NV20

Field tester of binocular night vision goggles



Fig. 1. Photo of the NV20 test station

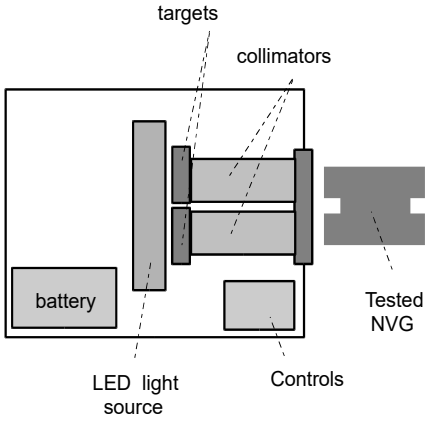


Fig. 2. Block diagram of NV20 test station

BASIC INFORMATION:

Military forces, paramilitary organizations, and civilian organizations have suffered losses due to accidents at night conditions. It has been proved that performance defects of binocular goggles or improper settings are one of main reasons of accidents during night missions. Due to this reason it is recommended to carry out mission readiness tests.

NV20 station is a test station optimized to carry out basic tests of binocular NVGs before important missions. In detail, The NV20 is a portable system that projects in image of resolution target of variable light intensity for both channels fo tested NVGs. The station enables to carry out a series of important a alignments/check: focusing of all lenses, checking inter-pupillary distance, checking adjustment of the goggle mount for tilt and eye relief, resolution check, operational defects check, collimation error check.

The station due to its compact size, small mass, battery power and simple operation can be used at field conditions as part of support equipment for night operations.

TEST CONCEPT

NV20 station works as a dual channel image projector. The station projects an image of a resolution target on an uniform background into direction of tested NVG located opposite to station optics. Light intensity of can be regulated at several steps to simulate typical light conditions that can be met during missions.
The target is typically USAF1951 resolution target recommended by majority of military and civilian standards. The USAF1951 resolution target used by NV20 station is directly correlated to Snellen scale resolution target and enable determination of visual acuity range of human observer at range from 20/20 to 20/70. Typical NV20A station simulated resolution target at optical infinity. Step regulation of distance to simulated target is possible for advanced version NV20B. Two distances are simulated: optical infinity (distance over 1km) and distance about 20m.

TEST CAPABILITIES

Typical NV20 station enables:

1. to focus properly both objectives and oculars of tested NVDs (version NV20A- only infinity distance; NV20B/C versions : two simulated distances are possible: infinity and about 20m (option 12m),
2. check inter-pupillary distance,
3. check adjustment of the goggle mount for tilt and eye relief
4. to check if image resolution is better than specified limits at different operational light conditions, including high light level conditions,

5. to check if image generated by NVGs is free from operational defects (shading, edge glow, flashing,/flickering/intermittent operation, emission points): NV20B/C versions
6. to check relative collimation of both channels (NV20A/B- rough mechanical alignment check, NV20C – precision optical measurement)

Proper focus – situation when NVGs generate sharp image of all targets located at typical operational range from about 20 m to infinity without necessity to do any refocusing for both channels.
Operational procedures of NV20 to carry out focusing, to check inter-pupillary distance, and check adjustment of the goggle mount for tilt and eye relief are identical as procedures recommended by military/civilian aviation authorities accepted over the world.
Attention: NV20 is a station for basic tests of NVGs at field conditions. Other test stations like NVT, NV14 or Nimax are recommended for advanced tests of NVGs.

VERSIONS

Three versions of NV20 station of different design and different test capabilities are offered: NV20A, NV20B and NV20C. All three versions externally look similar.

NV20A can be treated as equivalent to typical mission readiness test stations offered on international market. NV20B and NV20C stations significantly exceed performance of typical test stations.

NV20A station is basically a tool to check to check focus for target located at infinity, check inter-pupillary distance, check adjustment of the goggle mount for tilt and eye relief, and resolution at night conditions.

NV20B station enables additionally to check performance at high illumination conditions (flare or other artificial sources) and to check full focus for typical operational range from about 20 m to infinity.
NV20C is practically NV20B station with additional ability to generated fused image generated by both channels. This image is used to check if collimation errors between two channels are within accepted limits. It can be also used for easy aligning of optical axis of both channels of binocular NVG if the manufacturer enable mechanical tools for such regulation to be done by users– most manufactures do it.

