



Putting Lasers In the Crosshairs

Laser illuminations of aircraft cockpits continue to increase, posing a threat to pilots and aviation safety.

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Technical Editor**

Capt. Robert Hamilton (PSA) flies Canadair jets for his airline. He has been struck by laser beams while flying five times and has, to twist a sports' metaphor, "retinas in the game."

"On an overcast night in 2005, I was flying alone in a Twin Commander approaching Detroit Metropolitan Airport," Hamilton recalled recently. "I had just dropped below a layer of clouds in preparation for landing when suddenly a red laser lit up the flight deck with shocking intensity. The beam tracked my airplane for almost 45 seconds.

"I found myself temporarily blinded," Hamilton continued. "The searing burst of light left me unable to see clearly at a time when I needed to run through checklists and closely monitor the airplane's instruments. I tried to recall whether I had received any training on responding to temporary blindness, but few resources existed at that time. Fortunately, I was able to land safely."

Whether done with malicious intent, thoughtlessness, or ignorance, people pointing laser devices with their beams of concentrated energy at aircraft present a risk to safety. Doing so is a

federal crime punishable by a fine of as much as \$250,000 and imprisonment for as long as five years. The FBI has raised to \$10,000 the reward offered for information that leads to the conviction of any person engaged in illuminating aircraft in the United States with a laser (see "ALPA, Feds Partner to Boost Laser Threat Awareness," page 29).

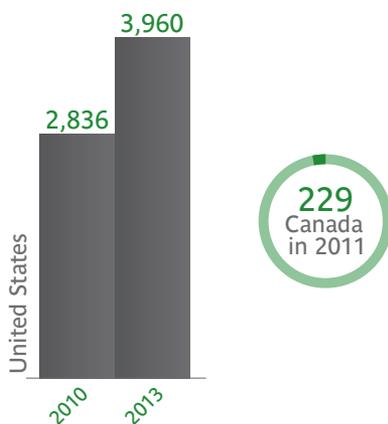
Pointing a laser at an aircraft in flight poses a serious risk to safely operating the aircraft because it can momentarily disrupt the flight crew's ability to focus on operating the aircraft by creating unwanted distractions as well as impairing their vision, normally at low altitudes while landing or preparing to land.

Hamilton was alone in the cockpit when he was lased the first time. Six years later, he captained a PSA flight on approach to Charlotte Douglas International Airport, in Charlotte, N.C.

"A flash on the left side of the aircraft caught my attention," he noted. "Reflexively, I looked to see what it was, and caught myself staring straight into a green laser beam."

Hamilton's first officer, the pilot flying, also had been lased. The pilots were

Reported Laser Incidents



able to land safely, but both men had impaired vision for several hours. They were lucky; the outcome could have been catastrophic.

A growing threat

That's part of the message that Hamilton, now chairman of ALPA's Security Council, delivered to a well-attended press conference in Sacramento, Calif., on February 11, where ALPA joined the FAA and the FBI in launching a national public awareness campaign to thwart this growing threat to aviation safety.

FAA data show that intentional laser illuminations of aircraft in the United States have increased sharply over the past few years, from 2,836 incidents reported in 2010 to 3,960 incidents reported in 2013. Canadian pilots reported 229 events in 2011, with most coming from Alberta, British Columbia, Ontario, and Quebec.

At the same time, the easy availability of more powerful (and eye-damaging) lasers has also increased.

Inexpensive battery-powered, handheld laser pointers are available in stores and on the Internet. In the United States, the most powerful and legal noncommercial laser pointers authorized for manufacture or sale emit 5 milliwatts (mW). Commercial lasers may exceed 1 watt and can be bought from overseas sources via the Internet, and owning them is not illegal in the United States.

Moreover, the advent of green lasers is notable from the standpoint of risk of eye damage: The human eye perceives different wavelengths of light from equal power sources differently. Green-yellow light is perceived as 35 times as bright as red light of the same power and distance. The overwhelming majority of cockpit illuminations have occurred below 8,000 feet AGL and involved green lasers. Most laser illuminations of aircraft have involved continuous-emission lasers putting out 5–200 mW (pulsed lasers, however, can emit more

concentrated bursts of energy).

