

EXTREME ENVIRONMENT NON-BURN IMAGE ORTHICON TYPE WL-7198A

The WL-7198A image orthicon is a non-burn image orthicon, that is completely environmentally adapted to military applications, having high sensitivity and resolution. The WL-7198A is both mechanically and electrically interchangeable with the WL-7198 and will operate in any commercially available image orthicon camera.

The WL-7198A ruggedized design will permit operation in airborne equipment and other applications where a reliable and environmentally adapted tube is required. This tube will pass MIL-E-5272 vibration, shock, temperature and humidity specifications as detailed in data. The WL-7198A has an S-10 photosurface and the proven long-life target of the WL-7611.

This special target, developed by Westinghouse, is essentially free of after-image or picture-sticking and raster-burn throughout life when operating in the temperature range of 40 to 55°C. Resolution and gray-scale are equal to or better than the WL-7198.

In the first 50 hours of use, the WL-7198A can be cleared of target burns created by exposure of 3×10^{-3} foot candles maximum photocathode illumination for periods up to 1 hour duration.

The WL-7198A has a spectral response comparable to that of the human eye. Good grey-scale rendition of colors is possible inasmuch as it is insensitive to infrared rays which would otherwise cause color masking.

ELECTRICAL:

Cathode	Coated Unipotential
Heater:	
Voltage (ac or dc)	6.3 ± 10% Volts
Current	0.6 Amperes
Direct Interelectrode Capacitance:	
Anode to all other Electrodes	12 uuf
Photocathode	Semitransparent
Response (See Spectral Response Compared With Human Eye). Rectangular Image (4x3 aspect ratio):	
Useful Size of	1.6" max. Diagonal
Focusing Method	Magnetic
Deflection Method	Magnetic

MECHANICAL:

Overall Length	15-3/16" ± 1/4"
Greatest Diameter of Bulb	3" ± 1/16"
Shoulder Base	Keyed Jumbo Annular 7-Pin
End Base	Small Shell Diheptal 14-Pin (JETEC B14-45)
Operating Position Recommended	Tube axis not less than 20° from the vertical with faceplate down
Weight (approx.)	1 lb., 6 oz.
Min. Deflecting-Coil Inside Diameter	2-3/8"
Deflecting-Coil Length	5"
Focusing-Coil Length	10"
Alignment-Coil Length	15/16"
Photocathode Distance:	
Inside End of Focusing Coil	1/2"

MAXIMUM RATINGS:

Absolute Maximum Values:

Photocathode:	
Voltage	-650 max. Volts
Illumination	50 max. ft-c
Grid 6 Voltage	-650 max. Volts
Target Voltage:	
Positive Value	10 max. Volts
Negative Value	10 max. Volts
Grid 5 Voltage	150 max. Volts
Grid 4 Voltage	300 max. Volts
Grid 3 Voltage	400 max. Volts
Grid 2 and Dynode 1 Voltage	400 max. Volts
Grid 1 Voltage:	
Negative Bias Value	125 max. Volts
Positive Bias Value	0 max. Volts
Peak Heater-Cathode Voltage:	
Heater Negative with Respect to Cathode	125 max. Volts
Heater Positive with Respect to Cathode	10 max. Volts
Anode-Supply Voltage (Note 1)	1850 max. Volts
Voltage per Multiplier Stage	400 max. Volts
Environmental Conditions:	
Operating Temperature:	
Of any part of bulb	71 max. °C
Of bulb at large end of tube -	
Target Section	20 min. °C
Temperature Difference:	
Between target section and any part of bulb hotter than target section	7-1/2 max. °C
Shock (Note 2)	30 max. G's
Vibration (Note 3)	10 max. G's
Humidity	Note 4.

TYPICAL OPERATING CONDITIONS

Photocathode Voltage (Image Focus) . . .	-400 to -600	Volts
Grid 6 Voltage (Accelerator):		
75% of Photocathode Voltage	-300 to -450	Volts
Target Voltage (Note 5).	+1 to -3	Volts
Grid 5 Voltage (Decelerator)	0 to 125	Volts
Grid 4 Voltage (Beam Focus)	130 to 180	Volts
Grid 3 Voltage (Note 6).	225 to 330	Volts
Grid 2 and Dynode 1 Voltage	300	Volts
Grid 1 Voltage for Picture Cutoff.	-45 to -115	Volts
Dynode 2 Voltage	600	Volts
Dynode 3 Voltage	910	Volts
Dynode 4 Voltage	1200	Volts
Dynode 5 Voltage	1490	Volts
Anode Voltage	1550	Volts
Anode Current (dc).	30	μamp
Signal-Output Current (Peak to Peak).	2 to 15	μamp
Target Temperature Range (See Text).	40 ± 2	°C
Ratio of Peak-to-Peak Highlight:		
Video-Signal Current to RMS Noise		
Current (Approx.).	25	-
Min. Peak-to-Peak Blanking Voltage	10	Volts
Field Strength at Center of Focusing		
Coil (Note 7)	75	Gausses
Field Strength of Alignment		
Coil (Approx.).	0 to 3	Gausses

