Extracts from DDAAFS Safety Magazine
"SIFTING THROUGH THE EVIDENCE"

25 October 1978 (F-111C A8-141) – 3rd F-111 accident – inflight fire and ejection near Auckland

Overview

During an emergency diversion following a wheel-well hot indication, the aircraft suffered a wheel-well fire. An ejection was initiated and the aircraft crashed into the sea near Auckland, New Zealand. The ejection was successful, however both crew members suffered back injuries.

The incident crew were Number 2 of a day four-ship F-111 maritime strike mission operating from RNZAF Ohakea airbase, taking part in an Australian/New Zealand Exercise.

Crew

Pilot: Cat C – 3232.8 hrs total time / 283 hrs F-111; current

Navigator: Cat B – 2842 total time / 1037.2 hrs F-111; current

Crew module – aircraft A8-141

Accident summary

The wheel-well hot caution lamp (WWHL) illuminated during recovery from an autotoss weapon delivery profile. The incident pilot deselected afterburner, reducing the power setting of both engines to idle, and then completed the extant boldface emergency actions of extending the speedbrake (to ventilate the wheel-well) and selecting the air source selector knob (ASSK) to off (to close the 16th stage engine bleed air check and shut-off valves). The landing gear was extended at 300 kts (to minimize heat/fire damage to the main landing gear). During the diversion to the recovery airfield, the WWHL went out (it was on for a total of 1 min 23 sec which is unusual as it historically goes out with ASSK selection of OFF or EMER) followed shortly by illumination of the forward equipment hot caution lamp (FEHL) and then the low equipment pressure caution lamp (LEPL).

During crew actions to alleviate the FEHL, the pilot inadvertently selected RAM (he intended to select EMER where the bleed air shut-off valves remain closed but ram air cooling is provided for cooling and ventilation) on the ASSK. The crew of one of the other F-111s who had rejoined to assist, advised that white smoke was coming from the aircraft. The incident pilot then selected EMER on the ASSK at which time the white smoke stopped immediately. Shortly thereafter the LEPL went out, followed by the FEHL.

Less than two minutes after repositioning the ASSK to EMER, the WWHL again illuminated. Inspection by the other aircraft revealed no abnormalities.

The incident crew then decided to dump fuel to reduce aircraft landing weight. During the fuel dump, the other aircraft reported an apparent reversal of flow of the dump plume, and an intense fire started immediately in the wheel-well. Fuel dumping was ceased but the wheel-well fire continued. The situation compounded further with the right hand engine instruments fluctuating wildly, illumination of the left and right fuel pressure caution lamps and right engine oil hot caution lamp. A loud thump from the rear of aircraft was heard by both crew members so the pilot initiated ejection (less than 14 mins from initial WWHL illumination). The ejection was successful and the aircraft crashed into the water.[1]

Board findings

The Board made the following findings:

1. The primary cause of the accident could not be determined. However, it was noted that much of the evidence pointed to a 16th stage bleed air duct failure in the wheel-well.[2]

[1] Approximately 80% of the wreckage was recovered from a depth of 130 ft. A RNZN diver died during the salvage operation.
[2] Wreckage examination showed that the main landing gear was severely damaged and would have certainly collapsed had the crew attempted to land the aircraft.

2. It could not be determined whether the wheel-well fire was caused by the fuel dumping. It was noted that the pilot's decision to dump fuel was based on well-founded and widely accepted principles of airmanship at the time.

3. It could not be determined whether the bleed air check and shut-off valves were closed or open prior to ejection. (During wreckage inspection, the ball valve was found to be unseated, however removal of electrical power following ejection should have opened the valve.)

4. The F-111 checklist procedures for illumination of the WWHL caution lamp were found to be deficient as it caused the pilot to delay selection of the ASSK to a position where the bleed air check and shut-off valves could be closed. Additionally, the checklist did not contain a caution to advise the crew that repositioning the ASSK after initial selection might cause a shut-off valve to fail to the open position.

5. The F-111C flight manual was found to be deficient in a number of areas compared to equivalent USAF publications (e.g. post-ejection procedures).

6. The ASSK was assessed to be of poor ergonomic design as the OFF and EMER positions should have been together rather than at opposite ends of the available selections as, when passing through these other selections (L ENG, BOTH, R ENG), a signal is sent to open the shut-off valves.

7. An inspection program for 16th stage bleed air clamps should have been initiated prior to the accident as there was considerable evidence that the integrity of critical items of the environmental cooling system (ECS) were not satisfactory, as indicated from a 3½ year history of wheel-well hot incidents together with associated defect and failure reports.

