Fourth in a series focusing on approach and landing incidents that might have resulted in controlled flight into terrain but for timely warnings by TAWS.

BY DAN GURNEY

Wrong Airport

Learning From Experience
Incident No. 4

An insidious loss of positional awareness called "mental map shift" might have played a role in an incident involving the flight crew of a modern regional jet during a nonprecision instrument approach in nighttime visual meteorological conditions. During initial approach, the pilots apparently saw what they perceived to be their destination airport and began a visual descent toward the runway lights.

The crew was heading for the wrong airport. The aircraft's terrain awareness and warning system (TAWS) did not have this airport in its database and generated a "TERRAIN, PULL UP" warning when the aircraft reached the programmed obstacle/terrain clearance floor.[1]

A TAWS database can be configured to an operator's requirements. In this instance, the airport that the aircraft was approaching was not in the database because the length of its runway was less than the regional jet operator's minimum requirement of 3,500 ft (1,068 m).

The situation encountered by the flight crew offered several opportunities for error. The VOR/DME (VHF omnidirectional radio/distance measuring equipment) approach procedure provides the choice of a procedure turn beginning at the VORTAC (VOR/tactical air navigation) or a 7.0 nm DME arc to establish the aircraft inbound on the final approach course, 220 degrees. The crew flew the arc. At the turn-in point from the arc to the final approach course, the distance to the VORTAC is 7.0 nm; the distance from the VORTAC to the runway also is 7.0 nm (Figure 1). Located slightly less than 7.0 nm from the turn-in point is the small airport that the crew mistook for the destination airport.

The following are possible explanations for the flight crew's error:

- Fatigue might have reduced their capacity for careful thought, resulting in a loss of mental timing and a loss of positional awareness. The crew might have been unable to maintain an accurate mental picture of the approach. Their cross-checking of the aircraft's position with navigation instrument indications might have been inadequate or nonexistent.

- While turning inbound from the arc, the crew might have expected to see a runway, and "wishful thinking" contributed to the misidentification.

The crew's apparent loss of positional awareness might have taken the form of a mental map shift that resulted

from nearly identical distances from the turn-in point to the VORTAC, from the turn-in point to the small airport and from the VORTAC to the destination airport. These could have been misidentified on the electronic flight instrument system (EFIS) map display.

The runway headings at the destination airport and the small airport are within 30 degrees. Terrain could have masked any distinguishing or differentiating lighting features at the two airports. Thus, the similarity of the runway headings could have contributed to the crew's disorientation.

If the crew had used a flight management system (FMS) route, waypoints would have been positioned at the arc turn-in point, the VORTAC and the runway. Most EFIS map formats follow the convention of using "DIST" to identify distance between waypoints and "DME" to identify VORTAC or DME range values. If the crew's mental attention was low, they could have interchanged these identifications.

Familiarity with the approach procedure also might have contributed to the crew's error. They might have expected a 7.0 nm "DIST" value to the runway waypoint. At the turn-in point, the crew likely mistook a 7.0 nm "DME" value for the expected 7.0 nm "DIST" value. The pilots seem to have inadvertently shifted their mental position by seven miles to the VORTAC — the mental map shift — and began the descent toward the wrong runway.

Lessons to Be Learned

Beware of habit and complacency — "We have always done it this way" — and expecting to see something.

Mental resources and the ability to think carefully are reduced by fatigue and stress. In this condition, humans are susceptible to errors in positional awareness, situational awareness, timing and monitoring. Pilots must refocus their attention on lateral and vertical position before beginning an approach.

Conscious effort must be made to avoid distraction or fixation on the nearest or brightest lights. Visual approaches always should be cross-checked with navigation instruments. ●

[This series, which began in the July issue of *Aviation Safety World*, is adapted from the author's presentation, "Celebrating TAWS Saves, But Lessons Still to Be Learned," at the 2006 European Aviation Safety Seminar and the 2006 Corporate Aviation Safety Seminar.]

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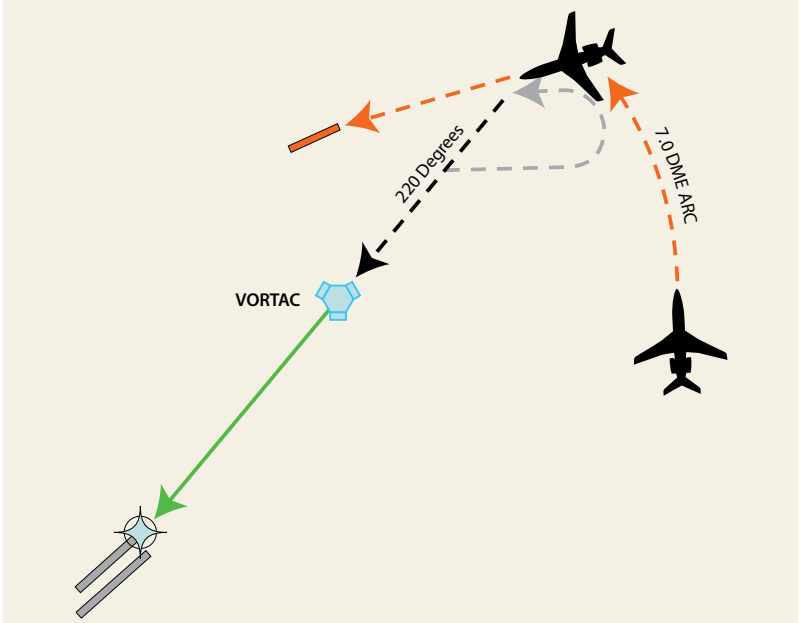
Note

1. *Terrain awareness and warning system* (*TAWS*) is the term used by the International Civil Aviation Organization to describe ground-proximity warning system (GPWS) equipment that provides predictive terrain-hazard warnings; *enhanced GPWS* (*EGPWS*) and *ground collision avoidance system* (*GCAS*) are other terms used to describe TAWS equipment.

Aircraft Flight Path



Source: Dan Gurney

Figure 1