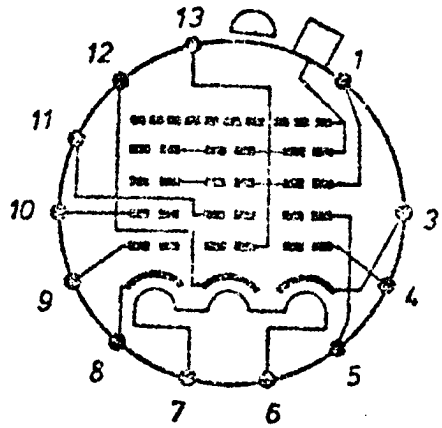
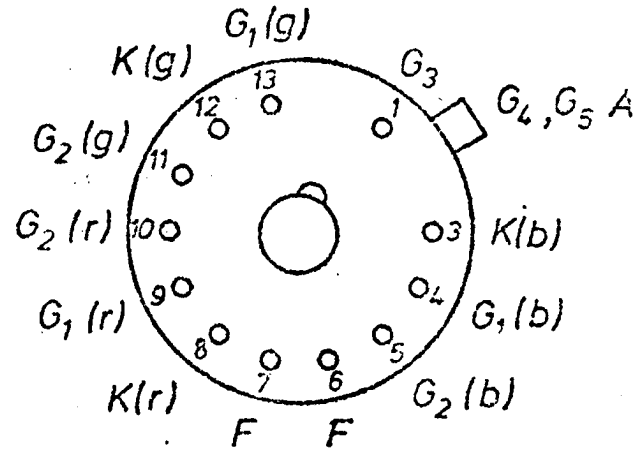
	RECTANGULAR COLOUR PICTURE TUBE	A67-510X 26" -Preliminary-





Technical Data 14 pages.
Alterations reserved.

DESCRIPTION

The ITT-Picture Tube A 67-510 X is a rectangular colour picture tube with 110° deflection angle and 29 mm neck diameter.

The useful screen area of 2100 cm^2 (appr.) has nearly straight sides of 53x40 cm (appr.) with 3x4 aspect ratio. The filterglass of the faceplate has a light transmission of 49,5 % (appr.).

The phosphor screen is composed of triangular dot groups - colour triplets - each consisting of a red-, green- and blue-emitting phosphor dot. The green- and blue-emitting phophors utilize silver activated sulfide phosphors, the red emitting phosphor is composed of yttrium compounds activated with rare-earths.

The tube utilizes three electrostatic-focus guns and is operating according to the shadow mask principle.

The gun axes are tilted slightly towards the tube axis to facilitate convergence to the shadow mask. Beam-convergence and deflection are provided magnetically.

1. MECHANICAL DATA

Bulb	All-glass Type with rectangular Spherical Faceplate Filterglass	
Implosion Protection	Steel-Jacket including Tube Mount	
Minimum Useful Screen Dimensions		
Aspect Ratio 3x4	Diagonal	626 mm
	Horizontal	528 mm
	Vertical	396 mm
Deflection Angles	Diagonal	110°
	Horizontal	97°
	Vertical	77°
Weight	20 kg (appr.)	
Base	JEDEC B 12-260	

ANNEX
ML-TE
CRT75/02-03
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2. ELECTRICAL DATA

2.1. TYPICAL OPERATING CONDITIONS[1)]

Heater Voltage	U_f	6.3[2)]	volts
Heater Current appr.	I_f	730	ma
Anode Voltage	U_{g4g5a}	25,000	volts
Focusing Voltage	U_{g3}	4,200...5,000	volts
Grid-No. 2 Cutoff Voltage[3)4)] (at $(-U_{g1})$ = 105 V)	U_{g2} cutoff	160...445	volts
Grid-No. 1 Cutoff Voltage[4)] (at U_{g2} = 300 V)	$(-U_{g1})$ cutoff	76...162	volts
Heating Time[11)]		(Approx.) 5	s

2.2. MAXIMUM RATINGS[1)]

Anode			
Voltage	U_{g4g5a} max	27,500[6)]	volts
	U_{g4g5a} min	20,000	volts
Current[5)]	I_{g4g5a} max	1,000	µ amps
Focusing Electrode			
Voltage	U_{g3} max	6,000	volts
Grid-No. 2			
Peak Voltage	$U_{g2\ p}$ max	1,000	volts
Grid-No. 1			
Negative Peak Voltage	$(-U_{g1})$ p max	400	volts
Negative Operating Cutoff Value	$(-U_{g1})$ max	200	volts
Positive-Bias Value	U_{g1} max	0	volts
Positive-Peak Value	$U_{g1\ p}$ max	2	volts
Heater/Cathode[8)]			
Voltage[9)]	$U_{-f/k}$ max	450[10)]	volts
	$U_{-f/k}$ max	200	volts
	$U_{-f/k\ p}$ max	200	volts
	$U_{+f/k\ p}$ max	200	volts
	$U_{+f/k}$ max	0	volts

Notes see page 3

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2.3. RATINGS FOR CIRCUIT DESIGN

Leakage current[7]	I_{g3}	$\leq \pm 15$	µ amps
	I_{g2}	$\leq \pm 5$	µ amps
	I_{g1} ($-U_{g1}$ = 150 V)	$\leq \pm 5$	µ amps

NOTES FOR PAGE 2 AND 3

1) For grid drive service. Voltage values are for each gun and refer to cathode potential.

