

IBIG

Testing non-typical image intensifier tubes

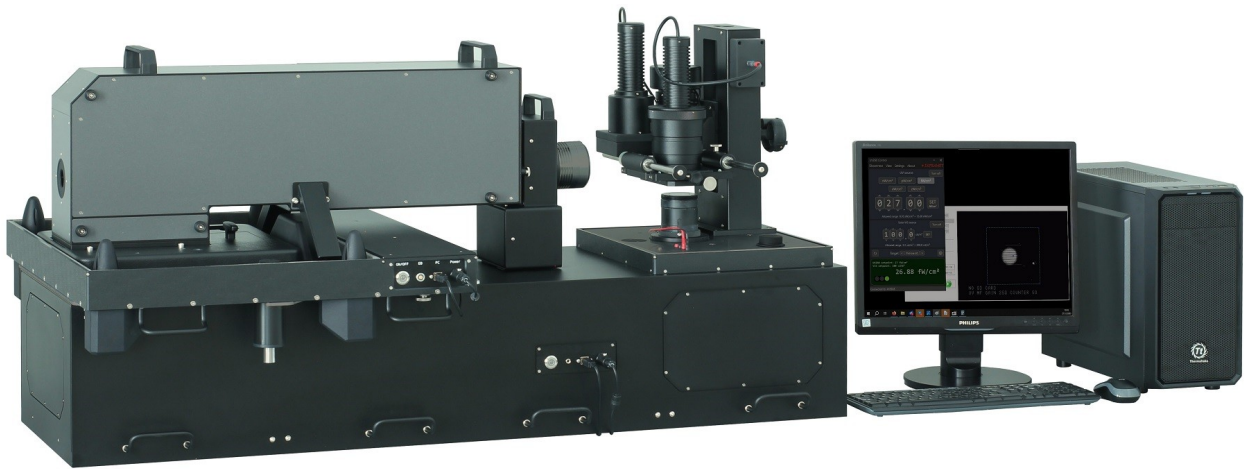


Fig. 1. Photo of IBIG test system

1 What are non-typical image intensifier tubes?

Great majority of image intensifier tubes is used as critical modules of night vision devices to enable surveillance at night conditions. These are small tubes (photocathode diameter below 25 mm, typical situation: equal to 18mm) sensitive in VIS-NIR spectral band). However, there are also on market non-typical IITs: 1) tubes of non-typical spectral band (UV only, both UV and VIS, broadband UV-SWIR) or tubes of non typical large aperture (over 25mm up to about 40mm). These non typical IITs have found applications in both medium size markets (IITs for solar blind UV cameras) and niche markets (low power large image sensors for space imagers, spectroscopy, R/D projects).

2 What is IBIG?

IBIG is a test station that enables expanded testing defined earlier non typical image intensifier tubes. Such IITs cannot be tested using typical test stations optimized for small tubes of spectral band limited to VIS-NIR band. This limitation of typical test stations (like popular ITIP offered by Inframet) originated due to use of small refractive image projectors in such typical test stations. IBIG test station is based on a totally different design concept comparing to typical ITIP station. It is designed using a large, broadband catadioptric macro objective. Therefore IBIG can test photocathodes up to 40mm in diameter. Spectral range is expanded to cover range from 240 up to 1600nm. IBIG can also generate test reports compatible with ISO/IEC17025 standard.

KEY FEATURES

- Photocathode diameter up to 40mm.
- Spectral range from 240nm to 1600nm (UV – SWIR)
- Resolution of tested IIT up to 80 lp/mm
- Improved measurement uncertainty (7%)
- Wide range of parameters (18)
- Test report compatible with ISO/IEC17025

