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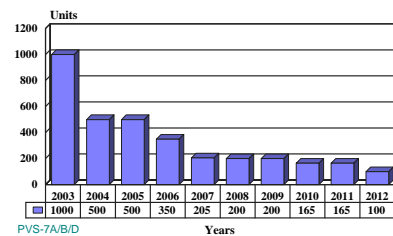
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PVS-7A/B/D - Archived 03/2003

Outlook

- Production continues
- Rate decreases as newer systems become available
- New operations rely heavily on night vision equipment
- NVG value increases

10 Year Unit Production Forecast
2003 - 2012



Orientation

Description. Third-generation (Gen III) night vision goggles.

Sponsor

US Army

PM Engineering & Logistics

Night Vision/Reconnaissance, Surveillance & Target Acquisition

10221 Burdeck Road, Suite 400

Ft. Belvoir, Virginia (VA) 22060-5806

USA

Tel: 1+ 703 704 3493

Fax: 1+ 703 704 3449

Web site: <http://www.nvrst.army.mil>

Contractors

ITT Corp

Electro-Optical Products Division

7035 Plantation Road NW

Roanoke, Virginia (VA) 24019

USA

Tel: +1 703 563 0371

Web site: <http://www.ittind.com>

(PVS-7A/B production)

Northrop Grumman Corp

Electronic Systems Sector

Electron Devices Division

860 Industrial Road

San Carlos, California (CA) 94070-4194

USA

Tel: +1 408 988 1331

Web site: <http://www.northropgrum.com>

(PVS-7A/B production)

Status. In production, ongoing logistics support.

Total Produced. Through 2002, approximately 141,500 units had been produced and fielded.

Application. Head-mounted night vision goggle for close-up viewing.

Price Range. PVS-7A/B unit cost is US\$3,200. PVS-7D unit cost is US\$2,800 per unit.

Price is estimated based on an analysis of contracting data and other available cost information, and a comparison with equivalent items. It represents the best-guess price of a typical system. Individual acquisitions may vary, depending on program factors.

Technical Data

	<u>Metric</u>	<u>US</u>
Dimensions		
Weight		
PVS-7A/B:	680 grams	23.8 oz
PVS-7D:	700 grams	24.5 oz
Characteristics		
Image Intensifier Tube:	Gen III - MX-10130C	
Scene Illumination:	10 ⁻⁶ to 1 foot candle	
Field of View:	40°	
Magnification:	Unity	
Range (PVS-7D):	180 m (starlight, man-sized target)	
Resolution:	0.76 cy/mr, minimum	
Brightness Gain:	2,000 FI/fL, minimum	
Collimation:	1° +/-1° convergence; ≤ 1/2° divergence	
Diopter Adjustment:	+2 to -6 diopters	
Interpupillary Adjustment:	55 mm to 71 mm	
Eye Relief Adjustment:	15 mm, minimum	
Objective Lens:	EFL 26 mm, F/1.2, T/1.3	
Eyepiece Lens:	EFL 26 mm	
Focus Range:	25 cm to infinity	
Voltage Required:	2.7 Vdc - 3.0-Vdc, battery	
(50mA, maximum)		
Operating Temperature Range:	-51°C to +45°C	
Battery Type:	Two AA-size alkaline or one lithium or mercury (BA-5567 or BA-1567)	
Controls:	Off/On/IR 3-position switch	
Ancillary Items:	De-mist shields (anti-fogging devices)	
	Carrying case, shipping/storage case	
	Sacrificial filter	
	Protective eyecups	
	Lens cover	
	Compass attachment	
	Kevlar helmet mount	
	IR focusing lens attachment	
	3X magnifier (optional)	

Design Features. The PVS-7(V) is a lightweight, high-performance, passive, third-generation image intensifier system. The head-mounted goggle assembly consists of an objective lens assembly, an image intensifier tube, and a binocular eyepiece. The frame is mounted to a face mask that straps to the user's head. The assembly incorporates an infrared light source which provides illumination for close-in viewing.

