



TECHNICAL NOTE

SHOOTING WITH NIGHT VISION GOGGLES (NVGShoot)

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References: Armada International Vol 17 Nos 3 and 5 1993

Night Vision Goggles (NVG) are usually unit power i.e. have no magnification. They amplify what light there is at night using a special tube. The efficiency of the tube depends on its sophistication; there are, in general, two main types, Generation II and Generation III. Generation III are more efficient but the West tries to limit the countries supplied with these. Sights with Gen III tubes may cost twice as much as those with Gen II. Target acquisition and engagement require tubes which give good contrast of the target scene: This may matter more than the greatest light efficiency.

NVG may use a tube for each eye or one tube for both eyes (the latter tend to be cheaper). Some with one tube have the objective lens (the lens which receives the light from the target) not in line with the right eye so cannot be used for aiming rifles and other shoulder fired weapons (but see below); such NVG can be used to aim hand guns or pintle mounted machine guns where the weapon can be offset to compensate.

The weapon sight itself can affect the use of NVG apart from preventing the NVG seeing into the sight.

NVG should be focussed at infinity for weapon shooting. This means that open sights are not in focus and cannot be used.

The aperture of NVG is, ordinarily, about 20 mm. Telescopic sights are designed with an exit pupil of about 6 mm to match the pupil of the eye. So the light getting into the NVG is 6 squared/ 20 squared or about one tenth of what it should be. Telescopic sights have thick rims which prevent sampling the view through them. Ring Sight MC-10-90, a solid glass unit power telescopic sight, if mounted on the gun suitably so that it only fills part of the NVG objective, can be used successfully.

Reflex collimator sights, like the larger Ring Sights, can have apertures as large, or larger than, the NVG. So the NVG is only limited by the light of absorption in the sight. Use of a solid glass sight with a dichroic beamsplitter reduces this absorption to a minimum. The NVG looks directly through the sight and sees the graticule against the target scene. These sights, for example Ring Sight LC-40-100-NVG, are used on machine guns and cannon.

Smaller reflex collimator sights have apertures from 14 mm down to 7 mm. These fill only part of the objective lens of the NVG; with proper design their surround is kept to a minimum; the rest of the NVG aperture is unobstructed and the NVG performance is kept high. The firer has to have the NVG aperture in the right place; this needs some training.

NVG look straight out from the eye. On existing rifles or other shoulder fired weapons the sight

line may be too low for the firer using NVG to get his head in the right position. So a reflex collimator sight (or MC-10-90) for use with NVG must be positioned correctly, probably on top of a telescopic sight or on an extension piece. If a reflex collimator is positioned for normal day use, an extension prism can be fitted to periscope the sight line to a convenient height for NVG.

The length of the monocular NVG can also affect the position of a reflex collimator sight since the NVG must fit between the firer's head and sight. But, since reflex collimator sights have considerable eye freedom (unlike telescopic sights) they can still be used with the naked eye when at a point which allows a monocular NVG to be accommodated.

To make the graticule easily visible it is best to light it artificially. This can be done by betalight or LED. The graticule does not need to (in fact must not) be bright; as a result the current drain with an LED is low - under one milliamp. The brightness can be adjusted manually for use in low light by the naked eye and by NVG at night. Or the brightness can be controlled automatically by an integral photodiode (as in the EPC); this may be militarily preferable; the lowest light level is chosen to suit NVG at night.

To avoid undue current drain, and too short a battery life, the LED should only be switched on when required. The day graticule should be visible to the naked eye in the day lit by the ambient light. When the ambient light is too dim the LED is switched on.

So, to sum up for rifle shooting with NVG:-

The NVG and the rifle sight must be compatible

Open sights are no good

Telescopic sights, while often useable, spoil the NVG performance

Reflex collimator sights, especially Ring Sights which have minimal surrounds to them, are easily used with NVG

For hand guns the same applies except that the sight can be lined up with any NVG objective position.

Sights for machine guns and cannon, especially those used with large leads for shooting at aircraft, have large enough apertures for NVG to see through. Such sights need good light transmission to give the best NVG performance; this is provided in Ring Sight LC-40-100-NVG.