4. Under conditions specified in MIL-E-5272A Par. 4.4.1, and Par. 4.4.3. The resistance between pins is at least 100 megohms following this test.
5. Adjustable from -3 to -5 volts with blanking voltage off.
6. Adjust to give the most uniformly shaded picture near maximum signal.
7. Direction of current 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.
8. With 2870° K illumination.
9. In properly adjusted TK31A Image orthicon camera chain, or equivalent, with EIA (formerly RETMA) 1956 Resolution Chart.
10. After 5 minutes exposure focused on RETMA chart with tube operating 1 f stop above Knee.
11. After 30 seconds exposure focused on RETMA chart with tube operating 1 f stop above Knee.
12. Tube having burn-in of specified time is recovered by exposure to uniform white surface, under standard operating conditions, except overscan, for the specified recovery time. This procedure also removes darkened raster area due to change in scan sweeps.

TYPICAL PERFORMANCE

Sensitivity:

at foot-candles

Photocathode Illumination	Lines Horizontal Resolution
(Note 8)	(Note 9)
3×10^{-2}	625 center min.
3×10^{-3}	525 center min.
3×10^{-4}	350 corner min.
3×10^{-4}	275 center min.

Image Retention:

At 0 Hours (New Tube) (Note 10)	0 Sec.
At 750 Hours (Note 11)	30 Sec.

