System Assessment and Validation for Emergency Responders (SAVER)

Handheld Image Intensifiers Market Survey Report

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System Assessment and Validation for Emergency Responders

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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 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 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.

Information provided by the SAVER Program will be 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. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

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 conducted a market survey of commercially available handheld image intensifiers. Handheld image intensifiers fall under AEL reference number 03OE-02-TILA titled Optics, Thermal Imaging and/or Light Amplification and AEL reference number 04MD-01-LAMP titled Equipment, Light Amplification.

Visit the SAVER section of the Responder Knowledge Base (RKB) website at http://www.rkb.us/saver for more information on the SAVER Program or to view additional reports on handheld image intensifiers or other technologies.

POINTS OF CONTACT

SAVER Program
U.S. Department of Homeland Security
Science and Technology Directorate
OTE Stop 0215
245 Murray Lane
Washington, DC 20528-0215

E-mail: saver@hq.dhs.gov
Website: http://www.rkb.us/saver

Space and Naval Warfare Systems Center Atlantic
Advanced Technology and Assessments Branch
P.O. Box 190022
North Charleston, SC 29419-9022

E-mail: ssc_lant_saver_program.fcm@navy.mil

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

Handheld image intensifiers increase the intensity of available light to provide imaging in poorly lit situations. They are widely used by emergency responders in nighttime surveillance, search and rescue, and covert operations. Image intensifiers may assist with navigation of terrain in darkness and recognition of objects and people that may not be seen by the human eye. To provide emergency responders with information on handheld image intensifiers, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey.

This market survey report is based on information gathered from January to October 2013 from vendors, Internet searches, industry publications, an emergency responder focus group, and a government issued Request for Information (RFI) that was posted on the Federal Business Opportunities website. For inclusion in this report, the handheld image intensifiers had to meet the following criteria:

- The device is commercial off-the-shelf (COTS);
- The device is a monocular, binocular, or biocular;
- The device has a magnification of 1x; and
- The image intensifier tube is classified as Generation (Gen) 2 for white phosphor technology or Gen 3 for green phosphor technology.

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

2. HANDHELD IMAGE INTENSIFIERS OVERVIEW

Image intensifiers use light-amplifying technology to enhance vision in environmental conditions with minimal light. Handheld image intensifiers include monoculars, binoculars, and bioculars. Monoculars are useful when it is important to maintain some peripheral vision. In addition, monoculars are typically smaller, lighter, and less expensive than other handheld image intensifiers because they have only one set of optics and a single image intensifier tube. Binoculars provide a separate image for each eye, allowing true depth perception within the field of view of the device, whereas bioculars provide the same image to both eyes which does not provide for depth perception.

2.1 Current Technology

Particles of light (photons) enter an image intensifier through its objective lens and travel through its image intensifier tube where electrons are generated. The electrons are then multiplied and projected against a phosphor screen, producing an image that can be viewed through the ocular lens of the device, as illustrated in Figure 2-1.