A 5 mW green laser's maximum range to cause eye damage is 52 feet, but glare and disruption can occur at ¼ mile, and distraction may occur as far as 2.2 miles away. A 500 mW green laser theoretically can cause damage from as far away as 520 feet, glare and disruption at 2 miles, and distraction as far away as 22 miles. The chance of permanent damage to vision is very slight; distraction and temporary effects are much more likely to occur.

Temporary responses to laser-energy insults to the eye include discomfort, light sensitivity, glare, halos, flash blindness, and afterimages. Visual acuity is reduced briefly, and night vision is

compromised for minutes to hours after a laser illumination. The eye's response to this damage is to produce tears and a chemical reaction that triggers itching in the eye and a desire to shut the eyelids. Corneal abrasions may occur after rubbing the eyes.

Dr. Quay Snyder, ALPA's aeromedical advisor, notes, "The most significant negative consequences of a pilot's being illuminated by a laser are anxiety regarding safely operating the aircraft, uncertainty about damage to vision and reporting medical visits to the FAA, frustration at the administrative requirements for reporting an incident, and concern about the possibility of being lased again." 

ALPA, Feds Partner to Boost Laser Threat Awareness

On Feb. 11, 2014, ALPA joined the FAA and the FBI in launching a campaign in 12 U.S. cities to raise public awareness of the consequences of illegal laser attacks on aircraft cockpits.

Said Capt. Sean Cassidy, ALPA first vice president and national safety coordinator, "We applaud the FBI for recognizing how serious this situation is and believe that this campaign will have a positive effect on reducing the laser threat to airline safety by raising public awareness of the serious consequences of illuminating aircraft with lasers. We are calling on industry, government, and the public to take steps to help safeguard the skies against laser strikes."

The FBI announced that it is now offering a reward of as much as \$10,000 for information that leads to the conviction of any person engaged in illuminating aircraft in the United States with a laser.

The campaign will raise awareness of aircraft laser illumination threats via public service announcements, billboards, and press releases. 



From the left: Mesa Master Executive Council (MEC) Chairman F/O Marcin Kolodziejczyk, Special Agent in Charge Douglas G. Price, Phoenix Chief of Police Daniel V. Garcia, and Mesa MEC Vice Chairman F/O Jacob Clymo participate in launching a public awareness campaign on the consequences of laser attacks on airplanes.

Do the Crime, Do the Time

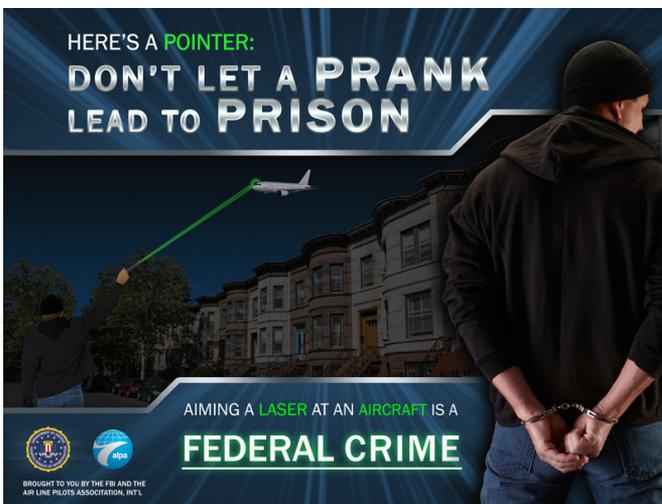
ALPA takes the laser threat very seriously, and so does the U.S. federal government. ALPA successfully urged lawmakers to make laser illuminations of aircraft a specific federal crime, and on Feb. 14, 2012, President Barack Obama signed the FAA Modernization and Reform Act of 2012, which established a new criminal offense for aiming the beam of a laser pointer at an aircraft.

