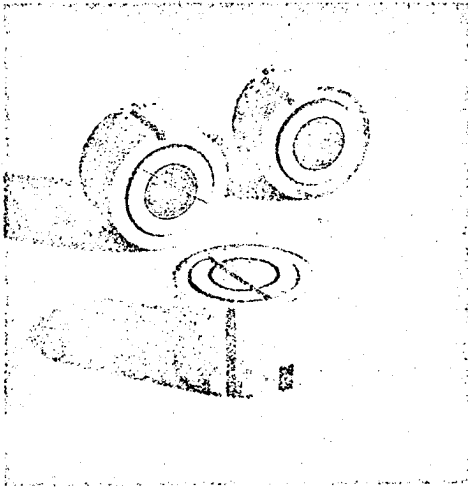


# Image Intensifiers

## 18mm Microchannel Wafers



ITT Type Number	Input Window Fiberoptic Configuration	Spectral Response
F-4704	Trifocal	S-25
F-4747	Plane Focus	S-25
F-4748	Bifocal	S-25

ITT's 18mm microchannel wafers are single stage, high gain image intensifiers used for image pick-up applications under low light or infrared ambient light conditions.

The wafers consist of a high efficiency S-25 photocathode deposited on a fiberoptic input window, a microchannel plate (MCP) current amplifier and a green P-20 phosphor screen fabricated on the twisted fiberoptic output window. Low light level or infrared images focused on the fiberoptic input window of the wafer are converted to electron images by the photocathode. The wafer's microchannel plate, consisting of several million microscopic glass channels, amplifies the electron image with virtually no distortion and loss of resolution. By twisting the fiberoptics on the output window, the need for a corrective lens to invert the viewed image is eliminated.

ITT's 18mm microchannel wafer image intensifiers are completely self-contained with an integral high voltage power supply. The power supply incorporates Automatic Brightness Control (ABC) for uniform image output and bright source protection for photocathode protection during exposure to high light levels. All high voltage is contained internally and the unit may be powered by a low current 2.7 volt battery (P. R. Mallory, Model 303843 or equivalent).

Major advantages of ITT microchannel plate image intensifiers are size and individual point saturation. The small size makes these devices particularly applicable where size is a primary factor, as in head mounted night vision goggles. These intensifiers offer very effective operation under high point light conditions such as flares, spotlights and tracers. This is due to the special saturation characteristics of the individual glass channels in the MCP. Operational recovery of these devices after exposure to high light levels is instantaneous.

For engineering and applications assistance contact ITT Electron Tube Division, 7635 Plantation Road, Roanoke, Virginia 24019. Telephone (703) 366-7601.

U.K. technical and sales enquiries should be directed to :

ITT Components Group Europe  
Valve Product Division  
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Brixham Road, Paignton Devon

Telephone : Paignton 50762 (STD 0893-). Telex 42830

### Features

- Miniature size
- Point light source saturation
- Instantaneous recovery from high light exposure
- Minimum image halo
- Automatic Brightness Control
- Bright Source Protection
- Image Inversion
- Ruggedized Construction
- Low Voltage Pulse Capability

### Optional Features

- Pulsed Operation
- Phosphors other than P-20
- Non-inverted Output Optics

ELECTRON TUBE DIVISION



# F-4704, F-4747, F-4748

## PERFORMANCE

Photocathode	
Entrance Window	
F-4747 .....	Plane Surface, Fiberoptics
F-4748 .....	Bifocal, Fiberoptics
F-4704 .....	Trifocal, Fiberoptics
Cathode Type ..... S-25	
Photocathode Sensitivity	
(2870°K) .....	175 to 400 uA/Lumen
Radiant Sensitivity	
.80 microns .....	.010 to .030 amperes/watt
.83 microns .....	.006 to .025 amperes/watt
.85 microns .....	.003 to .015 amperes/watt
Fluorescent Screen	
Exit Window*..... Curved surface (radius	
	1.575") fiberoptics
Response Characteristic .... P-20 Type, Aluminized	
Luminous Gain (Input	
2 X 10 <sup>-6</sup> ft. C) .....	5000 to 15000 adjustable
Equivalent Background	
Input.....	2 X 10 <sup>-11</sup> lumens per cm <sup>2</sup>
Luminous Uniformity ...	4:1 maximum
Magnification .....	1.00 ± .005
Resolution.....	22 to 28 line pairs per mm
Modulation Transfer ...	(See Figure 2)
Saturation Characteristics	(See Figure 1)