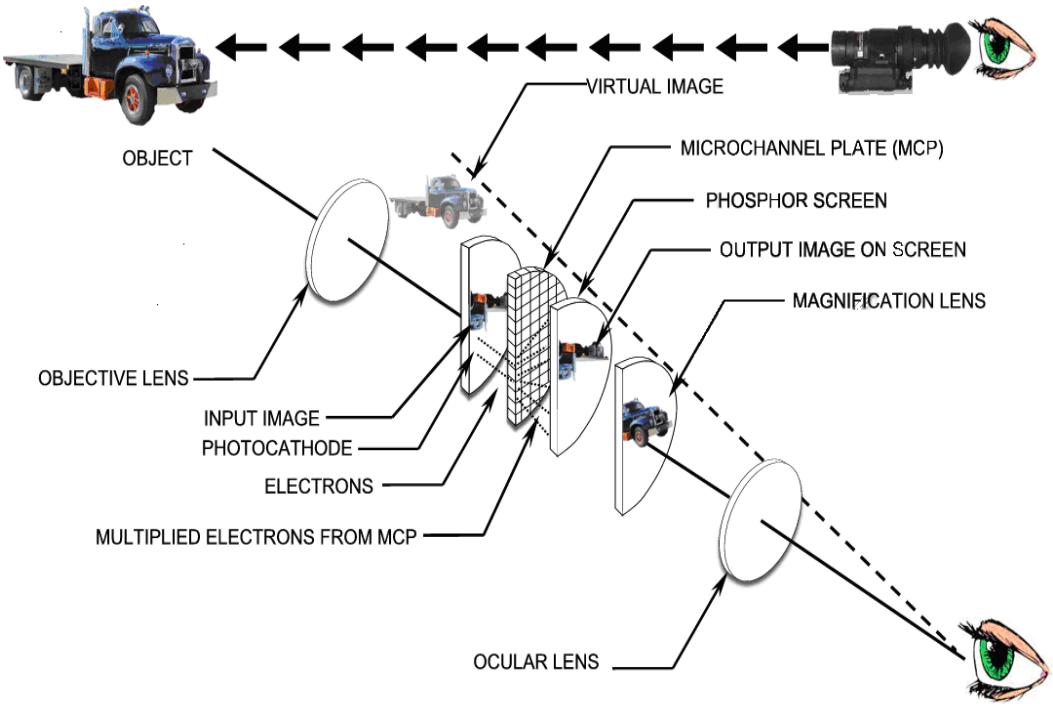

Figure 2-1. Gen 2 and Gen 3 Image Intensifier Operating Principle

Image intensification technology is generally classified within the following four generations: Gen 0, Gen 1, Gen 2, and Gen 3. These classifications are based on the components and level of sophistication of the image intensification technology. Some vendors use the designations Gen 2+, Gen 3+, and Gen 4 for devices that they believe exceed the classification.

The environment's ambient lighting conditions and the generation of the image intensifier tube are key factors to consider when deploying an image intensifier. While Gen 2+ image intensifier tubes are often considered on par with Gen 3 tubes, Gen 3 tubes have a Gallium Arsenide photocathode that provides a brighter image in environments with extremely low levels of light. Tube life is affected by exposure to all light, with bright light causing the most damage. In an effort to limit this damage, some devices offer inherent tube protection features, including automatic gain, gated power supplies, automatic brightness control, and bright-source protection.

As illustrated in Figure 2-2, a device may present a green or white image, depending on the phosphor screen color. A benefit of the green phosphor image is that the human eye is more sensitive to detecting variant shades of green; however, white phosphor images may be more familiar to the human eye, which naturally perceives poorly lit scenery in shades of gray. Preference for one type over the other is generally user-dependent and may vary by application.

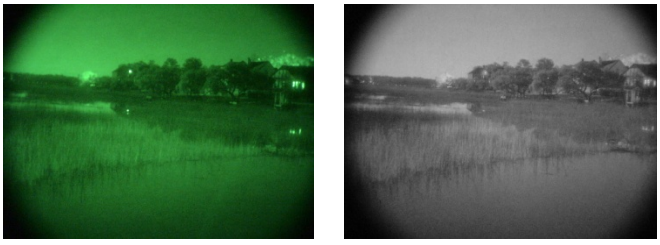

Figure 2-2. Green and White Phosphor Images

Handheld image intensifiers often have built-in infrared (IR) illuminators that provide a light source to produce enhanced images in very low-light environments. If an IR illuminator is used, other image intensifier users can readily detect the presence and location of the IR illumination source. This is an important consideration when planning to use an IR illuminator in covert operations.

2.2 Emerging Technologies

The extensive use of image intensifiers in military operations has led to significant advancements in image intensification technology, including development of Gen 3 white and Gen 4 green phosphor tubes, panoramic night vision, and integrated night vision systems (INVSs). Panoramic night vision enables four monoculars to be mounted together; pointing two monoculars straight forward and slightly angling the others to provide a much wider field of view (e.g., 95 degrees). An INVS integrates image intensifier and thermal imaging technology by combining the image output from both types of sensors to form one image. Additional information on INVSs, including market survey and assessment reports, as well as the SAVER *Night Vision Handbook*, can be found at http://www.rkb.us/saver.

