CAMERA TUBE

Vidicon with low heater current intended for use in black-and-white or colour TV cameras in industrial, medical and broadcast applications.

QUICK REFERENCE DATA		
Resolution	600 to 900	TV lines
Focusing	magnetic	
Deflection	magnetic	
Diameter	25.4	mm (1 inch)
Length	158	mm ($6\frac{1}{4}$ inch)
Heater	6.3 V, 90	mA

The 55850 has 5 grades:

- 55850 AM: low cost tube for experiments, amateur use etc.
- 55850 F : for use in film scanners
- 55850 N : for normal industrial applications
- 55850 S : for industrial and broadcast applications in which a higher picture quality is required
- 55850 SR : for use in X-ray medical equipment

The electrical and mechanical properties of the 5 grades are identical, main differences being found in the degree of uniformity and freedom of blemishes of the photoconductive layers.

OPTICAL

Diagonal of quality rectangle on photoconductive layer (aspect ratio 3 : 4) max. 16 mm

Orientation of image on photoconductive layer:
horizontal scan should be essentially parallel to the plane passing through tube axis and short index pin. The masking is for orientation only and does not define the proper scanned area of the photoconductive layer.

Spectral response See page A

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HEATING

Indirect by A.C. or D.C., series or parallel supply

Heater voltage	V_f	6.3	V +10%
Heater current	I_f	90	mA

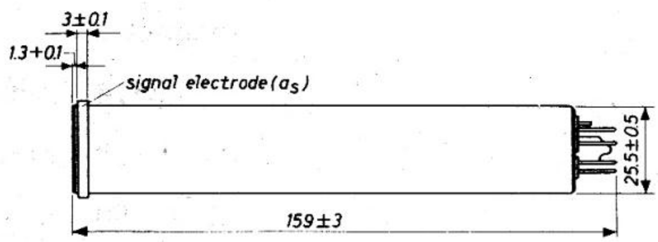
When the tube is used in a series heater chain the heater voltage must not exceed 9.5 V_{rms} when the supply is switched on.

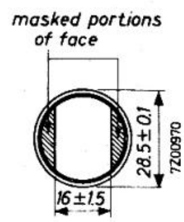
CAPACITANCES

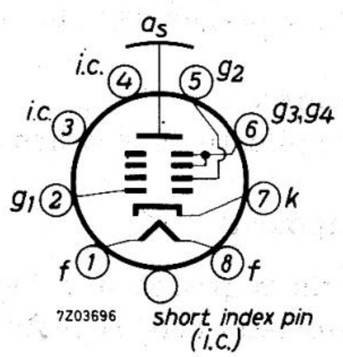
Signal electrode to all	C_{a_s}	4.5	pF [1])

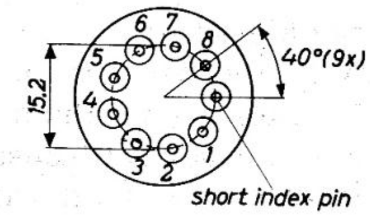
MECHANICAL DATA

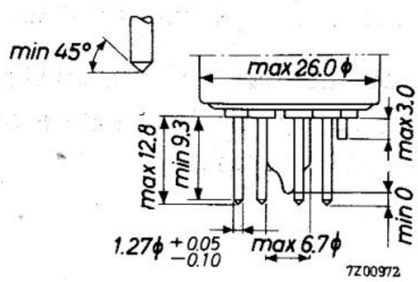
Base: JEDEC No. E8-11 Dimensions in mm











FOCUSING magnetic

DEFLECTION magnetic

MOUNTING POSITION: any

NET WEIGHT approx. 65 g

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1) This capacitance, which effectively is the output impedance of the 55850, is increased by about 3 pF when the tube is inserted into the deflection and focusing coil-assembly. The resistive component of the output impedance is in the order of 100 MΩ.

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ACCESSORIES

Socket — Cinch No. 54A18088 or equivalent

Focusing and deflection coil assembly: AT1101, AT1102 or equivalent.

LIMITING VALUES (Absolute max. rating system)
for scanned area of 9.6 mm x 12.8 mm (3/8" x 1/2") [1]

Signal electrode voltage	V_{a_s}	max.	100	V [2]
Grid No.4 and grid No.3 voltage	V_{g_4,g_3}	max.	800	V
Grid No.2 voltage	V_{g_2}	max.	350	V
Grid No.1 voltage,				
negative	$-V_{g_1}$	max.	125	V
positive	$+V_{g_1}$	max.	0	V
Signal electrode current, peak	I_{as_p}	max.	0.6	μA [3]
Faceplate illumination		max.	5000	lux
Faceplate temperature	t	max.	80	°C [4]
Cathode to heater voltage, peak				
cathode positive	V_{kf_p}	max.	125	V
cathode negative	V_{kf_p}	max.	10	V
Dark current, peak	I_{d_p}	max.	0.25	μA

[1] "Full-size scanning", i.e. scanning of a 9.6 mm x 12.8 mm area of the photoconductive layer should always be applied. The use of a mask having these dimensions is recommended. Underscanning, i.e. scanning of an area less than 9.6 mm x 12.8 mm may cause permanent damage to the specified full-size area.

[2] The signal-electrode voltage should never exceed 100 V, either during heating-up or stand-by, or during operation. An excessive signal-electrode voltage may cause permanent damage to the photoconductive layer.

[3] Video-amplifiers should be capable of handling signal-electrode currents of this magnitude without amplifier overload or picture distortion.

[4] Absolute maximum for shelf-life and operation. Under difficult environmental conditions a flow of cooling air directed at the faceplate is recommended. When televising flames and furnaces appropriate infra-red filters should be applied.

7Z2 7683

OPERATING CONDITIONS AND PERFORMANCE

For scanned area of 9.6 mm x 12.8 mm and faceplate temperature of 25-35 °C

A. PICK-UP FROM LIMITED-MOTION LIVE SCENES

Conditions

Grid No.3 and grid No.4 (beam focus electrode) voltage		250 - 300	V [1]
Grid No.2 voltage		300	V
Grid No.1 voltage adjusted for sufficient beam currents to stabilise highlights			
Minimum peak-to-peak blanking voltage			
when applied to grid No.1		75	V
when applied to the cathode		20	V [2]
Field strength at centre of focusing coil	approx.	40	Oerstedt [3]
Field strength of adjustable alignments coils		0 - 4	Oerstedt [4]

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[1] Beam focus is obtained by the combined effect of the grid No.3 voltage, which should be adjustable over the indicated range and a focusing coil having an average field strength of 40 Oerstedt.
Definition, focus uniformity and picture quality decrease with decreasing grid No.3 voltage. In general, grid No.3 should be operated above 250 V.

[2] In transistorized cameras cathode blanking will be preferable. The cathode impedance is in the order of 30 kΩ.

[3] The polarity of the focusing coil should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

[4] The alignment coil assembly should be located on the tube so that its centre is at a distance of approx. 94 mm (3 11/16") from the face of the tube and be positioned so that its axis coincides with the axis of the tube, the deflecting yoke and the focusing coil.

