



**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) of DHS, the SAVER Program conducts objective assessments and validations on commercial 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 emergency 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 and produce SAVER knowledge products.

For more information on the program or the assessed technologies, contact the SAVER Program by e-mail or visit the SAVER website.

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Summary

Magnifying Patrol Rifle Scopes

(AEL reference number 03OE-02-BNOC)

A magnifying patrol rifle scope aids in aiming a patrol rifle by providing a magnified view of distant threats such as gunmen. Law enforcement personnel may use magnifying patrol rifle scopes during active shooter situations, felony car stops, and field searches, as well as for perimeter containment.

In order to provide responders with information on currently available magnifying patrol rifle scopes, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic conducted a comparative assessment for the System Assessment and Validation for Emergency Responders (SAVER) Program in July 2013. Detailed findings are provided in the *Magnifying Patrol Rifle Scopes Assessment Report*, which is available at <http://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 had experience using magnifying patrol rifle scopes. The 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; no criteria were identified for the Affordability category. The focus group then assigned a weight for each criterion's level of



importance. Once the criteria were weighted, the four 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, the following magnifying patrol rifle scopes were selected for assessment:

- Leupold & Stevens Inc., Mark 6™ 1-6x20mm M6C1;
- Raytheon ELCAN Optical Technologies, SpecterDR™ 1.5-6x;
- Nightforce Optics Inc., 1-4x24 NXS™ Compact Riflescope;
- Vortex Optics, Razor HD Gen II 1-6x24 Riflescope;
- Trijicon Inc., Trijicon ACOG® 4x32 BAC;
- Bushnell Outdoor Products, Elite Tactical SMRS 1-6.5x24mm;
- Burris Company Inc., MTAC Riflescope 1x-4x-24mm; and
- Valdada Optics, 1:4x32 QR-TS 35mm PITBULL Compact Scope.

Six law enforcement personnel from various jurisdictions with at least 2 years experience using magnifying patrol rifle scopes were selected to be evaluators for the assessment. The evaluators' experience with magnifying patrol rifle scopes provided meaningful results for this assessment.

During the assessment, evaluators rated the magnifying patrol rifle scopes 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 products based on vendor-provided information during the specification assessment. Hands-on experience during three scenarios—pre-fire, live-fire, and active shooter—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 magnifying patrol rifle scope. Scores are based on a 5-point scale; higher scores indicate a more favorable rating by evaluators. The advantages and disadvantages of each magnifying patrol rifle scope, as identified by evaluators, are listed in table 2. To view how each magnifying patrol rifle scope scored against the evaluation criteria assigned to the SAVER categories, see table 3. For specifications, see table 4.

According to evaluators, magnifying patrol rifle scopes should not be considered a replacement for iron sights. Any of these scopes can fail (e.g., batteries die, tritium loses illumination), whereas iron sights are most reliable since they are known to less likely fail. In addition, training on the use of magnifying patrol rifles scopes should be required prior to deployment. Evaluators noted variable-magnification scopes may be better suited for patrol rifle use than fixed-magnification scopes since it may be important for a patrol officer to use minimal or no magnification. Evaluators further noted scopes with illuminated reticles assist the user in adapting to different lighting conditions. They agreed that all of the assessed scopes had maximum magnifications that were helpful in assisting with identification of subjects from a distance, and most evaluators agreed that the eye reliefs of the scopes were sufficient throughout all scenarios and at varying magnifications. In addition, evaluators stated the weights of the assessed scopes did not impact rifle operation. All of the scopes appeared to withstand heat, recoil, muzzle blast, and shock generated by firing the rifles. Overall, there were no signs of damage, and the controls were still working properly when inspected at the end of the live-fire scenario.

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.

Evaluators also noted the technical support for all scopes—available Monday through Friday, for at least 8 hours each day, for the life of the products—met expectations.

Responder agencies that may be considering the purchase of magnifying patrol rifle scopes should review the detailed findings in the *Magnifying Patrol Rifle Scopes Assessment Report* and carefully consider each scope’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, <http://www.firstresponder.gov/SAVER>.

