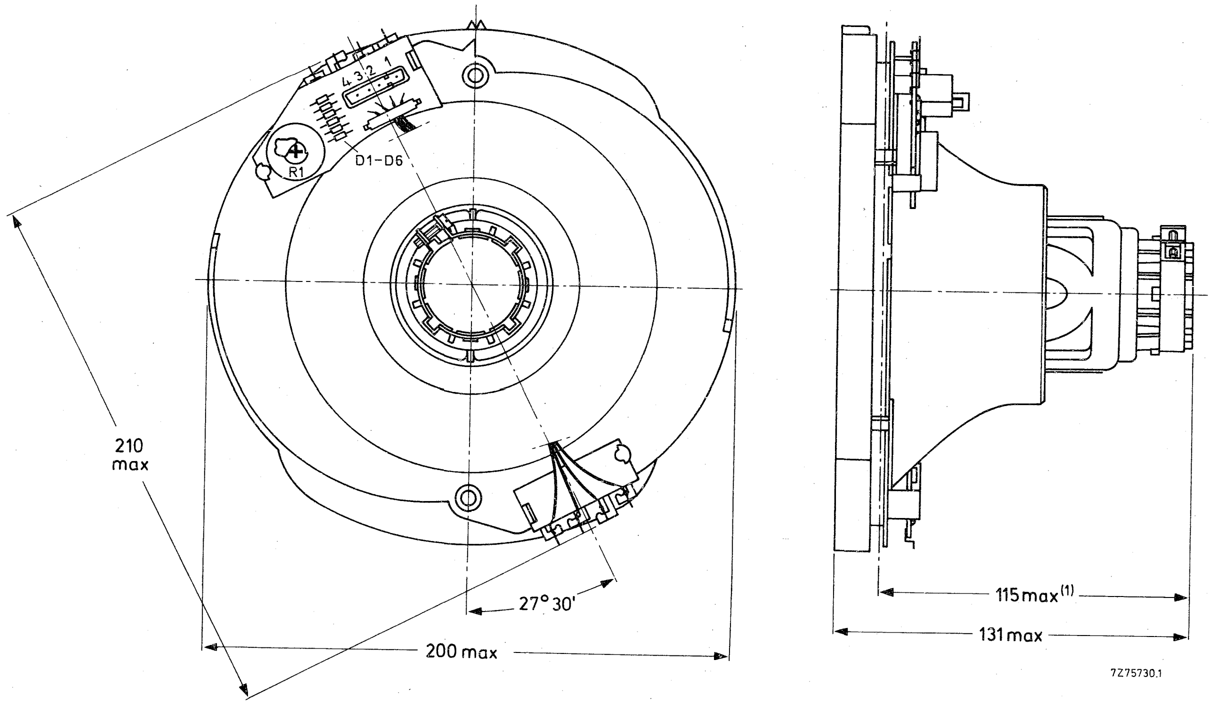
DESCRIPTION

The deflection unit consists of flangeless line and field coils, a one piece ferrite ring and a one piece coil carrier.

MECHANICAL DATA

Outlines

Dimensions in mm



(1) Reference plane of centring bosses.

Fig. 1.

DEVELOPMENT SAMPLE DATA

Mounting

The deflection unit can simply be pushed on the neck of a picture tube.

Both on the neck of the tube and on the deflection unit, there are 3 reference surfaces to establish angular and axial positioning.

Once the unit is mounted the combination is perfectly aligned and requires no further adjustment for static convergence, colour purity and raster orientation.

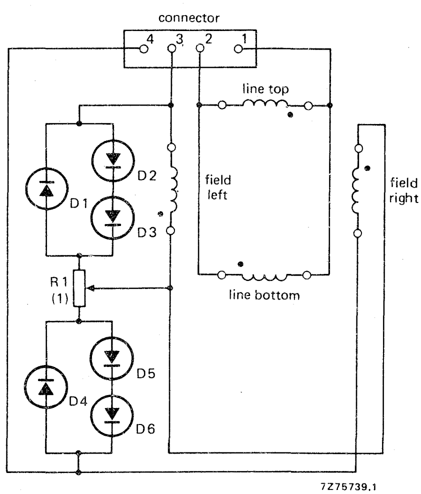
The unit must be pressed against the reference surfaces on the cone of the picture tube with a force of 20 ± 5 N and fixed by tightening the screw in the clamping ring at the rear with a torque of 1,4 Nm. Maximum axial force exerted on the screw is 20 N.

ELECTRICAL DATA

Line coils	
inductance	1,5 mH ± 4%
resistance at 25 °C	1,35 Ω ± 10%
Line deflection current edge to edge at 25 kV	5,1 A p-p
Field coils	
inductance	9,9 mH ± 10%
resistance at 25 °C (damping resistance R1 included)	6,3 Ω ± 7%
Field deflection current edge to edge at 25 kV	2,05 A p-p
Max. operating temperature	90 °C

Connections

(See also Fig. 1).



● Means winding direction

Fig. 2.

Matching female Stocko connector MKF 804-1-0-404.
D1 to D6 = BAS11, BAX18 or BAX18A.

(1) R1 is factory adjusted and locked with adhesive.

3122 138 35120

DIODE-SPLIT LINE OUTPUT TRANSFORMER

- **With aluminium foil primary winding**
- **"Piggy-back" type**

QUICK REFERENCE DATA

For transistor line output stages	
I_{eht}	max. 1,5 mA
E.H.T.	25 kV
$R_{i(eht)}$	2 MΩ
$I_{p\text{-}p}$ deflection (incl. 6% overscan)	6,5 A
Load inductance (of line deflection coils)	1,12 mH
Supply voltage (V_B')	148 V
Supply current ($I_{average}$) at I_{eht} = 1,5 mA	660 mA
Voltages of primary windings*	+ 105 V p, + 335 V p, + 520 V p
Voltages of auxiliary windings	–335 V p, –160 V p, + 160 V p, + 335 V p, picture tube heater voltage

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 20AX 110° colour picture tubes with a neck diameter of 36,5 mm in transistor equipped television receivers presenting 625 lines at 50 fields per second (CCIR) or 525 lines at 60 fields per second (USA).

It is intended for use in conjunction with:
- deflection unit AT1080, AT1083/01 or AT1085;
- linearity control unit AT4042/38;
- line output transistor BU208A;
- a screened e.h.t. cable with a length of 1 m (available under catalogue number 3122 137 58254),

as shown in the circuit diagram of Fig. 3.

DESCRIPTION

The magnetic circuit of the transformer comprises 2 Ferroxcube U-cores, screwed together. The primary winding of aluminium foil and the secondary windings are situated on one leg of the core. The e.h.t. winding is moulded in flame retarding polyester, meeting the self-extinguishing requirements of IEC 65, para. 14.4 and UL492, para. 280-SE1. The transformer is provided with 2 M3 screw-studs for mounting.** External circuit connection is made to connecting pins, positioned as indicated in Fig. 1 enabling the unit to be soldered directly into a printed-wiring board (Fig. 2).

* D.C. component on these pulses is V_B' (see Fig. 3).

** For mounting on the printed-wiring board a washer of 20 mm in diameter has to be used. Tightening torque on printed-wiring board: 500 + 100 mNm.

MECHANICAL DATA

Dimensions in mm

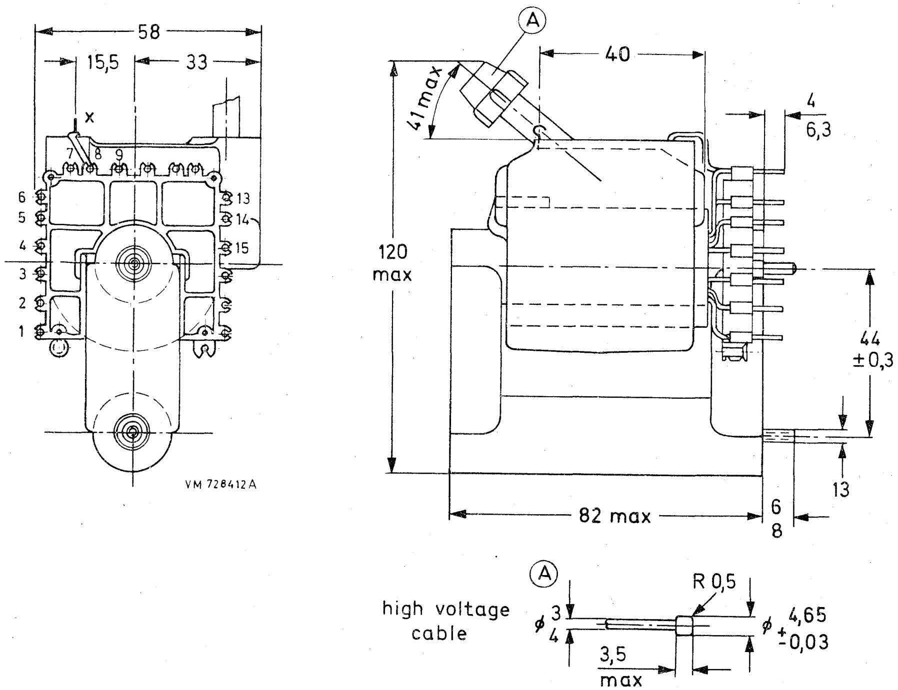


Fig. 1.

Mass	500 g approximately
Solderability	in accordance with IEC 68, Test T

MOUNTING

The transformer may be mounted on either a printed-wiring board or, under certain conditions, on a metal chassis. Two securing studs (M3) are provided. The fit of the connecting and the mounting pins in a printed-wiring grid with a pitch of 2,54 mm is illustrated in Fig. 2.

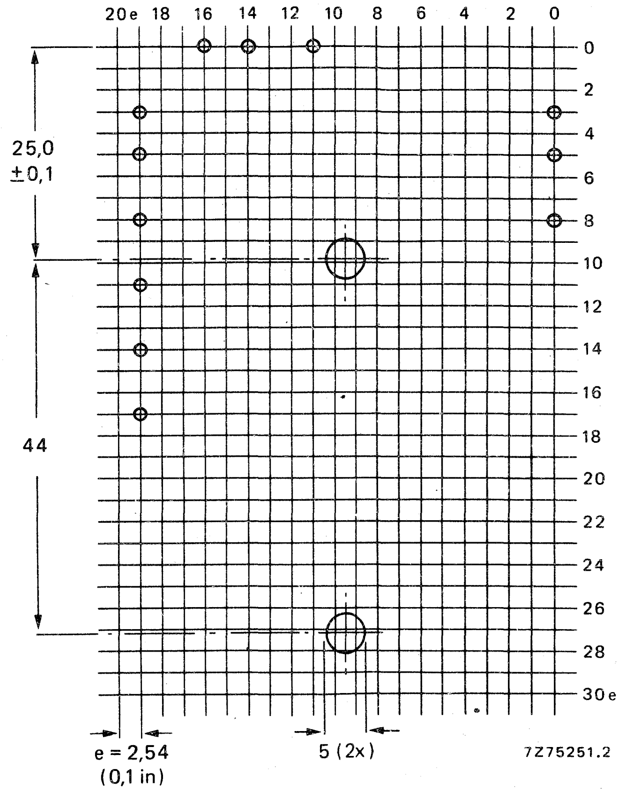


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side). Grid hole diameter 1,3 ± 0,1 mm.

Whether the transformer is board or chassis mounted, the core must be earthed.

Temperature

The operating temperature of the e.h.t. coil should not exceed + 85 °C under worst conditions, i.e. taking into account:

- over-voltage on the coils;
- low atmospheric pressure (at high altitudes) implying bad cooling by convection;
- high ambient temperature (up to 45 °C).

To satisfy this requirement it may be necessary to provide an ample cool air flow around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces must be maintained (it should be noticed that edges of conductive parts must have a greater distance):

From the e.h.t. coil radially, 10 mm
From the e.h.t. coil axially, 10 mm

The transformer, and the leads and components carrying high voltage pulses, should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (measured in circuit of Fig. 3, mains voltage 220 V)

E.H.T. supply	I_{eht}	mA	0,05		1,5
	e.h.t.	kV	25,2		22,6
	$R_{i(eht)}$	MΩ		2,0	
Power supply	V_B	V	163		163
	$V_{B'}$	V	148		141,5
	$I_{average}$	mA	540		760
Output transistor	V_{CEM}	V	1200		1180
	$+I_{CM}$	A	4,1		4,25
Deflection	$I_{p\text{-}p}$ flyback (incl. 6% overscan)	A	6,5		6,2
	$t_{flyback}$	μs	11,3		
	Overscan	%	6		7
V_{focus}		kV	6,3		5,65
Video supply after rectification*		V	233		224
Auxiliary windings: picture tube heater voltage $V_{1\text{-}2}$ (4,67 W)		V	7,6	r.m.s.	7,4
voltages at					
pin 3	V_3	V	−335 p (+ 38 V d.c.)		
pin 4	V_4	V	−160 p		
pin 6	V_6	V	+ 160 p		
pin 7	V_7 **	V	+ 335 p		
pin 9	V_9 **	V	+ 105 p		
pin 14	V_{14}**	V	+ 520 p		

* Class-B video stage.
** D.C. component on these pulses is V_B'.

APPLICATION CIRCUIT

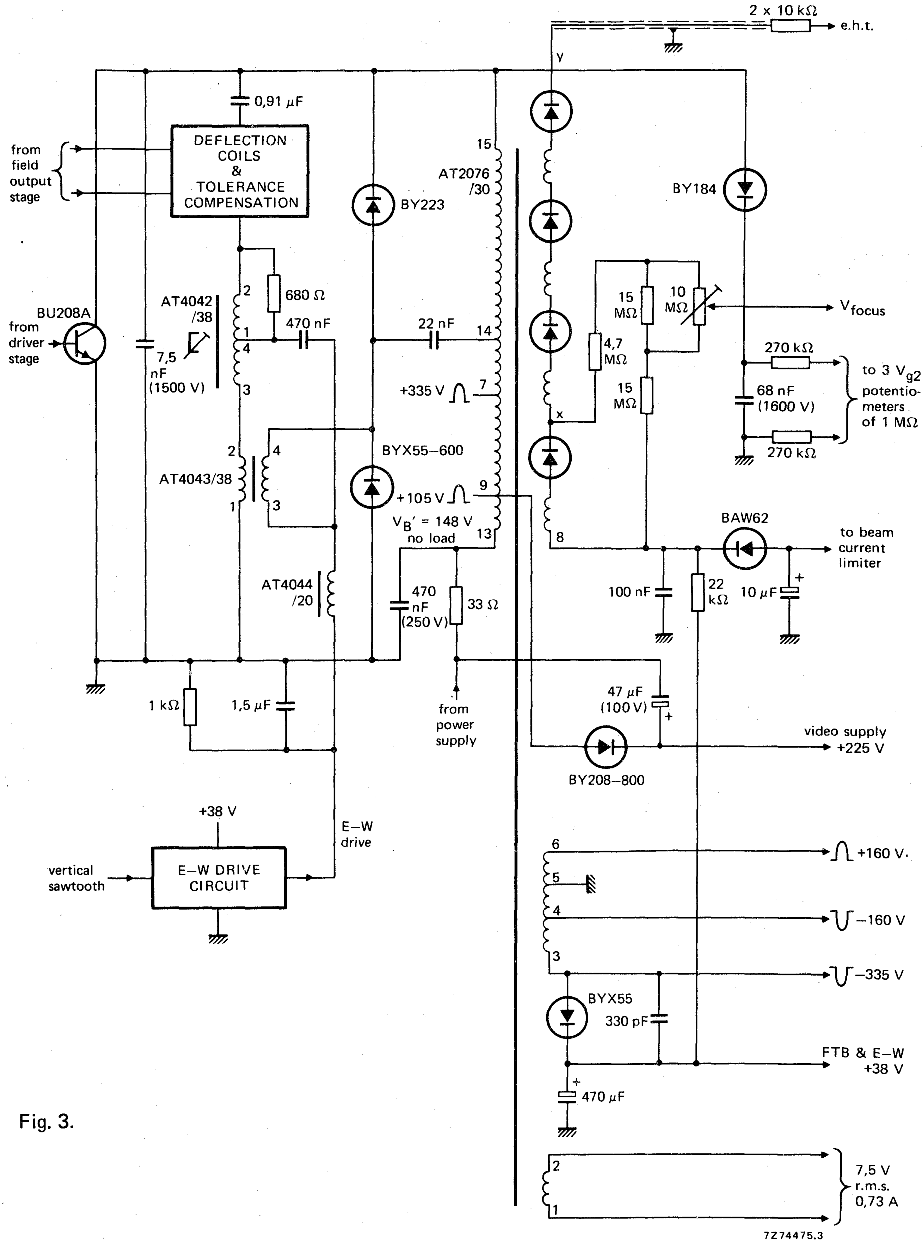


Fig. 3.

3122 138 35880

SYNCHRONOUS POWER PACK TRANSFORMER

for colour television

- piggy-back type
- mains isolation
- aluminium foil primary winding and screens

QUICK REFERENCE DATA

E.H.T.	25 kV ± 3%
I_{eht}	max. 1,6 mA
$R_{i(eht)}$	1 MΩ
V_x (see Fig. 3)	6,25 kV
Supply	
voltage d.c.	+ 292 V
current (I_{eht} = 1,5 mA)	345 mA
Voltages of auxiliary windings	
r.m.s.	3,8 V, 8 V
d.c.	8 V, 18 V, 24 V, 33 V, 147 V, 225 V

APPLICATION

This transformer has been designed for use as a mains isolated supply transformer in colour television sets. It provides the required stabilized auxiliary voltages including an e.h.t. supply with low internal resistance. The transformer is suitable for 90° and 110° deflection systems using 25 kV e.h.t. It is intended for use in conjunction with:

- mains filter choke AT4043/55;
- mains transformer TS561/2;
- current sensing transformer AT4043/46;
- driver transformer AT4043/45;
- supply choke AT4043/52;

and for 110° 20, 22 and 26 inch tubes:

- deflection unit AT1270, AT1260 and AT1250;
- line choke AT4043/53;
- linearity control unit AT4042/41;
- line driver transformer AT4043/87 (if separate drive of line output stage is required);

and for 90° 20 inch tubes:

- deflection unit AT1235/00;
- line choke AT4043/53;
- linearity control unit AT4042/02.

DESCRIPTION

The magnetic circuit of the transformer comprises two Ferroxcube U-cores screwed together. The primary winding of aluminium foil with screens and the e.h.t. winding with incorporated diodes are moulded in flame retarding polyester.

The device is provided with two securing M3 studs. External circuit connection is made to connecting pins, positioned as indicated in Fig. 1, enabling the unit to be soldered directly into a printed-wiring board (Fig. 2).

MECHANICAL DATA

Dimensions in mm

Outlines

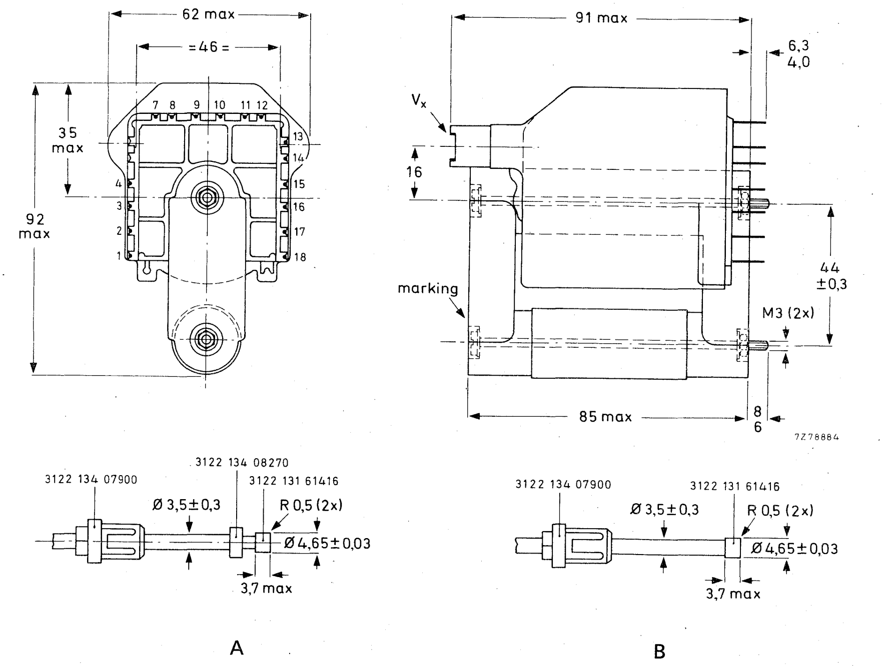


Fig. 1 A is plug for connection to V_x, B is plug for connection to e.h.t.

Mass 530 g

Solderability max. 240 °C, max. 2,5 s

Mounting

The transformer may be mounted on either a printed-wiring board or, on a metal chassis. Two securing studs (M3) are provided. For mounting on a printed-wiring board, a washer of 20 mm outer diameter has to be used. Tightening torque on printed-wiring board: 500 + 100 mNm. The fit of the connecting pins and the studs in a printed-wiring grid with a pitch of 2,54 mm is illustrated in Fig. 2.

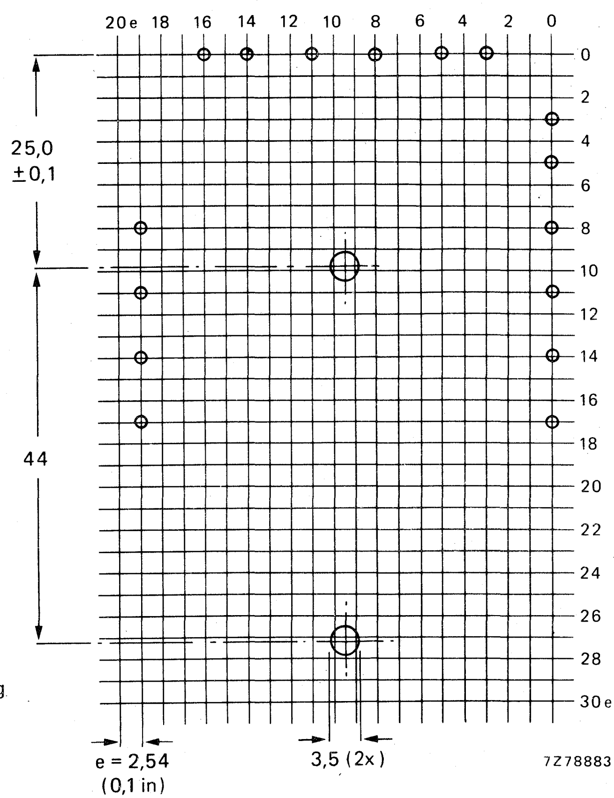


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side). Grid hole diameter 1,3 ± 0,1 mm.

Whether the transformer is board or chassis mounted, the core must be earthed.

Temperature

The ambient temperature in the set should not exceed + 65 °C under worst conditions, i.e. taking into account:

- maximum output power;
- maximum supply voltage;
- low atmospheric pressure (at high altitudes) implying bad cooling by convection;
- high ambient temperature (up to 45 °C).

To satisfy this requirement it may be necessary to provide an ample cool air flow around the transformer.

Distances

The following minimum distances between the transformer and neighbouring **conductive flat surfaces** must be maintained (it should be noted that edges of conductive parts must have a greater distance):

from the e.h.t. coil, radially 10 mm, axially 10 mm.

The transformer, and the leads and components carrying high voltage pulses, should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (measured in circuit of Fig. 3, mains voltage 220 V)

E.H.T. supply	I_{eht}	mA	0,15	1,6
	e.h.t.	kV	25,2	23,7
	$R_{i(eht)}$	MΩ	1,0	
Power supply	V_B *	V	297	292
	$I_{average}$	mA	230	345
V_o prim.		V	150	150,5
Supply transistor (BU208A)	V_{CEM}	V	1250	1260
	$+I_{CM}$	A	2,8	3,1
Flyback time		µs	14,8	15,0
V_x		kV	6,25	–
Auxiliary windings (typical value):				
picture tube heater voltage	V_{18} (r.m.s.)	V	7,7 (720 mA)	
drive winding	V_{15-17} (r.m.s.)	V	3,8 (1 A)	
Voltages after rectification, pins 10 and 11 to earth:				
field time base	V_8	V	33 (310 mA)	
line time base	V_9	V	147 (140 mA)	
	V_{12}	V	8 (97 mA)	
video output	V_{13}	V	225 (10 mA)	
audio output	V_{14}	V	24	
audio output	V_{16}	V	18 (700 mA)	

Note: The power pack is capable of supplying 45 W extra output power if required, e.g. higher audio output power from pin 14.

* Stabilization range V_B from 215 V d.c. (165 V mains) to 350 V d.c. (265 V mains).

APPLICATION CIRCUIT

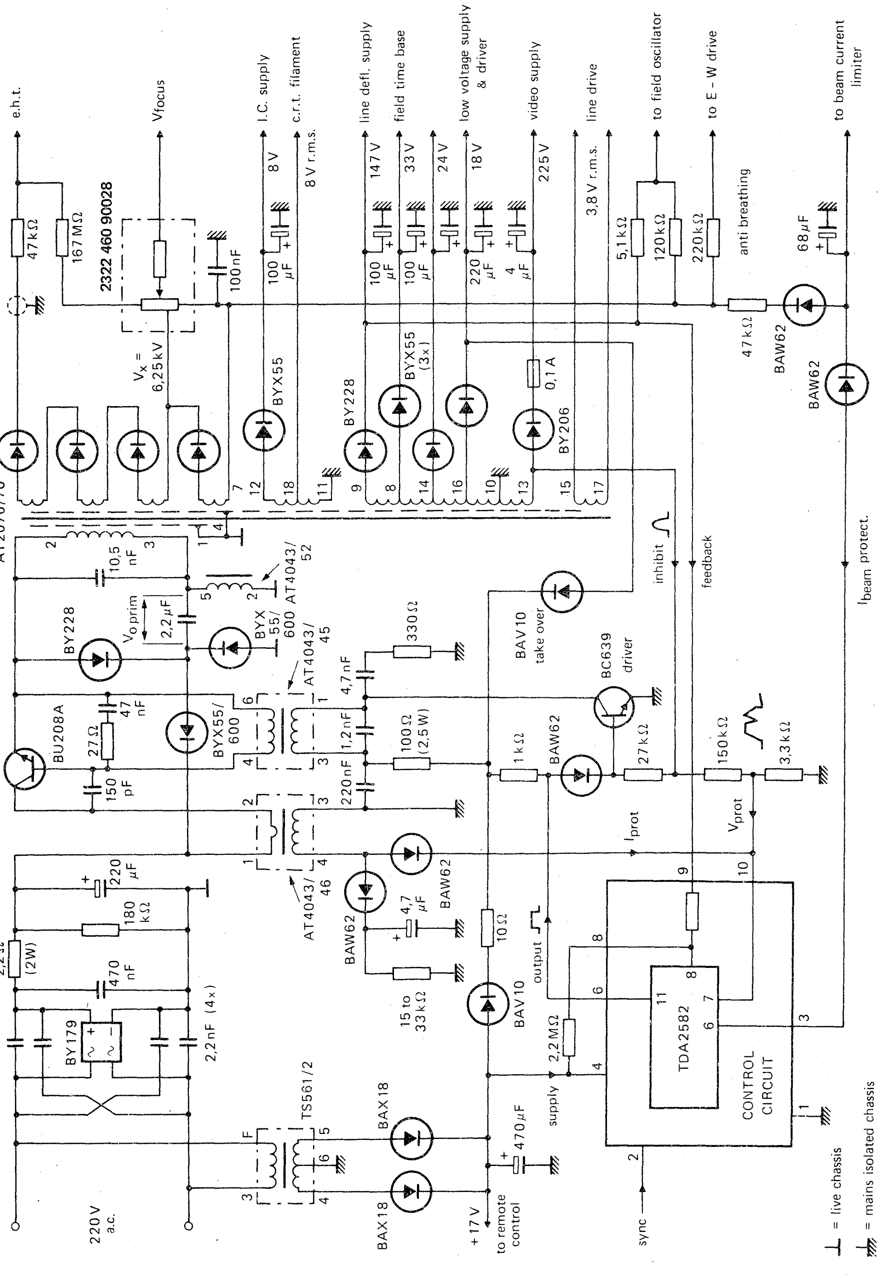


Fig. 3.

3122 138 91930

SWITCHED-MODE TRANSFORMER

- without mains isolation

APPLICATION

The AT2097/01 has been designed for use as a switched-mode transformer for 90° colour television receivers without mains isolation, in conjunction with the switched-mode driver transformer AT4043/58.

MECHANICAL DATA

The magnetic circuit of the transformer comprises two Ferroxcube U25-cores. The item is provided with eight pins for mounting on a printed-wiring board.

Outlines

Dimensions in mm

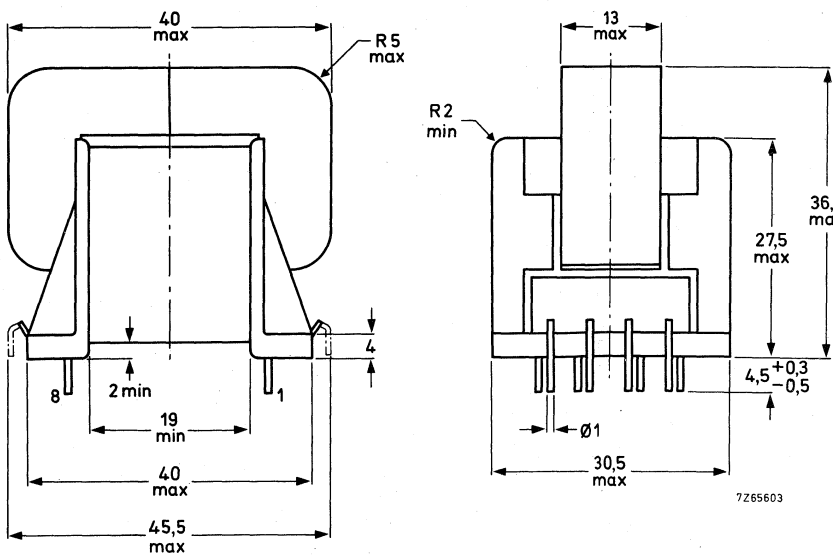


Fig. 1.

