Night Vision Care and Terminology – Quick Tips

Introduction

Night vision products are comprised of image intensifier tubes and optics that amplify existing light to allow a person to see in conditions that are too dark for the naked eye. All night vision products work on the principle of collecting light energy (photons), converting that energy into electrical energy (electrons), multiplying the electrical energy and converting it back to light when the electrons strike a phosphor screen similar to a television.

Applications for night vision include:

- Security, to scan surroundings or property for intruders or illegal hunters
- Search and rescue, to spot lost people in low-light situations
- Natural disasters, to see when electrical power is out for extended periods
- Wildlife studies, to remain undetected while observing wildlife at night

Night Vision Generations

The term generation refers to a major advancement in technology regarding image quality and tube life.

Generation 0: This technology, while impressive in its time as the first night vision equipment, depended on an infrared light source to supplement available light to produce an image. These images were fuzzy and distorted and range was limited by the strength of the infrared source. The tube, which is the heart of any night vision system, generally lasted only a few hundred hours of use.

Generation 1: These devices use improved electronics to produce an image without the need for an external light source, but image quality and tube life are still low. Generation 1 technology is found in most starlight or moonlight devices.

Generation 2: Devices marked a major improvement by introducing the micro-channel plate (MCP). The MCP is a glass disk with millions of microscopic holes to multiply and channel the electrons before they reach the phosphor screen. Light amplification for Generation 2 devices is typically 30,000 times.

Advanced night vision: Is not a separate generation, but rather a separate

technology advanced by Bushnell that is comparable to Generation 2. Instead of using a micro-channel plate, fiber optic bundles eliminate distortion and noise to produce a high-resolution image.

Generation 3: Technology is even more sensitive by using gallium arsenide (GaAs) in the photocathode. This is the component responsible for converting photons to electrons, and the GaAs creates significantly more photoelectrons than with Generation 2. Light amplification for Generation 3 devices is typically 50,000 times.

Night Vision Terminology

Angle or field of view: The widest dimension of the circular viewing area seen through the device, often expressed in feet at 1000 yards distance.

Bright source: A bright source is an electronic circuit that turns the power down or off when exposed to light, thereby protecting the image intensifier.

Eyepiece focus: The focus used to match a night vision device to a persons specific eyesight.

Intensifier tube: These tubes amplify light to present a usable image.

Objective lens: Collects available light and focuses it on the image intensifier, along with providing magnification.

Phosphor screen: A green screen located at the back of the intensifier tube. The phosphor screen makes the image become visible.

Photocathode: This component converts the photon energy into electrons to be amplified in the intensifier tube.

Night Vision Care and Maintenance

The most important point is to keep the device off in the light. Exposure to bright light can damage the components, and reduce the life span of those devices featuring a bright source protection. Though designed for use at night when humidity and dampness can be high, exposure to rain, fog or extended periods of high humidity can also damage these devices. Lenses should be cleaned similarly to those of a camera, and can easily be scratched if abrasive material is used. Cool, dry places are best for long-term storage.

Commonly Asked Questions

Q: Why don’t night vision devices have higher magnification?

A: Magnification results in a decrease in the amount of light available to amplify.

Q: How long do these devices last?

A: Providing there have not been exposures to light, intensifier tube life increases as the generation increases. Generation 0 and 1 products tend to last in the neighborhood of 400 hours, while the operational life of Generation 2 devices is around 5,000 hours, and Generation 3 devices have an ion coating on the MCP which increases life to 10,000 hours of use.

Q: Can these be used in total blackness?

A: No, night vision amplifies the small amount of existing light, so they require some light in order to operate.

Sources

Night Owl Optics®
Bushnell®