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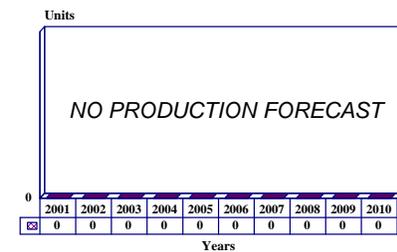
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VVS-2(V) - Archived 03/2002

Outlook

- Some production possible for spares and replacement
- No new contracts made public
- Barring any future activity, this report will be archived next year (2002)

10 Year Unit Production Forecast
2001 - 2010



Orientation

Description. The VVS-2(V) is a passive night driving viewer.

E-mail: khernandez@litton-eos.com
(Production; Gen III upgrades)

Sponsor

US Army
Communications - Electronics Command
Ft. Monmouth, New Jersey (NJ) 07703-5000
USA
Tel: +1 201 532 2534

Licensee

Optechs Korea Inc
291-1 Ga Jwa-Dong
Seo-ku
In Chon 404-205
South Korea
Tel: +82 32 578 1441
Fax: +82 32 578 1442
(South Korean production)

Contractors

ITT Night Vision
7635 Plantation Road
Roanoke, Virginia (VA) 24019
USA
Tel: +1 540 563 0371
Fax: +1 540 366 9015
Web site: www.ittnv.com
(Prior co-production; Gen III upgrades)

Status. Possible production for spares and replacement.

Litton Industries (formerly Varo Optical Systems)

Electro-Optical Systems - Garland Operation
3414 Herrmann Drive
Garland, Texas (TX) 75041-6188
USA
Tel: +1 972 840 5600
Fax: +1 972 271 2195
Web site: www.littoneos.com

Total Produced. According to the manufacturer, through 1998, over 75,000 viewers had been produced.

Application. The VVS-2(V) is a night viewing device designed for armored-vehicle drivers. Typical platform configurations include the M1A2 Abrams, V-150, LAV25 Piranha, M113, M60A3, M48, Armored Infantry Fighting Vehicle, M109 Howitzer, T54, PT76, and Fox NBCRS.

Price Range. The unit price is estimated to be between US\$6,000 and US\$10,000.

Technical Data

Characteristics

Field of View:	45° horizontal x 35° vertical
Total Field Coverage:	135° horizontal x 35° vertical
Depth of Focus:	4 meters to infinity
System Resolution:	1.25 milliradians
Linear Distortion:	Less than 9% over entire image
Image Intensifier:	25 mm, Generation II
Power Supply:	28 V DC from vehicle, or internal lithium battery

Design Features. The VVS-2(V) night viewing system is a second-generation, passive (non-visible-light-emitting) light amplification device. The VVS-2(V) allows a vehicle to be driven under night conditions without illumination. The area viewed is presented in varying shades of green, from near white to near black, with lighter reflections making up the brighter relief.

The system includes an objective lens assembly, an entrance window housing assembly, a main housing assembly composed of an electronic power control and electric power adapter, a low-level image intensifier, a 4-inch cathode ray tube (CRT), an eyepiece assembly, and a mounting device. The unit is light enough to be installed from within the vehicle, and can be manually

rotated in azimuth from between 30° to 45°, depending on the vehicle's configuration. The VVS-2(V) is a direct replacement of the US Army M19 and M24 active IR viewing devices.

Operational Characteristics. The system amplifies all available ambient light by as much as 50,000 times. The picture is relayed through circuitry to a CRT tube/screen, providing the viewer (the driver in this case) with a detailed, light-intensified image. An eyepiece is available as an alternative viewing option.

Generation II image intensifier tubes feature automatic gain control and bright source protection. An ambient light detector acts as a protective circuit to cut electrical power to the image tube if the system is inadvertently turned on in daylight.

Variants/Upgrades

VVS-2(V)1/1A. Designed for the M60A3 main battle tank (MBT).

VVS-2(V)2/2A. Designed for the M1 and M1A1 MBT.

VVS-2(V)3. Designed for the M2 and M3 Bradley series armored vehicles.

VVS-2(V)4. The most recently reported variant in production. Intended for the M109 Palladin and the M992.

NDS-2. Export variant.

VVS-501. Export variant designed for Canadian Army's Leopard 1 MBT.

Generation III retrofit. An upgrade that, according to Litton, provides 70 percent improved resolution over Generation II performance specifications. It is also offered by ITT Night Vision.

Korean production. Optechs Korea Inc manufactures several types of VVS-2(V) viewers, each of which applies to specific vehicles including the following: the VVS-2(V)M1924, the VVS-2(V)1A, the VVS-2(V)2A, the VVS-2(V)III, and the VVS-2(V)IV.