## MECHANICAL AND ELECTRICAL CHARACTERISTICS

Operating Input Voltage ...	2.5 Volts
Operational Range .....	2.0 to 2.7 volts
Weight .....	105 grams maximum
Operating Position .....	Any
Dimensions .....	See outlines

## ENVIRONMENTAL

Temperature Range	
(Storage) .....	+52°C to -62°C
Temperature Range	
(Operating) .....	+52°C to -54°C
Temperature Shock	
(Allowable) .....	12 degrees per minute
Vibration .....	10 to 55 cycles, .10" displacement
Shock .....	85 G's peak amplitude

## LIFE AND HIGH LIGHT PROTECTION

Life (In goggles, Scene	
Illumination, 10 <sup>-4</sup> ft. C)....	1000 hours
Life (Direct Cathode	
Illumination, 10 <sup>-6</sup> ft. C)....	2000 to 10,000 hours
Room Lighting, short periods	No damage
Point Light Source**, short periods .....	No damage

## PULSE OPERATION (Special models or without power supply)

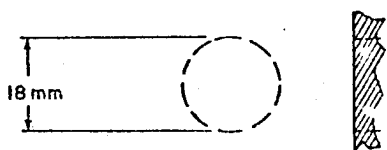
The standard intensifier with power supply is for continuous operation, but special models are available for pulse mode. The device is readily adaptable to pulse operation, having a low gating voltage and a high input impedance. The gain may also be controlled to some degree by varying the input pulse height (Figure 3). Repetition rates up to 1000 cycles/sec. are standard; higher rates have not been tested.

On Pulse Voltage (Cathode to MCP) .....	100 to 300 volts (Optional)
Cutoff Voltage (Cathode to MCP) .....	-30 volts (minimum)
Input capacitance.....	30 picofarads (nominal)

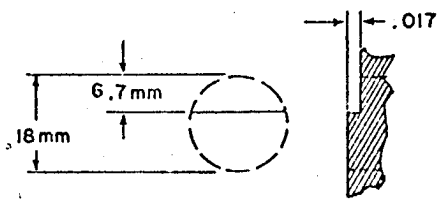
\*Output optic may be ground flat or to other radii. \*\*Auto lights, flares, tracers, spotlights, etc.