Table 1. Magnifying Patrol Rifle Scope Assessment Results

Product	Composite Score	Capability (30% Weighting)	Deployability (25% Weighting)	Maintainability (10% Weighting)	Usability (35% Weighting)
Mark 6™ 1-6x20mm M6C1	4.0	3.9	4.0	4.2	4.1
SpecterDR™ 1.5-6x	4.0	4.2	3.6	4.1	4.1
1-4x24 NXS™ Compact Riflescope	4.0	3.9	4.0	4.3	3.9
Razor HD GEN II 1-6x24 Riflescope	3.9	4.2	3.8	3.9	3.8
Trijicon ACOG® 4x32 BAC	3.8	3.1	3.9	3.9	4.2
Elite Tactical SMRS 1-6.5x24mm	3.6	3.7	3.5	3.8	3.6
MTAC Riflescope 1x-4x-24mm	3.5	3.3	3.7	3.7	3.6
1:4x32 QR-TS 35mm PITBULL Compact Scope	3.5	3.5	3.7	3.2	3.3

Table 2. Magnifying Patrol Rifle Scope Advantages and Disadvantages



Product	Advantages	Disadvantages
 <p>Mark 6™ 1-6x20mm M6C1 Variable Magnification Composite Score: 4.0</p>	<ul style="list-style-type: none"> • Locking windage and elevation turrets and zero stop • Excellent optical quality • Illuminate reticle is night vision compatible • Thorough and intuitive user manual • Wide magnification range 	<ul style="list-style-type: none"> • Oversized reticle at maximum magnification • Illuminated reticle flickered with slightest head movement
 <p>SpecterDR™ 1.5-6x Dual Magnification Composite Score: 4.0</p>	<ul style="list-style-type: none"> • Recessed windage and elevation turrets • Reticle clearly seen in bright sunlight • Dot or crosshair reticle options • Built-in iron sights • Integrated quick-release mount • Magnification throw lever • Illuminated reticle is night vision compatible 	<ul style="list-style-type: none"> • No mid-range magnification options • A tool, such as a coin or screwdriver, is required to adjust windage turret • Unmarked windage and elevation turrets with no reference to zero • Minimum magnification should be a true 1x

Table 2. Magnifying Patrol Rifle Scope Advantages and Disadvantages Continued
















































































































Product	Advantages	Disadvantages
 <p>1-4x24 NXS™ Compact Riflescope Variable Magnification Composite Score: 4.0</p>	<ul style="list-style-type: none"> Covered windage and elevation turrets Magnification throw lever Illuminated reticle is night vision compatible Extensive user manual with additional resources available (online options and CD included) 	<ul style="list-style-type: none"> Difficult to see reticle in bright sunlight
 <p>Razor HD Gen II 1-6x24 Riflescope Variable Magnification Composite Score: 3.9</p>	<ul style="list-style-type: none"> Covered windage and elevation turrets Locking brightness control Reticle clearly seen in bright sunlight Wide magnification range 	<ul style="list-style-type: none"> None
 <p>Trijicon ACOG® 4x32 BAC Fixed Magnification Composite Score: 3.8</p>	<ul style="list-style-type: none"> Tethered windage and elevation caps that did not interfere with operation No batteries required Compact size and lightweight Integrated flattrap mount with thumbscrews 	<ul style="list-style-type: none"> No manual reticle brightness controls Windage and elevation turrets have no zero reference No low-magnification option
 <p>Elite Tactical SMRS 1-6.5x24mm Variable Magnification Composite Score: 3.6</p>	<ul style="list-style-type: none"> Covered windage and elevation turrets Wide magnification range Illuminated reticle is night vision compatible 	<ul style="list-style-type: none"> Oversized reticle at maximum magnification Could unintentionally change zero due to push-pull design of windage and elevation turrets (when not capped)
 <p>MTAC Riflescope 1x-4x-24mm Variable Magnification Composite Score: 3.5</p>	<ul style="list-style-type: none"> Covered windage and elevation turrets Reticle clearly seen in bright sunlight 	<ul style="list-style-type: none"> Oversized reticle regardless of magnification Lower end of operating temperature is too high
 <p>1:4x32 QR-TS 35mm PITBULL Compact Scope Dual Magnification Composite Score: 3.5</p>	<ul style="list-style-type: none"> Magnification throw lever 	<ul style="list-style-type: none"> Windage and elevation turrets not covered or recessed No mid-range magnification options Minimal information in user manual Haloing around outer edge of image and blooming around reticle

Table 3. Magnifying Patrol Rifle Scope Criteria Ratings¹

KEY Lowest Rating → Highest Rating 								
	Mark 6™ 1 6x20mm M6C1	SpecterDR™ 1.5 6x	1 4x24 NXS™ Compact Riflescope	Razor HD Gen II 1 6x24 Riflescope	Trijicon ACOG® 4x32 BAC	Elite Tactical SMRS 1-6.5x24mm	MTAC Riflescope 1x 4x 24mm	1:4x32 QR TS 35mm PITBULL Compact Scope
Capability								
Reticle								
Field of view								
Magnification range								
Deployability								
Eye relief								
Setup								
Maintainability								
Technical support								
User manual								
Usability								
Maintain settings								
Durability								
Optical quality								
Ease of use								
Size and weight								

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. Magnifying Patrol Rifle Scope Specifications¹