2) Maximum heater voltage tolerance of ± 10 % is admissible. For maximum cathode life, it is recommended to regulate heater supply to 6.3 volts.

3) Maximum ratio of Grid-No. 2 cutoff voltages, Highest Gun to Lowest Gun in any tube will not exceed the value of 1.86 at the same Grid-No. 1 voltage.

4) Visual extinction of focused spot (see Cutoff Design Chart p. 8).

Relation: Line cutoff = Spot cutoff x 1.01 + 1 volts

Raster cutoff = Spot cutoff x 1.05 + 7 volts

5) Due to a higher total anode current of longer duration, deformation of the shadow mask may be effected, causing colour impurities. To avoid this effect, a limitation of the total anode current to 1.5 ma is practically sufficient.

6) Design-Maximum Rating should not be exceeded under the worst probable operating conditions.

7) These values indicate the permissible leakage currents of the electrodes concerned. The circuit must be designed in such a manner that the voltages applied are not substantially altered by these currents.

8) The equipment should be designed mechanically and electrically so that in consequence of an internal arc no power sources allone or in combination will cause a discharge current across the heater exceeding 750 ma.
Such current limitation will prevent heater burnout.

9) To avoid picture distortions, the interference from the heater must be kept as low as possible. Therefore, the AC voltage between heater and cathode shall not exceed the value $U_{f/k\ rms}$ = 20 volts.

10) During warm-up period not exceeding 15 seconds $U_{-f/k\ max}$ may increase to 450 volts; within 15 and 45 seconds this value must decrease at least gradually to 200 volts.

11) By using a short time heater cathode the picture will appear in 5 seconds approx., when applying a constant heater voltage.

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2.4. CAPACITANCES (Appr.)

Grid-No. 1 of any gun to all other electrodes	c_{g1}	3,8	pF
Cathode of any gun to all other electrodes	c_k	6,3	pF
Grid-No. 3 to all other electrodes	c_{g3}	2,6	pF
Anode to external conductive coating	$c_{g4g5a/m\ max}$	2,500	pF
	$c_{g4g5a/m\ min}$	2,000	pF
Anode to steel-reinforcement	$c_{g4g5a/m'}$	450	pF

3. OPTICAL DATA

Faceplate: Filterglass
Light Transmission (appr.) 49,5 %

Screen: Aspect Ratio 3x4.
Three separate phosphor dots - Colourtriplets - arranged in Triangular groups, aluminized.
Spacing between centres of adjacent Triplets nearest centre of screen 0.66 mm

Colour dot Coordinates	x	y
Red	0.630	0.340
Green	0.300	0.600
Blue	0.150	0.060
Coordinates for White	0.281	0.311

Average percentage of total cathode current to produce White

Red	34 %
Green	34 %
Blue	32 %

Ratio of cathode currents for White

Red to Green	1.0	(0.65...1.5)
Red to Blue	1.1.	(0.75...1.5)
Blue to Green	0.9	(0.6....1.3)

4. GENERAL CONSIDERATIONS

X-RADIATION

At the maximum permissible anode voltage of 27.5 kilovolts and a total anode current of 1.0 milliamps, X-Radiation will not exceed the permissible value of 0.5 mR/h.

MOUNTING INFORMATION

Orientation
The tube must be operated with the tube axis in a horizontal position and with the blue gun up. This is the operating position to which refer the specified beam displacement and convergence correction values.
The deflecting yoke should not be used for supporting the picture tube.

Socket
Socket should not be rigidly mounted but connected by flexible leads. The base may be located within a circle of 51 mm diameter, concentric with the perpendicular line through the centre of screen.

Steel-reinforcement
Mounting angles of the steel-jacket may be used for fixing the tube in the receiver. Corresponding data see drawing p. 12.

External conductive coating
Contact to the external conductive coating should be made by multiple fingers to prevent localized overheating.

Steel jacket and external conductive coating are separated galvanically against each other. They may be connected mutually if it is allowed by the effective safety rules.

The impedance between steel jacket and external conductive coating must not exceed 1 MΩ at 50 Hz and 5 kΩ at 15 kHz.

Anode contact
The area round the anode contact is coated with water-repellent insulating layer, to clean it wipe only with soft dry lintless cloth.

5. APPLICATION DATA

Reference potential
Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode.

Focusing Electrode
Focusing voltage for optimum focus is 17...20 % of anode voltage.

