

Executive Summary

AIRCRAFT ACCIDENT INVESTIGATION

B-1, S/N 86-0114

Indian Ocean, near Diego Garcia (UK)

On 12 Dec 01, at about 1540Z, B-1 aircraft S/N 86-0114, call sign Icecube 44, struck the ocean surface about 55 nautical miles (NM) north of the island of Diego Garcia, UK. The aircraft was destroyed upon impact and sank. All four crewmembers ejected and were rescued by the US Navy; they sustained minor injuries. The mishap crew (MC) was part of the 34th Expeditionary Bomb Squadron (EBS) conducting combat operations from Diego Garcia in support of Operation ENDURING FREEDOM. The B-1 was permanently assigned to the 37 BS, 28 BW (ACC), Ellsworth AFB, SD, and was temporarily assigned to 34 EBS at the time of the mishap.

The mishap aircraft (MA) departed Diego Garcia on a night air-to-surface attack mission over Afghanistan. Shortly after level off, the MC shut the #1 engine down due to an oil over-temperature. The associated primary engine generator fell off-line normally during the engine shutdown. The MC decided to abort the mission and return to Diego Garcia. En route to Diego Garcia the #2 primary engine driven generator dropped off-line, accompanied by loss of the MA's computer navigation complex. The pilot switched on the emergency generator, in accordance with the appropriate emergency procedure for single generator operation. Shortly thereafter, the pilots determined their primary and standby aircraft attitude (i.e. level flight, turning, climbing, etc.) information was unreliable. Though weather at the cruise altitude of FL 200 (20,000 feet) was clear, there was no lunar illumination and neither pilot could discern the horizon. The offensive systems officer (OSO) and defensive systems officer (DSO) noted increasing uncommanded bank angle displays up to 120° (partially inverted), accompanied by rapidly decreasing altitude and increasing airspeed, and advised the pilots. Passing his altimeter indication of 15,000 ft MSL, the OSO determined the aircraft was out of control and, in accordance with technical order guidance, ejected, followed quickly by the DSO. The pilots confirmed the OSO and DSO altitude and airspeed indications but could not positively determine the MA attitude. Convinced the aircraft was out of control and unrecoverable, the pilots ejected.

From takeoff to ejection the evidence available to the board regarding aircraft system performance came exclusively from crew testimony. Objective evidence from the MA was not available because recovery efforts failed to locate any part of the wreckage. Therefore, it is not possible to make a clear determination as to the cause of the mishap. However, it is possible to reach an opinion regarding key factors that likely led to the loss of the aircraft.

- 1) Emergency generator operation can make the displays of the primary heading and attitude sources erratic. It is a design feature of the B-1 that, when operating, the emergency generator powers the aircraft's essential AC electrical bus independently of the primary AC generators and not in parallel with them. This unsynchronized power, if applied to the pilots' primary flight instruments, can seriously degrade the displays of the primary heading and attitude sources. In this situation the pilots would have had to rely on backup attitude information.
- 2) The source of backup attitude information was unavailable when the computer navigation complex fell off-line. To work around erratic displays created by the use of the emergency generator, the emergency procedure directs the crew to select a back-up attitude source that, if the computer navigation complex is off-line, presents an invalid constant level flight attitude display with no associated caution light warning. The pilots' primary attitude instrument would have displayed this invalid backup information in a way that likely would have approximated the actual level flight attitude of the MA.
- 3) The MC could not confirm if the OSO and DSO attitude information was valid. Though the aft station attitude indicators share a common attitude information source with the pilots, the mishap pilots testified their primary attitude instruments and the aft station attitude indicators did not agree. Furthermore, neither indication agreed with the pilots' standby attitude. In short, the MC perceived three conflicting attitude displays. Given a lack of a discernable horizon and rapidly decreasing altitude and increasing airspeed, little time was available for the crew to determine which attitude display, if any, was valid.
- 4) The pilots perceived the Standby Attitude Indicator (SAI) had failed. With the loss of primary attitude reference sources and no discernable horizon, the pilots had to rely on the SAI. Though they disagree in the details of their recollections, both pilots' testimony states they perceived the SAI had failed. The board could not correlate a SAI failure to other likely aircraft malfunctions present at the time, but an SAI failure unrelated to the other malfunctions is possible. Regardless of whether the SAI actually failed, pilot and co-pilot momentary perception of the SAI failure was the last link in a chain of events that led to the loss of the MA. The circumstances the MC faced were sufficient to cause unrecognized spatial disorientation that would have made it near impossible for them to recover the MA.

It is likely a progression of aircraft malfunctions, aggravated by aircraft design and technical order emergency procedures, created a situation where the pilots were unable to maintain control of the aircraft.

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.