

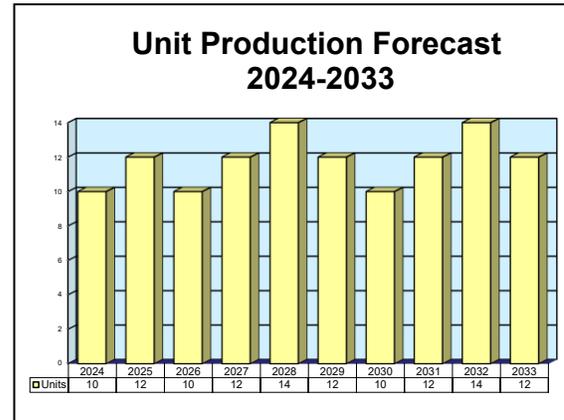
ARCHIVED REPORT

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Panoramic Night Vision Goggles

Outlook

- Systems have been evaluated by crews of USAF A-10 Thunderbolt, MC-130, and AC-130 aircraft for integration into other technology
- Ground version (GPNVG) will likely continue to be promoted and purchased in the years ahead



Orientation

Description. Helmet-mounted Panoramic Night Vision Goggles (PNVG) provide 95° horizontal field of view (FOV) for users.

Status. Ongoing support, possible limited production.

Application. PNVG are in use on both rotary- and fixed-wing aircraft, such as the A-10 Thunderbolt and the MC-130 Combat Talon.

Price Range. U.S. procurement documents indicate Panoramic Night Vision Goggles have a unit price of \$59,000-\$60,000. The actual price will vary depending on the quantity purchased.

Contractors

Prime

Elbit Systems of America, Night Vision	http://www.elbitamerica.com/night-vision , 7635 Plantation Rd, Roanoke, VA 24019 United States, Tel: + 1 (540) 563-0371, Fax: + 1 (540) 366-9015, Co-producer
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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 75 Glen Road, Suite 302, Sandy Hook, CT 06482, USA; rich.pettibone@forecast1.com

Technical Data

PNVG have a 95° FOV and use four 16mm format image intensifier tubes, as opposed to the traditional 18mm tubes. PNVG are being evaluated on several U.S. Air Force platforms, including the A-10, F-15, F-16, and HH-60. PNVG have been integrated into the Joint Helmet-Mounted Cueing System (JHMCS) to give

it nighttime capabilities. PNVG are also being designed to protect the eyes of aircrews from lasers.

A Ground Panoramic Night Vision Goggle (GPNVG) variant in use by U.S. Special Forces features a 97° panoramic field of view and, like the original version, uses four image-intensified tubes to create the FOV.

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Source: U.S. Air Force

Program Review

Background. Until the advent of PNVG, U.S. military fixed- and rotary-wing aircraft generally used Generation III night vision devices, which are able to detect near-infrared waves. Although these goggles increased the effectiveness of night missions, they are bulky and have a limited 40° FOV. This limited FOV was considered a significant contributing factor to the drastic increase in U.S. Army aircraft accidents between 1987 and 1992.

Concerned about the high accident rate, the U.S. military set criteria for new night vision goggles. They were to be lightweight, low profile, ejection compatible, and helmet-mounted, with an FOV greater than 60° and the capability for head-up display (HUD) symbology.

Significant steps were made in the development of such devices. In 1997, the U.S. Army Night Vision and Electronic Sensors Directorate tested an early prototype of Panoramic Night Vision Goggles aboard an AH-1 helicopter at Fort Carson in Colorado. After using them in low-level missions at night over mountainous terrain, pilots gave PNVG a favorable performance assessment.

Further PNVG evaluations were performed in 1999 on rotary-wing aircraft. At Fort Rucker, the goggles were used aboard OH-58, UH-60, and CH-48 U.S. Army rotorcraft. In a cooperative effort among the U.S. Army Aeroflightdynamics Directorate, NASA, and the U.K. Defence Evaluation and Research Agency, PNVG were used during precise, low-level maneuvers to test pilot performance and workload. The NAH-1S Cobra was used in the U.S., and the Lynx Mk 7 in the U.K. The tests, which also incorporated a restriction of FOV from 20° to 100°, demonstrated that performance increased as the FOV increased.

Prime Contractors Chosen, Awarded Initial R&D Contract

With successful test results and an increased FOV of 100°, PNVG appeared to have significant support. In April 2000, Insight Technology was awarded a contract for R&D of Panoramic Night Vision Goggles for U.S. Army and Air Force rotary- and fixed-wing aircraft.

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Another series of tests was conducted during spring 2000. The tests were used as the basis for an evaluation of the performance, workload, and situational awareness differences between AVS-9 night vision goggles and PNVG. Of the three maneuvers tested (landing, bob-up, and pirouette), PNVG fared better in landing and bob-up, but AVS-9 goggles scored slightly better during the pirouette maneuvers.

Despite these favorable reviews, the U.S. Request for Proposals (RFP) to acquire PNVG was delayed indefinitely in 2002 because of a lack of funding for the program. However, under the FY02 Defense Appropriations Act, \$2.5 million was reportedly awarded to Insight Technology for further development of PNVG technology.

