NV10

Go/No go tester of night vision devices



Fig. 1. Photo of the NV10 test station

1 Why Go-No testing of NVDs?

It looks apparently to be a very easy task to do basic performance evaluation of night division devices before important missions: just looking on the image at several far away targets generated be NVD. However practically it is easy to make an error in performance evaluation as user can not notice:

1. wrong focusing of objective/ocular
2. too low image resolution
3. presence of operational defects,
4. presence of significant cosmetic defects.

2 What is NV10 test station?

NV10 is the simplest of a series of station for testing night vision devices offered by Inframet. It is a small portable test station optimized to carry out very basic tests of NVDs (monoculars, monocular goggles, binocular goggles) before important missions. In detail, the task of NV10 station is to check resolution of tested NVD at two illuminance levels and to enable optimal focus of oculars and objective of the tested night vision device. It can be also use to for basic checking of operational defects and cosmetic defects.

3 How NV10 works?

NV10 station works as a single channel image projector. The station projects an image of a resolution target on an uniform background into direction of tested NVD located opposite to station optics. Light intensity of can be regulated at two steps to simulate typical light conditions that can be met during potential missions. The target is typically USAF1951 resolution target recommended by majority of military and civilian standards. It simulates the resolution target located at a single fixed distance: optical infinity (distance over about 250m). The station is characterized by compact size, small mass, extremely long battery operation time power and very simple operation.
Due to its single channel design it optimal to use NV10 for testing single channel night vision devices like monoculars, monocular goggles but it can be used also for basic tests of binocular goggles. However, in case of airborne night vision binocular goggles it is highly recommended to use more advanced dual channel test station coded NV20.

4 Block of NV10 set

Basic blocks of NV10 set: NV10 test station, set of positioning adapters, batteries, battery charger, transportation box, microfiber lens cleaning cloth, user manual.

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5 Technical specifications

Parameters	**NV10**
Active aperture of the collimator	35mm diameter
Resolution of collimator	> 8lp/mrad
FOV	32º
Light Source	LED 730nm
Distance to simulated target	Optical infinity (distance over 250 m)
Simulated illuminance levels	Low – approx. moonless night sky illumination High – approx. quarter moon sky illumination
Light level	Low: Approx. 0.25mlx for Gen II/Gen III High: Approx. 25mlx for Gen II/Gen III
Target type	Dark USAF 1951 pattern on bright background
Resolution of target	0.12 lp/mrad to 6.84 lp/mrad
Dimensions	160x125x100 mm
Mass	1kg
Powering	Battery CR123A
Battery operating time	At least 20 hours (at low illuminance mode)
Reliability	>10000 hours
Operating temperature	–10°C to 40°C
Calibration	traceable to ILAC MRA
Recalibration interval	At least once per three years

*specifications are subject to change without prior notice

6 NV10 versus TS-4348/UV

NV10 is typically compared with TS-4348/UV tester. TS-4348/UV is a simple, low cost, small, light device manufactured in past by an US manufacturer. At present great majority of Go-No testers of NVD used world wide are TS-4348/UV testers or clones of this tester.

There is a series of similarities of NV10 and TS-4348/UV:

1. The operating principle of both devices is the same. User familiar with TS-4348/UV tester shall immediately know logic of use of NV10.
2. Both devices use USAF 1951 target placed in the optics focal plane to project image of this target in direction of tested NVD (the target is slighly modified in case of TS-4348/UV),
3. In both cases the preferred test configuration is to put tested NVD looking down over the tester located on any horizontal platform.
4. The FOV of both devices is similar: the NV10 has 32 degrees and the TS-4348/UV has 30 degrees.
5. Both devices use NIR LEDs as light source. NV10 having a wavelength of 730 nm and the TS-4348/UV having an 800 nm wavelength. This difference does not affect the results, as both wavelengths are within the sensitivity band of the IIT's Gen II and Gen III and within the transmission band of the Class B filter.
6. Both devices use a set of mechanical adapters for easy positioning of tested NVD relative to optics of the tester.
7. Both devices are battery-powered.

There are some differences of NV10 and TS-4348/UV:

1. The NV10 uses optics of 35mm aperture when TS-4348/UV uses of smaller optics of 11mm aperture.

2. The NV10 is calibrated in photometric units when the TS-4348/UV in radiometric units. Both devices are calibrated taking into account the sensitivity of typical Gen II and Gen III image intesfier tube but photometric units are easier for interpretation for typical users (illumination is typically measured in photometric units)
3. Dimensions/mass of NV10 are slightly higher over dimensions/mass of TS-4348/UV.

The first difference means that TS-4348/UV projects only small beam of rays that passes through center of optics (diameter about 11mm) of tested NVD. Practically it means that tests using TS-4348/UV give information about quality of image generated by center of optics of tested of NVD when tests using NV10 give information about quality of image generated by full optics of tested of NVD. This is critical difference that shows significant superiority of NV10 over TS-4348/UV. Only tests using NV10 can give reliable information about performance of tested NVDs.

It can be said that designers of NV10 sacrifice slightly mass and dimensions but achieves tested of much better optics that enables of more accurate tests. It should be noticed that slightly bigger mass/dimensions of NV10 does not significantly impact its use. The small difference is not noticeable in typical use: place the device on a table to allow for easy manipulation of the objective lens and eyepiece of the tested goggles.

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