Mounting

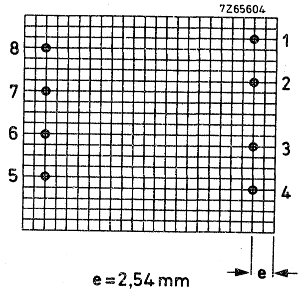


Fig. 2 Hole pattern (viewed from solder side) for mounting on a printed-wiring board, hole diameter 1,3 + 0,1 mm.

ELECTRICAL DATA

Inductance primary (8-6) *	16 mH ± 10%
Resistance primary (8-6) at 25 °C	3,2 Ω ± 12%
Resistance secondary at 25 °C	
(7-5)	0,14 Ω ± 12%
(4-3)	0,57 Ω ± 12%
Leakage inductance (7-5) **	⩽ 1,5 μH
Transformation ratio	
8-6/7-5	36,5
8-6/4-3	6,5
Maximum working temperature	115 °C

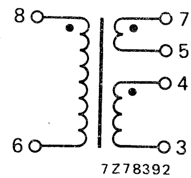


Fig. 3.

* Measuring conditions: E = 1,6 V; f = 1000 Hz.
** Measuring conditions: primary (8-6) short-circuited; E = 250 mV; 1,7 MHz ⩽ f ⩽ 2,2 MHz.

Application circuit

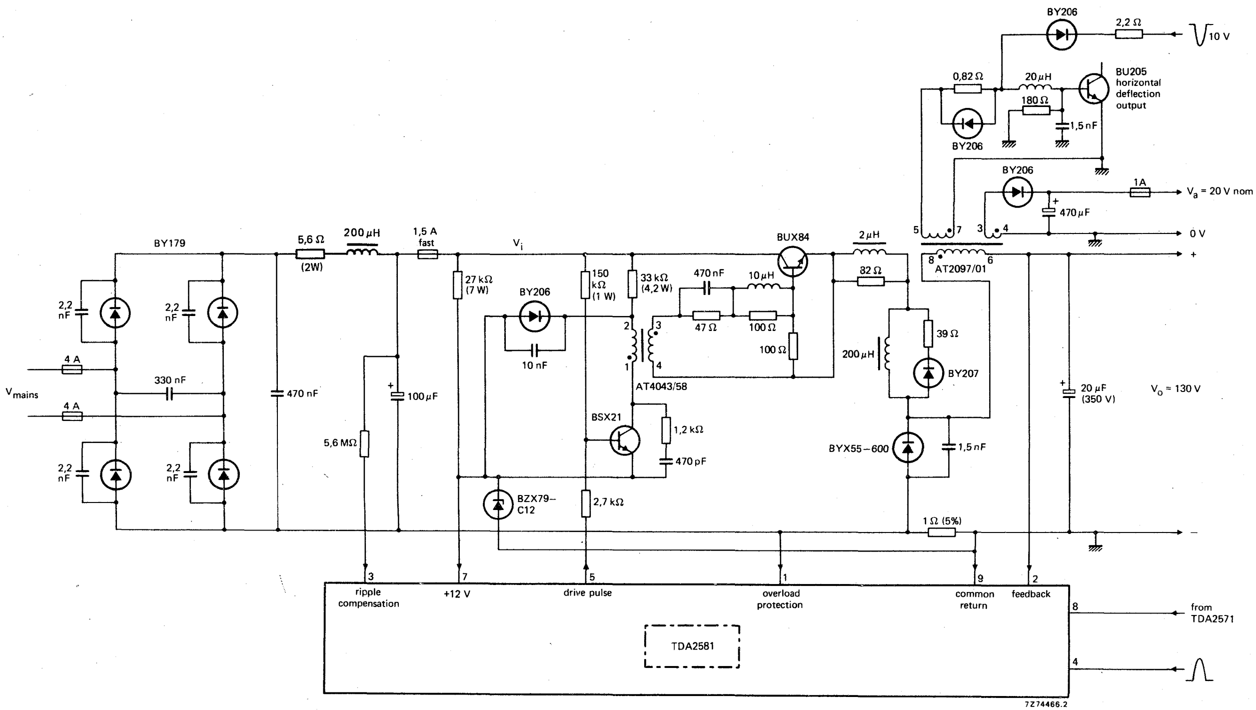


Fig. 4 Circuit of an SMPS using a forward converter for providing the power supplies and the horizontal drive for a television receiver.

3122 108 39450

ADJUSTABLE LINEARITY CONTROL UNIT

APPLICATION

This unit has been designed to adjust the linearity of the line deflection in monochrome television sets in conjunction with deflection unit AT1040/15, and in 90° colour television sets in conjunction with deflection unit AT1235/00.

DESCRIPTION

The control unit consists of a coil wound on a Ferroxcube rod, and three Ferroxdure magnets. One magnet is placed around the Ferroxcube rod, above the coil. One of the magnets has the shape of a half ring; it is placed around the Ferroxcube rod under the coil. The third Ferroxdure magnet is cylindrical, it is positioned parallel to and clamped against the Ferroxcube rod opposite the second. It is provided with a square hole to facilitate turning to adjust the biasing field and so the linearity of the line deflection.

MECHANICAL DATA

Dimensions in mm

Outlines

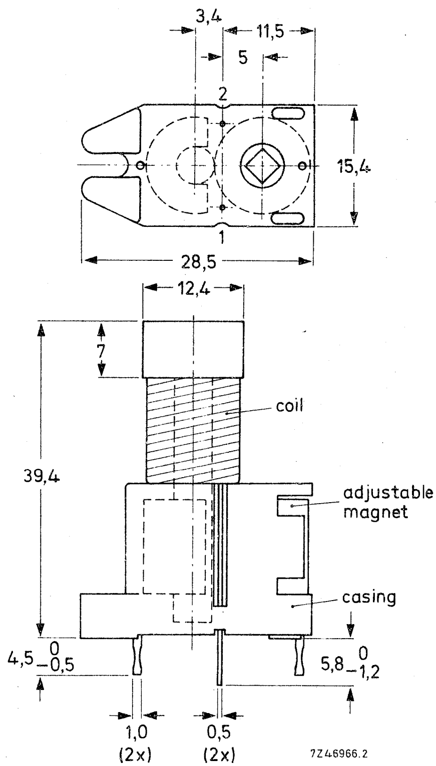
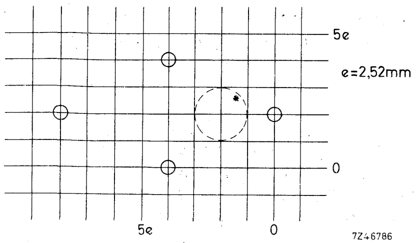


Fig. 1.

Mounting

The unit can be mounted either on printed-wiring boards by means of its two connection pins and two mounting pins (see Fig. 2), or on metal chassis, by bending of the two mounting pins and/or by means of a screw through an aperture in the casing (see Fig. 3). To prevent distortion of the magnetic field no iron part should approach the magnetic parts anywhere nearer than 3 mm. The coil should be shunted with a carbon resistor to damp ringing phenomena (value of resistor depends on line-deflection transformer used).



* Hole only necessary for bottom adjustment.

Fig. 2 Hole pattern for mounting on a printed-wiring board (e = 2,54 mm (0,1 in).

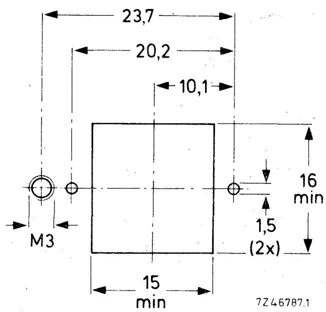


Fig. 3 Hole pattern for mounting on a chassis.

ELECTRICAL DATA

When a sawtooth current (without S-correction) of 2,8 A p-p, frequency 15 625 Hz, flyback ratio 18%, flows through the linearity control unit (one connection point to earth), the correction voltage is adjustable between 15 V and 26 V.

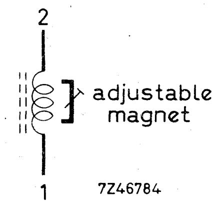


Fig. 4 Circuit diagram.

APPLICATION CIRCUITS

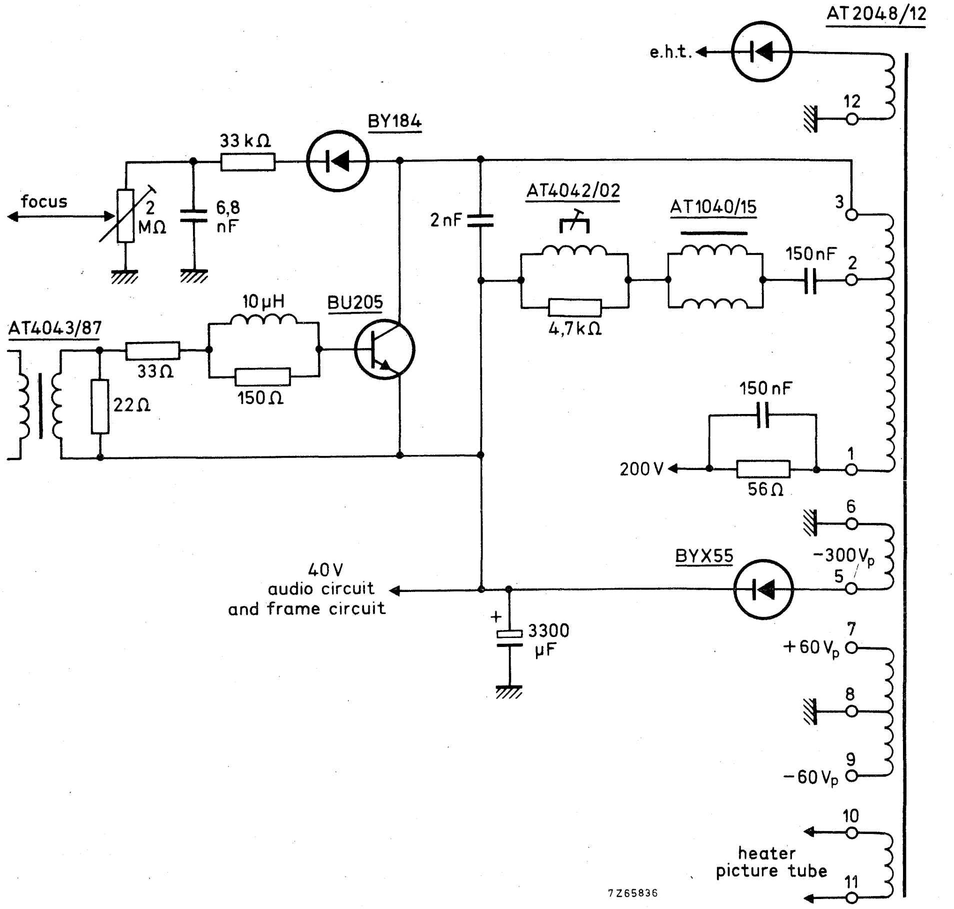


Fig. 5 Line deflection circuit for a monochrome television set.

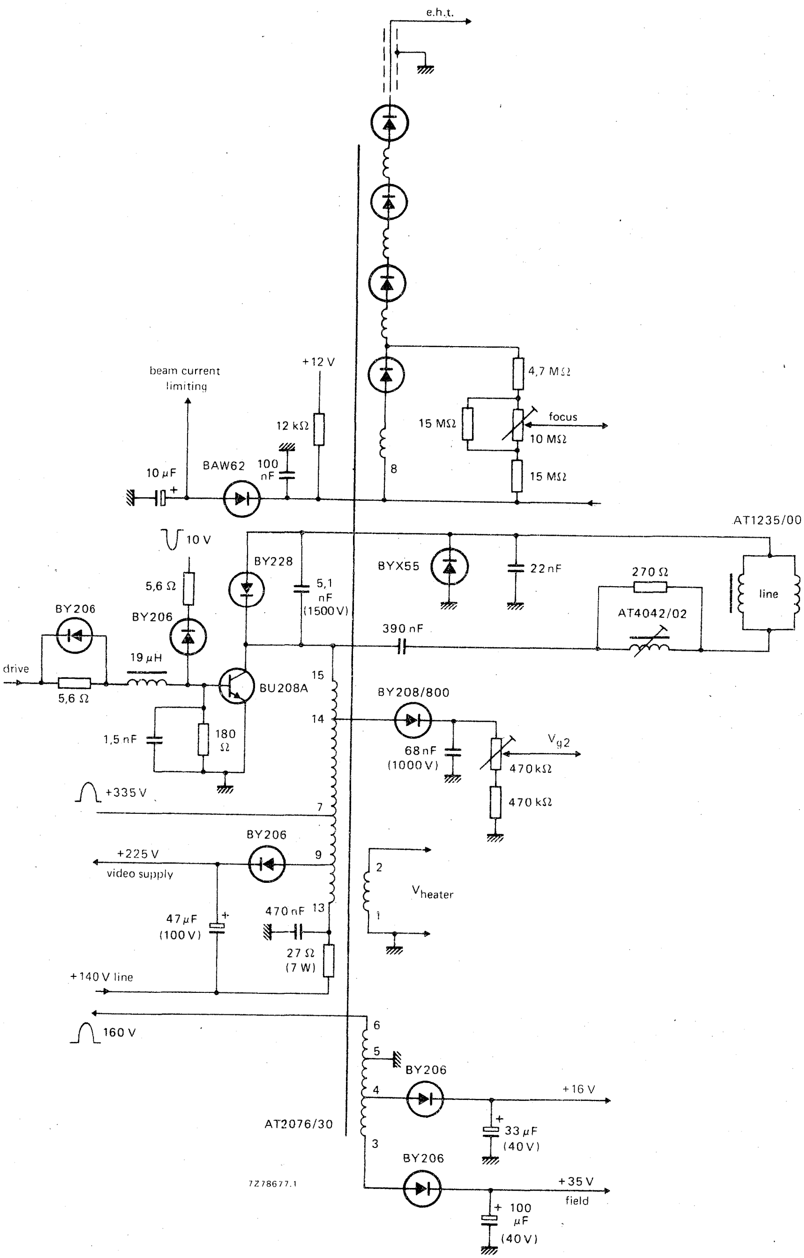


Fig. 6 Line deflection circuit for a 90° colour television set.

ADJUSTABLE LINEARITY CONTROL UNIT

APPLICATION

This unit has been designed for use in colour TV sets equipped with a 110° deflection angle colour picture tube, to adjust the linearity of line deflection. It can be used in combination with the deflection units AT1080, AT1083/01 and AT1085.

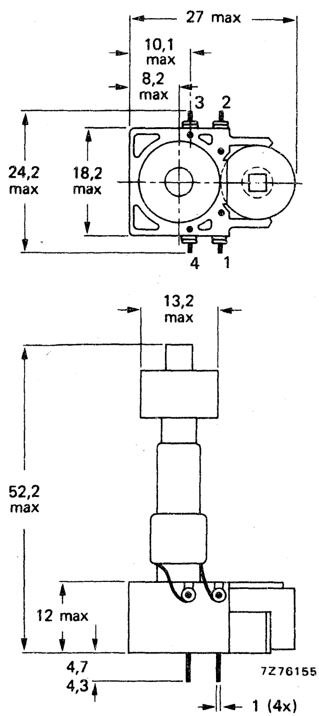
DESCRIPTION

The unit consists of a coil, mounted on a Ferroxcube rod, and three Ferroxdure magnets. Two ring-shaped magnets are placed around the Ferroxcube rod, one at the top and one at the bottom. The third magnet is positioned against the Ferroxcube rod opposite the bottom magnet and clamped. It is provided with a square hole to facilitate adjustment of the biasing field and, therefore, the linearity of the line deflection.

MECHANICAL DATA

Dimensions (mm)

Fig. 1



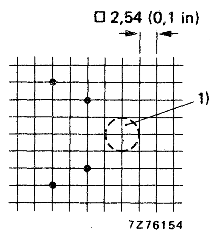


Fig. 2 Hole pattern for mounting on a printed-wiring board. Hole diameter 1,3 + 0,1.

1) Hole (dia 5,1 mm min.) only necessary for bottom adjustment.

ELECTRICAL DATA

The correction voltage is pre-adjusted to 23,5 V ± 2,5% at a saw-tooth current of 6,4 A peak-to-peak, frequency 15 625 Hz, flyback ratio 18% (without S-correction), flowing through winding 1 - 2. The voltage between pins 2 and 3 (pins 1 and 4 interconnected) is then 28,5 ± 10%.

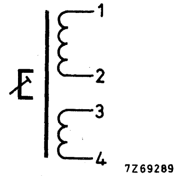


Fig. 3 Circuit diagram *)

MOUNTING

The unit can be mounted on printed-wiring boards by means of its four connection pins (see Fig. 2). To prevent distortion of the magnetic field, no iron part should approach the magnetic parts nearer than 3 mm. The coils should be shunted with a carbon resistor to damp ringing phenomena; the value of resistor depends on applied deflection transformer (typical value 560 Ω with transformer AT2076/10).

*) Pins 1 and 4 should be interconnected on the printed-wiring board.

ADJUSTABLE LINEARITY CONTROL UNIT

APPLICATION

These linearity control units are for the horizontal deflection output stage of the 30AX system.

DESCRIPTION

The units consist of a coil, mounted on a Ferroxcube rod, and three Ferroxdure magnets. Two ring-shaped magnets are placed around the Ferroxcube rod, one at the top and one at the bottom. The third magnet is positioned against the Ferroxcube rod opposite the bottom magnet and clamped. It is provided with a square hole to facilitate adjustment of the biasing field and, therefore, the linearity of the line deflection.

MECHANICAL DATA Dimensions in mm

Outlines of type AT4042/42.
Type AT4042/41 is identical, except for the two pins 3 and 4, which are missing.

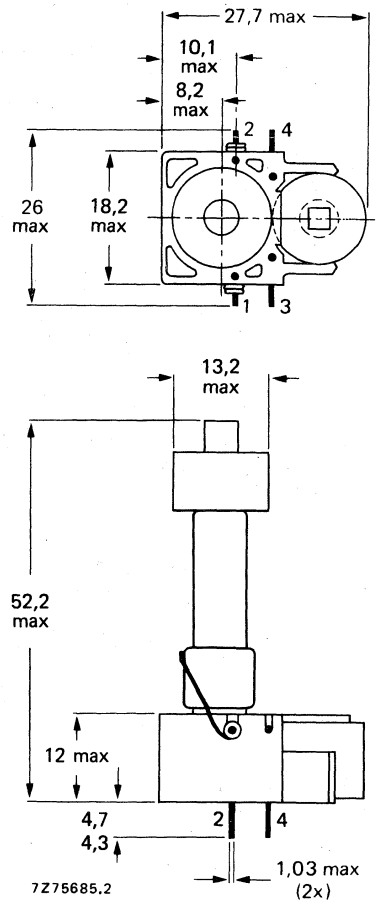


Fig. 1. 7Z75685.2

Mounting

The AT4042/41 can be mounted on printed-wiring boards by means of its two connection pins, the AT4042/42 by means of its two connection pins and two extra pins (without electrical function) which are provided for mounting only (see Fig. 2). To prevent distortion of the magnetic field, no iron part should approach the magnetic parts nearer than 3 mm. The coils should be shunted with a carbon resistor to damp ringing phenomena; the value of resistor depends on line output transformer used (typical value 820 Ω).

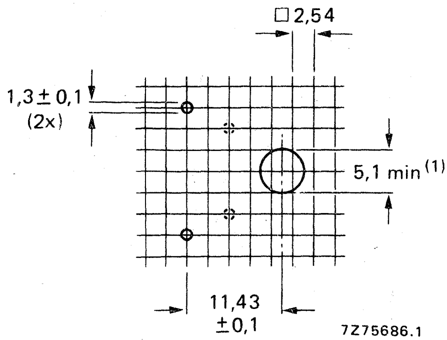


Fig. 2 Hole pattern for mounting on a printed-wiring board. Dotted holes only for AT4042/42.
(1) Hole for bottom adjustment, if required.

ELECTRICAL DATA

When a sawtooth current (without S-correction) of 5 A (p-p), frequency 15 625 Hz, flyback ratio 18%, flows through the linearity control unit, the correction voltage is adjustable between 9 V and 18 V.

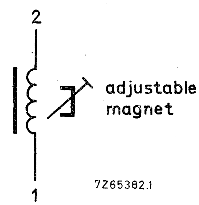


Fig. 3 Circuit diagram.

FILTERING COIL

APPLICATION

The coil AT4043/15 has been designed for all-transistor colour television sets, to be used in the supply unit.

MECHANICAL DATA

The magnetic circuit of the coil comprises two iron U-cores.
The unit is provided with pins for mounting on a printed-wiring board.

Dimensions (mm)

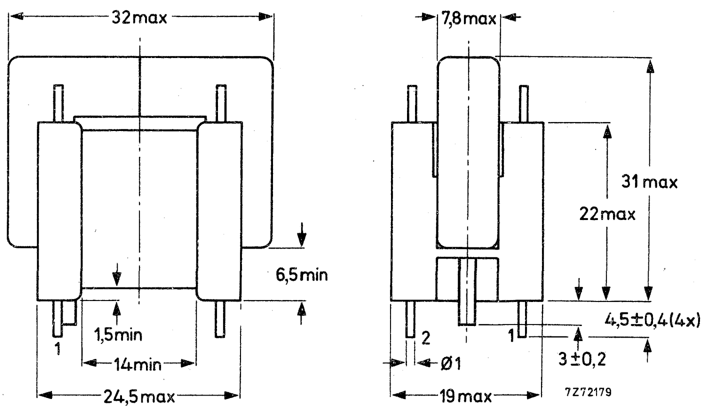


Fig.1

<u>Mounting</u>

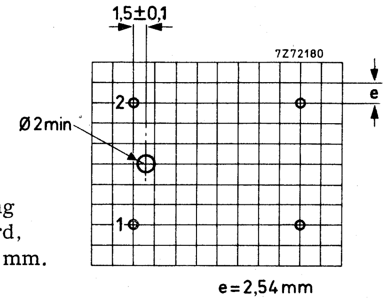


Fig. 2
Hole pattern for mounting on a printed-wiring board, hole diameter 1,3 + 0,1 mm.

ELECTRICAL DATA

Inductance	2,1 mH ± 15%
Resistance at 25 °C	0,27 Ω
Maximum working temperature	95 °C

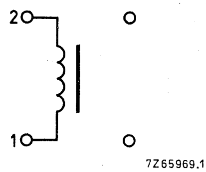


Fig. 3 Connection diagram

BRIDGE COIL

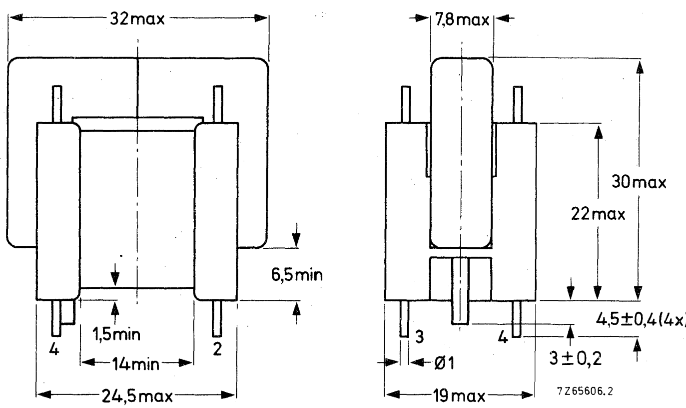
APPLICATION

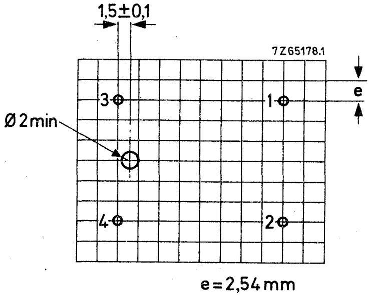
This correction coil has been developed to be used as a bridge transformer in the line output transformer circuitry of the AT2076/30 in conjunction with the deflection unit AT1080 (see also data sheet of the AT2076/30).

MECHANICAL DATA

The magnetic circuit of the coil comprises two Ferroxcube U-cores. The unit is provided with pins for mounting on a printed-wiring board.

Dimensions (mm)

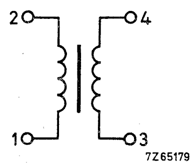




Hole pattern for mounting on a printed-wiring board. Hole diameter 1, 3 + 0, 1 mm. e = 2, 54 mm (0, 1 in).

ELECTRICAL DATA

Inductance (primary, 1-2)	425 μH ± 10%
→ Resistance (primary, 1-2)	< 0, 24 Ω
Maximum voltage, peak-to-peak	400 V
Maximum current, peak-to-peak	6, 7 A
Maximum current, r. m. s.	1, 8 A
Maximum working temperature	100 °C



3122 138 90290

SWITCHED-MODE DRIVER TRANSFORMER

with mains isolation

APPLICATION

The transformer AT4043/45 has been designed for use as a driver transformer in the synchronous power pack system for colour tv receivers with mains isolation. It is used in conjunction with current sensing transformer AT4043/46 and mains transformer TS561/2.

MECHANICAL DATA

Dimensions in mm

The magnetic circuit of the transformer comprises two Ferroxcube U20-cores. Two separate coil formers guarantee the required isolation between primary and secondary. The transformer is provided with 6 pins for mounting on a printed-wiring board.

Outlines

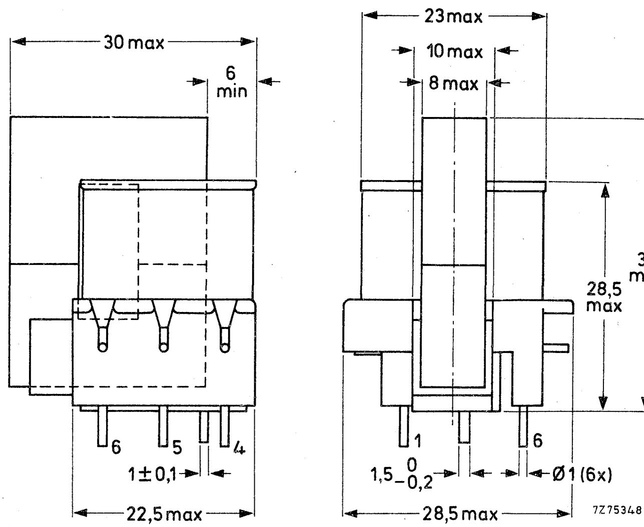


Fig. 1.

Mounting

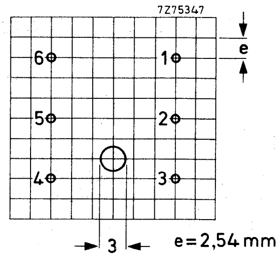


Fig.2 Hole pattern for mounting on a printed-wiring board; hole diameter 1,3 + 0,1 mm. Viewed from the component side.

ELECTRICAL DATA

Inductance, primary	(4 – 6)	⩾ 16 mH *
Resistance at 25 °C	(4 – 6)	2 Ω ± 12%
Leakage inductance, secondary	(1 – 3)	⩽ 6 μH **
Resistance at 25 °C	(1 – 3)	0,05 Ω ± 12%
Turns ratio		5 : 1
Mains isolation		acc. to IEC 65
Maximum working temperature		115 °C

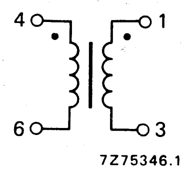


Fig. 3.

* Measuring condition: E = 8 V, f = 1 kHz.
** Measuring condition (primary short-circuited): E ⩽ 250 mV, 0,9 MHz ⩽ f ⩽ 1,1 MHz.

CURRENT SENSING TRANSFORMER
with mains isolation

APPLICATION
The transformer AT4043/46 has been designed for use as a sensing transformer in switched-mode power supply circuits.

MECHANICAL DATA
The magnetic circuit of the transformer comprises two Ferroxcube U15-cores. The primary turn is potted in the coil former to guarantee the required isolation. The transformer is provided with 4 pins for mounting on a printed-wiring board.

Outlines Dimensions in mm

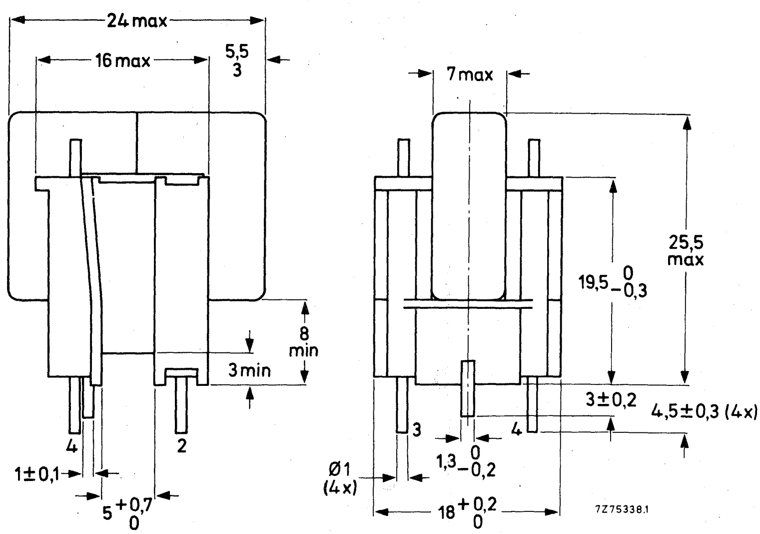


Fig.1

Mounting

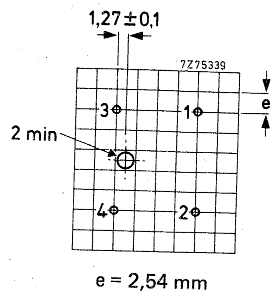


Fig.2 Hole pattern for mounting on a printed-wiring board; hole diameter 1,3 + 0,1 mm. Viewed from the component side.