3. PRODUCT DATA

This market survey report includes a total of 79 handheld image intensifiers inclusive of 38 monoculars, 28 binoculars, and 13 bioculars that range in price from $2,299 to $12,499. All image intensifiers in this market survey report include either imported Gen 2 white phosphor image intensifier tubes or domestic Gen 3 green phosphor image intensifier tubes manufactured by Exelis Inc. or L3/EOTech Inc. All have a magnification of 1x, are available in tactical colors (e.g., black, dark grey, tan, camouflage), have eye reliefs ranging from 15mm to 25mm, and have a 40-degree field of view. Most are head- and/or helmet-mountable, include a built-in IR illuminator, and require standard-sized batteries, such as AA or CR123. All of the vendors provide technical support at least 7 hours per day, Monday through Friday.

Product data presented in this report was obtained from RFI responses and directly from vendors and their websites. The information has not been independently verified by the SAVER Program. Features in the product comparison matrices are defined as follows, listed in column order:

MSRP refers to the manufacturer's suggested retail price of the device.

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

Image Color refers to the color of the image, green or white.

IR Illuminator indicates if the device features a built-in IR illuminator.

Manual Gain indicates if the device features a manual gain adjustment.

Gated indicates if the device features a gated power supply.

Typical Resolution (lp/mm) refers to the resolution of the image produced by the image intensifier tube. Higher resolution provides greater image detail, allowing the user to better distinguish between objects close together in the field of view. Given that line pairs per millimeter (lp/mm) vary by tube, some vendors provide a range of typical lp/mm for the product.

Signal-to-Noise Ratio refers to the signal-to-noise ratio of the device. A higher signal-to-noise ratio denotes the image intensifier tube's ability to provide higher contrast images.

Photocathode Sensitivity (µA/lm) refers to the efficiency by which the photocathode converts light to electrons in microamperes per lumen (µA/lm). Typically, a higher value indicates the image intensifier tube is more sensitive to light, resulting in a more detailed image.

Dimensions (inches) refers to the length, width, and height of the device.

Weight (ounces) refers to the weight of the device.

Battery Runtime (hours) refers to the amount of time the device can be used before the battery requires replacement. *Note: Battery runtime will vary based on battery type and IR illuminator usage.*

Waterproof indicates if the device is waterproof. *Note: At a minimum, all devices are water- and/or weather-resistant*.

Table 3-1. Monocular Handheld Image Intensifiers Specifications

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
American Technologies Network (ATN) Corp.	6015-3	$2,949	2	G	✓		✓	64	22	NP	4.5x2.2x2.0	11	50	
	6015-3A	$3,299	2	G	✓		✓	64 to 72	26	NP	4.5x2.2x2.0	11	50	
	6015-3P	$3,599	2	G	✓		✓	64 to 72	24	NP	4.5x2.2x2.0	11	50	
	6015-4	$5,099	2	G	✓		✓	64 to 72	25 to 30	NP	4.5x2.2x2.0	11	50	
	6015-WPT	$3,599	2	W	✓			60 to 74	18 to 26	NP	4.5x2.2x2.0	11[1]	50	
	ATN NVM14-3	$2,999	2	G	✓		✓	64	22	NP	4.7x1.9x2.7	12	50	✓
	ATN NVM14-3A	$3,199	2	G	✓		✓	64 to 72	26	NP	4.7x1.9x2.7	12	50	✓
	ATN NVM14-WPT	$3,095	2	W	✓			60 to 74	18 to 26	NP	4.7x1.9x2.7	12	50	✓
	NVM14-3P	$3,599	2	G	✓		✓	64 to 72	24	NP	4.7x1.9x2.7	12	50	✓
	NVM14-4	$4,799	2	G	✓		✓	64 to 72	25 to 30	NP	4.7x1.9x2.7	12	50	✓
	PVS-14-3(1AA)	$3,299	2	G	✓	✓	✓	64	22	NP	4.5x2.2x2.0	11	50	✓
	PVS-14-3A (1AA)	$3,599	2	G	✓	✓	✓	64 to 72	26	NP	4.5x2.2x2.0	11	50	✓
	PVS-14-3P (1AA)	$3,799	2	G	✓	✓	✓	64	24	NP	4.5x2.2x2.0	11	50	✓

