



**Homeland
Security**

Science and Technology

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System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T), the SAVER Program conducts assessments and validations on commercially available equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?" These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of technical agents who perform assessment and validation activities. This summary provides an overview of such an assessment.

For more information on this and other technologies, contact the SAVER Program Support Office.

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Summary

Handheld Image Intensifiers

(AEL reference number 03OE-02-TILA and 04MD-01-LAMP)

Handheld image intensifiers increase the intensity of available light to provide imaging in poorly lit situations. They are widely used by emergency responders in nighttime surveillance, search and rescue, and covert operations. Image intensifiers may assist with navigation of terrain in darkness and recognition of objects and people that may not be seen by the unaided eye.

In order to provide responders with information on currently available handheld image intensifiers, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic conducted a comparative assessment of these devices for the System Assessment and Validation for Emergency Responders (SAVER) Program in March 2014. Detailed findings are provided in the *Handheld Image Intensifiers Assessment Report*, which is available by request at www.firstresponder.gov/SAVER.

Assessment Methodology

Prior to the assessment, eight law enforcement personnel were chosen from various jurisdictions to participate in a focus group. Participants possessed at least two years experience using handheld image intensifiers. The group recommended evaluation criteria, product selection criteria, and possible scenarios for assessment.

After identifying evaluation criteria, the focus group assigned each criterion to one of five SAVER categories, and then assigned a weight for its level of importance. Once the criteria were weighted, the five SAVER categories were assigned a percentage value to represent the level of each category's importance relative to the other categories.

Based on focus group recommendations and market research, these six handheld image intensifiers were selected for assessment:

- TNV/PVS-14 Pinnacle, Tactical Night Vision Company Inc.
- SNVG-14™ (AN/PVS-14), Summit Night Vision Group
- ATN-6015-3, American Technologies Network (ATN) Corp.
- GT-14, N-Vision Optics LLC



- MUM-14 Mini-monocular (Omni IV Grade), Nivisys LLC
- D-300 Monocular, Night Optics USA Inc.

Six responders served as evaluators for this assessment. All evaluators had experience using handheld image intensifiers.

During the assessment, evaluators rated the handheld image intensifiers based on evaluation criteria established by the focus group. The assessment was separated into two phases: the specification assessment and the operational assessment. Evaluators assessed the systems based on vendor-provided information during the specification assessment. Hands-on experience served as the basis for the operational assessment.

Assessment Results

Table 1 displays the composite assessment scores as well as the category scores for each handheld image intensifier. Scores are based on a 1-to-5 scale with higher scores indicating a higher rating by evaluators. The advantages and disadvantages of each device, as identified by evaluators, are listed in table 2. To view how each device scored against the evaluation criteria assigned to the SAVER categories, see table 3. For specifications, see table 4.

According to evaluators, handheld image intensifiers that can be easily configured with head/helmet/weapon/tripod-mounting options are preferred. Additionally, they favored devices that were equipped with a manual gain control, featured a long battery life, and were covert during operation. Evaluators agreed that monocular night vision devices assist in maintaining depth perception since only one eye is viewing the image while the other eye remains open. Additionally, they noted that it is important to keep in mind that the infrared (IR) illuminators on these devices are limited to close-quarter applications due to their limited illumination range. The evaluators also agreed that all of the assessed devices had good eye reliefs and would assist responders in conducting operations in poorly lit conditions.

Responder agencies that may be considering the purchase of handheld image intensifiers should review the detailed findings in the *Handheld Image Intensifiers Assessment Report* and carefully consider each device’s overall capabilities and limitations in relation to their jurisdiction’s operational needs. All reports in this series, as well as reports on other technologies, are available in the SAVER section of the FirstResponder.gov website, www.firstresponder.gov/SAVER.

SAVER Category Definitions	
Affordability	groups criteria related to life-cycle costs of a piece of equipment or system.
Capability	groups criteria related to the power, capacity, or features available for a piece of equipment or system to perform or assist the responder in performing one or more relevant tasks.
Deployability	groups criteria related to the movement, installation, or implementation of a piece of equipment or system by responders at the site of its intended use.
Maintainability	groups criteria related to the maintenance and restoration of a piece of equipment or system to operational condition by responders.
Usability	groups criteria related to the quality of the responders’ experience with the operational employment of a piece of equipment or system. This includes the relative ease of use, efficiency, and overall satisfaction of the responders with the equipment or system.

Table 1. Handheld Image Intensifier Assessment Results

Product	Composite Score	Affordability (8% Weighting)	Capability (32% Weighting)	Deployability (5% Weighting)	Maintainability (15% Weighting)	Usability (40% Weighting)
TNV/PVS-14 Pinnacle	4.1	4.7	4.4	3.5	4.0	4.0
SNVG-14™ (AN/PVS-14)	4.0	2.7	4.3	3.5	4.0	4.0
ATN-6015-3	3.9	3.5	4.2	4.3	4.0	3.8
GT-14	3.8	2.7	4.0	4.2	4.0	3.8
MUM-14 Mini-monocular (Omni IV Grade)	3.7	2.8	3.6	4.8	4.0	3.7
D-300 Monocular	3.6	3.3	3.6	3.5	3.5	3.7

