Thermal Imaging FIRST RESPONDER

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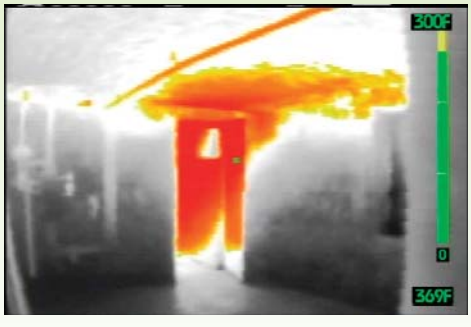
• Fire Service • Law Enforcement • Hazmat
• EMS • Homeland Security

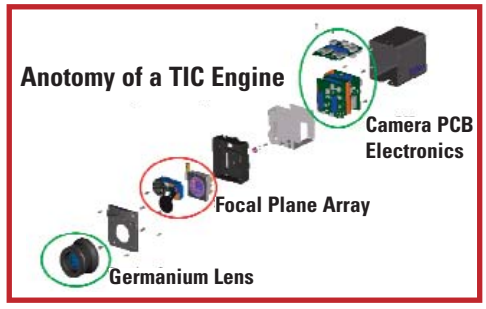
In This Issue

Maximizing the benefit from your TIC....the importance of a two tiered training approach.

In this issue of *Emergency Responder Thermal Imaging:*



How Do Sensors Sense?



Inside every thermal imaging camera is a highly sensitive, technologically advanced "brain" that detects, translates and communicates what we see into a gray-scale image that we would otherwise never be able to see. So how does a TIC sensor, which can be small enough to fit in the palm of your hand, take a scene that our eyes may not even see and turn it into a picture that allows us to make vital, lifesaving decisions?

As you may already know, TICs have an array of pixels that make up the sensor's imaging "field." Focal plane arrays (FPA) are the number of pixels that a particular sensor has–today's TICs are either 160x120 or 320x240. Each of these pixels is as small as 38µ (microns), which is about half the width of a human hair. It's these minute sizes that allow sensors to squeeze so much information into such a small package.

Each pixel is a mini-resistor that reacts to in frared energy. As the pixel detects more energy, it gets "pushed" closer to the main sensor board. This information is relayed through the TIC's electronics to the display, which then shows the gray image. Each pixel has a pair of "legs" that keep them separated from the main board. Knowing how small the pixels are, you can appreciate the tiny space between the pixels and the main sensor board!


Indigo IR Sensor/ROIC

As discussed, manufacturers can add software packages that incorporate colors into the display by correlating colors to temperatures.

Sitting atop each pixel is a thin layer of infrared sensing material. This is where either vanadium oxide or amorphous silicone comes into the picture. These materials are highly sensitive to thermal energy and affect how much (or how little) the pixels react to the energy in the scene.

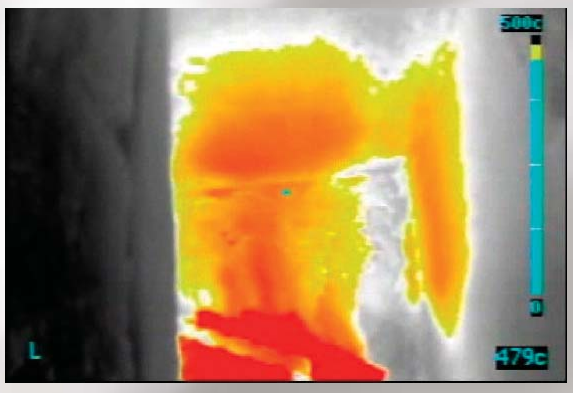
A key element of a sensor's ability to detect thermal energy is using a lens that can "see" through smoke and/or darkness. As you research TICs, you will find that germanium is the lens of choice for most all TIC manufacturers. Germanium allows thermal energy to pass through the sensor, which subsequently activates the individual pixels. Those of you who have ever tried to look through a pane of glass with a TIC know that you only get a reflection of yourself in the display of the TIC. That's because standard glass does not allow thermal energy to pass through, which is why germanium is the material of choice for both TIC lenses as well as the lens on the actual sensor.

