Flying High: Understanding Safety & Risks in FLIR Operations

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Current thermal imaging technology provides law enforcement with capabilities that were in their infancy only 15 to 20 years ago. Today, they are the standard for most law enforcement aircraft, both airplanes and helicopters. That means we all must understand how to operate aircraft safely while using the technology.

The single greatest safety feature of thermal imaging is not due to the tactical advantage it provides when managing events on the ground, but its ability to allow us to operate at higher altitude above the ground and surface obstacles. In the 1980s and 90s, helicopters routinely conducted tactical FLIR operations at 500 feet AGL and below. This occurred largely due to the belief that being closer to the ground gave us a better view. That is not necessarily true.

Operating From Altitude

Early FLIR systems were as much as three feet in diameter, with massive mounting systems that were not suitable for patrol operations due to speed and weight limitations. The technology today is much more compact with higher resolution and increased zoom capability, which enables us to operate at higher altitudes with a higher quality image. Several advantages result from operating at higher altitudes:

• You have a broader field of view.

• It is more difficult for suspects to hide behind surface obstacles while we are on the backside of an orbit.

• In the event of power loss, you have significantly better chance of making a successful landing.

• When an engine quits at 500 feet AGL and below, especially at night, you generally have few options other than going straight ahead. Making a 180-degree auto at this altitude at night is not likely. It can take several seconds for the pilot to recognize and respond to an engine failure.

Some agencies have honed their skills, enabling them to routinely conduct FLIR operations above 1,000 feet AGL. The San Diego (CA) Police Department, for example, recently conducted a high-speed vehicle pursuit that resulted in a foot-pursuit of an armed suspect in a residential area. At one point during the foot-pursuit, the suspect, who was armed with a shotgun with slug ammunition, stopped and turned to fire at the officer, who was about to round the corner of a building.

A tactical flight officer for the department, operating from well above the action, directed the pursuing officer, who was no more than 50 feet behind the suspect, to immediately stop before rounding the corner. When the officer stopped, the suspect fled. As the air unit directed ground personnel to surround the suspect, he recognized he could not escape and committed suicide.

This entire operation was conducted using the unit's FLIR at 1,200 feet AGL, and the aircrew never needed to look outside the aircraft to follow the suspect and manage the incident. The directions from the air unit kept ground officers from making visual contact with the suspect before they were tactically prepared. Ground officers later told the aircrew they would not have been able to communicate had the air unit been closer to the ground.

The Role of the Pilot

It's important that a pilot using FLIR keep the aircraft positioned so that the TFO can perform his/her duties. This can be accomplished by monitoring the video display without looking outside.

Increasingly, new law enforcement aircraft are being configured with a small video display in the panel in front of the pilot. This enables the pilot to minimize distractions that often occur when attempting to look outside to monitor activity on the ground. Using the video display increases situational awareness,

enhances CRM, reduces the likelihood of a CFIT accident and enables the pilot to focus more attention on flying. This is a good thing. Too many law enforcement accidents occur due to loss of control as a result of a loss of situational awareness due to the pilot looking outside to maintain visual contact with ground operations.

In addition to advantages listed above, aircrews will receive the following from operating at higher altitudes:

- minimize the likelihood of an armed suspect hitting the aircraft when firing;

- more easily maintain visual contact with the suspect and ground officers without lighting up ground personnel when using a searchlight;

- remain above most surface obstacles, including wires, radio towers, tall buildings and trees;

- have a better view of surrounding terrain and terrain obstacles;

- minimize the adverse affects that noise has on the public's opinion of police aviation operations;

- minimize the impact of noise on ground officers trying to communicate;

- have a better chance of making a successful emergency landing.

Calculating the Risks

In calculating risks, it is important to understand that when we operate lower, risk increases. Consider this simple equation that demonstrates how risk changes. We can look at total risk (TR) as a function of severity (S), probability (S) and exposure (E): S x P x E = TR

Risk goes up exponentially when you increase any of these elements. For example, let's assume that each element has a value of 1-5. Giving each element a value of 2 and multiplying the three elements, the total risk equals 8. If you increase any one of these elements by a value of 1, the total risk equals 12. This represents a 50 percent increase in total risk.

So, if flying higher can reduce any of those elements by 1, it will reduce total risk exponentially. If flying lower increases each element, it will exponentially increase total risk.

Be Proactive

All law enforcement aviation managers and supervisors should take a proactive approach to minimizing the risks associated with low-level FLIR operations by assessing their training and tactics. Don't wait to have a catastrophic accident to change tactics. As an industry, we can and should operate at higher altitudes whenever possible. Operating below 1,000 feet AGL when conducting FLIR operations is an unnecessary risk in most cases.

There are several safety principles that should be complied with:

- Always operate in the safest manner possible.

- Never take unnecessary risks.

- Manage known risks.

- Recognize that avoiding accidents does not necessarily mean you are operating safely.

We can and should maximize safety and increase effectiveness, especially at night, by using thermal imaging technology to its fullest potential. However, this requires management to set altitude

standards and provide guidance with training that enables aircrews to operate effectively and more safely at higher altitudes. So train to operate at a higher altitude. You will like the results.

Check the Regulations

Consider what the regulations say about how high you should fly, according to CFR Part 91.119, Minimum Safe Altitudes:

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) An altitude allowing, if in the event a power unit fails, an emergency landing without undue hazard (unreasonable) to persons or property on the surface.

(b) Over any congested area of a city, town or settlement…an altitude of 1,000 feet above the highest obstacle…

(c) Helicopters may be operated at less than the minimums if the operation is conducted without hazard to persons or property on the surface.

"Without hazard" means you cannot injure persons or damage property on the surface. This is a minimum requirement. When you add reduced visibility due to darkness or weather, wind, the inability to see emergency landing areas, wires and other obstacles, we need to raise our minimum altitudes. The outcome of law enforcement accidents resulting from engine failures is often catastrophic, resulting in serious injury and/or death. Why? – we are too low. The pilot often does not have the time or the visibility to recognize the engine failure, react, locate a safe landing area and land the aircraft.