See page 8 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
Exelis Inc.	AN/PVS-14 Monocular Night Vision Device (MNVD), Gen 3 F6015 Series	NP	1	G	✓	✓	✓	64	NP	NP	NP	13	25	✓
	AN/PVS-14 Pinnacle	NP	1	G	✓	NP	✓	64	NP	NP	NP	13	25	✓
L-3/EOTech Inc.	AN/PVS-14 M914	$4,799	1	G	✓	✓	✓	64	21	1800	4.5x2.0x2.2	10	16	✓
	AN/PVS-18 M983	$6,599	1	G	✓	✓	✓	64	21	1800	6.6x3.5x2.6	13	16	✓
MaxaVision Technologies	LE/PVS-14 HG	$3,524	5	G	✓	NP	✓	64	25	NP	4.5x2.0x2.3	13	50	✓
	NEPVS-14-17	$3,595	5	G	✓	✓	✓	64	22	NP	4.5x2.0x2.3	13	50	✓
	PVS-14 G	$3,499	3	W	✓	NP	✓	56	22	NP	4.5x2.0x2.3	13	50	✓
	SNVG-14	$3,475	3	G	✓	NP	✓	64	22	NP	4.5x2.0x2.3	13	50	✓
	SNVG-Mini	$3,550	3	G	✓	NP	✓	64	22	NP	4.3x2.7x2.0	9	40	✓
MOROVISION NIGHT VISION Inc.	GNVPVS-14	$3,195	3	G	✓	NP	NP	64	21 to 32	NP	4.5x2.0x2.3	12	50	NP
	NEPVS-14 Night Enforcer	$3,495[1]	3	G	NP	✓	NP	64	21 to 32	NP	4.5x2.0x2.3	12	50	NP

See page 8 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
Night Optics USA Inc.	D-300 Monocular (NM-300-3G)	$3,399[1]	2	G	✓	✓	✓	57 to 72[1]	NP	NP	5.5x1.8x2.3	16	40	
	D-300 Monocular (NM-300-2H)	NP	2	W	✓	NP		NP	NP	NP	5.5x1.8x2.3	16	40	
	NO/PVS-14 Monocular	NP	2	G	✓	✓	✓	NP	NP	NP	4.5x2.3x2.0	16	40	✓
Night Vision Depot	NVD-PVS-14 P+	$3,195	5	G	✓	✓	✓	64 to 72	20	1750	4.5x2.5x2.8	14	40	✓
	NVD-PVS-14 ULT	$3,995	5	G	✓	✓	✓	64 to 72	28	2400	4.5x2.5x2.8	14	40	✓
	NVD-PVS-14 VG	$3,695	5	G	✓	✓	✓	64 to 72	25	2000 to 2200	4.5x2.5x2.8	14	40	✓
	NVD-PVS-14 YG	$3,595	5	G	✓	✓	✓	64 to 72	25	1800	4.5x2.5x2.8	14	40	✓
Nivisys LLC	AN/PVS-14A	$3,595	1	G	✓	✓	NP	64	25	NP	4.5x2.0x2.2	14[1]	49	✓
	MUM-14 Mini-Monocular (Omni IV Grade)	$3,685	1	G	✓		NP	64	25	NP	4.2x2.7x2.0	9	20	✓
N-Vision Optics LLC	GT-14	$2,926	1	G	✓		✓	57 to 64	18	NP	4.5x2.0x2.0	11	40	
	PVS-14 Night Vision Monocular	$3,095	1	G	✓	✓	✓	57 to 64	18	NP	4.5x2.0x2.0	14	40	✓

