

6914 (D 16)

INFRA-RED IMAGE CONVERTER TUBE

- SMALL SIZE
- ELECTROSTATIC SELF-FOCUSING
- MONOVOLTAGE
- HIGH RESOLUTION
- S 1 PHOTOCATHODE
- NIGHT VISION

The 6914 (D 16) is a monovoltage type, self-focusing image converter tube used in infra-red viewing system to convert near infra-red radiation to visible light.

The infra-red image is focused by means of an optical objective onto the photocathode of the tube which converts incident radiation into electrons. These electrons are electrostatically accelerated and focused onto the fluorescent screen and the image produced on the viewing screen may be viewed through an optical magnifier. The tube has a typical center resolution of 40 line pairs/mm and a typical peripheral resolution of 15 line pairs/mm.

The tube is self-focusing and requires only 16 kV high voltage supply.

Features of the 6914 include small size and weight, low power requirements, good shock and vibrations characteristics, making it very useful in portable equipments.



GENERAL CHARACTERISTICS

Mechanical

Operating position	any
Overall length	74.4 mm
Greatest diameter	48 mm
Weight, approximate	105 g

Electrical

Focusing method	electrostatic
Nominal tube voltage	16 kV
Direct interelectrode capacitance, approximate	5 pF

Optical

Photocathode :	
- Type	S1
- Peak spectral response	800 ± 100 nm
- Limit spectral response	1200 nm
- Minimum useful diameter	25.4 mm
Fluorescent screen :	
- Type	P 20 aluminized
- Minimum useful diameter	21.8 mm
- Fluorescence	Yellow-green
- Phosphorescence	Yellow-green
- Persistence	Medium-short



MAXIMUM RATINGS

(Absolute values)

Anode voltage			
- continuous operation	max.	17 000	V
-	min.	10 000	V
- intermittent operation (max. duration 10 s)	max.	18 000	V
Photocathode current at nominal voltage (note 1)			
- average (continuous operation)	max.	0.35	μA
- peak (intermittent operation) (note 2)	max.	3.5	μA
Maximum allowed photocathode illumination level for I.R. filtered (I.R.F.)			
- continuous operation	max.	10	lux
- intermittent operation (note 2)	max.	300	lux
Ambient temperature range (see operational instructions)			
- storage	max.	+ 68	$^{\circ}\text{C}$
	min.	- 54	$^{\circ}\text{C}$
- operating	max.	+ 50	$^{\circ}\text{C}$
	min.	- 32	$^{\circ}\text{C}$

OPERATING CHARACTERISTICS

Test conditions			
- Ambient temperature	20 ± 5	$^{\circ}\text{C}$	
- Anode voltage	16 000	V	
- Anode circuit resistance	100	$\text{M}\Omega$	
- Color temperature of unfiltered radiation source	2854	$^{\circ}\text{K}$	

Performances	min.	typical	max.	
Conversion index (note 3)	15	30	-	
Conversion factor (note 4)	0.6	1.2	-	Cd/lm
Resolution (note 5)				
- at center	25	40	-	lp/mm
- peripheral	12	15	-	lp/mm
Electronoptical magnification (note 6)				
- at center (note 7) Mc	0.735	-	0.785	
- peripheral (note 8) Mp	-	-	-	
Distortion (note 9)	8.5	-	12.5	%
Dark current	-	-	0.02	μA
Back ground equivalent illumination (note 10)	-	0.004	0.025	lux I.R.F.



NOTES

- 1 - For the whole photocathode area.
- 2 - Assuming duration shorter than 2 mn and not repeated more than ten times during tube life.
- 3 - $C.I. = \frac{F_e}{F_i T}$ where.
 F_e = total luminous flux in lumen emitted by the viewing screen.
 F_i = unfiltered luminous flux (2854 °K tungsten lamp) in lumen, incident on the photocathode.
 T = filter transmittance of infra-red standard filter (E.I.A.) CS 94 (Corning type n° 2540, Melt n° 1613) of 2.61 mm thickness
- 4 - $L = \frac{J_e}{F_i}$ where J_e is the luminous intensity of the viewing screen.
- 5 - Center resolution : in a 1/6 useful minimum diameter concentric circle on photocathode.
Peripheral resolution : between a 1/6 minimal useful diameter, and 1/2 useful minimum diameter concentric circles on photocathode.
- 6 - Magnification is defined as the ratio of the separation of the two image lines to the separation of corresponding object lines, the latter being located on a diameter and equidistant from the tube axis.
- 7 - Center magnification shall be measured with a separation of object lines of 1/6 of the useful minimum photocathode diameter.
- 8 - Peripheral magnification shall be measured with a separation of object lines of 4/5 of the useful minimum photocathode diameter.
- 9 - Percentage distortion shall be determined by the following formula
$$D = \frac{M_p - M_c}{M_c} \times 100$$
- 10 - This is the value of equivalent input illumination (I.R.F.) required to give an increase of luminance on the screen equal to the background luminance.

