NIVIS

Universal station for testing night vision devices

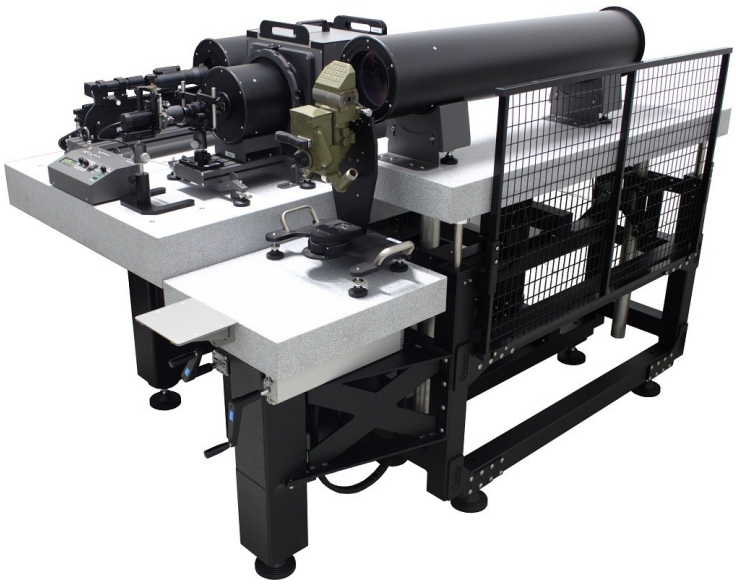

Fig. 1. Photo of NIVIS test station

1 Basic information

Night vision devices present on the market can be divided due to design differences into six basic types:1)monoculars , 2)goggles (mono and bino type), 3)sights,4) clip-ons, 5)binoculars, 6)periscopes.
NIVIS is the most universal Inframet test station for testing night vision devices. It is a computerized, table type station for expanded testing/boresight of all these types of NVD. In detail, it enables testing NVDs having aperture of the optics up to 150mm (virtually all NVDs offered on the market). All important parameters of NVDs recommended by MIL standards can be measured. Tested NVDs can be fixed using universal adapters (fast easy connection) or mechanical railway (typically Picatinny rail) for precision positioning. The station is computerized and offers following features: output image on external monitor, automatic calculation of dark spots, software support for resolution/MRC measurement, high accuracy of FOV and distortion measurement, optional ability to measure MTF, computer read out of light source settings, and digital recording of measurement results.

2 Comparison to other stations

NIVIS can be treated as computerized fusion of several specialized test stations:

1. NVS – station for testiong monoculars/goggles/sights
2. NCLIP - station for testing/boresight clip-ons,
3. NPER – station for testing night vision periscopes

In contrast to other computerized stations like Nimax and Nicom, NIVIS offers ability to test night vision clip ons, night vision periscopes and bigger night vision sights. NIVIS is also horizontal configuration test station (like NVS, NCLIP, NPER) when many of Inframet test stations (NVT, NV14, Nimax, Nicom) are vertical configuration test stations.
If NIVIS ability to test/boresight all types of NVDs is not needed the it is recommended to choose other more specialized stations: Nimax, Nicom, NVS, NPER, NCLIP.

3 How it works?

The universality of Nivis (case of most expanded version) has been achieved by a concept of an image projector built using a set of three exchangeable refractive collimators of different focal length, a single large movable calibrated light source, and a set of external targets all based on a horizontal platform (optical table). The active collimator is exchanged depending on field of view of tested NVD. A set of mechanical adapters and railways is used to enable positioning of tested NVDs. Further on, special tables of variable height are used as platforms for tested NVDs/test station.

The station projects images of some standard targets into direction of tested night vision. The user can control light intensity and type of target to be projected using two knobs. The tested NVD generates copies of the projec-

ted standard images. Images generated by tested NVD are evaluated by human observer, test software or with help of some other measuring tools (luminance probe) and important parameters of night vision devices are determined.

4 Versions

NIVIS is a modular station that in most extended version can enables expanded testing and boresight of al types of night vision devices: 1)monoculars, 2)goggles (mono and bino type), 3)sights,4) clip-ons, 5)binoculars, 6)periscopes. However, there are few potential customers who need abilitity to test all types of NVDs. In addition, test capabilities (number of parameters to be measured) vary from customer to customer. Therefore Nivis is offered in a form of many versions optimized for testing different types of NVDs and measurement of different parameters.