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OPERATING CONDITIONS AND PERFORMANCE (continued)

Performance

Signal-electrode voltage for dark current of 0.02 μA,	range	20 - 100	V [1]
	typical	40	V
Grid No.1 voltage for picture cut-off		-30 to -100	V [2]
Signal output current, faceplate illumination 8 lux	typical	0.150	μA [3]
	minimum	0.075	μA
Resolution capability in picture centre (see page B)		600	TV lines [4]
Decay: 8 lux on layer, V_{a_s} adjusted for dark current of 0.02 μA, residual signal after dark pulse of 200 msec	typical	10	%
Average gamma of transfer characteristic for signal output currents between 0.01 and 0.3 μA		0.6	
Visual equivalent signal-to-noise ratio	approx.	300 : 1	[5]

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[1] The deflection circuits must provide sufficiently linear scanning for good black-level reproduction. The dark-current signal being proportional to the velocity of scanning, any change in this velocity will produce a black-level error.

[2] With no blanking voltage on grid No.1.

[3] Defined as the component of the signal-electrode current after the dark current has been subtracted.

[4] With a video-amplifier system having 7.5 Mc/s bandwidth (-3 dB points).

[5] Measured with a peak signal output current of 0.2 μA into a high-gain, cascode-input type of amplifier with an own noise of 0.002 μA r.m.s. and a bandwidth of 5 Mc/s. Because the noise in such a system is predominantly of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight video-signal current to the r.m.s. noise current multiplied by a factor of 3.

7Z2 5678

OPERATING CONDITIONS AND PERFORMANCE (continued)

B. PICK-UP FROM FILM (MINIMUM-LAG OPERATION)

Conditions

As under "Pick-up from limited-motion live scenes" with the exception of:

Faceplate illumination (highlight)		500	lux

Performance

As under "Pick-up from limited-motion live scenes" with the exception of:

Signal-electrode voltage for a dark current of 0.005 μA		10 - 20	V
Signal output current	typical	0.3	μA
Decay: peak white signal of 0.3 μA, residual signal after dark pulse of 200 msec	typical	3	%

C. OPERATION FOR MAX. RESOLUTION

Conditions

As under "Pick-up from limited-motion live scenes" or "Pick-up from film" with the exception of:

Grid No.3 and grid No.4 voltage		750	V
Field strength at centre of focusing coil	approx.	70	Oerstedt [1][2]

Performance

As in "Pick-up from limited-mottion live scenes" or "Pick-up from film", with the exception of:

Resolution capability in picture centre	approx.	900	TV lines

For further details see text and pages B and C

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[1] The polarity of the focusing coil should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

[2] With this mode of operation beam-landing errors, resulting in parabolic shading and dark corners, increase. The deflecting and focusing coils should be designed to eliminate these errors.
The increased-power requirements for these coils will increase the tube temperature, adequate provisions for cooling should be made. 7Z2 5679

PRINCIPLE OF OPERATION

SCHEMATIC ARRANGEMENT

The schematic arrangement of the vidicon 55850 with its accessories is shown in Fig.1.

The vidicon may be assumed to consist of three sections, namely the electron gun, the scanning section, and the target section.

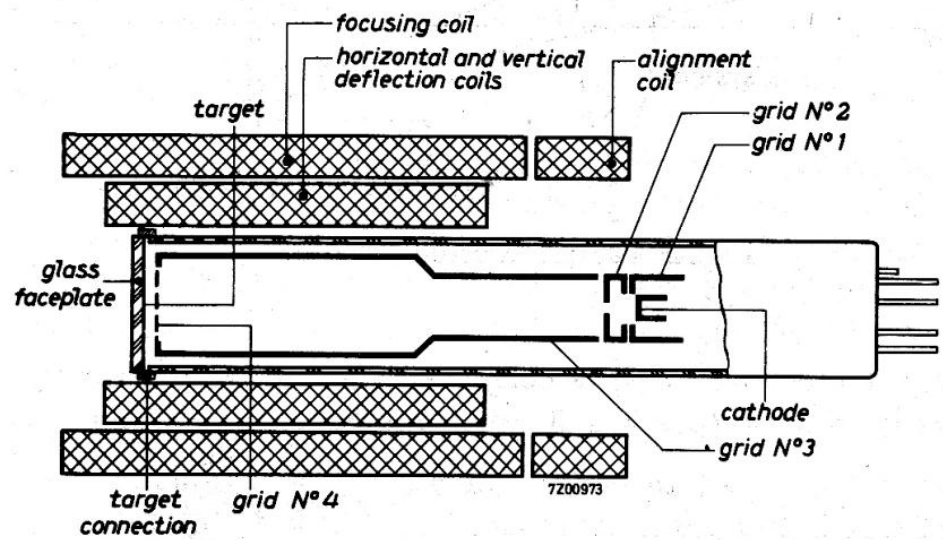

Fig. 1 Schematic electrode and coil arrangement

The electron gun contains a thermionic cathode, a grid g_1 controlling the amount of beam, and a limiter anode g_2 which accelerates the electrons and releases them in a fine beam through its diaphragm.

The scanning section. The electron beam released by g_2 enters the space enclosed by the cylindrical anode g_3. By means of the combined action of the adjustable electrical field of g_3 (beam focus control) and a fixed axial magnetic field produced by the focusing coil, the electrons are focused in one loop on to the target.

The far end of the g_3 cylinder is closed with a fine metal mesh, g_4, electrically connected to g_3, which produces a uniform, decelerating field in front of the target. The focused beam is magnetically deflected by two pairs of deflection coils so that it scans the target. Proper alignment of the beam with the axial magnetic field is achieved by either an adjustable magnet, or, as shown in Fig.1, by two sets of alignment coils producing an adjustable transverse magnetic field.

The target section is illustrated in Fig.2. It consists of:

- an optically flat glass faceplate,
- a transparent conductive film on the inner surface of the faceplate, connected electrically to the external signal-electrode ring.
- a thin layer of photoconductive material deposited on the conductive film. In the dark this material has a high specific resistance, which decreases with increasing illumination.

7Z2 5680

PRINCIPLE OF OPERATION (continued)

The optical image to be televised is focused on the conductive film by means of a lens system.

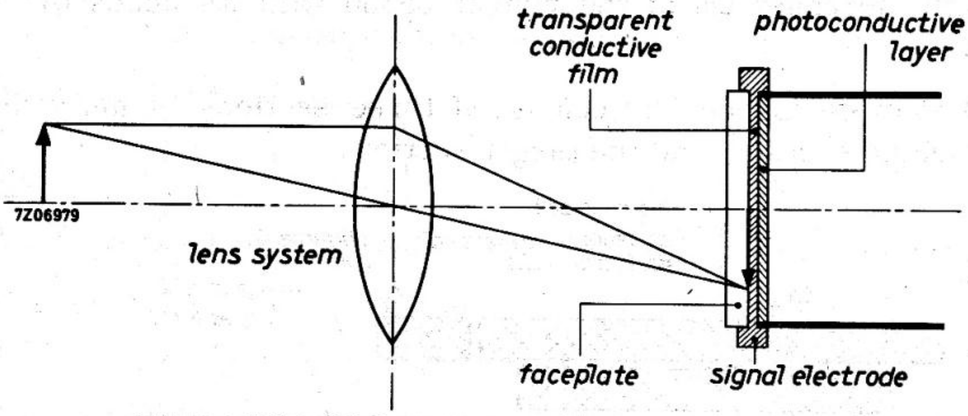

Fig.2 Target section

OPERATING

The external signal-electrode ring is connected via a load resistor to a positive voltage in the order of 30 V (see Fig.3).