## USEFUL VIEWING AREA

F-4747 SINGLE FOCAL

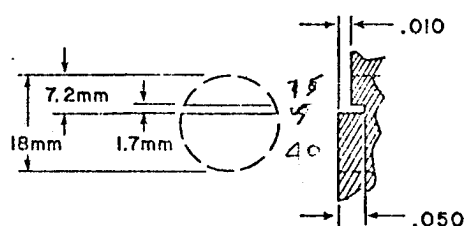


F-4748 BIFOCAL

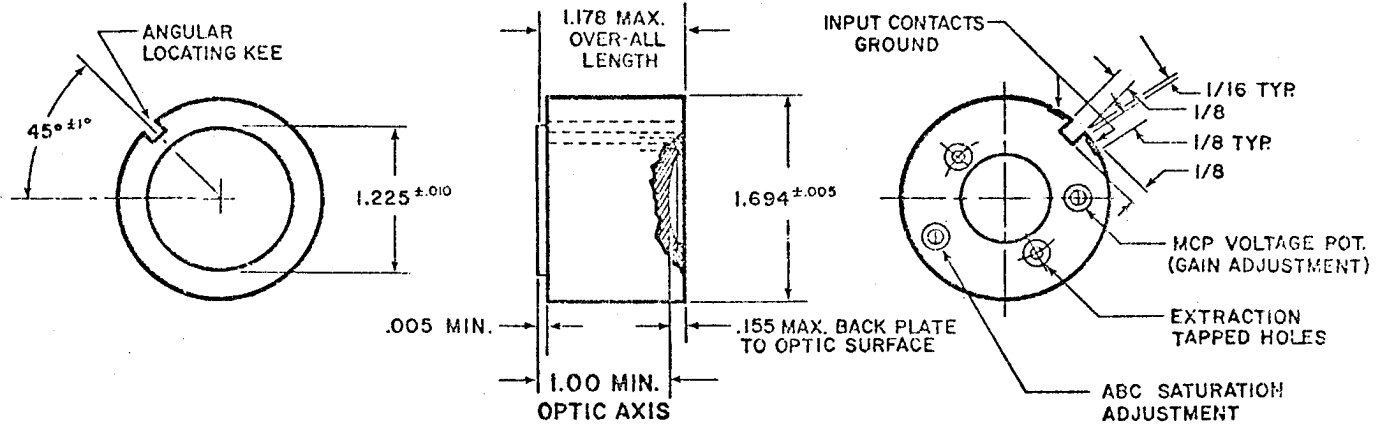


THE RECESSED AREA IS 1/3 THE TOTAL AREA.

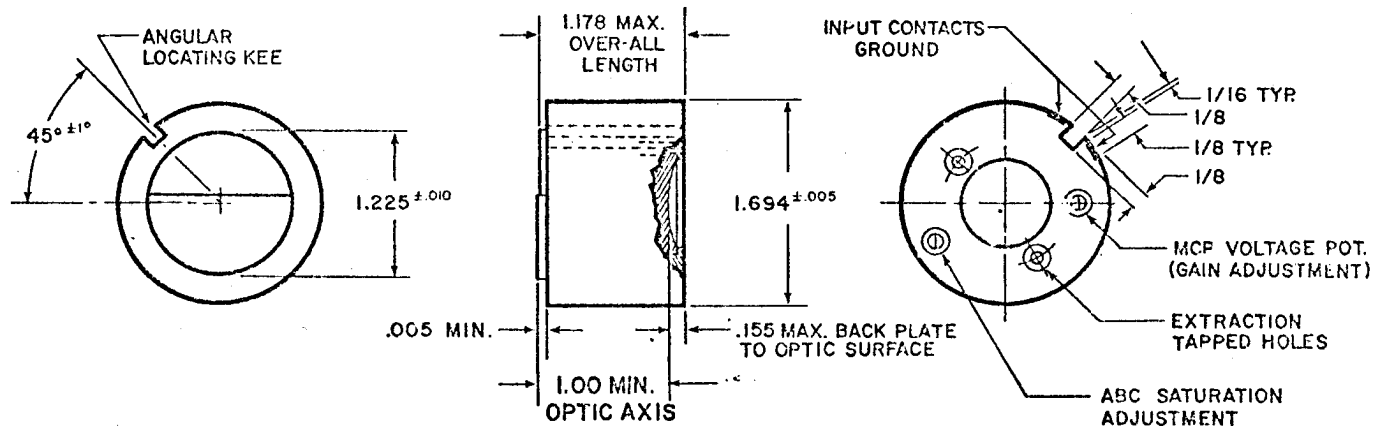
F-4704 TRIFOCAL



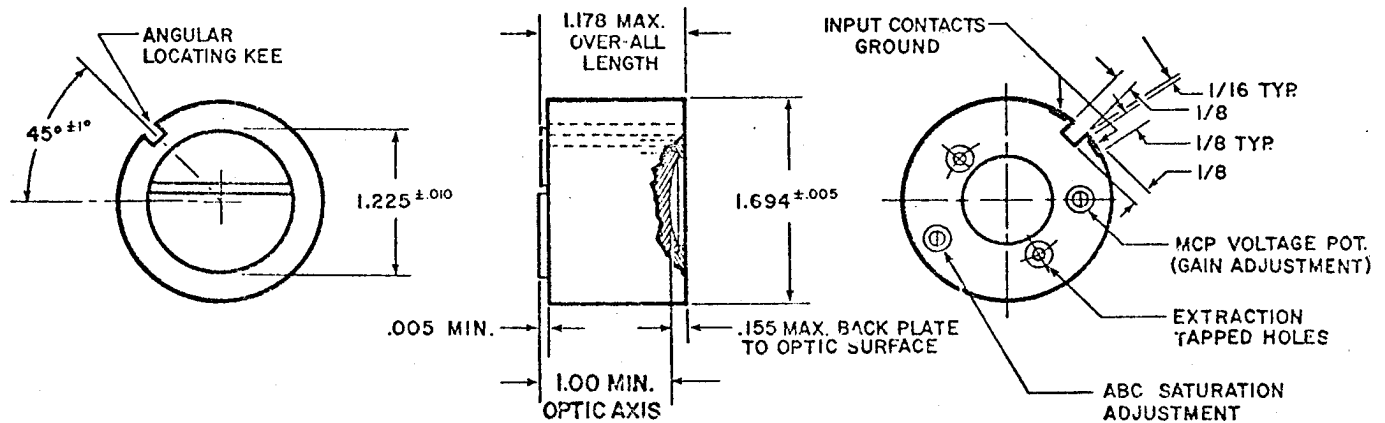
**F-4747 SINGLE FOCAL 18mm MICROCHANNEL IMAGE INTENSIFIER**