ELECTRICAL DATA

Inductance, secondary	(3 – 4)	⩾ 700 mH *
Resistance, secondary, at 25 °C	(3 – 4)	65 Ω ± 12%
Turns ratio		1 : 800
Mains isolation		acc. to IEC 65
Maximum working temperature		115 °C

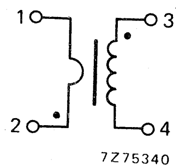


Fig.3

APPLICATION CIRCUIT

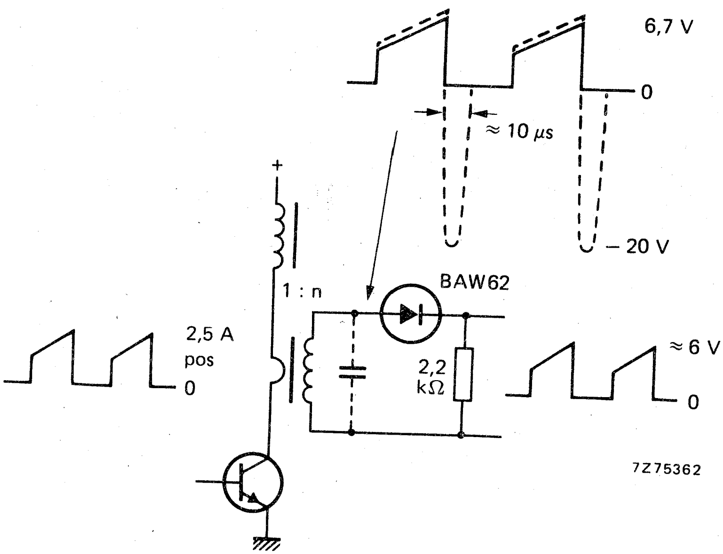


Fig.4

* Measuring condition: E = 10 V, f = 1 kHz.

3122 138 93410

POWER PACK SYSTEM SUPPLY CHOKE

for colour television

APPLICATION

The AT4043/52 has been designed to be used as a choke in a power pack system in conjunction with mains transformer TS561/2, mains filter choke AT4043/55, current sensing transformer AT4043/46, line choke AT4043/53 and power pack transformer AT2076/70.

MECHANICAL DATA

Dimensions in mm

The magnetic circuit of the choke comprises two Ferroxcube U-cores. The coil is provided with pins for mounting on a printed-wiring board.

Outlines

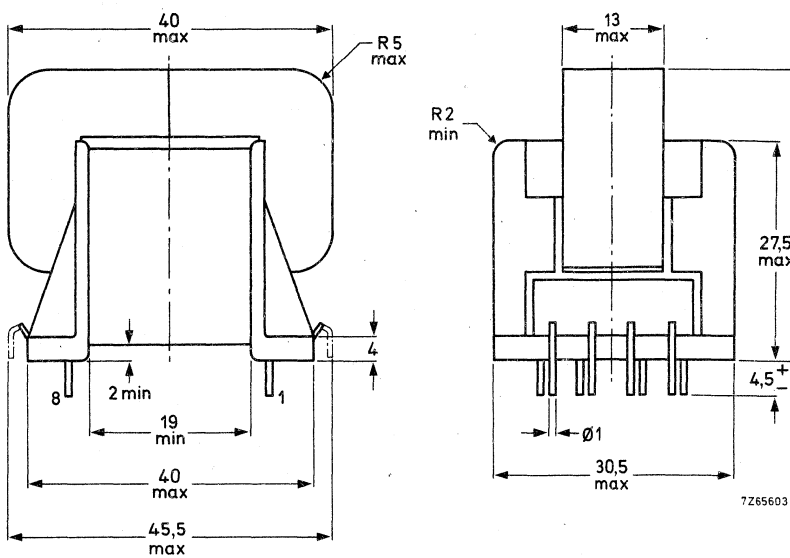


Fig. 1.

Mounting

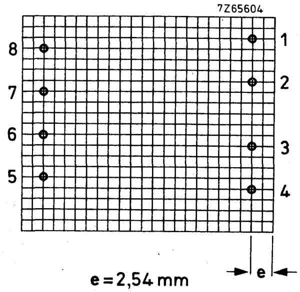


Fig. 2 Hole pattern (viewed from printed-wiring side) for mounting on a printed-wiring board, hole diameter 1,3 + 0,1 mm.

ELECTRICAL DATA

Inductance (2 – 5)*	9 mH ± 10%
Resistance (2 – 5)	2,2 Ω ± 10%
Maximum peak current	1,4 A
Maximum working temperature	115 °C
Inflammability	UL94V–1

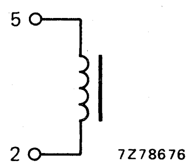


Fig. 3.

* Measuring condition: E = 1,5 V, f = 1 kHz.

3122 138 93420

POWER PACK SYSTEM LINE CHOKE

for colour television

APPLICATION

The AT4043/53 has been designed for use as a line choke in a power pack system in conjunction with mains transformer TS561/2, power pack transformer AT2076/70, etc. (see data on relevant transformer).

MECHANICAL DATA

Dimensions in mm

The magnetic circuit of the line choke comprises two Ferroxcube U-cores. The unit is provided with pins for mounting on a printed-wiring board.

Outlines

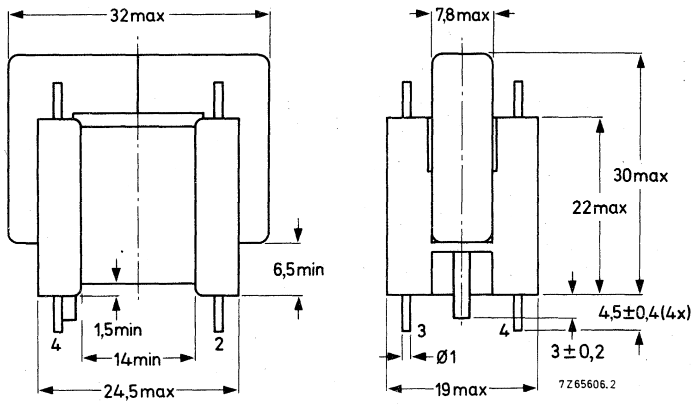


Fig. 1.

Mounting

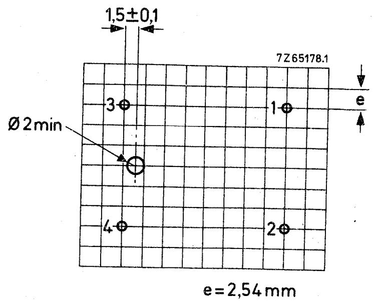


Fig. 2 Hole pattern for mounting on a printed-wiring board, viewed from component side. Hole diameter 1,3 + 0,1 mm.

ELECTRICAL DATA

Inductance (1-2)*	12 mH ± 10%
Resistance (1-2)	9,2 Ω ± 10%
Maximum peak current (1-2)	525 mA
Turns ratio 1-3/1-2	0,32
Maximum working temperature	115 °C
Inflammability	UL94V-1
Corona test voltage at 70 kHz	1700 V peak

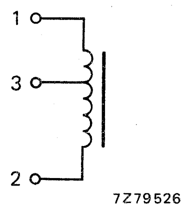


Fig. 3.

With the choke connected in the line timebase circuit with deflection unit AT1270, AT1260 or AT1250:

Deflection current p-p	5,35 A
Flyback time	11,5 μs
BU208A	
V_{CEM}	1150 V
I_C	3,1 A

With deflection unit AT1035/00:

Deflection current p-p	2,85 A
Flyback time	11,6 μs
BU205 or BU208A	
V_{CEM}	1000 V
I_C	1,7 A

* Measuring condition: E = 1 V, f = 1 kHz.

APPLICATION CIRCUITS

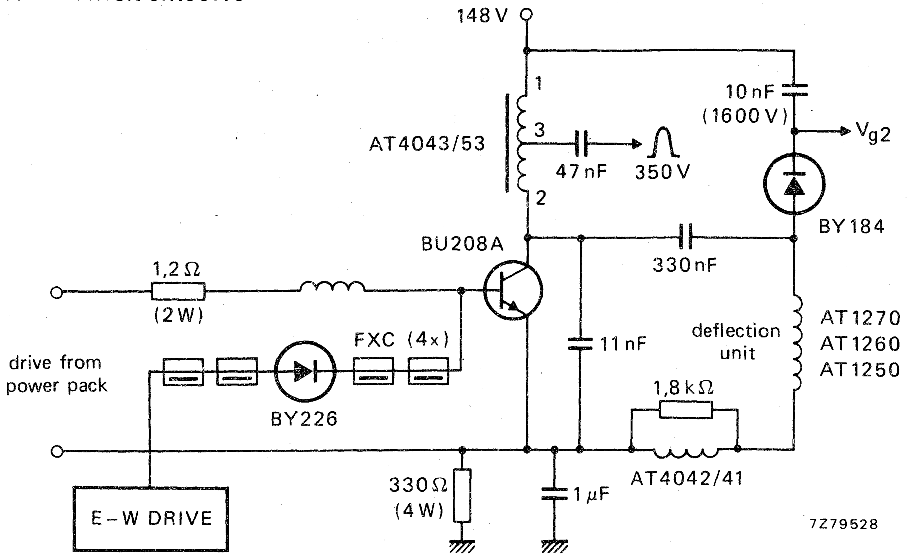


Fig. 4 Circuit for 110° deflection.

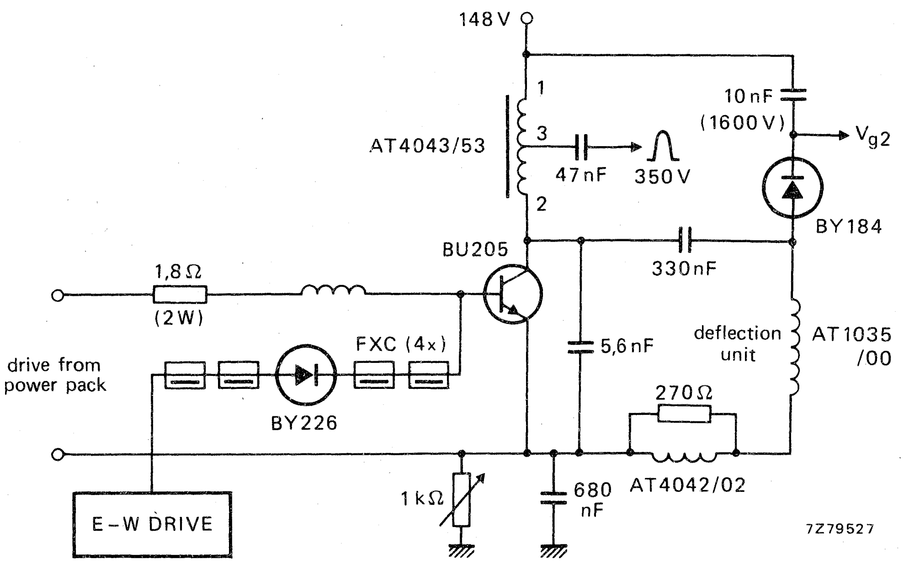


Fig. 5 Circuit for 90° deflection.

3122 138 93240

MAINS FILTER CHOKE FOR 1,5 A rms

APPLICATION

The AT4043/55 has been designed for use in consumer and professional equipment as part of the filter network in the power supply.

MECHANICAL DATA

The magnetic circuit of the filter choke comprises two Ferroxcube U25 cores. The unit is provided with four pins for mounting on a printed-wiring board.

Outlines

Dimensions in mm

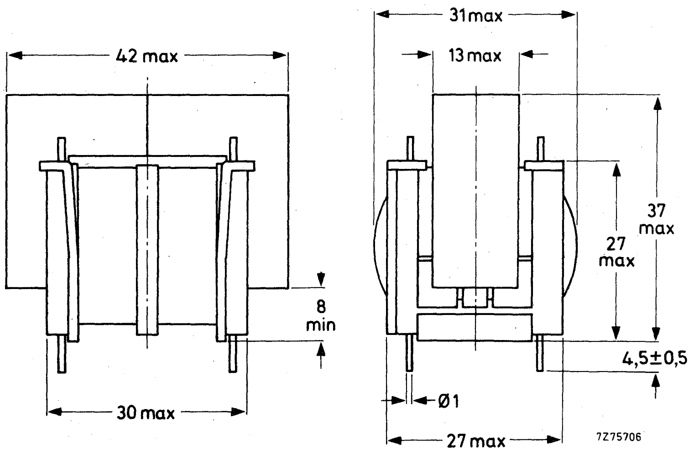


Fig. 1.

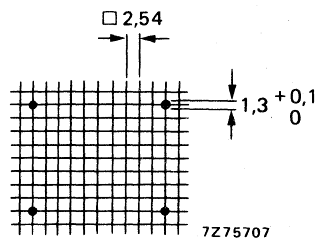


Fig. 2 Hole pattern for mounting on a printed-wiring board. Viewed from the solder side. The windings may be interchanged because the coil is symmetrical.

Marking

The catalogue number is printed on the Ferroxcube core.

ELECTRICAL DATA

Inductance, $L_{1\text{-}2} = L_{3\text{-}4}$	$\geqslant$ 25 mH
Resistance, $R_{1\text{-}2} = R_{3\text{-}4}$, at 25 °C	0,5 Ω
Leakage inductance	
$L_{s(1\text{-}2)}$, $L_{3\text{-}4}$ short-circuited	0,65 mH
$L_{s(3\text{-}4)}$, $L_{1\text{-}2}$ short-circuited	0,65 mH
Capacitance	37 pF
Maximum current (r.m.s.)	2 A
Maximum working temperature	115 °C

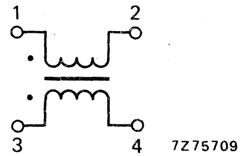


Fig. 3.

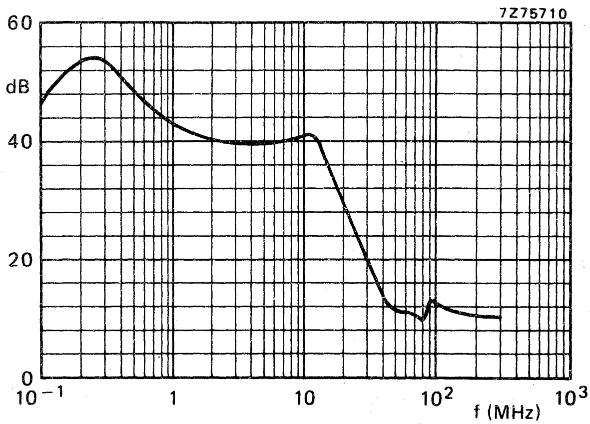


Fig. 4 Insertion loss measured in the 60 Ω circuit of Fig. 5.

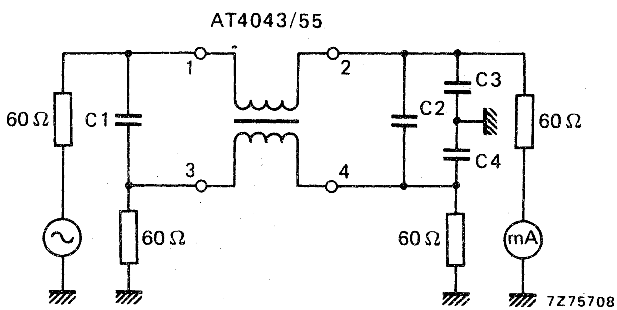


Fig. 5
C1 = C3 = C4 = 2200 pF, 250 V.
C2 = 0,47 μF, 250 V.

3122 138 91400

SWITCHED-MODE DRIVER TRANSFORMER

APPLICATION

The AT4043/58 driver transformer has been designed for use in switched-mode power supply circuits for 90° colour television receivers, in conjunction with the switched-mode transformer AT2097/01.

MECHANICAL DATA

The magnetic circuit of the transformer comprises two Ferroxcube U15-cores. The item is provided with four pins for mounting on a printed-wiring board.

Outlines

Dimensions in mm

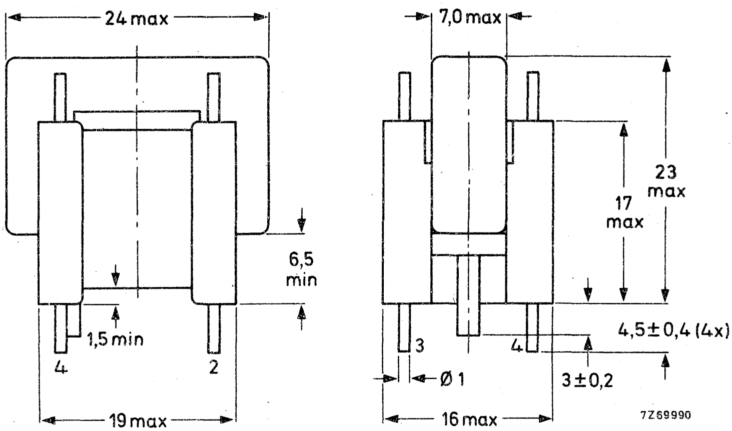


Fig. 1.

Mounting

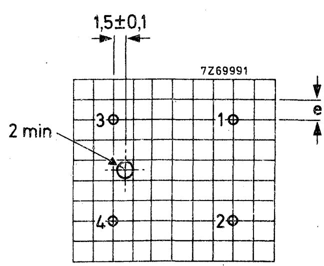


Fig. 2 Hole pattern for mounting on a printed-wiring board (component side). Hole diameter 1,3 + 0,1 mm. e = 2,54 mm (0,1 in).

ELECTRICAL DATA

Inductance primary (1-2) *	⩾ 220 mH
Resistance primary (1-2)	17,5 Ω
Resistance secondary (3-4)	0,27 Ω
Leakage inductance secondary (3-4)**	⩽ 5 μH
Transformation ratio 1-2/3-4	10
Maximum working temperature	115 °C

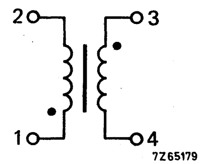


Fig. 3.

* Measuring conditions: E = 6 V; f = 1000 Hz.
** Measuring conditions: primary short-circuited; E = 250 mV; 1,1 ⩾ f ⩾ 0,9 MHz.

LINE DRIVER TRANSFORMER

APPLICATION

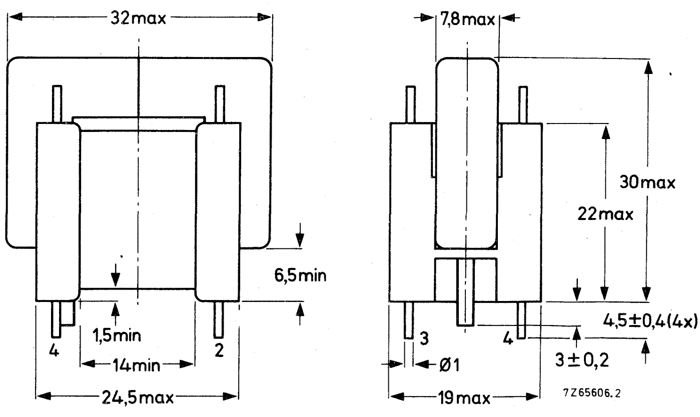
The transformer AT4043/87 has been designed for all-transistor black/white and colour television sets. In black and white television sets it can be used in the single-transistor (BU205) line-output circuit in conjunction with the line-output transformer AT2048/12; in colour television sets it can be used in the single-transistor (BU208A) line-output circuit in conjunction with the line-output transformer AT2076/30.

MECHANICAL DATA

Dimensions in mm

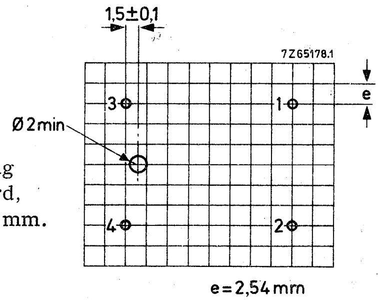
The magnetic circuit of the transformer comprises two Ferroxcube U-cores.
The unit is provided with pins for mounting on a printed-wiring board.

Outlines



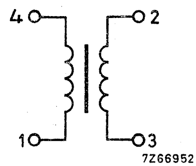
Mounting

Hole pattern for mounting on a printed-wiring board, hole diameter 1, 3 + 0, 1 mm.



ELECTRICAL DATA

Inductance (primary, 1-4)	76 mH ± 12%
Leakage inductance (secondary) *)	≤ 2, 0 μH
→ Transformation ratio 4-1/2-3	29 : 1
Maximum working temperature	100 °C



*) Primary short circuited

E/W LOADING COIL

APPLICATION

This coil has been designed for the circuitry around the line output transformer AT2076/30 in conjunction with the deflection unit AT 1080 (see also the data on the transformer).

MECHANICAL DATA

Dimensions (mm)

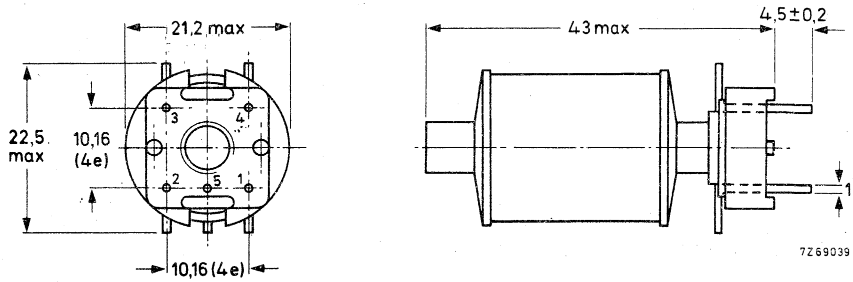


Fig. 1.

The coil is provided with pins for mounting on a printed-wiring board. It can be adjusted at the top by means of a trimming key.

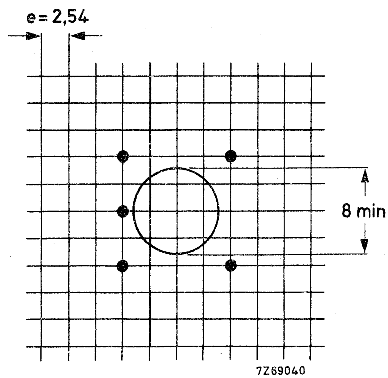


Fig. 2 Hole pattern for mounting on a printed-wiring board, hole dia 1, 3 + 0, 1 mm

ELECTRICAL DATA

Inductance between 3 and 4	*)	1 to 5,3 mH
Resistance between 3 and 4		2 Ω
Maximum working temperature		95 °C

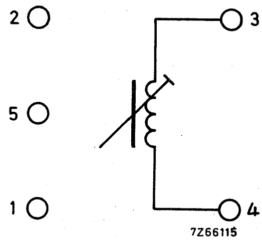


Fig. 3 Connection diagram

*) measured with 5000 pF in parallel.

LINE BALANCE COIL

APPLICATION

This coil has been designed for the circuitry of the four-pole unit incorporated in the deflection unit AT1080, for equalization of line and field astigmatism (see also data on AT1080)

MECHANICAL DATA

Dimensions (mm)

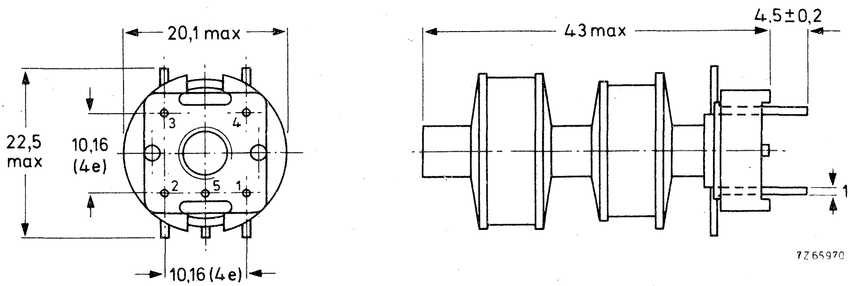


Fig. 1

The coil is provided with pins for mounting on a printed-wiring board. It can be adjusted at the top by means of a trimming key.

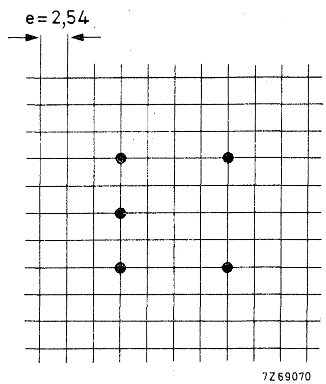


Fig. 2 Hole pattern for mounting on a printed-wiring board, hole dia 1,3+0,1 mm

ELECTRICAL DATA

Inductance between 4 and 1	*)	13 to 63 μH
between 2 and 3		63 to 13 μH
Resistance between 4 and 1, and 2 and 3		0,15 Ω
Maximum working temperature		95 °C

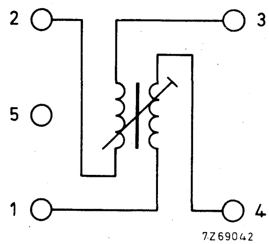


Fig. 3 Connection diagram

Pins 2 and 4 should be interconnected.

*) measured with 5000 pF in parallel.

FOUR-POLE ADJUSTING COIL

APPLICATION

This correction coil has been designed for the circuitry of the four-pole unit incorporated in the deflection unit AT1080, for equalization of line astigmatism (see also data on AT1080).

MECHANICAL DATA

Dimensions (mm)

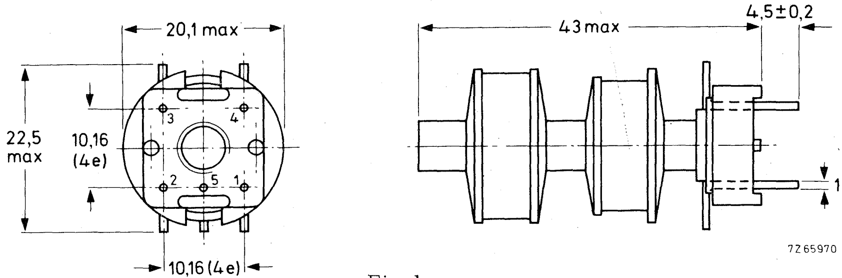


Fig. 1

The coil is provided with pins for mounting on a printed-wiring board. It can be adjusted at the top by means of a trimming key.

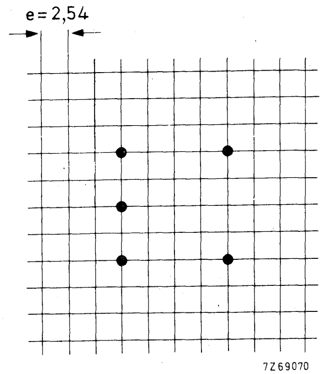


Fig. 2 Hole pattern for mounting on a printed-wiring board, hole dia 1,3 + 0,1 mm

ELECTRICAL DATA

Inductance, measured with 5000 pF in parallel	
between 3 and 5 *)	33 to 150 μH
between 4 and 5 *)	150 to 33 μH
Resistance at 25 °C	
between 1 and 2	0,23 Ω
between 3 and 4	0,18 Ω
Maximum working temperature	95 °C

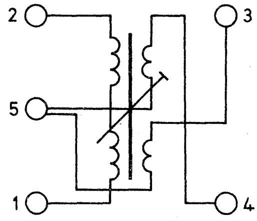


Fig. 3. Connection diagram

*) Supplied with core position for $L_{3-5} = L_{5-4} = 11,3\ \mu H \pm 5\%$.

4322 027 84620

DELAY LINE

QUICK REFERENCE DATA

For receivers up to European PAL standard	
Nominal frequency	4,433619 MHz
Phase delay time	63,943 μs
Dimensions	37 x 7,5 x 28,5 mm
Self-extinguishing properties	

APPLICATION

The DL600 is intended for use in decoder circuits of colour television receivers.

DESCRIPTION

A very thin slab of zero TC glass provided with two transducers is shock-proof mounted in a housing with self-extinguishing properties. Four pins enable the unit to be soldered directly onto a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

Outlines

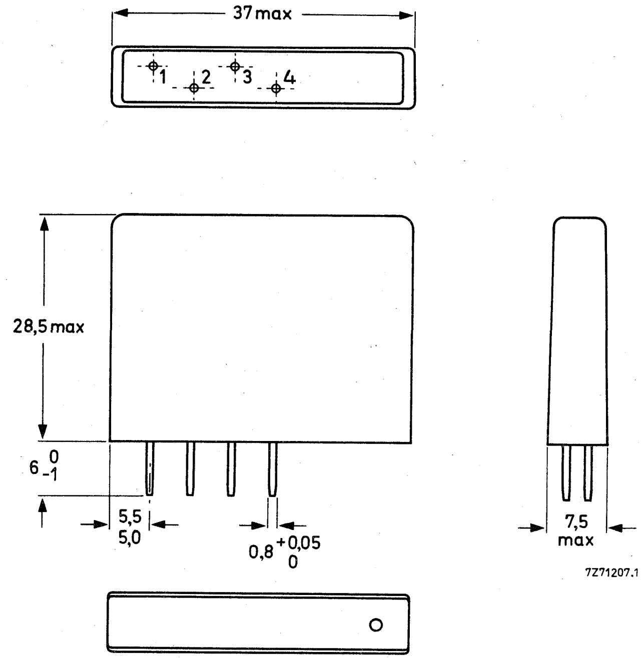


Fig. 1.

Mass 7 g

Mounting

The unit can be soldered directly onto a printed-wiring board.

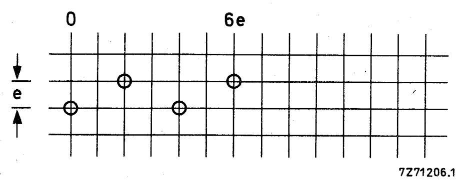


Fig. 2 Recommended hole pattern for mounting on a printed-wiring board: e = 2,54 mm. The tolerance on the distances of the different holes to the 0-line is ± 0,1 mm. Hole diameter is 1,0 + 0,1 mm.

ELECTRICAL DATA

Measured with the circuit of Fig. 3 at 25 °C and f_o (unless otherwise specified)

Nominal frequency (f_o)	4,433619 MHz
Phase delay time (τ)	63,943 ± 0,005 μs
Bandwidth at –3 dB	from ≤ 3,43 to ≥ 5,23 MHz
Insertion loss	9 ± 3 dB
Drift of phase delay from +10 to +60 °C (relative to +25 °C)	max. 5 ns, typ. 3 ns
Maximum input voltage (p-p)	10 V
Spurious signals	
3 τ signals	≤ –30 dB with respect to 1 τ signal
other signals	≤ –30 dB with respect to 1 τ signal
Phase relation $\varphi_{4\text{-}3} - \varphi_{2\text{-}1}$	180°
Storage temperature range	–40 to +70 °C

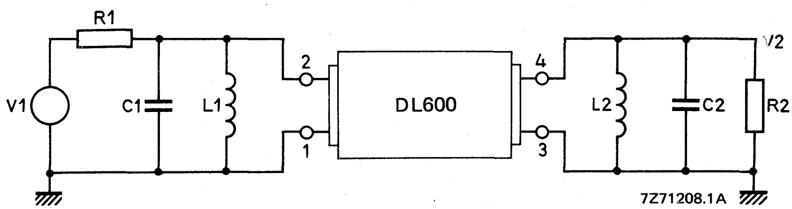


Fig. 3.