REMOVAL OF PERMANENT BURN

0 to 50 Hours of Tube Life

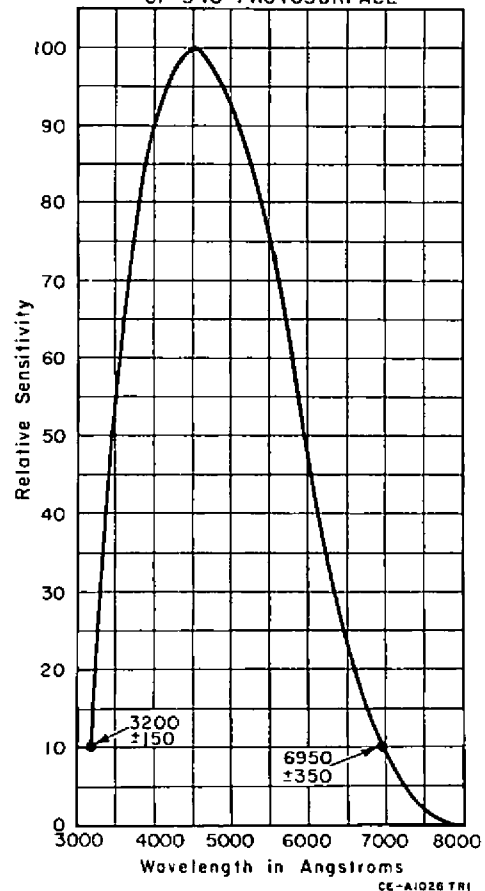
Procedure See Note 12

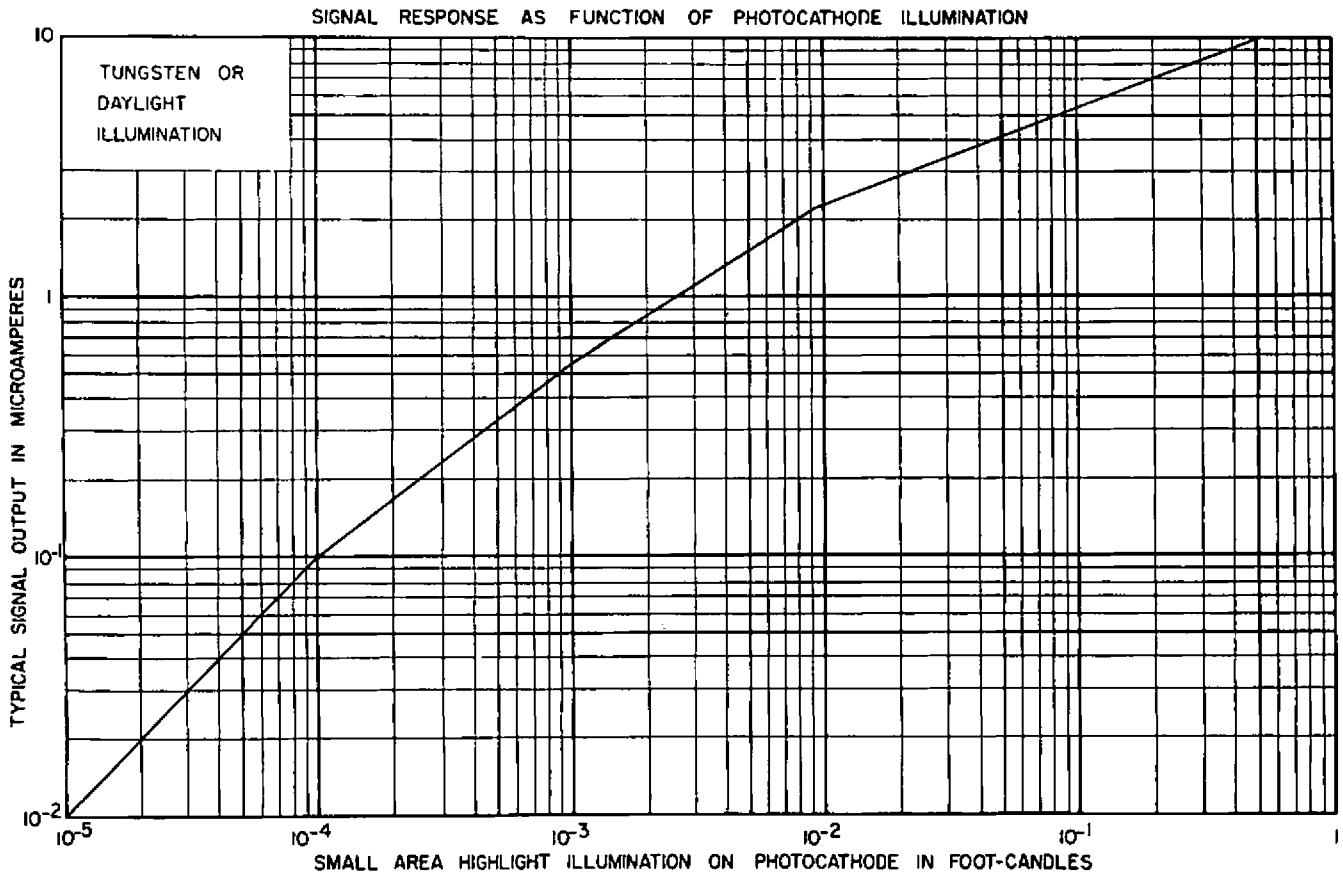
Burn-in Time (Minutes)	Recovery Time (Minutes)
10	20
20	40
30	60
40	180
50	180
60	180

NOTES

1. Ratio of dynode voltages is shown under Typical Operation.
2. Under conditions specified in MIL-E-5272A Par. 4.15.2.1.
3. Under conditions specified in MIL-E-5272A Par. 4.7.1. Procedure 1 except at operating temperature only. Center horizontal resolution at 3×10^{-2} foot-candles photocathode illumination will be at least 350 lines with 5G applied acceleration in the frequency range of 50 to 500 cycles per second.

SPECTRAL RESPONSE CHARACTERISTIC OF S-10 PHOTOSURFACE





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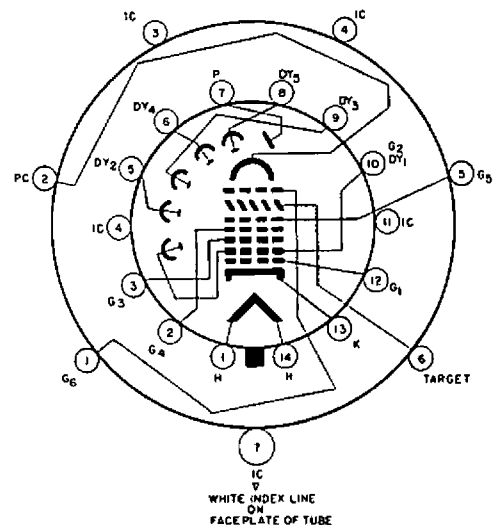
SMALL SHELL DIHEPTAL 14-PIN BASE

- | | |
|--|---|
| Pin 1: Heater | Pin 8: Dynode 5 |
| Pin 2: Grid 4 | Pin 9: Dynode 3 |
| Pin 3: Grid 3 | Pin 10: Dynode 1 & Grid 2 |
| Pin 4: Internal Connection
(Do NOT Use) | Pin 11: Internal Connection
(Do NOT Use) |
| Pin 5: Dynode 2 | Pin 12: Grid 1 |
| Pin 6: Dynode 4 | Pin 13: Cathode |
| Pin 7: Anode | Pin 14: Heater |