Low voltage adjustment
Grid-No. 2 and Grid-No. 1 voltages for visual extinction of focused spot are shown in the Cutoff Design Chart p. 8.

Beam landing correction
In spite of internal magnetic shield and due to manufacturing variations which may produce misregister, it is necessary for pure colour operation to correct for remaining magnetic effects and for manufacturing variations by an additional static magnetic field (purifying magnet).

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Displacements, measured at centre of screen:

Raster displacement:	max	12 mm
Lateral convergence displacement:		
blue beam with respect to converged red and green beams	max ±	5 mm
Radial convergence displacement:		
excluding effects of dynamic convergence (each beam)	max ±	8 mm

The additional deflecting components may be arranged according to the drawing on page 14.

Grounding
The external conductive coating is to connect with the negative high voltage terminal.

Arc-over protection
In order to minimize the possibility of tube damage caused by an internal arc, it is recommended to limit the high voltage power for anode and grid-No. 3 and to apply protective gaps.

Maximum ratings
The network is to lay out in such a manner that the tabulated data should not be exceeded during life, even under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation or signal and environmental conditions. The high voltage limiting values are of absolute maximum rating type, which are not to exceed initially and throughout life.
The picture tube must not be connected until the high tension has been adjusted within the limiting values.

6. COMPONENT CONSIDERATIONS

Deflecting yoke
The deflecting yoke should not be used for supporting the picture tube. The yoke must be free to move along the neck for a distance of approximately 1.5 cm to enable adjustment of colour purity. The yoke mount should also provide for a small amount of rotational adjustment. Raster may be adjusted by superposition of a DC current of suitable size to the deflecting current within each coil. Pincushion correction may be accomplished by adding the necessary current waveforms to the deflecting current waveforms.

Purifying magnet
The purifying magnet is used to compensate for the effects of uniform extraneous magnetic fields which may affect register. The purifying magnet should be located on the neck according to the instructions shown on p.14. The device should provide a magnetic field perpendicular to the tube axis. The field should be adjustable in magnitude and direction to cause a change of register.

Magnetic shield
The tube is equipped with an internal magnetic metal shield to minimize effects of interferring extraneous magnetic fields. To be effective, the shield and shadow mask must be degaussed. This may be done automatically by means of a degaussing coil when the equipment is switched on.

For optimum degaussing it is necessary to delay the start of vertical deflection until the degaussing current has died out completely. Otherwise an interference of the field for degaussing and a stray field of vertical deflection (deflection yoke) may impress an indefinite magnetical condition to the tube.

Radial converging assembly
The radial converging assembly and associated circuits provide the magnetic fields necessary to converge dynamically the three electron beams as they traverse the screen of the picture tube, and together with the lateral converging magnet it provides the magnetic fields necessary for static convergence. The assembly is mounted on the neck of the picture tube with the three electromagnets centered over the three pairs of internal converging pole pieces. The necessary horizontal and vertical current waveforms are passed through the windings for maintaining convergence of the deflected beams. Static magnetic fields for converging the three beams at the center of the screen are produced by passing direct current through the windings or by permanent magnets with variable intensity or by combination of both.

Lateral converging device
The lateral converging magnet supplements the correction supplied by the radial converging assembly in statically converging the three electron beams at the center of the screen.

The magnetic field should cause a lateral (horizontal) movement of the blue beam opposite to the movement of the converged red and green beams. The magnetic field strength should be adjustable to provide correction of specified tolerance values.