Terminations

R1 = R2 = 560 Ω

C1 = 20 pF, C2 = 30 pF } total capacitance of test jig without delay-line i.e. wiring capacitance, capacitance of coil and extra trimming capacitor.

L1 = 10,5 μH

L2 = 9,7 μH

Application circuit

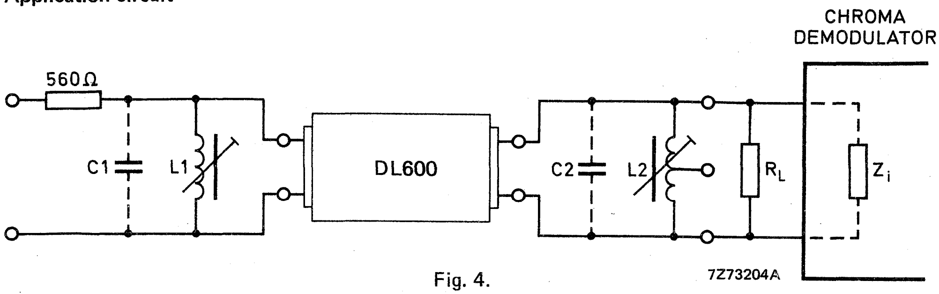


Fig. 4.

$(R_L//Z_i) = 560\ \Omega$

C1, C2 < 30 pF (wiring capacitance and capacitance of the coil)

L1, L2 nominal values depend on values of C1 and C2 to produce the reactances:

$$X1 = \frac{\omega_o L_1}{1 - \omega_o^2\ L1C1} = 350\ \Omega$$

$$X2 = \frac{\omega_o L_2}{1 - \omega_o^2\ L2C2} = 350\ \Omega$$

$f_o = 4{,}433619$ MHz.

Maximum bandwidth is obtained at minimum C1 and C2.

Recommended adjustment range of the coils −19 to +36%.

4322 027 84640

DELAY LINE

QUICK REFERENCE DATA

For receivers up to European PAL and SECAM standard		
Nominal frequency	4,433619	MHz
Phase delay time	63,943	μs
Dimensions	37 x 7,5 x 28,5	mm
Self-extinguishing properties		

APPLICATION

The DL610 is intended for use in decoder circuits of colour television receivers.

DESCRIPTION

A very thin slab of zero TC glass provided with two transducers is shock-proof mounted in a housing with self-extinguishing properties. Four pins enable the unit to be soldered directly onto a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

Outlines

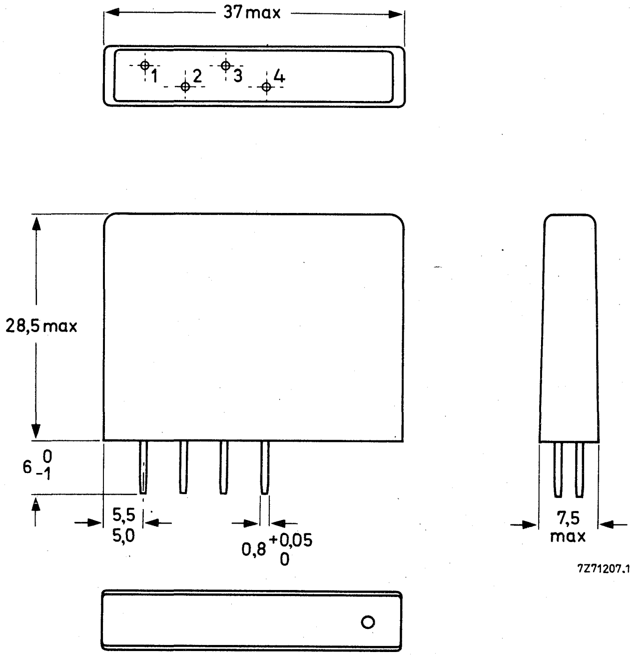


Fig. 1.

Mass 7 g

Mounting

The unit can be soldered directly onto a printed-wiring board.

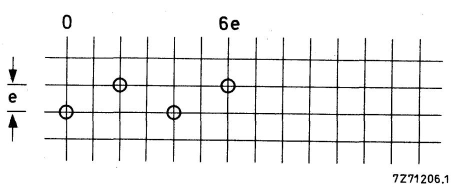


Fig. 2 Recommended hole pattern for mounting on a printed-wiring board: e = 2,54 mm. The tolerance on the distances of the different holes to the 0-line is ± 0,1 mm. Hole diameter is 1,0 + 0,1 mm.

ELECTRICAL DATA

Measured with the circuit of Fig. 3 at 25 °C and f_o (unless otherwise specified)

Nominal frequency (f_o)	4,433619 MHz
Phase delay time (τ)	63,943 ± 0,005 μs
Bandwidth at –3 dB	from $\leqslant$ 3,43 to $\geqslant$ 5,23 MHz
Insertion loss	9 ± 3 dB
Drift of phase delay from + 10 to + 60 °C (relative to + 25 °C)	max. 5 ns, typ. 3 ns
Maximum input voltage (p-p)	10 V
Spurious signals*	
3 τ signals	$\leqslant$ –30 dB with respect to 1 τ signal
other signals	$\leqslant$ –30 dB with respect to 1 τ signal
Phase relation $\varphi_{4\text{-}3} - \varphi_{2\text{-}1}$	180°
Storage temperature range	–40 to + 70 °C

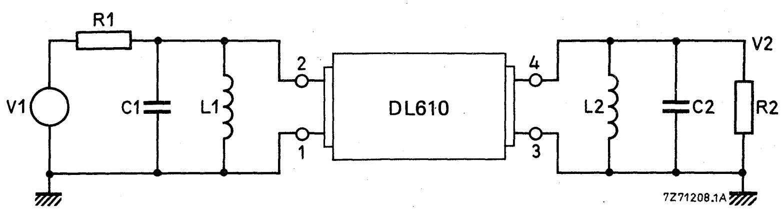


Fig. 3.

Terminations
R1 = R2 = 560 Ω
C1 = 20 pF } total capacitance of test jig without delay-line i.e. wiring
C2 = 30 pF } capacitance, capacitance of coil and extra trimming capacitor.
L1 = 10,5 μH
L2 = 9,7 μH

* Measured in frequency range 3,9 to 4,75 MHz.

Application circuit

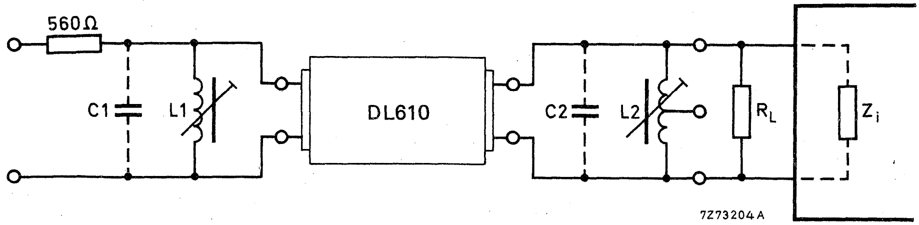


Fig. 4.

$(R_L//Z_i)$ = 560 Ω

C1, C2 < 30 pF (wiring capacitance and capacitance of the coil)

L1, L2 nominal values depend on values of C1 and C2 to produce the reactances:

$$X1 = \frac{\omega_o L1}{1-\omega_o^2 L1C1} = 350\ \Omega$$

$$X2 = \frac{\omega_o L2}{1-\omega_o^2 L2C2} = 350\ \Omega$$

$$f_o = 4{,}433619\ \text{MHz}$$

Maximum bandwidth is obtained at minimum C1 and C2.

Recommended adjustment range of the coils −19 to + 36%.

4322 027 84700

DELAY LINE

QUICK REFERENCE DATA

For receivers up to European PAL standard		
Nominal frequency	4,433619	MHz
Phase delay time	63,943	μs
Dimensions	37 x 7,5 x 28,5	mm
Self-extinguishing properties		

APPLICATION

The DL700 is intended for use in decoder circuits of colour television receivers.

DESCRIPTION

A very thin slab of zero TC glass provided with two transducers is shock-proof mounted in a housing with self-extinguishing properties. Four pins enable the unit to be soldered directly onto a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

Outlines

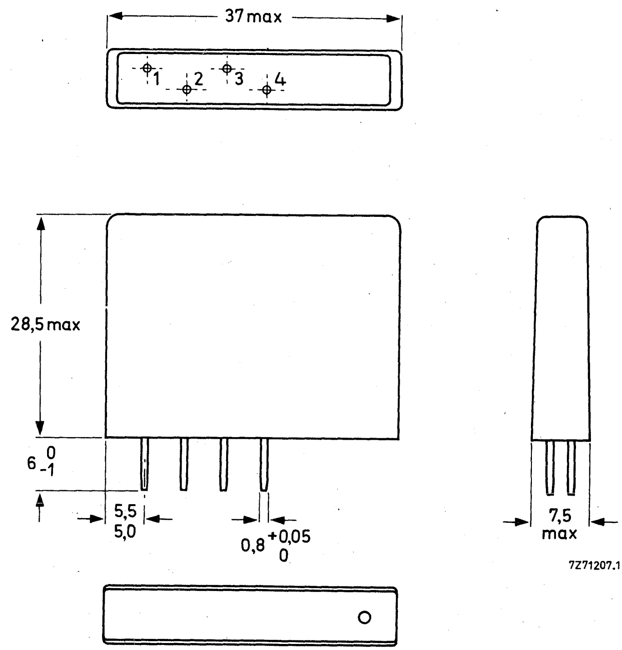


Fig. 1.

Mass 7 g

Mounting

The unit can be soldered directly onto a printed-wiring board.

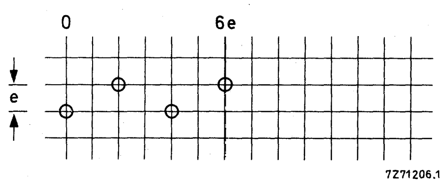


Fig. 2 Recommended hole pattern for mounting on a printed-wiring board: e = 2,54 mm. The tolerance on the distances of the different holes to the 0-line is ± 0,1 mm. Hole diameter is 1,0 + 0,1 mm.

ELECTRICAL DATA

Measured with the circuit of Fig. 3 at 25 °C and f_o (unless otherwise specified)

Nominal frequency (f_o)	4,433619 MHz
Phase delay time (τ)	63,943 ± 0,005 μs
Bandwidth at –3 dB	from ≤ 3,43 to ≥ 5,23 MHz
Insertion loss	9 ± 3 dB
Drift of phase delay from + 10 to + 60 °C (relative to + 25 °C)	max. 5 ns, typ. 3 ns
Maximum input voltage (p-p)	10 V
Spurious signals	
3 τ signals	≤ –30 dB with respect to 1 τ signal
other signals	≤ –30 dB with respect to 1 τ signal
Phase relation $\varphi_{4\text{-}3} - \varphi_{2\text{-}1}$	180°
Storage temperature range	–40 to +70 °C

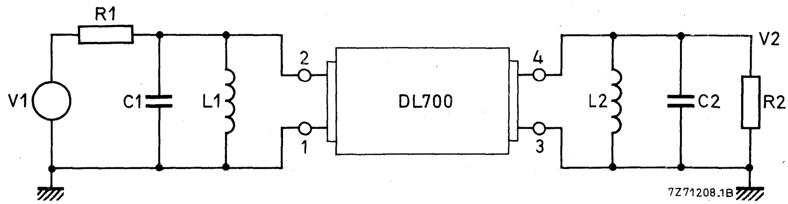


Fig. 3.

Terminations
R1 = R2 = 390 Ω
C1 = 20 pF
C2 = 30 pF
} total capacitance of test jig without delay-line i.e. wiring capacitance, capacitance of coil and extra trimming capacitor.
L1 = 8,64 μH
L2 = 8,10 μH

Application circuit

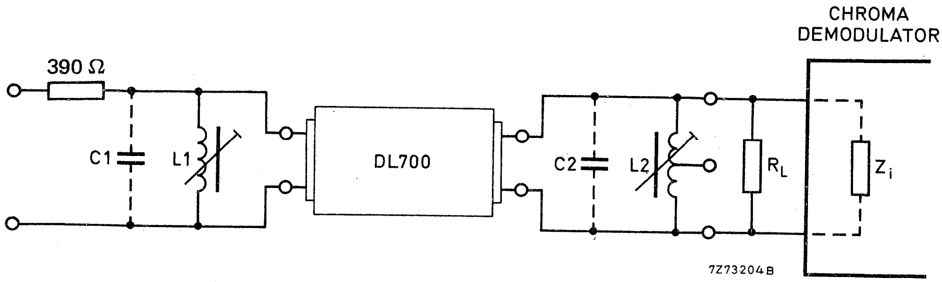


Fig. 4.

$(R_L // Z_i) = 390\ \Omega$

C1, C2 < 30 pF (wiring capacitance and capacitance of the coil)

L1, L2 nominal values depend on values of C1 and C2 to produce the reactances:

$$X1 = \frac{\omega_o L1}{1 - \omega_o^2 L1C1} = 278\ \Omega$$

$$X2 = \frac{\omega_o L2}{1 - \omega_o^2 L2C2} = 278\ \Omega$$

$$f_o = 4{,}433619\ \text{MHz}$$

Maximum bandwidth is obtained at minimum C1 and C2.

Recommended adjustment range of the coils −19 to + 36%.

4322 027 84710

DELAY LINE

QUICK REFERENCE DATA

For receivers up to European PAL and SECAM standard	
Nominal frequency	4,433619 MHz
Phase delay time	63,943 μs
Dimensions	37 x 7,5 x 28,5 mm
Self-extinguishing properties	

APPLICATION

The DL710 is intended for use in decoder circuits of colour television receivers.

DESCRIPTION

A very thin slab of zero TC glass provided with two transducers is shock-proof mounted in a housing with self-extinguishing properties. Four pins enable the unit to be soldered directly onto a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

Outlines

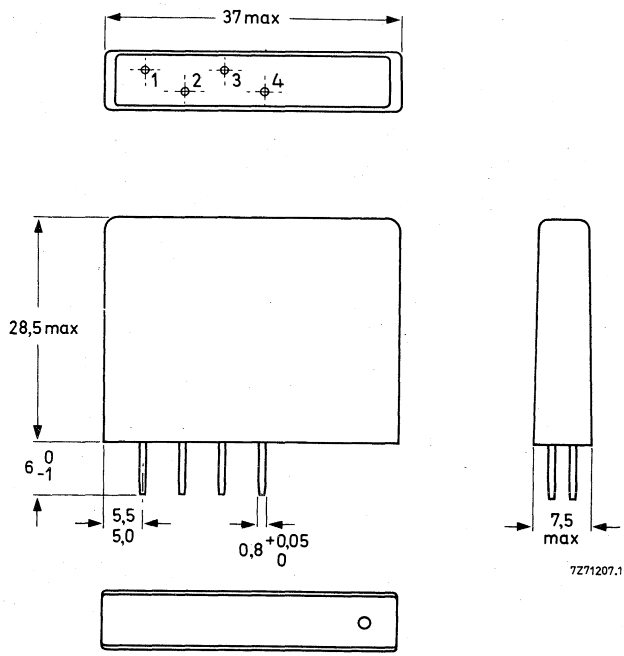


Fig. 1.

Mass 7 g

Mounting

The unit can be soldered directly onto a printed-wiring board.

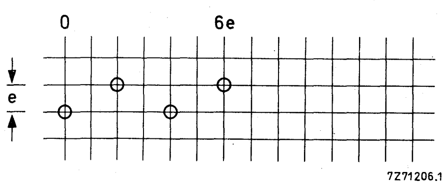


Fig. 2 Recommended hole pattern for mounting on a printed-wiring board: e = 2,54 mm. The tolerance on the distances of the different holes to the 0-line is ± 0,1 mm. Hole diameter is 1,0 + 0,1 mm.

ELECTRICAL DATA

Measured with the circuit of Fig. 3 at 25 °C and f_o (unless otherwise specified)

Nominal frequency (f_o)	4,433619 MHz
Phase delay time (τ)	63,943 ± 0,005 μs
Bandwidth at −3 dB	from ⩽ 3,43 to ⩾ 5,23 MHz
Insertion loss	9 ± 3 dB
Drift of phase delay from +10 to + 60 °C (relative to + 25 °C)	max. 5 ns, typ. 3 ns
Maximum input voltage (p-p)	10 V
Spurious signals*	
3 τ signals	⩽ −30 dB with respect to 1 τ signal
other signals	⩽ −30 dB with respect to 1 τ signal
Phase relation $\varphi_{4\text{-}3} - \varphi_{2\text{-}1}$	180°
Storage temperature range	−40 to + 70 °C

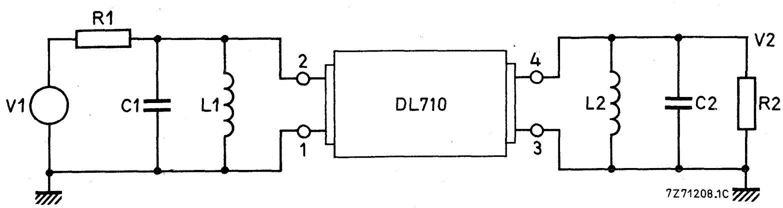


Fig. 3.

Terminations
R1 = R2 = 390 Ω
C1 = 20 pF } total capacitance of test jig without delay-line i.e. wiring capacitance,
C2 = 30 pF } capacitance of coil and extra trimming capacitor.
L1 = 8,64 μH
L2 = 8,10 μH

* Measured in frequency range 3,9 to 4,75 MHz.

Application circuit

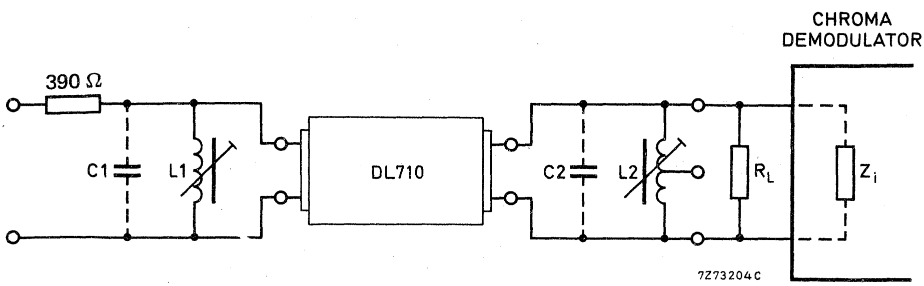


Fig. 4.

$(R_L//Z_i)$ = 390 Ω
C1, C2 < 30 pF (wiring capacitance and capacitance of the coil)
L1, L2 nominal values depend on values of C1 and C2 to produce the reactances:

$$X1 = \frac{\omega_o L1}{1-\omega_o^2 L1C1} = 278\ \Omega$$

$$X2 = \frac{\omega_o L2}{1-\omega_o^2 L2C2} = 278\ \Omega$$

f_o = 4,433619 MHz
Maximum bandwidth is obtained at minimum C1 and C2.
Recommended adjustment range of the coils −19 to + 36%.

3112 318 36191

MAINS TRANSFORMER

APPLICATION

The TS561/2 is a supply transformer for colour television receivers with the power pack system. It is also suitable in many semi-professional and professional applications.

MECHANICAL DATA

The transformer has a laminated iron core with a stacking height of max. 19,5 mm. The item is provided with 4 primary pins and 3 secondary pins for mounting on a printed-wiring board. Mounting facility with 4 self-tapping screws is provided.

Outlines Dimensions in mm

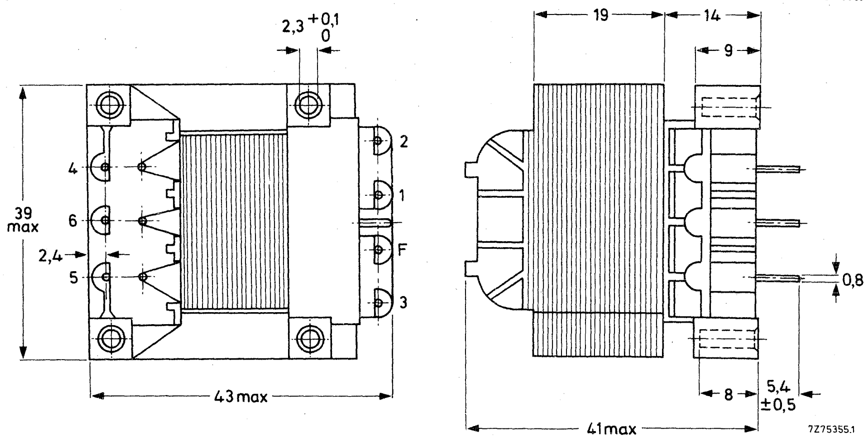


Fig. 1.

Mass 160 g

Mounting

The transformer is secured by means of four self-tapping screws of 3 mm.

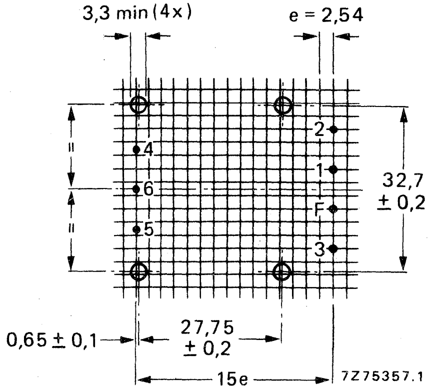


Fig. 2 Hole pattern for mounting on a printed-wiring board; hole diameter 1 + 0,1 mm. Viewed from the solder side.

ELECTRICAL DATA

Input power at T = 115 °C (T_{amb} = 60 °C)		6,5 VA
Output power at T = 115 °C (T_{amb} = 60 °C)		3,22 W

Note: for over-temperature protection a built-in temperature fuse (123 °C) is used; connection F.

Primary voltage,	(2 – F)	110 V
	(3 – F)	220 V
Primary resistance at T_{amb} = 25 °C	(3 – F)	1140 Ω
Secondary voltage V_o at I_o = 80 mA	(4 – 6 = 6 – 5)	17,4 V, see Fig. 4
Secondary resistance at T_{amb} = 25 °C		19 Ω
Test voltage between primary and case (d.c.)		5600 V
Test voltage between secondary and case (d.c.)		500 V
Mains isolation		acc. to IEC 65

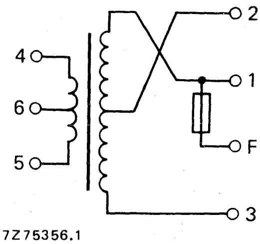
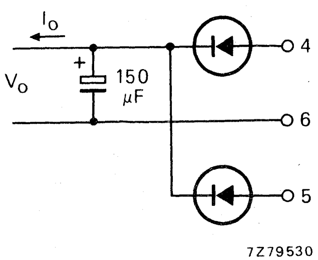


Fig. 3 Diagram and connections.



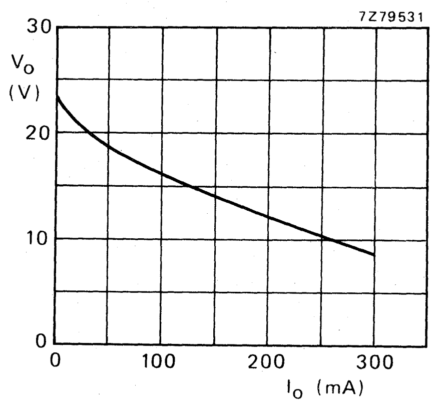


Fig. 4 Output voltage V_o as a function of the load current I_o.

DEGAUSSING COILS for 20AX picture tubes with mains isolation

APPLICATION

Two coils mounted on the top and bottom of the cone of the picture tube produce in conjunction with PTC thermistor 2322 662 98009 a decaying alternating field. The coils have to be connected in such a way that they operate magnetically in series, producing flux lines which flow from the top coil through the picture tube into the bottom coil or vice versa.

MECHANICAL DATA

The coils are completely sleeved with a flame-retardent foil; to guarantee mains isolation the coil ends are connected to a holder. For connecting the coils to the circuit a special plug has to be used.

Outlines

Dimensions in mm

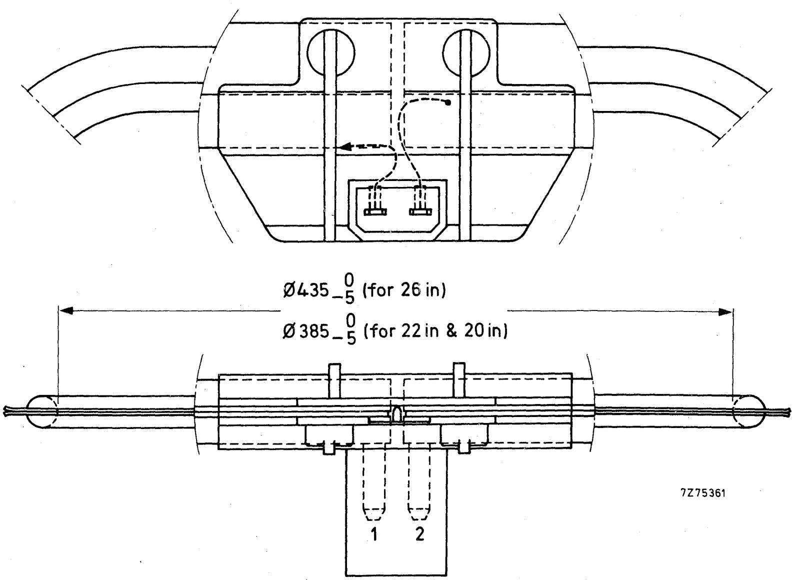


Fig.1

Dimensions of plug

Housing 3122 128 70921

Receptacle 3122 128 70931

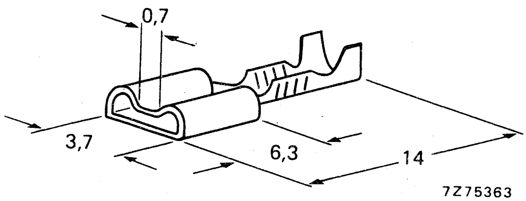
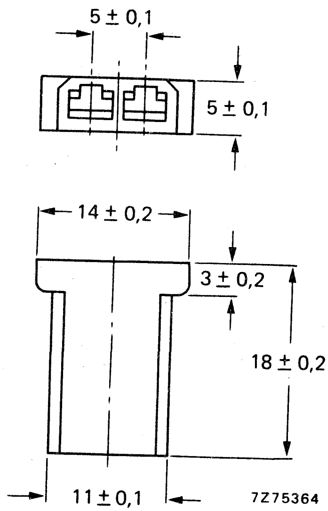


Fig.2



ELECTRICAL DATA

Coil resistance		
26 inch	catalogue no. 3122 138 75581	8,6 Ω ± 10%
22 and 20 inch	catalogue no. 3122 138 75941	11,5 Ω ± 10%
Number of turns		
26 inch		52
22 and 20 inch		49
Mains isolation		acc. to IEC 65
Maximum working temperature		70 °C

DEGAUSSING COILS
with double insulation

APPLICATION

For 26 in, 22 in and 20 in , 110° colour picture tubes. Two coils mounted on the top and bottom of the cone of the picture tube produce in conjunction with PTC thermistor 2322 662 98009 a decaying alternating field. The coils have to be connected in such a way that they operate magnetically in series, producing flux lines which flow from the top coil through the picture tube into the bottom coil or vice versa.

MECHANICAL DATA

The coils are completely double sleeved with a flame-retardent foil; to guarantee mains isolation the coil ends are connected to a holder. For connecting the coils to the circuit a special plug has to be used (see Figs 2 and 3).

Outlines Dimensions in mm

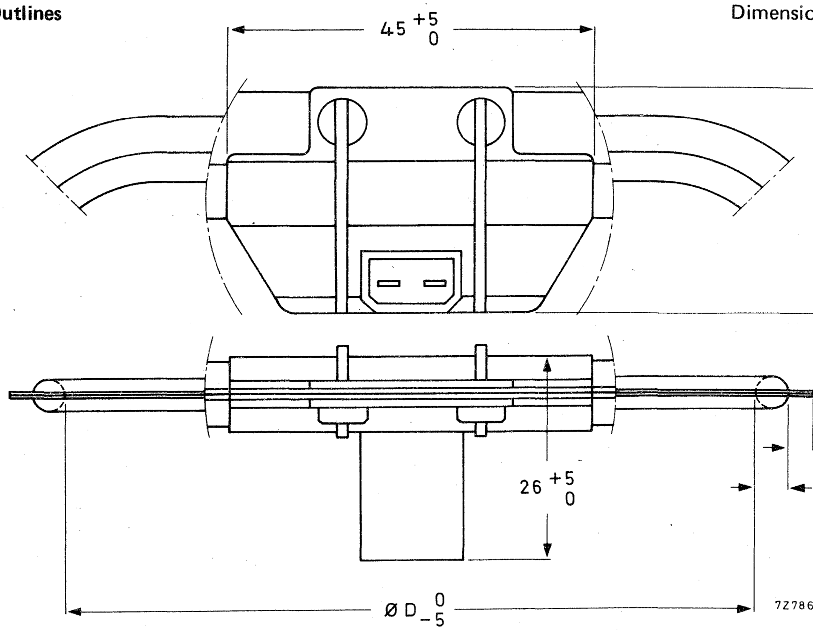


Fig. 1.

degaussing coil catalogue no.	D mm	d mm
3122 138 94350 for 26 in tube	435	8
3122 138 94380 for 22 in and 20 in tube	385	5

Dimensions of plug

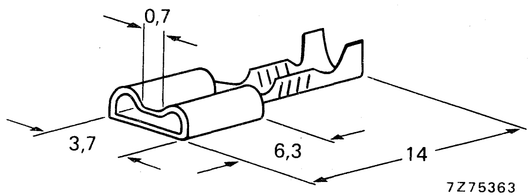


Fig. 2 Receptacle (3122 128 70931).

