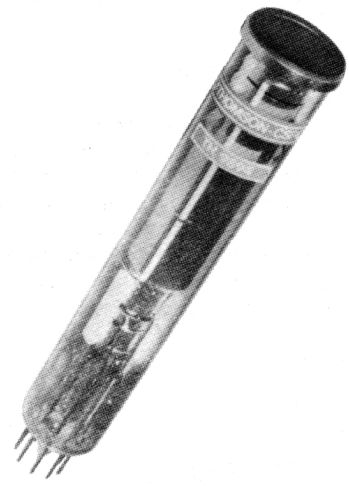
TH 9894
X RAY SENSITIVE 1" VIDICON

- ELECTROMAGNETIC FOCUS AND DEFLECTION
- HIGH RESOLUTION
- LOW LAG

The TH 9894 is a 1" magnetic focus and deflection X-ray sensitive Vidicon. It is intented for non destructive testing of components and assemblies by displaying an image of their structure on a T.V. monitor through direct conversion of X-ray incident on the faceplate into a video signal. It enables instantaneous inspection of stationary or in-motion phenomena.



The beryllium input window allows reduction of energy absorption : for 50 kV X-radiation, the absorption is about 4 %.

The operating principle of the TH 9894 is strictly similar to that of a conventional Vidicon with post-acceleration.

The electron beam is focused and deflected magnetically and collimated by the final grid so as to obtain a good uniformity of stabilization potential.

The limiting resolution is near to 35 lp/mm which corresponds to a dimension of the smallest detectable element of 15 to 20 μm.

A special design layer permits to obtain remarkable characteristics : for 50 V applied to the signal electrode, the dark current is about 3 nA. This value is sufficiently low so that its space variation does not introduce parasitic effect impairing the observation of low contrasts.

The characteristics of the TH 9894 make possible the design of inspection T.V. equipments with small focal spot X-ray sources.

This technique is of a great importance in many fields such as industrial applications (X radiation of high energy) medicine and biology (X radiation of low energy).

Detection characteristics

The spectrum of X-radiation, within which the tube can be used is that obtained from 8 to 200 kVp generator.

The detection power can be defined in the following way, with a fine spot source at 200 mm from the faceplate :

1 - Detection of 0.50 mm diameter hole in a 0.25 mm thick aluminum penetrameter placed on 10 mm thick aluminum.

2 - Resolution of 500 mesh stainless steel 25 μm thick wire screen.

TH 9894 tube due to the low lag layer is capable of monitoring stationary and in-motion phenomena, with a speed of about 2 mm/s relative to the faceplate. In this condition 250 mesh wire can be detected.

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GENERAL CHARACTERISTICS

Electrical

Heating	for unipotential cathode indirectly heated	
Heater : - Voltage	6.3 ± 10 %	V
- Current	0.15	A
Minimum preheating time	60	s
Output capacitance : Target to all other electrodes	4.5	pF
Deflecting method	Magnetic	
Focusing method	Magnetic	

Mechanical

Base	Ditetrar 8 pins (JEDEC N° E8-11)	
Socket	METOX N° 30.250	
Deflecting yoke	GERHARD	
Dimensions	See drawing	
Photoconductive layer :		
- normal dimensions of image on target	12.7 x 9.5	mm
- maximum useful diagonal diameter (4 x 3 aspect ratio)	17	mm
- orientation scan parallel to the plane passing through the tube axis and short index pin.		
Maximum temperature of faceplate	60	°C
Operating position	Any	
Net weight, approximate	60	g

