MINISTRY OF DEFENCE

Military Aircraft Accident Summaries

MAAS 15/85

31 May 1985

ACCIDENT TO ROYAL AIR FORCE TORNADO GR1 ZA586

Date:	27 September 1983
Parent Airfield:	RAF Honington
Place of Accident:	5 miles NNE Kings Lynn
Crew:	Two
Casualties:	One - pilot killed

CIRCUMSTANCES

1. About 1½ hours after take-off, the crew of Tornado ZA586 were returning to their base from an uneventful night training sortie. (The only aircraft malfunction had been a transient generator failure which had occurred about 15 minutes beforehand, although the generator had reset satisfactorily). The crew carried out their pre-return checks and began a descent from an altitude of 21,000 feet in an ostensibly fully serviceable aircraft, with ample fuel remaining. At a height of 17,000 feet the pilot remarked to his navigator that a generator had failed. A few seconds later, all the aircraft's lights went out, the radio and crew intercommunication failed to operate, and all the aircraft's systems appeared to have failed. There were no audio or visual warnings in the cockpit, but shortly thereafter, the navigator sensed a bright flash from the rear of the aircraft, a metallic thump, and a sharp jolt through the airframe. The cockpit was unusually quiet to the extent that the slipstream flow over the canopy could be heard. The crew were only able to communicate by unfastening their oxygen masks and shouting to each other. The pilot turned the aircraft towards the coast, while the navigator attempted to transmit emergency calls. After a few seconds the pilot shouted that he was starting to lose control; he first warned the navigator to be prepared to eject and shortly afterwards ordered abandonment. The navigator replaced his mask, lowered his visor and ejected, confident that the pilot would promptly follow suit. Whilst descending in his parachute, he saw an explosion as the aircraft hit the ground. He landed safely and was quickly rescued. An intensive search for the pilot by land, sea and air was terminated on the following day when it was established that he had still been in the aircraft on impact and had not survived.

CAUSE

2. Replay of the Accident Data Recorder (ADR) and investigation of the wreckage confirmed that one generator had come off-line, followed a few seconds later by a simultaneous loss of allAC and DC power supplies. Consequently, both engines had, as designed, oversped to their governed limit and this had resulted in the mechanical failure of the turbines and subsequent rundown to windmilling rpm; this was believed to be the explanation for the flash and the jolt reported by the navigator. It was deduced that at this stage the loss of the aircraft had become inevitable and the accident was accordingly attributed to the total electrical failure.

3. An early deduction that a connector in the aircraft's crash protection circuitry may have become disconnected in flight, thus cutting off all electrical power, was disproved. The investigation thus eliminated the only known single fault which could have caused a simultaneous loss of the main and back up electrical power supplies. A protracted study of the implications of possible multiple failures within the electrical power generation and distribution systems was then carried out, together with rig testing, in an attempt to diagnose a likely combination of defects which would explain the known circumstances. However, in the absence of some electrical components which were destroyed in the crash this proved to be inconclusive. A number of hypotheses were advanced, but the precise cause of the electrical failure remained unknown; every likely eventuality was fully explored and exhaustive checks of other Tornado aircraft in each case enabled these early putative causes to be discarded.

4. As far as the fatality was concerned, following specialist assessments and simulated trials of the aircrew escape system, no reason for the pilot's failure to eject could be positively established. Several subsequent ejections have been completely successful.

SUBSEQUENT ACTIONS

5. Whilst the initial accident investigation took place and pending a fleet-wide check of the crash protection circuits, all Tornado aircraft were temporarily suspended from training flying. Subsequently, inspection or testing of other components has been carried out by a number of agencies in response to other theories, and a comprehensive review of the integrity of the electrical system has been completed. A number of design changes which would lead to improved system redundancy and reliability of the essential services have already been formulated and are being incorporated into the aircraft's system.

CLAIMS

6. Following the accident a claim was received from the Sandringham Estate on whose land the aircraft crashed. A settlement was made of £800.

Issued by - Public Relations
Ministry of Defence
Main Building
Whitehall
London SW1A 2HB

01 218-3253/3254 (Royal Air Force)