Laser illumination of an aircraft is now a federal crime and is punishable by a fine of as much as \$250,000 and imprisonment for as long as five years. In addition to these criminal penalties, the FAA also has the ability to impose civil fines of as much as \$11,000 per laser incident.

Previous laws required proof that a person willfully tried to interfere with a flight to endanger safety. The new law only requires proof that a person knowingly aimed the laser at an aircraft. This is a much lower standard of proof for federal prosecutors. As a result, more cases are now being prosecuted in the United States.

Similar laws in Australia, Canada, the United Kingdom, and other countries are leading to more prosecutions.

The FAA also interprets FAR Part 91.11, which prohibits interfering with a flightcrew member, to include lasing an aircraft. 



Self-Assess with ALESA

The United Kingdom's Civil Aviation Authority has produced an Aviation Laser Exposure Self-Assessment (ALESA) tool to help pilots determine whether they need to visit an eye-care professional immediately for an eye exam. Pilots can download, print, and use the two-page ALESA after a laser attack, or print it in advance and carry a copy with them in their flight bags. ALPA's Aeromedical Office recommends that any pilot who experiences a laser strike use ALESA.

Pilots should also review FAA Advisory Circular (AC) 70-2 or Transport Canada Aeronautical Information Circular (AIC) 14/09 as appropriate. Both circulars provide guidance to flight crews on laser mitigation procedures and how to report unauthorized laser illumination events. To view these documents, plus the ALESA form, scan the QR code. 



If You're Lased

ALPA has published an excellent guide, *Laser Illumination Threat Mitigation*, on procedures to follow if exposed to a laser in flight. The recommended flight crew actions are

- When struck by a laser on approach, do not continue to look into the beam. Shield your eyes and go heads-down immediately. Doing so will protect your eyes from further damage while the laser is illuminating the cockpit.
 - Consider executing a missed approach or go-around. As with any event that prompts a missed approach or go-around (e.g., low weather, birds, aircraft or vehicle on the runway), a go-around may be your most prudent course of action in responding to a laser illumination.
 - Do not rub your eyes.
 - Consistent with flight manual restrictions, use cockpit automation to the fullest extent.
 - Maintain control of the airplane, monitoring configuration, altitude, and airspeed to maintain or reestablish the desired flight profile.
 - Turn instrumentation and panel background lighting up.
 - Communicate with other flightcrew members and assess their condition. In the event of an injury, declare an emergency and request priority handling from ATC, if necessary.
 - Transfer control of the airplane to the other pilot if necessary.
 - Expeditiously advise ATC of the laser event. Provide the most accurate description possible of the location of the laser source, beam direction, color, and length of exposure (flash or intentional tracking).
 - While in the arrival area, if you are notified that a laser event has been reported and remains unresolved, request a different runway or ask for holding until the area has been secured and the threat has ceased.
 - Consider diverting to an alternate airport if the laser threat continues.
 - Follow all company protocols related to reporting laser illuminations in a safe and timely fashion, to include notifying local company officials.
 - Cooperate with law enforcement officials investigating the event.
 - Download, print, and use the ALESA form noted at left (see "Self-Assess with ALESA").
 - Go to an eye specialist if your responses to the ALESA form suggest doing so.
 - Report eye injuries to ALPA's Aeromedical Office (303-341-4435) as soon as possible. Additional information and treatment referrals, as appropriate, are available from that office.
 - Call the ALPA Safety Hotline at 1-800-424-2470.
 - When practicable, write a report on the event via directions contained in AC 70-2 or AIC 14/09, as appropriate, and send the report to the FAA or Transport Canada.
- Laser protective eyewear (LPE) glasses are available, but ALPA's Aeromedical Office doesn't recommend purchasing them at this time. LPE only blocks out a single wavelength of light, so it's useful only if you are struck by a laser of the same wavelength. Some LPE may reduce the visibility of cockpit displays of the same color as the laser. 