VERSIONS

Version	Measurement capabilities	Modules	Test range
NIVIS-1	focus (infinity checking), resolution (center, peripheral, high light level), screen quality (dark spots), system gain, FOV, collimation errors, gain disparity of all NVDs [1]	LAN-C1 light source, CNV15120 collimator, CNV1260 collimator, CNV421 collimator, LP1N luminance probe, CLAN-C1 controller, PS1 power supply, BP-C base platform, PP1 positioning platform, set of aperture reductors, PP2 positioning platform, OB21 optical bridge, USAF 1951 resolution target, three FOV targets, distortion target, set of five dark spot targets, three cross (collimation) targets, HCP1 platform, HCP2 platform, HCP2 table, AT1022 table, HEN camera, PC set	typical testing
NIVIS-2	As in NIVIS-1 but additionally: MRC, distortion, deflection angle, angle between line of sight and axis of the mechanical platform (typically Picatinny rail) of all NVDs[1]	As in NIVIS-1 but additionally set of five variable contrast MRC targets, three distortion targets, RAC camera, and XOR60 rail	extended testing
NIVIS-3	As in NIVIS-2 but additionally diopter range and magnification[1]	As in NIVIS-2 but additionally DPM diopter power meter, and magnification target.	ultra-extended testing

[1]Attention: all parameters can be measured for periscopes with FOV and diameter of objective lens below of FOV and aperture of CNV collimators – see specifications table)

5 Specifications of basic blocks

Maximal optical diameter of tested NVD	150mm
Light Source	Dual switchable light source: 1) 2850K color temperature halogen source, 2)LED 660 nm monochromatic LED source
Illuminance range of light source	from at least 0.1 mlx to 200 lx
Regulation resolution	0.01mlx (at low intensity range)
Regulation type	continuous (any value can be set within the regulation range)
Regulation mechanism	manual
Regulation stability	better than 2% of the set value
Collimator codes	CNV12100 collimator, CNV950 collimator, CNV421 collimator Option LA: CNV15120 collimator, CNV1260 collimator, CNV421 collimator
Apertures/focal length/FOV of the collimators	1) CNV12100 collimator: 120/1000mm/10º, 2) CNV950 collimator: 90/500mm/20º, 3) CNV421 collimator: 35/210mm/44º, 4)CNV15120 collimator: 150/1200mm/8º, 5)CNV1260 collimator: 120/600mm/16º
Resolution of the collimators	1)>100 lp/mrad, 2) >60 lp/mrad, 3) > 30 lp/mrad, 4) >120lp/mrad, 5) >70lp/mrad

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Targets	Set of standard targets: 100% contrast USAF 1951 resolution target, three FOV targets, distortion target, set of five dark spot targets, three cross (collimation) targets, set of five variable contrast MRC targets
Range of luminance probe	0.01-1000 cd/m^2
DPM66 meter	for measurement of diopter power of optical oculars; +6D to -6D
IM 50 camera	for measurement of deflection angle (Clip ons) and angle between line of sight and axis of the mechanical platform (Sights and Clip ons)
Output readout	internal digital screen
Power	230 VAC 50/60 Hz
Operating temperature	5°C to 40°C
Average life time of light source	>10000 hours

*specifications are subject to change without prior notice

6 Comparison to other commercial test stations

There are other commercially available test stations that can be used for testing night vision. Here we will present advantages of the Nivis station in comparison to other commercially available test systems.

1. All types of NVDs can be tested. Typical competitor stations can do test of only monoculars/goggles.
2. Much wider test capabilities, especially in case of expanded versions. More parameters can be measured.
3. Computerized test station. Measurement results can be archived.
4. Nivis station is built using dual switch-able light source (polychromatic 2850K color temperature or monochromatic light source) in situation when typical stations are built using only a monochromatic light source. Due to use of polychromatic 2850K color temperature calibration of NV14 is valid for any type of night vision device. Calibration is typical stations is valid only for one type of NVD of specified spectral sensitivity.
5. Unique possibility of measurement of MRC characteristic. Detection, recognition, identification ranges of most targets of interest can be calculated when MRC characteristic is known.

Version 3.1

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