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The Next Generation of Night Vision Goggles

A Lightweight Binocular Designed for SOF Missions

Harris Corporation

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Customer Experience is Shaping Night Vision Technology

In the more than 60 years since Harris Corporation developed its first image intensifier tube, night vision technology has become an indispensable warfighting tool.

Each succeeding generation of devices has added new capabilities, and most versions of today's military night vision goggles (NVGs) offer similar features and user benefits across common tactical applications.

Special Operations Forces, however, face unique challenges in today's dynamic battlespace and have requirements that have not been fully addressed in currently fielded systems.

These limitations include lack of an integrated illuminator or an adjustable diopter lens, diminished focal range for very close-in activities, the weight of the device, cost challenges and maintenance issues.

This paper discusses new night vision technology from Harris, how it addresses current limitations, and the specific benefits it offers for SOF missions over existing products.

Harnessing the Darkness

The Harris F5032 Lightweight Night Vision Binocular is a military-grade, image intensified, dual-tube binocular that can be operated helmet-mounted, head-mounted, or in a hand-held configuration. Part of the 500-gram weight class of LWBs, the F5032 is designed for agility in must-succeed moments.

The F5032 is equipped with high-performing Stealth dB Generation 3 image intensifiers (discussed later in this paper). Traditional night vision binocular features are included, but unlike currently fielded devices, the F5032 is optimized for tactical operations requiring the highest levels of stealth, agility, flexibility, and self-sustainment. The F5032 is specifically designed to meet the unique requirements of SOF missions – a lighter load, better optical performance, enhanced safety and faster mission readiness.

Reducing Equipment Load

Integrated IR Illuminator

Compared to other lightweight binocular (LWB) systems, the F5032 is the first to be equipped with an integrated, forward-projecting LED infrared illuminator and indicator that can be turned on and off by the operator as the mission changes. This capability, in direct response to user input, eliminates the need to carry a separate IR illuminator, resulting in:

- Reduced operator equipment load
- Simplified mission preparation (fewer pieces)
- Elimination of potential loss of illuminator
- New tactical possibilities in areas of zero light
- Expanded mission capabilities

Enhancing Optical Performance

Close-Focus Range

The F5032 close-focus capability is a minimum of 25 cm (~9 inches) versus other LWB systems, which have an 18-inch minimum focus. This allows users to conduct near-eye functions such as:

- Reading printed map details
- Close medical support
- Expediting critical weapons repairs and clearing
- Enabling radio operation and reconfiguration
- Explosive ordnance and site exploitation

Vertical Viewing Capability

Maximum viewing range is essential to mission success. The F5032 supports vertical viewing capability of 105 degrees and does not shut off automatically unless it is placed into the stowed position.

Glass Optics

The F5032 uses a combination of glass and plastic lenses to achieve superior optical performance. Rather than using all plastic optics and compromising overall system performance, this combination allows for an optimal weight versus performance result.

Increasing Safety and Comfort

Light Emission Security with Auto Goggle Shutoff

Not all of today's NVGs turn off automatically, potentially revealing the user's position to the enemy. To ensure light security, each F5032 monocular switches to a standby, non-powered state when stowed, and returns to operation when rotated back in front of the eye.

Zero Acoustic Emissions

The F5032 is the only LWB with Stealth dB technology, the latest class of power supply, which provides silent operation by eliminating acoustic emissions associated with standard, auto-gated power supplies. This evolution in Generation 3 performance provides zero audibility in starlight conditions and below with virtual silence at higher light levels.

Traditional gating/auto-gating frequency tends to be close to the harmonic frequency of the Microchannel Plate (MCP). The continual excitation of the MCP – from switching the cathode voltage from the power supply during tube operation – causes the MCP to flex. This flexing forces the edges of the MCP to rub against the components holding it in place, causing a vibration that is transferred out of the tube, creating the sound. Stealth dB technology changes the forcing function, eliminating acoustic emissions.

Individual Flip-Out Stow

The F5032 is engineered with individual monocular flip-out stow, providing a low profile and reduced silhouette when the system is flipped back against the helmet. For momentary configuration changes, the user can flip away each monocular separately. With both monoculars flipped away and up, the system stows along the contour of the helmet, reducing silhouette and neck strain and minimizing the danger of system damage. The monocular stows flat against the helmet.

Figure 3. In addition to providing individual monocular functionality, the flip-out stow provides a significant improvement in stowed head-borne inertial loads and snag reduction.

Figure 4. The images above show both the independent rotation and monocular standby state.

Speeding Mission Readiness

Fixed or Adjustable Diopter Lens Configurations

The F5032 is mission-centric, providing both fixed and adjustable diopter lens configurations. The fixed diopter, favored for SOF deployment, delivers lighter weight night vision capabilities tailored to an individual soldier's vision. The adjustable diopter option, used for general deployment, allows the lens to be adjusted depending on individual warfighter's needs. Having both options improves deployment flexibility over significantly wider use populations because it:

- Fits all soldiers
- Eliminates the need for multiple custom diopters, yet
- Offers the ability to custom fit the diopters in a lower weight configuration

Swappable Image Intensifier Modules

Today's rapidly changing missions require night vision systems that are agile. Unlike models currently in the field, the F5032 is designed so that the standard MX-10160 image intensifier tube can be removed and replaced at the unit level, without sending the goggle back to the factory. This unique service level supports:

- Faster repair turnarounds at lower cost
- Less equipment testing in the field
- Lower skill level requirements from field technicians

Unified Master Switch

The F5032 includes a Unified Master Switch to control goggle function without requiring access to multiple switches in different locations. This integrated control switch increases the system's flexibility, simplicity and speed of use in very demanding conditions.

