Crossed Signals

BY MARK LACAGNINA

Entering an ILS critical area can cause problems for aircraft on approach.

The flight crew was in for a surprise. They had established their large air carrier aircraft on the localizer during a coupled instrument landing system (ILS) approach to Chicago O'Hare International Airport's Runway 28 and were awaiting glideslope interception when their glideslope course deviation indicators (CDIs) abruptly moved from the full-up position to full-down. The airplane pitched nose-down and descended 100 ft before the pilot flying disengaged the autopilot and hand flew the airplane back to the appropriate altitude. "While leveling, I saw the glideslope indicator go back to the correct indication of full-up," the pilot said.[1]

The anomaly likely was caused by disruption of the glideslope signal by a large cargo aircraft holding for takeoff on Runway 28. Tower personnel told the crew that, because of the weather conditions — 2 1/2 mi (4,000 m) visibility in snow and a 1,500-ft overcast ceiling — they were not required to protect the ILS critical area.

Incidents like this prompted the U.S. Federal Aviation Administration (FAA) in April to issue a notice "to remind operators of the potential for erroneous glideslope and/or localizer indications caused by movement of aircraft or equipment through ILS critical areas."[2]

The notice said that there had been several recent reports by pilots and air traffic controllers about fluctuations of glideslope and/or localizer indications in aircraft on ILS approaches. "This well-known phenomenon may occur when aircraft or vehicles are moving through the ILS localizer and/or glideslope critical areas and is due to interference with the ILS signals," the notice said, adding that in several of the reported incidents, pilots were conducting coupled approaches, and the autopilots tracked the distorted ILS signals, causing excessive pitch and roll excursions.

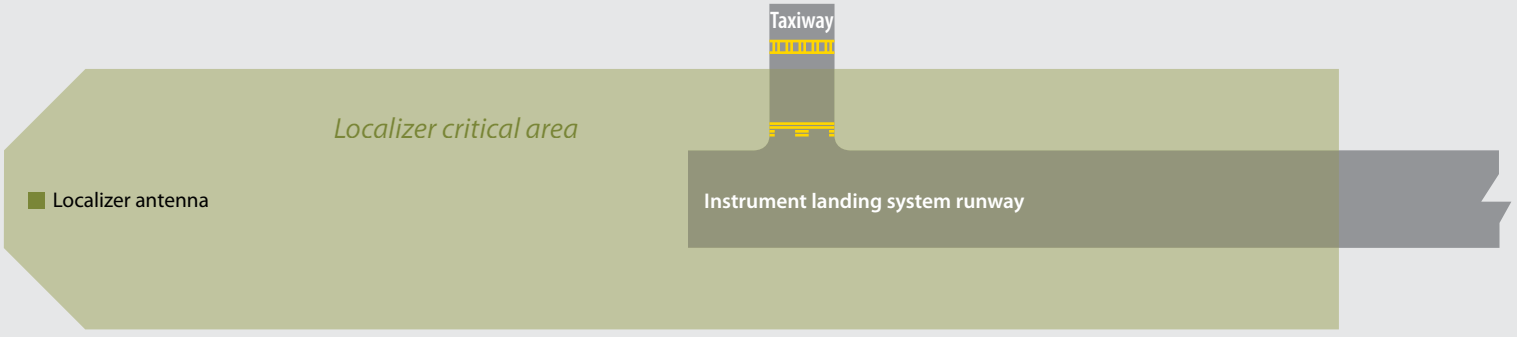
The notice recommended that pilots review the guidance contained in the *Aeronautical Information Manual* (*AIM*) and be "continually aware of the conditions under which [localizer/glideslope] critical area protections are imposed and whether or not the ILS fluctuations are likely caused by movement through the ILS critical area or an actual equipment malfunction."

Partial Protection

"Most ILS installations are subject to signal interference by … surface vehicles, aircraft or both," the *AIM* says. "ILS critical areas are established near each localizer and glideslope antenna."

The localizer antenna is located beyond the departure end of the runway; the glideslope antenna is off the side of the runway, close to the approach end. The dimensions of their designated critical areas vary according to such factors as the size of the aircraft that operate at the airport.[3]

ILS critical areas are "protected" by airport traffic controllers only under the specific conditions spelled out in the *AIM*. Chief among them is that visibility must be less than 2 mi (3,200 m) or the ceiling must be lower than 800 ft. Another key factor is that critical areas are protected only when an arriving aircraft has crossed the ILS outer marker or final approach fix (FAF).



Protection might consist of a ground controller telling a crew taxiing an aircraft to the runway to "hold short of the ILS critical area."[4] The holding position is designated by markings (two yellow lines spanning the taxiway and enclosing pairs of perpendicular yellow lines) and an adjacent sign ("ILS" in white on a red background).