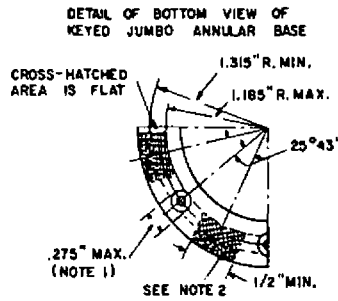
KEYED JUMBO ANNULAR 7-PIN BASE

- Pin 1: Grid 6
- Pin 2: Photocathode
- Pin 3: Internal Connection
(Do NOT Use)
- Pin 4: Internal Connection
(Do NOT Use)
- Pin 5: Grid 5
- Pin 6: Target
- Pin 7: Internal Connection
(Do NOT Use)

Direction of Incident Light should be approximately Parallel to Tube Axis toward the Large End (Faceplate)



CE-21030



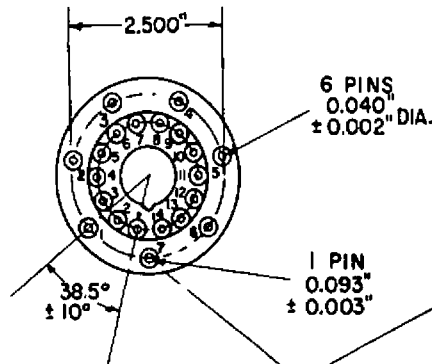
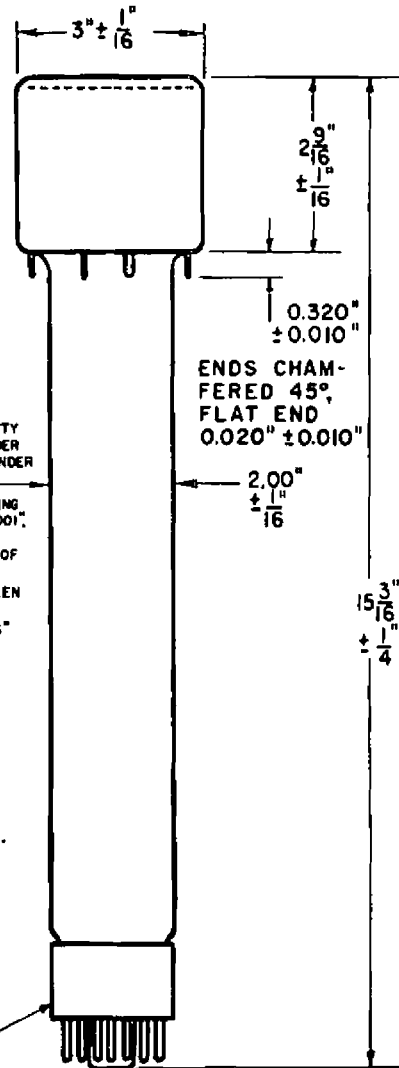
NOTE 1: MEASURED AT DISTANCE OF 1/32" BELOW BOTTOM OF ANNULAR BASE.

NOTE 2: DOTTED AREA IS FLAT OR EXTENDS TOWARD DIHEPTAL BASE END OF TUBE BY 0.060" MAX.

KEYED ANNULAR BASE GUIDE

ANGULAR VARIATIONS BETWEEN PINS AS WELL AS ECCENTRICITY OF NECK CYLINDER WITH RESPECT TO PHOTOCATHODE CYLINDER ARE HELD TO TOLERANCES SUCH THAT PINS AND NECK CYLINDER WILL FIT FLAT-PLATE GAUGE WITH:

- A- SIX HOLES HAVING DIA. OF 0.065" ± 0.001" AND ONE HOLE HAVING DIA. OF 0.150" ± 0.001", ALL HOLES HAVE DEPTH OF 0.265" ± 0.001". THE SIX 0.065" HOLES ARE ENLARGED BY 45° TAPER TO DEPTH OF 0.047". ALL HOLES ARE SPACED AT ANGLES OF 51°23' ± 5' ON CIRCLE DIA. OF 2.500" ± 0.001".
- B- SIX STOPS HAVING HEIGHT OF 0.187" ± 0.001", CENTERED BETWEEN PIN HOLES, TO BEAR AGAINST FLAT AREAS OF BASE,
- C- RIM EXTENDING OUT A MINIMUM OF 1/8" FROM 2-13/16" DIA. AND HAVING HEIGHT OF 0.126" ± 0.001"
- D- NECK CYLINDER CLEARANCE HOLE HAVING DIA. OF 2.200" ± 0.001"



**SMALL SHELL DIHEPTAL
14 PIN BASE
JEDEC NO B14-45**

CE-A1858