

## Basic Night Vision Training

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**N**ight Vision Goggles (NVGs) have been in military use by USAF and US Marines since late 1960s during Vietnam war. The tremendous success of NVGs during air warfare was well established as an unforeseen force multiplier in Gulf war in early 90s and subsequent conflicts in Bosnia and Kosovo in late 90s. Today, almost all the Air Forces of the world and Armies with effective air wings are rapidly adopting night warfare strategies.

One of the most important and versatile night vision devices in any night air warfare scenario constitutes the use of Night Vision Goggles. This device is a helmet mounted electro optical device based on image intensifier technology and amplifies the image made by the available light in the night scene. Presently available NVGs can intensify ambient light to about one thousand times (1000x) [1].

By increasing the situational awareness, it enhances the manoeuvrability and navigation, which in turn facilitates better air-to-ground tactics leading to improved mission effectiveness. This device is portable, helmet mounted and can be used effectively in low altitude aircraft operations under minimal moon light conditions. Modern NVGs are capable of operations even in the starlit night effectively.

The essential features of NVG vision include monochromatic image in a field of view reduced to a cone of 40 deg with diminished visual acuity as compared to daytime vision [2]. Consequently, pilots have to continually turn their heads to see to the sides. NVGs, which are

sensitive to the slightest amount of light, work off ambient light from the moon, stars and city lights, while excessive light can blind a pilot.

### NVG Lab and Training facility

The NVG Lab and Training facility was established in Nov 2001 at IAM, IAF with the following objectives :-

- (a) For objective ground trials of all Night Vision Devices for aviation purposes.
- (b) To evaluate NVG anchoring systems on the helmet and shift of CG of helmet assemblies.
- (c) For indoctrination of aircrew and medical officers.

The NVG Lab and Training facility consists of the following sections:-

**(a) Long corridor.** The corridor is 144 ft in length and with a mirror placed at the far end, the effective distance becomes 288 ft. This corridor is used to demonstrate the following:-

- (i) Perspective of a lighted runway and Distance To Go Markers from a height of about 250-300 ft AGL.
- (ii) Effects of cultural lights on ground.
- (iii) Effects of cockpit lighting on instrument panel and
- (iv) Loss of colour discrimination.

**(b) Multi-Terrain Model Room.** This room demonstrates desert terrain, plains with town and mountainous terrain under varied lighting conditions from quarter moon to full moon illumination and also with an option to select the

angle of illumination. The effects of a bright source of light on the image can also be demonstrated.

(c) **Eye Lane Room.** This room is used for the following purposes:-

- (i) Teaching NVG focussing procedures.
- (ii) Checking visual acuity through the NVG.
- (iii) Checking the field of view through the NVG.
- (iv) Checking NVG view for distortions.

### **NVG Training**

Proper and thorough initial training of the inexperienced aircrew is essential. Aircrew need to understand how the goggles work, the complexity of the sensor/eye/brain interpretation of imagery and how to recognise adverse situations as they arise. The aircrew should be familiar with the physiology of night vision, proper focussing procedures and use of NVGs, limitations of NVGs and different disorientation phenomena which occur under varying ambient light levels.

In UK, Royal Air Force Shawbury conducts the NVG training for a week-long period for the helicopter aircrew of the three services in the Bell Griffin HT1 aircraft [3].

In the USAF, the emphasis on night operations has made the development of NVG training increasingly important. The Warfighter Training Research Division of the Air Force Research Laboratory [AFRL/HEA] has been developing and distributing such training since 1990 [4]. The Air Education and Training Command identified NVG training as a high priority for pilots who fly the Air Force's primary fighter aircraft, the F-16 Fighting Falcon. Luke Air Force Base, a U.S. Air Force Air Education

and Training Command facility in Glendale, Ariz. conducts an intensive training program for F-16 pilots in which they are trained solely on the night vision goggles for three to four weeks. The training includes academics, sorties in the F-16 simulators which are integrated with high-fidelity NVG simulation system and actual flight sorties using the goggles [5].

In India, the first Basic Indoctrination course on NVG for aircrew was started in Mar 2003 at the NVG Lab and Training Facility at IAM, IAF. Helicopter aircrew from all the three services are detailed for this three day course before commencing the flying operations with NVGs. This course reduces the operational induction time for NVG assisted flying.

In the course, didactic lectures are delivered covering topics such as physiology of vision, physics of image intensification and human factor/biodynamic issues of NVGs. Practical hands-on training in the long corridor, multi-terrain model room and eye lane room exposes the inexperienced aircrew to various critical issues related to NVG usage such as achieving desired visual acuity through NVG, operating with a restricted visual field, appreciation of terrain features in a monochromatic image, appreciating terrain under different angles of illumination, visual and neck muscle fatigue and cockpit lighting issues.

### **References**

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