

ADDENDUM EXECUTIVE SUMMARY

AIRCRAFT ACCIDENT INVESTIGATION

A-10A, S/N 80-0266

Boise Air Terminal, Gowen Air National Guard Base, Idaho

20 Jan 00

On 20 Jan 00, 1842L, an A-10A, S/N 80-0266, impacted the ground approximately 12 miles west of the Boise Air Terminal and was destroyed. The mishap pilot was killed. The mishap was investigated pursuant to AFI 51-503, and the report was approved on 9 May 00. The Board was unable to determine a cause by clear and convincing evidence. However, by identifying substantially contributing factors, the Board concluded the mishap most likely occurred due to pilot error caused by spatial disorientation during particularly adverse weather conditions. Additional contributing factors included possible distraction of the mishap pilot (MP) due to potential failure of the cockpit lighting, radio or navigation equipment, and possible failure (or MP distrust because of a history of failure) of the main ADI.

Following release of the report, a former member of the mishap Wing came forward to dispute the findings of the AIB. Based on his experience working in the A-10 engine maintenance shop, he believed the Auxiliary Power Unit (APU) could have caused a fire on the mishap aircraft (MA) due to a faulty hot air check valve. The Board had previously ruled out APU malfunction, as well as the possibility of a pre-impact fire. Nonetheless, it was decided to re-open the AIB to investigate the new theory.

The proponent of the theory was interviewed, and the APU itself and the original report, including the tear-down analysis of the APU, were carefully re-examined. The re-examinations revealed no evidence of a pre-impact fire or explosion. The most reliable witnesses to the mishap ruled out pre-impact fire or explosion. Analysis of maintenance practices on the MA confirmed all maintenance was performed in accordance with existing technical orders, regulations and guidance. Furthermore, analysis of the APU hot air check valve showed no evidence of failure.

Based on the foregoing, the Board concluded there was no reason to change its opinion as stated in the original AIB report.

Under 10 U.S.C 2254(d), any opinion of the accident investigators as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from an aircraft accident, nor may such information be considered an admission of liability by the United States or by any person referred to in those conclusions or statements.

EXECUTIVE SUMMARY

AIRCRAFT ACCIDENT INVESTIGATION

A-10A, S/N 80-0266

Boise Air Terminal, Gowen Air National Guard Base, Idaho

20 Jan 00

On 20 Jan 00, 1842L, an A-10A, S/N 80-0266, crashed 12 miles west of Boise, ID and was destroyed. The mishap pilot (MP), Maj Mark Moynihan was fatally injured. There was no damage to structures or injury to civilians. The mishap aircraft (MA) was assigned to the 190th Fighter Squadron (190 FS), 124th Wing, Idaho ANG, located at Boise Air Terminal. The MP was the instructor and number 2 in a 2-ship, night vision goggle upgrade sortie for the flight lead.

The MP's flight was recalled from the Saylor Creek weapons range due to worsening weather in Boise and began a trail approach to runway 28L. The weather was broken clouds at 600 feet above ground level (AGL) with visibility 2 ½ miles. The flight lead landed and the MP executed a missed approach either due to inadequate spacing or inability to see the runway. The 190 FS Supervisor of Flying directed the 4 A-10As still airborne to the instrument landing system (ILS) approach for runway 10R and the MP was the last A-10A vectored to the ILS. In post-mishap interviews, these other pilots described the clouds as disorienting and solid from 500 feet AGL to 4,500 feet mean sea level (MSL).

Approach control directed the MP to turn base (010 degrees) and then further right (070 degrees) to intercept the ILS course (098 degrees), and descend to 4,200 feet MSL. The MP acknowledged these calls, which were his last transmissions. In the turn to 070 degrees, the MP entered a very steep and rapid descent and leveled off at 3,200 feet MSL that was 1,000 feet low and only 700 feet AGL. The MP made no radio calls indicating problems, but remained at 3,200 feet MSL for 23 seconds. This descent was probably the result of a main attitude director indicator (ADI) malfunction compounded by a cockpit distraction (a faulty radio, a lighting problem, or a bad inertial navigation system). After such a dramatic, turning descent (probably inverted), from above the clouds into a very thick cloud cover, the MP likely suffered severe spatial disorientation. Therefore, the MP did not realize he was 1,000 feet low and was most likely focussed entirely on the standby attitude indicator (SAI), which had precessed 20 degrees in bank. The MP continued in a turn, probably due to the SAI precession, as he tried to regain his situation awareness and intercept the ILS course. The MP configured the MA for landing. Shortly after, the MP perhaps saw the ground below him, which was dark with little ground lighting, through breaks in the clouds. Still suffering from spatial disorientation the MP disregarded his flight instruments (some of which may have been faulty), rolled the aircraft to the right and pulled the aircraft toward the ground in the belief he was pulling up and away from the clouds. He had pushed the throttles to maximum power, retracted the speed brakes and still rolling right impacted the ground with no attempt to eject.

The A-10A fleet suffers from main ADI problems. Failure modes range from off flags, jittery behavior, failing in bank or pitch and then either remaining failed or returning to normal function. The MA had 9 discrepancies in the previous 12 months for main ADI malfunctions resulting in its replacement 6 times. The MTBF for the MA was 65.3 hours compared to a fleet average of 431 hours. In addition the MA had other malfunctions in the previous 12 months (heading and attitude reference system (HARS), directional gyro, inertial navigation unit) that could also result in faulty main ADI indications. While post-mishap analysis of these components did not prove any of these were faulty at the exact time of impact (except that HARS was selected indicating a problem with the INS), pre-impact problems could not be ruled out. Given the history of problems in this aircraft and the sequence of mishap events, it is likely that some of these components experienced problems. Further, based on the history of the main ADI, it is probable that a faulty main ADI indication contributed to this mishap.

While there is no clear and convincing evidence regarding the cause or causes of the mishap, the factors substantially contributing to this accident indicate the possible mishap scenario. Maj Moynihan was fatally injured primarily due to severe spatial disorientation as a result of flying in adverse weather conditions. This spatial disorientation was probably caused by the display of incorrect information on the main ADI (caused by a potential malfunction) or the pilot's mistrust of the information on the main ADI during a critical phase of flight. Additionally, the spatial disorientation was possibly enhanced by cockpit distractions affecting his navigation, lighting and radio equipment. As a result of the spatial disorientation, the MP mistook the ground for the sky, and pulled toward it thinking he was recovering from his disorientation and climbing away from the clouds.

Under 10 U.S.C 2254(d), any opinion of the accident investigators as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from an aircraft accident, nor may such information be considered an admission of liability by the United States or by any person referred to in those conclusions or statements.