This work led to the transition of PNVG technology to the Aeronautical Systems Center for System Development and Demonstration (SDD) and eventual production. For FY02 and FY03, this transition was funded under the Warfighter Rapid Acquisition Program (WRAP, PE#0203761F). A total of \$4.6 million was allocated for the program in 2002, and \$4 million was allocated in 2003.

The PNVG program was ranked third overall on the U.S. Air Force's Unfunded Priorities List for FY03 and was the first individual item on the list. A total of \$8.1 million was requested for the PNVG program, but Congress approved only \$5.7 million.

First Production Contract Awarded

The PNVG program reached a milestone in April 2004 when the USAF issued its first low-rate initial production (LRIP) contract for Block 1 Panoramic

Night Vision Goggles. Later, in October 2004, the Air Force added 145 units to the initial order, to be completed within the same timeframe.

It was reported in July 2005 that the U.S. Air Force and Navy were close to releasing an RFP for Block IV production of PNVG. This effort to drum up competition for production of PNVG was seen as an attempt to ensure the integration of the goggles with the JHMCS was seamless and cost-effective.

In September 2006, the Pentagon awarded Insight Technology a \$9.7 million contract for production of PNVG and related items.

In June 2008, ITT received a \$14 million order for 16mm image intensifier tubes for two advanced aviation programs. The tubes would be integrated into PNVG, as would a Quad-Eye aviation system.

The USAF awarded a \$6.9 million firm-fixed-price (FFP) modification contract in April 2009 to Insight Technology. With this action, PNVG would be procured for LRIP III.

In January 2017, L3 Insight Technology announced it had received the first FAA Technical Standard Order (TSO)-C164a authorization for its M949 Aviation Night Vision Goggle (ANVG).

In June 2018, L3 Warrior Sensor Systems announced the Korean National Police Agency in South Korea had placed an order for the company's Ground Panoramic Night Vision Goggles (GPNVG).

In June 2019, L3 Technologies and Harris merged to form L3Harris.

Contracts/Orders & Options

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Insight Technology	6.4	Apr 2000 – Cost-plus-fixed-fee contract for R&D in support of the integrated PNVG program. Work was completed in Apr 2002. Air Force Research Laboratory, Wright-Patterson AFB, OH, was the contracting activity. (F33615-00-C-6000)
Insight Technology ITT Night Vision	13.0	Apr 2004 – FFP contract to provide 255 Block 1 PNVG and 255 support equipment adapters. Work was completed in Oct 2005. Wright-Patterson AFB was the contracting activity. (FA8607-04-C-2752)
Insight Technology	7.2	Oct 2004 – FFP contract modification to provide an additional 145 PNVG. Work was completed in Sep 2005. Headquarters Aeronautical Systems Center, Wright-Patterson AFB, was the contracting activity. (FA8607-04-C-2752, P00001)

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<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Insight Technology	9.7	Sep 2006 – FFP contract modification to assemble and deliver 145 Block I PNVG and 16 ANV-126-210 adapter kits. Work was completed in Apr 2008. Headquarters Aeronautical Systems Center, Wright-Patterson AFB, was the contracting activity. (FA8607-04-C-2752, P00011)
ITT	14.0	Jun 2008 – Order for image intensifier tubes for use in PNVG.
Insight Technology	6.9	Apr 2009 – FFP contract to procure PNVG; LRIP III. Entire amount has been obligated. Wright-Patterson AFB is the contracting activity. (FA8607-04-C-2752, P00016)
L-3 Communications	9.0	Jun 2016 – FFP, indefinite delivery/indefinite quantity contract for the following visual augmentation systems: Fusion Goggle System, Fusion Goggle Enhanced, Ground Panoramic Night Vision Goggles, and the Ruggedized Ultra-Light Rangefinder utilized by the Air Force and the U.S. Special Operations Command. Work completed May 2021. The Naval Surface Warfare Center, Crane, IN, was the contracting activity. (N00164-16-D-JQ95)

Worldwide Distribution/Inventories

Initially, Panoramic Night Vision Goggles were a U.S.-only program. The government of South Korea purchased the GPNVG version in 2018.

Forecast Rationale

Panoramic Night Vision Goggles (PNVG) have been in service for the crews of several U.S. aircraft platforms, such as the A-10 Thunderbolt, MC-130, and AC-130. The last U.S. Air Force contract award for the system was announced in June 2016.

In June 2018, L3 announced the Korean National Police Agency in South Korea had placed an order for the

company's Ground Panoramic Night Vision Goggles (GPNVG).

While the original PNVG have been discontinued, the GPNVG version promoted by L3Harris will likely continue to be promoted and purchased in the years ahead, especially for use by special forces and security agencies.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Elbit Systems of America												
Panoramic Night Vision <> United States <> Multi-agencies												
	2,906	10	12	10	12	14	12	10	12	14	12	118
Total	2,906	10	12	10	12	14	12	10	12	14	12	118