See page 8 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
Tactical Night Vision Company Inc.	GT-14 Pinnacle	$2,999 to $3,289	2	G	✓		✓	64	24	NP	4.5x1.9x2.6	11	40	✓
	MUM/MINI-14 Gen 3 Pinnacle	$3,499	2	G	✓		✓	64	24	NP	4.2x2.0x2.5	9	40	✓
	TNV/PVS-14 Pinnacle	$2,918	5	G	✓	✓	✓	64	25	NP	4.5x2.0x2.3[1]	12	50	✓

Notes:
[1]Information obtained from vendor's website. Vendor did not confirm information provided in the cell.
✓—image intensifier has corresponding feature
Blank Cell—image intensifier does not have corresponding feature
NP—information was not provided by the vendor or available on the vendor's website
MSRP—manufacturer's suggested retail price
IR—infrared
lp/mm—line pairs per millimeter
µA/lm—microamperes per lumen
Phosphor Screen Color—Green (G); White (W)

Information in this table is based on data gathered from January to October 2013.

Table 3-2. Binocular Handheld Image Intensifiers Specifications

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
American Technologies Network (ATN) Corp.	PS15-3	$6,099	2	G	✓		✓	64	22	NP	4.7x4.4x2.7	25	40	✓
	PS15-3A	$6,499	2	G	✓		✓	64 to 72	26	NP	4.7x4.4x2.7	25	40	✓
	PS15-3P	$7,199	2	G	✓		✓	64 to 72	24	NP	4.7x4.4x2.7	25	40	✓
	PS15-4	$8,699	2	G	✓		✓	64 to 72	25 to 30	NP	4.7x4.4x2.7	25	40	✓
	PS15-WPT	$6,399	2	W	✓			60 to 74	18 to 26	NP	4.7x4.4x2.7	25	60	✓
B.E. Meyers & Co. Inc.	PVS-7	NP	90 days	G	NP	NP	NP	57	16	1700 to 1900	NP	21	50	✓
Exelis Inc.	AN/AVS 6	NP	1	G		NP	✓	NP	NP	NP	NP	21	30	✓
	AN/AVS 9 (F4949)	NP	1	G		NP	✓	NP	NP	NP	NP	19	30	✓
	AN/PVS-23 (F5050)	NP	1	G	✓	NP	✓	64	NP	NP	NP	23	30	✓
L-3/EOTech Inc.	M953 (AN/PVS-15)	$11,292	1	G	✓	✓	✓	64	21	1800	6.5x4.9x3.3	26	18	✓
MaxaVision Technologies	PVS-15	$10,325	1	G	✓	NP	✓	64	25	NP	6.6x4.9x3.3	26	16	✓
MOROVISION NIGHT VISION Inc.	PVS-15SLG	$10,450[1]	1	G	✓	NP	✓	64 to 72	21 to 32	NP	6.4x3.0x6.0	23	10	✓

See page 11 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
Night Optics USA Inc.	D-221G Goggle/Binocular	NP	2	W	✓	✓[1]	NP	51 to 70[1]	NP	NP	4.5x4.5x2.5	19	30	✓
	D-321G Goggle/Binocular	$6,999[1]	2	G	✓	NP	✓[1]	57 to 72[1]	NP	NP	4.5x4.5x2.5	19	30	✓
Night Vision Depot	NVD-BNVD P+	$7,495	5	G	✓	✓	✓	64 to 72	20	1750	5.0x5.0x3.0	21	40	✓
	NVD-BNVD ULT	$8,695	5	G	✓	✓	✓	64 to 72	28	2400	5.0x5.0x3.0	21	40	✓
	NVD-BNVD VG	$8,495	5	G	✓	✓	✓	64 to 72	25	2000 to 2200	5.0x5.0x3.0	21	40	✓
	NVD-BNVD YG	$8,095	5	G	✓	✓	✓	64 to 72	25	1800	5.0x5.0x3.0	21	40	✓
	NVD-BNVD-G P+	$7,495	5	G	✓	✓	✓	64 to 72	20	1750	5.0x5.0x3.0	22	40	✓
	NVD-BNVD-G ULT	$9,095	5	G	✓	✓	✓	64 to 72	28	2400	5.0x5.0x3.0	22	40	✓
	NVD-BNVD-G VG	$8,695	5	G	✓	✓	✓	64 to 72	25	2000 to 2200	5.0x5.0x3.0	22	40	✓
	NVD-BNVD-G YG	$8,295	5	G	✓	✓	✓	64 to 72	25	1800	5.0x5.0x3.0	22	40	✓