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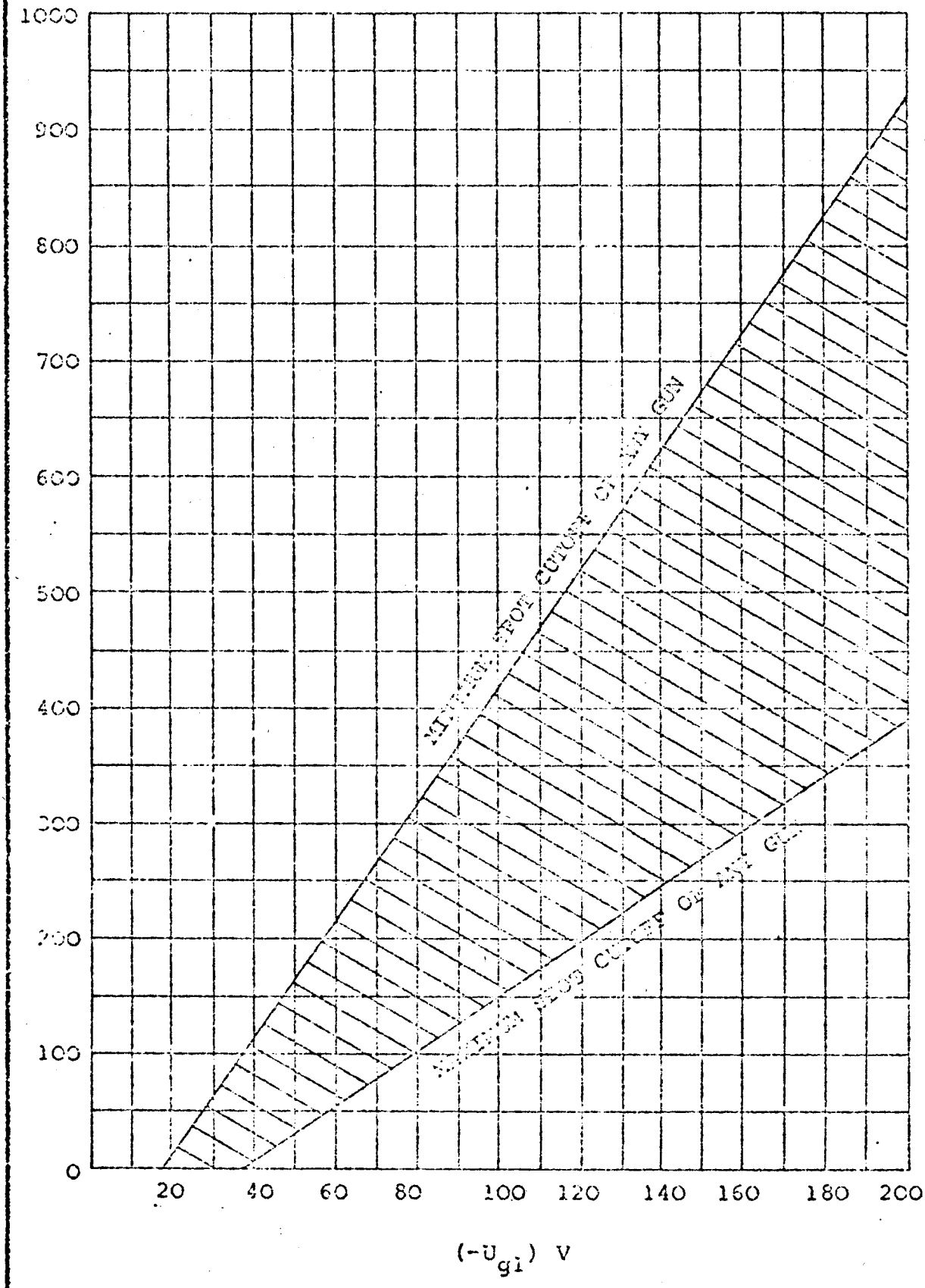
CUTOFF DESIGN CHART

U_{g4g5a} = 20...27.5 kV