The target may be assumed to consist of a large number of target elements, corresponding to the number of picture elements, each consisting of a small capacitor (C_e), connected on one side to the signal electrode via the transparent conductive film and shunted by a light-dependent resistor (R_{ld}, see Fig.3).

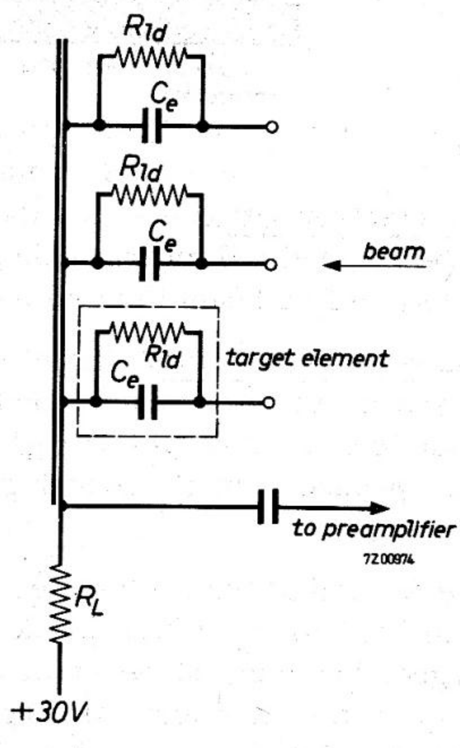

Fig.3

When the target is scanned by the beam its surface will be stabilised at approximately the cathode potential (low-velocity stabilisation) and a potential difference will be established across the photoconductive layer, in other words, each elementary capacitor will be charged to nearly the same potential as applied to the electrode ring.

In the dark, the photoconductive material is a fairly good insulator, so that only a minute fraction of the charge of the elementary capacitors will leak away between successive scans. This charge will be restored by the beam; the resulting current to the signal electrode is termed "dark current".

When an optical image is focused on to the target, those target elements which are illuminated will become more conductive and will be partly discharged. As a consequence a pattern of positive charges corresponding to the optical image will be produced on the side of target facing the gun section.

7Z2 7684

OPERATION (continued)

When scanning this charge pattern the electron beam will deposit electrons on the positive elements until the latter are restored to their original cathode potential, causing a capacitive current to the signal electrode and hence a voltage across the load resistor R_L. This voltage, negative going for the highlights, is the video signal and is fed to the pre-amplifier.

A vidicon is called "stabilised" when the magnitude of the beam current applied is just sufficient to restore the scanned surface to cathode potential, so that all elementary capacitors, including those at the highlights in the image, are recharged successively.

During the retrace times the beam electrons should be prevented from landing on the target since otherwise the scan retraces will appear as dark lines in the picture obtained on the monitor. This may be achieved either by cutting off the beam with suitable negative blanking pulses on the control grid or by cutting off the target with adequate positive blanking pulses applied to the cathode.

EQUIPMENT DESIGN AND OPERATING CONSIDERATIONS

The signal-electrode connection is made by a spring contact, which bears against the metal ring at the face end of the tube. The spring contact may be provided as part of the focusing coil design.

The deflection yoke and the focus coil used with the 55850 must be so designed that the beam lands perpendicularly to the target at all points of the scanned area, to ensure high uniformity of sensitivity and focus.

The deflection circuits must provide constant scanning speeds in order to obtain good black-level reproduction. The dark-current signal being proportional to the velocity of scanning, any change in this velocity will produce a black-level error.

The polarity of the focusing coil should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

The alignment coil assembly should be located on the tube so that its centre is at a distance of approx. 94 mm (3 11/16") from the face of the tube and be positioned so that its axis coincides with the axis of the tube, the deflecting yoke and the focusing coil.

The temperature of the faceplate should never exceed 80 °C, either during operation or storage of the 55850. Operation at a faceplate temperature of 25 to 35°C is recommended.

The effect of the faceplate temperature on sensitivity and dark current of a typical 55850, measured with illumination level and signal-electrode voltage as fixed parameters, is illustrated on page D. 7Z2 5682

EQUIPMENT DESIGN AND OPERATING CONSIDERATIONS (continued)

The temperature of the faceplate is determined by the heating effects of the incident illumination, the associated components, the environmental conditions and to a minor extent by the tube itself.

To reduce these heating effects and to permit operation in the preferred temperature range under conditions of high light levels, respectively high ambient temperatures, the use of an infra-red filter between object and camera lens, or a flow of cooling air directed across the faceplate, is recommended.

As the signal-electrode voltage is increased, the dark current and the sensitivity also increase. See page E.

Signal output and light-transfer characteristics
The typical signal output as a function of a uniform 2870 °K tungsten illumination on the photoconductive layer is shown on page F.

The average "gamma" of the light-transfer characteristic is approx. 0.6. This value is relatively constant over a signal output range of 0.01 to 0.3 μA.

Sufficient uniformity in the value of gamma is maintained to ensure satisfactory performance of colour cameras, in which the signal output currents of three 55850's, with the aud of γ-correcting circuitry, must match closely over a wide range of scene illumination.

The spectral response of a typical 55850 is shown on page A.

The resolution capability of the 55850 is illustrated on page B.

In general the resolution decreases with decreasing grid No.3 voltage. The voltage range will depend on the design of the focusing coil, which should be such as to provide a field strength within the range of 36 to 44 Oerstedt. Definition, focus uniformity and picture quality decrease with decreasing grid No.3 and No.4 voltage. In general grid No.3 and grid No.4 should be operated above 250 V.

As shown on pages B and C, a substantial increase in both limiting resolution and amplitude response of the 55850 may be obtained by increasing the operating voltage of grids No.3 and No.4 to 750 V. With this mode of operation, the focusing field strength must be increased to approx. 70 Oerstedt.

Since beam-landing errors increase with increasing grid No.3 and grid No.4 voltage, such operation will show a reduced signal output in the corners of the scanned area. When the 55850 is operated in this manner, the deflecting and focusing coils employed must be designed to eliminate beam-landing errors.

Compensation of beam-landing errors can be obtained by supplying modulating voltages of parabolic shape and of both horizontal and vertical scanning frequencies to the cathode and additionally, in order to prevent beam-modulation, to grid No.1, No.2, No.3 and No.4.

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EQUIPMENT DESIGN AND OPERATING CONSIDERATIONS (continued)

A suitable amplitude for this mixed parabolic waveform is approximately 4 V peak-to-peak. The polarity should be chosen such that the potential of the cathode is lowered as the beam approaches the edges of the scanned area. The use of this modulating waveform also improves the centre-to-edge focus of the vidicon.

Care must be taken that identical waveforms are applied to the relevant electrodes of each of the three tubes when using the 55850 in 3-colour vidicon cameras to ensure good registration of all signals over the entire scanned area.

Operation with grid No.3 and grid No.4 voltage at 750 V and a field strength of 70 Oerstedt demands increased-power requirements for the deflecting and focusing coils, which will increase tube temperature unless adequate provisions for cooling are made.

