



Homeland Security

Science and Technology

Summary

U.S. Department of Homeland Security



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) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems, and provides those results along with other relevant equipment information to the emergency responder community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL).

The SAVER Program is supported by a network of technical agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

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

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Non-Magnifying Patrol Rifle Sights

(AEL reference number 03OE-02-BNOC)

Non-magnifying sights aid in aiming patrol rifles and allow law enforcement officers to keep both eyes open, which provides a full field of view, enhances situational awareness, and helps users maintain depth perception.

To provide responders with information on currently available non-magnifying patrol rifle sights, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic conducted a comparative assessment of these sights for the System Assessment and Validation for Emergency Responders (SAVER) Program in July 2012. Detailed findings are provided in the *Non-Magnifying Patrol Rifle Sights Assessment Report*, which is available by request at <https://www.rkb.us/saver>.

Assessment Methodology

Prior to the assessment, eight law enforcement personnel were chosen from various jurisdictions to participate in a focus group. All participants had experience using non-magnifying patrol rifle sights. The focus group identified evaluation criteria and recommended product selection criteria and possible scenarios for assessment.

After identifying evaluation criteria, the focus group assigned each criterion to one of four SAVER categories. The affordability category was discussed, and no criteria were identified for the category. Participants recommended that affordability be assessed by readers of the assessment report because jurisdictions have varying budgets available for purchasing equipment and product performance should be assessed separately from cost.

The focus group then assigned a weight for each criterion's level of importance. Once the criteria were weighted, a percentage value was assigned to the SAVER categories to represent the level of each category's importance relative to the other categories.



Based on focus group recommendations and market research, the following non-magnifying patrol rifle sights were selected for assessment:

- Aimpoint® Micro T-1™, Aimpoint® Inc.;
- EXPS3™, L-3 Communications EOTech;
- Trijicon® Reflex RX01NSN, Trijicon Inc.;
- SPARC, Vortex Optics;
- Z-Point Red Dot Sight, Carl Zeiss Sports Optics LLC;
- Leupold® DeltaPoint™; Leupold and Stevens Inc.;
- Mepro 21, MEPROLIGHT Ltd.; and
- Master Series™ Red Dot™ 1x30mm, Simmons Outdoor Products.

Five firearms instructors served as evaluators for this assessment. All evaluators had at least 11 years of experience using non-magnifying patrol rifle sights.

During the assessment, evaluators rated the non-magnifying patrol rifle sights 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 sights based on vendor-provided information during the specification assessment. Hands-on experience using the sights in three scenarios—pre-fire, live-fire, and active shooter—served as the basis for the operational assessment. A range safety officer was present throughout the assessment to ensure the safety of evaluators and assessment facilitators.

Assessment Results

According to evaluators, all of the assessed non-magnifying patrol rifle sights added minimal weight to the rifle and allowed for quicker target acquisition and increased situational awareness in comparison to aiming with iron sights. All of the assessed sights allowed co-witness with iron sights on the rifle; however, some required an appropriate mount or riser for co-witness. Evaluators also noted that any of these sights could fail (e.g., batteries die, tritium loses brightness), and iron sights are less likely to fail. The illumination source is another factor to consider; although sights using fiber optics and tritium-phosphor lamps as their illumination sources are more reliable, they have dim reticles that are not user adjustable.

Table 1 displays the composite assessment scores as well as the category scores for each non-magnifying patrol rifle sight. Higher scores indicate a more favorable rating by evaluators. The advantages and disadvantages of each sight, as identified by evaluators, are listed in table 2. To view how each sight scored against the evaluation criteria assigned to the SAVER categories, see table 3. For specifications, see table 4.

Responder agencies that may be considering the purchase of non-magnifying patrol rifle sights should review the detailed findings in the *Non-Magnifying Patrol Rifle Sights Assessment Report* and carefully consider each sight'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 Responder Knowledge Base (RKB) website, <https://www.rkb.us/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. Non-Magnifying Patrol Rifle Sight Assessment Results

System	Composite Score	Capability (35% Weighting)	Deployability (5% Weighting)	Maintainability (20% Weighting)	Usability (40% Weighting)
Aimpoint® Micro T-1™	4.5	4.6	4.4	4.2	4.7
EXPS3™	4.3	4.4	4.6	4.0	4.4
Trijicon® Reflex RX01NSN	4.1	3.6	4.8	4.1	4.3
SPARC	3.7	3.6	2.2	4.3	3.7
Z-Point Red Dot Sight	3.6	3.7	3.0	3.9	3.6
Leupold® DeltaPoint™	3.6	3.9	2.2	3.3	3.8
Mepro 21	3.3	3.0	3.2	3.2	3.5
Master Series™ Red Dot™ 1x30mm	2.8	2.7	2.6	3.2	2.7

