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Thermal Imaging Turns Up the Heat

It had become a typical unsupervised teenage party: loud music, late hours, and neighbor complaints. As police arrived, six teenagers ran into the nearby woods, tossing away beer bottles, hats, and jackets. Several loose cigarettes bounced out of one teenager's shirt pocket as he ran.

One of the responding officers was Chief Charles Fannon of the Wasilla, Alaska, Police Department. That night, however, Fannon was carrying a device—a thermal imager that let him "see" in the dark. When viewed through the thermal imager, the cigarettes that had fallen from the fleeing teenager's pocket acted just like a trail of breadcrumbs.

"They looked like little glow sticks in the dark," says Fannon, who apprehended the teenager by following the half-mile-long cigarette trail.

What is thermal imaging? Unlike devices that amplify available or ambient light, thermal vision or imaging devices "see" what essentially are differences in temperature—differences as small as 1 degree. The image of the "hotter" object stands out from other "cooler" objects or surroundings.

"Thermal imaging shows the location of anything that retains heat, like people, car tires, engines, or evidence thrown aside in a pursuit," Fannon says. "If it's 38 below and a moose walks through town, we can find the heat signature in the snow 2 hours later."

To evaluate the usefulness of thermal imaging devices to law enforcement, The Raytheon Corporation, through the National Institute of Justice (NIJ), provided 51 thermal imagers to 13 agencies with the only requirement that each agency participate in an NIJ study conducted by St. Mary's University in San Antonio, Texas. The study encompassed a two-pronged effort. Raytheon first documented the time it took to deliver the devices and train the operators and then determined how long it took the agencies to begin using them effectively. In the second part of the study, the university evaluated the technology's effectiveness.

Of the participating agencies, the Dallas County, Texas, Sheriff's Department used its thermal imaging devices to serve warrants; the Grayson County, Texas, Sheriff's Department used its devices for water rescues, marine and resort area surveillance, and counterdrug operations; and the Texas Rangers planned to use their devices at murder scene investigations and during manhunts.

In Plano, Texas, officers used thermal imaging to assist the fire department. "We could see right through the smoke, to pinpoint the most intense part of the fire so the fire department could attack that first," says Det. Larry Wilson, who heads up his department's thermal imaging project. "In the aftermath," he says, "we used the devices to prevent flareups by finding the hot spots so the firefighters could saturate those areas."

Also in Plano, patrol officers routinely used a thermal imager to scan for vagrants at a city-run day-labor site, which consists of a building surrounded by a large open area. During one pass, however, an officer instead spotted a hot spot in the wall of the building that measured at least 6 feet in diameter. Although there was no visible smoke, there was fire. Because the fire was detected early, only a 20-foot section of wall was damaged and the building was saved.

Fires were not the only place thermal imaging showed up in Plano. Police also began using thermal imaging at accident scenes. In one incident involving street racing, one car went over a bridge and into the river below. Officers used a thermal imager to be sure there were no victims other than the driver and to find the heat signature of the tire marks. "Antilock brake systems don't leave rubber, but you'll still have the heat transfer," Wilson says. "We needed to know when the driver initially hit the brakes so we could determine the speed of the car. In this case, the imager showed us an additional 46 feet of skid marks that couldn't be seen with the naked eye."

"In another case," Wilson says, "we had a cement truck lock up the brakes at an intersection, run a red light, and hit a car. It was a heavily traveled intersection,

so the imager showed us which skid marks belonged to the accident. It also showed us we were short a few marks, which indicated that we needed to check the brakes. It turned out they were faulty, which was a huge contributing factor in the accident."

But effective as thermal vision is, its cost is a distinct disadvantage. Estimates per unit run from $10,000 to $20,000, putting it out of reach for most departments. However, there is help available for acquiring thermal imaging.

One such program comes through the Office of National Drug Control Policy's (ONDCP's) Technology Transfer Program, administered by ONDCP's Counterdrug Technology Assessment Center (CTAC). Known for its ability to put new technology into the hands of law enforcement with a minimum of red tape, this program has supplied more than 600 thermal imaging systems to agencies throughout the United States. One of CTAC's requirements, however, is that the recipient agency use the technology in counterdrug activities. Funding is limited for this program.

Another activity that provides for the introduction and demonstration of thermal imaging technology is facilitated through the Border Research and Technology Center, part of NIJ's National Law Enforcement and Corrections Technology Center (NLECTC) system, which puts thermal imaging technology into the hands of law enforcement agencies on a temporary basis for evaluation. This effort leverages a $79 million investment made by the U.S. Army Night Vision and Electronic Sensors Directorate and the Defense Advanced Research Projects Agency to lower the cost of thermal imaging technology. It was through this initiative that the police department in Wasilla, Alaska, benefited.

"We got involved because narcotics agents around the State wanted to find a way to track people in the dark without exposing themselves," Wasilla's Chief Fannon says. "I called NIJ's Border Research and Technology Center in San Diego and they told me about the program. My proposal was to test this kind of technology in a place that was very cold. It gets down to 40 below in the winter here.

"The unit we were awarded is very high-end equipment. Technically it is very sophisticated, but it has been very, very maintenance free. We've not had one single problem with it, and for police equipment that's pretty unusual."

Sgt. Timothy Asbury of the Benewah County Sheriff's Department near Coeur d'Alene, Idaho, says his department's imager has been an enormous help in drug cases. "Benewah County is one of the State's most popular areas to grow dope," Asbury says. "We've used this to image houses to find the heat signature from grow lights and to image the path to a grow lab to be sure nobody is hiding in the woods waiting to ambush our officers." [See related article, "Thermal Imaging and 'The Fourth.' "]

Asbury adds, "We have a sheriff, assistant sheriff, and seven sworn officers covering 800 square miles. We would never have been able to buy one of these ourselves." Fannon agrees. "We would not have been able to afford something like this. If I hadn't found out about this through NIJ's Border Research and Technology Center, I would never have bought one myself."

For more information about thermal imaging equipment and programs available to acquire it, contact the Border Research and Technology Center, 888–656–2782; Tom Coty at the National Institute of Justice, 202–514–7683; or Jo Gann, program manager at the Counterdrug Technology Assessment Center, 202–395–6760. Equipment requests for the Counterdrug Technology Assessment Center should be directed to Maj. Laura Shnider at the U.S Army's Electronic Proving Ground, 877–374–2822, or log on to www.epgctac.com.

Information about thermal imaging, including standards, protocol, and training, can be found on the Law Enforcement Thermographer's Association's Web site at www.leta.org.

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