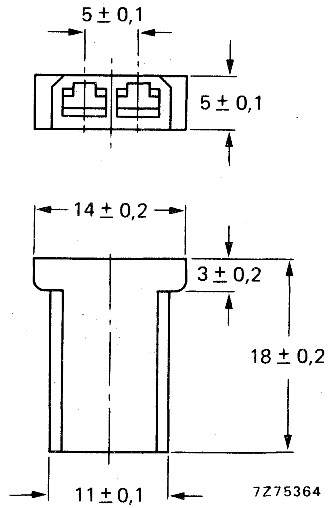


Fig. 3 Housing (3122 128 70921) for two receptacles.

Insertion force	max.	50 N
Withdrawal force	min.	10 N

ELECTRICAL DATA

Coil resistance		
26 inch type	(catalogue no. 3122 138 94350)	8,6 Ω ± 10%
22 and 20 inch type	(catalogue no. 3122 138 94380)	11,5 Ω ± 10%
Number of turns		
26 inch type		52
22 and 20 inch type		49
Safety		acc. to IEC 65.10 and UL1410
Maximum working temperature		70 °C

DEGAUSSING COIL

with single insulation

APPLICATION

For 20 inch 90^{o} picture tubes. Two coils mounted on the top and bottom of the cone of the picture tube produce in conjunction with PTC thermistor 2322 662 98009 a decaying alternating field. The coils have to be connected in such a way that they operate magnetically in series, producing flux lines which flow from the top coil through the picture tube into the bottom coil or vice versa.

MECHANICAL DATA

The coils are completely sleeved with a flame-retardent foil; to guarantee isolation the coil ends are connected to a holder. For connecting the coils to the circuit a special plug has to be used (see Figs 2 and 3).

Outlines Dimensions in mm

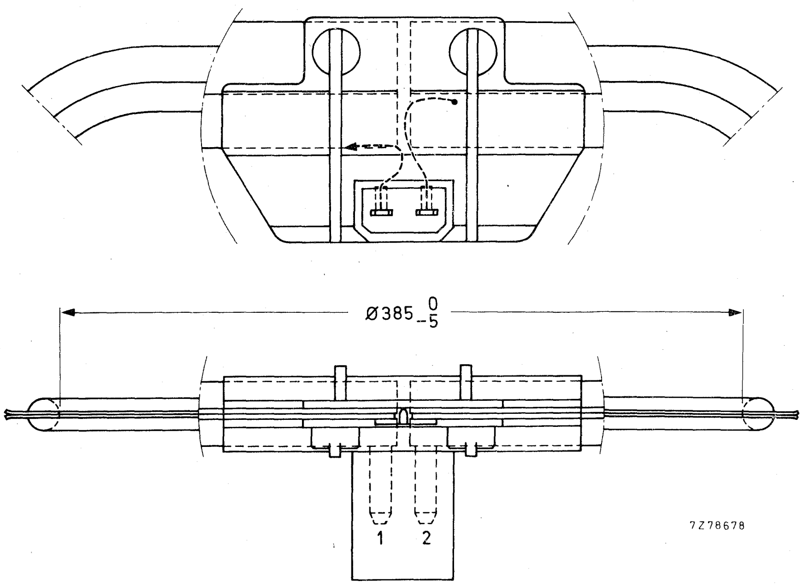


Fig. 1.

Dimensions of plug

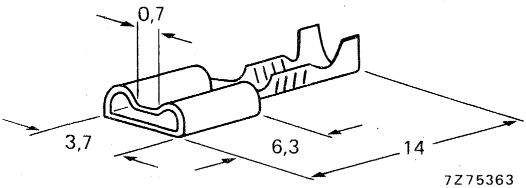


Fig. 2 Receptacle (3122 128 70931).

Insertion force	max. 50 N
Withdrawal force	min. 10 N

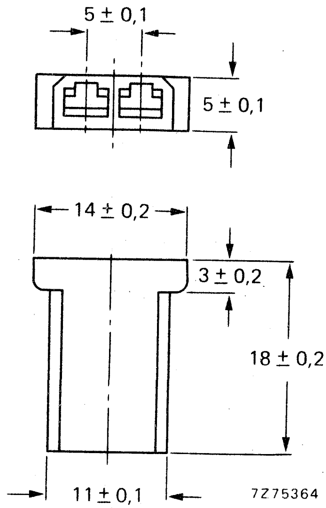


Fig. 3 Housing (3122 128 70921)
for two receptacles.

ELECTRICAL DATA

Coil resistance	11 Ω ± 10%
Number of turns	60
Safety	acc. to IEC 65.10
Maximum working temperature	70 °C

COMPONENTS FOR BLACK AND WHITE TELEVISION

SURVEY

tubes	basic deflection package	associated components	designed with
For black and white television			
110^{o} picture tubes, neck diameter 28 mm, A44-120 W, 44 cm (17 in) A50-120 W, 50 cm (20 in) A61-120 W, 61 cm (24 in)	deflection unit AT1040/15 line output transformer AT2048/12	adjustable linearity control unit AT4042/14 line driver transformer AT4043/87	line output transistor BU205
31 cm (12 in), 110^{o} picture tube, neck diameter 20 mm, A31-120 W	deflection unit AT1074 line output transformer AT2140		line output transistor BD407
For video (CCTV) and basic data displays			
90^{o} monitor tubes, 20 mm neck diameter, M24-300, 24 cm (9 in) M31-330, 31 cm (12 in)	deflection unit AT1074/01 line output transformer AT2140/10	adjustable linearity control unit AT4042/26 line driver transformer AT4043/56	
For half-page alphanumeric data displays			
90^{o} monitor tubes, 20 mm neck diameter, M24-300, 24 cm (9 in) M31-330, 31 cm (12 in)	deflection unit AT1071/03 line output transformer AT2102/02	adjustable linearity control unit AT4036 line driver transformer AT4043/64	
110^{o} monitor tubes, 28,6 mm neck diameter, M31-300, 31 cm (12 in) M38-300, 38 cm (15 in)	deflection unit AT1038/40 line output transformer AT2102/04	adjustable linearity control unit AT4042/08 line driver transformer AT4043/59	

DEFLECTION UNIT

QUICK REFERENCE DATA

Monitor tube	
diagonal	31 cm (12 in), 38 cm (15 in)
neck diameter	28 mm
Deflection angle	110^{o}
Line deflection current, edge to edge at 17 kV	4,4 A (p-p)
Inductance of line coils, parallel connected	690 μH
Field deflection current, edge to edge at 17 kV	1,08 A (p-p)
Resistance of field coils, parallel connected	7,6 Ω

APPLICATION

This deflection unit has been designed for use with 31 cm (12 in) and 38 cm (15 in) 110^{o} monochrome monitor tubes in conjunction with:
line output transformer AT2102/04;
linearity control unit AT4042/08;
line driver transformer AT4043/59.

DESCRIPTION

The saddle-shaped line deflection coils are moulded so that the deflection centre is well within the conical part of the monitor tube. The field deflection coils are wound on a Ferroxcube yoke ring which is flared so that the field and line deflection centres coincide. Provisions are made for centring, and correction of pin-cushion distortion. The unit meets the self-extinguishing and non-dripping requirements of IEC 65.

MOUNTING

The unit should be mounted as far forward as possible on the neck of the monitor tube, so that it touches the cone.

To orient the raster correctly, the unit may be rotated by hand on the neck of the monitor tube, with which it makes a slip fit. A screw-tightened clamping ring permits it to be locked, both axially and radially, in the desired position.

MECHANICAL DATA

Dimensions in mm

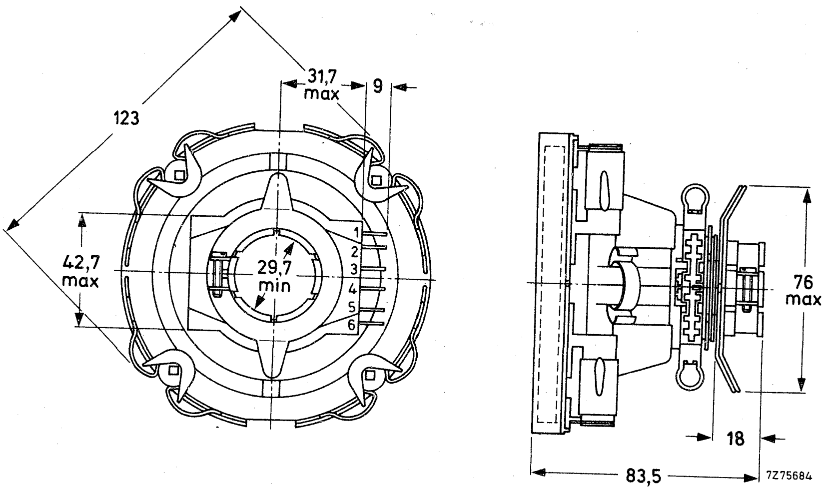


Fig. 1 Deflection unit AT1038/40.

ELECTRICAL DATA

The electrical values apply at an ambient temperature of 25 °C.

Line deflection coils, parallel connected (Fig. 2a); terminals 3 and 4	
Inductance	690 μH ± 4,5%
Resistance	1,1 Ω ± 8%
Field deflection coils, parallel or series connected (Fig. 2b); terminals 1 and 2 for parallel connected coils (terminals 1 and 6, and 2 and 5 to be interconnected); terminals 2 and 6 for series connected coils (terminals 1 and 5 to be interconnected)	
Inductance (parallel connected coils)	14,1 mH ± 8%
Inductance (series connected coils)	56,4 mH ± 8%
Resistance (parallel connected coils)	7,6 Ω ± 8%
Resistance (series connected coils)	30,4 Ω ± 8%
Maximum d.c. voltage between line and field coils	2500 V
Maximum operating temperature	95 °C

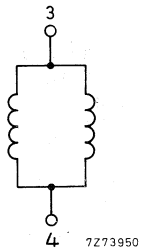


Fig. 2a Line coils.

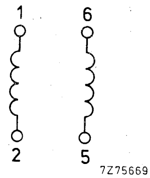


Fig. 2b Field coils.

The following characteristics are measured at an e.h.t. of 17 kV on a 38 cm (15 in) reference tube.

Sensitivity

Deflection current edge to edge

in line direction	4,4 A (p-p)
in field direction	1,08 A (p-p)

Geometric distortion measured without correction magnets on a 38 cm (15 in) reference tube.

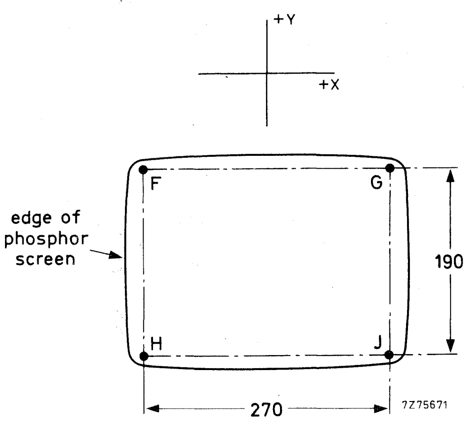


Fig. 3.

Fy	: $+4\,^{+2}_{-2}$	Fx	: $-4\,^{-2}_{+2}$
Gy	: $+4\,^{+2}_{-2}$	Gx	: $+4\,^{+2}_{-2}$
Jy	: $+4\,^{-2}_{+2}$	Jx	: $+4\,^{+2}_{-2}$
Hy	: $+4\,^{-2}_{+2}$	Hx	: $-4\,^{-2}_{+2}$

CORRECTION FACILITIES

For centring

After adjustment of the linearity of the deflection current, the eccentricity of the monitor tube and the deflection unit can be corrected by means of two independently movable centring magnets of plastic-bonded Ferroxdure. These magnets are magnetized diametrically. By turning the magnets with respect to each other the resulting field strength is varied. The direction of the resulting magnetic field is adjusted by turning the magnets simultaneously.

These centring magnets cannot be used for compensating the effects of non-linearity or of phase differences between the synchronization and time base, as otherwise the correction needed becomes excessive. Even if the correction is within the range of the magnets, curved lines may appear in the centre of the raster.

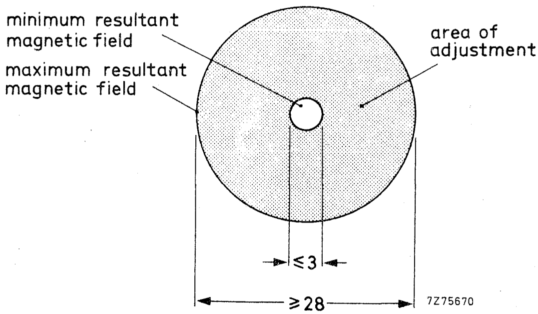


Fig. 4.

For pin-cushion distortion

Pin-cushion distortion can be corrected by four Ferroxdure magnets with pole-shoe brackets, which have been mounted on the deflection unit. Limited correction of asymmetrical pin-cushion distortion can be achieved by unequal movement of these magnets. The field strength can be adjusted by rotation of these magnets.

DEFLECTION UNIT

QUICK REFERENCE DATA	
Picture tube, diagonal	43 cm (17 in), 48 cm (19 in), 51 cm (20 in), 58 cm (23 in) and 61 cm (24 in)
neck diameter	28 mm
Deflection angle	110^o
Line deflection current, edge to edge at 18 kV	2,3 A (p-p)
Inductance of line coils, parallel connected	3,32 mH
Field deflection current, edge to edge at 18 kV	1,1 A (p-p)
Resistance of field coils, parallel connected	7,5 Ω

APPLICATION

This deflection unit has been designed for use with a 110^o black and white picture tube in conjunction with:
- line output transformer AT2048/12;
- linearity control unit AT4042/02 or AT4042/14;
- line output transistor BU205.

DESCRIPTION

The saddle-shaped line deflection coils are moulded so that the deflection centre is well within the conical part of the picture tube.
The field deflection coils are wound on a Ferroxcube yoke ring which is flared so that the frame and line deflection centres coincide.

The unit meets the self-extinguishing and non-dripping requirements of IEC 65.

For centring and pin-cushion distortion see under "Correction facilities".

MECHANICAL DATA

Dimensions (in mm) and terminals

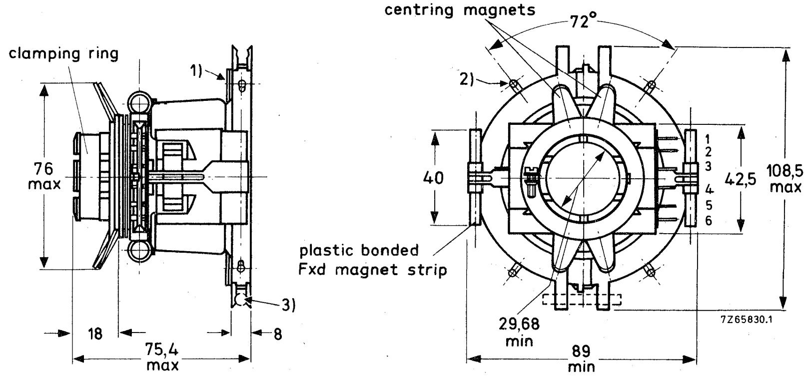


Fig. 1. 1) For fitting plastic bonded Fxd magnet strips, catalogue number 3122 137 10160.

2) For fitting plastic bonded Fxd magnets, catalogue number 3122 104 94120.

3) For fitting plastic bonded Fxd magnets, catalogue number 3122 104 90360.

The unit is provided with soldering pins for connection. The pin numbering in the figure corresponds to that in the connection diagrams (Figs. 2 and 3).

Weight | 300 g approximately

MOUNTING

The unit should be mounted as far forward as possible on the neck of the picture tube, so that it touches the cone.

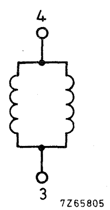
To orient the raster correctly, the unit may be rotated by hand on the neck of the picture tube, with which it makes a slip fit. A screw-tightened clamping ring permits it to be locked, both axially and radially, in the desired position.

ELECTRICAL DATA

The electrical values apply at an ambient temperature of 25 °C.

Line deflection coils, parallel connected (Fig. 2) terminals 3 and 4	
Inductance	3,32 mH ± 5%
Resistance	6,1 Ω ± 10%
Field deflection coils, parallel connected (Fig. 3) terminals 1 and 6	
Inductance	17 mH ± 10%
Resistance	7,5 Ω ± 8,5%
Maximum peak voltage between terminals of line and field coils (50 Hz)	2500 V
Maximum operating temperature	105 °C

Fig. 2 Line coils



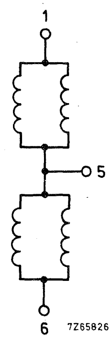


Fig. 3 Field coils

The following characteristics are measured at an e.h.t. of 18 kV on a 61 cm (24 in) reference picture tube.

Sensitivity

Deflection current edge to edge [1]	
in line direction	2,3 A p-p ± 7%
in field direction	1,1 A p-p + 3,5%

[1]) Minimum useful screen dimensions: 481 mm x 375 mm.

Geometric distortion (measured without correction magnets)

Barrel distortion in the corners	max. 1 mm
Pin cushion distortion	the edges of the raster fall within the two rectangles shown in Fig. 4.
Trapezium distortion	the edges of the raster fall within the two rectangles shown in Fig. 5.

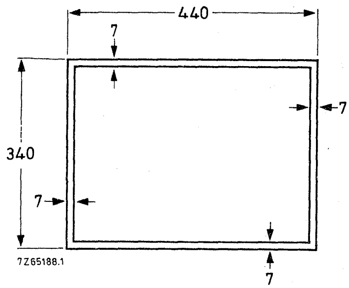


Fig. 4

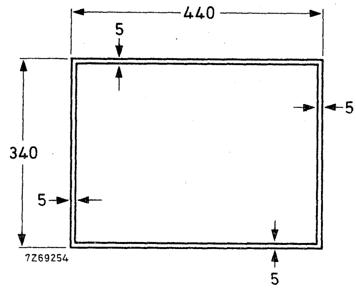


Fig. 5

CORRECTION FACILITIES

For centring

After adjustment of the linearity of the deflection current, the eccentricity of the picture tube and the deflection unit can be corrected by means of two independently movable centring magnets of plastic-bonded ferroxdure. These magnets are magnetised diametrically. By turning the magnets with respect to each other the resulting field strength is varied. The direction of the resulting magnetic field is adjusted by turning the magnets simultaneously.
These centring magnets can not be used for compensating the effects of non-linearity or of phase differences between the synchronisation and time base, as otherwise the correction needed becomes excessive. Even if the correction is within the range of the magnets, curved lines may appear in the centre of the raster.

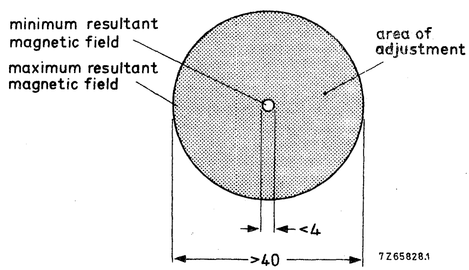


Fig. 6

For pin-cushion distortion

Pin-cushion distortion can be corrected by plastic bonded ferroxdure magnet strips, which have been mounted on the deflection unit brackets [1]. Limited correction of asymmetrical pin-cushion distortion can be achieved by unequal rotation of these magnets.

Notes

To correct the corners of the raster plastic bonded ferroxdure magnets can be fitted to the deflection unit, see Fig. 1.
These magnets can be supplied on request; please quote the 12-digit catalogue number (see Fig. 1) for ordering.

[1] Magnet strips are also available separately under catalogue number 3122 137 10160.

DEFLECTION UNIT

QUICK REFERENCE DATA

Monitor tube	
diagonal	24 cm (9 in), 31 cm (12 in)
neck diameter	20 mm*, 28 mm
Deflection angle	90°
Line deflection current, edge to edge at 16 kV	9,3 A (p-p)
Inductance of line coils, parallel connected	93 μH
Field deflection current, edge to edge at 16 kV	0,91 A (p-p)
Resistance of field coils, parallel connected	6,75 Ω

APPLICATION

This deflection unit has been designed for use with 24 cm (9 in) or 31 cm (12 in) 90° monochrome monitor tubes in conjunction with:
line output transformer AT2102/02;
linearity control unit AT4036;
line driver transformer AT4043/56.

DESCRIPTION

The saddle-shaped line deflection coils are moulded so that the deflection centre is well within the conical part of the monitor tube. The field deflection coils are wound on a Ferroxcube yoke ring which is flared so that the frame and line deflection centres coincide. Provisions are made for centring, and correction of pin-cushion distortion. The unit meets the self-extinguishing and non-dripping requirements of IEC 65.

MOUNTING

The unit should be mounted as far forward as possible on the neck of the monitor tube, so that it touches the cone.

To orient the raster correctly, the unit may be rotated by hand on the neck of the monitor tube, with which it makes a slip fit. A screw-tightened clamping ring permits it to be locked, both axially and radially, in the desired position.

Note: Use of the deflection unit with a monitor tube with a neck diameter of 20 mm requires the use of a packing piece, catalogue number 3122 134 07820.

* Packing piece required, see Mounting.

MECHANICAL DATA

Dimensions in mm

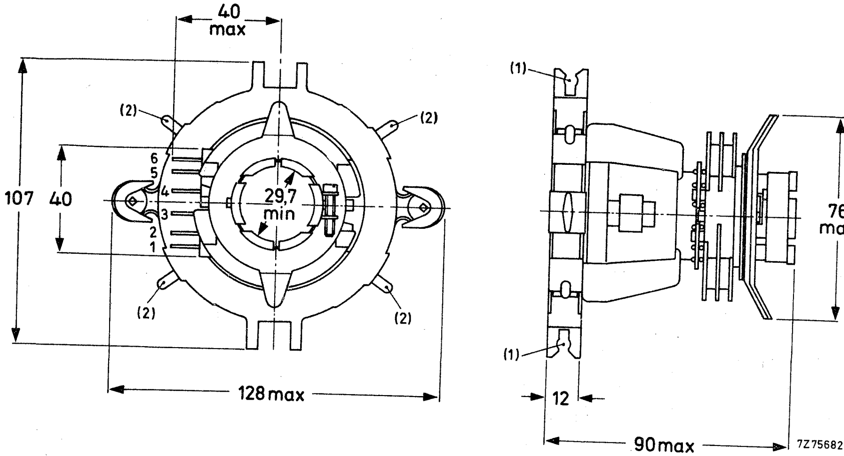


Fig. 1 Deflection unit AT1071/03. Facilities for fitting correction magnets:
(1) for plastic-bonded FXD magnet rods, catalogue number 3122 104 90360;
(2) for plastic-bonded FXD magnets, catalogue number 3122 104 94120.

The unit is provided with solder pins for connection. The pin numbering in Fig. 1 corresponds to that in the connection diagram (Figs 2a and 2b).

ELECTRICAL DATA

Line deflection coils, parallel connected (Fig. 2a);
terminals 3 and 4

Inductance	93 μH
Resistance	0,15 Ω

Field deflection coils, parallel or series connected (Fig. 2b); terminals 1 and 2 for parallel connected coils (terminals 1 and 6, and 2 and 5 to be interconnected); terminals 2 and 6 for series connected coils (terminals 1 and 5 to be interconnected)

Inductance (parallel connected coils)	14 mH
Inductance (series connected coils)	56 mH
Resistance (parallel connected coils)	6,75 Ω
Resistance (series connected coils)	27 Ω
Maximum d.c. voltage between terminals of line and field coils	2000 V
Maximum operating temperature	95 $^{\circ}$C

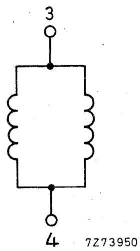


Fig. 2a Line coils.

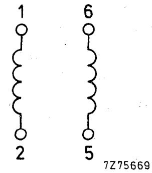


Fig. 2b Field coils.

The following characteristics are measured at an e.h.t. of 16 kV on a 24 cm (9 in) reference tube.

Sensitivity

Deflection current edge to edge	
in line direction	9,3 A (p-p)
in field direction	0,91 A (p-p)

Geometric distortion measured without correction magnets on a 24 cm (9 in) reference tube.

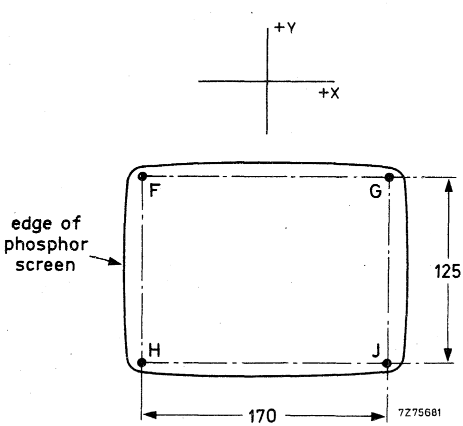


Fig. 3.

Fy	$+1{,}75\,^{+1{,}25}_{-1{,}25}$	Fx	$-1{,}25\,^{-1{,}25}_{+1{,}25}$
Gy	$+1{,}75\,^{+1{,}25}_{-1{,}25}$	Gx	$+1{,}25\,^{+1{,}25}_{-1{,}25}$
Jy	$-1{,}75\,^{-1{,}25}_{+1{,}25}$	Jx	$+1{,}25\,^{+1{,}25}_{-1{,}25}$
Hy	$-1{,}75\,^{-1{,}25}_{+1{,}25}$	Hx	$-1{,}25\,^{-1{,}25}_{+1{,}25}$

CORRECTION FACILITIES

For centring

After adjustment of the linearity of the deflection current, the eccentricity of the monitor tube and the deflection unit can be corrected by means of two independently movable centring magnets of plastic-bonded Ferroxdure. These magnets are magnetized diametrically. By turning the magnets with respect to each other the resulting field strength is varied. The direction of the resulting magnetic field is adjusted by turning the magnets simultaneously.

These centring magnets cannot be used for compensating the effects of non-linearity or of phase differences between the synchronization and time base, as otherwise the correction needed becomes excessive. Even if the correction is within the range of the magnets, curved lines may appear in the centre of the raster.

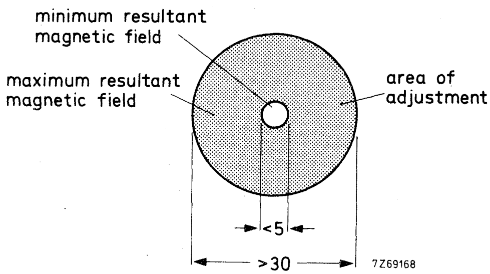


Fig. 4.

For pin-cushion distortion

Pin-cushion distortion can be corrected by two Ferroxdure magnets with pole-shoe brackets, which have been mounted on the deflection unit. Limited correction of asymmetrical pin-cushion distortion can be achieved by unequal movement of these magnets. The field strength can be adjusted by rotation of these magnets. To correct the top and bottom of the raster, two plastic-bonded Ferroxdure magnet rods* can be fitted (Fig. 1). To correct the corners of the raster, four plastic-bonded Ferroxdure magnets** (Fig. 1) can be fitted.

* Available under catalogue number 3122 104 90360.
** Available under catalogue number 3122 104 94120.

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube		
diagonal	31 cm (12 in) 34 cm (14 in)	24 cm (9 in) 31 cm (12 in)
neck diameter	max. 20,9 mm	max. 20,9 mm
Deflection angle	110°	90°
Line deflection current for full scan, at 11 kV	5,02 A (p-p)	4,05 A (p-p)
Inductance of line coils, parallel connected	255 μH	
Field deflection current for full scan, at 11 kV	1,1 A (p-p)	0,91 A (p-p)
Resistance of field coils, parallel connected	2,7 Ω	

APPLICATION

The deflection unit has been designed for use with 31 cm (12 in) or 34 cm (14 in) 110° black and white picture tubes, or 24 cm (9 in) or 31 cm (12 in) 90° monochrome monitor tubes. The unit is used in conjunction with:
– line output transformer AT2140/10 or AT2140;
– linearity control unit AT4042/39;
– line driver transformer AT4043/56.

DESCRIPTION

The saddle shaped line deflection coils are moulded so that the deflection centre is well within the conical part of the picture tube. The field deflection coils are wound on a Ferroxcube yoke ring which is flared so that the frame and line deflection centres coincide. Provisions are made for centring, and correction of pin-cushion distortion. The unit meets the self-extinguishing and non-dripping requirements of IEC 65.

MOUNTING

The unit should be mounted as far forward as possible on the neck of the picture tube, so that it touches the cone.

To orient the raster correctly, the unit may be rotated by hand on the neck of the picture tube, with which it makes a slip fit. A screw-tightened clamping ring permits it to be locked, both axially and radially, in the desired position.

MECHANICAL DATA

Dimensions in mm

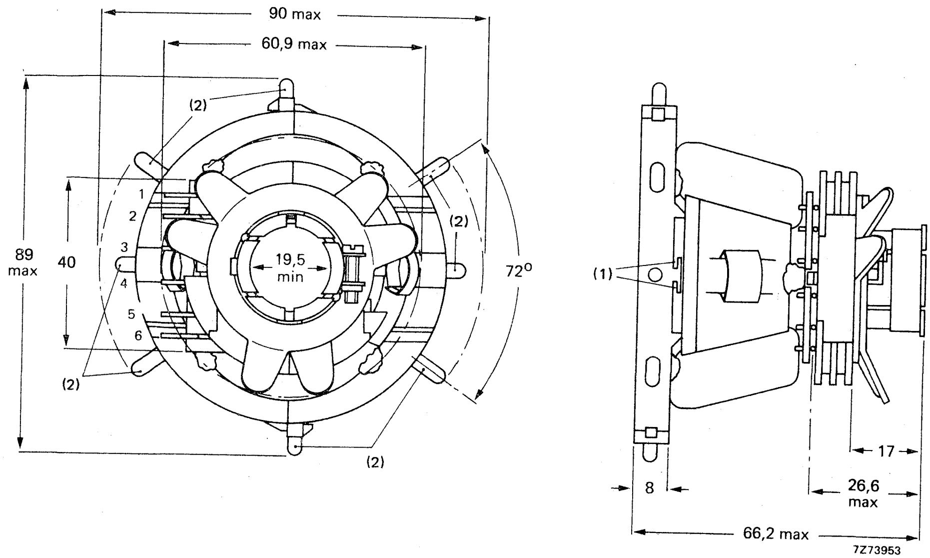


Fig. 1 Deflection unit AT1074. Facilities for fitting correction magnets:
(1) for bracket with plastic-bonded FXD magnet strip, catalogue number 3122 137 10160;
(2) for plastic-bonded FXD magnets, catalogue number 3122 104 94120.