Detail differences between these versions are listed below. Detail specifications of NV20C is not presented because parameters of NV20C are practically the same as for NV20B station but NV20C enables also to check collimation errors.

Table 1. Main design differences between NV20A and NV20B/C

Parameter/feature	NV20A	NV20B/C
Number of illuminance levels of simulated scenery	two	Four (including bright level 200lx)
Type of simulated scenery	Bright USAF1951 target on black uniform background	Dark USAF1951 target on bright large uniform background that fill FOV
Number of simulated distances	One (optical infinity)	Two (optical infinity and about 20 m)

Table 2. Differences in test capabilities between NV20A and NV20B

Test capability	NV20A	NV20B
Focusing of objectives and oculars	Yes (but at single distance equal to infinity)	Yes (but for two distances: about 20m and infinity)
Checking center resolution	Yes. Bright resolution target on black background. Negative contrast.	Yes. Dark resolution target on bright background (positive target contrast according to recommendations of most standards)
Checking bright level resolution (simulation of flare conditions)	No.	Yes. Resolution tests at 200lx illumination.
Checking operational defects	Not possible at background	Yes. Bright background enables easy detection of operational defects

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NV20A SPECIFICATIONS

Modules	Modules: NV20A base block, PS12/3 external AC power supply, battery set, wall adapter, tripod, transport box
Light Source	Monochromatic area LED source calibrated to simulate 2856K color temperature polychromatic light source
Number of optical channels	2 (user can see image in two eyes if using binocular NVGs)
Aperture of built in collimators	at least 35 mm
Collimator resolution	at least 10 lp/mrad
Simulated scenery	Bright USAF1951 target on black background
Spatial frequency range of resolution target	At least from 0.5 lp/mrad to 1.78 lp/mrad Snellen scale: approximately 20/20 to 20/70
Distance to simulated target	Fixed: optical infinity (distance over 200m)
Simulated illuminance levels	Two switchable levels: Low: 2 mlx, High: 64 mlx
Power	1)Internal battery, 2)230/110 VAC 50/60 Hz
Positioning	NV20A can be located on a table, on tripod or fixed to wall
Operating temperature	-5°C to 40°C
Average life time of LEDs source	>10000 hours
Mass of NV20A base module	<8kg
Dimensions NV20A block	353x195x263mm (without handles) 401x195x263mm (including handles)

NV20B SPECIFICATIONS

Modules	Modules: NV20B base block, PS12/3 external AC power supply, battery set, wall adapter, tripod, transport box
Light Source	Monochromatic area LED source calibrated to simulate 2856K color temperature polychromatic light source
Number of optical channels	2 (user can see image in two eyes if using binocular NVGs)
Aperture of built in collimators	at least 35 mm
Collimator resolution	at least 10 lp/mrad
Simulated scenery	Dark USAF1951 target on uniform bright background
Spatial frequency range of resolution target	At least from 0.5 lp/mrad to 1.78 lp/mrad
Distance to simulated target	Variable: optical infinity (distance over 2 km) or 20m
Simulated illuminance levels	Four switchable levels: Low: 2 mlx, Medium: 16 mlx, High: 128 mlx, Bright level: 200lx
Power	1)Internal battery, 2)230/110 VAC 50/60 Hz
Positioning	NV20A can be located on a table, on tripod or fixed to wall
Operating temperature	-5°C to 40°C (option -25°C to 40°C)
Average life time of LEDs source	>10000 hours
Mass of NV20B base module	<8kg
Dimensions NV20B block	353x195x263mm (without handles) 401x195x263mm (including handles)
Accessories	wall adapter, tripod

NV20C SPECIFICATIONS

NV20C is practically NV20B station with additional ability to generated fused image generated by both channels. This image is used to check if collimation errors between two channels are within accepted limits. It can be also used for easy aligning of optical axis of both channels of binocular NVG if the manufacturer enable mechanical tools for such regulation to be done by users– most manufactures do it.

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CALIBRATION

Calibration of NV20 station is done using meters traceable to EU metrology system. Recommended recalibration interval is at least once per three years.

SUMMARY

NV20A can be treated as equivalent to portable test stations offered by competitors. NV20B and NV20C test stations are much more advanced and offer more expanded tests comparing to test stations offered by competitors at international market.

*specifications are subject to change without prior notice

Version 5.2

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