



System Assessment and Validation for Emergency Responders (SAVER)

Handheld Metal Detectors Market Survey Report

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System Assessment and Validation for Emergency Responders

Prepared by Space and Naval Warfare Systems Center Atlantic

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FOREWORD

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 commercially available equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community. The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency response equipment; and
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency response equipment.

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 responder community: “What equipment is available?” and “How does it perform?” These knowledge products are shared nationally with the 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. As a SAVER Program Technical Agent, the Space and Naval Warfare Systems Center (SPAWARSYSCEN) Atlantic has been tasked to provide expertise and analysis on key subject areas, including communications, sensors, security, weapon detection, and surveillance, among others. In support of this tasking, SPAWARSYSCEN Atlantic developed this report to provide emergency responders with information gathered during a market survey of commercially available handheld metal detectors, which fall under AEL reference number 02EX-00-PBIE titled Explosive Device Mitigation and Remediation Equipment.

Visit the SAVER website on First Responder.gov (<http://www.firstresponder.gov/SAVER>) for more information on the SAVER Program or to view additional reports on handheld metal detectors or other technologies.

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1. INTRODUCTION

Handheld metal detectors (HHMD), also known as security wands, are lightweight battery-powered devices designed to detect concealed items such as weapons or illicit contraband that contain metallic components. These highly portable detection units provide law enforcement and security professionals with a low-cost and effective means of screening individuals seeking access to a variety of locations including airports, private and government buildings, military installations, prisons, concert venues, and sporting events. To provide emergency responders with information on HHMDs, the System Assessment and Validation for Emergency Responders (SAVER) program conducted a market survey. This market survey report is based on information gathered from October 2013 to February 2014 from Internet research, industry publications, and a government issued Request for Information (RFI) that was posted on the Federal Business Opportunities website.

Due diligence was performed to develop a report that is representative of products in the marketplace.

2. HHMD TECHNOLOGY OVERVIEW

HHMDs can be used either as a sole screening device or in conjunction with more elaborate equipment such as walk-through metal detectors to identify ferrous metals (e.g., steel, iron) and non-ferrous metals (e.g., aluminum, copper, zinc, gold, silver). Though relatively simple in design, HHMDs operate on similar technological principles as other metal detectors.

The HHMD's power source sends a time-varying electrical current through a wire coil built into the device. This current can be a smooth continuous wave or regularly pulsed signal, and in response, the coil generates a primary magnetic field, which varies with the current and emanates from the device. Then, as the device comes within range of conductive or magnetically permeable substances, such as those contained in guns or metal belt buckles, the changing primary magnetic field induces electrical eddy currents in the object, as illustrated in Figure 2-1. These induced currents generate a secondary magnetic field, which emanates from the object and can be picked up by the HHMD's receiver. Electronic circuitry in the device then analyzes this field and triggers an alarm when an object is detected.

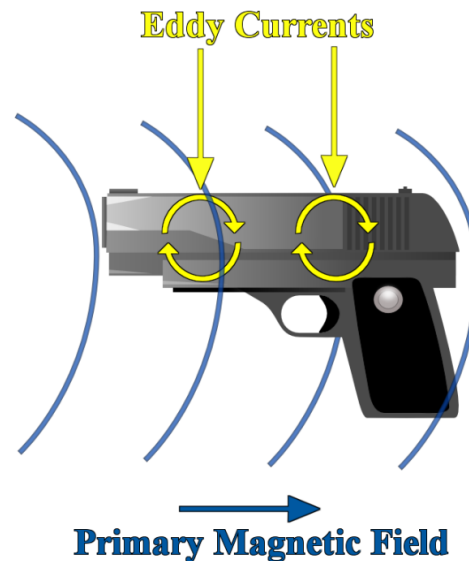


Figure 2-1. Induced Eddy Currents

Image courtesy of Scientific Research Corporation

Regardless of their mass, larger objects generally produce magnetic fields of greater intensity and will therefore induce a stronger signal in the receiver. Other factors contributing to signal intensity and object detectability include:

- Metal type;
- Object shape;
- Object orientation relative to the HHMD; and
- The velocity at which the HHMD is passed over an object.