The unit is provided with solder pins for connection. The pin numbering in Fig. 1 corresponds to that in the connection diagrams (Fig. 2).

ELECTRICAL DATA

The electrical values apply at an ambient temperature of 25 °C.

Line deflection coils, parallel connected (Fig. 2a) terminals 3 and 4	
Inductance	255 μH ± 5%
Resistance	0,56 Ω
L/R	455 μH/Ω ± 8%
Field deflection coils, parallel connected (Fig. 2b) terminals 1 and 6	
Inductance	7,7 mH ± 8%
Resistance	2,7 Ω
L/R	2,87 mH/Ω ± 10%
Maximum d.c. voltage between terminals of line and field coils	500 V
Maximum operating temperature	95 °C

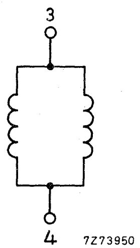


Fig. 2a Line coils.

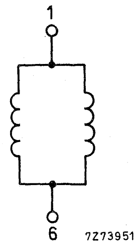


Fig. 2b Field coils.

The following characteristics are measured at an e.h.t. of 11 kV on a 31 cm (12 in) reference picture tube.

Sensitivity

Deflection current edge to edge	110°	90°
in line direction	5,02 A (p-p)	4,05 A (p-p)
in field direction	1,1 A (p-p)	0,91 A (p-p)

Geometric distortion measured without correction magnets, on a 31 cm (12 in) reference picture tube.

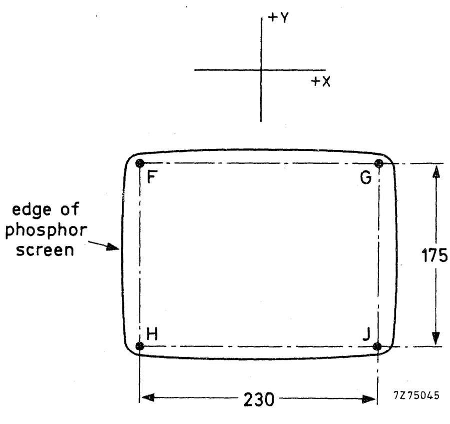


Fig. 3.

Fy : 0^{+4}_{-2}	Fx : 0^{-4}_{+2}
Gy : 0^{+4}_{-2}	Gx : 0^{+4}_{-2}
Jy : 0^{-4}_{+2}	Jx : 0^{+4}_{-2}
Hy : 0^{-4}_{+2}	Hx : 0^{-4}_{+2}

CORRECTION FACILITIES

For centring

After adjustment of the linearity of the deflection current, the eccentricity of the picture tube and the deflection unit can be corrected by means of two independently movable centring magnets of plastic-bonded Ferroxdure. These magnets are magnetized diametrically. By turning the magnets with respect to each other the resulting field strength is varied. The direction of the resulting magnetic field is adjusted by turning the magnets simultaneously.

These centring magnets cannot be used for compensating the effects of non-linearity or of phase differences between the synchronization and time base, as otherwise the correction needed becomes excessive. Even if the correction is within the range of the magnets, curved lines may appear in the centre of the raster.

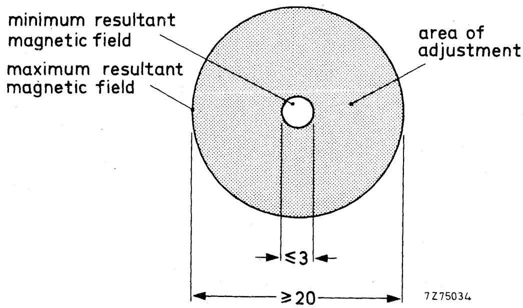


Fig. 4.

For geometric distortion

The unit has provisions for mounting brackets for magnet strips* to correct pin-cushion distortion and for magnets** to correct the raster corners, see Fig. 1.

* Plastic-bonded Ferroxdure magnet strips (with bracket) are available on request (catalogue number 3122 137 10160).

** Plastic-bonded Ferroxdure magnets are available on request (catalogue number 3122 104 94120).

DEFLECTION UNIT

QUICK REFERENCE DATA

Picture tube		
diagonal	31 cm (12 in) 34 cm (14 in)	24 cm (9 in) 31 cm (12 in)
neck diameter	max. 20,9 mm	max. 20,9 mm
Deflection angle	110°	90°
Line deflection current for full scan, at 11 kV	5,27 A (p-p)	4,25 A (p-p)
Inductance of line coils, parallel connected	255 μH	
Field deflection current for full scan, at 11 kV	0,577 A (p-p)	0,477 A (p-p)
Resistance of field coils, series connected	10,8 Ω	

APPLICATION

The deflection unit has been designed for use with 31 cm (12 in) or 34 cm (14 in) 110° black and white picture tubes, or 24 cm (9 in) or 31 cm (12 in) 90° monochrome monitor tubes. The unit is used in conjunction with:
- line output transformer AT2140/10 or AT2140;
- linearity control unit AT4042/26;
- line driver transformer AT4043/56.

DESCRIPTION

The saddle shaped line deflection coils are moulded so that the deflection centre is well within the conical part of the picture tube. The field deflection coils are wound on a Ferroxcube yoke ring which is flared so that the frame and line deflection centres coincide. Provisions are made for centring, and correction of pin-cushion distortion. The unit meets the self-extinguishing and non-dripping requirements of IEC 65.

MOUNTING

The unit should be mounted as far forward as possible on the neck of the picture tube, so that it touches the cone.

To orient the raster correctly, the unit may be rotated by hand on the neck of the picture tube, with which it makes a slip fit. A screw-tightened clamping ring permits it to be locked, both axially and radially, in the desired position.

MECHANICAL DATA

Dimensions in mm

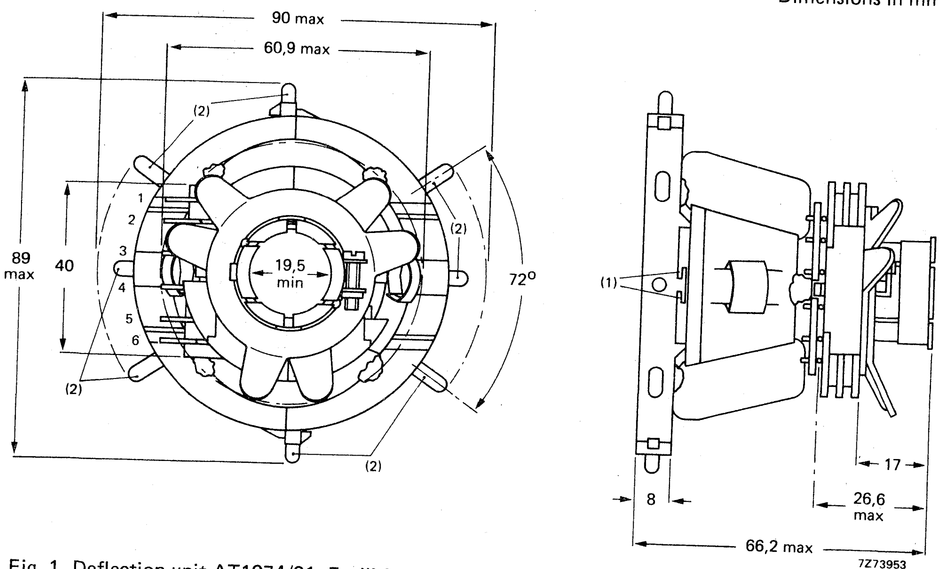


Fig. 1 Deflection unit AT1074/01. Facilities for fitting correction magnets:
(1) for bracket with plastic-bonded FXD magnet strip, catalogue number 3122 137 10160;
(2) For plastic-bonded FXD magnets, catalogue number 3122 104 94120.

The unit is provided with solder pins for connection. The pin numbering in Fig. 1 corresponds to that in the connection diagrams (Fig. 2).

ELECTRICAL DATA

The electrical values apply at an ambient temperature of 25 °C.

Line deflection coils, parallel connected (Fig. 2a)
terminals 3 and 4

Inductance	255 μH ± 5%
Resistance	0,56 Ω
L/R	455 μH/Ω ± 8%

Field deflection coils, series connected (Fig. 2b)
terminals 1 and 6

Inductance	28,96 mH ± 8%
Resistance	10,8 Ω
L/R	2,7 mH/Ω ± 10%

Maximum d.c. voltage between terminals of line and field coils	500 V
Maximum operating temperature	95 °C

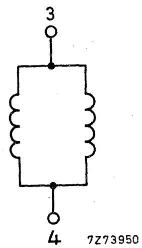


Fig. 2a Line coils.

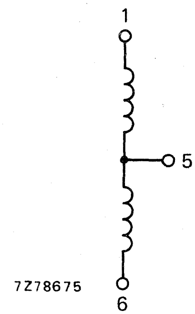


Fig. 2b Field coils.

The following characteristics are measured at an e.h.t. of 11 kV on a 31 cm (12 in) reference picture tube.

Sensitivity

Deflection current edge to edge	110^{o}	90^{o}
in line direction	5,27 A (p-p)	4,25 A (p-p)
in field direction	0,577 A (p-p)	0,477 A (p-p)

Geometric distortion measured without correction magnets, on a 31 cm (12 in) reference picture tube.

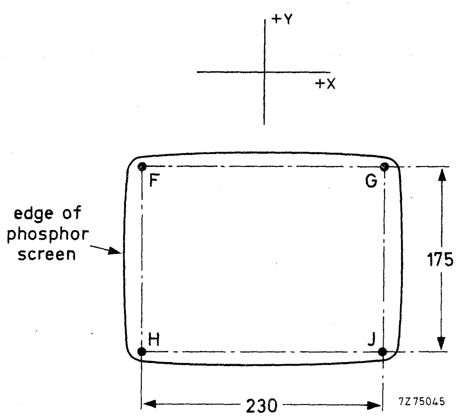


Fig. 3.

Fy : 0^{+4}_{-2}	Fx : 0^{-4}_{+2}
Gy : 0^{+4}_{-2}	Gx : 0^{+4}_{-2}
Jy : 0^{-4}_{+2}	Jx : 0^{+4}_{-2}
Hy : 0^{-4}_{+2}	Hx : 0^{-4}_{+2}

CORRECTION FACILITIES

For centring

After adjustment of the linearity of the deflection current, the eccentricity of the picture tube and the deflection unit can be corrected by means of two independently movable centring magnets of plastic-bonded Ferroxdure. These magnets are magnetized diametrically. By turning the magnets with respect to each other the resulting field strength is varied. The direction of the resulting magnetic field is adjusted by turning the magnets simultaneously.

These centring magnets cannot be used for compensating the effects of non-linearity or of phase differences between the synchronization and time base, as otherwise the correction needed becomes excessive. Even if the correction is within the range of the magnets, curved lines may appear in the centre of the raster.

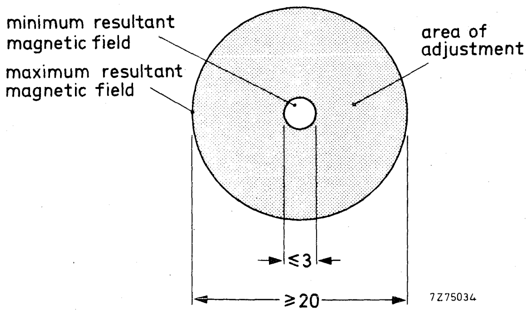


Fig. 4.

For geometric distortion

The unit has provisions for mounting brackets for magnet strips* to correct pin-cushion distortion and for magnets** to correct the raster corners, see Fig. 1.

* Plastic-bonded Ferroxdure magnet strips (with bracket) are available on request (catalogue number 3122 137 10160).

** Plastic-bonded Ferroxdure magnets are available on request (catalogue number 3122 104 94120).

LINE OUTPUT TRANSFORMER

QUICK REFERENCE DATA			
I_{eht}	35	435	μA
E.H.T.	17,7	16,2	kV
$R_{i(eht)}$	4,0		MΩ
Supply voltage (V_B)	188	186	V
current (I_B)	212	250	mA
I p-p deflection	2,20	2,15	A
Auxiliary voltages	−300 V p, +60 V p, −60 V p and 7,7 V r.m.s.		

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 43 cm (17 in) to 61 cm (24 in) 110 ^{o} black and white picture tubes with a neck diameter of 28 mm in transistor equipped television receivers presenting 625 lines at 50 frames per second (CCIR) or 525 lines at 60 frames per second (USA).

It is intended for use in conjunction with:
- deflection unit AT1040/15
- adjustable linearity control unit AT4042/02
- line output transistor BU205
- E.H.T. rectifier device selenium stack.

DESCRIPTION

The magnetic circuit of the transformer comprises two Ferroxcube U-cores, clamped together with a bracket. The primary windings, the auxiliary windings and the E.H.T. windings are situated on one leg of the core. The E.H.T. windings are encapsulated in flame retardant polyester. The whole transformer meets the self-extinguishing and non-dripping properties of the American Underwriters' Laboratories rating mentioned in UL94SE-1.
The transformer is provided with four mounting pins. External circuit connection is made to connecting pins, positioned as indicated in Fig. 1 enabling the unit to be soldered directly into a printed-wiring board.

MECHANICAL DATA

Dimensions (in mm) and terminals

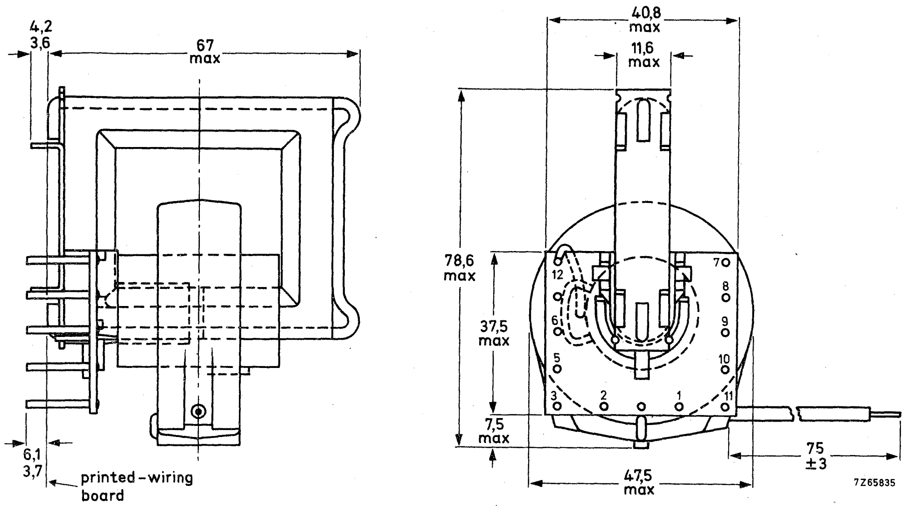


Fig. 1

Weight 155 g approximately

MOUNTING

The transformer may be mounted on a printed-wiring board. The fit of the connecting pins in a printed-wiring grid with a pitch of 2,54 mm (0,1 in) is illustrated in Fig. 2. The core of the transformer must be earthed.

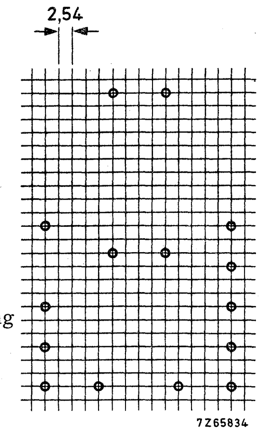


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side)
Grid holes 1,3 ± 0,1 mm

Temperature

The operating temperature of the core and the coils should not exceed 105 ^{o}C, under worst conditions, i.e. taking into account:

- overvoltage on the windings
- low atmospheric pressure (at high altitudes) implying bad cooling by convection
- high room temperature (up to 45 ^{o}C).

To satisfy this requirement it may be desired to provide ample cool air circulation around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces (in proportion to their sharpness protruding parts must have a greater distance) must be maintained:

a. From the e.h.t. winding, radially 25 mm
axially 15 mm

b. From the e.h.t. lead 25 mm

The transformer, and the leads and components carrying high voltage pulses should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (see circuit diagram)

E.H.T. supply	I_{eht}	μA	35		435
	E.H.T.	kV	17,7		16,2
	$R_{i(eht)}$	MΩ		4,0	
Power supply	V_B 1)	V		200	
	V_B' 1)	V	188		186
	I_{av} 1)	mA	212		250
Output transistor	V_{CEM}	V	1080		1100
	I_{CM}	A	1,4		1,45
Deflection	I p-p	A	2,20		2,15
	Flyback ratio (average)	%		18	
	Overscan variation	%	6		10
Auxiliary windings, connecting pin 5		V p	−300		
connecting pin 7		V p	+60		
connecting pin 9		V p	−60		
connecting pins 10, 11		V r.m.s.	7,7		

1) Measured at pin 1

Circuit diagram

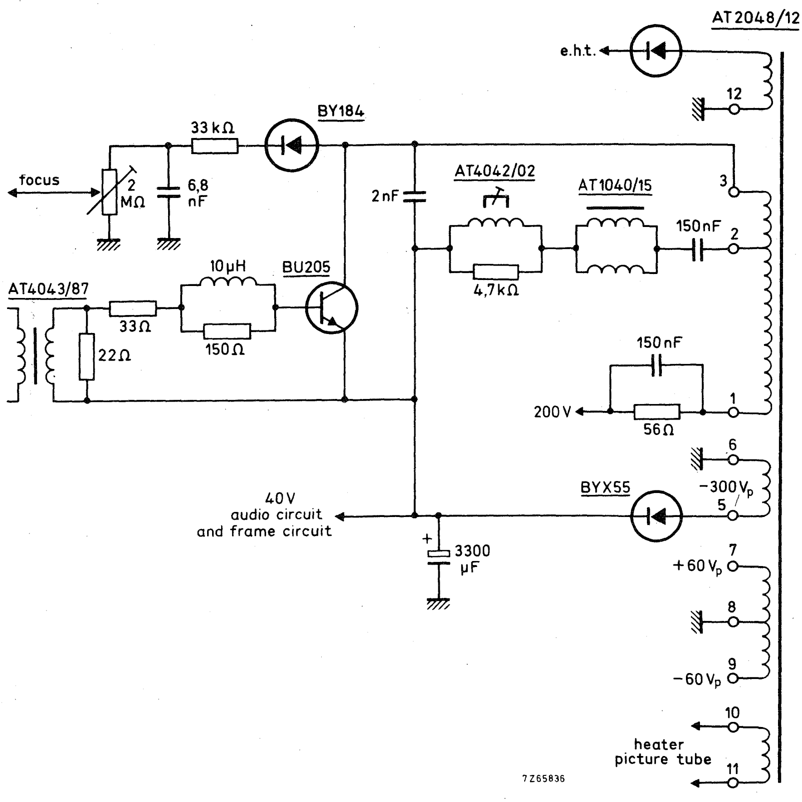


Fig. 3

LINE OUTPUT TRANSFORMER

QUICK REFERENCE DATA

	used in conjunction with AT1071/03		used in conjunction with AT1074/01	
I_{eht}	0 μA	100 μA	0 μA	100 μA
E.H.T.	15,7 kV	14,8 kV	16,2 kV	15,3 kV
$R_{i(eht)}$	9 MΩ		9 MΩ	
Supply voltage (V_B)	12 V	12 V	12 V	12 V
Supply current (I_B)	1620 mA	1740 mA	1650 mA	1770 mA
Deflection current	8,2 A	8,1 A	5,0 A (p-p)	4,95 A (p-p)
Auxiliary voltages	6,3 V (r.m.s.), 11 V (r.m.s.), 70 V (d.c.), 800 V (d.c.)			

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 24 cm (9 in) to 31 cm (12 in) 90° monochrome monitor tubes in video display monitors presenting 625 lines at 50 frames per second (CCIR) or 525 lines at 60 frames per second (USA).

It is intended for use in conjunction with the following packages of components:

deflection unit AT1071/03 or AT1071/07;
adjustable linearity control unit AT4036;
line driver transformer AT4043/64;

deflection unit AT1074/01;
adjustable linearity control unit AT4042/26;
line driver transformer AT4043/56.

DESCRIPTION

The magnetic circuit of the transformer comprises Ferroxcube U and I-cores clamped together with two screws. The primary windings and the auxiliary windings are situated on one leg of the core, the e.h.t. winding and the coupling winding are situated on the other leg. The e.h.t. winding is encapsulated in flame retardent polyester. An e.h.t. rectifier diode is incorporated in the transformer. The whole transformer meets the self-extinguishing and non-dripping properties of the American Underwriters' Laboratories rating mentioned in UL94SE-1.

The transformer is provided with four mounting pins; it can also be screwed to the printed-wiring board. External circuit connection is made to connecting pins, enabling the unit to be soldered directly into a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

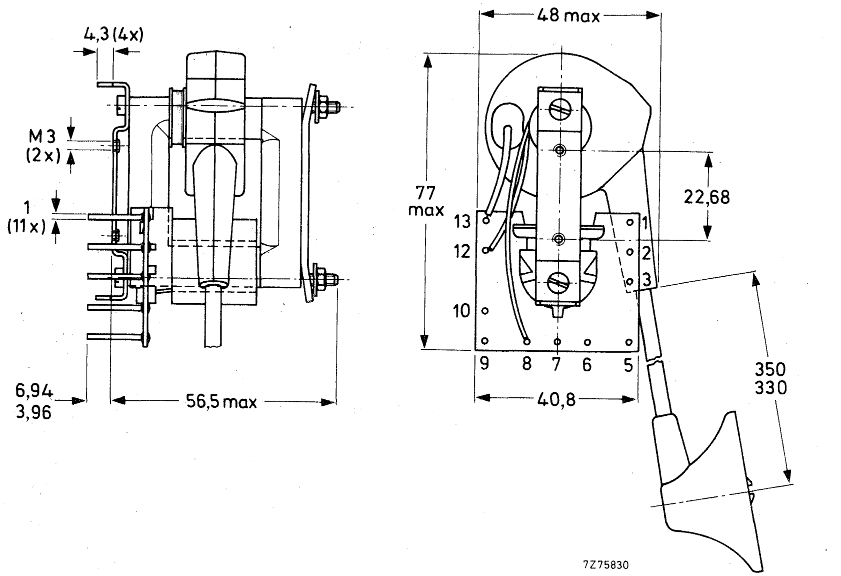


Fig. 1 Line output transformer AT2102/02.

MOUNTING

The transformer may be mounted on a printed-wiring board. The fit of the connecting and mounting pins in a printed-wiring grid with a pitch of 2,54 mm (0,1 in) is illustrated in Fig. 2. The core of the transformer must be earthed.

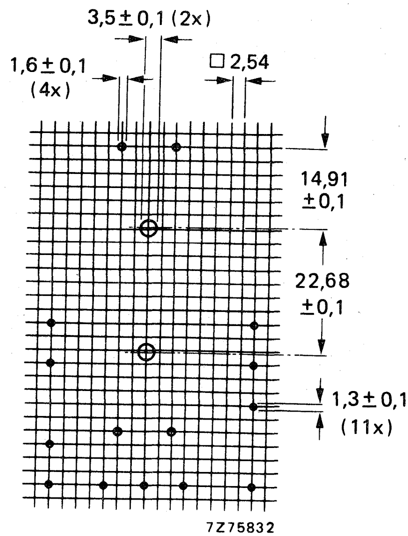


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side).

Temperature

The operating temperature of the core and the coils should not exceed 90 °C, under worst conditions, i.e. taking into account:

over-voltage on the windings;
low atmospheric pressure (at high altitudes) implying bad cooling by convection;
high room temperature (up to 45 °C).

To satisfy this requirement it may be desired to provide ample cool air circulation around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces must be maintained (in proportion to their sharpness protruding parts must have a greater distance):

a. From the e.h.t. winding, radially 15 mm, axially 10 mm.
b. From the e.h.t. lead 25 mm.

The transformer, and the leads and components carrying high-voltage pulses should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (see also Figs 3 and 4)

		AT2102/02 used in conjunction with AT1071/03		AT2102/02 used in conjunction with AT1074/01	
E.H.T. supply	I_{eht}	0 μA	100 μA	0 μA	100 μA
	E.H.T.	15,7 kV	14,8 kV	16,2 kV	15,3 kV
	$R_{i(eht)}$	9 MΩ		9 MΩ	
Power supply	V_B	12 V	12 V	12 V	12 V
	I_{av}	1620 mA	1740 mA	1650 mA	1770 mA
Output transistor	V_{CEM}	143 V	140 V	147 V	146 V
	I_{CM}	6,4 A	6,4 A	6,1 A	6,15 A
Deflection	Current	8,2 A (p-p)	8,1 A (p-p)	5,0 A (p-p)	4,95 A (p-p)
	Flyback time	10,2 μs	10,2 μs	9,9 μs	9,9 μs
	Scan variation	1%		1,5%	

Auxiliary windings

connecting pins 1 and 2	6,3 V (r.m.s.)
connecting pins 1 and 3	11 V (r.m.s.)
connecting pin 5 (pin 6 connected to earth)	800 V (d.c.)
connecting pin 7 (pin 6 connected to earth)	70 V (d.c.)

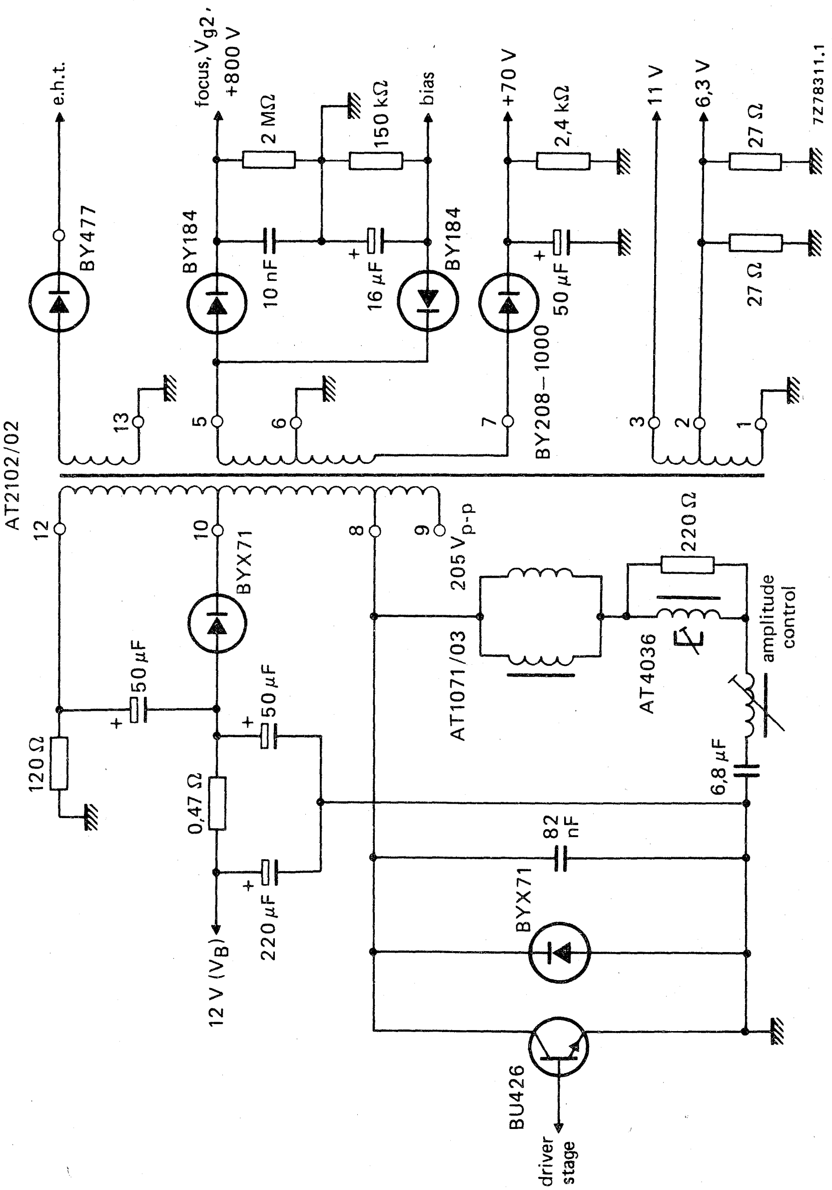


Fig. 3 Application circuit for use with deflection unit AT1071/03.

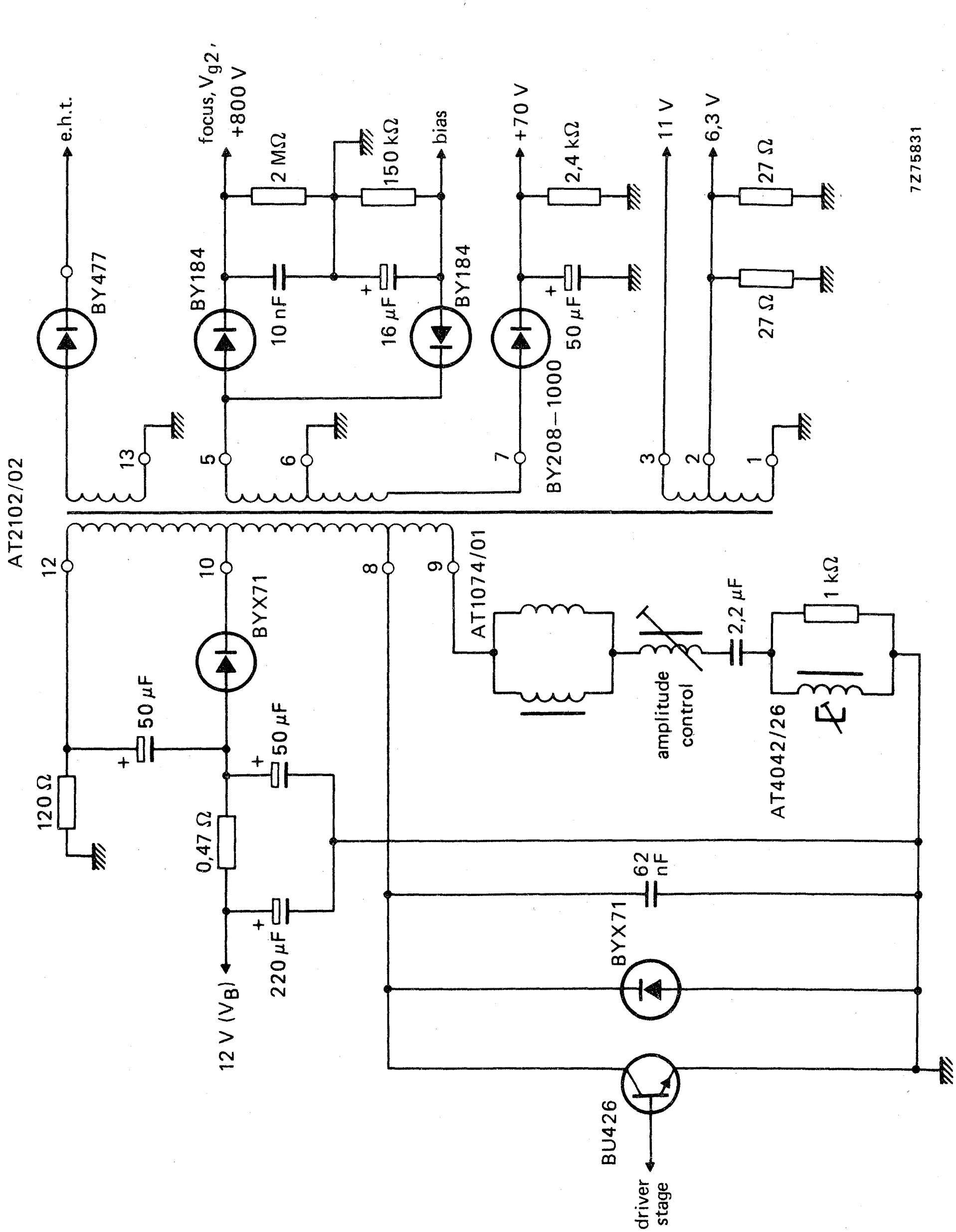


Fig. 4 Application circuit for use with deflection unit AT1074/01.