Why do TICs Have Colorized Pixels?

These days, virtually every TIC manufacturer offers colorized pixels to augment the imagery captured by the camera's sensor. Colorized pixels bring to life those portions of the scene that are the hottest, leaving the rest of the scene in the traditional gray/white scheme. But how do manufacturers determine what should be colored and why?

Most users agree that colorizing the hot spots benefits the attack line during the blaze in addition to improving the efficiency and effectiveness of overhaul operations. Citing the lack of NFPA standards to overlook TIC specifications, manufacturers are free to implement colorization according to what they feel is best for the user. So let's look at some existing fire service TICs and how their colorization scheme is set.

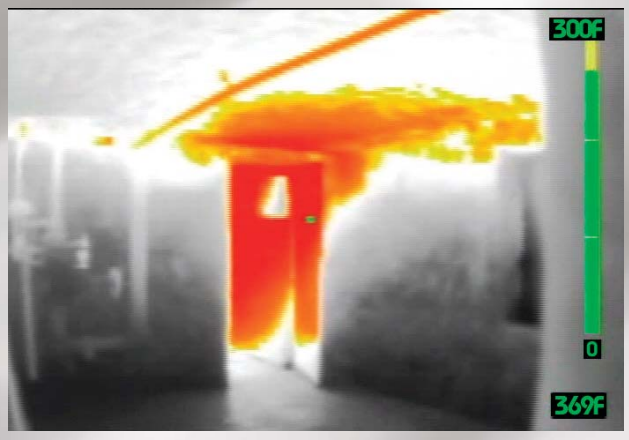
A significant factor in determining the meaning behind colorization is where colors are activated. The Evolution 5200 TIC from MSA sets its color scheme to match kindling points of materials most encountered by firefighters. For instance, wood, a common material used in construction, has a kindling temperature range of 380°F to 870°F. When in high-sense mode, the Evolution 5200 TIC starts to colorize objects beginning at 275°F, offering enough warning to the user that the potential for danger is lurking nearby. In low-sense mode, this TIC will activate colors near the upper range of wood's kindling point, at 842°F. For this TIC, colorized pixels coincide with kindling points of standard building materials, helping firefighters determine what may be a fire hazard.



As you know, almost all fire service TICs operate in what is called high and low sensitivity (sense) modes. With this in mind, there are some fire service TICs that only offer colorized pixels in low-sense mode, or in scenes with elevated temperatures. These TICs typically use a dual-color scheme that includes red pixels for the hottest objects and yellow pixels for those that are slightly cooler. Software programming allows manufacturers to determine the temperature-color correlation. In TICs offering low-sense only colorization, the pixels turn red for objects exceeding 1,000°F.

Other TICs allow users to determine when pixels become colorized. Known as "user-selectable isotherms," users can press buttons on the TIC that change the display from the gray/white scheme to one that includes colorized pixels. From here, the user can determine how much (or how little) color to add to a scene. Though helpful in some non-fire applications (such as search-and-rescue operations), these TICs offer little help in finding true fire hazards, as they allow users to colorize objects that may be as cool as 100°F. Realistically speaking, objects that are only a few degrees warmer than the average human body temperature aren't typically considered fire hazards.

To summarize, when your department is evaluating TICs, be sure that, like other features and accessories, the reasons behind why that company sets its colorization scheme is to benefit the user, not the seller. Will adding color–at the prescribed temperature points–add value and crucial decision-making information to the user? Or is it another money-making scheme designed to make you pay more for something you don't really need or use?



Thermal Imaging Training

Have you ever heard the saying "a little knowledge can be a dangerous thing." Firefighters need adequate equipment, as well as training to ensure that they use their equipment properly. Thermal imaging cameras (TICs) are no exception. TICs are powerful tools designed to facilitate a firefighter's tasks, but like any tool, if used without the necessary applications knowledge and training, the information that the TIC provides may create an incorrect interpretation about the safety of a fire ground situation. At the very least, misapplications will prevent a fire department from reaping the full benefits of the technology. Although manufacturers include product instruction manuals with their thermal imagers, the technology is varied and complex enough to advocate more in depth classroom and hands-on training.

