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 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?"

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

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Explosive Ordnance Disposal Disrupters

(AEL reference number 02EX-02-TLPB)

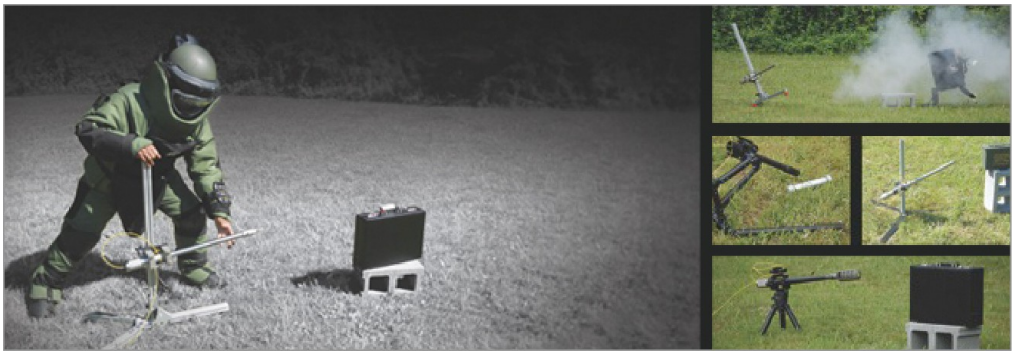
Explosive ordnance disposal (EOD) disrupters are used by hazardous device technicians as bomb mitigation devices. The primary purpose of a disrupter is to remotely open or render safe a suspect item or improvised explosive device (IED). To "remotely open" is to open a suspect item to expose the contents, while "render safe" means to penetrate, cut, or remove the fusing system components in order to disable an explosive. Most disrupters are capable of discharging several different types of projectiles depending on the requirements of the operational situation. A secondary purpose for a disrupter is to create a means of access in a window, door, trunk, etc.

In order to provide emergency responders with information on currently available EOD disrupters, Science Applications International Corporation (SAIC) conducted a comparative assessment of EOD disrupters for the System Assessment and Validation for Emergency Responders (SAVER) Program in June 2011. Detailed findings are provided in the *Explosive Ordnance Disposal (EOD) Disrupters Assessment Report*, which is available by request at https://www.rkb.us/saver.

Assessment Methodology

Prior to the assessment, eight hazardous device technicians 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 equipment availability, the following EOD disrupters were selected for assessment:

- RADC-24, Royal Arms International Inc.;
- Lance Water Jet Disrupter (Lance), Canadian Technology Systems (CTS);
- 12-Gauge PAN Disrupter™ (PAN), Ideal Products Inc.; and
- CarbonFire 24, Concept Development Corporation.

Eight responders served as evaluators for this assessment. These evaluators were certified as hazardous device technicians by a nationally recognized agency and had at least 2 years of EOD experience.

During the assessment, evaluators rated the EOD disrupters 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 EOD disrupters to remotely open simulated IEDs served as the basis for the operational assessment. The simulated IEDs included a briefcase, steel pipe, ammunition box, and backpack; these items were identified by the focus group as items typically found during bomb mitigation calls.

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.

Assessment Results

Evaluators were able to successfully complete the assessment with all four EOD disrupters. Table 1 displays the composite assessment scores as well as the category scores for each EOD disrupter. Higher scores indicate a higher rating by evaluators. The advantages and disadvantages of each EOD disrupter, as identified by evaluators, are listed in table 2. To view how each EOD disrupter scored against the evaluation criteria assigned to the SAVER categories, see table 3. For equipment specifications, see table 4.

Analysis of evaluator comments and scores revealed the following common observations:

- Evaluators preferred disrupters that include lightweight stands that can be easily carried, setup, and stored;
- Evaluators placed a high value on disrupters that can be easily assembled and adjusted;
- Evaluators expressed a strong preference for disrupters that are compatible with various types of ammunition and projectiles;
- Evaluators favored disrupters with limited recoil;
- Evaluators preferred disrupters with a laser sighting feature;
- Evaluators placed a high value on standoff charts and ammunition characterizations;
- Evaluators expressed a strong preference for disrupters with different mounting capabilities; and
- Evaluators favored disrupters that are reasonably priced with affordable accessories and inexpensive consumables.