LINE OUTPUT TRANSFORMER

QUICK REFERENCE DATA

I_{eht}	0 μA	100 μA
E.H.T.	17 kV	16,35 kV
$R_{i(eht)}$	6,5 MΩ	
Supply voltage (V_B)	24 V	24 V
Supply current (I_B)	820 mA	910 mA
Deflection current	4,6 A (p-p)	4,6 A (p-p)
Auxiliary voltages	6,3 V (r.m.s.), 25 V (d.c.), 70 V (d.c.), 800 V (d.c.)	

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 31 cm (12 in) to 38 cm (15 in) 110° monochrome monitor tubes with a neck diameter of 28 mm in video display monitors presenting 625 lines at 50 frames per second (CCIR) or 525 lines at 60 frames per second (USA).

It is intended for use in conjunction with:
deflection unit AT1038/40;
adjustable linearity control unit AT4042/08;
line driver transformer AT4043/59;
e.h.t. cable with a length of 450 mm (catalogue number 3111 108 18450).

DESCRIPTION

The magnetic circuit of the transformer comprises Ferroxcube U and I-cores, clamped together with two screws. The primary windings, the auxiliary windings and the e.h.t. winding are situated on one leg of the core, and are encapsulated in flame retardent polyester. An e.h.t. rectifier diode is incorporated in the transformer. The whole transformer meets the self-extinguishing and non-dripping properties of the American Underwriters' Laboratories rating mentioned in UL94SE-1.

The transformer is provided with four mounting pins; it can also be screwed to the printed-wiring board. External circuit connection is made to connecting pins, enabling the unit to be soldered directly into a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

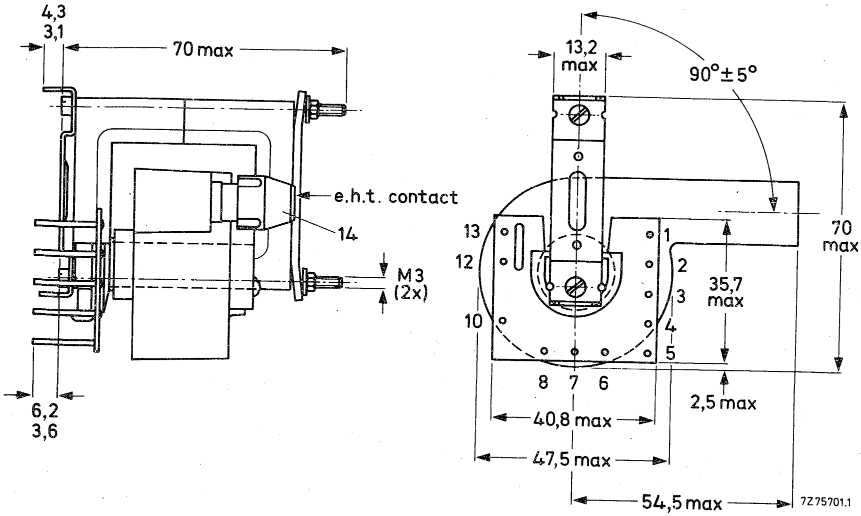


Fig. 1a Line output transformer AT2102/04.

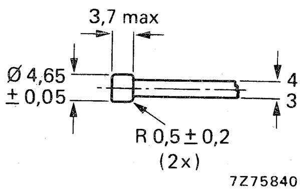


Fig. 1b E.H.T. contact (transformer side).

MOUNTING

The transformer may be mounted on a printed-wiring board. The fit of the connecting and mounting pins in a printed-wiring grid with a pitch of 2,54 mm (0,1 in) is illustrated in Fig. 2. The core of the transformer must be earthed.

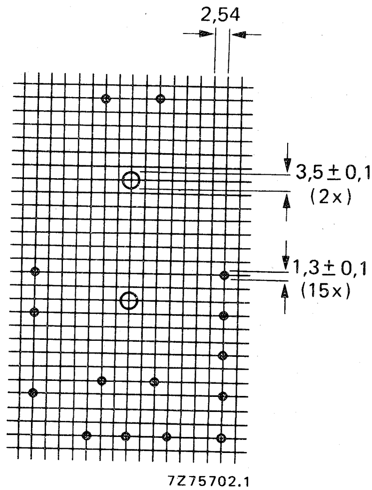


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side).

Temperature

The operating temperature of the core and the coils should not exceed 90 °C, under worst conditions, i.e. taking into account:

- over-voltage on the windings;
- low atmospheric pressure (at high altitudes) implying bad cooling by convection;
- high room temperature (up to 45 °C).

To satisfy this requirement it may be desired to provide ample cool air circulation around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces must be maintained (in proportion to their sharpness protruding parts must have a greater distance):

a. From the e.h.t. winding, radially 15 mm, axially 10 mm.
b. From the e.h.t. lead 25 mm.

The transformer, and the leads and components carrying high-voltage pulses should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (see also Fig. 3)

E.H.T. supply	I_{eht}	0 μA	100 μA
	E.H.T.	17 kV	16,35 kV
	$R_{i(eht)}$	6,5 MΩ	
Power supply	V_B	24 V	24 V
	I_{av}	820 mA	910 mA
Output transistor	V_{CEM}	440 V	440 V
	I_{CM}	3,6 A	3,6 A
Deflection	Current	4,6 A (p-p)	4,6 A (p-p)
	Flyback time	10,5 μs	10,5 μs
	Overscan variation	1,5%	

Auxiliary windings	
connecting pins 1 and 2	6,3 V (r.m.s.)
connecting pin 4 (pin 5 connected to earth)	25 V (d.c.)
connecting pin 3 (pin 5 connected to earth)	70 V (d.c.)
connecting pin 7 (pin 6 connected to earth)	800 V (d.c.)

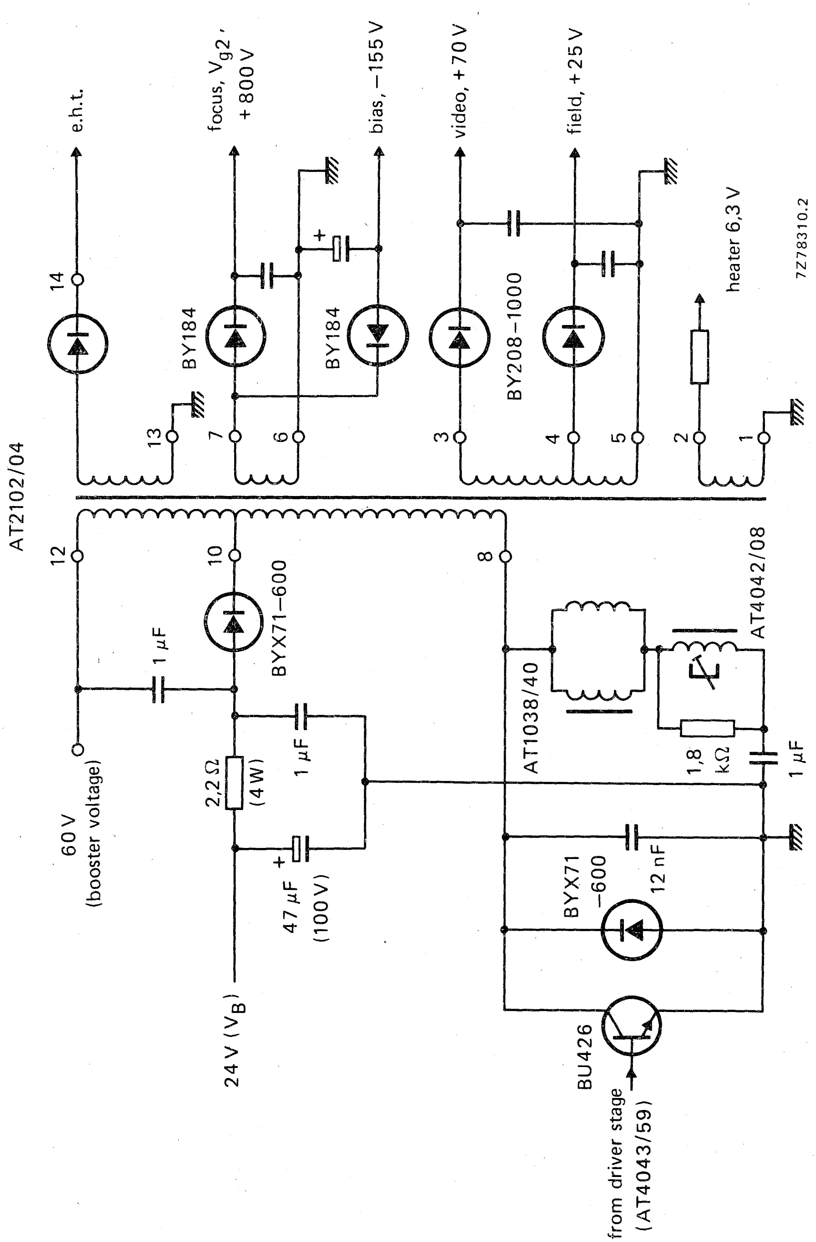


Fig. 3 Application circuit.

LINE OUTPUT TRANSFORMER

QUICK REFERENCE DATA

I_{eht}	0 μA	100 μA
E.H.T.	17 kV	16,35 kV
$R_{i(eht)}$	6,5 MΩ	
Supply voltage (V_B)	24 V	24 V
Supply current (I_B)	820 mA	910 mA
Deflection current	4,6 A (p-p)	4,6 A (p-p)
Auxiliary voltages	6,3 V (r.m.s.), 25 V (d.c.), 70 V (d.c.), 800 V (d.c.)	

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 31 cm (12 in) to 38 cm (15 in) 110° monochrome monitor tubes with a neck diameter of 28 mm in video display monitors presenting 625 lines at 50 frames per second (CCIR) or 525 lines at 60 frames per second (USA).

It is intended for use in conjunction with:
- deflection unit AT1038/40;
- adjustable linearity control unit AT4042/08;
- line driver transformer AT4043/59;
- e.h.t. cable with a length of 450 mm (catalogue number 3111 108 18450).

DESCRIPTION

The magnetic circuit of the transformer comprises Ferroxcube U and I-cores, clamped together with two screws. The primary windings, the auxiliary windings and the e.h.t. winding are situated on one leg of the core, and are encapsulated in flame retardent polyester. An e.h.t. rectifier diode is incorporated in the transformer. The whole transformer meets the self-extinguishing and non-dripping properties of the American Underwriters' Laboratories rating mentioned in UL94SE-1.

The transformer is provided with four mounting pins; it can also be screwed to the printed-wiring board. External circuit connection is made to connecting pins, enabling the unit to be soldered directly into a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

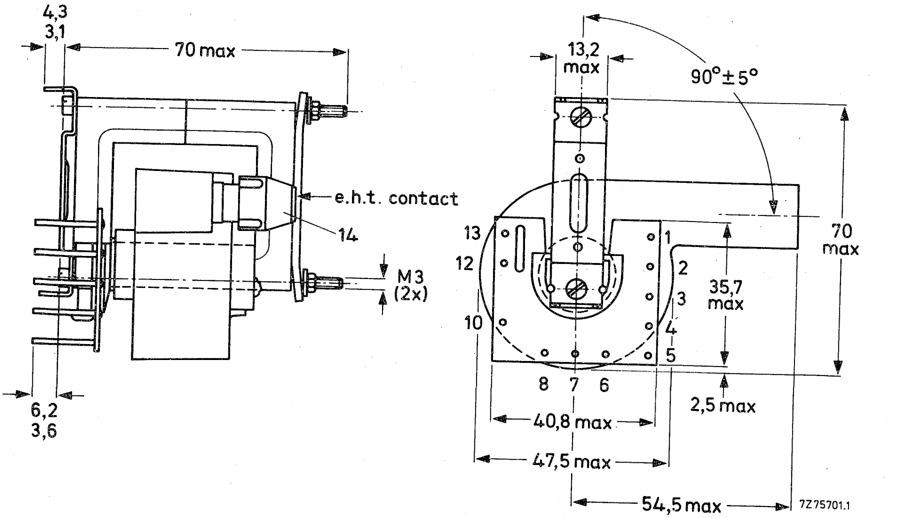


Fig. 1a Line output transformer AT2102/04.

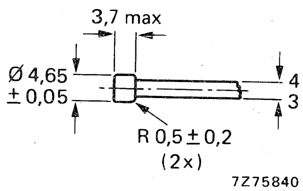


Fig. 1b E.H.T. contact (transformer side).

MOUNTING

The transformer may be mounted on a printed-wiring board. The fit of the connecting and mounting pins in a printed-wiring grid with a pitch of 2,54 mm (0,1 in) is illustrated in Fig. 2. The core of the transformer must be earthed.

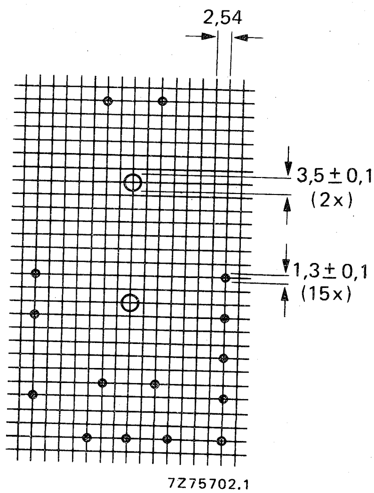


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side).

Temperature

The operating temperature of the core and the coils should not exceed 90 °C, under worst conditions, i.e. taking into account:

over-voltage on the windings;
low atmospheric pressure (at high altitudes) implying bad cooling by convection;
high room temperature (up to 45 °C).

To satisfy this requirement it may be desired to provide ample cool air circulation around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces must be maintained (in proportion to their sharpness protruding parts must have a greater distance):

a. From the e.h.t. winding, radially 15 mm, axially 10 mm.
b. From the e.h.t. lead 25 mm.

The transformer, and the leads and components carrying high-voltage pulses should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (see also Fig. 3)

E.H.T. supply	I_{eht}	0 µA	100 µA
	E.H.T.	17 kV	16,35 kV
	$R_{i(eht)}$	6,5 MΩ	
Power supply	V_B	24 V	24 V
	I_{av}	820 mA	910 mA
Output transistor	V_{CEM}	440 V	440 V
	I_{CM}	3,6 A	3,6 A
Deflection	Current	4,6 A (p-p)	4,6 A (p-p)
	Flyback time	10,5 µs	10,5 µs
	Overscan variation	1,5%	

Auxiliary windings

connecting pins 1 and 2	6,3 V (r.m.s.)
connecting pin 4 (pin 5 connected to earth)	25 V (d.c.)
connecting pin 3 (pin 5 connected to earth)	70 V (d.c.)
connecting pin 7 (pin 6 connected to earth)	800 V (d.c.)

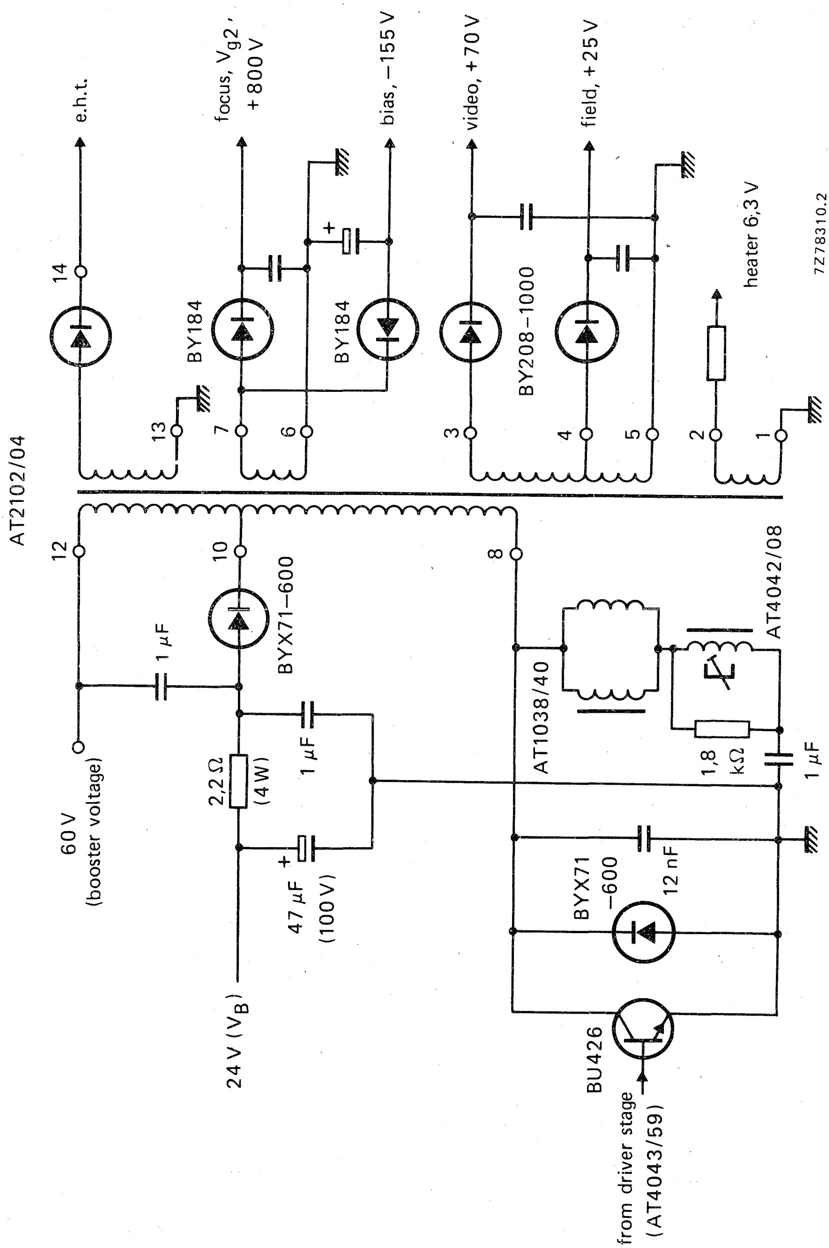


Fig. 3 Application circuit.

LINE OUTPUT TRANSFORMER
with integral e.h.t. rectifier diode

QUICK REFERENCE DATA	
I_{eht}	25 μA
E.H.T.	10,2 kV
$R_{i(eht)}$	≤ 5,5 MΩ
Supply voltage (V_B)	10,4 V
current (I_B)	0,86 A
I(p-p) deflection	4,9 A
Auxiliary voltages 11,2 V (a.c.), +350 V(d.c.), +100 V(d.c.), +13 V(d.c.), +25 V(d.c.)	

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 31 cm (12 in) and 34 cm (14 in) 110° black and white picture tubes with a neck diameter of 20 mm in transistor equipped television receivers presenting 625 lines at 50 frames per second (CCIR) or 525 lines at 60 frames per second (USA).

It is intended for use in conjunction with:
- deflection unit AT1074;
- line output transistor BU407.

DESCRIPTION

The magnetic circuit of the transformer comprises two Ferroxcube U-cores, clamped together with a bracket. The primary winding, the auxiliary windings and the e.h.t. winding are situated on one leg of the core. An e.h.t. rectifier diode is incorporated in the transformer. The e.h.t. winding is encapsulated in flame retardent polyester.
The whole transformer meets the self-extinguishing and non-dripping properties of the American Underwriters' Laboratories rating mentioned in UL94SE-1.
The transformer is provided with four mounting pins. External circuit connection is made to connecting pins, positioned as indicated in Fig. 1 enabling the unit to be soldered directly into a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

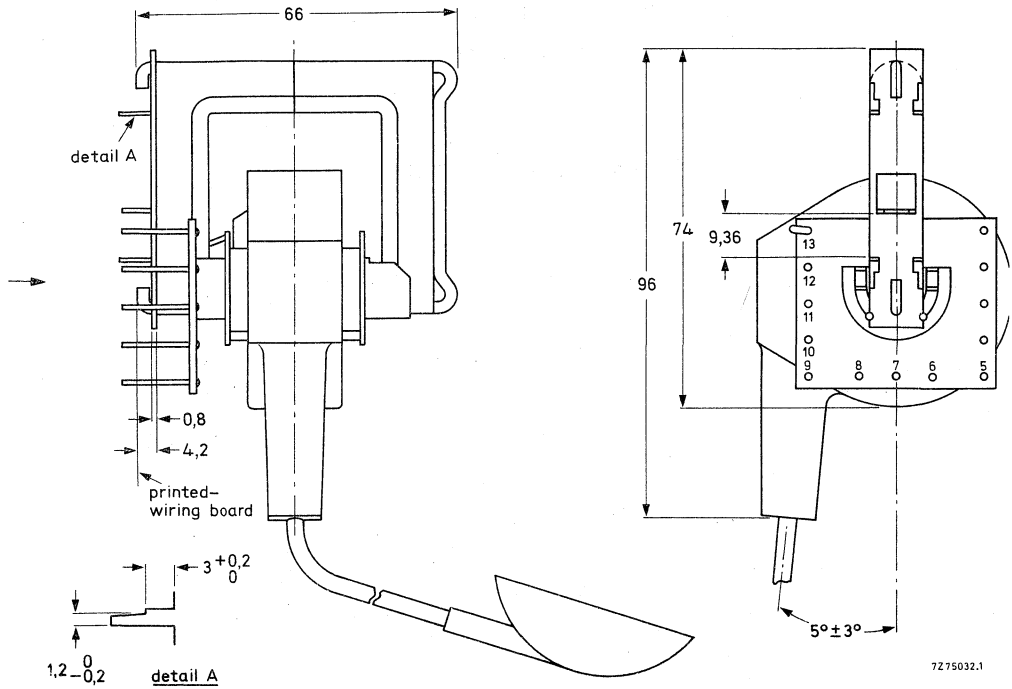


Fig. 1

MOUNTING

The transformer may be mounted on a printed-wiring board. The fit of the connecting pins in a printed-wiring grid with a pitch of 2,54 mm (0,1 in) is illustrated in Fig. 2. The core of the transformer must be earthed.

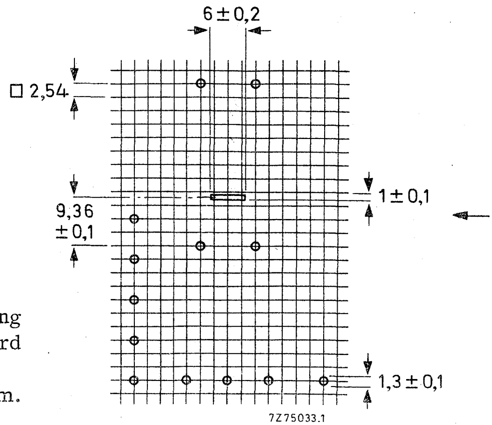


Fig. 2. Hole pattern for mounting on a printed-wiring board (solder side). Grid holes 1,3 ± 0,1 mm.

Temperature

The operating temperature of the core and the coils should not exceed 90 °C, under worst conditions, i.e. taking into account:
- over-voltage on the windings;
- low atmospheric pressure (at high altitudes) implying bad cooling by convection;
- high room temperature (up to 45 °C).

To satisfy these requirements it may be desirable to provide ample cool air circulation around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces must be maintained (in proportion to their sharpness protruding parts must have a greater distance):

a. From the e.h.t. winding, radially 15 mm
axially 10 mm

b. From the e.h.t. lead 15 mm

The transformer, and the leads and components carrying high-voltage pulses should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (see circuit diagram)

E.H.T. supply	I_{eht}	μA	25	250
	E.H.T.	kV	10,2	9,0
	$R_{i(eht)}$	MΩ	≤ 5,5	
Power supply	V_B	V	10,4	
	I_B	mA	860	
Output transistor	V_{CEM}	V (p-p)	160	
	I_{CM}	A (p-p)	3,4	
Deflection	$I_{(p-p)}$	A	4,9	
	Flyback ratio (average)	%	19	
	Overscan variation	%	6	10
Auxiliary windings,	connecting pin 5	V	11,2 (booster voltage)	
	connecting pin 9 [1]	V (d.c.)	+350	
	connecting pin 10 [1]	V (d.c.)	+100	
	connecting pin 11 [1]	V (d.c.)	+13	
	connecting pin 12 [1]	V (d.c.)	+25	

[1]) After rectification.

Circuit diagram

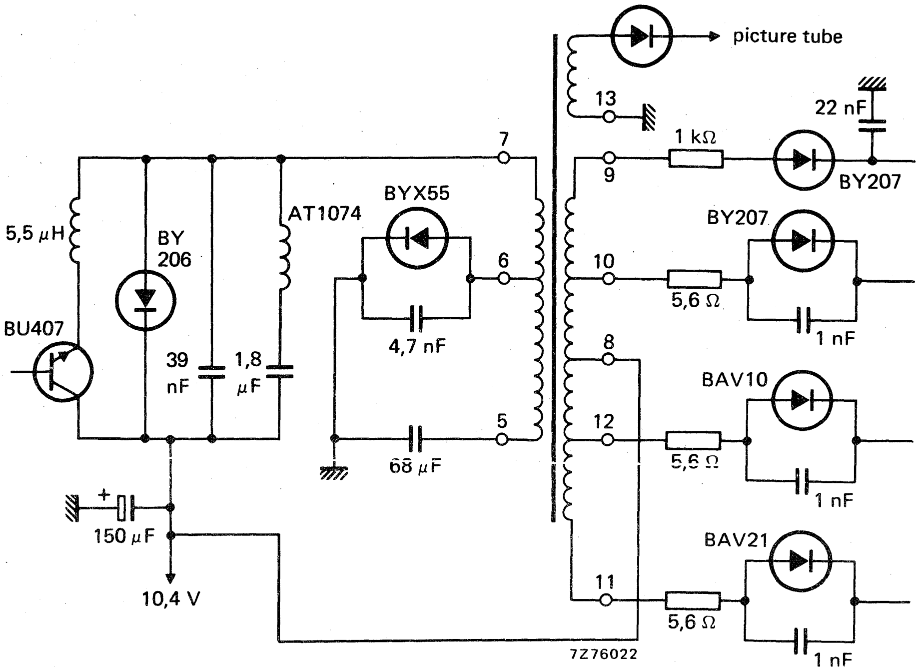


Fig. 3

LINE OUTPUT TRANSFORMER

QUICK REFERENCE DATA

I_{eht}	0 μA	100 μA
E.H.T.	11 kV	10,2 kV
$R_{i(eht)}$	8 MΩ	
Supply voltage (V_B)	8,8 V	8,8 V
Supply current (I_B)	920 mA	1100 mA
Deflection current	4,2 A (p-p)	4,1 A (p-p)
Auxiliary voltages	15 V (d.c.), 75 V (d.c.), 200 V (d.c.)	

APPLICATION

This transformer has been designed to provide the required scanning amplitude for 31 cm (12 in) and 34 cm (14 in) 90° monochrome monitor tubes with a neck diameter of 20 mm in video display monitors presenting 625 lines at 50 frames per second (CCIR) or 525 lines at 60 frames per second (USA).

It is intended for use in conjunction with:
deflection unit AT1074;
adjustable linearity control unit AT4042/26;
line driver transformer AT4043/56.

DESCRIPTION

The magnetic circuit of the transformer comprises two Ferroxcube U-cores, clamped together with a bracket. The primary winding, the auxiliary windings and the e.h.t. winding are situated on one leg of the core. An e.h.t. rectifier diode is incorporated in the transformer. All windings are encapsulated in flame retardent polyester. The whole transformer meets the self-extinguishing and non-dripping properties of the American Underwriters' Laboratories rating mentioned in UL94SE-1.

The transformer is provided with four mounting pins. External circuit connection is made to connecting pins, enabling the unit to be soldered directly into a printed-wiring board.

MECHANICAL DATA

Dimensions in mm

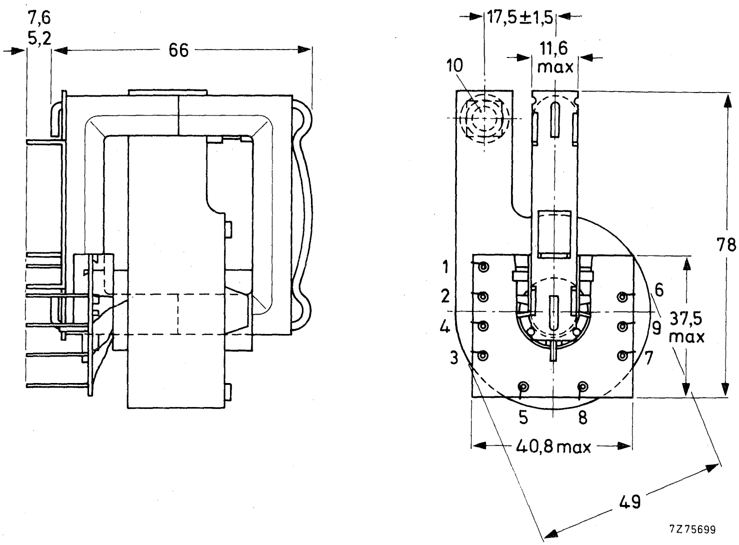


Fig. 1 Line output transformer AT2140/10.