Table 2. Non-Magnifying Patrol Rifle Sight Advantages and Disadvantages



System	Advantages	Disadvantages
 <p>Aimpoint® Micro T-1™ Composite Score: 4.5</p>	<ul style="list-style-type: none"> Extended battery life Reticle brightness adjustability Small footprint on rail Thin frame around lenses does not obstruct field of view 2 minutes of angle (MOA) reticle aids in quick target acquisition Optical quality Easy-to-reach, knowledgeable technical support 	<ul style="list-style-type: none"> Proprietary tool required for zeroing and mounting
 <p>EXPS3™ Composite Score: 4.3</p>	<ul style="list-style-type: none"> Wide range of reticle brightness settings Small footprint on rail Does not obstruct field of view Circle and dot reticle aids in quick target acquisition Optical quality Quick-release mount Easy-to-adjust windage and elevation 	<ul style="list-style-type: none"> Short battery life Size and location of reticle brightness control buttons
 <p>Trijicon® Reflex RX01NSN Composite Score: 4.1</p>	<ul style="list-style-type: none"> No batteries required Thin frame around lens does not obstruct field of view Sturdy and user-friendly mount LensPen® cleaning tool included Easy-to-adjust windage and elevation 	<ul style="list-style-type: none"> Reticle brightness is not user adjustable Large footprint on rail Tinted lens darkens images Dim reticle Brightly illuminated targets wash out reticle
 <p>SPARC Composite Score: 3.7</p>	<ul style="list-style-type: none"> Small footprint on rail 2x magnifier included Unconditional lifetime warranty Easy-to-reach, knowledgeable technical support 	<ul style="list-style-type: none"> Short battery life Operation of reticle brightness controls Thick frame around lenses obstructs field of view Tinted lenses darken images

Table 2. Non-Magnifying Patrol Rifle Sight Advantages and Disadvantages (Continued)





System	Advantages	Disadvantages
 <p>Z-Point Red Dot Sight Composite Score: 3.6</p>	<ul style="list-style-type: none"> • Small footprint on rail • Optical quality • Large power button 	<ul style="list-style-type: none"> • Adjusting reticle brightness is not intuitive • Thick frame around lenses obstructs field of view • Difficult to use quick-release mount • Requires an after-market riser to co-witness with iron sights
 <p>Leupold® DeltaPoint™ Composite Score: 3.6</p>	<ul style="list-style-type: none"> • Small footprint on rail • Thin frame around lens does not obstruct field of view • Optical quality • Scratch-resistant coating 	<ul style="list-style-type: none"> • Reticle brightness is not user adjustable • Not night vision compatible • Difficult battery replacement • Requires an after-market riser to co-witness with iron sights • TORX® wrenches required for mounting and zeroing
 <p>Mepro 21 Composite Score: 3.3</p>	<ul style="list-style-type: none"> • No batteries required • Quick-release mount • Easy-to-adjust windage and elevation 	<ul style="list-style-type: none"> • Reticle brightness is not user adjustable • Limited operating temperature range • Large footprint on rail • Tinted lens darkens images • Dim reticle • Brightly illuminated targets wash out reticle • Large reticle obscures targets • Difficult to clean back of lens
 <p>Master Series™ Red Dot™ 1x30mm Composite Score: 2.8</p>	<ul style="list-style-type: none"> • Easy-to-operate the reticle brightness controls 	<ul style="list-style-type: none"> • Short battery life • Limited reticle brightness adjustments • Tinted lenses darken images • Images are not clear • Difficult to adjust windage and elevation • Not night vision compatible • Requires an after-market riser to co-witness with iron sights • For warranty repairs, user must include a check or money order for return shipping costs

Table 3. Non-Magnifying Patrol Rifle Sight Criteria Ratings¹

KEY								
	Aimpoint® Micro T-1™	EXP3™	Trijicon® Reflex RX01NSN	SPARC	Z-Point Red Dot Sight	Leupold® DeltaPoint™	Mepro 21	Master Series™ Red Dot™ 1x30mm
Capability								
Target acquisition	●	◐	◑	◐	◐	◐	◑	◑
Optical quality	●	●	◑	◐	◐	●	◑	◑
Durability	◐	◐	◐	◐	◑	◐	◑	◑
Mounts	●	●	●	◑	◑	◑	◐	◑
Reticle	●	●	◑	◐	◑	◑	◑	◐
Compatibility	●	●	●	●	●	◐	●	◑
Deployability								
Setup	◐	●	●	◑	◑	◑	◑	◑
Maintainability								
Easy to maintain	●	◐	●	◐	◐	◑	◑	◐
Warranty	◑	◑	◐	●	◐	◐	◑	◑
Technical support	●	◐	◑	◐	◑	◐	◑	◑
Usability								
Reliability	●	◐	●	◑	◑	◐	◑	◑
Ease of use	◐	◐	◐	◑	◑	◑	◐	◑
Size	●	●	◐	◐	◐	●	◐	◐
User manual	●	●	◐	●	◑	◐	◑	◑

Note:

¹ 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. Non-Magnifying Patrol Rifle Sight Specifications¹

