

# **GRAFLEX....INTENSICON**

## **INTENSICON DUAL CHANNEL INTENSIFIED CAMERA**

### Discussion

During the design stage of the *INTENSICON* camera, there were numerous electronic, mechanical, and optical design considerations that had to be successfully addressed to achieve optimal performance. The *INTENSICON* is designed to be specifically integrated to one of three select motorized zoom lenses and during the optical design stage each system was optimized using the latest in advanced optical design software. The design of the *INTENSICON* has resulted in a rugged, reliable, flexible, and high performance system with a maximum achievable MTBF in severe environments such as those found in military applications.

Traditionally, the main reliability issue in an I<sup>2</sup> camera concerns the intensifier tube, unfortunately this item is also the highest priced component. The *INTENSICON* channels are selected manually by the user but has been designed to remove/de-energize the intensifier tube from the optical path and will not allow the user to energize it during daylight conditions. The night channel relay lens has been designed as to achieve the maximum in sensitivity and performance. Graflex recommends that a superior grade, MIL performance intensifier tube always be used. The night channel (and day) utilizes a high efficiency relay lens rather than fiber optically connecting to the intensifier; the relay lens is much more efficient and there is no discernible image degradation or loss of light to the intensifier.

The objective lenses (zoom lens) integrated to the *INTENSICON* were chosen by Graflex for obvious reasons:

1. Aperture (f-stop): A low f-stop will pass more light to the intensifier thereby increasing night sensitivity. An objective lens of f2.0-3.0 aperture and high IR transmission provide basic ingredients for superior performance in an I<sup>2</sup> camera. During the day, with an abundance of light, f-stop is virtually insignificant.
2. Transmission: The objective lenses chosen, as well as, the component elements of the *INTENSICON* have multi-layer, high efficiency coatings for maximum IR and visible transmission.
3. Focal Length: The progressively increasing focal length of an objective lens will produce a narrowing field of view thus increasing a systems ability to resolve. The objective lenses chosen possess an appropriate maximum focal length versus aperture combination allowing for maximum performance at a reasonable cost and physical size.

Although a good aperture (low f-stop) is imperative during night operation, it is of little concern during daylight; this optical principle is applied within the design concept of the *INTENSICON*. The day channel of the *INTENSICON* contains a 1X by 3X motorized extender thus allowing for the tripling of the objective lens focal length in the day channel.

The day and night channel of the *INTENSICON* are of 1" (16mm) format prior to the relay lens optical groups thus allowing for constant scene width in either channel at matching objective lens focal lengths. The relay lens groups in both channels reduce the format to 1/3" (beyond the intensifier in the case of the night channel). The relay lens reduction allows for the use of more common 1/3" CCDs without image loss.

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