Program Review

Background. Armored vehicles were among the first types of vehicles to be equipped with night vision devices for improved night fighting capabilities. Moreover, these devices, along with related infrared targeting systems, made armored night operations practical. Traditionally, most main battle tanks were equipped with active infrared (IR) viewing devices at the driver's

position. The device consisted of an infrared wavelength-emitting searchlight and a viewing device installed in the driver's hatch to allow the driver to see in the dark.

The IR searchlight bathed the area in front of the vehicle in IR light that was invisible to the human eye.

The driver's viewer acquired the reflected IR illumination and electronically transformed the image into visible wavelengths on the viewing scope. These systems were only practical until infrared detection/viewing devices became conventionally deployed. At that point, the infrared emissions of the early illuminators revealed the position of the vehicle to IR viewer-equipped units, including other tanks and anti-tank units.

The VVS-2(V) Passive Night Driving Periscope was developed by Baird Corporation for the US Army Night Vision Laboratory (NVL), Fort Belvoir, VA. The system is a light-amplification device, which uses all available ambient light sources (such as that from stars; hence, the "Starlight" nickname of this type of system) to provide imagery of the vehicle's surroundings in the dark. The system was originally designed for the US Army's M60 tank, with subsequent versions of the night sight employed onboard other vehicles. The first production contract for 1,257 viewers was awarded to Baird in September 1975. Through 1988, Baird produced a total of 26,231 VVS-2(V)s.

Production of the VVS-2 was also undertaken by a joint venture of ITT Corporation and Varo Corporation in the mid-1980s. A five-year OMNIBUS I contract was awarded to the team in 1985, covering the production of

11,418 units through June 1991. One of the highlights of OMNIBUS I was a 1986 increment that called for a total of 3,360 units (2,348 VVS-2(V)1A, 449 VVS-2(V)2A, and 563 VVS-2(V)3), and included foreign military sales to Egypt, Tunisia, Taiwan, and Australia.

Further ITT/Varo production stemmed from an OMNIBUS II multiyear production order covering three years and upwards of 3,720 units. The first-year contract was awarded in March 1990, with the second award a year later in 1991. Scheduling documents indicate that OMNIBUS II production was completed sometime in 1994.

Several other countries had taken an interest in VVS-2 over the past few years. Sales have occurred in Brazil, Canada, Denmark, Norway, Sweden, Switzerland, and Turkey. As for the US, an older model for the M60 tank is being refurbished for the US Army, and it is believed that a current contract exists for the US Marine Corps, although no specific information has been made public.

As of January 2001 there have been no new contracts for VVS-2(V) or any of its variants made public. Low rate production is likely however for spares and replacement parts for the already widely distributed system.

Funding

Monetary amounts specifically designated for VVS-2 RDT&E/procurement cannot be pinpointed.

Recent Contracts

No recent contracts have been identified.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Nov	1971	US Army awarded Baird VVS-2 engineering development contract
Sep	1975	First production contract for 1,257 units
	1978	First armor unit equipped
	1985	Five-year OMNIBUS I contract awarded to ITT/Varo for 11,418 units
	1987	M60 production ended following the completion of an Egyptian M60A3 order
	1990	Three-year OMNIBUS II contract awarded to IMO/Varo
Jun	1991	VVS-2 production for OMNIBUS I completed
	1994	OMNIBUS II production completed
	1996	Varo Optical Systems became Litton Electro-Optical Systems

Worldwide Distribution

The VVS-2 is widely fielded with the entire US fleet. Confirmed foreign sales have occurred to such nations as **Australia, Brazil, Canada, Denmark, Egypt, Norway, Sweden, Switzerland, Tunisia, Taiwan, and Turkey.** **South Korea** is producing the VVS-2 domestically for its army's armored vehicles.

Forecast Rationale

Along with the United States, numerous countries are known to have procured the VVS-2(V) passive night driving viewer system. However, there has been a dearth of information in recent years regarding new contracts and it appears that full production for the system and its variants has ceased. Platform configurations for the system have included the M1A2 Abrams, V-150, LAV25 Piranha, M113, M60A3, M48, Armored Infantry Fighting Vehicle, M109 Howitzer, T54, PT76, and Fox NBCRS. While there have been significant foreign sales to Australia, Brazil and Canada, to name only a few, the future does not look particularly bright for the system.

The possibility of the VVS-2(V) generating new contracts has been declining significantly with the production of newer, enhanced, next-generation systems. With the system widely fielded among thousands of armored vehicles in the US and several other nations, production for spares and replacement parts will likely be ongoing. This possibility would be too speculative to accurately forecast, however, so the ten-year outlook has been omitted. Barring any unexpected future activity, this report will be archived next year.

Ten-Year Outlook

The forecast chart has been omitted due to the unavailability of information regarding past sales and the lack of prospective sales.

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