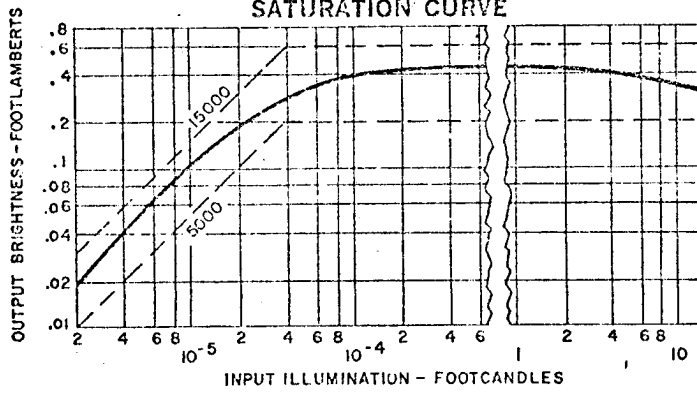
**F-4748 BIFOCAL 18mm MICROCHANNEL IMAGE INTENSIFIER**



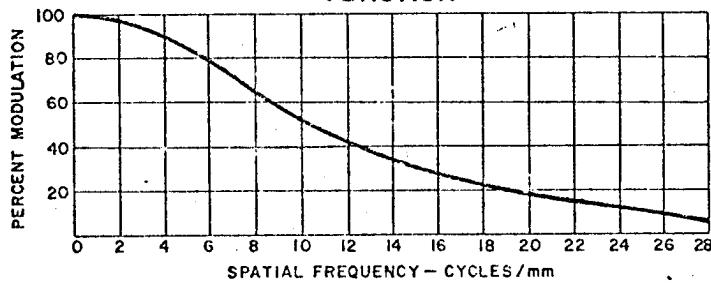
**F-4704 TRIFOCAL 18mm MICROCHANNEL IMAGE INTENSIFIER**



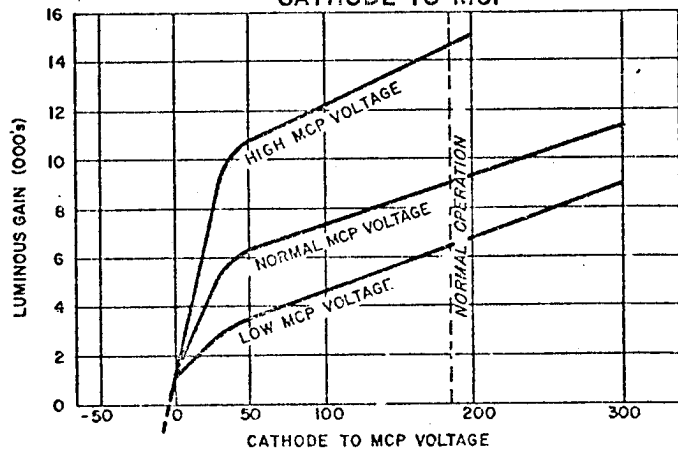
**FIGURE 1**  
TYPICAL  
SATURATION CURVE



**FIGURE 2**  
TYPICAL  
MODULATION TRANSFER  
FUNCTION



**FIGURE 3**  
TYPICAL GAIN FOR INPUT PULSE  
HEIGHT OR D.C. INPUT VOLTAGE  
CATHODE TO MCP



**FIGURE 4**  
TYPICAL GAIN FOR VOLTAGE  
ACROSS MCP (MICROCHANNEL PLATE)

