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 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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Fiber Optic Kits
(AEL reference number 02EX-00-KTFO)

Fiber optic kits are used by responders for surveillance and inspection of areas that are potentially dangerous or difficult to access. These devices fit underneath a door or through a hole drilled in a wall, allowing users to view a scene covertly. Fiber optic kits are also useful for visually inspecting confined areas such as gas tanks or inside machinery.

To provide responders with information on currently available fiber optic kits, the Space and Naval Warfare Systems Center Atlantic conducted a comparative assessment of these kits for the System Assessment and Validation for Emergency Responders (SAVER) Program in June 2011. Detailed findings are provided in the *Fiber Optic Kits Assessment Report*, which is available by request at https://www.rkb.us/saver.

Assessment Methodology

Prior to the assessment, seven law enforcement officers with experience using fiber optic kits were chosen from various jurisdictions to participate in a focus group. 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 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, market research, and availability, the following fiber optic kits were selected for assessment:

- XL Go™ VideoProbe®, GE Measurement and Control Solutions;
- WalkAbout II™ Videoscope – Color, Zistos® Corporation;
- Model 178708 V5 Non-Conductive Videoscope (V5 Videoscope), Instrument Technology Inc.; and
- Ultimate Fiberscope® Master Kit, SAS R&D Services Inc.

Six responders served as evaluators for this assessment. All evaluators had at least 10 years of law enforcement experience. Evaluators' specific experience included bomb squads, specialized electronic operations teams, special weapons and tactics teams, and narcotics units.

During the assessment, evaluators rated the fiber optic kits 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 using the fiber optic kits in three scenarios served as the basis for the operational assessment. During the inspection scenario, evaluators drilled a hole in a metal tool box and used the scope to inspect the contents. Evaluators maneuvered the scope under a closed door to observe and identify people and objects during the hostage barricade scenario and through a hole drilled in a wall to observe people on the other side during the investigation scenario.

Assessment Results

According to evaluators, all of the fiber optic and videoscope kits included in the assessment would assist responders in inspection and most explosive ordnance disposal operations. Table 1 displays the composite assessment scores as well as the category scores for each fiber optic kit. Higher scores indicate a more favorable rating by evaluators. The advantages and disadvantages of each fiber optic kit, as identified by evaluators, are listed in table 2. To view how each fiber optic kit 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 a fiber optic kit should review the detailed findings in the *Fiber Optic Kits Assessment Report* and carefully consider each product'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. Fiber Optic Kit Assessment Results

Product	Composite Score	Affordability (7% Weighting)	Capability (33% Weighting)	Deployability (25% Weighting)	Maintainability (10% Weighting)	Usability (25% Weighting)
XL Go™ VideoProbe®	**4.2**	3.0	4.4	4.1	4.4	4.3
WalkAbout II™ Videoscope — Color	**3.5**	3.2	3.4	3.4	3.6	3.6
V5 Videoscope	**3.0**	1.5	3.2	2.9	3.3	3.2
Ultimate Fiberscope® Master Kit	**2.9**	2.3	2.7	3.6	3.3	2.5

Table 2. Fiber Optic Kit Advantages and Disadvantages

Product	Advantages	Disadvantages
XL Go™ VideoProbe® Composite Score: 4.2	• Excellent image quality due to high resolution and low-light capability (using long exposure setting) • One-handed joystick operation of the articulating head provides very good range of motion • Records to standard media (USB thumb drive), which is included • Small, lightweight, all-in-one system	• No infrared (IR) illuminator capability • High cost • Minimal accessories included
WalkAbout II™ Videoscope — Color Composite Score: 3.5	• One-handed operation with good articulation • Quality monitor that enables users to change orientation • Features a sun shade	• Lack of orientation awareness features • No low lux capability • Light source attachment interferes with operation • Proprietary batteries and connectors
V5 Videoscope Composite Score: 3.0	• Features white, blue, and IR illumination • Location of illuminator is inside the control case instead of on the handle • Large display size (10 inches) • Good orientation awareness; physical cues of orientation and markings on shaft	• Total system weight is 61 pounds; the travel case is very large, affecting portability • Battery life is 45 minutes, and system cannot be used while charging • Older technology (e.g., incandescent light, CompactFlash [CF] storage media) • IR ineffective at longer ranges
Ultimate Fiberscope® Master Kit Composite Score: 2.9	• Very good articulation • Many accessories and interchangeable components included in the kit • Lightweight, well-organized case • Field repair kit for articulation cables	• Limited use (inspection only, not tactical) • Limited depth of field (target must be within 4 to 6 inches) • Monitor image quality (image better with eyepiece only) • Less than favorable performance in low lighting