Scanning amplitude

Full-size scanning of the 9.6 mm x 12.8 mm area of the photoconductive layer should always be applied. To obtain this condition, first adjust the deflection circuits to overscan the photoconductive layer sufficiently so that the edges of the sensitive area can just be seen on the monitor, which itself should not be overscanned.

Then, after centring the image on the sensitive area (see Fig.4), reduce the scanning amplitudes in both directions with 15%.

In this way, the maximum signal-to-noise ratio and maximum resolution can be obtained. It should be noted that overscanning of the photoconductive layer produces a picture on the monitor that is smaller than normal.

Underscanning of the photoconductive layer, i.e. scanning of an area of less than 9.6 mm x 12.8 mm or failure of scanning for even the shortest duration should always be avoided, since this may cause permanent damage to the specified full-size area.

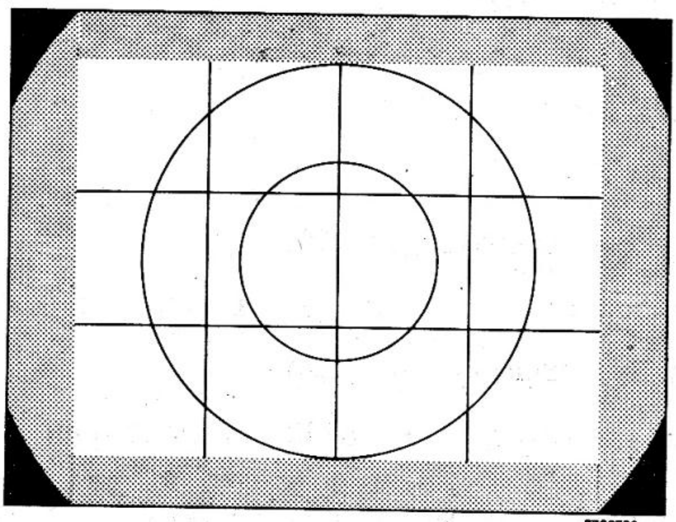
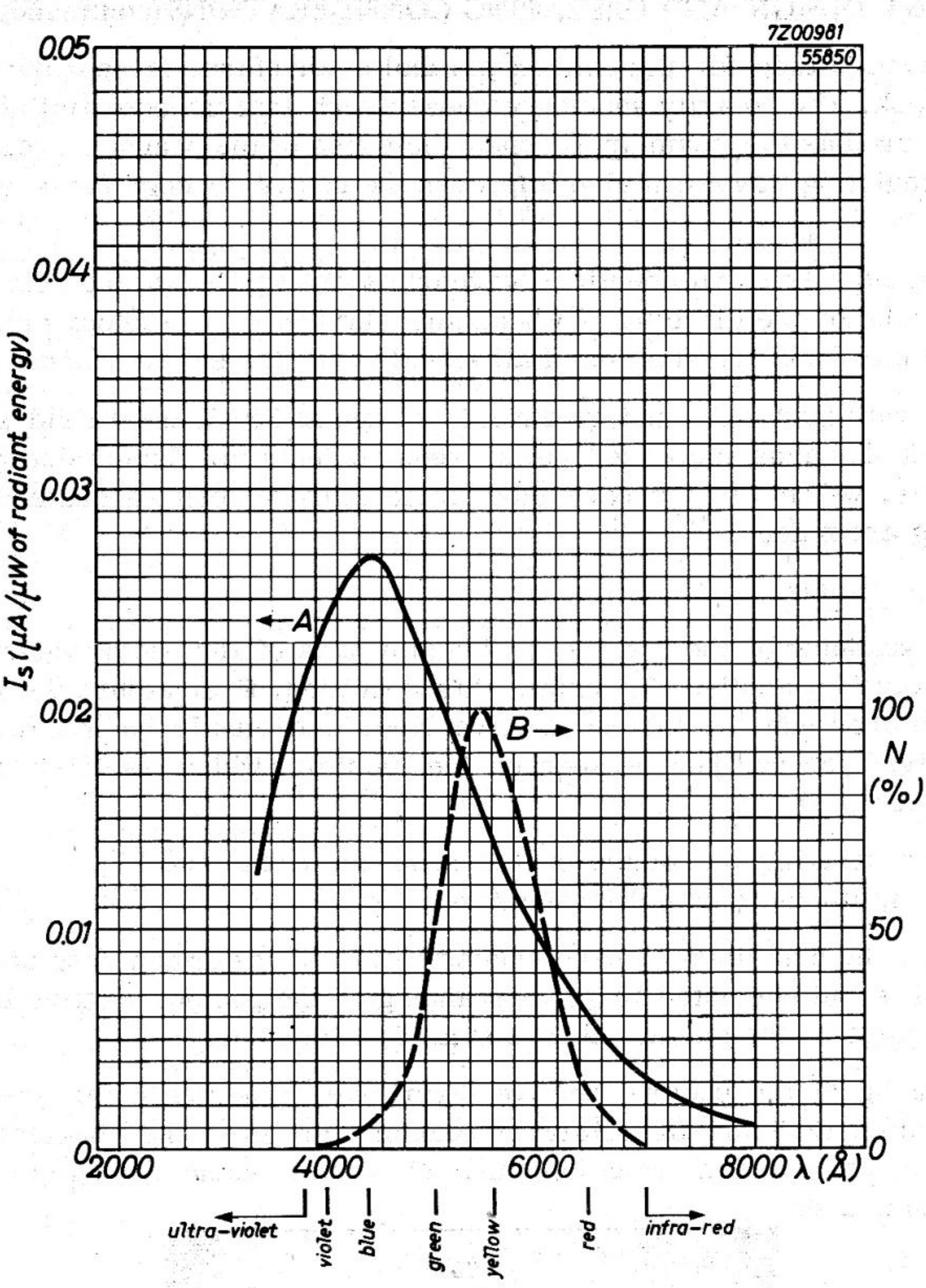