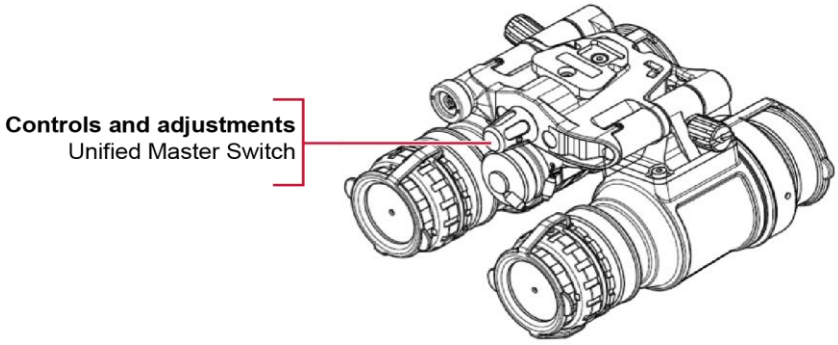

Figure 5. The Unified Master Switch is located on the front of the binocular, and controls on/off, manual brightness, IR on/off and momentary, and will turn off (for training) the high-light cut-off and standby-off functions.

Summary

Today's tactical forces require night vision systems that support speed, flexibility, accuracy and safety. They must have maximum vision capabilities to operate, succeed, and remain safe in low- and zero-light areas such as caves, buildings and underground tunnels.

The F5032 incorporates the latest leading-edge technology, providing the features of a traditional lightweight night vision binocular with new capabilities and options previously unavailable. These capabilities lower the size, weight, and power burden of the warfighter while significantly increasing performance advantages. They also directly reduce lifecycle costs by making it easier to maintain the system.

A diagram of the F5032 components follows. A marketing datasheet, which details the operation and functionality of the F5032, is available upon request.

Body Assembly

- Optical alignment – hinges to maintain line of sight
- Electrical power:
  - Single internal “AA” battery
  - Connector for external battery pack
- Openings for attachment of neck cord

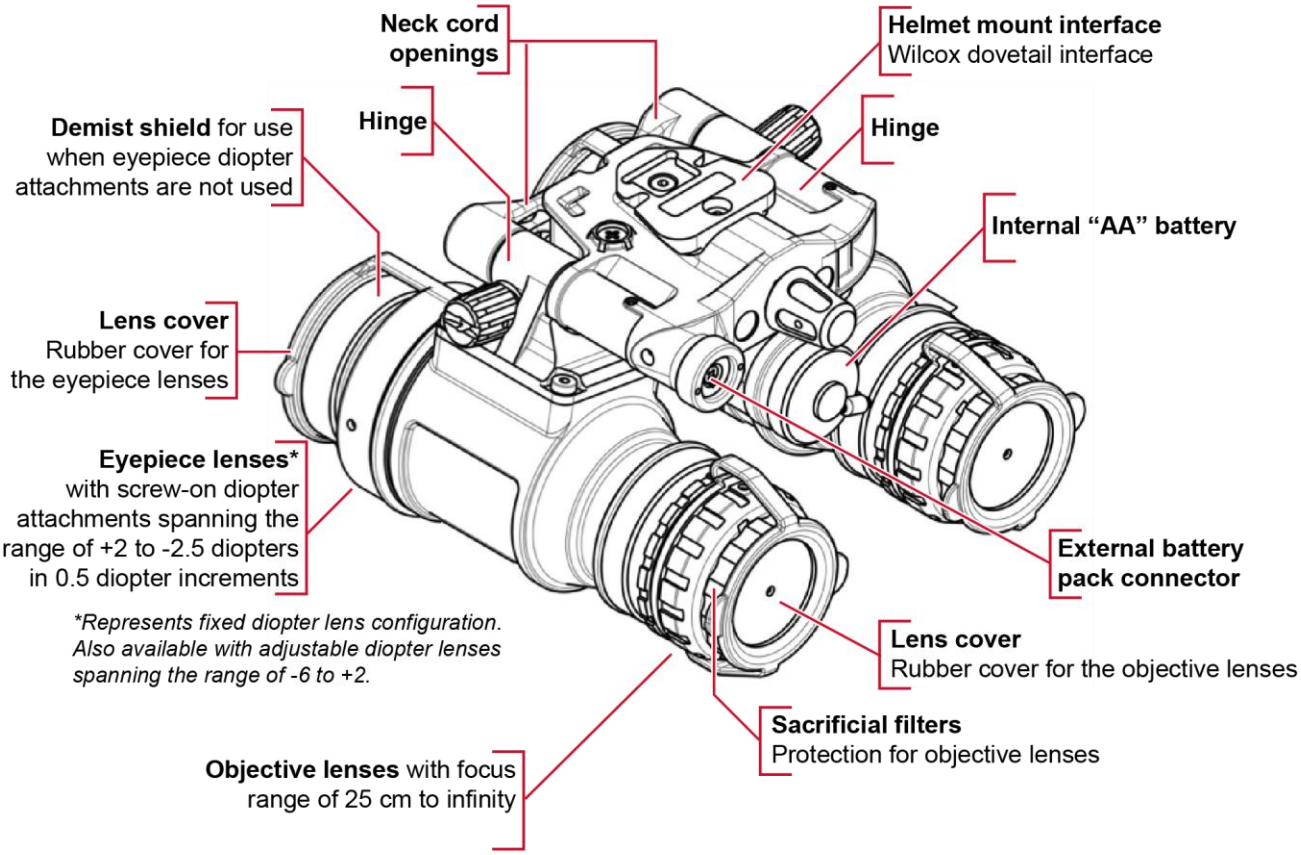

Figure 6. Harris F5032 illustrated components.

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