When visibility is less than 2 mi, the ceiling is lower than 800 ft and an aircraft is inside the FAF, critical areas might not be protected against aircraft that have landed and are exiting the runway, or are on a missed approach or departure. Controllers are required to keep critical areas clear of such operations only when runway visual range (RVR) is 2,000 ft (600 m) or less, or the ceiling is less than 200 ft, *and* the arriving aircraft is inside the ILS middle marker.

At uncontrolled airports, there is no protection of ILS critical areas. The *AIM* recommends that pilots be especially alert when conducting a coupled approach to an uncontrolled airport, but it provides no guidance for ground operations.

As noted in the *AIM*, vehicles also can disrupt ILS signals. The pilots of a twin-turboprop business airplane found this to be true while conducting a hand-flown approach to the uncontrolled airport in Barre-Montpelier, Vermont. They reported "spurious and random oscillations" of the localizer CDI, with half-scale deflections occurring about five times.[5] "After landing, we observed a large tractor-style mower cutting grass at the far end of the runway, in the vicinity of the localizer antenna array," the pilot monitoring said. "We surmised that the movement of the mower through this area might have accounted for the erratic behavior of the localizer signal during our approach."

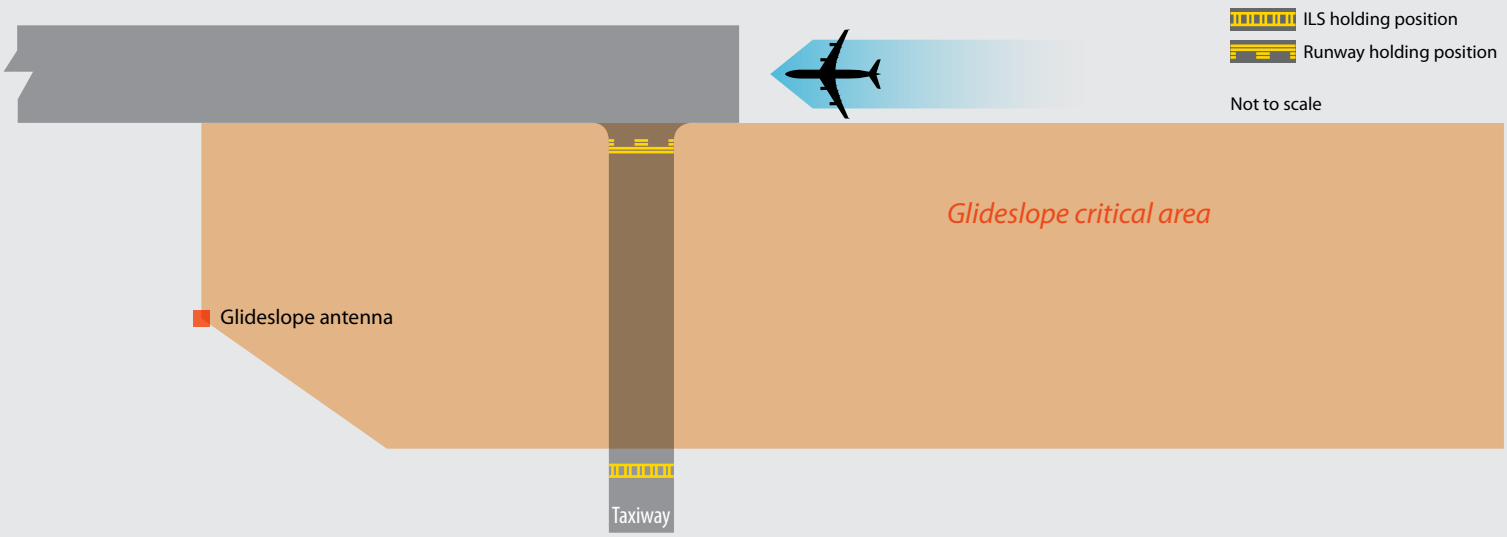
False Courses

The *AIM* also warns of *false courses* generated outside the ILS service area as a normal byproduct of ILS signal generation. Depending on the ILS installation, an aircraft might be 40, 50 or 60 degrees left or right of the localizer course or on a 9-degree glide path while the CDIs show on-course indications with no warning flags.[6]

Erroneous localizer and glideslope signals also may be radiated during maintenance or testing of the ILS ground equipment, which usually is brought to pilots' attention by notices to airmen (NOTAMs) and/or by removing the Morse code identification normally transmitted on the ILS frequency.

Notes

1. U.S. National Aeronautics and Space Administration Aviation Safety Reporting System (ASRS) report no. 871505, January 2010.
2. FAA Information for Operators (InFO) 12007, April 26, 2012.
3. FAA Order 6750.16D, *Siting Criteria for Instrument Landing Systems*.
4. FAA Order 7110.65U, *Air Traffic Control*.
5. ASRS report no. 837437, May 2009.
6. FSF editorial staff. "Erroneous ILS Indications Pose Risk of Controlled Flight Into Terrain." *Flight Safety Digest*, July 2002.



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