Fig.4 Positioning of the image on the sensitive area 7Z2 5684

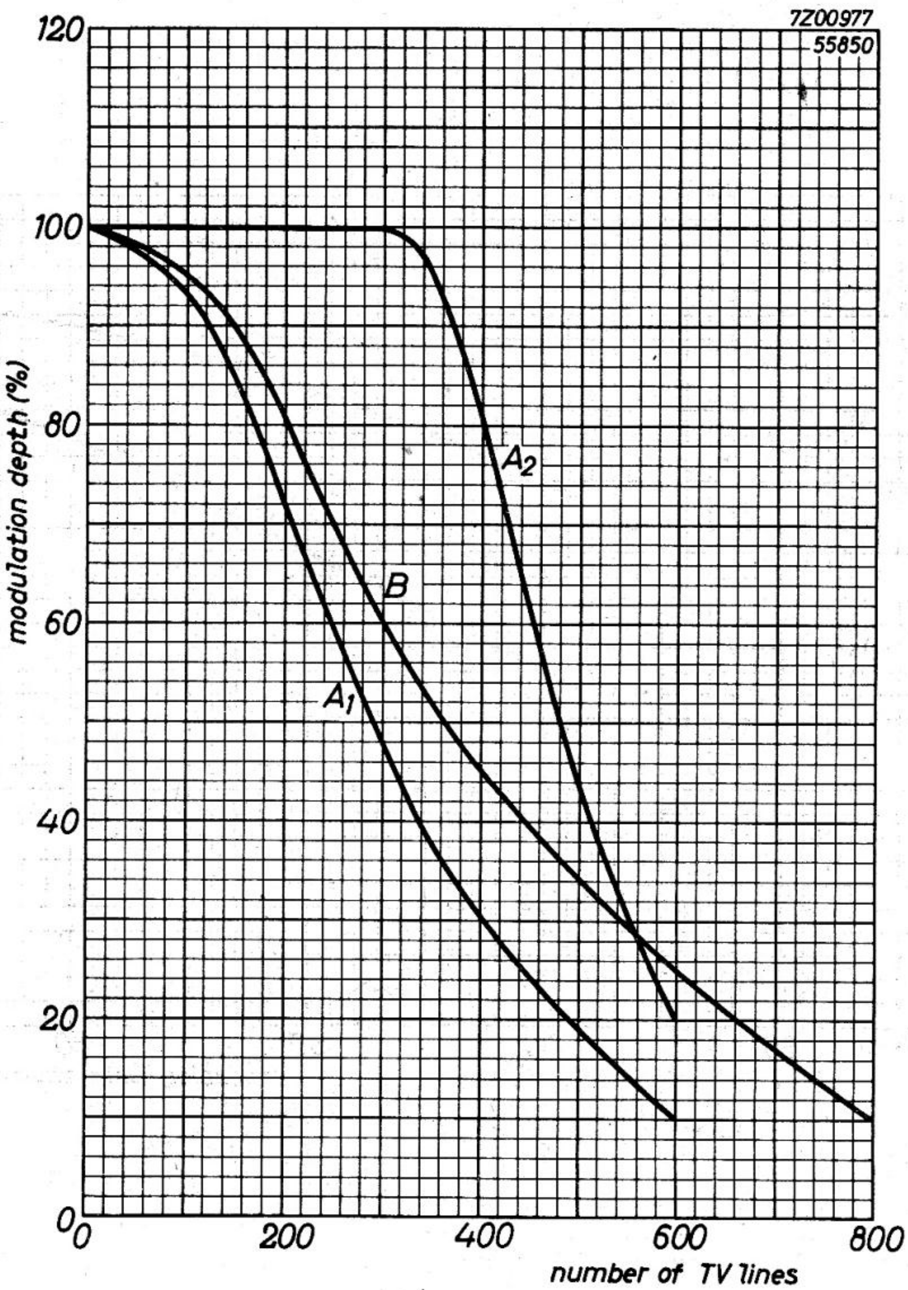


A: Spectral sensitivity of 55850

Scanned area = 12.8 mm x 9.6 mm

Signal current I_S = 0.02 μA

B: Relative spectral sensitivity of the human eye (N).

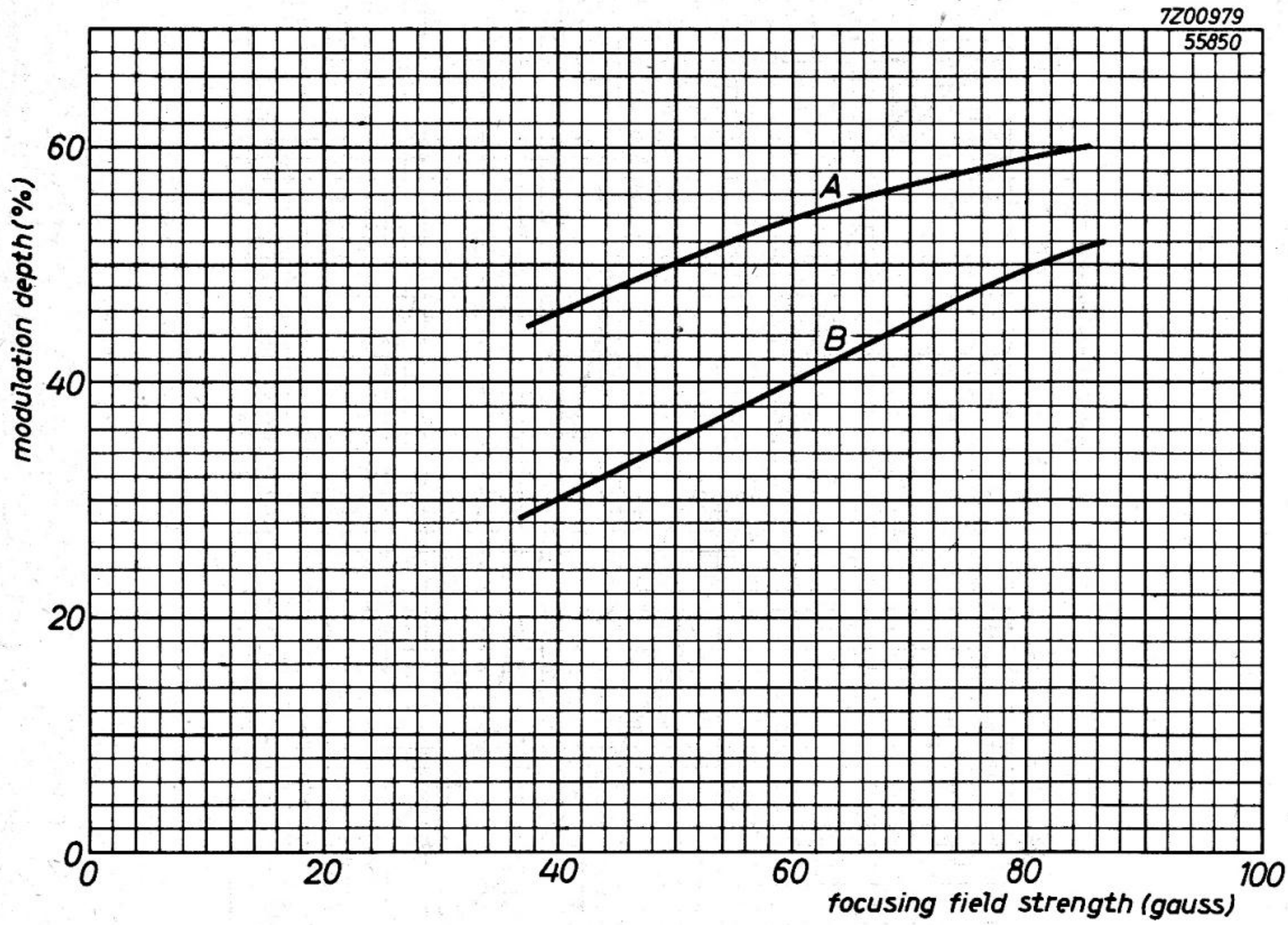


Horizontal square-wave response in picture centre of a typical 55850.

Highlight signal current = 0.3 μA.

Test pattern: transparent square-wave resolution wedge.