2.1 Operating Frequency

The operating frequency of an HHMD is usually expressed in kilohertz (kHz). In general, devices operating at lower frequencies can more easily detect high conductivity metals such as copper and silver and provide better surface penetration capabilities. Alternatively, devices operating at higher frequencies can more easily detect low conductivity metals such as aluminum and iron and are better able to detect small objects. Some HHMDs operate on a single frequency, while others offer multiple operating frequencies. In situations where there is a higher presence of ambient electromagnetic (e.g., radio frequency) signals, having the capability to operate among several frequencies serves to eliminate potential interference due to the ambient signal environment.

2.2 Sensitivity Levels

Sensitivity levels of HHMDs can be either preset or adjustable and enable users to target objects based on factors such as metal type, size, and location. By adjusting sensitivity level, users can discriminate with greater accuracy between threat items such as guns and knives and non-threat items such as keys and belts.

Additionally, some HHMDs have built-in microprocessors that automatically calibrate and tune the device and continuously modify the sensitivity levels to account for changing situations and conditions. Some devices also provide an interference clearing mechanism, which enables users to adjust for temporary environmental static caused by metals contained in nearby places such as walls or floors.

2.3 Alarms

HHMD alarms alert users when the device comes within range of a concealed item. Manufacturers offer various alarm features including the following:

- Visual, audio, and vibration alarm modes;
- Switchable alarm mode settings;
- Light-emitting diode (LED) displays indicating the presence of a metal object;
- Adjustable audio volume control and selectable alarm tones; and
- Increasing audio and vibration alarm intensity based on the size of a metal object as well as its proximity to the device.

Precise alarm signaling helps improve detection accuracy and promote greater traffic flow through a security checkpoint. LED displays, for example, can be particularly useful in low-light areas, while vibration alarms are good for screening in high-noise environments and maintaining discretion during a search. Some HHMDs also come with a headphone jack so that audio alarms can be monitored through devices such as earbuds.

2.4 Batteries and Battery Life

Most HHMDs operate on a single 9-volt battery, which can be either disposable or rechargeable. Depending on the device, disposable batteries provide up to 130 hours of normal usage time, while rechargeable batteries, such as nickel metal hydride (NiMH) or nickel cadmium (NiCd), provide approximately 40 hours of use on a single charge.

HHMDs often have LED indicators to show that the device is powered on or that the battery charge is low. Some HHMDs also come with a charging unit that plugs directly into the device; while for rechargeable batteries, a charging unit may be a standard or an optional accessory.

2.5 Product Design

Some HHMDs are constructed of ruggedized, high-impact plastic to protect against damage if the device is dropped, and some have a sealed outer casing to protect against water, dust, and other environmental factors. Before purchasing an HHMD, agencies may want to inquire as to whether the product has been drop-tested and how well it can withstand the elements. If an HHMD will be used in outdoor settings, agencies should consider the device's operational temperature range and humidity rating.

Based on the shape of their detection surfaces, HHMDs can be grouped into three categories: planar, circular, and probe. An example of each is shown in Figure 2-2.



Figure 2-2. Examples of Handheld Metal Detectors

Planar devices have flat, two-sided detection surfaces and are predominately used for scanning people passing through security checkpoints. Circular devices have curved detection surfaces and are often used in security checkpoint applications requiring greater sensitivity ranges, enhanced depth penetration capabilities, and no electromagnetic signal distortion. Probe devices have elongated detection surfaces, typically 360° in range, and are often designed for specific applications such as performing body searches, locating evidence at crime scenes, and scanning for objects at greater distances. Some HHMDs also have an LED flashlight in the tip of the device for use in low-light and nighttime operations.

3. STANDARDS

The National Institute of Justice (NIJ) Standard-0602.02 titled *Hand-Held Metal Detectors for Use in Concealed Weapon and Contraband Detection* establishes thorough requirements and test procedures for evaluating the performance of HHMDs used for detecting concealed weapons and

contraband. This document is currently available at the following URL: <https://www.ncjrs.gov/pdffiles1/nij/200330.pdf>. A revision to this standard, 0602.03 titled *Hand-held Metal Detector Standard for Public Safety*, is now in draft form and can be accessed at <https://www.justnet.org/pdf/NIJ-Hand-Held-Metal-Detector-Standard-0602-03-Draft-for-Public-Comment.pdf>. Other standards pertaining to the design, testing, and operation of HHMDs include the following:

- **Standard:** Federal Communications Commission (FCC) Part 15
Subject: Radio frequency devices
URL: <https://www.fcc.gov/encyclopedia/rules-regulations-title-47>
- **Standard:** International Civil Aviation Organization (ICAO) Annex 17 to the Convention on International Civil Aviation, *Security: Safeguarding International Civil Aviation Against Acts of Unlawful Interference*
Subject: Guidance and procedures for implementing preventative security measures at airports
URL: <http://www.icao.int/Security/SFP/Pages/Annex17.aspx>
- **Standard:** International Electrotechnical Commission (IEC) 60529
Subject: Ingress protection (IP) ratings indicating a device's ability to resist dust, water, and other environmental factors
URL: <http://www.nema.org/Standards/ComplimentaryDocuments>
- **Standard:** International Organization for Standardization (ISO) 9001
Subject: Requirements and guidelines for quality assurance
URL: http://www.iso.org/iso/iso_9000

4. HEALTH SAFETY CONSIDERATIONS

The low-frequency magnetic fields emitted by HHMDs have periodically caused electromagnetic interference (EMI) with ambulatory medical devices including the following:

- Implanted cardiac pacemakers and defibrillators;
- Implanted spinal cord and nerve stimulators; and
- Drug infusion units.

Although EMI can affect the functioning of these devices and therefore pose a potential risk to patient safety, the number of reported incidents has been relatively low. Nevertheless, the Food and Drug Administration has made the following recommendations:

If scanning with a hand-held metal detector is necessary, warn the security personnel that you have an electronic medical device and ask them not to hold the metal detector near the device longer than necessary. You may also ask for an alternate form of personal search.¹

¹ "Very Low Health Risks from Full-Body X-ray Scanners," U.S. Food and Drug Administration, Consumer Health Information, November 2010.

According to the U.S. Transportation Safety Administration (TSA), people “who have internal medical devices should not be screened by a metal detector and should instead request to be screened by imaging technology or a patdown.”² Thus, public safety practitioners who use HHMDs should be aware of the health risks associated with their operation.

Recommended practices for the United States are described in IEEE Standard C95.1-2005: “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.” Additional guidance can be found in NIJ Standard-0602.02 and ASTM F2401–04(2010): “Standard Practice for Security Checkpoint Metal Detector Screening of Persons with Medical Devices.”

5. PRODUCT DATA

RFI responses were received for 32 commercially available HHMDs. Of these, 15 are planar, 10 are circular, and 7 are probe.

The product data presented in this report was obtained directly from vendors and their websites and has not been confirmed by the SAVER program. General information, features, and performance are presented in separate product comparison matrices for each HHMD group and are defined as follows, listed in table and column order:

General Information Matrix:

MSRP refers to the manufacturer’s suggested retail price of an HHMD.

Dimensions (inches) refers to the dimensions of an HHMD expressed in inches as length, width, and height, in accordance with the perspective shown in Figure 5-1, or as length and thickness for probe models.

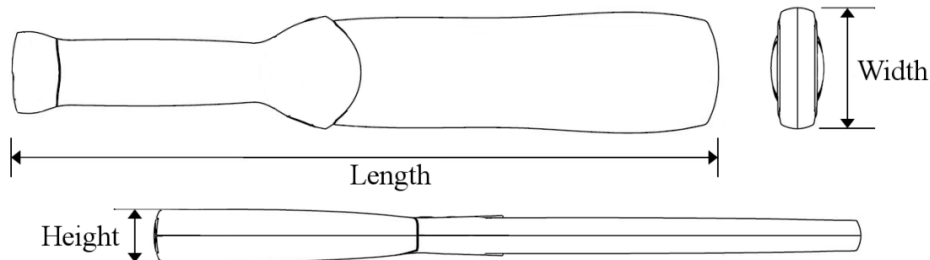


Figure 5-1. Handheld Metal Detector Dimensions

Image courtesy of Scientific Research Corporation

Weight (ounces) refers to the weight of an HHMD with the battery installed.

Warranty (years) refers to the duration of the warranty.

Support indicates whether a vendor provides support.

² “Internal Medical Devices, Travelers with Disabilities and Medical Conditions,” U.S. Department of Homeland Security, Transportation Security Administration, January 28, 2013.

Features Matrix:

LED Indicators refers to HHMD functions—power on, low battery, and alarm signals—that are displayed visually with LEDs.

Alarm Types refers to the types of alarm options (e.g., visual, audible, and/or vibration).

