MINISTRY OF DEFENCE

Military Aircraft Accident Summary

MILITARY AIRCRAFT ACCIDENT SUMMARY

OF RAF BOARD OF INQUIRY

Aircraft:	**Harrier T10 ZH655**
Date of accident:	**26 July 1995**
Place of accident:	**RAF Wittering**
Casualties:	**1 slight**

SYNOPSIS

1. A Qualified Flying Instructor (QFI) was flying a dual conversion sortie with a student in a Harrier T10 when, shortly before landing at the end of the sortie, the nose of the aircraft pitched down abnormally. The QFI, who was flying the approach, was unable to correct this and the aircraft landed heavily on the landing strip. The nose undercarriage broke off and the aircraft slid for about 2,000 feet before coming to a halt. The Inquiry concluded that the accident was caused by a lack of documentation on the handling characteristics of the aircraft. The QFI could not therefore have known of the adverse handling trait, nor how to recover from it.

BACKGROUND

2. During Short Take-Off and Landing (STOL) operations above 165 knots, the Harrier's flaps are set at 25°. Below this speed, however, flap movements are actuated by changes to the angle of rotation of the thrust vectoring nozzles. Thus, as the nozzles rotate downwards, so the flaps move progressively to their maximum

setting, 62°. This is known as flap scheduling. Whilst there is a well documented pitch down movement associated with flap scheduling on the Harrier this can usually be corrected by pulling back on the control column.

CIRCUMSTANCES

3. The Harrier is a unique aircraft and the purpose of this sortie was to teach the student some of the techniques associated with STOL operations. The weather was fine with a light easterly breeze. The QFI took control during the final circuit in order to demonstrate a STOL approach, intending to touch down on the landing strip which runs parallel to the main runway at RAF Wittering.

4. The QFI commenced the approach by rotating the thrust nozzles downwards to 60° and, as the aircraft decelerated through 160 knots in the final turn, the flaps moved down. At this point, the QFI pulled back on the control column in order to correct the expected pitch down, but immediately found the stick against the backstop and the pitch angle greater than normal. He recovered by rotating the nozzles upwards (which automatically raised the flaps), reducing the angle of bank and increasing power. Having regained control, he continued the approach and, at 300 feet, reselected 60° of nozzle and throttled back the engine. As the aircraft decelerated, the flaps again moved down and the QFI experienced an extreme pitch down which he could not arrest. The option to eject was considered but rejected and the aircraft struck the ground in a nose-low attitude.

RESCUE OPERATION

5. Once the aircraft had come to a halt, the crew made their ejection seats safe and climbed out of the aircraft. Fire crews arrived shortly thereafter to extinguish a small fire which had ignited behind the engine intake.

AIRCRAFT DAMAGE

6. The aircraft sustained significant damage to the fuselage and wing and has been placed in storage pending a decision on whether to repair it and return it to service.

INVESTIGATION

7. The Inquiry quickly determined that STOL flap scheduling was a factor in the accident and was able, by investigation of the damaged aircraft and analysis of the Accident Data Recorder, to reject any kind of technical failure. The Inquiry also examined the position of the damaged aircraft's Centre of Gravity (CofG) which, due to the combined effect of the aircraft's stores configuration and the low fuel weight reached by the time the sortie ended, was found to be outside the forward limit. Nevertheless, it was not clear whether this had a bearing on the accident, so a Harrier T10 trials flight was carried out by a test pilot at Boscombe Down. This demonstrated that the known pitch down associated with movements of the flaps was more pronounced with the CofG at forward positions. The Inquiry therefore concluded that the aircraft's CofG position had been a contributory factor. In addition, the trials flight also demonstrated that control column authority was insufficient at low engine RPM and that control could be regained by increasing engine power.

8. Although the pitch change associated with flap movement was a known handling characteristic, the Inquiry found that there was no indication in either the Aircrew Manual or the Flight Reference Cards that there was a possible lack of control column authority. Furthermore, there was no advice on increasing engine power to regain control. The Inquiry concluded that the QFI's actions on the day of the accident had been entirely consistent with the practices prevailing in the Harrier Force at the time and that, as a result, he was absolved of blame.

SAFETY RECOMMENDATIONS

9. The Aircrew Manual has been amended to improve the advice on the flap characteristics and to highlight the interaction of power setting and control column authority. In addition, Harrier T10 CofG limits have been recalculated and aircraft modified accordingly. A review of policy and procedure for preparing Aircrew Manuals, and its relationship with other associated documents, will take place.