A_1: Uncompensated	V_{g_3,g_4} = approx. 285 V,
A_2: Compensated	focusing field strength = 40 Oerstedt
B: Uncompensated;	V_{g_3,g_4} = 750 V, focusing field strength = approx. 70 Oerstedt



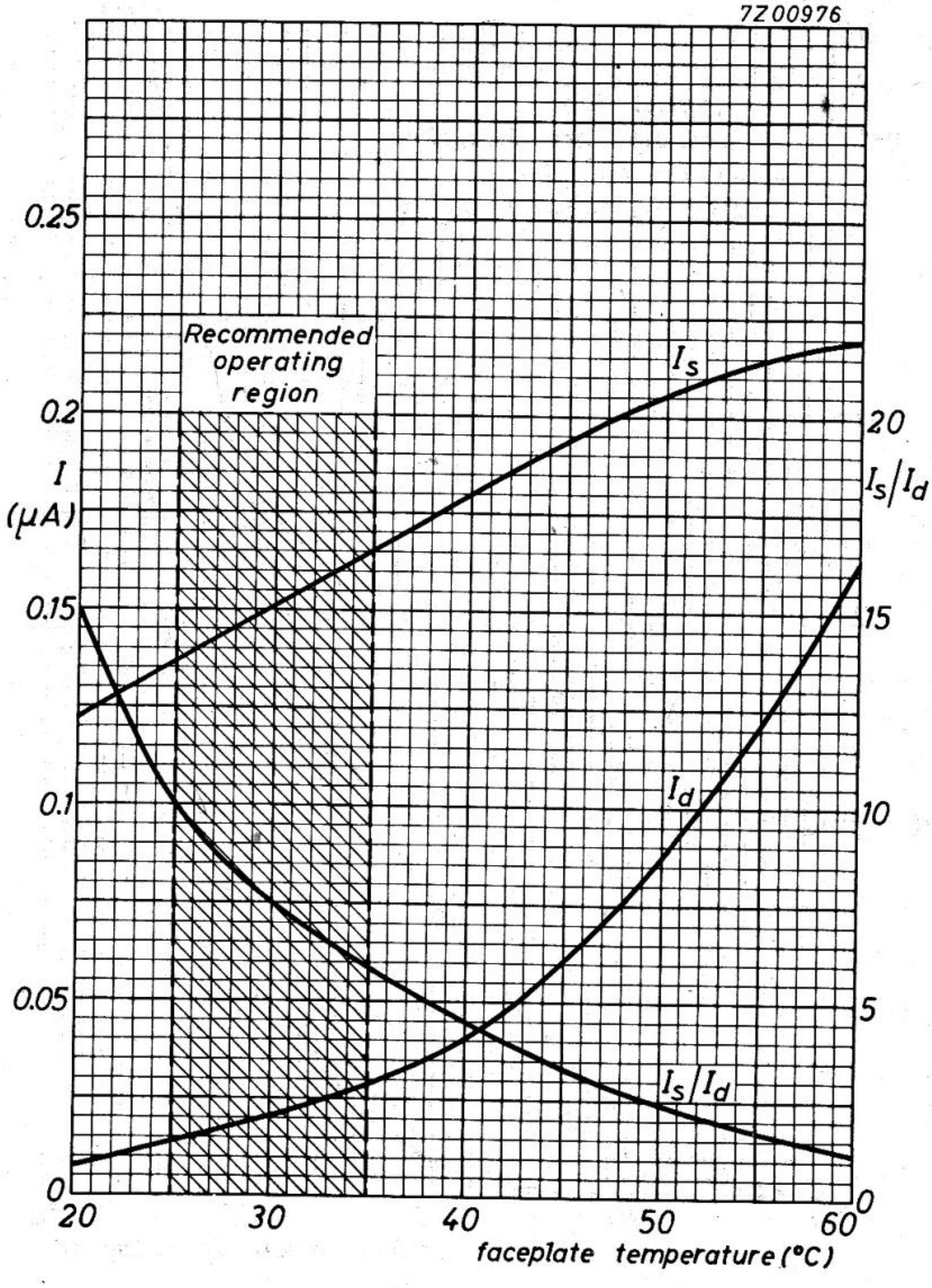
Uncompensated horizontal square-wave response at 400 TV lines as a function of the focusing magnetic field strength of an average 55850.