SAFE-IR, sensed a need for more involved thermal imaging and set about developing a practical curriculum that could be taught to firefighters in a concentrated setting. An analogy can be made between the fire service thermal imaging industry and the automobile industry. Car dealers are in the business of selling cars. They are not in the business of teaching customers how to drive. They will provide you with a demonstration of the features and benefits of the vehicle, but they will not teach you how to drive your newly acquired vehicle off of the lot. Firefighters who use TICs must have a full understanding of all of the features of their specific TIC, being able to interpret the displayed image, utilizing the information to make safe and sound fire-ground decisions. An explanation of the TIC's features may be performed by the manufacturer or their representative, however understanding how these features function and properly interpreting them can only be accomplished through a curriculum of in-class thermal imaging theory combined with camera-specific live fire training.

Why combine theory and practical training? Fire departments continually underutilize their TICs. This is due in part to the simple fact that many users do not fully understand the TIC's full potential. SAFE-IR programs are designed to reinforce the features and characteristics of the department's specific camera, combining that knowledge with image interpretation and tactical applications gained in the classroom followed by hands-on live fire scenarios.

A critical factor in the success of any training program, including a TIC program is to establish the skill set of the participants and customize the training program to meet their needs. SAFE-IR's programs are designed to teach firefighters the technical advantages of thermal imaging and how to apply the knowledge gained tactically on the fire-ground. A low student / instructor ratio in the hands-on live burn portion of the training allows the instructor to enhance each student's individual potential by giving him or her personalized instruction in camera-specific image interpretation and tactics. The objective is to build the trainee's confidence in using this new tool through a positive learning experience with firefighter safety being the priority. Any good training program takes time. The basic TIC course is offered in two sessions, classroom and live-burn over two consecutive days. Customized training programs are available to meet specific department's needs.

Training is one element of a successful TIC program, another is the creation of thermal imaging SOPs. SAFE-IR can assist in developing SOPs that meet the department's needs by observing current tactics and procedures and offers suggestions on how the TIC may be effectively integrated. Networking is also an effective information tool, SAFE-IR's comprehensive list of satisfied customers can be tapped into, allowing the department network with other departments that have faced similar challenges. All of the SOPs developed are based on the SAFE-IR thermal imaging training programs.

Thermal imaging for firefighting is functional and has a definitive place in the fire service. Thermal imaging is here to stay. Just like buying an automobile, the reasons for buying a particular brand of thermal imager may vary. Reasons may include relationships with specific manufacturers or salespeople, camera evaluation results, option preferences, size or even price. A department may make a TIC purchase based on "word of mouth," simply because another department is happy with that brand or model. Ultimately priority one is firefighter safety and with that in mind, SAFE-IR makes two recommendations:

1) Get a thermal imager; and
2) Get camera-specific live fire training.

Fireslayer Challenge: Thermal Response — More than just a game

In the video gaming industry, where development partnerships are the norm rather than the exception, most observers might have to agree that a new video game partnership in Pittsburgh is somewhat novel for the fire service industry.

In a move that gives firefighters a new and interactive tool to train with in the use of a thermal imaging cameras, MSA and Sim Ops Studios—a spin-off of Carnegie Mellon University—have teamed up to bring video game technology to the firefighter's training arena. For the fire service industry, the partnership marks the first such effort involving a safety equipment manufacturer and a video gaming technology firm.

The game, "Fireslayer Challenge: Thermal Response," requires players to react to instructions given by a fictitious fire chief. With the help of MSA's Evolution 5200 TIC, players must navigate a smoke-filled environment to rescue victims and find the seat of the fire before exhausting all the air in their SCBA. The game was previewed recently at the annual Fire Department Instructors Conference in Indianapolis, Ind., and is being made available as a free download from MSA's fire service Web site (www.msafire.com), as well as National Fire and Rescue's Web site (www.nfrmag.com).