ENVIRONMENTAL TESTS

(in accordance with MIL - E - 1/1049 D)

The image converter 6914 is designed to withstand the following non operational, environmental tests. After completion of those tests tubes will meet the performances specified under operating characteristics.

Thermal test

The tube shall be subjected to a temperature cycling with extremal values, +68 °C and -54 °C and held at these limits for at least 1 hour.

Vibration test

The tube shall be rigidly mounted in a vertical position with photocathode end up and subjected to ;

- 1 - A sinusoidal vibration having an amplitude of 1.5 mm, at a frequency of 30 Hz, for a period of 2.1/2 minutes.
- 2 - A sinusoidal vibration having an amplitude of 1.0 mm, at a frequency of 50 Hz, for a period of 2 minutes.

Shock test

The tube shall be subjected to a 75 g peak half-sine shock with six shock pulses parallel to, and six shock pulses perpendicular to, its longitudinal axis. The duration of each shock pulse should be 6 ms ± 2 ms.


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OPERATIONAL INSTRUCTIONS

Temperature

Storage temperature should not exceed 68 °C. The period the tube is submitted to this limit temperature must be as short as possible. Failure to follow this recommendation would result in decreasing life and sensitivity of the tube due to partial deterioration of photocathode.

Incident radiation level

It is recommended not to expose the photocathode to high intensity radiation such as direct sun radiation even when no voltage is applied on (for instance during transport and handling).

During operation, radiation level should not exceed the maximum values given in characteristics data.

Amounting arrangement

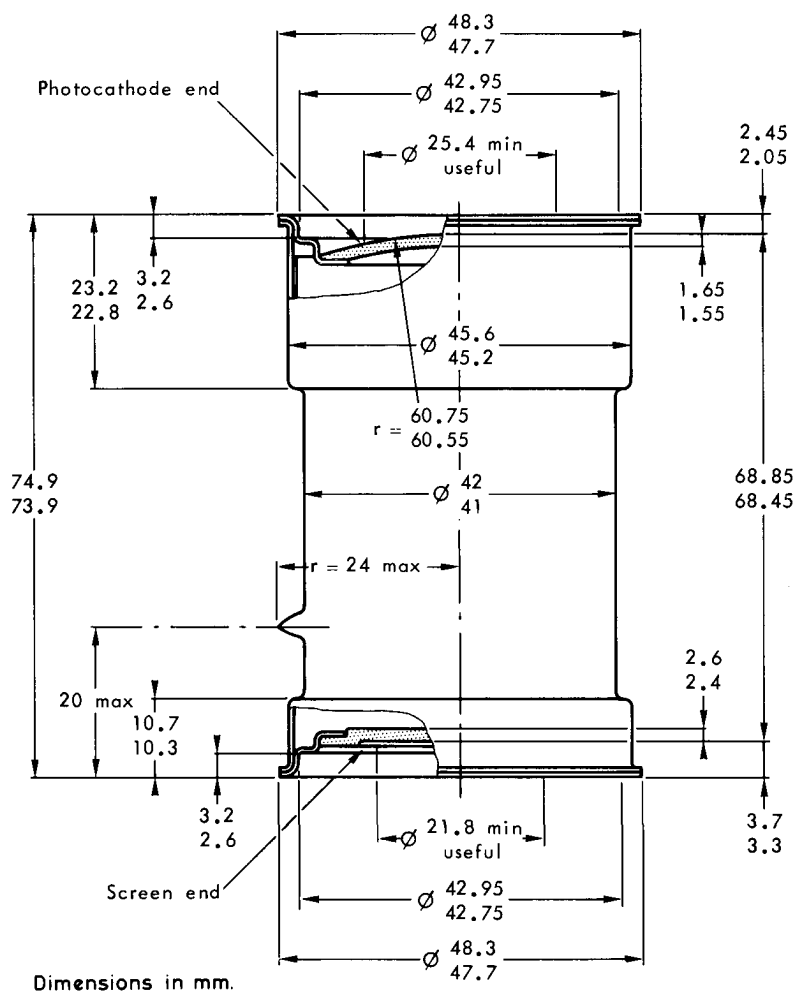
Amounting arrangement for the tube may be provided by clamp arrangement on either end. Avoid mechanical efforts which should damage the glass metal seals.

Power supply

Voltage should be applied to the tube through the metal rings located at both end of the tube. Connections to the terminals of the tube must not be soldered but should be made by either spring clips or clamps.

The source positive terminal must be connected to screen end ring, ground connection may be made to either ring.

Outline drawing



Spectral sensitivity of the photocathode

