



# MINISTRY OF DEFENCE

## Military Aircraft Accident Summary

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AIRCRAFT ACCIDENT INVOLVING ROYAL AIR FORCE

TORNADO GR1A ZG725

Date: 19 September 1994  
Parent Station: Royal Air Force, Marham  
Place of Accident: Capa Frasca, Sardinia  
Crew: Pilot & Navigator  
Casualties: 2 Major

### CIRCUMSTANCES

1. On the 19 September 1994, the crew of ZG725 was one of a pair of aircraft engaged in a weapons training sortie. The sortie progressed uneventfully until the lead aircraft positioned for its final attack. As the pilot of ZG725 rolled out behind the leader, the crew heard a loud bang from the rear of their aircraft. The pilot retarded the throttles and began to climb, noting that the left engine was winding down. Two minor engine-related captions on the Central Warning Panel (CWP) illuminated, followed by a warning of low oil pressure in the left engine. The pilot noted that the left engine reheat gauge was reading abnormally, before the left engine vibration warning illuminated. The navigator noticed that the left engine oil warning light had extinguished, but he had a warning of an over temperature of the turbine cooling air. The pilot closed the left engine High Pressure (HP) fuel cock and informed the formation leader that he had an engine problem

and needed a visual inspection.

2. As the crew of the lead aircraft approached, both saw a bright orange glow below the leading edge of the left taileron. They informed the crew of ZG725 that the aircraft was on fire and advised them to prepare to eject. The pilot of ZG725 completed the left engine fire drills, which included closing the Low Pressure (LP) fuel cock. Although the right engine fire button flashed momentarily, the only abnormal indication in the front cockpit was a caption indicating a reheat malfunction. The lead pilot reported that the aircraft was still on fire and the crew of ZG725 ejected successfully although both sustained injuries to the spine. The aircraft crashed into Oristano Bay to the north of Capa Frasca. Some of its remains were recovered subsequently for engineering investigation purposes.

#### DETERMINATION OF THE CAUSE

3. The Inquiry concluded that the accident was caused by the failure of the first stage stator vane in the left engine HP compressor which led to a titanium fire and a sustained rear fuselage fire. The titanium fire break-out also damaged the No 1 hydraulic system, releasing a spray of hydraulic fluid which, together with burning engine oil and accumulated standing fuel, continued to sustain the fire after the LP cock was closed. It was this hydraulic fire that attracted the attention of the lead crew.

4. Although the use of titanium in aircraft and engine manufacture has considerable design advantages, it can ignite at very high temperatures. A programme had been initiated to introduce a titanium fire containment modification into Tornado engines, although ZG725 had not yet been modified. This modification should have contained the titanium fire to the core of the engine. In exiting the engine carcass, the titanium fire also severed the fire warning and detection system wiring looms, which accounted for the lack of fire warning indications. The lack of left engine fire warning and the non-embodiment of the titanium fire containment

modification were contributory factors in the accident.

**SUBSEQUENT ACTIONS**

5. The Engineering Authority is evaluating the options for a modification to prevent stator vane failures. The planned titanium fire containment modification to the Tornado fleet will be accelerated to complete as soon as possible.