MOUNTING

The transformer may be mounted on a printed-wiring board. The fit of the connecting and mounting pins in a printed-wiring grid with a pitch of 2,54 mm (0,1 in) is illustrated in Fig. 2. The core of the transformer must be earthed.

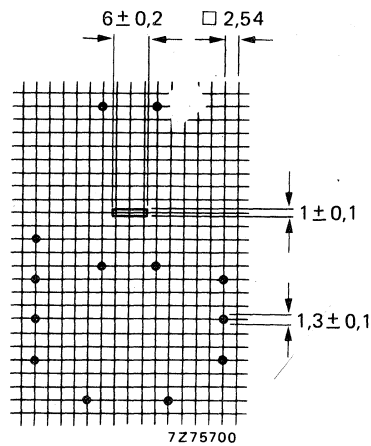


Fig. 2 Hole pattern for mounting on a printed-wiring board (solder side).

Temperature

The operating temperature of the core and the coils should not exceed 90 °C, under worst conditions, i.e. taking into account:

over-voltage on the windings;
low atmospheric pressure (at high altitudes) implying bad cooling by convection;
high room temperature (up to 45 °C).

To satisfy these requirements it may be desirable to provide ample cool air circulation around the transformer.

Distances

The following minimum distances between the transformer and neighbouring conductive flat surfaces must be maintained (in proportion to their sharpness protruding parts must have a greater distance):

a. From the e.h.t. winding, radially 18 mm, axially 10 mm.
b. From the e.h.t. lead 15 mm.

The transformer, and the leads and components carrying high-voltage pulses should be kept free from metal particles, solder drops etc.

ELECTRICAL DATA (see also Fig. 3)

E.H.T. supply	I_{eht} E.H.T. $R_{i(eht)}$	0 μA 11 kV 8 MΩ	100 μA 10,2 kV 8 MΩ
Power supply	V_B I_B	8,8 V 920 mA	8,8 V 1100 mA
Output transistor	V_{CEM} I_{CM}	220 V 3,6 A	220 V 3,7 A
Deflection	Current Flyback ratio (average) Overscan variation	4,2 A (p-p) 9,4 % 0 %	4,1 A (p-p) 9,4 % 0 %

Auxiliary windings	
connecting pin 1	200 V (d.c.)
connecting pin 2	75 V (d.c.)
connecting pin 4	15 V (d.c.)

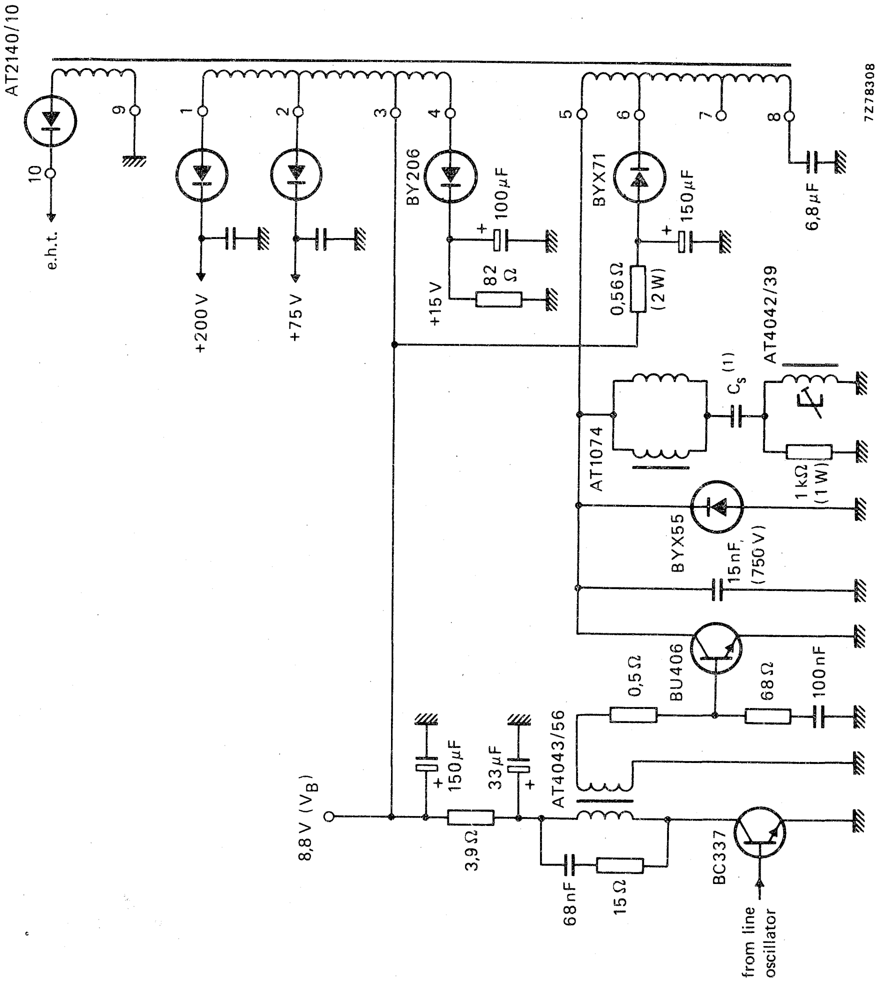


Fig. 3 Application circuit. (1) $C_s = 1,5\ \mu F + 0,22\ \mu F + 1,5\ \mu F$.

ADJUSTABLE LINEARITY CONTROL UNIT

APPLICATION

This linearity control unit has been designed for use in monochrome monitors with 24 cm (9 in) or 31 cm (12 in) 90° monitor tubes. It can be used in conjunction with deflection unit AT1071/03, line output transformer AT2102/02 and line driver transformer AT4043/56.

DESCRIPTION

The unit consists of a coil wound on a Ferroxcube rod and two Ferroxdure magnets. One of these magnets has the shape of a half ring and is placed around the Ferroxcube rod under the coil. The other magnet is cylindrical; it is placed parallel to and clamped against the Ferroxcube rod opposite the first one. This magnet is provided with a square hole to facilitate turning of it to adjust the biasing field and so the linearity of the line deflection.

MECHANICAL DATA

Dimensions in mm

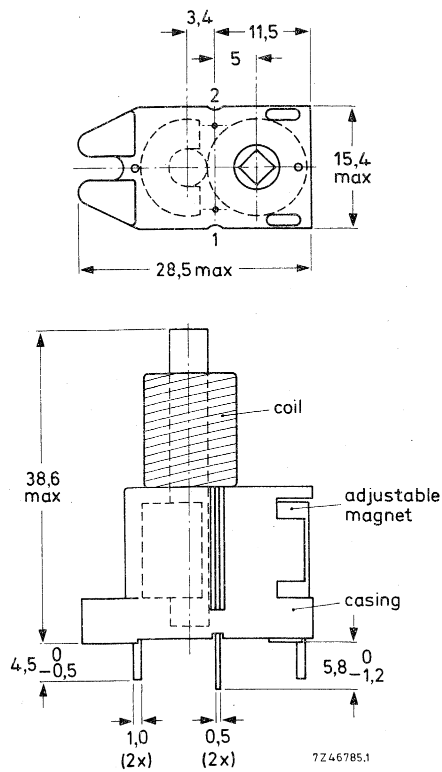


Fig. 1 Adjustable linearity control unit AT4036.

ELECTRICAL DATA

When a sawtooth current (without S-correction) of 6 A (p-p), frequency 15 625 Hz, flyback ratio 18%, flows through the linearity control unit (one connection point to earth), the correction voltage is adjustable between 1,05 and 1,95 V.

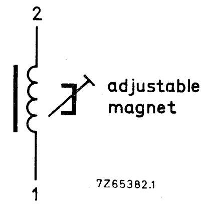


Fig. 2 Circuit diagram.

MOUNTING

The unit can be mounted either on printed-wiring boards by means of its two connection pins and two mounting pins (see Fig. 3), or on metal chassis by bending the two mounting pins and/or by means of a screw through an aperture in the casing (see Fig. 4). To prevent distortion of the magnetic field no iron part should approach the magnetic parts nearer than 3 mm. The coil should be shunted with a 1 W carbon resistor to damp ringing phenomena.

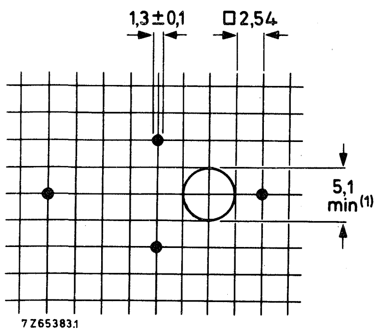


Fig. 3 Hole pattern for mounting on a printed-wiring board.
(1) Hole for bottom adjustment, if required.

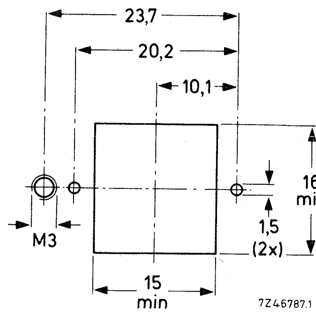


Fig. 4 Hole pattern for mounting on a chassis.

ADJUSTABLE LINEARITY CONTROL UNIT

APPLICATION

This linearity control unit has been designed for use in monochrome monitors with 31 cm (12 in) or 38 cm (15 in) 110° monitor tubes. It can be used in conjunction with deflection unit AT1038/40, line output transformer AT2102/04 and line driver transformer AT4043/59. The unit is also to be used in colour television sets with a 110° colour picture tube.

DESCRIPTION

The unit consists of a coil, mounted on a Ferroxcube rod, two Ferroxdure magnets and one plasto-ferrite magnet. One magnet has the shape of a ring and is placed around the Ferroxcube rod above the coils. One has the shape of a half ring and is placed around the Ferroxcube rod under the coils. The third magnet is cylindrical; it is positioned to and clamped against the Ferroxcube rod opposite the half ring magnet. It is provided with a square hole to facilitate turning to adjust the biasing field and, therefore, the linearity of the line deflection.

MECHANICAL DATA

Dimensions in mm

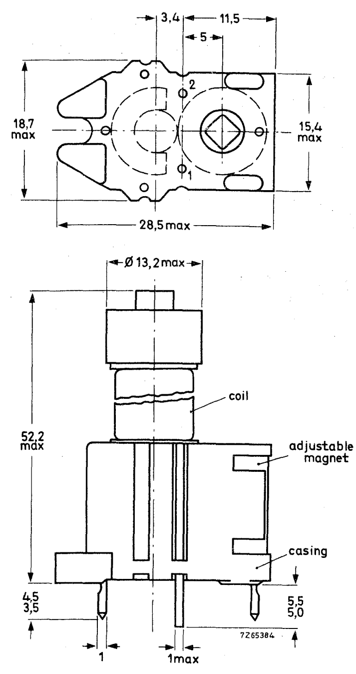


Fig. 1 Adjustable linearity control unit AT4042/08.

ELECTRICAL DATA

When a sawtooth current of 6 A (p-p), frequency 15 625 Hz, fly-back ratio 18% (without S-correction) flows through the linearity control unit (coils connected in parallel, one connection point to earth), the correction voltage is adjustable between 15 and 25 V.
With a sawtooth current of 4,65 A (p-p) the correction voltage is adjustable between 8 and 15 V.

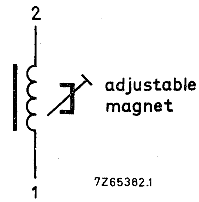


Fig. 2 Circuit diagram.

MOUNTING

The unit can be mounted either on printed-wiring boards by means of its two connection pins and two mounting pins, or on metal chassis by bending the two mounting pins and/or by means of a screw through an aperture in the casing (see Fig. 4). To prevent distortion of the magnetic field, no iron part should approach the magnetic parts nearer than 3 mm. The coils should be shunted with carbon resistors to damp ringing phenomena; the value of resistor depends on applied line output transformer.

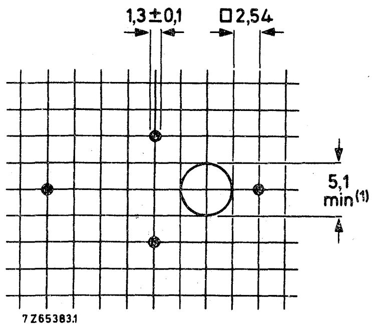


Fig. 3 Hole pattern for mounting on a printed-wiring board.
(1) Hole for bottom adjustment, if required.

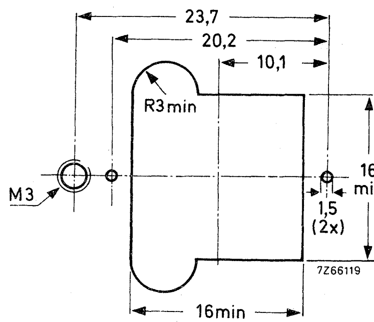


Fig. 4 Hole pattern for mounting on a chassis.

LINEARITY CONTROL UNIT

APPLICATION

This non-adjustable linearity control unit is designed for use in black and white television sets equipped with 110° deflection angle picture tube.

It is intended for use in conjunction with:
- deflection unit AT 1040/15;
- line output transformer AT 2048/12.

DESCRIPTION

The unit consists of a coil wound on a Ferroxcube rod, and a Ferroxdure magnet, which is placed around the rod next to the coil.

Dimensions in mm

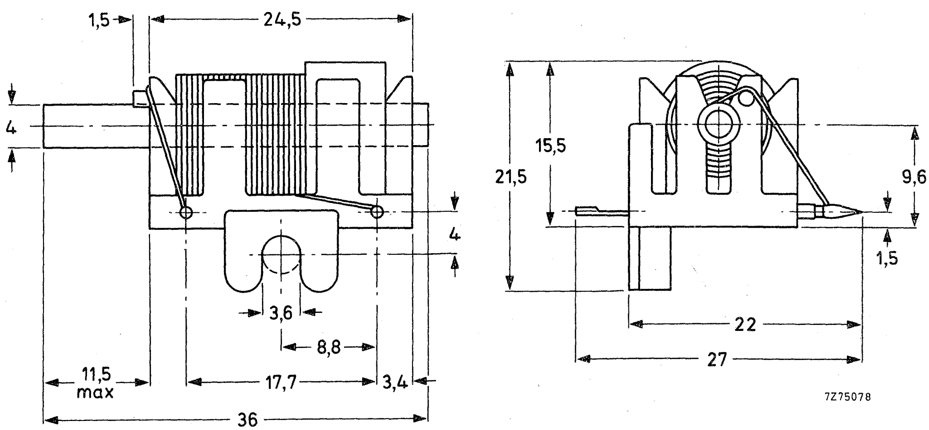


Fig. 1

ELECTRICAL DATA

When a saw-tooth current (without S-correction) of 2, 2 A(p-p), frequency 15 625 Hz, flyback ratio 18%, flows through the linearity control unit, the correction voltage is 17 V.

MOUNTING

The unit can be mounted on printed-wiring boards by means of its two connection pins and two mounting pins (see Fig. 1). To prevent distortion of the magnetic field no iron part should approach the magnetic parts anywhere nearer than 3 mm.

ADJUSTABLE LINEARITY CONTROL UNIT

APPLICATION

This linearity control unit has been designed for use in monochrome monitors with 24 cm (9 in) or 31 cm (12 in) 90° monitor tubes. It can be used in conjunction with deflection unit AT1074/01, line output transformer AT2102/02 or AT2140/10 and line driver transformer AT4043/56.

DESCRIPTION

The unit consists of a coil, mounted on a Ferroxcube rod, two Ferroxdure magnets and one plasto-ferrite magnet. One magnet has the shape of a ring and is placed around the Ferroxcube rod above the coil. One has the shape of a half ring and is placed around the Ferroxcube rod under the coil. The third magnet is cylindrical; it is positioned to and clamped against the Ferroxcube rod opposite the half ring magnet. It is provided with a square hole to facilitate turning to adjust the biasing field and, therefore, the linearity of the line deflection.

MECHANICAL DATA

Dimensions in mm

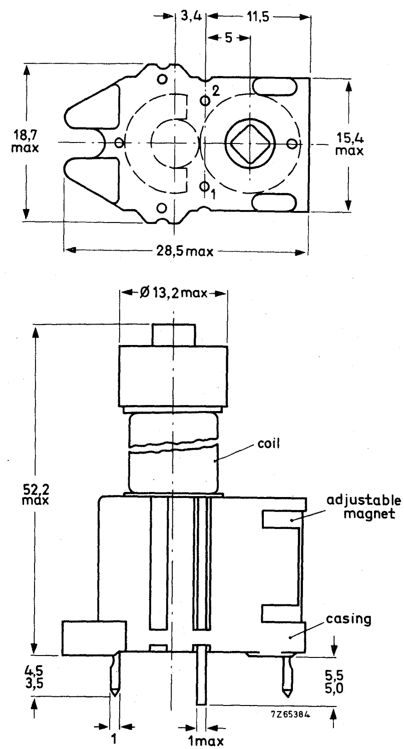


Fig. 1 Adjustable linearity control unit AT4042/26.

ELECTRICAL DATA

When a sawtooth current of 5 A (p-p), frequency 15 625 Hz, fly-back ratio 18% (without S-correction) flows through the linearity control unit (one connection point to earth), the correction voltage is adjusted to 17 V.

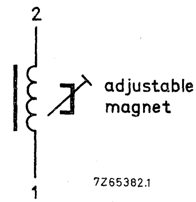


Fig. 2 Circuit diagram.

MOUNTING

The unit can be mounted either on printed-wiring boards by means of its two connection pins and two mounting pins (see Fig. 3), or on metal chassis by bending the two mounting pins and/or by means of a screw through an aperture in the casing (see Fig. 4). To prevent distortion of the magnetic field, no iron part should approach the magnetic parts nearer than 3 mm. The coil should be shunted with a 1 W carbon resistor to damp ringing phenomena.

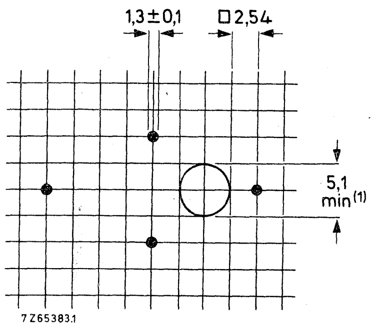


Fig. 3 Hole pattern for mounting on a printed-wiring board.
(1) Hole for bottom adjustment, if required.

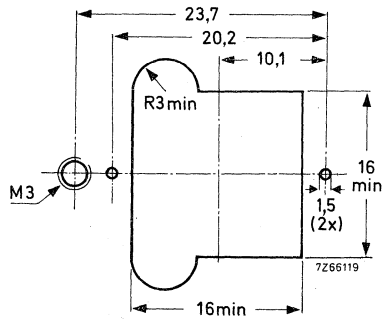


Fig. 4 Hole pattern for mounting on a chassis.

LINE DRIVER TRANSFORMER

APPLICATION

This transformer has been designed for use in monochrome monitors. The required supply voltage is 12 V. The transformer is used in conjunction with deflection unit AT1071/03 or AT1074, line-output transformer AT2102/02 or AT2140/10, and linearity control unit AT4036.

MECHANICAL DATA

Dimensions in mm

The magnetic circuit of the transformer comprises two Ferroxcube U-cores. The unit is provided with pins for mounting on a printed-wiring board.

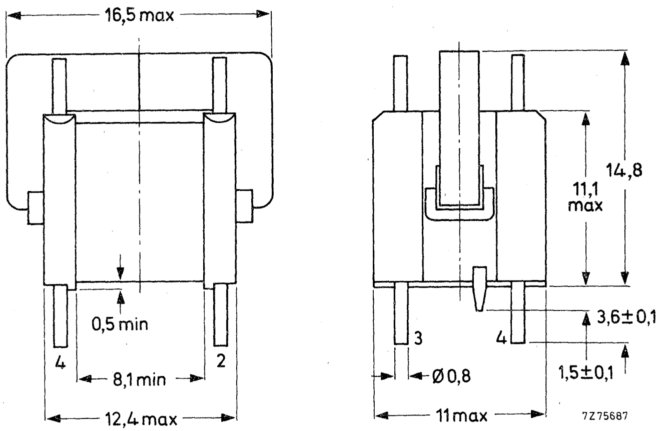


Fig. 1 Line driver transformer AT4043/56.

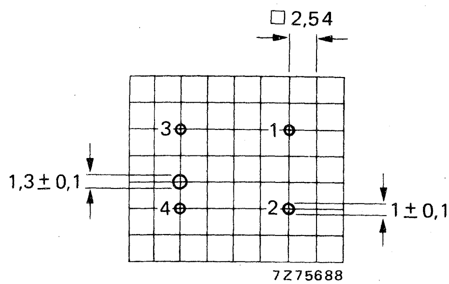


Fig. 2 Hole pattern for mounting on a printed-wiring board (component side).

ELECTRICAL DATA

Inductance (primary, 1-2)	5,8 mH ± 15%
Inductance (secondary)	⩽ 10 μH
Transformation ratio	4 : 1
Maximum operating temperature	95 ^oC

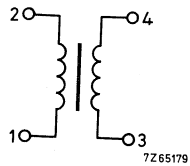


Fig. 3 Circuit diagram.

Application circuit

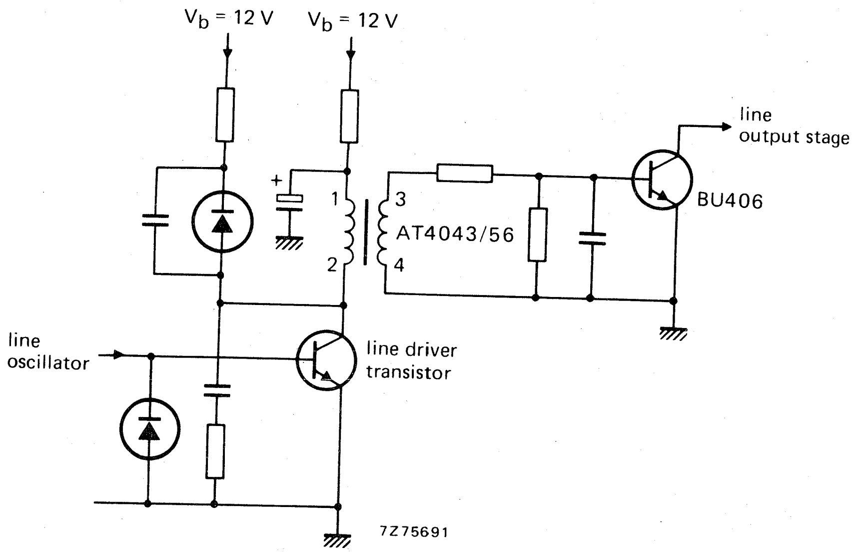


Fig. 4.

LINE DRIVER TRANSFORMER

APPLICATION

This transformer has been designed for use in monochrome monitors. The required supply voltage is 24 V. The transformer is used in conjunction with deflection unit AT1038/40, line-output transformer AT2102/04, and linearity control unit AT4042/08.

MECHANICAL DATA

Dimensions in mm

The magnetic circuit of the transformer comprises two Ferroxcube U-cores. The unit is provided with pins for mounting on a printed-wiring board.

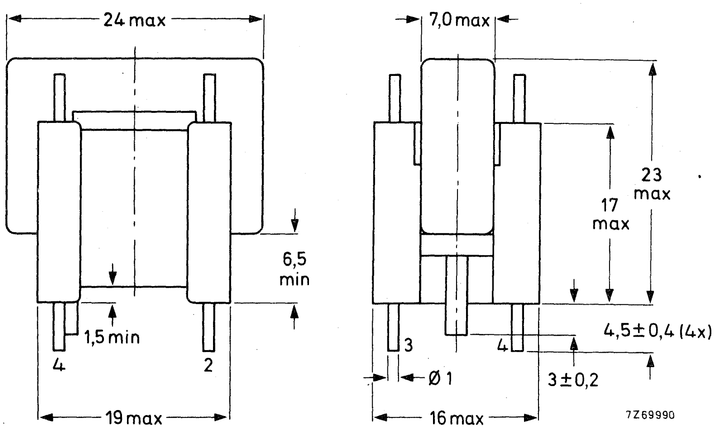


Fig. 1 Line driver transformer AT4043/59.

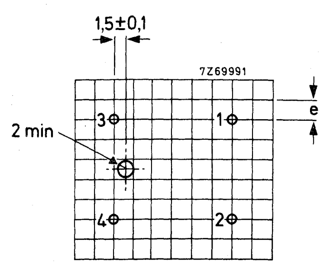


Fig. 2 Hole pattern for mounting on a printed-wiring board (component side). Hole diameter 1,3 + 0,1 mm. e = 2,54 mm (0,1 in).

ELECTRICAL DATA

Inductance (primary, 1-2)	6,1 mH
Leakage inductance (secondary)	12 μH ± 15%
Transformation ratio	4,18 : 1
Maximum operating temperature	95 °C

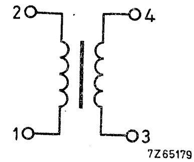


Fig. 3 Circuit diagram.

Application circuit

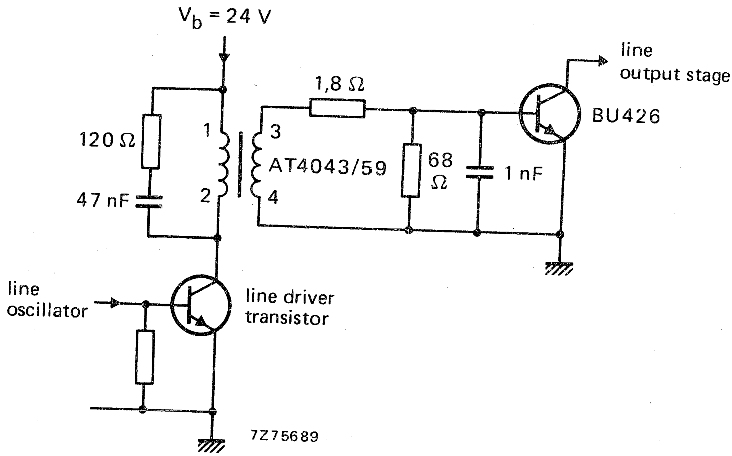


Fig. 4.

LINE DRIVER TRANSFORMER

APPLICATION

This transformer has been designed for use in monochrome monitors. The required supply voltage is 12 V. The transformer is used in conjunction with deflection unit AT1071/03, line-output transformer AT2102/02, and linearity control unit AT4036.

MECHANICAL DATA

Dimensions in mm

The magnetic circuit of the transformer comprises two Ferroxcube U-cores. The unit is provided with pins for mounting on a printed-wiring board.

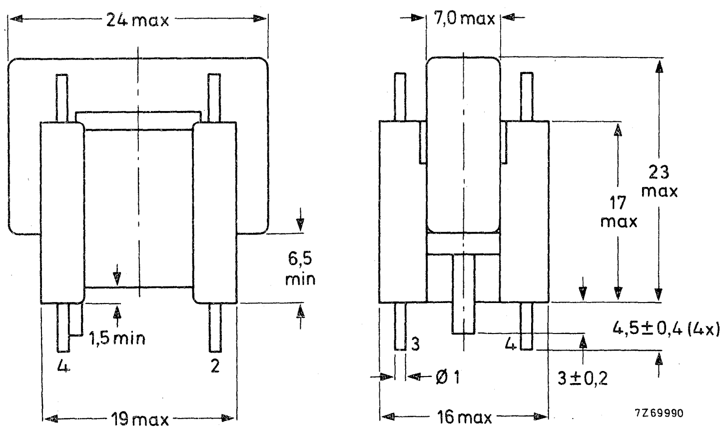


Fig. 1 Line driver transformer AT4043/64.

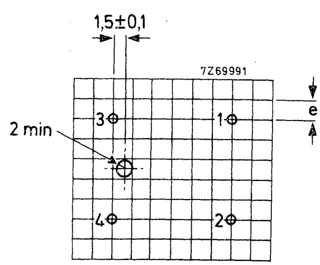


Fig. 2 Hole pattern for mounting on a printed-wiring board (component side). Hole diameter 1,3 + 0,1 mm. e = 2,54 mm (0,1 in).

ELECTRICAL DATA

Inductance (primary, 1-2)	1,2 mH
Leakage inductance (secondary)	5 μH ± 10%
Transformation ratio	2 : 1
Maximum operating temperature	95 °C

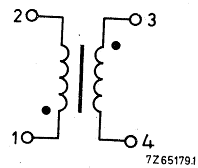


Fig. 3 Circuit diagram.

Application circuit

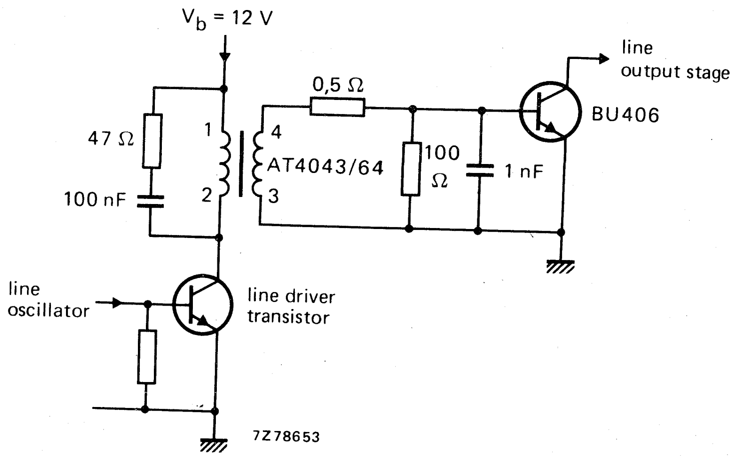


Fig. 4.

LINE DRIVER TRANSFORMER

APPLICATION

This transformer has been designed for black and white, and colour television sets equipped with transistors.
In black and white television sets it can be used in the single-transistor (BU205) line output circuit in conjunction with the line output transformer AT2048/12.

For further information see section "Components for colour television".

CONTENTS

COMPONENTS FOR COLOUR TELEVISION

COMPONENTS FOR BLACK AND WHITE TELEVISION

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