Alarm Adjust indicates whether the volume of an audible alarm can be adjusted and/or muted.

Sensitivity Tuning refers to whether an HHMD is tuned automatically or manually.

Sensitivity Levels refers to the number of selectable sensitivity levels of an HHMD.

Multiple Operating Frequencies indicates whether users can operate an HHMD at multiple operating frequencies.

Interference Clearing indicates whether an HHMD provides a mechanism for reducing or eliminating operational disturbances caused by other devices or ambient electromagnetic and radio frequency signals.

Audio Jack indicates whether an HHMD has a headphone jack for monitoring audible alarms through devices such as earbuds.

Performance Matrix:

Operating Temperature (°F) refers to the safe operating temperature range of an HHMD.





Maximum Humidity Range (percent) refers to the maximum safe operating humidity of an HHMD without condensation.

Operating Frequency (kHz) refers to the frequency of the electromagnetic signal transmission.







Battery Type refers to the number and types of batteries required to power an HHMD.

NIJ Standard indicates whether an HHMD complies with NIJ Standard-0602.02.

Table 5-1. Planar HHMD Product Comparison Matrix – General Information

Vendor	Product Name	MSRP	Dimensions (inches)				Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height	Phone			E-mail	Web		
Adams® Electronics, Inc.	AD10-2	\$150.00	14.20	2.16	1.80	9.24	2	✓	✓	✓		
	AD11-2	\$200.00	14.20	2.16	1.80	9.24	2	✓	✓	✓		
	AD11-V											
Autoclear® LLC	HandWand® Models 20 and 21	NP	17.00	3.60	2.40	11.00	1	NP			NP	
CEIA® USA	PD140N	\$250.00	14.00	3.20	1.60	13.12	2	✓	✓			

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Vendor	Product Name	MSRP	Dimensions (inches)				Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height	Phone			E-mail	Web		
CEIA® USA	PD240	\$330.00	17.00	3.20	1.60	16.48	2	✓	✓			
Fisher® Research Labs	CW-10	\$149.00	15.75	2.50	1.00	11.02	2	✓	✓	✓		
	CW-20	\$99.00	16.50	3.50	1.40	14.10	2	✓	✓	✓		
Garrett® Metal Detectors	Super Scanner® V	\$199.95	16.50	3.25	1.62	17.60	2	✓	✓	✓		
Ranger™ Security Detectors, Inc.	M1000	\$95.00	16.00	3.12	1.37	14.00	2	✓	✓			
	M1500	\$120.00	16.00	3.12	1.37	14.00	2	✓	✓			

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Vendor	Product Name	MSRP	Dimensions (inches)				Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height	Phone			E-mail	Web		
SUNS™ International, LLC	TS-90	\$100.00	16.50	3.10	1.60	13.80	2	✓	✓	✓		
	TS-90V	\$120.00	16.50	3.10	1.60	13.80	2	✓	✓	✓		
White's® Electronics	Spectra-Scan™	\$229.95	16.00	2.75	1.17	11.10	3	✓	✓	✓		

Notes:
 MSRP—manufacturer's suggested retail price
 ✓—detector is equipped with corresponding feature
 NP—information was not provided by the vendor
 Blank cell—detector is not equipped with corresponding feature

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-2. Planar HHMD Product Comparison Matrix - Features

Vendor	Product Name	LED Indicators		Alarm Types			Alarm Adjust	Sensitivity Tuning	Sensitivity Levels	Multiple Operating Frequencies	Interference Clearing	Audio Jack	
		Power On	Low Battery	Alarm	Visual	Audible							Vibration
Adams [®] Electronics, Inc.	AD10-2	✓	✓	✓	✓	✓		No	Automatic	1	No	No	No
	AD11-2	✓	✓	✓	✓	✓	✓	See note ¹	Automatic	1	No	No	No
	AD11-V												
Autoclear [®] LLC	HandWand [®] Models 20 and 21		NP		✓	✓	O	Adjusted	NP	NP	NP	NP	Yes
CEIA [®] USA	PD140N ² PD240 ²		✓	✓	✓	✓	✓	Adjusted/ Muted	Manual	3	5	Yes, by switching frequencies	No
Fisher [®] Research Labs	CW-10	✓	✓			✓	✓	Muted	Automatic	1	No	No	No
	CW-20	✓	✓			✓	✓	Muted	Automatic	2	3	Yes, by switching frequencies	No
Garrett [®] Metal Detectors	Super Scanner V	✓	✓	✓	✓	✓	✓	Muted	Automatic/Manual	3	No	Yes	Yes
Ranger [™] Security Detectors Inc.	M1000		✓	✓	✓	✓		Adjusted/ Muted	Automatic	Adjustable	No	Yes	Yes
	M1500					✓							
SUNS [™] International, LLC	TS-90	✓	✓	✓	✓	✓		No	Automatic	2	No	No	Yes
	TS-90V						✓	Muted					