Recommendations

Board recommendations included:

1. F-111 checklist (and flight manual) emergency actions for WWHL caution lamp illumination be changed back to earlier procedures (ASSK – OFF or EMER, then extend the speedbrake[3]) and that a caution be added to advise that the ASSK should not be repositioned after initial selection as the shut-off valves may fail to an open position.

2. The F-111 air conditioning control (ACC) panel should be fitted with a larger ASSK knob to aid crew tactile identification of the knob.

[3] The emergency actions had recently been revised to conform to USAF procedures – the rationale to immediately ventilate the wheel-well area by opening the speedbrake – and to retain consistency with oil hot emergency procedures (speedbrake – extend, followed by ASSK – OFF or EMER as applicable). As a result of these new procedures, the incident pilot had to delay speedbrake extension for approximately 8 seconds until airspeed was below the imposed speedbrake limit of 600 KIAS / Mach 2.0. This in turn delayed selection of the ASSK to OFF. The Board determined that the first priority should be to eliminate the most likely source of the problem and thereby stabilise the emergency, and then complete actions to ventilate the wheel-well.

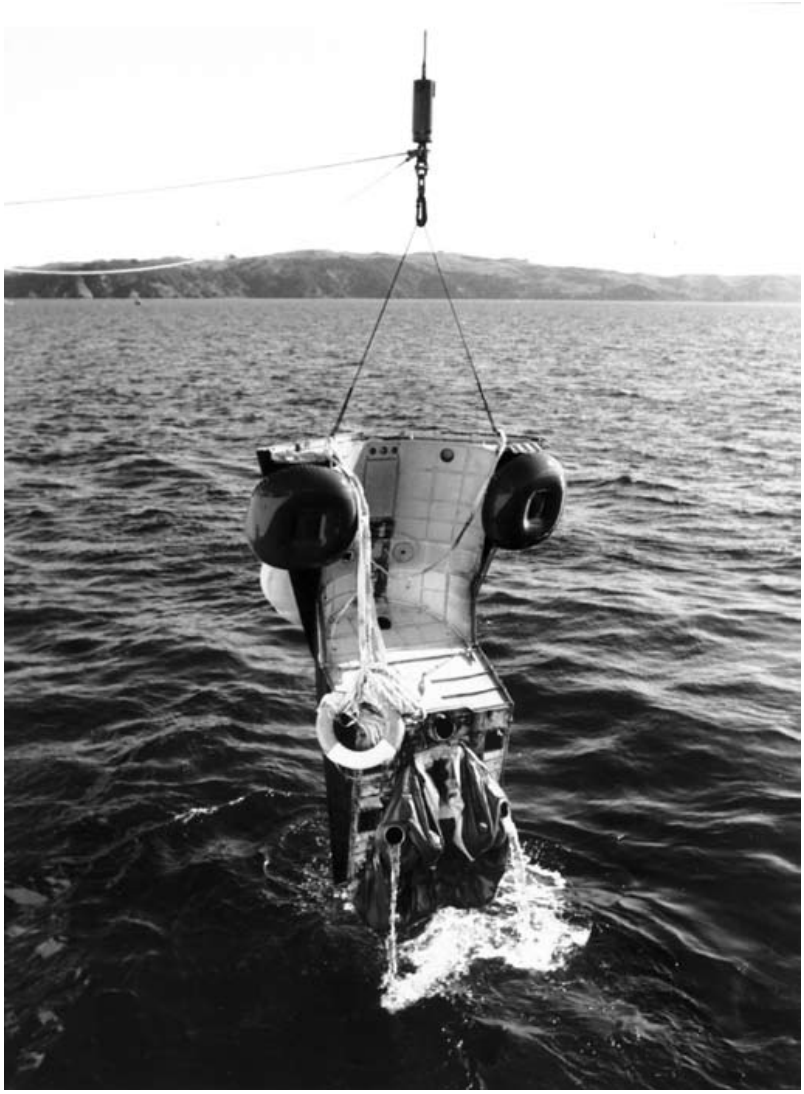
Changes attributable to this accident

Changes to F-111 procedures and aircraft modifications that were more than likely influenced by this accident are as follows:

1. Fuel dumping is not conducted following potential or actual overheat conditions such as indications of engine bleed air duct failure, engine oil hot, wheel-well hot, engine fire or fuselage fire.

2. Incorporation of a separate control switch on the ACC panel for manual RAM air door operation to provide the option for RAM air cooling following an emergency selection of the ASSK to OFF. *(Author's note - The EMER position on the ASSK was subsequently removed as a selection option.)*

3. The wheel-well hot, engine oil hot and bleed duct failure orange caution lamps were changed to red warning lamps to assist the crew in quickly identifying the severity of the emergency indication.



Crew module extraction – aircraft A8-141