Specifications	Mark 6™ 1 6x20mm M6C1	SpecterDR™ 1.5 6x	1 4x24 NXS™ Compact Riflescope	Razor HD Gen II 1 6x24 Riflescope	Trijicon ACOG® 4x32 BAC	Elite Tactical SMRS 1-6.5x24mm	MTAC Riflescope 1x 4x 24mm	1:4x32 QR TS 35mm PITBULL Compact Scope
MSRP	\$2,440	\$1,599	\$1,370	\$1,899	\$1,645	\$1,968	\$399	\$1,395
Warranty duration	5 years	1 year	Limited lifetime	Limited lifetime	Limited lifetime	Limited lifetime	Limited lifetime	Limited lifetime
Transferrable warranty	✓	✓	✓	✓			✓	
Length	10.3 inches	7.3 inches	8.8 inches	10.1 inches	5.8 inches	10.6 inches	11.3 inches	7.3 inches
Tube diameter	34 millimeters	41 millimeters; integrated mount	30 millimeters	30 millimeters	Not available; integrated mount	30 millimeters	30 millimeters	35 millimeters
Weight (without mount)	17.0 ounces	17.5 ounces	17.0 ounces	16.0 ounces	15.8 ounces	18.5 ounces	17.0 ounces	23.0 ounces
Eye relief ²	4.4 to 3.6 inches	2.8 inches	3.5 inches	4.0 inches	1.5 inches	3.8 inches	4.0 to 3.5 inches	3.5 inches
Field of view ²	106 to 19 feet at 100 yards	16° to 4°	100 to 25 feet at 100 yards	115 to 21 feet at 100 yards	37 feet at 100 yards	106 to 16 feet at 100 yards	100 to 32 feet at 100 yards	144 to 38 feet at 100 yards
Reticle assessed	TMR-D	5.56 caliber	FC-3G™	JM-1 BDC (MOA)	Chevron with target reference system	BTR-1	Ballistic CQ 5.56 caliber	CQB with 2 MOA dot
Other available reticles	✓	✓	✓		✓	✓		
Reticle illumination source	LED	LED	LED	LED	Fiber optics and tritium	LED	LED	LED
Reticle location ³	First focal plane	Second focal plane	Second focal plane	Second focal plane	Not applicable; fixed magnification	First focal plane	Second focal plane	Second focal plane
Click value	0.2 mil	½ MOA	¼ MOA	½ MOA	½ MOA	0.1 mil	½ MOA	0.1 mil
Battery type	CR123	DL 1/3N	CR2032	CR2032	No batteries required	CR2032	CR2032	CR2032
Night vision compatible illumination	✓	✓	✓			✓		
Mounting options	Standard tube diameter; mount not included	Integrated quick-release mount	Standard tube diameter; mount not included	Standard tube diameter; mount not included	Integrated flattop mount with thumbscrews	Standard tube diameter; mount not included	Standard tube diameter; mount not included	Rings included; proprietary quick-release mount available for additional cost

Table 4. Magnifying Patrol Rifle Scope Specifications¹ Continued

Specifications	Mark 6™ 1 6x20mm M6C1	SpecterDR™ 1.5 6x	1 4x24 NXS™ Compact Riflescope	Razor HD Gen II 1 6x24 Riflescope	Trijicon ACOG® 4x32 BAC	Elite Tactical SMRS 1-6.5x24mm	MTAC Riflescope 1x 4x 24mm	1:4x32 QR TS 35mm PITBULL Compact Scope
Anodized coating	✓	✓	✓	✓	✓		✓	Optional
Scratch-resistant lenses	✓	✓	✓	✓		✓	✓	✓
Operating temperature	-40°F to 120°F	-40°F to 140°F	-80°F to 200°F	-20°F to 120°F	-51°F to 185°F	-25°F to 150°F	-4°F to 149°F	-40°F to 150°F
Storage temperature	-40°F to 160°F	-40°F to 180°F	-80°F to 200°F	-20°F to 120°F	-51°F to 185°F	-25°F to 150°F	-40°F to 158°F	Information not available
User manual availability	Online, e-mail	Online, e-mail	Online, e-mail	Online, e-mail	Hard copy by mail only	Online, e-mail	E-mail	E-mail

Notes:

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

² A range is provided from minimum to maximum magnification if applicable and available.

³ A reticle located in the first focal plane will change in size as the magnification is adjusted, while a reticle located in the second focal plane will stay the same size.

✓ Scope is equipped with corresponding feature. If the cell is blank, the scope is not equipped with the corresponding feature.

F = Fahrenheit

LED = light emitting diode

mil = milliradian

MOA = minute of angle

MSRP = manufacturer's suggested retail price