Vendor	Product Name	LED Indicators		Alarm Types			Alarm Adjust	Sensitivity Tuning	Sensitivity Levels	Multiple Operating Frequencies	Interference Clearing	Audio Jack
		Power On	Low Battery	Alarm	Visual	Audible						
White's® Electronics	Spectra-Scan	✓	✓	✓	✓	✓	Adjusted/ Muted	Automatic/Manual	3	No	Yes, with de-sense feature	Yes
<p>Notes:</p> <p>¹The Adams AD11-V offers the same features listed here for the AD11-2 but also includes a vibrate alarm, which mutes the device.</p> <p>²The CEIA PD140N and PD240 also have LED indicators for sensitivity levels, vibration on, and audio on.</p> <p>✓—detector is equipped with corresponding feature</p> <p>Blank cell—detector is not equipped with corresponding feature</p> <p>O—optional vibration alarm available</p> <p>NP—information was not provided by the vendor</p>												

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-3. Planar HHMD Product Comparison Matrix - Performance

Vendor	Product Name	Operating Temp. (°F)	Maximum Humidity (percent)	Operating Freq. (kHz)	Battery Type	NIJ Standard
Adams [®] Electronics, Inc.	AD10-2 AD11-2 AD11-V	-4 to 149	98	20	9 Volt alkaline (one) or 9 Volt NiCd (one)	Yes
Autoclear [®] LLC	HandWand [®] Models 20 and 21	NP	98	NP	9 Volt alkaline (one) or 9 Volt NiCd (one)	Yes
CEIA [®] USA	PD140N PD240	-35 to 158	98	Proprietary	AA NiMH (two)	Yes
Fisher [®] Research Labs	CW-10	0 to 160	NP	110	9 Volt alkaline (one)	NIJ-0602.00
	CW-20	0 to 160	NP	7.1	9 Volt alkaline (one)	NIJ-0602.00
Garrett [®] Metal Detectors	Super Scanner V	-35 to 158	95	56	9 Volt alkaline (one) or 9 Volt NiMH (one)	Yes
Ranger [™] Security Detectors, Inc.	M1000 M1500	35 to 110	95	13	9 Volt alkaline (one) or 9 Volt NiCd (one)	NIJ-0602.01
SUNS [™] International, LLC	TS-90 TS-90V	14 to 158	95	50	9 Volt alkaline (one)	Yes
White's [®] Electronics	Spectra-Scan	-35 to 149	95	125	9 Volt alkaline (one) or 9 Volt Li-Mn (one)	Yes

Notes:

°F—degrees Fahrenheit

kHz—kilohertz








NIJ—National Institute of Justice

Battery Type—Nickel Cadmium (NiCd); Nickel Metal Hydride (NiMH); Lithium Magnesium (Li-Mn)

NP—information was not provided by the vendor

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-4. Circular HHMD Product Comparison Matrix - General Information

Vendor	Product Name	MSRP	Dimensions (inches)			Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height			Phone	E-mail	Web	
Adams® Electronics, Inc.	AD15 (AD18)	\$370.00	14.80	4.13	2.16	9.24	2	✓	✓	✓	
	AD16	\$300.00	14.80	4.13	2.16	9.24	2	✓	✓	✓	
	AD17 (AD14)	\$350.00	14.80	4.13	2.16	9.24	2	✓	✓	✓	
	AD2300	\$400.00	14.80	4.13	2.16	10.40	3	✓	✓	✓	
	AD2300V	\$437.00	14.80	4.13	2.16	10.40	3	✓	✓	✓	
	AD2600S	\$435.00	14.80	4.13	2.16	10.40	3	✓	✓	✓	
	AMR-11	\$487.00	14.80	4.13	2.16	10.40	3	✓	✓	✓	

