Homeland Security
Science and Technology

Summary

U.S. Department of Homeland Security
SAVER
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 operational tests on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response 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?"

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Stabilized Binoculars

In order to provide emergency responders with information on currently available stabilized binoculars' capabilities, limitations, and usability, the System Assessment and Validation for Emergency Responders (SAVER) Program, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic conducted a comparative assessment of stabilized binoculars for the SAVER Program. Detailed findings are provided in the Stabilized Binoculars Assessment Report*, which is available by request at https://www.rkb.us/saver.*

Background

Binoculars are often used in law enforcement for long-distance surveillance, search and rescue operations, evidence gathering, and to tactically assess observed situations. Holding the binoculars steady during these tasks can be difficult, even when using two hands. Wind, muscle fatigue, and excitement can cause the view through binoculars to appear shaky, leading to problems such as eye fatigue, distraction, and an unclear image. To broaden their usefulness to law enforcement, many binoculars are equipped with internal image stabilization optics to minimize image movement.

Internal image stabilization works by instantly adjusting the relative refraction angle of the binoculars' optics to compensate for motion. Stabilization is achieved using one of three techniques: gyroscopic, electronic, or mechanical. Gyroscopic stabilization uses internal gyroscopes to provide a stable reference that is used to move prisms and counteract any motion. Electronic stabilization uses small integrated accelerometers to measure any movements being made and to send commands to adjust the prisms to counteract any motion. Mechanical systems use a system of small counterweights and balances to counteract any motion. Mechanical systems were excluded from this assessment based on the recommendations of the focus group.

Assessment

A focus group of eight emergency response practitioners from various regions of the country met in April 2008 to identify equipment selection criteria, evaluation criteria, and assessment scenarios. The selection criteria included desired features such as ruggedness, water-resistance, weight, battery life, warranty, magnification, and utilization of electronic or gyroscopic stabilization technologies. The focus group also recommended that one product from each cost category (i.e., low, mid range, and high) be included in the assessment. Based on focus group recommendations and market survey research, SPAWARSYSCEN selected five models for assessment:

- Fujinon Techno-Stabi™ 12×32
- Nikon StabilEyes 12×32
- Canon 10×42 L IS WP
- Fraser-Volpe LLC Stedi-Eye® Observer 14×40
- Newcon Optik SIB 16×40 WP

Six emergency responders served as assessment evaluators, representing six different jurisdictions from across the nation. The assessment was conducted in two phases that focused on specific assessment criteria.

Phase 1 was the operational assessment. Evaluators assessed product performance for those criteria directly relating to using the product in three simulated scenarios: (1) in a surveillance vehicle, (2) on a boat, and (3) from a stationary vantage point. Each scenario included pre- and post-assessment procedures that were completed by the evaluators prior to continuing with the assessment. Phase 2 was the specification assessment. Evaluators provided feedback on criteria based on vendor-provided specifications, such as warranty and battery life.

Assessment Results

Evaluators rated the stabilized binoculars based on the evaluation criteria established by the focus group. Each recommended criterion was assigned to one of the five SAVER categories, and each criterion was then assigned a weight for its level of importance on a scale of 1 to 5, with 1 being somewhat important and 5 being of utmost importance. Once the criteria were weighted, the five SAVER Program categories were assigned a percentage value to represent the level of each category's importance relative to the other categories.

The SAVER category and composite scores are shown in table 1. Higher scores indicate better equipment performance. To view how each of the stabilized binoculars scored against each of the evaluation criteria assigned to the SAVER Program categories, see table 2 (on page 6).

The following paragraphs provide a brief summary of the evaluator comments and feedback on each of the stabilized binoculars and present the binoculars from the highest to lowest composite score.

SAVER Program Category Definitions

Affordability: This category groups criteria related to life-cycle costs of a piece of equipment or system.

Capability: This category 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 responder-relevant tasks.

Deployability: This category 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: This category groups criteria related to the maintenance and restoration of a piece of equipment or system to operational conditions by responders.

Usability: This category 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. Stabilized Binoculars Assessment Results[1]

Stabilized Binoculars	Composite Score	Affordability (27% Weighting)	Capability (30% Weighting)	Deployability (7% Weighting)	Maintainability (13% Weighting)	Usability (23% Weighting)
Fujinon Techno-Stabi 12×32	**78**	70	72	88	80	92
Nikon StabilEyes 12×32	**78**	68	74	92	76	90
Canon 10×42 L IS WP	**77**	68	70	90	86	88
Fraser-Volpe LLC Stedi-Eye Observer 14×40	**73**	60	78	80	84	72
Newcon Optik SIB 16×40 WP	**67**	62	70	68	66	70

Note:

[1] Scores contained in the assessment report may be displayed differently. For the purposes of the SAVER Summary, all SAVER category scores are normalized using a 100-point scale and rounded to the nearest whole number.