OPERATING CONDITIONS

Maximum ratings

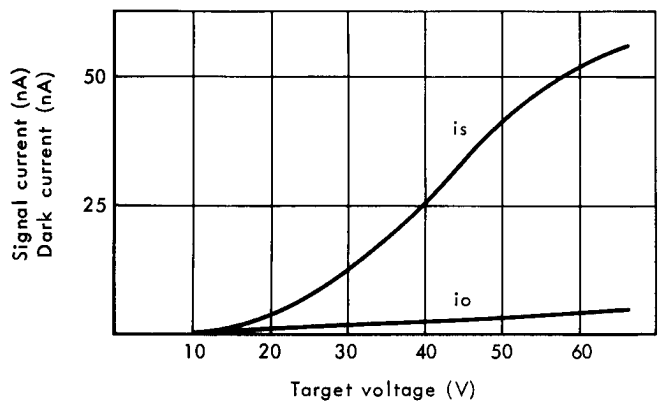
Scanned area 12.7 x 9.5 mm

Electrode g4 voltage (field electrode)	1000	V
Electrode g3 voltage (wall electrode)	1000	V
Electrode g2 voltage (accelerator)	700	V
Electrode g1 voltage (cut-off) :		
- negative bias value	125	V
- positive bias value	0	V
Signal electrode voltage	50	V
Dark current	5	nA
Peak output current	0.2	µA
Faceplate :		
- incident radiation	5000	R/mn
- temperature	45	°C

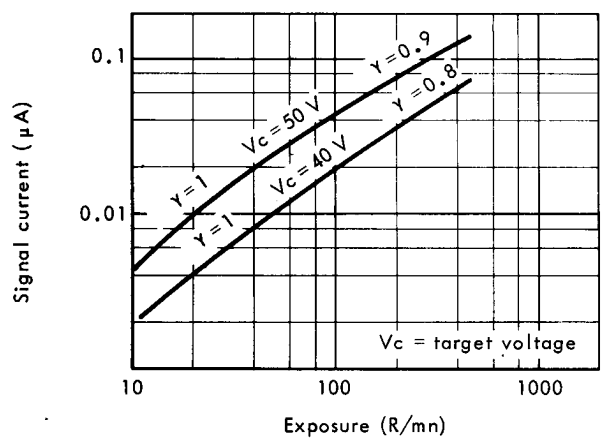
Typical operation

Scanned area 12.7 x 9.5 mm
Temperature of faceplate 25°C

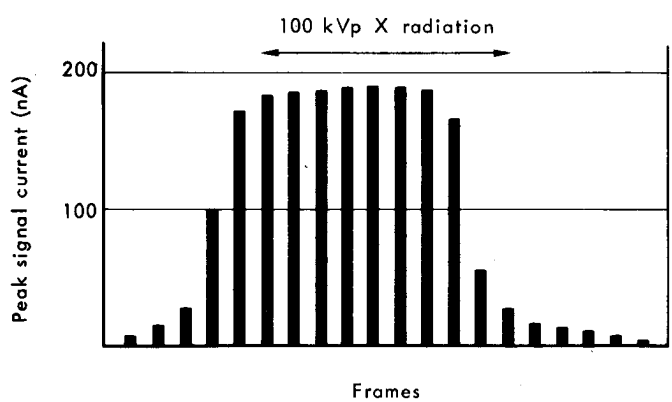
Electrode g4 voltage	750	V
Electrode g3 voltage	450	V
Electrode g2 voltage	300	V
Electrode g1 voltage	−45 to −110	V
Average gamma	0.95	
Minimum peak to peak blanking voltage :		
- applied to electrode g1	−75	V
- applied to cathode	+20	V
Axial magnetic focus field	50 ± 2	Gauss
Deflection peak current :		
- horizontal	200	mA
- vertical	24	mA
Alignment field	0 to 4	Gauss



