

# Technology Focus:

## NVGs, Microwave Downlinks & Aerial Mapping

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**Moving map systems, microwave downlinking and night vision goggles already have changed the face of airborne law enforcement, and they're still developing at rapid speeds.**

Few would argue that the law enforcement cockpit today hasn't become a very sophisticated and technologically advanced environment. Long gone are the days of the pilot having the "basic six" (or less) flight instruments and the tactical flight officer being armed with a paper map and a pair of binoculars.

Today's pilots have the luxury of multi-functional displays that provide an enormous amount of data. Many of these displays are linked to global positioning systems (GPS), real-time weather and collision avoidance equipment. On the TFO side, moving street maps and hi-definition cameras, many providing microwave downlink capability, have almost become standard in the law enforcement cockpit. Night vision goggles (NVGs) for all flight crewmembers have allowed law enforcement aircraft to make tremendous advances in safety. Following is a detailed look at each of these major advancements in aircraft technology.

### Moving Map Systems

Moving map systems have greatly enhanced law enforcement aircraft in terms of safety of flight and the law enforcement mission. Using GPS data, moving map systems provide an exact location for the aircraft. For the pilot, this means an exceptional means of maintaining situational awareness, as most maps display any special use airspace and Class B and D boundaries. Coupled with street mapping, a pilot can fly to a scene quickly and efficiently with a wide array of information available right off the display, such as time to target and suggested heading.

For the law enforcement mission, street mapping is incredibly useful. For example, when arriving at a scene in which a perimeter is established and a suspect is contained, the tactical flight officer knows precisely what streets, parks and railroad tracks border the perimeter. If a suspect moves, the flight crew no longer has to say "the suspect is moving north," which causes confusion when ground personnel are unfamiliar with working solely on the points of the compass. The flight crew can instead say, "the suspect is moving north towards Elm, away from Oak Street."

In similar fashion, vehicle pursuits, which are dynamic and changing, are better managed with moving maps, particularly when the pursued vehicle goes into an unfamiliar jurisdiction. A flight crew can still maintain situational awareness using moving street map technology.

Mike Thompson of Aerocomputers believes the next five years for moving maps will be very exciting. "It is almost hard to imagine all the technology and information that is combining to produce some amazing products that will give airborne law enforcement aircraft incredible capability," he says. Thompson believes that 3-D mapping and integration with other mapping programs are just a few of the exciting developments on the horizon.

### Microwave Downlinking

The electronic news gathering helicopter has become a staple for any evening news broadcast. All of us have seen numerous helicopters over a scene vying to capture the perfect shot of a breaking news story and transmit it down to their station's receivers. Law enforcement aircraft are using this same technology to provide emergency command centers and ground-based tactical receivers real-time images of developing scenes.

Today, a ground commander can utilize the aviation asset to make assessments and deploy personnel based on real-time data. During the Republican National Convention in 2004, a common tactic of many protest groups was to "splinter", with a small group walking away from the larger group of protestors. It was hoped this tactic would force the police to divide assets and resources. The New York Police Department responded by having its aviation unit follow the splinter groups, transmitting their route and behavior back to the command post. Since the ground commander could easily monitor the splinter group's behavior, he or she did not have to commit a large number of personnel to these smaller groups.

A recent development has been the introduction of high definition cameras that can now transmit clear and crisp images from relatively far "stand off" distances. The aircraft no longer has to be right on top of the scene. In a drill, the NYPD was able to stand off approximately one mile while transmitting the image of a suspected chemical device to experts on the ground. The experts determined it was safe to approach, and the drill continued successfully. This has both officer safety and surveillance implications. Today, bad guys can be watched from considerable distances without realizing that a helicopter or airplane is following them.

Steve Yanke, Law Enforcement and Public Safety Sales Manager of Broadcast Microwave Services Inc., thinks that microwave downlinking is a technology that can only improve airborne law enforcement operations. "Video images are really a communications tool. A picture is worth a thousand words, and video is a universal language," he says.

Yanke believes that the greatest improvement in downlinking over the last five years has been the change to a digital signal. "Now, with certain limitations, we can go around corners and through walls with a digital signal," he says.

And what are the challenges to microwave downlink technology in the future? Yanke describes what he believes is the most pressing problem: frequency congestion. "Without a doubt, the lack of nationwide frequencies for law enforcement and public service aircraft are limiting this technology," he says.

## Night Vision Goggles

One helicopter emergency medical services pilot remarks, "Once you fly with goggles, you will never fly without them again. I cannot believe what a difference they make in seeing potential obstacles and hazards."

It seems that law enforcement aviation has received the message loud and clear, as many units in just the last three to five years have acquired and use "goggles" as standard equipment for their nighttime missions. NVGs have gained this wide acceptance and popularity for good reason; mission profiles for law enforcement aircraft make NVGs a very powerful tool to assist flight crews. Operating low and slow, often searching for missing persons or suspects, NVGs give the law enforcement aircraft a decided edge in both safer flight operations and conducting the law enforcement mission more effectively.

Although night vision technology is a recent addition to the law enforcement aircraft, the technology was actually first developed in World War II. NVG technology became widely used in the Vietnam War and has subsequently been improved and refined, allowing widespread civilian use. The U.S. government has classified NVGs by generation, with the very first devices being Generation 0. The first devices were bulky, required ambient light such as moonlight to work properly, and had resolution and clarity problems. The first NVGs for aircraft use were also heavy and had a narrow field of vision. Many aviators experienced severe and debilitating headaches using the early goggles.

As the technology progressed, many of the issues and concerns of earlier models were addressed. Fields of view have increased dramatically, and there is no longer "washout" when looking from a dark area to a brightly lit area. Finally, image resolution and clarity have vastly improved. The U.S. Air Force is already using panoramic NVGs that increase the aviator's field of view to 95 degrees.

Most aircrews that use NVGs agree that implementing an NVG program should be undertaken with a certain amount of caution.

"NVGs are tremendous tools for enhancing safety of flight in many dark environments, but they do have limitations," says Chief Pilot Kevin Means, San Diego (CA) Police Department Air Support Unit and author of *Tactical Helicopter Missions: How to Fly Safe, Effective Airborne Law Enforcement Missions*. "Crewmembers should use NVGs to enhance safety when performing missions they would normally perform with the naked eye. But it's a mistake to assume that NVGs will always enable crewmembers to see adequately in all dark environments. They won't. Low light level conditions, combined with low-contrast environments, can make it impossible for crewmembers to see what they need to see. The end results can be disastrous."

Scott Baxter, Assistant Chief Flight Instructor at the Bell Helicopter Training Academy, believes the growth of NVGs in the last 10 years is a positive step for airborne law enforcement, and this growth will continue.

"When NVGs were first introduced to the civilian market, there were numerous issues and questions," he said. "Equipment requirements and training concerns were all legitimate considerations. The Federal Aviation Administration has become much more standardized, and I believe the industry as a whole has embraced NVGs. I would recommend to all airborne law enforcement units to examine all the entities that provide NVG training carefully. A cheaper tuition may not cover an incident or accident while instructing in a particular unit's aircraft, and a wrinkled tailboom can change the value of that cheaper tuition in a hurry."