Curve A: Highlight signal current = 0.1 μA

Dark current = 0.02 μA

Curve B: Highlight signal current = 0.3 μA

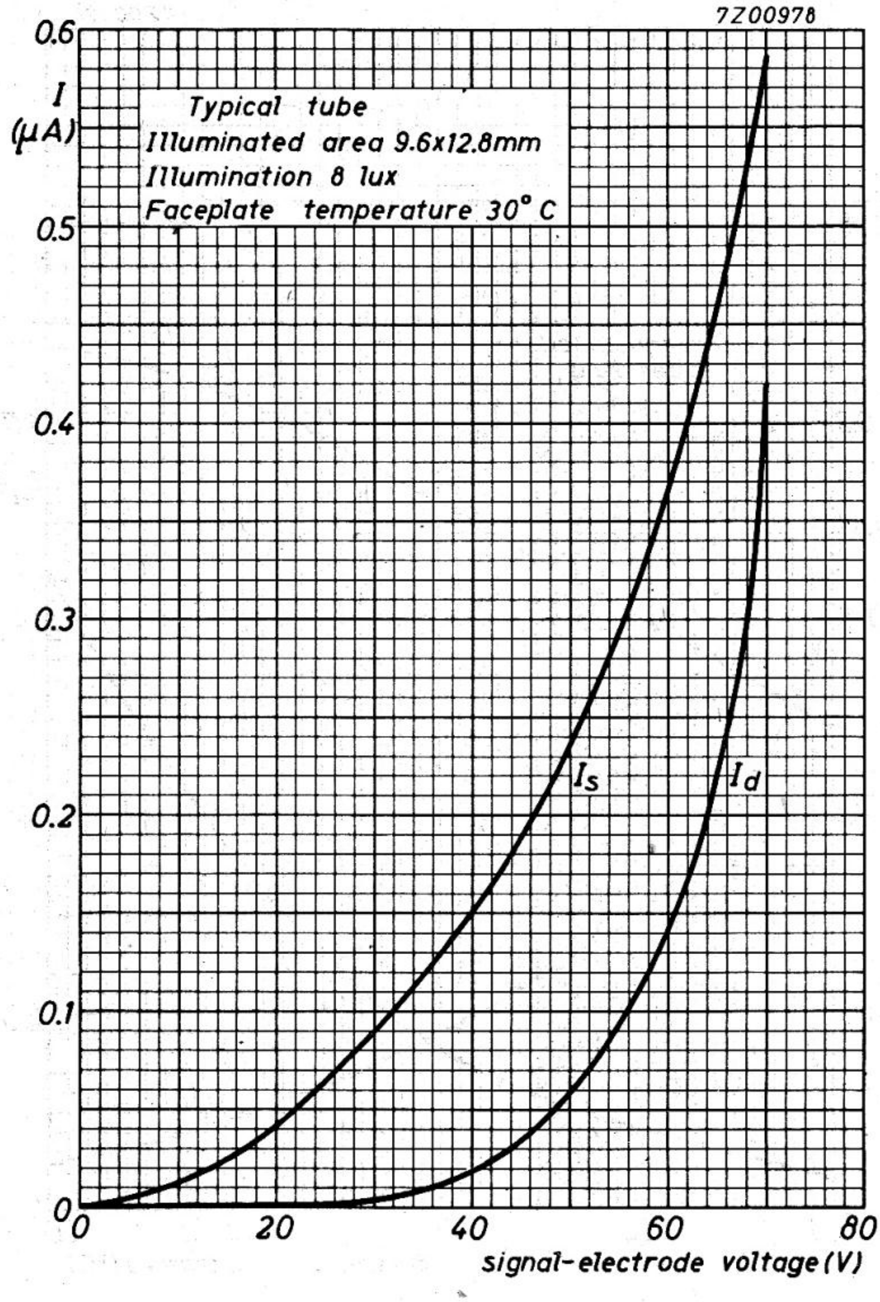
Dark current = 0.02 μA



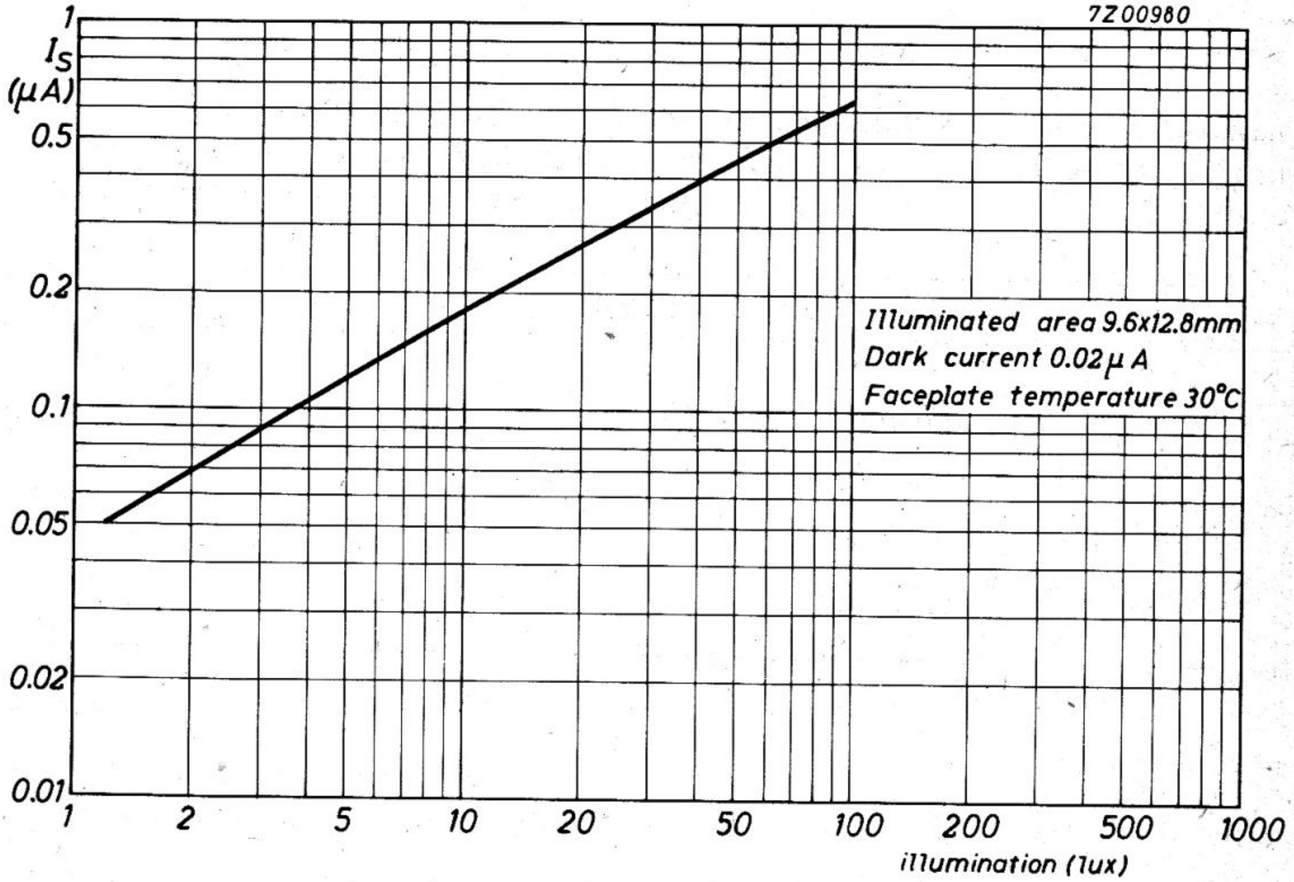
Signal current, dark current and ratio signal current: dark current as a function of the faceplate temperature.

Typical tube

Signal-electrode voltage and illumination level adjusted for a dark current (I_d) of 0.02 μA and a signal current (I_s) of 0.15 μA at a faceplate temperature of 30 °C.



Signal current and dark current as a function of the signal-electrode voltage.



Average signal current as a function of the illumination on the photoconductive layer.

CAMERA TUBE

Vidicon, television camera tube with low heater consumption, magnetic focusing, magnetic deflection and 1" diameter for low-cost industrial cameras, experiments in camera development and for amateur use.

QUICK REFERENCE DATA		
Resolution	600 to 900	TV lines
Focusing	magnetic	
Deflection	magnetic	
Diameter	25.4	mm (1 inch)
Length	158	mm ($6\frac{1}{4}$ inch)
Heater	6.3 V, 90	mA

OPTICAL

Diagonal of quality rectangle on photoconductive layer (aspect ratio 3 : 4) max. 16 mm

Orientation of image on photoconductive layer:
horizontal scan should be essentially parallel to the straight sides of the masked portions of the faceplate. The masking is for orientation only and does not define the proper scanned area of the photo-conductive layer.

CAPACITANCE

Signal electrode to all C_{a_s} 4.5 pF [1])

[1]) This capacitance, which effectively is the output impedance of the tube, is increased by about 3 pF when the tube is inserted into the deflection and focusing coil-assembly. The resistive component of the output impedance is in the order of 100 MΩ.

7Z2 7709

HEATING

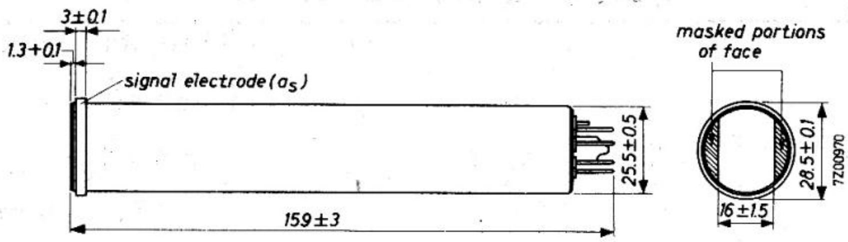
Indirect by A.C. or D.C., series or parallel supply

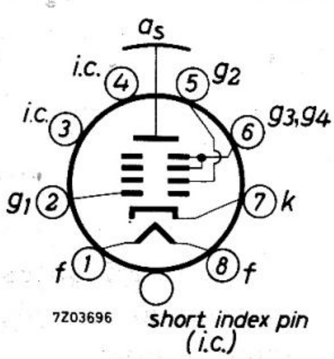
Heater voltage	V_f	6.3	V ±10%
Heater current	I_f	90	mA

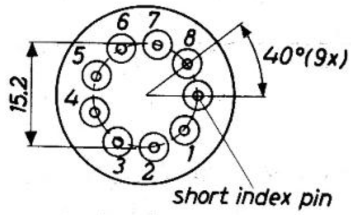
When the tube is used in a series heater chain the heater voltage must not exceed 9.5 V_{rms} when the supply is switched on.