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Vendor	Product Name	MSRP	Dimensions (inches)				Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height	Phone			E-mail	Web		
Adams® Electronics, Inc.	ER3000	\$487.00	14.80	4.13	2.16	10.40	3	✓	✓	✓		
CEIA® USA	PD240C	\$550.00	16.00	4.70	1.60	16.00	2	✓	✓			
Rapiscan® Systems, Inc.	Metor 28	\$110.00	16.50	5.50	1.00	9.30	2	✓				
<p>Notes: MSRP—manufacturer’s suggested retail price ✓—detector is equipped with corresponding feature Blank cell—detector is not equipped with corresponding feature</p>												

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-5. Circular HHMD Product Comparison Matrix - Features

Vendor	Product Name	LED Indicators		Alarm Types			Alarm Adjust	Sensitivity Tuning	Sensitivity Levels	Multiple Operating Frequencies	Interference Clearing	Audio Jack	
		Power On	Low Battery	Alarm	Visual	Audible							Vibration
Adams® Electronics, Inc.	AD15 (AD18)	✓	✓	✓	✓	✓	No	Manual	2	No	No	No	
	AD16	✓	✓	✓	✓	✓	No	Automatic	1	No	No	No	
	AD17 (AD14)	✓	✓	✓	✓	✓	No	Automatic	2	No	No	No	
	AD2300	✓	✓	✓	✓	✓	No	Automatic	1	No	No	No	
	AD2300V	✓	✓	✓	✓	✓	✓	No	Automatic	1	No	No	No
	AD2600S	✓	✓	✓	✓	✓		No, but muted in LED mode	Manual	Multiple	No	No	No
	AMR-11	✓	✓	✓	✓	✓		No	Manual	11	No	No	No
	ER3000	✓	✓	✓	✓	✓		No	Manual	Multiple	No	No	No
CEIA® USA	PD240C		✓	✓	✓	✓	✓	Yes	Manual	3	5	Yes, by switching frequencies	No
Rapiscan® Systems, Inc.	Metor 28	✓	✓	✓	✓	✓		Muted, with headphone	Manual	3	No	Yes	Yes
Notes: ✓—detector is equipped with corresponding feature Blank cell—detector is not equipped with corresponding feature													

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-6. Circular HHMD Product Comparison Matrix - Performance


Vendor	Product Name	Operating Temp. (°F)	Maximum Humidity (percent)	Operating Freq. (kHz)	Battery Type	NIJ Standard
Adams® Electronics, Inc.	AD15 (AD18) AD16 AD17 (AD14) AD2300 AD2300V AD2600S AMR-11 ER3000	-4 to 149	98	20 kHz	9 Volt alkaline (one) or 9 Volt NiCd (one)	Yes
CEIA® USA	PD240C	-35 to 158	98	Proprietary	AA NiMH (two)	Yes
Rapiscan® Systems, Inc.	Metor 28	32 to 122	95	24 kHz	9 Volt alkaline (one) or 9 Volt NiMH (one)	Yes
Notes: °F—degrees Fahrenheit kHz—kilohertz NIJ—National Institute of Justice Battery Type—Nickel Cadmium (NiCd); Nickel Metal Hydride (NiMH)						

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-7. Probe HHMD Product Comparison Matrix - General Information

Vendor	Product Name	MSRP	Dimensions (inches)			Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height			Phone	E-mail	Web	
Adams [®] Electronics, Inc.	AD360	\$138.00	9.30	See note ¹		7.72	2	✓	✓	✓	
Autoclear [®] LLC	SuperOmniPlus [™]	NP	18.50	See note ²		14.00	2	NP	NP	NP	NP
Garrett [®] Metal Detectors	SuperWand [™]	\$229.95	19.00	3.25	1.25	18.6	2	✓	✓	✓	
	THD [™]	\$199.95	8.40	See note ³		6.40	2	✓	✓	✓	
	CSI Pro-Pointer [™]	\$169.95	9.00	See note ⁴		7.00	2	✓	✓	✓	
Torfino [®] Enterprises, Inc.	Metal-Tec ₇ 1400 [®]	\$169.00	7.90	1.75	1.30	8.80	3 (U.S. only)	✓	✓		