Table 3. Fiber Optic Kit Criteria Ratings[1]

KEY: Least Favorable → Most Favorable: ○ (least) ◔ ◑ ◕ ● (most)

Criteria	XL Go™ VideoProbe®	WalkAbout II™ Videoscope — Color	V5 Videoscope	Ultimate Fiberscope® Master Kit
Affordability				
Value	◑	◑	◔	◔
Capability				
Low light	●	◑	◑	○
Articulating head	●	◕	◕	◕
Power options	◕	◑	◔	◑
Viewing options	◕	◕	◑	◑
Interchangeable components	◕	◑	◕	◑
Recording	●	◕	◑	◑
Deployability				
Portability	●	◕	◔	◕
Length of fiber	◕	◕	◕	◕
Covert	◕	◔	◑	◔
Bend radius	●	◕	◕	◕
Water resistance	●	◕	◑	◕
Chemical resistance	◕	◕	◑	◕
Diameter	◕	◑	◑	◕
Drill bit	◑	◑	◑	◕
Maintainability				
Durability	●	◕	◑	◑
Battery accessibility	◕	◑	◕	◑
Usability				
Image quality	●	◕	◑	◔
Field of view	◕	◕	◕	◔
User-friendly	◕	◕	◑	◕
Monitor	◕	◕	◑	◑
Handheld component	◕	◕	◑	◑
Orientation awareness	◕	◔	◑	◑

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. Fiber Optic Kit Specifications[1]

Specifications	XL Go™ VideoProbe®	WalkAbout II™ Videoscope — Color	V5 Videoscope	Ultimate Fiberscope® Master Kit
MSRP	$32,000	$16,495	$28,495	$14,773
Shaft length	2.0 meters	1.5 meters	2.0 meters	2.0 meters
Tip/probe diameter	6.1 millimeters	6.0 millimeters	8.0 millimeters	6.0 millimeters
Articulation	4-way, 150°	4-way, 100° to 160°	4-way, 120°	4-way, 120°
Minimum bend radius	2.0 inches	4.0 inches	4.0 inches	1.5 inches
Chemical-resistant probe	Yes	Yes	No	Yes
Display size	3.7 inches	5.0 inches	10.0 inches	3.5 inches
Resolution	440,000 pixels	380,000 pixels	307,000 pixels	17,000 fibers
Field of view	50°	90°[2]	80°	70°
Total system weight (including case)	14.3 pounds	23.0 pounds	61.0 pounds	30.0 pounds
Weight of display	3.8 pounds[3]	3.6 pounds	22.0 pounds[4]	2.0 pounds
Battery type	Lithium ion battery pack (rechargeable)	Nickel metal hydride (NiMH) battery pack (rechargeable)	NiMH battery pack (rechargeable)	Lithium ion battery pack (rechargeable)
Illuminator(s) color and type	White light, light-emitting diode (LED)	White light LED	White, infrared, and blue light incandescent	White light LED
Illuminator power source	Integrated	4 AA batteries	Integrated	Integrated
Drill bit included	No	No	No	Yes

Notes:

1   Information was provided by manufacturers and has not been independently verified by the SAVER Program.
2   Kit includes 58 to 90° lenses; however, the vendor only provided the 90° lens for evaluators to assess.
3   Weight of entire display, controller, and probe (excluding case). This is an all-in-one system.
4   Weight of monitor in case. The monitor is integrated into the case.