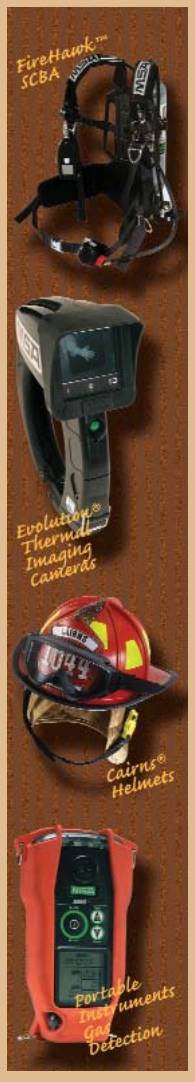
Sim Ops Studios was founded in 2006 with the vision of using video game technology to train emergency responders worldwide, and is a pioneer in applying gaming technology to the training needs of emergency responders. Most recently, the company developed a hazardous materials response game called HazMat Hotzone that is currently being tested by members of the Fire Department of New York. . A key benefit to this type of training is the ability to create highly realistic and easily accessible virtual training scenarios, using the engaging and immersive graphic capabilities of video game technologies.

The key tool used in Fireslayer Challenge is the thermal imaging camera, which in real applications, utilizes infrared technology that allows firefighters to "see" through smoke and in the dark. Introduced in the mid '90s, TICs enable firefighters to locate trapped victims in conditions with zero visibility, pinpoint the seat of a fire and identify "hotspots" after a fire has been brought under control.

The development of TIC training that uses video gaming technology to demonstrate the effectiveness of such a tool is clearly the next evolution in this category. MSA is excited about making the game available to fire departments around the country, and looks forward to the feedback and reactions from the firefighters benefiting from it, as well as the gamers.

Get your free copy of the "Fireslayer Challenge: Thermal Response" game today!

Funding For Firefighters



Unless your fire department has a very generous benefactor, it probably struggles to cultivate creative funding sources to purchase thermal imaging cameras, PASS devices, helmets, SCBA and other personal protective firefighting equipment. There are more than one million firefighters in the United States including more than 800,000 volunteers. However, even the nearly 300,000 career firefighters must face certain funding concerns.

Funding Sources

These days, community bake sales, hoagie sales and bingos just won't provide the profits needed to purchase life-saving equipment. Firefighters must depend upon the generosity of their residents, local businesses and service organizations as only part of their resource pool. Government and corporate sources for funding have turned firefighters into creative thinkers and professional-level grant writers.

Fire departments have gotten increased financial assistance from state legislatures and Congress thanks to the development of new grant programs. The Assistance to Firefighters federal grant program disbursed a total of 650 million for operations, safety and equipment in 2005, with 64% of applicants from volunteer fire departments. 20% of applying departments were a combination of volunteer and professional firefighters, while 10% were career departments and 6% were paid-on-call departments.

Grant sources include federal and state governments, foundations, corporations, service organizations and more. The Homeland Defense Journal produced "A Guidebook to Grants" (which can be obtained through the MSA), a great starting point when searching for government funding.