Fujinon Techno-Stabi 12×32

Both the Fujinon Techno-Stabi 12×32 and Nikon StabilEyes 12×32 binoculars received the highest overall assessment scores. Evaluator feedback highlighted the clarity and brightness of the image when using the Fujinon Techno-Stabi 12×32 binoculars. Evaluators commented the binoculars are compact, lightweight, and easy to use with one hand. They agreed that the binoculars are the ideal size for use in many emergency response applications. Evaluators also stated that the binoculars produce virtually no noise when stabilization is engaged.

Evaluators noted the Fujinon Techno-Stabi 12×32 binoculars are reasonably priced and include a 1-year parts and labor warranty. They stated the binoculars use two AA batteries and have a battery life of 8 to 10 hours. In addition, evaluators noted that the batteries are easy to install.

Several disadvantages were noted about the Fujinon Techno-Stabi 12×32 binoculars. There was expressed concern that the battery case could become lost since it is not attached and the ruggedness of the binoculars was described as less favorable. Evaluators noted that polarization filters and magnification options are not available, and ridges are needed to improve the grip of the binocular casing.

	**Pros**	• Battery life • Ease of battery installation • Bright and clear image • Compact size • Lightweight • Silent when stabilization is engaged • Economical • Hand strap
	Cons	• Battery case cover is not attached (could be lost) • Polarization filters are unavailable from the manufacturer • Dual mode not available
Fujinon Techno-Stabi 12×32	**Composite Assessment Score: 78**	

Nikon StabilEyes 12×32

The Nikon StabilEyes 12×32 and Fujinon Techno-Stabi 12×32 binoculars both received the highest overall assessment scores. Evaluators noted that these binoculars have a favorable field of view and impressive image quality when stabilization is engaged. They agreed that one-handed operation could be done with ease due to the hand strap and location of controls. Evaluators concurred that these binoculars are quiet, lightweight, and an ideal size for use in many emergency response operations.

	**Pros**	• Image quality • Field of view • Battery life • Ease of battery installation • Compact size • Lightweight • Silent when stabilization is engaged • Economical • Hand strap
	Cons	• Battery case cover is not attached (could be lost) • Polarization filters are unavailable from the manufacturer • Dual mode not available
Nikon StabilEyes 12×32	**Composite Assessment Score: 78**	

Evaluators reported the binoculars were reasonably priced and include a 1-year parts and labor warranty. They stated the binoculars use four AA batteries and have a battery life of 6 hours. They further noted that the batteries were easy to install.

Evaluators expressed concern over the battery case cover becoming lost since it is not attached. They reported other disadvantages as well, such as polarization filters and dual modes not being available.

Canon 10×42 L IS WP

The Canon 10×42 L IS WP binoculars received the second highest overall score. Evaluators approved of this product's size and weight, and concluded that the binoculars had a favorable, large field of view and clear image. They reported that the binoculars are quiet and easy to maintain.

Evaluators stated the binoculars were more expensive than the other products; however, a 3-year parts and labor warranty was included. The Canon 10×42 L IS WP binoculars use two AA batteries, and evaluators agreed battery installation and replacement can be accomplished without the use of tools. In addition, they stated that the battery life met their expectations.

In comparison to the Fujinon and Nikon binoculars, evaluators found the Canon binoculars to be less cost-effective and less user friendly. They agreed that

	Pros	• Image quality • Field of view • Battery life • Ease of battery installation • Compact size • Lightweight • Silent when stabilization is engaged • Warranty
	Cons	• No hand strap • Polarization filters are unavailable from the manufacturer • Dual mode not available
Canon 10×42 L IS WP	**Composite Assessment Score: 77**	

one-handed operation was difficult since the focus could not be adjusted without the use of a second hand, and since a hand strap was not available on the equipment. Evaluators also noted that polarization filters and dual modes are not available.