Specifications	Aimpoint® Micro T-1™	EXPS3™	Trijicon® Reflex RX01NSN	SPARC	Z-Point Red Dot Sight	Leupold® DeltaPoint™	Mepro 21	Master Series™ Red Dot™ 1x30mm
MSRP	\$731	\$659	\$583	\$289	\$575	\$362	\$488	\$80
Warranty duration	2 years	2 years	15 years (tritium-phosphor lamp) Lifetime (defects, workmanship)	Lifetime	10 years (electronics) Lifetime (housing, optics)	2 years (electronics) Lifetime (materials, workmanship)	10 years (tritium-phosphor lamp) 1 year (materials, workmanship)	2 years
Technical support duration	10 years	Unlimited ²	Unlimited ²	Unlimited ²	Unlimited ²	Unlimited ²	Unlimited ²	Unlimited ²
Illumination source(s)	LED	Laser diode	Fiber optics and tritium-phosphor lamp	LED	LED	LED	Fiber optics and tritium-phosphor lamp	LED
Battery type	CR2032	CR123A	No batteries required	CR2354	CR2032	CR2032	No batteries required	CR2032
Battery life	50,000 hours with continuous operation at position 8 of 12	600 hours with continuous operation at a nominal setting	Not applicable	120 to 4,600 hours (depending on mode)	Unknown (unlimited daytime silicon solar cell usage)	900 hours with continuous operation	Not applicable	40 hours with continuous operation
Auto-off feature	No	8 hours (programmable to 4 hours)	Not applicable	6 hours	4 hours	5 minutes (auto-on with motion sensor)	Not applicable	No
Low battery indicator	No	Flashing reticle upon startup	Not applicable	No	No	No	Not applicable	No
Quick-release mount	No	Yes	No	No	Yes	No	Yes	No
User-adjustable brightness	Yes	Yes	No	Yes	Yes	No	No	Yes
Reticle pattern (as assessed)	2 MOA dot	65 MOA circle with 1 MOA dot	4.5 MOA dot	2 MOA red dot	3.5 MOA dot	3.5 MOA dot	Bull's eye	3 MOA dot
Alternate reticle patterns available at time of purchase	4 MOA dot	65 MOA circle with two 1 MOA dots	None	None	None	7.5 MOA delta (i.e., triangle)	"X" shape, 12 MOA triangle, 4.3 MOA dot, 5.5 MOA dot	None
Reticle color	Red	Red	Amber	Red	Red	Red	Amber	Red, green, blue
Dimensions	2.4 x 1.6 x 2.4 in.	3.5 x 2.4 x 2.8 in.	4.9 x 1.3 x 2.3 in.	3.0 x 2.3 x 1.6 in.	2.5 x 1.7 x 1.5 in.	1.6 x 1.2 x 1.1 in.	4.5 x 1.8 x 2.2 in.	3.9 x 2.3 x 2.7 in.

Table 4. Non-Magnifying Patrol Rifle Sight Specifications (Continued)¹

Specifications	Aimpoint® Micro T-1™	EXPS3™	Trijicon® Reflex RX01NSN	SPARC	Z-Point Red Dot Sight	Leupold® DeltaPoint™	Mepro 21	Master Series™ Red Dot™ 1x30mm
Weight with mount	4.4 oz	11.2 oz	7.6 oz	10.9 oz	5.6 oz	0.6 oz	14.1 oz	6.9 oz
Fog proof	Vacuum sealed	Nitrogen filled	No internal optics to fog	Nitrogen filled	Nitrogen filled	No internal optics to fog	No internal optics to fog	Unknown
Lens coatings	No	No	No	No	LotuTec® water-repellant coating	DiamondCoat™ scratch-resistant coating	No	No
Storage temp range	-50°F to 160°F	-40°F to 150°F	-51°F to 185°F	-40°F to 140°F	-22°F to 140°F	-40°F to 160°F	-4°F to 160°F	-20°F to 120°F
Operating temp range	-50°F to 160°F	-40°F to 150°F	-51°F to 185°F	-40°F to 140°F	-22°F to 140°F	-20°F to 120°F	23°F to 113°F	-20°F to 120°F
Night vision device compatibility	1st, 2nd, and 3rd generation	1st, 2nd, 3rd, and 3rd+ generation	1st, 2nd, and 3rd generation	1st, 2nd, and 3rd generation	1st, 2nd, and 3rd generation	No	1st, 2nd, and 3rd generation	No
Magnification device compatibility	Aimpoint magnification devices	EOTech magnification devices	Trijicon magnification devices	Vortex Optics magnification devices	Carl Zeiss magnification devices	Leupold magnification devices	MEPROLIGHT magnification devices	No

Notes:

¹ Information was provided by manufacturers and has not been independently verified by the SAVER Program.

² The duration of technical support is unlimited as long as the units are in production.

F = Fahrenheit

in. = inches

LED = light-emitting diode

MOA = minutes of angle

MSRP = manufacturer's suggested retail price

oz = ounces

SAVER = System Assessment and Validation for Emergency Responders

temp = temperature