Initial delivery units were equipped with second-generation (Gen II) image intensifier tubes, but were later upgraded to third-generation (Gen III). The Gen III tubes employ GaAs photocathodes that are about three times more light-sensitive than the multi-alkali photocathodes used in second-generation devices. The newer goggles can be used on overcast nights,

while the earlier second-generation types required at least quarter-moon illumination. The operational life of Gen III tubes is said to be 7,500 hours, compared with 2,000 hours for Gen II.

Operational Characteristics. The PVS-7(V) offers major advantages over the PVS-5(V). It uses one third-generation image intensifier tube, while the PVS-5(V) uses two second-generation tubes. The PVS-7(V) can be worn with a gas mask and weighs 8 ounces less than the PVS-5(V). The PVS-7(V) can be removed from its head mount and used as a handheld system. This increases its utility and allows map reading as well as equipment maintenance. The PVS-7B can also be used with the PAQ-4(V) or similar infrared aiming light to form a Special Forces/Commando system. Typical

fielding is 509 units per infantry battalion and 298 per armor battalion.



PVS-7(V)

Source: DoD

Variants/Upgrades

PVS-7A. Initial version available with either Gen II or Gen III tubes.

PVS-7B. Production version that features M-10130C Generation III image tubes. These have three times the range of any other goggle available and a higher reliability rating.

PVS-7D. Current version which is more sensitive and offers near-IR performance. Designed for use with rifle-mounted aiming lights.

F4937. ITT commercial version of the PVS-7B.

M972. Commercial version of the PVS-7A. M972D is the underwater version.

M973. Commercial version of the PVS-7B. M973D is the underwater version.

Helmet Mount. ITT introduced a flip-up helmet mount for the PVS-7B as part of the Omnibus III contract.

Program Review

Background. In 1976, the US Army began to develop a less expensive version of the PVS-5(V) in an effort to expand its inventory of night vision goggles. Initially, manufacturers received small contracts for this work. Advanced Development was completed in FY81 and Engineering Development began in FY82.

That year, ITT and (then) Litton were each awarded US\$1 million contracts to supply third-generation image intensifier tubes for the PVS-7(V). Development Testing II began in August 1983, and the results showed that the PVS-7(V) outperformed the PVS-5(V).

The Arctic portion of the test showed that the PVS-7(V) was unsuitable for use in cold regions because of cracking problems with the tabs on the face mask, but

that problem was corrected. Operational Testing II was initiated in November 1983. Development Testing II, essentially a checklist to evaluate corrective fixes, was completed in August 1984.

The following year, the US Army awarded Litton and the ITT/Varo joint venture contracts totaling US\$890 million for the development of the consolidated tri-service night vision requirements for the PVS-4(V), PVS-5(V), PVS-7(V), AVS-6(V), TVS-5(V), and VVS-2(V).

The PVS-7(V) will be a primary night vision goggle for ground troops for some time to come because of its flexibility, low cost, replaceable parts, and adaptability to new gas masks and other equipment. The US Army

is replacing the PVS-5(V) with the PVS-7(V) for ground use and the AVS-6(V) for airborne use.

An Omnibus II production award was made in FY90 to extend production of the PVS-7B for four years (FY93) without a break in production between contracts. Intevac, subcontractor to Litton for PVS-7A components, was brought in as a new source to supply the -B model. The contracts of ITT/Varo and Intevac were completed in April 1994. Production for Omnibus III continues with a 60/40 split between ITT and Litton, respectively.

In a November edition of *Commerce Business Daily*, the US Marine Corps announced plans to conduct a market survey to gather information for upgrading selected PVS-7Bs to allow their use in military driving operations. The requirements were that the goggle withstand prolonged submersion in sea water. Kits would have to allow installation at intermediate maintenance facilities using standard tools and equipment. The kit was not to require the use of a case or enclosure for the goggle, but would have to be a minor modification to the existing goggle/lens assembly. Responses were required by the end of 1996.

In August 1997, the Department of Energy announced that it would be soliciting a procurement for up to 240 night vision goggles. The selected system would have to meet all of the specifications and requirements set out for the PVS-7D. Delivery was required by December 1997.