U_{g3} ADJUSTED FOR FOCUS



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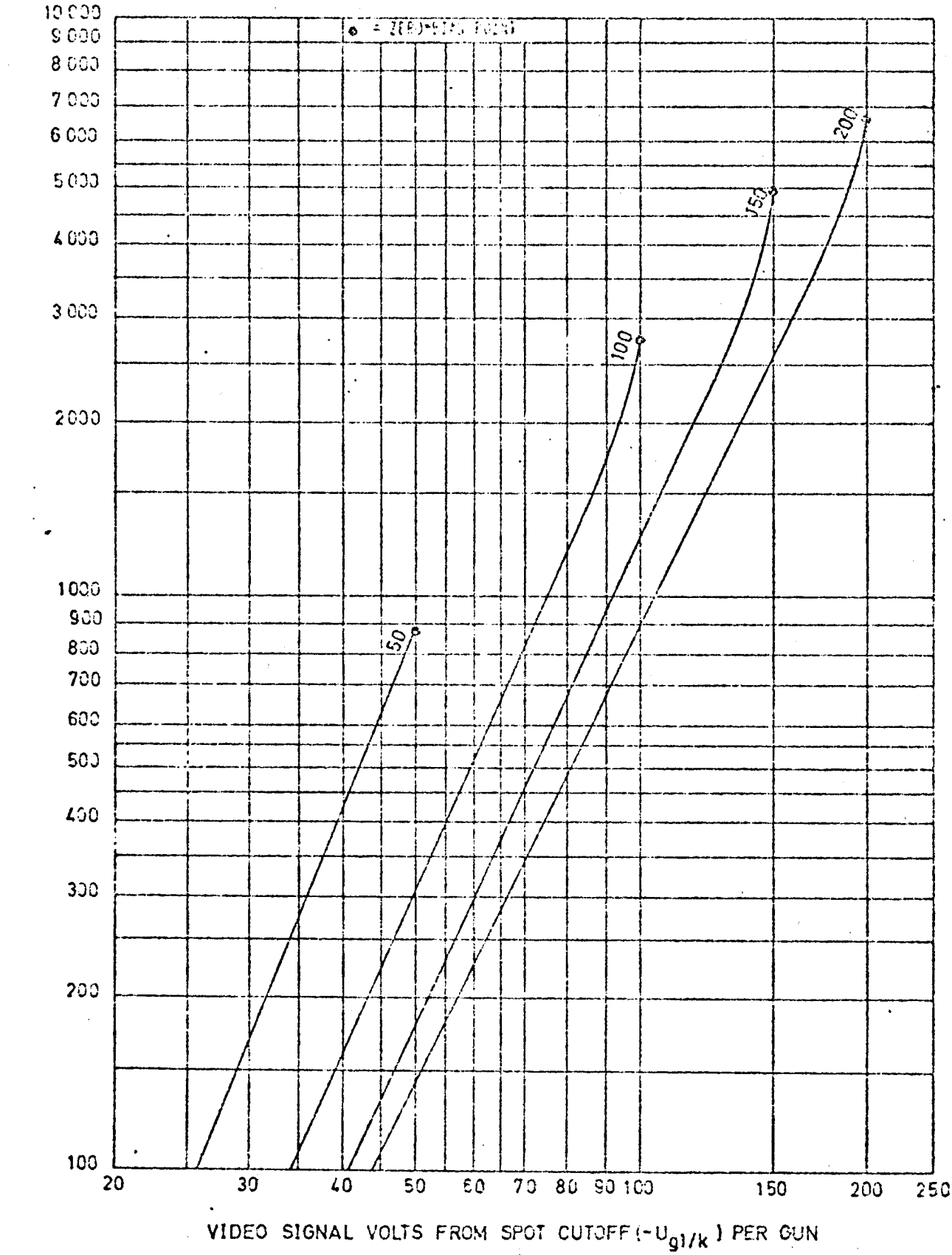
U_f = 6,3 V