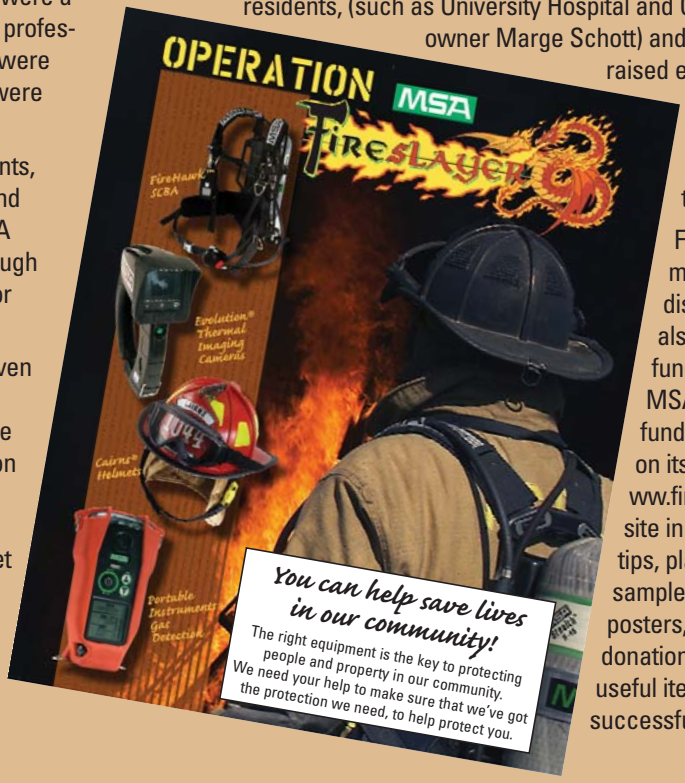
Many fire departments though, still rely on the proven standby of yearly residential fund drives, asking members of the fire district for contribu-tions. Since this usually nets the department only a small portion of its operating budget, firefighters have had to become more savvy in searching out grants and funding from the corporate community. The internet has also opened doors to allow easier research of private funding sources for fire and emergency services, bringing funding access to their fingertips.

Fire departments have also tapped into local resources such as business drives and solicitation of local service organizations. It's best for firefighters in these situations to have a specific goal or item in mind to be purchased with the collected funds. Business leaders and organizations such as the Lions Club, Kiwanis or Masonic Temple are more likely to get involved in grassroots fundraising efforts when focused on a specific piece of equipment.

More than ever, corporate funding is crucial for first responders. For example, Wal-Mart has been instrumental in helping fire departments across the country purchase thermal imaging cameras.

The company's efforts began in Wisconsin in 1997 after a young girl perished in a house fire. She had initially escaped the burning house but then returned to rescue her brother. Firefighters searched for the children but couldn't see through the thick smoke. With a thermal imaging camera, they would have had a drastically improved chance of "seeing" and rescuing these victims. Local Wal-Mart stores assembled a campaign booklet and distributed it to other local businesses, eventually building the present fundraising model.

Enlisting community activists may also be quite helpful for fire depart-ments, as a local spokesperson is an obvious advantage for rallying community support. In 2003, the Cincinnati Fire Department received more than $367,000 thanks to Doug Adams, a member of the local Rotary Club. A city councilman and community activist, Adams undertook the project and gained support from numerous local organizations, corporations and residents, (such as University Hospital and Cincinnati Reds owner Marge Schott) and within a year raised enough money to place a thermal imaging camera on every city fire truck.



Fire equipment manufacturers and distribu-tors may also be good fundraising sources. MSA offers fundraising assistance on its website ww.fireslayer.com. This site includes fundraising tips, plans, can wrappers, sample press releases, posters, flyers and donation request forms, all useful items for mounting a successful campaign.

New Application: MSA TIC Video Capture

The world's first TIC video capture unit goes a step beyond limited single-image capture TICs. It offers full-length recordings that document Emergency Responder/Fire Service incidents and training exercises without additional transmitters or receivers.

MSA's Video Capture unit is a small, easy-to-use standalone unit, which can be retrofitted to and then removed from any Evolution 5000 or 5200 TIC. Using a standard MSA TIC battery and a standard 512-MB flash memory card, it can handle full length incident or training recording of up to 2 hours.

In Emergency Response/Fire Service work, documenting incidents is becoming more and more important. Many Emergency Responders see the benefits of using their existing thermal imaging cameras to record and store images in hazardous environments. There is also a similar application for training environments.

Until now though, the solutions were limited. The basic approach has been to record and store images through a TIC by transmitting to a recording device attached to the transmitter's receiver station. This approach requires lots of equipment and set-up time, both of which are often in short supply.