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Vendor	Product Name	MSRP	Dimensions (inches)			Weight (ounces)	Warranty (years)	Support			Product Image
			Length	Width	Height			Phone	E-mail	Web	
Torfino [®] Enterprises, Inc.	Metal-Tec [®] HS 1500	\$189.00	7.90	1.75	1.30	8.80	3 (U.S. only)	✓	✓		
<p>Notes:</p> <p>¹Adams lists the dimensions of the probe end of the AD360 as 0.98 inches and the handle end as 1.73 inches</p> <p>²Autoclear lists the probe length of the SuperOmniPlus as 10.00 inches and the probe diameter as 1.00 inches</p> <p>³Garrett lists the thickness of the THD as 1.60 inches tapered to 1.10 inches</p> <p>⁴Garrett lists the thickness of the CSI Pro-Pointer as 1.50 inches tapered to 0.87 inches</p> <p>MSRP—manufacturer’s suggested retail price</p> <p>✓—detector is equipped with corresponding feature</p> <p>NP—information was not provided by the vendor</p> <p>Blank cell—detector is not equipped with corresponding feature</p>											

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-8. Probe HHMD Product Comparison Matrix - Features

Vendor	Product Name	LED Indicators			Alarm Types			Alarm Adjust	Sensitivity Tuning	Sensitivity Levels	Multiple Operating Frequencies	Interference Clearing	Audio Jack
		Power On	Low Battery	Alarm	Visual	Audible	Vibration						
Adams [®] Electronics, Inc.	AD360	✓	✓	✓	✓		✓	No	Automatic	1	No	No	No
Autoclear [®] LLC	SuperOmniPlus	NP			See note ¹			NP	Manual	2	NP	NP	NP
Garrett [®] Metal Detectors	SuperWand	✓	✓	✓	✓	✓	✓	No, but muted in vibration mode	Automatic	1	No	Yes	No
	THD ²	✓	✓	✓	✓		✓	No	Automatic	1	No	Yes	No
	CSI Pro-Pointer ²					✓	✓	No	Automatic	1	No	Yes	No
Torfino [®] Enterprises, Inc.	Metal-Tec 1400 Metal-Tec HS 1500		✓ ³				✓	No	Automatic	1	No	No	No

Notes:

¹Autoclear offers three versions of the SuperOmniPlus, each of which has different alarm type combinations.

²The Garrett THD and CSI Pro-Pointer both feature LED flashlights in the tip of the device.

³Low battery is indicated through vibration, not an LED indicator.

✓—detector is equipped with corresponding feature

NP—information was not provided by the vendor

Blank cell—detector is not equipped with corresponding feature

Information presented in this table is based on data gathered from October 2013 to February 2014.

Table 5-9. Probe HHMD Product Comparison Matrix - Performance

Vendor	Product Name	Operating Temp. (°F)	Maximum Humidity (percent)	Operating Freq. (kHz)	Battery Type	NIJ Standard
Adams [®] Electronics, Inc.	AD360	-4 to 149	98	20	9 Volt alkaline (one) or 9 Volt NiCd (one)	N/A
Autoclear [®] LLC	SuperOmniPlus	14 to 140	95	NP	9 Volt alkaline (one) or 9 Volt NiCd (one)	Yes
Garrett [®] Metal Detectors	SuperWand	-35 to 158	95	97	9 Volt alkaline (one) or 9 Volt NiMH (one)	Yes
	THD	-35 to 158	95	97	9 Volt alkaline (one) or 9 Volt NiMH (one)	N/A
	CSI Pro-Pointer	-35 to 158	95	12	9 Volt alkaline (one) or 9 Volt NiMH (one)	N/A
Torfino [®] Enterprises, Inc.	Metal-Tec 1400 Metal-Tec HS 1500	-15 to 130	98	360	9 Volt alkaline (one)	N/A
Notes: °F—degrees Fahrenheit kHz—kilohertz NIJ—National Institute of Justice Battery Type—Nickel Cadmium (NiCd); Nickel Metal Hydride (NiMH) N/A—not applicable						

Information presented in this table is based on data gathered from October 2013 to February 2014.

level may be sufficient. For search scenarios requiring greater precision and/or penetration capacity, a device with a wider range of sensitivity levels may be warranted.

Moreover, approximately one-fourth of the devices provide a means for clearing interference, which can be accomplished through a reset feature or by switching operating frequencies. Depending on their requirements, agencies seeking to purchase HHMDs should also be aware of a device's ability to resist dust, water, and other environmental factors as well as its ability to withstand impact when dropped. Information regarding specific model features and performance capabilities can be obtained from the vendors listed in Table 6-1.