Emergency responder agencies that may be considering the purchase of an EOD disrupter should review the detailed findings in the *Explosive Ordnance Disposal (EOD) Disrupters Assessment Report* and carefully consider the overall capabilities and limitations of each EOD disrupter 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 at https://www.rkb.us/saver.

Table 1. EOD Disrupter Assessment Results

Model	Composite Score	Affordability (15% Weighting)	Capability (30% Weighting)	Deployability (20% Weighting)	Maintainability (10% Weighting)	Usability (25% Weighting)
RADC-24	**79**	69	78	81	83	83
Lance	**74**	46	73	83	74	86
PAN	**72**	78	82	64	75	62
CarbonFire 24	**61**	62	76	49	66	49

Table 2. EOD Disrupter Advantages and Disadvantages

Model	Advantages	Disadvantages
 **RADC-24** Composite Score: 79	• Few moving parts; less potential for mechanical malfunction • Compatible with a variety of rounds • Lightweight stand • Vertical adjustment capabilities • One-lever height adjustment	• Proprietary ammunition • Difficult to adjust legs on stand; instability of stand on uneven surfaces • Aluminum part of stand bent during kickback • Occasional separation and lodging of ammunition base within breech • Lengthy setup time due to extra components (i.e., small ball bearing and disk)
 **Lance** Composite Score: 74	• Lightweight, portable stand • Adjustment capabilities • Storage provided in legs of stand • Easy-to-load ammunition • Built-in recoil reduction feature • Zero-convergence laser sighting	• Height limitations of stand • Cost of unit and ammunition • Laser battery life and type • Unable to be mounted on other stands • Limited ammunition characterization
 **PAN** Composite Score: 72	• Compatible with a large selection of ammunition • Key components included with initial cost • Interoperability of components with other disrupters • Standoff charts and characterization included • Robot-mounting capabilities	• Heavy, cumbersome stand • Poor weight distribution of stand • Breech design; mechanical difficulties and misfires • Overall weight of system • Weak intensity of red laser sighting system • Proprietary ammunition
 **CarbonFire 24** Composite Score: 61	• Lightweight unit • Recoil reduction feature • Short and tall stand options; adjustment capabilities with tall stand • Uses components from PAN disrupter • Cost of unit	• Instability of short legs for stand • Key components not included • Unclear warranty • Instability of laser mounting system • Difficult to load water

Table 3. EOD Disrupter Criteria Ratings[1]

KEY Least Favorable → Most Favorable				
○ ◔ ◑ ◕ ●	RADC-24	Lance	PAN	CarbonFire 24
Affordability				
Initial cost	◕	◔	◕	◑
Costs of consumables	◕	◑	◕	◕
Costs of accessories	◕	◕	◕	◔
Warranty	◕	◑	◕	◑
Repair costs	◕	◕	●	◕
Maintenance costs	◕	◕	◕	◕
Capability				
Accuracy	◕	●	●	◕
Various projectile options	◕	◑	●	●
Various stand options	◕	◕	●	◕
Various barrel options	●	◑	◕	◑
Secure barrel locking	◕	●	◕	●
Recoil reduction	◕	●	◑	●
Interchangeable sights	◕	◕	◕	◕
Deployability				
Minimal time on target	●	◕	◑	◑
Stability of disrupter	◕	●	◕	◔
Ease of portability	◕	●	◑	●
Maintainability				
Ease of cleaning	●	◕	◕	◕
Accuracy of manuals	◑	◕	●	◑
Special tools required	●	◕	◕	◕
Ease of maintenance	●	●	◕	◕
Storage requirements	◕	◕	◕	●
Usability				
Simplicity on target	●	◕	◑	◔
Secure initiation source	●	●	◑	◑
Ease of setup (off target)	◕	●	◕	◕
User-friendly 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. EOD Disrupter Specifications[1]

Specifications	RADC-24	Lance	PAN	CarbonFire 24
Initiation	Shock tube	Electric or shock tube	Shock tube	Shock tube
Ammunition	12 gauge	12 gauge	12 gauge	12 gauge
Projectiles	Frangible, liquid, solid	Frangible, liquid, solid	Frangible, liquid, solid	Frangible, liquid, solid
Length	610 millimeters	551 millimeters	660 millimeters	609 millimeters
Weight	3.6 kilograms	< 2.0 kilograms	3.4 kilograms	1.0 kilograms

Note:

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