

# UVIR

## Tester of broadband UV-SWIR imaging systems

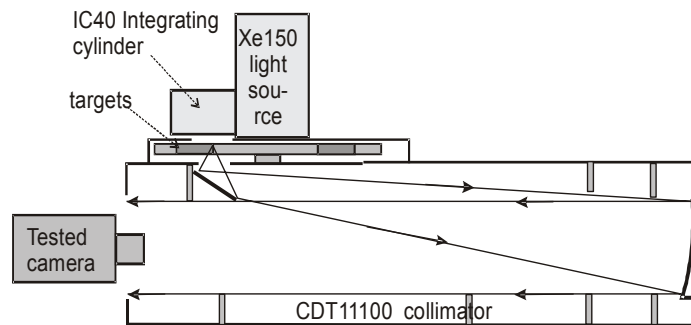


Fig. 1. Block diagram of UVIR test system



Fig. 2. Photo of UVIR test system

### BASIC INFORMATION:

Multi-sensor broadband imaging systems sensitive in spectral range from shortwave UV-B band to SWIR band (from about 280nm to about 1700nm) are rare type of imaging systems targeted mostly for space applications. These imaging systems are typically built by combining several cameras of different spectral bands to form a single broadband imaging system. UVIR is a test system optimized to enable expanded testing these imaging systems.

UVIR test system is in general a variable target image projector that uses a series of different targets to project their images into direction of tested camera: UV camera, VIS camera, NIR camera, SWIR camera. The tested camera generates copies of the projected images. Quality of the images generated by the camera is evaluated by human observers or by software and its important characteristics of tested camera are measured.

The UVIR test system in its basic version (UVIR-A) is system optimized to enable measurement of imaging parameters of tested system (resolution, MRC, MTF). However, UVIR can be also delivered in a more advanced version (UVIR-B) capable to measure both imaging (resolution, MRC, MTF) and radiometric parameters (sensitivity, noise parameters, response function).

### HOW IS BUILT:

UVIR-A test system is built from four main blocks: CDT reflective off axis collimator, XE150-A broadband UV-SWIR light source, MRW-8 motorized rotary wheel, a set of targets, PC set, frame grabber, TAS-A computer program. UVIR-B uses modified XE150-B light source and modified TAS-B computer program.

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### FEATURES:

- Ability to project images of reference targets in wide spectral band from about 280nm to about 1700nm
- UVIR typically enables testing imaging systems using cameras of optical aperture as big as 100 mm (but aperture of tested cameras can be increased)
- Ability to simulate both dark night and very bright day conditions
- Computerized test system, semi-automatic measurement of important parameters of UV-SWIR imaging systems (version UVIR-B)
- Test capabilities:
  - UVIR-A: Resolution, Minimal Resolvable Contrast, MTF, Distortion, FOV,
  - UVIR-B: Resolution, Minimal Resolvable Contrast, MTF, Distortion, FOV, Sensitivity, SNR, Noise Equivalent Input, Fixed Pattern Noise, Non Uniformity, Response Function, Dynamic Range, Linearity

### SPECIFICATIONS

|                              |   |                                      |  |
|------------------------------|---|--------------------------------------|--|
| <b>CDT collimator</b>        |   | <b>Light source</b>                  |  |
| Collimator type              | reflective, off-axis  | Active aperture                      | 40 mm  |
| Clear aperture               | 100 mm (can be increased to 200mm)  | Light source type                    | Xenon 150W   |
| Focal length                 | 1000mm (can be modified)  | Spectral band                        | 250-1800nm   |
| Spectral range               | At least 0.28-15 $\mu\text{m}$  | Spectrum                             | typical spectrum of xenon light sources  |
| Spatial resolution           | not less than 100 lp/mrad   | Maximal luminance                    | at least $> 7000 \text{ cd/m}^2$   |
| Coating                      | Protected Aluminum  | Method of regulation light intensity | XE150-A: Manual continuous opto-mechanical<br>XE150-B: Motorized continuous opto-mechanical  |
| Field of view                | 2.7° (can be modified)  | Regulation dynamic                   | XE150-A: $>10\ 000$<br>XE150-B: $>1\ 000\ 0000$  |
| <b>Rotary wheel</b>          |   | Calibration                          | XE150-A: non-calibrated<br>XE150-B: calibrated in $\text{cd/m}^2$ units or in $\text{W/m}^2$ |
| Model                        | MRW-8   | <b>PC</b>                            |  |
| Number of holes for targets  | 8   | Basic information                    | Typical PC set   |
| Control type                 | motorized, digital  | <b>Frame grabber</b>                 |  |
| <b>Targets</b>               |   | Number and type                      | one or two from following list: analog video, CL, GigE, LVDS, HD-SDI, HDMI                   |
| Diameter                     | 54 mm (for wheel holes)   | <b>Other parameters</b>              |  |
| Typical targets              | Set of 5 variable contrast USAF targets, FOV/distortion target, edge target | Work temperature                     | +5C to 35C   |
| Optional non typical targets | 4-bar targets, pinhole targets, silhouette targets                          | Storage temperature                  | -5C to 50C   |
|                              |   | Power supply                         | 115-230VAC 50/60Hz   |

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CONTACT: Tel: +48 22 6668780

Fax: +48 22 3987244

Email: info@inframet.com

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