Table 2. Handheld Image Intensifier Advantages and Disadvantages

Product	Advantages	Disadvantages
 <p>TVN/PVS-14 Pinnacle Composite Score: 4.1</p>	<ul style="list-style-type: none"> • Commonly used PVS-14 controls • Manual gain control • Warranty duration (5 years) • Long battery runtime (according to vendor specification) 	<ul style="list-style-type: none"> • Battery cap difficult to turn while wearing gloves due to proximity to gain control
 <p>SNVG-14™ (AN/PVS-14) Composite Score: 4.0</p>	<ul style="list-style-type: none"> • Commonly used PVS-14 controls • Manual gain control • Included a variety of mounting options • Housing easy to hold 	<ul style="list-style-type: none"> • Battery cap difficult to turn while wearing gloves due to proximity to gain control
 <p>ATN-6015-3 Composite Score: 3.9</p>	<ul style="list-style-type: none"> • Commonly used PVS-14 controls • Included a variety of mounting options • Long battery runtime (according to vendor specification) 	<ul style="list-style-type: none"> • No manual gain control
 <p>GT-14 Composite Score: 3.8</p>	<ul style="list-style-type: none"> • One-handed operation • Can specify AA battery or CR123 battery at time of purchase 	<ul style="list-style-type: none"> • No manual gain control • Streaked image quality • IR illuminator indicator location in the field of view is difficult to see
 <p>MUM-14 Mini-monocular (Omni IV Grade) Composite Score: 3.7</p>	<ul style="list-style-type: none"> • Bright IR illuminator • Color quick-start reference guide • Accepts AA battery or CR123 battery with adaptor 	<ul style="list-style-type: none"> • No manual gain control • Must turn device off before activating IR illuminator • Noisy switches
 <p>D-300 Monocular Composite Score: 3.6</p>	<ul style="list-style-type: none"> • Bright IR illuminator • One-handed operation • All metal housing • Diopter and focus adjustment turn smoothly 	<ul style="list-style-type: none"> • No manual gain control • IR illuminator visible to unaided eye • Heavy • Untethered battery cap with exposed O-ring • Blurry edges around image perimeter

Table 3. Handheld Image Intensifier Criteria Ratings *

KEY							
Lowest Rating	Highest Rating	TNV/PVS-14 Pinnacle	SNVG-14™ (AN/PVS-14)	ATN-6015-3	GT-14	MUM-14 Mini-monocular (Omni IV Grade)	D-300 Monocular
Affordability							
Warranty							
Capability							
Infrared illuminator							
Versatility							
Battery runtime							
Field of view							
Deployability							
User manual							
Maintainability							
Battery type							
Maintenance							
Technical support							
Usability							
Image quality							
Image adjustment							
Handheld operation							
Tube protection							
Durability							
Depth perception							
Covertress							
Eye relief							
Indicators							

Note:

* Averaged criteria ratings for each assessed product are graphically represented by colored and shaded circles. Highest ratings are represented by full green circles.

Table 4. Handheld image Intensifier Specifications *

Specifications	TNV/PVS-14 Pinnacle	SNVG-14™ (AN/PVS-14)	ATN-6015-3	GT-14	MUM-14 Mini-monocular (Omni IV Grader)	D-300 Monocular
MSRP	\$2,918	\$3,495	\$2,949	\$2,926	\$3,685	\$3,399†
Warranty duration	5 years	1 year	2 years	1 year	1 year	2 years
Typical resolution	64 lp/mm	64 lp/mm	64 lp/mm	57 to 64 lp/mm	64 lp/mm	64 lp/mm
Dimensions	4.5 x 2.3 x 2.0 in.†	4.5 x 2.2 x 2.0 in.	4.5 x 2.2 x 2.0 in.	4.5 x 2.0 x 2.0 in.	4.2 x 2.7 x 2.0 in.	5.5 x 2.3 x 1.8 in.
Weight	12 oz	10 oz	11 oz	11 oz	9 oz	16 oz
Operating temperature range	NP	-59°F to 120°F	-40°F to 122°F	-60°F to 120°F	-35°F to 129°F	-4°F to 113°F
Storage temperature range	NP	-59°F to 120°F	-58°F to 158°F	-60°F to 185°F	-60°F to 160°F	NP
Waterproof	✓	✓	✓	✓	✓	
Ingress protection (IP) rating	NP	IP67	NP	IP67	NP	IP67
Impact resistant	NP	✓ (6 foot drop)	NP	✓	✓	✓ (6 foot drop)
Mounting options	Head, helmet, weapon	Head, helmet, weapon, tripod	Head, helmet, weapon	Head, helmet, weapon, tripod	Head, helmet	Head, helmet, weapon
Sacrificial lens compatible	✓	✓	✓	✓	✓	
Battery type‡	AA	AA	AA	AA or CR123§	AA or CR123	CR123
Battery runtime	50 hr	40 hr	60 hr	40 hr¶	20 to 40 hr¶	40 hr
Technical support duration	Lifetime	Lifetime	Lifetime	NP	NP	Lifetime
Technical support hours	8:00 a.m. to 4:30 p.m., Eastern Monday through Friday	8:00 a.m. to 5:00 p.m., Central Monday through Friday	8:00 a.m. to 5:00 p.m., Pacific Monday through Friday	8:00 a.m. to 5:00 p.m., Eastern Monday through Friday	6:00 a.m. to 3:30 p.m., Mountain Monday through Friday	8:00 a.m. to 5:00 p.m., Pacific Monday through Friday

Notes:

* Information was provided by manufacturers and has not been independently verified by the SAVER Program.

† The information was not confirmed by the vendor.

‡ All units require one battery of the type specified.

§ Battery type must be specified at time of purchase. The AA model was assessed.

¶ Battery runtime listed is based on AA battery; CR123 battery life was not provided by vendor.

¶ Dependent on battery chemistry, Alkaline or Lithium.

✓ = image intensifier is equipped with corresponding feature

Blank cell = image intensifier is not equipped with corresponding feature

NP = information not provided by vendor

F = Fahrenheit

hr = hours

in. = inches

lp/mm = line pairs per millimeter

oz = ounces