



CONTROLLED FLIGHT INTO TERRAIN

In spite of years of concentrated effort by the aviation community, Controlled Flight into Terrain (CFIT) remains the No1 aviation killer. In most cases, CFIT accidents are caused primarily by the actions of the pilot, and there is little scope for ATC intervention. However, there have been instances where controller action - or inaction - has been the direct cause, or where action by the controller could have saved the day. The following report, based on the findings of the NTSB investigation², illustrates this point very well. The accident took place in USA, but perhaps it could have happened anywhere.

Factual Information

On 10th May 2004, at about 2051 local time, a Piper Seminole aircraft, N304PA, collided with mountainous terrain at Julian, California. The aircraft was operated by Pan Am



International Flight Academy. Both private pilots were fatally injured and the aircraft was destroyed. Visual meteorological conditions prevailed and an instrument flight plan had been filed. The flight originated at Deer Valley, Arizona.

The aircraft was on an IFR flight from Phoenix, Arizona, to Carlsbad, California. N304PA was number four in a train of five company aircrafts flying the same route. The time separation between each aircraft was about 5 to 10 minutes. The aircraft directly ahead of N304PA was N434PA.

The flight crew of N304PA contacted the San Diego North Radar (SDNR) controller at 2043:48, reporting level at 8,000. The SDNR controller instructed the pilot to fly heading 260 after Julian and intercept the (Palomar) localiser. The pilot read back the clearance.

At 2045:47, the SDNR controller told the pilot of N434PA, the Piper Seminole ahead of N304PA and flying the same route, to descend to 6,000 feet. The pilot of N434PA acknowledged the clearance.

At 2047:55, the SDNR controller transmitted, "Seminole four papa alpha descend and maintain five thousand two hundred." The pilot of N304PA responded, "Down to five thousand two hundred for three zero four papa alpha." According to information provided by the approach controller, this clearance was intended for N434PA. The controller did not recognize that the clearance had been acknowledged by N304PA rather than N434PA.

At 2048:19, the pilot of N434PA transmitted, "...for four three four papa alpha?" (The beginning of the transmission was blocked by another transmission from the SDNR controller to an uninvolved aircraft.) The SDNR controller replied, "No. Duke six romeo tango heading one nine zero maintain eight thousand."

When, at 2049:03, N304PA descended below 7,800 feet, the MSAW system activated and provided a visual alert to the controller. The alert continued until N304PA struck the terrain, although recorded automation data shows that the controller dropped the data block from the display when the aircraft descended through 6,800 feet.

At 2049:55, the pilot of N304PA reported that he had ATIS information

Zulu at Palomar, and the SDNR controller responded, "Seminole three zero four papa alpha thank you very much." According to radar data, at that time N304PA was descending through about 6,600 feet.

At 2050:27, the SDNR controller again cleared N434PA to descend and maintain 5,200 feet. The pilot read back the clearance, and the SDNR controller then transmitted, "Seminole four three four papa alpha is five miles from ESCON. Cross ESCON three thousand five hundred or above cleared ILS 24 at Palomar." The pilot of N434PA acknowledged.

The TRACON's MSAW system generated two predicted altitude alerts on the accident aircraft at 2050:46 and 2050:51. According to FAA MSAW documentation, two consecutive predicted alerts will initiate an MSAW warning to the controller working the affected aircraft. Collectively, these alerts would have caused a 5 second aural alert to the sector controller beginning at 2050:51, along with a flashing red "LA" in N304PA's data block from 2050:51 until about 2051:06.

N304PA then descended below radar coverage and the alert terminated. The wreckage of N304PA was located on a ridgeline 200 yards south of the Julian VOR at 5,537 feet above sea level.

Accident Cause

The NTSB determined the cause of this accident to be the incorrect use of an abbreviated call sign by the sector controller when issuing of a descent clearance to N434PA, and the sector controller's failure to detect that the pilot of N304PA had read the clearance back with the full call sign.

² www.nts.gov/ntsb/query.asp

A contributing cause was the N304PA pilot's failure to question a clearance that put them below the published minimum en route altitude. Another contributing cause to the accident was the failure of both the Centre and TRACON controllers to properly respond to the aural and visual MSAW alert.

Analysis

The similarity of the aircraft call signs - N434PA and N304PA - meant that there was a high probability of confusion. However, if this danger was appreciated by the controllers involved, they did not point it out either to the pilots involved or to adjacent sector controllers.

This danger of call sign confusion was increased when the SDNR controller abbreviated the first aircraft's call sign "Seminole four papa alpha"; this abbreviated call sign could have applied equally to N304PA or N434PA. It is legitimate for an aircraft call sign of this type to be abbreviated "After satisfactory communication has been established... provided that no confusion is likely to arise²"; however, in this case, both aircraft had checked in on frequency and it should have been obvious to the controller that confusion was extremely likely to arise.

The pilot of N304PA may have understood that this risk existed, for he used the full call sign in his response "Down to five thousand two hundred for three zero four papa alpha"; however, by placing his call sign at the end of the message and preceding it by the word "for" (which may have been misunderstood as the figure "four") the chance of the controller detecting the mistake was reduced.

The missing words from the blocked transmission from N434PA at 2048:19 are not known, but given the timing of the message (immediately after N304PA wrongly accepted the other aircraft's descent clearance), it is quite probable that the full transmission was "was that descent clearance... for four three four papa alpha?" If the controller had asked N434PA to repeat his message he might have realised that the clearance had been taken by the wrong aircraft.

The necessity to repeat the descent clearance for N434PA two minutes after the first clearance, coupled with the height loss depicted on N304PA's data block and the MSAW alert should have alerted the SDNR controller to the impending accident, but appears to have overlooked all these clues took no action. The TRACON controller also received two MSAW alerts but apparently took no action either.

Lessons Learned

During the 1990s, international collaboration led by the Flight Safety Foundation (FSF) resulted in the development of the FSF Approach and Landing Accident Reduction (ALAR) Toolkit, which comprises a detailed study of CFIT together with much valuable advice on accident avoidance. For more information, refer to www.flightsafety.org.

Specific lessons learned from the above accident are listed below:

- Place the aircraft call sign at the beginning of a message. This allows pilots to identify messages intended for them quickly and reduces the chance of a message being acted on by the wrong pilot;

- After satisfactory communication has been established, abbreviated call signs may be used provided that no confusion is likely to arise
- Advise adjacent sectors/airports if it is felt that potential confusion may exist between aircraft likely to enter their airspace
- A transmission could be blocked when two or more aircraft are responding to the same clearance. Typically the controller would hear a partial or garbled read-back. If a blocked transmission is suspected, ensure that both aircraft retransmit their messages and confirm carefully that a clearance has not been taken by an aircraft for which it was not intended.

³ See ICAO Annex 10 Volume II Section 5.2.1.7