$U^f_{c4g5a/k}$ = 20...27,5 kV

$U_{g3/k}$ ADJUSTED FOR FOCUS

$U_{g2/k}$ ADJUSTED FOR EACH GUN TO PROVIDE SPOT CUTOFF FOR DESIRED FIXED ($-U_{g1/k}$)

PARAMETER: CUTOFF VOLTAGE 50, 100, 150, 200 V



CATHODE - DRIVE CHARACTERISTIC

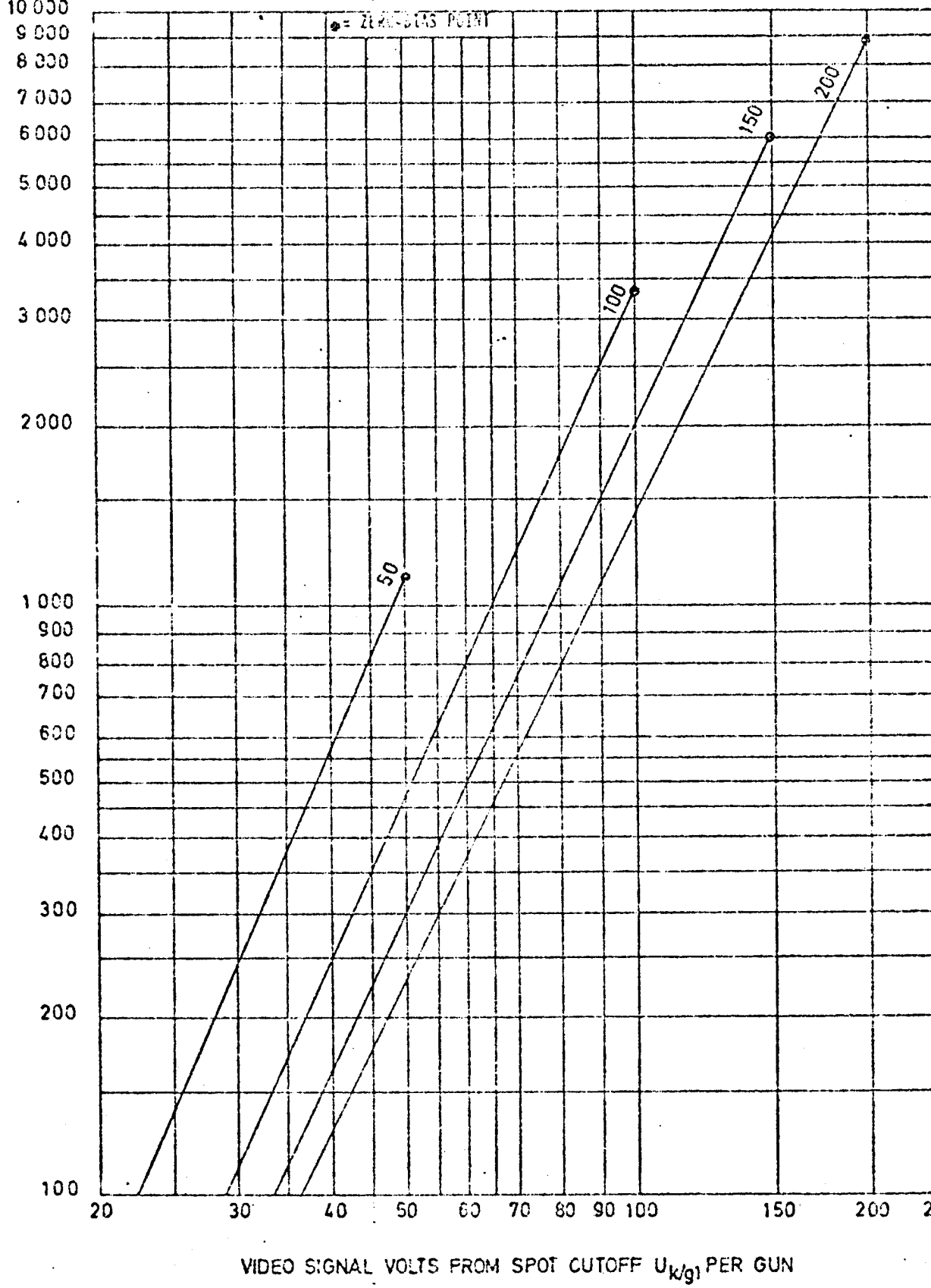
U_f = 6,3 V

$U_{g4/g3a/g1}$ = 20...27,5 kV

$U_{g3/g1}$ ADJUSTED FOR FOCUS

$U_{g2/g1}$ ADJUSTED FOR EACH GUN TO PROVIDE SPOT CUTOFF FOR DESIRED FIXED $U_{k/g1}$

PARAMETER: CUTOFF VOLTAGE 50, 100, 150, 200 V



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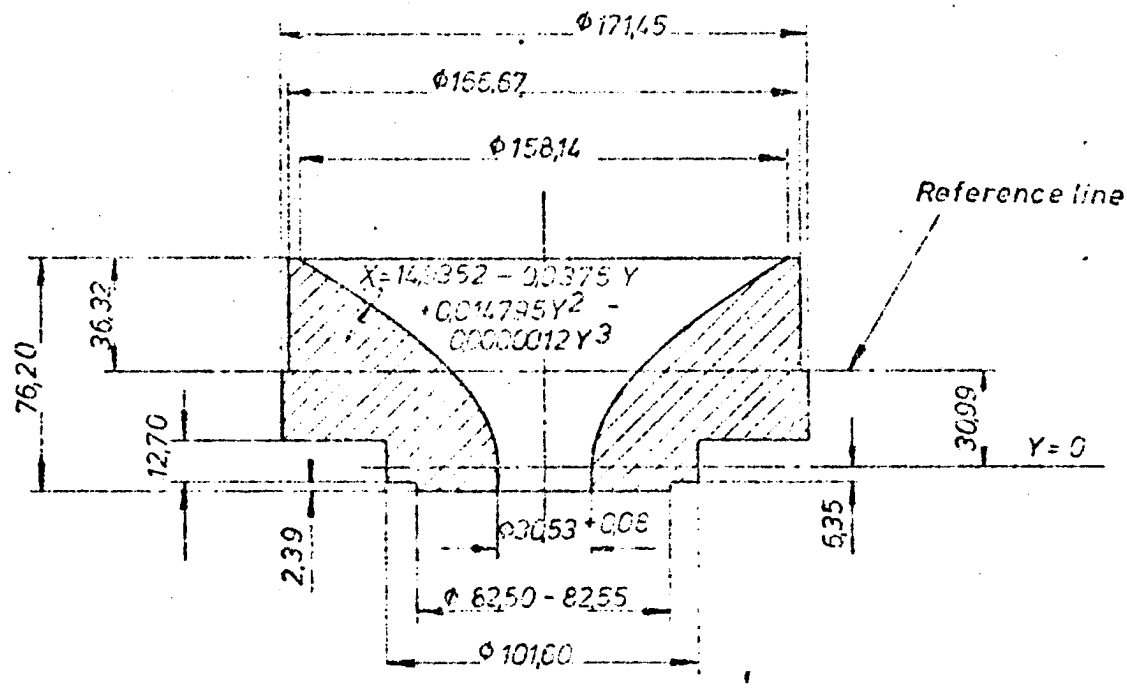

