

# NVS

## Universal tester of night vision devices



Fig. 1. Photo of the NVS test station

### BASIC INFORMATION:

Night vision devices present on the market can be divided into two basic groups: A) short range night vision devices (binocular goggles, monocular goggles, monoculars) of wide field of view about  $40^\circ$ ; B) long range night vision devices (night vision sights/binoculars of narrow field of view below about  $12^\circ$ ).

NVS test station is a modular test station optimized for testing night vision sights/binoculars but can be also used for testing night vision goggles/monoculars. Therefore NVS station can be considered as an universal tester of night vision devices. This universality has been achieved by using modular design based on several exchangeable refractive collimators, movable light source, and a set of external targets all based a horizontal platform. The test procedures used by NVS station are based on recommendations of MIL series military standards.

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

Big advantage of NVS test station is ability to test all types of night vision devices. However, when testing is limited to only night vision goggles/monoculars and small night vision sights then NVT/NV14 stations based on vertical configuration are more recommended.

### BLOCKS

NVS station is built from following blocks: LAN light source (different versions), set of 3 refractive collimators(CNV15120, CNV960, CNV421), basic/expanded set of targets, LP1N luminance probe, CLAN controller, OB21 optical bridge, PS1 power supply, BP base platform, PP1 positioning platform, PP2 positioning platform, set of aperture reducers

### FEATURES:

- Optimized for testing night vision sights/binoculars (optical aperture up to 150mm). The station can also be used for testing night vision goggles/monoculars.
- Modular design that enables testing of all types of night vision devices. Attention: more specialized NVT/NV14 stations are more convenient for testing night vision goggles/monoculars and small night vision sights.
- Wide range of performance tests: focus, resolution (center, peripheral, high level), screen quality (dark spots), brightness gain, field of view, Minimal Resolvable Contrast (resolution tests for variable contrast USAF1951 targets), collimation error of two channels, gain disparity.

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- Maintenance checks: Operational defects (shading, edge glow, flashing./flickering/intermittent operation, emission points); Cosmetic defects (Dark Spots, Bright Spots, Fixed-Pattern Noise, Chicken Wire, Image Disparity, Output Brightness Variation, Image Distortion) according to ASAM recommendations
- Built using dual switch-able light source (polychromatic 2850K color temperature source or monochromatic LED source) in situation when typical stations are built using only a monochromatic light source.

### SPECIFICATIONS

Maximal optical diameter of tested NVD	120 mm (LA option: 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 of the collimators	CNV12100 collimator: 120/1000mm, CNV950 collimator: 90/500mm, CNV421 collimator: 35/210mm CNV15120 collimator: 150/1200mm, CNV1260 collimator: 120/600mm
Resolution of the collimators	1)>100 lp/mrad, 2) >60 lp/mrad, 3) > 30 lp/mrad
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 <sup>2</sup>
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
Units	Metric (US - option)
Mass	About 78 kg
Dimensions	1380×690 x 360 mm (including collimators)

\*specifications are subject to change without prior notice

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### VERSIONS

Version	Measurement capabilities	Modules	Recommendations
NVS-A	focus (infinity checking), resolution (center, peripheral, high light level), screen quality (dark spots), brightness gain, FOV of night vision sights/binoculars of narrow FOV	LAN-A light source, CNV12100 collimator, CNV950 collimator, LP1N luminance probe, CLAN-A controller, PS1 power supply, BP-A base platform, PP1 positioning platform, set of aperture reducers, USAF 1951 resolution target, two FOV targets, distortion target, set of three dark spot targets	basic testing night vision monoculars/sights /cyclops goggles
NVS-B	focus (infinity checking), resolution (center, peripheral, high light level), screen quality (dark spots), system gain, FOV, MRC, distortion, collimation error of night vision sights/binoculars of narrow FOV	LAN-B light source, CNV12100 collimator, CNV950 collimator, LP1N luminance probe, CLAN-B controller, PS1 power supply, BP-B base platform, PP1 positioning platform, set of aperture reducers, USAF 1951 resolution target, two FOV targets, distortion target, set of five dark spot targets, two cross (collimation) targets, set of five variable contrast MRC targets	extended testing monoculars/sights /cyclops goggles
NVS-C1	focus (infinity checking), resolution (center, peripheral, high light level), screen quality (dark spots), system gain, FOV, collimation errors, gain disparity of all types of NVDs	LAN-C1 light source, CNV12100 collimator, CNV950 collimator, LP1N luminance probe, CLAN-C1 controller, PS1 power supply, BP-C base platform, PP1 positioning platform, set of aperture reducers, PP2 positioning platform, CNV421 collimator, OB21 optical bridge, USAF 1951 resolution target, three FOV targets, distortion target, set of five dark spot targets, three cross (collimation) targets	typical testing all types of night vision devices: monoculars, sights, cyclops goggles, binocular goggles, binoculars
NVS-C2	focus (infinity checking), resolution (center, peripheral, high light level), screen quality (dark spots), system gain, FOV, collimation errors, gain disparity, MRC, distortion of all types of NVDs	LAN-C2 light source, CNV12100 collimator, CNV950 collimator, LP1N luminance probe, CLAN-C2 controller, PS1 power supply, BP-C base platform, PP1 positioning platform, set of aperture reducers, PP2 positioning platform, CNV421 collimator, OB21 optical bridge, 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	extended testing all types of night vision devices
NVS-C3	As in NVS-C2 but additionally diopter range and magnification.	Additional DRM diopter range meter and MAG magnification meter	Ultra-extended testing all types of night vision devices

All versions enable also to carry out the following checks.

1. Operational defects (shading, edge glow, flashing./flickering/intermittent operation, emission points)
2. Cosmetic defects (Dark Spots, Bright Spots, Fixed-Pattern Noise, Chicken Wire, Image Disparity, Output Brightness Variation, Image Distortion)

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### 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 NVS station in comparison to other commercially available test systems.

- Much wider test capabilities, especially in case of expanded versions. More parameters can be measured.
- NVS 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 of typical stations is valid only for one type of NVD of specified spectral sensitivity.
- Night vision sights of big apertures up to 120mm (option: 150mm) can be tested.
- 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 4.3*

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