MINISTRY OF DEFENCE

Military Aircraft Accident Summary of a Royal Air Force Board of Inquiry

Aircraft:	Bulldog T1 XX710
Date of accident:	21 July 1997
Place of accident:	RAF Woodvale, Lancashire
Casualties:	2, fatal

Synopsis

1. On the afternoon of 21 July 1997, a Bulldog training aircraft was being flown on an instructional sortie at RAF Woodvale when, during the climb away after take-off from a roller landing, the aircraft suffered engine failure. The crew attempted a forced landing but were unsuccessful and the aircraft crashed inside the airfield perimeter. The instructor died instantly. His student was rescued but died two days later from her injuries. The accident was caused by a loss of power followed by a reduction in airspeed below that from which a controlled forced landing was possible in the height available.

Background

2. The sortie was intended to be a routine instructional check flight on a Liverpool University Officer Cadet conducted by the Officer Commanding Liverpool University Air Squadron, a very experienced instructor on the Bulldog. The aircraft allocated was declared serviceable, however, it had a seemingly minor fuel indication fault which was well known to the instructor and other aircrew.

Circumstances

3. On the day of the accident both the instructor and student flew in the morning. After lunch, the instructor flew a formation sortie of 1 hour 45 minutes duration, the second half of which was relatively relaxed as he led the formation. Landing from that sortie, he remained in the cockpit, changed students and took-off, once again, in good weather. After 50 minutes they returned to Woodvale for circuit flying. At about 200ft on the climb away from their fourth circuit, the engine was heard to splutter and the aircraft's nose dropped below the horizon. Shortly thereafter, the aircraft yawed and turned to starboard with approximately 45° of bank and the engine noise ceased. As the aircraft passed an easterly heading, the nose dropped markedly and the aircraft entered a steep spiral descent striking the ground just inside the airfield perimeter. On impact, the fuselage broke aft of the cockpit. There was neither fuel spillage nor fire. Airfield and civilian rescue services quickly arrived, followed by the RAF Valley Search and Rescue helicopter. The rescue services were able to remove the crew and applied resuscitation. The captain however, had died instantly. The student was transferred to the local general hospital with serious injuries from which she died 2 days later without regaining consciousness.

Salvage Operation

4. The aircraft wreckage was confined to a small area inside the airfield boundary. Following initial investigation, it was removed for further analysis.

Aircraft Damage

5. The aircraft was severely damaged and beyond economical repair.

Investigation

6. With the assistance of the Aircraft Accidents Investigation Branch of the Department for the Environment, Transport and the Regions, the Inquiry quickly confirmed the presence of an anomaly in the aircraft's fuel system. On recent sorties, aircrew had noticed that the port fuel indicator had remained on full whilst the starboard one decreased. They attributed this anomaly either to a sticking fuel gauge or to preferential feeding from the starboard tanks, and had accepted it as a minor defect and balanced the fuel through use of 'left feed' on the fuel selector valve. In reality, the Inquiry found that the float had become detached from the port outer tank fuel contents transmitter switch and so provided an incorrect signal to the cockpit fuel gauge. The port gauge only started to move when fuel began feeding from the port inner tank once the outer tank was empty. Consequently, when the instructor landed for his running change, he had a false indication of the amount of fuel in each tank. Fifty minutes later, just prior to the accident, the gauges probably indicated 4 gallons port and 3.5 gallons starboard, however, the port tank was virtually empty. The Inquiry deduced that at some point during the final take-off, or in the climb, the aircraft yawed momentarily permitting air from the port tank to enter the fuel line causing the engine to misfire. In all probability the instructor diagnosed a partial power loss, lowered the nose and turned right to find somewhere to land, the area ahead being mainly built up and unsuitable for landing. Witnesses noticed that the aircraft also yawed right just before the turn and that around this time the engine ceased to make any further noise, indicative of a major power loss. This would be consistent with more air entering the fuel line as the aircraft yawed. After about 50° of turn, the aircraft departed from controlled flight and began a steep and slow speed spiral descent from which recovery was impossible in the height available.

Safety Recommendations and Actions

7. Amongst the Inquiry's main recommendations were improved advice on aircraft handling when faced with engine failure immediately after take-off and a requirement to modify engineering procedures to facilitate prompt detection and diagnosis of fuel gauging defects, all of which have been put in hand.

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