The second approach is to purchase an expensive Image Capture TIC. Capable of only still- image capture, these units have limited recording capacity (only about 25 separate images) and cumbersome downloading operations.

MSA's Video Capture unit is built to withstand the harsh environments and high heat that all MSA Evolution TICs are designed and tested to operate in. The unit simply attaches to the side of the TIC.

A New Solution: MSA will soon introduce a better way to use a TIC to record, store and document important incident or training information in a fast, simple, and inexpensive way. MSA's new Video Capture option for all existing Evolution 5000 Series TICs is a small, easy-to-use standalone unit, which can be retrofitted to and then removed from any Evolution 5000 or Evolution 5200 TIC. No need to buy a new TIC to take advantage of the world's first video capture unit for Emergency Responder/Fire Service TICs. In addition, you can pull still shots for reports and slides from the captured video recordings.

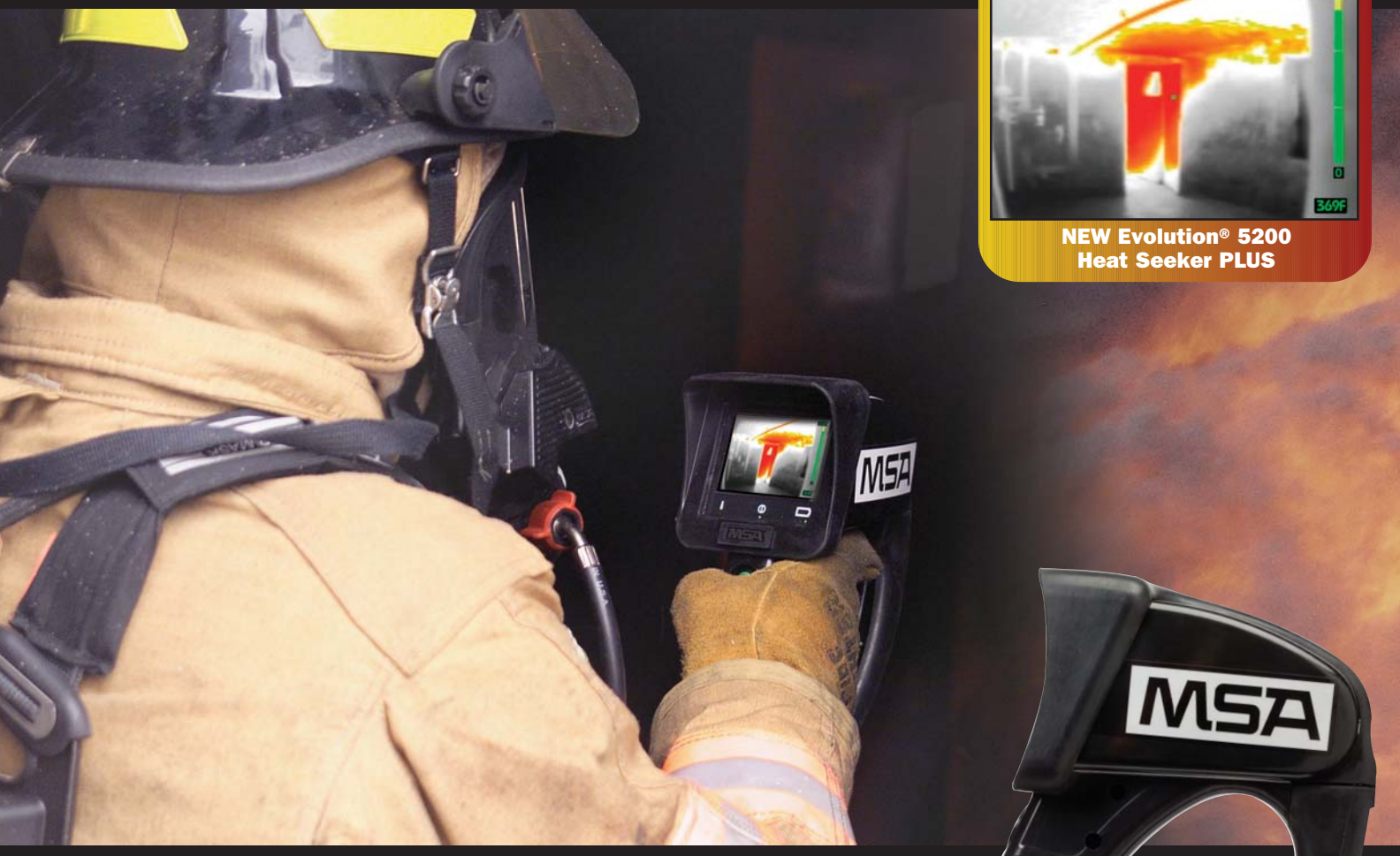
Here's How It Works: Simply attach the Video Capture unit to the MSA Evolution 5000 or 5200 TIC. Open the watertight latch and install a standard MSA TIC battery (which will run for up to 8 hours in this new Video Capture unit) and a standard 512-MB flash memory card for up to 2 hours of record time. Close the latch on the Video Capture unit, press the On button, and start recording. When finished, download the video clips to your personal computer using a standard card reader. The video clips can then be stored, viewed or followed up as documentation of the incident or training exercise. The flash memory card can then be erased and used again. Still shots from the videos can also be selected and stored using standard office software.