Reference - Line and Neck-Funnel-Contour Gauge

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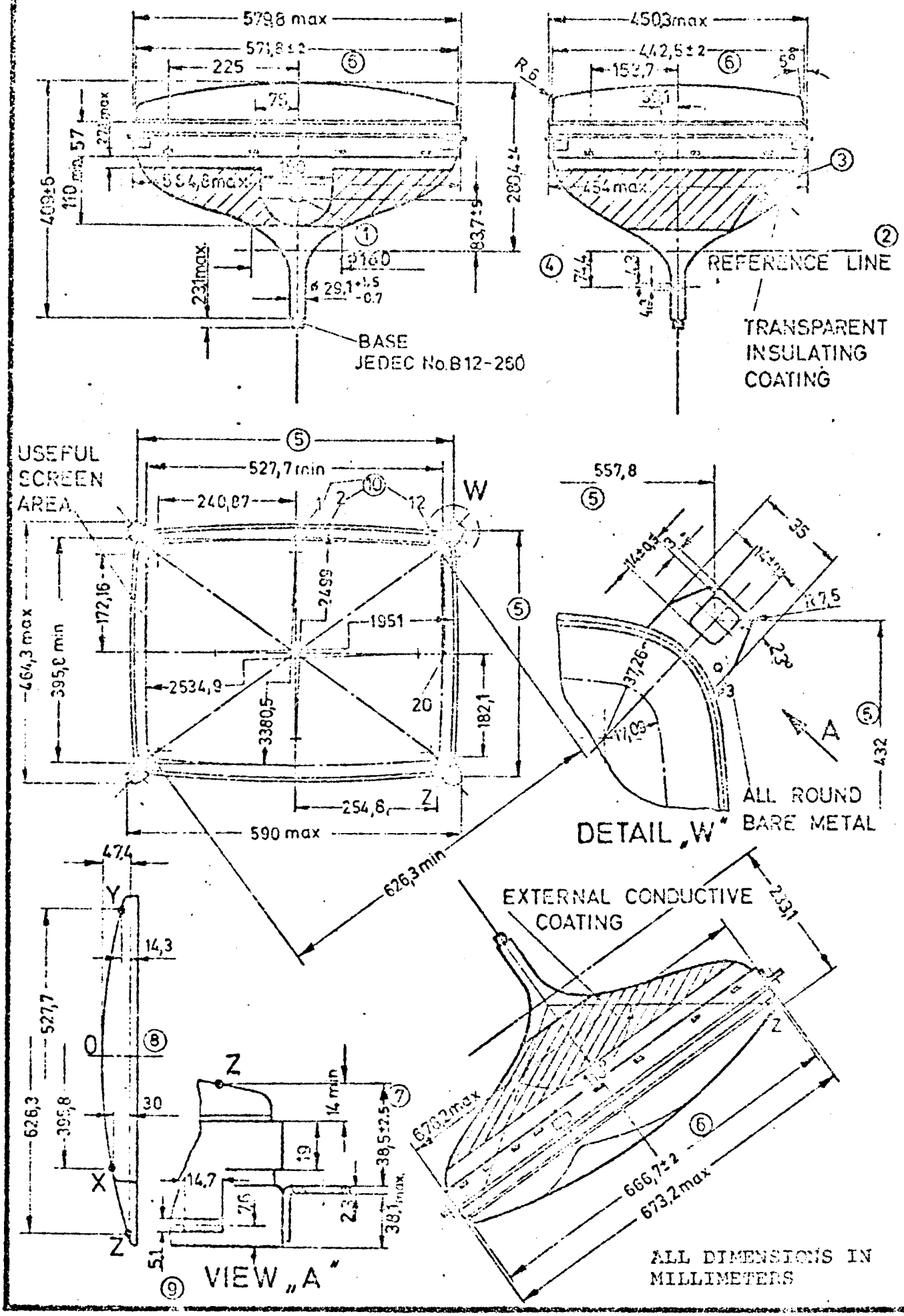

579,8 max
571,8±2
225
79
409±5
110 min
57
22,2max
384,8max
231max
R160
ø 29,1 +1,5 -0,7
283,7±5
BASE
JEDEC No.B12-260
450,3max
442,5±2
152,7
55,1
5°
R6
454max
REFERENCE LINE
TRANSPARENT
INSULATING
COATING
USEFUL
SCREEN
AREA
527,7min
240,87
W
464,3 max
395,8 min
172,16
2499
1951
2534,9
3380,5
20
182,1
254,8
Z
590 max
626,3min
557,8
35
14±0,5
3
R7,5
23°
37,26°
17,05
A
432
ALL ROUND
BARE METAL
DETAIL „W"
47,4
Y
14,3
527,7
626,3
395,8
30
X
Z
VIEW „A"
51
14 min
38,5±2,5
19
14,7
26
23
38,1max
EXTERNAL CONDUCTIVE
COATING
293,1
673,2max
666,7±2
673,2max
ALL DIMENSIONS IN
MILLIMETERS

NOTES for page 12

1) Cavity cap IEC 67-III-2, JEDEC No. J1-21.

2) Reference line is determined by plane c-c' when gauge is seated against the funnel (s. p.11).

3) This area is free of conductive coating.

4) Location of internal radial-converging pole pieces.

5) For mounting bolts a free passage of at least 9.5 mm diameter at nominal position is ensured.

6) Bulb measure at the front edge of implosion-protection.