See page 11 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
Night Vision Depot	NVD-BNVD-SG P+	$8,295	5	G	✓	✓	✓	64 to 72	20	1750	5.0x5.0x3.0	21	40	✓
	NVD-BNVD-SG ULT	$8,895	5	G	✓	✓	✓	64 to 72	28	2400	5.0x5.0x3.0	21	40	✓
	NVD-BNVD-SG VG	$8,695	5	G	✓	✓	✓	64 to 72	25	2000 to 2200	5.0x5.0x3.0	21	40	✓
	NVD-BNVD-SG YG	$8,495	5	G	✓	✓	✓	64 to 72	25	1800	5.0x5.0x3.0	21	40	✓
N-Vision Optics LLC	G15 Night Vision Binocular	$6,314	1	G	✓	✓[1]	✓[1]	57 to 64	18	NP	5.0x2.5x4.0	26	40	✓
Tactical Night Vision Company Inc.	G15 Pinnacle	$6,124 to $6,414	1	G	NP	NP	✓	64	NP	NP	4.3x4.7x2.5	26	40	✓

Notes:
[1]Information obtained from vendor's website. Vendor did not confirm information provided in the cell.
✓—image intensifier has corresponding feature
Blank Cell—image intensifier does not have corresponding feature
NP—information was not provided by the vendor or available on the vendor's website
MSRP—manufacturer's suggested retail price
IR—infrared
lp/mm—line pairs per millimeter
µA/lm—microamperes per lumen
Phosphor Screen Color—Green (G); White (W)

Information in this table is based on data gathered from January to October 2013.

Table 3-3. Biocular Handheld Image Intensifiers Specifications

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
American Technologies Network (ATN) Corp.	ATN PVS7-3	$3,599	2	G	✓			64	22	NP	5.8x6.1x3.1	24	50	✓
	ATN PVS7-3A	$3,799	2	G	✓		✓	64 to 72	26	NP	6.3x6.0x3.0	24	50	✓
	ATN PVS7-3P	$4,099	2	G	✓		✓	64 to 72	24	NP	6.3x5.9x2.9	24	60	✓
	NVG7-3	$3,199	2	G	✓		✓	64	22	NP	6.3x6.0x3.0	18	60	✓
	NVG7-3A	$3,399	2	G	✓		✓	64 to 72	26	NP	5.8x6.1x3.1	18	60	✓
	NVG7-WPT	$2,299	2	W	✓			45 to 54	18 to 24	NP	6.3x6.0x3.0	18	60	
L-3/EOTech Inc.	AN/PVS31BNVD	$12,499	1	G			✓	64	21	1800	4.2x4.2x3.4	16	50	✓
	PVS-7B	$4,799	1	G	✓			64	21	1800	5.5x6.0x2.0	22	40	✓
MOROVISION NIGHT VISION Inc.	PVS-7	$3,995[1]	2	G	✓	NP	NP	64	21 to 32	NP	6.4x6.0x3.0	24	30	NP
Night Optics USA Inc.	NO/PVS-7 Biocular (NG-P07-3G)	NP	2	G	✓	NP	✓[1]	NP	NP	NP	6.0x6.0x3.0	18	40	✓
	NO/PVS-7W Biocular	NP	2	W	✓	NP	NP	NP	NP	NP	6.0x6.0x3.0	18	40	✓
Nivisys LLC	AN/PVS-7	$3,495	1	G	✓		NP	64	25	NP	6.0x6.1x4.0	24	40	✓

See page 13 for notes and definitions of the abbreviations used throughout this matrix.