The RS-MMC flash memory card allows you to download video clips to your personal computer using a standard card reader. There they can be stored, viewed or followed up on a documentation of the incident or training exercise. The flash memory card can then be erased and used again. Still shots from the videos can also be selected and stored using standard office software.

MSA's Video Capture unit is built to withstand the harsh environments and high heat that all MSA Evolution TICs are designed and tested to operate in. The Video Capture unit also works with the same Lithium-ion rechargeable battery and battery charger that the whole Evolution TIC series of products uses.

Video Clips from the MSA Video Capture Unit

Fire. There's a new standard in safety and we are defining it. Every day.



NEW Evolution® 5200 Heat Seeker PLUS

Take the Next Step Up – in TIC Performance and Safety.

The Evolution® 5200 Thermal Imaging Camera delivers *"next generation" performance,* along with ***exclusive features*** available only from MSA.

High Performance Safety:

- 320˚F High Sense mode* range gives **high image definition** over the **widest temperature range** of any Firefighting TIC.
- Twice the Low Sensitivity* in the 320˚ to +1000˚F temperature range, compared to all other Firefighting TICs - for **great Low Sense imaging!**

*Most TICs generate thermal images in either High Sense or Low Sense mode, depending on the temperature of the scene. High Sense mode delivers the best image quality – but has a limited temperature range. Low Sense mode trades image quality for a wider temp range to keep the TIC working in high heat conditions.

MSA Be Sure. Choose MSA.

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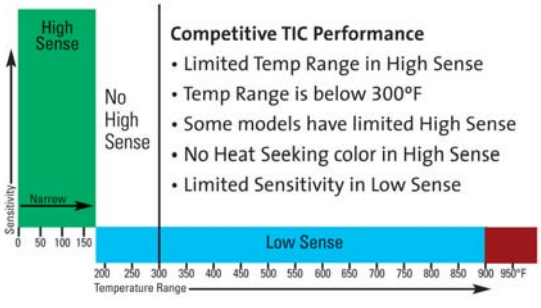

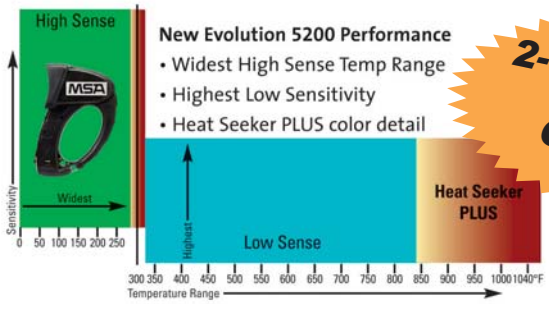

2-Year Sensor Warranty Only from MSA!

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