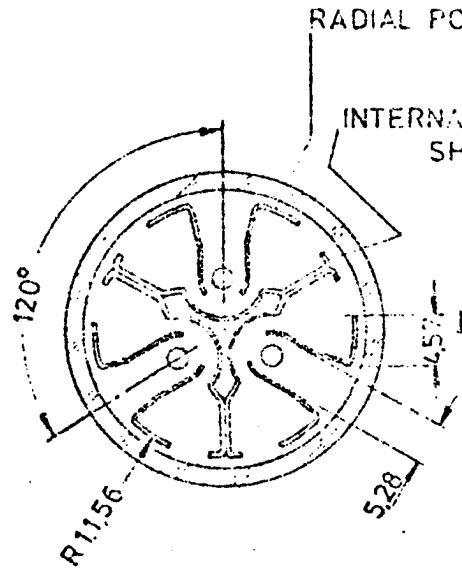
7) Maximum deviation between one screenside angle-seating and a plane through the other three angle seating will not exceed 2 mm.

8) The points "Z" are reference points for the location concerning the altitude of the points "X" and "Y".
The dimensions for the location of the points "X", "Y" and "Z" count also for the border line of the minimum useful screen area.

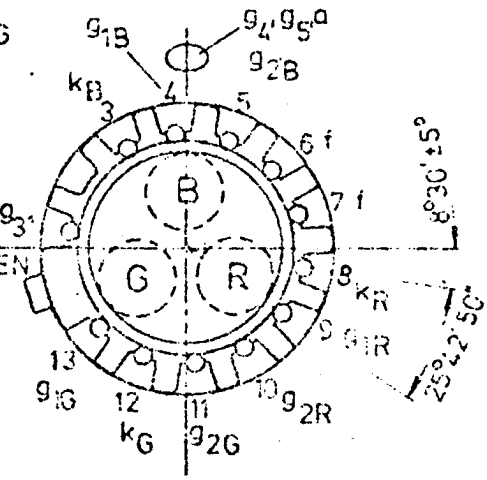
9) Mounting holes for degaussing coils.

10) Panel contour.
Sagittal Heights with reference to centerface at points 3,2 beyond edge of min. screen.

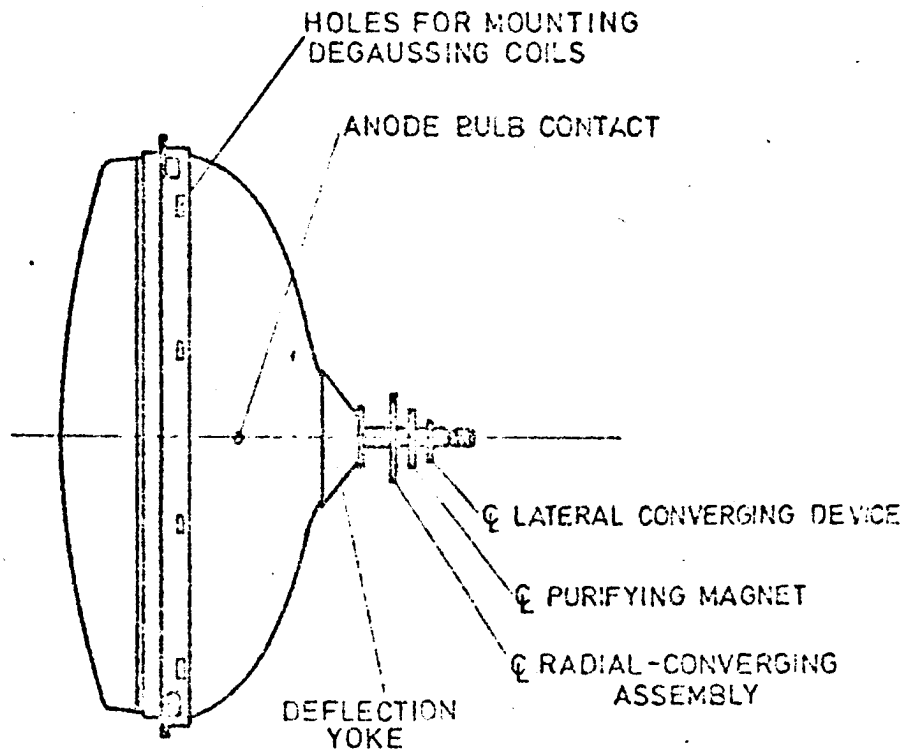
Station No.	Coordinates great axis	small axis	Sagittal height
1	0	201,07	17,91
2	25,40	200,96	18,21
3	50,80	200,69	19,18
4	76,20	200,20	20,73
5	101,60	199,54	22,91
6	127,00	198,68	27,99
7	152,40	197,64	29,11
8	177,80	196,39	33,12
9	203,20	194,87	37,74
10	228,60	193,34	43,00
11	242,32	192,38	46,10
12	(diagonal) 257,35	183,95	48,34
13	261,09	173,53	47,40
14	262,46	152,40	44,32
15	263,86	127,00	41,15
16	265,00	101,60	38,53
17.	265,89	76,20	36,50
18	266,52	50,80	35,05
19	266,90	25,40	34,16
20	267,03	0	33,86



LOCATION OF RADIAL-CONVERGING POLE PIECES



BOTTOM VIEW OF BASE



RELATIVE PLACEMENT OF TYPICAL COMPONENTS

DIMENSIONS IN MILLIMETERS