SIGNAL AND DARK CURRENT CHARACTERISTICS



100 kVp X RADIATION ON FACEPLATE



VARIATION OF SIGNAL CURRENT WHEN EXCITATION IS ETABLISHED AND SUPPRESSED

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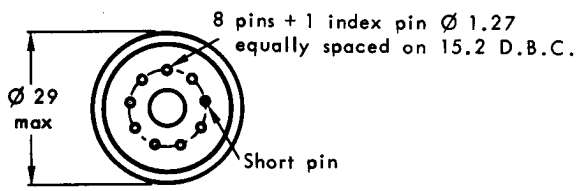
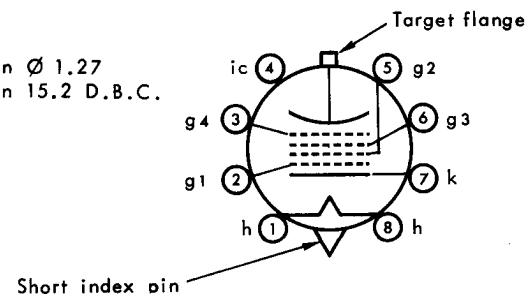
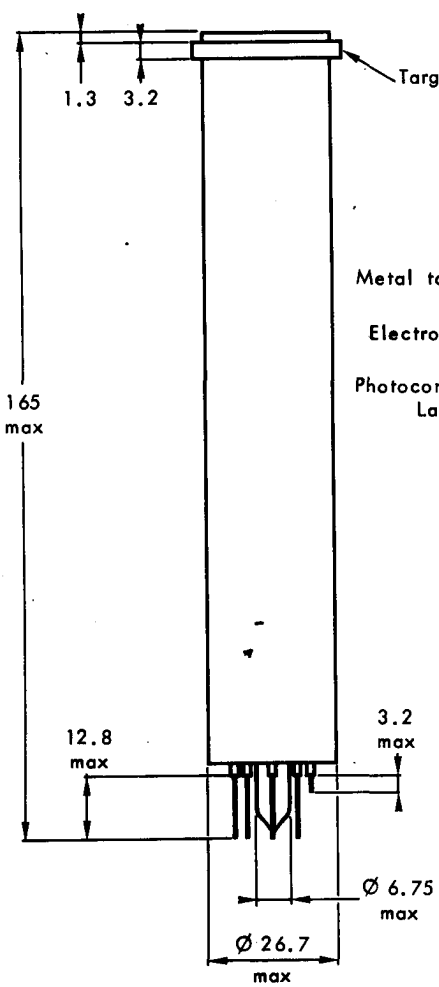
OUTLINE DRAWING

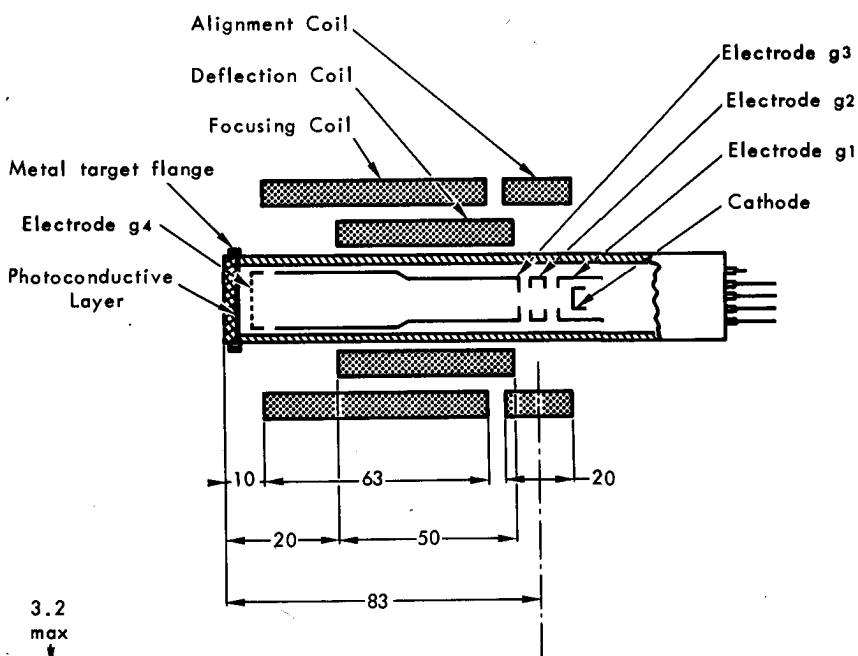


BASING DIAGRAM



1 - Heater	5 - Electrode g2
2 - Electrode g1	6 - Electrode g3
3 - Electrode g4	7 - Cathode
4 - Internal connection	8 - Heater





Optimum locating of the tube inside the deflecting - focusing - alignment components

Dimensions in mm.