MINISTRY OF DEFENCE

Military Aircraft Accident Summary

Aircraft:	Tornado GR1 ZA555
Date of accident:	2 December 1986
Parent Airfield:	RAF Honington
Place of accident:	Wortham, Suffolk
Crew:	Two
Casualties:	Two Major

Circumstances

1. On 2 December 1986, Tornado ZA555 took off from RAF Honington on a routine Air Combat Training sortie with a student piloting the aircraft. About 9 minutes after take-off, the instructor in the rear seat became aware of an unfamiliar noise from the rear of the aircraft. At about the same time the Command Stability Augmentation System (CSAS) (a computer controlled fly by wire system) suffered a minor failure. Although this was rectified, the instructor noticed a flickering generator caption, and told the student to initiate immediate recovery to base. Other failure indications then appeared and the instructor was sufficiently alarmed to declare a MAYDAY.

2. Some 35 seconds after the first warning, the CSAS suffered several more failures and very shortly afterwards flying control reverted to a full mechanical mode. Over the next one and a half minutes the various warning captions illuminated as the aircraft descended from 12,000 ft to 3,500 ft. A failure of the left hydraulic controls circuit was then indicated. Shortly afterwards, the aircraft started a steady and continuous pitch down movement. The student attempted to control the pitch by pulling back on the control column, eventually using both hands. The aircraft did not respond. The instructor, seeing the control column was fully aft and realising that the aircraft was out of control, initiated command ejection.

3. Both ejection sequences were normal. The aircraft continued to pitch down and rolled to the left. Some 6 seconds after the crew ejected the aircraft passed through a thin line of trees and hit the ground.

Cause

4. Wreckage examination revealed that the final loss of control was caused by failure of the mechanical linkage between the pilot's control inputs and the aircraft tailerons. The failure occurred because the linkage had bee subjected to excessive heat, the source of which could not be positively determined. There was no evidence of pre-impact fire in the wreckage. It was considered that the most likely source was a hot gas leak from the Environmental Conditioning System (ECS) which initiated a carbon arc in an adjacent electrical cable loom. This would have explained not only the numerous unconnected warnings experienced by the crew, but also the generation of sufficient heat to degrade the mechanical control linkage.

Subsequent Actions

5. The manufacturer has been tasked to investigate the possible replacement of the mechanical control linkages with a more heat resistant type; and to test further the integrity of the ECS components, with a view to making any practicable improvements in their reliability.

Claims

6. Claims have been received for damage to farm-land and property, including access roads, caused by the accident and the ensuing recovery operation.