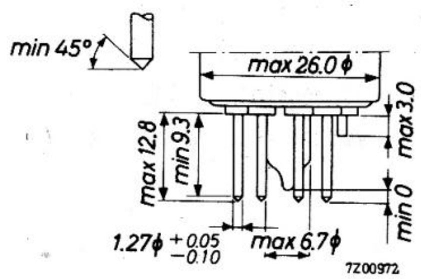
MECHANICAL DATA

Base: JEDEC No. E8-11 Dimensions in mm









FOCUSING magnetic

DEFLECTION magnetic

MOUNTING POSITION :any

NET WEIGHT approx. 65 g

ACCESSORIES

Socket	Cinch No. 54A18088 or equivalent
Focusing and deflection coil assembly	AT1101, AT1102 or equivalent

7Z2 7710

LIMITING VALUES (Absolute max. rating system)
for scanned area of 9.6 mm x 12.8 mm (3/8" x ½") [1]

Grid No.3 and grid No.4 voltage	$V_{g3,g4}$	max.	800	V	
Grid No.2 voltage	V_{g2}	max.	350	V	
Grid No.1 voltage					
Negative bias	$-V_{g1}$	max.	125	V	
Positive bias	$+V_{g1}$	max.	0	V	
Peak heater-cathode voltage					
Heater neg. with respect to cathode	V_{kf_p}	max.	125	V	
Heater pos. with respect to cathode	V_{kf_p}	max.	10	V	
Signal-electrode voltage	V_{a_s}	max.	100	V	[2]
Peak signal-electrode current	$I_{a_{s\,p}}$	max.	0.6	µA	[3]
Faceplate illumination		max.	5000	lux	
Faceplate temperature		max.	80	°C	[4]
Dark current, peak	I_{d_p}	max.	0.25	µA	

[1] "Full-size scanning", i.e. scanning of a 9.6 mm x 12.8 mm area of the photoconductive layer should always be applied. The use of a mask having these dimensions is recommended. Underscanning, i.e. scanning of an area less than 9.6 mm x 12.8 mm may cause permanent damage to the specified full-size area.

[2] The signal-electrode voltage should never exceed 100 V, either during heating-up or stand-by, or during operation. An excessive signal-electrode voltage may cause permanent damage to the photoconductive layer.

[3] Video-amplifiers should be capable of handling signal-electrode currents of this magnitude without amplifier overload or picture distortion.

[4] Absolute maximum for shelf-life and operation. Under difficult environmental conditions a flow of cooling air directed at the faceplate is recommended. When televising flames and furnaces appropriate infra-red filters should be applied.

7Z2 7711

OPERATING CONDITIONS AND PERFORMANCE

For scanned area of 9.6mm x 12.8mm and faceplate temperature of 25-35 °C

PICK-UP FROM LIMITED-MOTION LIVE SCENES

Conditions

Grid No.3 and grid No.4 (beam focus electrode) voltage	250-300	V [1]
Grid No.2 voltage	300	V
Grid No.1 voltage adjusted for sufficient beam current to stabilise highlights		
Peak-to-peak blanking voltage		
when applied to grid No.1	> 75	V
when applied to the cathode	> 20	V [2]
Field strength at centre of focusing coil	40	Oerstedt [3]
Field strength of adjustable alignment coils	0-4	Oerstedt [4]

[1] Beam focus is obtained by the combined effect of the grid No.3 voltage, which should be adjustable over the indicated range and a focusing coil having an average field strength of 40 Oerstedt.
Definition, focus uniformity and picture quality decrease with decreasing grid No.3 voltage. In general, grid No.3 should be operated above 250 V.

[2] In transistorized cameras cathode blanking will be preferable. The cathode impedance is in the order of 30 kΩ.

[3] The polarity of the focusing coil should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.

[4] The alignment coil assembly should be located on the tube so that its centre is at a distance of approx. 94 mm (3 11/16") from the face of the tube and be positioned so that its axis coincides with the axis of the tube, the deflecting yoke and the focusing coil.

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OPERATING CONDITIONS AND PERFORMANCE (continued)

Performance

Signal-electrode voltage for dark current of 0.02 μA	range	20 to 100	V	
	typical	40	V [1]	
Negative grid No.1 voltage for picture cut-off		20-110	V [2]	
Signal output current, faceplate illumination 10 lux	>	0.075	μA [3]	
Resolution capability in picture centre	>	600	lines	[4] [5]
Decay: 10 lux on layer, V_{as} adjusted for dark current of 0.02 μA, residual signal after dark pulse of 200 msec	<	20	%	
Average gamma of transfer characteristic for signal output currents between 0.01 and 0.3 μA	=	0.6		
Visual equivalent signal-to-noise ratio		300:1	[6]	
Spurious signals: Shading		see note 7		
Spots and blemishes		see note 8		

[1] The deflection circuits must provide sufficiently linear scanning for good black-level reproduction. The dark-current signal being proportional to the velocity of scanning, any change in this velocity will produce a black-level error.

[2] With no blanking voltage on grid No.1.

[3] Defined as the component of the signal-electrode current after the dark current has been subtracted.

[4] With a video-amplifier system having 7.5 Mc/s bandwidth (-3 dB points).

[5] A resolution capability of approx. 900 TV lines can be achieved with the grid No.3 and grid No.4 voltage adjusted to 750 V and a focusing field strength of approx. 70 Oerstedt.
With this mode of operation beam-landing errors, resulting in parabolic shading and dark corners, increase.

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(Note 5 continued)

The deflecting and focusing coils should be designed to eliminate these errors. Since higher power requirements for these coils will increase the tube temperature, adequate provisions for cooling should be made.

6) Measured with a peak signal output current of 0.2 μA into a high-gain, cascode-input type of amplifier with an own noise of 0.002 μA r.m.s. and a bandwidth of 5 Mc/s. Because the noise in such a system is predominantly of the high-frequency type, the visual equivalent signal-to-noise ratio is taken as the ratio of the highlight video-signal current to the r.m.s. noise current multiplied by a factor of 3.

7) Target voltage adjusted to obtain a dark current of 0.02 μA. Camera directed towards a uniformly illuminated white background, light level adjusted to produce a signal output current (note 3, page 5) of 0.2 μA. The composite video signal when viewed at horizontal rate on a waveform oscilloscope will fall within an envelope having a width of 50% of the peak signal.

8) Target voltage adjusted to obtain a dark current of 0.02 μA. Camera focused at a uniformity illuminated two-zone test pattern with the centre zone (1) diameter equal to raster height. Light level adjusted to produce a signal output current of 0.2 μA. Scanning amplitudes of rectangular monitor adjusted to obtain a raster with aspect ratio of 3 : 4. Monitor set-up and contrast control adjusted for faint raster when lens of camera is capped, and for non-blooming bright raster when lens of camera is uncapped.
Under the above conditions number and size of the spots observable in the monitor picture will not exceed the limits stated below:

Spot size in % of raster height	Max. number of spots zone 1	Max. number of spots zone 2	To be considered as a black or as a white spot, its contrast ratio must be greater than 2 to 1. Black spots as well as white ones must be counted as spots.
> 1 %	none	none	
1 - 0.6 %	1	3	
0.6 - 0.2 %	4	6	
< 0.2 %	9)	9)	

9) Do not count spots of this size unless concentration causes a smudgy appearance.

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