Fraser-Volpe LLC Stedi-Eye Observer 14×40

The Fraser-Volpe LLC Stedi-Eye Observer 14×40 ranked third in the assessment. Evaluators found these binoculars to have good magnification and a clear image. They stated the size of the controls enabled them to easily engage stabilization and focus the binoculars. Optional features included alternative eyepieces to adjust magnification, as well as haze and polarizing filters. In addition, evaluators were impressed with the attachable lens covers, battery life, and ruggedness of the binoculars.

	Pros	• Image quality • Field of view • Battery life • Haze and polarization filters are available • Additional magnification options are available • Submersible • Rugged
	Cons	• Eyepieces are not adjustable • Heavy for single-handed operation • Size • Dual mode not available • Cost vs. warranty
Fraser-Volpe LLC Stedi-Eye Observer 14×40	**Composite Assessment Score: 73**	

Evaluators stated the binoculars require two AA batteries. Evaluators were divided in their opinions regarding ease of battery installation; some evaluators stated battery installation was easy but others found installation to be too cumbersome.

Evaluators reported that the Fraser-Volpe LLC Stedi-Eye Observer 14×40 binoculars were expensive and that the 1-year warranty should be longer due to the higher cost of the binoculars. They also commented that the binoculars were too heavy and bulky to operate single handedly. Although the field of view met the evaluators' expectations, it was noted that the optional rubber eyepieces narrowed the field of view when used to provide a tighter fit or to block out light.

Newcon Optik SIB 16×40 WP

The Newcon Optik SIB 16×40 WP binoculars received the lowest overall score. Evaluators agreed the binoculars were user friendly and provided a good image quality and field of view. They further stated that the amber filter was a favorable substitute for polarized filters.

Evaluators reported that the binoculars were expensive and include a 12- to 18-month warranty. The binoculars use six AA batteries and have a battery life of 2 to 4 hours, resulting in an increased maintenance cost.

Evaluators commented that these binoculars were too large for many law enforcement applications. Although one-handed operation is possible once the unit is powered up, most evaluators agreed that the unit is too heavy, bulky, and uncomfortable to operate with one hand.

Evaluators also stated that battery installation may be difficult to perform in the field or at night, and there was an expressed concern that the battery

	Pros	• Image quality • Field of view • Amber filter available for low light applications
	Cons	• Battery installation • Heavy for single-handed operation • Size • Dual mode not available • Cost vs. warranty
Newcon Optik SIB 16×40 WP	**Composite Assessment Score: 67**	

compartment could become lost since it must be removed when the batteries are installed or replaced.