Vendor	Product Name	MSRP	Warranty (years)	Image Color	IR Illuminator	Manual Gain	Gated	Typical Resolution (lp/mm)	Signal-to-Noise Ratio	Photocathode Sensitivity (µA/lm)	Dimensions (inches)	Weight (ounces)	Battery Runtime (hours)	Waterproof
N-Vision Optics LLC	PVS-7	$3,295	1	G	✓		✓	57 to 64	18	NP	6.0x6.0x3.0	24	40	✓

Notes:
[1]Information obtained from vendor's website. Vendor did not confirm information provided in the cell.
✓—image intensifier has corresponding feature
Blank Cell—image intensifier does not have corresponding feature
NP—information was not provided by the vendor or available on the vendor's website
MSRP—manufacturer's suggested retail price
IR—infrared
lp/mm—line pairs per millimeter
µA/lm—microamperes per lumen
Phosphor Screen Color—Green (G); White (W)

Information in this table is based on data gathered from January to October 2013.

4. VENDOR CONTACT INFORMATION

Additional information on handheld image intensifiers included in this market survey report and those outside the scope of this report (i.e., greater than 1x) can be obtained from the vendors listed in Table 4-1.

Table 4-1. Vendor Contact Information

Vendor	Phone Number	Website/E-Mail Address
American Technologies Network (ATN) Corp.	(800) 910-2862	http://www.atncorp.com info@atncorp.com
B.E. Meyers & Co. Inc.	(800) 327-5648	http://www.bemeyers.com sales@bemeyers.com
Exelis Inc.	(800) 533-5502	http://www.exelisinc.com nvsales@exelisinc.com
L-3/EOTech Inc.	(734) 741-8868	http://www.eotech-inc.com info.mil.insight@L-3com.com
MaxaVision Technologies	(561) 743-8180	http://www.maxavision.net sales@maxavision.net
MOROVISION NIGHT VISION Inc.	(800) 424-8222	http://www.morovision.com sales@morovision.com
Night Optics USA Inc.	(800) 306-4448	http://www.nightoptics.com sales@nightoptics.com
Night Vision Depot	(610) 395-9743	http://www.nvdepot.com sales@nvdepot.com
Nivisys LLC	(480) 970-3222	http://www.nivisys.com info@nivisys.com
N-Vision Optics LLC	(781) 505-8360	http://www.nvisionoptics.com info@nvisionoptics.com
Tactical Night Vision Company Inc.	(909) 796-7000	http://www.tnvc.com sales@tnvc.com

5. SUMMARY

The handheld image intensifiers in this market survey report differ in cost, warranty duration, dimensions, weight, resolution, signal-to-noise ratio, photocathode sensitivity, phosphor screen color, and battery runtime. All of the handheld image intensifiers are available in tactical colors (e.g., black, dark grey, tan, camouflage), have a 40-degree field of view, and have eye reliefs ranging from 15mm to 25mm. Most are head- and/or helmet-mountable, include a built-in IR illuminator, and require standard-sized batteries, such as AA or CR123.

The image intensifier tube(s) used in a handheld image intensifier is a significant consideration in device selection. The image quality observed through any image intensifier is directly related to the performance of the tube(s). Higher resolution tubes will provide more defined images and details within the scene, while tubes with high photocathode sensitivity will produce a brighter image.

A final consideration in the selection of a handheld image intensifier is the phosphor screen color. Preference for either white or green varies by user. Refer to the *Night Vision Devices Assessment Report* on the SAVER section of the RKB, http://www.rkb.us/saver, for information on the performance of image intensifiers equipped with either a green or white phosphor screen in various applications.

Emergency responder agencies that consider purchasing handheld image intensifiers should carefully research each product's overall capabilities and limitations in relation to their agency's operational needs.