3 How IBIG is built?

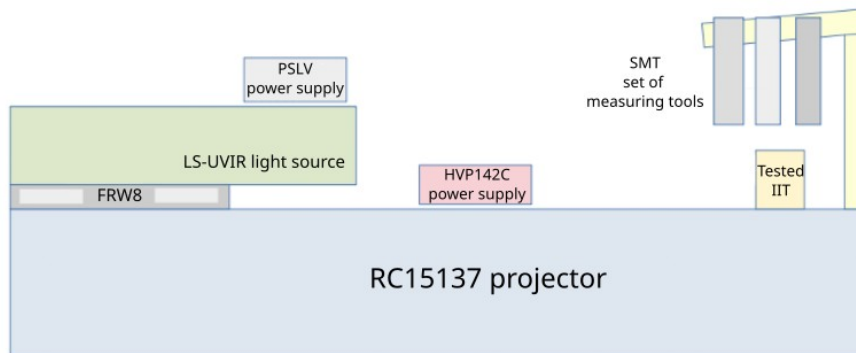
IBIG is built as a set of modules:

1. LS-UVIR broadband light source,
2. FRW8 rotary wheel with a set of targets,
3. RC15137 catadioptric macro objective,
4. PC with software.
5. SMT set of tools to analyze output image from tested IIT,

The blocks 1-3 form image projector that projects images of some standard targets to tube photocathode plane of precisely controlled light flux. Projector is designed to produce large images with negligible chromatic aberration. The measuring tools enable capturing images from tested II tubes and measuring output light intensity at the tube screen. The computer system carries out processing of data from image projector block and the measuring tools and finally calculates parameters of tested II tubes.

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Light source

IBIG uses LS-UVIR light source. LS-UVIR light source can work in two modes:

- halogen bulb of 2856K color temperature source
- set of monochromatic LED light sources, typical configuration: 265nm, 290nm, 400nm, 500nm, 595nm, 720nm, 810nm, 910nm, 1050nm.

Halogen source is used during measurement of photometric or as a broadband light source from 400 nm up to 1600nm. Monochromatic LED sources can be quickly changed to test IIT at desired wavelengths. Only one LED can be active at a time. Set of optomechanical attenuators allows wide range of regulation that can achieve dynamic range 10^{12} and low light levels at the level of 10^{-20} W/cm².

4 What can be tested?

IITs with photocathode diameter up to 40 mm and spectral range 240-1600nm.



5 Recalibration

Typical recalibration period is 2 years. IBIG can be recalibrated on-site using CALIN calibration kit. There is no need to send station back to check crucial parameters.

6 Comparison to ITIP test station

The key difference between IBIG and ITIP test station is photocathode size and spectrum of tested devices. ITIP is designed and optimized for testing small IITs used in night vision devices. IBIG enables testing bigger tubes and in wider spectral range.

7 TEST CAPABILITIES

IBIG test station enables measurement (or checking) following parameters:

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No	Parameter	Measurement range	Expanded relative uncertainty
1	Resolution	1-80,6 lp/mm	6.00%
2	MTF	0-30 lp/mm range (0-50 lp/mm - option)	0.01 at 0-10lp/mm 0.02 at 10-20lp/mm 0.03 at 20-30lp/mm 0.04 at 30-40lp/mm 0.05 at 40-50lp/mm
3	SNR	10-35 at 0.108 mlx	8.00%
4	Dark spots	From 0.05 to 0.5 mm	15% for spots 75µm – 150µm 10% for spots 151µm – 500µm
5	Halo	0.2-1.5mm	10.00%
6	Useful cathode diameter	10-40 mm	2.00%
7	Image alignment	0-1.5 mm	15% or 10 µm
8	Multi-Multi Pattern Noise	0-20%	10%
9	Multi-Boundary Pattern Noise	0-30%	10%
10	Image inversion	0.1°-5°	0.2° (absolute value)
11	Magnification	1 to 4	5.00%
12	Luminance gain	1000-100 000	10%
13	EBI	0.02-2 lx	10%
14	Output brightness	0.3-20 cd/m ²	5.00%
15	Brightness non uniformity	1:1 to 5:1	7.00%
16	Luminous photocathode sensitivity	200 to 2000 uA/lm	8%
17	Radiant photocathode sensitivity	10 to 100 mA/W	8%
18	Tube current consumption	1-100 mA	2% or 0.3mA

*specifications are subject to change without prior notice

8 Market situation

IBIG is the first commercially available system on the market that enables testing large, spectrally non typical image intensifier tubes. This new system improves position of Inframet as a world leader in field of apparatus for testing IITs.

Version 1.3

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