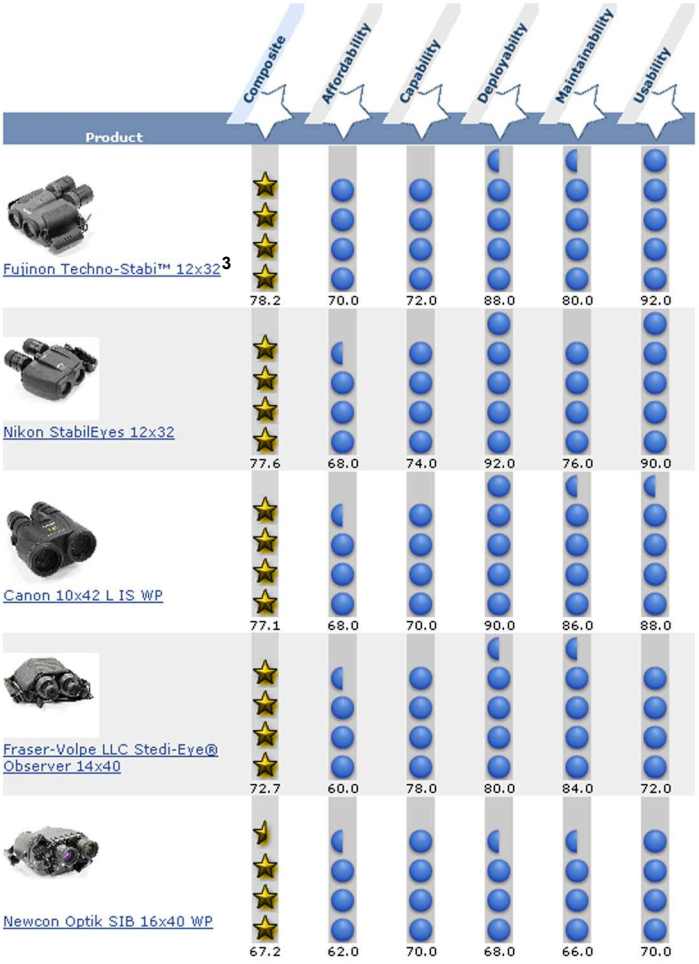
Conclusion

Representatives from across the nation successfully evaluated five stabilized binoculars from various manufacturer lines. The Techno-Stabi™ 12×32 binoculars by Fujinon and the StabilEyes 12×32 binoculars by Nikon scored the highest, followed by the 10×42 L IS WP binoculars by Canon, the Stedi-Eye Observer 14×40 binoculars by Fraser-Volpe LLC, and the SIB 16×40 WP binoculars by Newcon Optik. Evaluators indicated that the Fraser-Volpe and Newcon Optik binoculars did not meet their needs mainly due to their size and weight.

Throughout the assessment, evaluators stated that stabilized binoculars should be well-suited for application-specific needs. For example, size and weight were very important criteria for evaluators who use the equipment on boats and for those who carry their equipment in packs at all times. Evaluator feedback highlighted the following recommendations for agencies procuring stabilized binoculars:

- Determine the primary scenarios and applications for which the binoculars will be used. For example, think compact size and weight for mobile applications versus magnification and mounting options for fixed surveillance operations.
- Calculate the maintenance costs for long-term operation by evaluating the estimated battery life and the number and type of batteries required for operation. Lens covers and battery cases that do not stay attached once removed may also add to the costs of the equipment overtime since these pieces will need to be replaced if lost.
- Contact or visit other agencies that are already using stabilized binoculars and ask for feedback regarding the equipment they own.

QuickLook Snapshot[2]



Notes:

[2] The SAVER QuickLook, available on the SAVER Web site, allows users to select the SAVER categories that are most important to their department and view results according to their specific needs.

[3] Scores contained in the assessment report may be displayed differently. For purposes of the QuickLook, all SAVER category scores are normalized using a 100-point scale.

All reports in this series as well as reports on other technologies are available by request at https://www.rkb.us/saver.

Table 2. SAVER Category and Criteria Scores

KEY Least Favorable → Most Favorable					
○ ◔ ◑ ◕ ●	Fujinon Techno-Stabi™ 12×32	Nikon StabilEyes 12×32	Canon 10×42 L IS WP	Fraser-Volpe LLC Stedi-Eye® Observer 14×40	Newcon Optik SIB 16×40 WP
Assessment Criteria					
Affordability					
Initial Cost	◕	◕	◑	◔	◑
Warranty	◕	◑	●	◔	◑
Ruggedness	◑	◑	◔	◕	◑
Attachable Lens Covers	◑	◕	●	●	●
Capability					
Image Quality	●	●	◕	◕	◕
Field of View	●	●	◕	◕	●
Battery Life	◕	◕	◕	●	◔
Environmentally Sealed	◕	◕	◕	◕	◕
Multiple Magnification Options	◑	◑	◕	◕	◑
Dual Mode	◔	◔	◔	◔	◔
Polarization Filter	◔	◑	◕	◕	◕
Deployability					
Size	●	●	●	◑	◑
Surface Finish	◕	◕	◕	●	◕
Noise	●	●	●	●	◕
Maintainability					
Batteries (Type)	●	●	●	●	◕
Battery Replacement	◑	◑	◕	◕	◑
Usability					
Weight	●	◕	◕	◑	◑
User Friendly	●	●	◕	◕	◕
Ergonomics	●	●	◕	◕	◑
Size of Controls	●	●	●	◕	◕
Single-Handed Use	◕	●	◕	◑	◑
Specifications					
Polarizing Filters	Not Available	Not Available	Not Available	Haze and Polarizing Filters Available	Amber Filter Available for Low Light Applications
Environmentally Sealed	Waterproof, Airtight (No IP Rating Available)	Waterproof, Float (No IP Rating Available)	Waterproof (No IP Rating Available)	'100% Sealed, Submersible and Waterproof' (No IP Rating Available)	Waterproof (No IP Rating Available)
Dual Mode (for land and sea)	Not Available	Not Available	Not Available	Not Available	Not Available
Initial Cost	$846.00	$799.95	$1599.00	$5000.00	$2748.46
Warranty	One Year for Defects in Materials or Workmanship	One Year Parts and Labor for Material and Manufacturing Defects	Three Year Parts and Labor	One Year for Defects in Materials or Workmanship	One Year from Purchase for Defects in Material or Workmanship but no more than 18 Months After Date of Manufacture