In a June 1999 *Commerce Business Daily*, the Department of Energy, Albuquerque Operations Office,

requested proposals from interested parties for the possible procurement of 40 PVS-7D Generation-3 NVGs. The DoE was leaning toward the ITT or Litton units, and a formal RFP was planned for July 1999.

In September, 2000, the Republic of China expressed an interest in procuring weapons and other equipment through Foreign Military Sales, including 160 PVS-7B night vision goggles. They were part of an estimated US\$405 million FMS request.

National Guard and Reserve Equipment. In the “*National Guard and Reserve Equipment Report for Fiscal Year 2002 – NGRER*” released in February 2001, officials noted that although the National Guard and Army Reserve were receiving some new equipment, they still had a significant inventory of old equipment that could not perform to modernized equipment standards. They said 10,349 PVS-5(V) night vision goggles needed to be replaced with PVS-7Bs for the National Guard. The report also noted that inventory was at 33 percent of the requirement (147,693 units).

US\$3.578 million was budgeted in FY02 for roughly 3,283 PVS-7Bs. Tentative plans for FY03 include 1,611 units, moving to a FY04 goal of 157,817 systems in the inventory.

Transfers from the Active Force to the Reserves would total 2,120 units in FY02, 3,283 in FY03, and 1,611 in FY04. The Army Reserve listed an inventory of 15,537 PVS-7Bs on hand, with an FY04 requirement of 35,526 units.

Funding

	<u>US FUNDING</u>							
	<u>FY02</u>		<u>FY03</u>		<u>FY04 (Req)</u>		<u>FY03 (Req)</u>	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Procurement (US Army)								
Night Vision Devices	-	38.1	-	60.5	-	TBD	-	TBD
Procurement (USMC)								
Night Vision Equipment	-	28.0	-	23.2	-	TBD	-	TBD

Note: Procurement funding is for all types of night vision devices, including the PVS-7(V).

All US\$ are in millions.

Recent Contracts

No recent contracts over US\$5 million listed.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Sep	1985	Non-developmental item (NDI) contract for PVS-7
Feb	1988	Initial fielding
Mar	1990	Omnibus II awards
Jun	1990	Varian contracted for PVS-7B
Nov	1992	ITT and Litton split Omnibus III award
	1993	Marines receive the PVS-7B
	1999	Production continues
Sep	2000	RoC request for FMS
	2002	Production continues

Worldwide Distribution

The PVS-7A/B are exclusive to the **US**, primarily the Army and Marine Corps, with smaller orders from the Navy and Air Force.

Forecast Rationale

The Army “owns the night” because of its significant combat edge during night operations. A tool used to accomplish this goal is the relatively low-cost PVS-7(V). As many as 100,000 units may be available at any one time in the stocks of the US Marine Corps, the Army Reserve, and National Guard units, all of which have lagged behind the active Army in procurement of night vision devices. The 100 percent increase in option awards that were exercised on all aspects of these contracts under Omnibus III, and the sizable procurement funding planned, show the importance both the Army and Marine Corps are placing on acquiring Generation III technology.

Work is essentially complete on the US Army’s Omnibus III multi-year procurement contract, initiated in late 1992 covering the production of an additional 50,000 units from 1993 to 1997.

The production rate will fall off as the PVS-7(V) evolves into its next stage of development, perhaps employing Generation IV technology as new systems move into the marketplace. Department of Energy interest may support a small addition to the expected DoD acquisition through the forecast period.

The Gulf War proved the value of night operations that gave the US force a major advantage. Special Operations in Afghanistan were mostly undertaken at night because of the advantage this gave the troops. This may influence homeland defense planners as well as Reserve and National Guard units. Newer users may pick newer systems in lieu of the PVS-7(V), although cost favors the PVS-7(V). This will be determined over the next couple of years.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Designation	Application	Thru 02	<u>High Confidence</u>				<u>Good Confidence</u>			<u>Speculative</u>			Total 03-12
			03	04	05	06	07	08	09	10	11	12	
PVS-7A/B/D	NIGHT VISION (US)	141500	1000	500	500	350	205	200	200	165	165	165	3450
Total Production		141500	1000	500	500	350	205	200	200	165	165	100	3450