MILITARY AIRCRAFT ACCIDENT SUMMARY

AIRCRAFT ACCIDENT TO ROYAL AIR FORCE

HAWK XX197

Date:	13 May 1988
Parent Airfield:	RAF Brawdy
Place of Accident:	RAF Brawdy
Crew:	Two
Casualties:	One Major, One Minor

CIRCUMSTANCES

1. On 13 May 1988 an Engine Flight Test was to be carried out on Hawk XX197 following an engine change. Start up, taxi out and initial take-off appeared normal. The aircraft was flown off the runway at 120 kts and the undercarriage and flaps were selected up.

2. The undercarriage had just locked up and the speed was approxiamtely 180 kts when the Captain heard a grinding, shuddering noise from the engine. From the subsequent lack of engine noise and thrust he immediately diagnosed a catastrophic engine failure. The speed was at least 70 kts too slow to initiate a turn back to the runway so he ordered the rear seat pilot to eject. The rear seat pilott initiated command ejection and both crew members ejected successfully, although the Captain broke his leg on landing.

The aircraft remained airborne for a further 21 seconds before crashing 1300 metres beyond the airfield boundary.

CAUSE

3. Engine strip and examination revealed that the damage was confined to the area of the Low Pressure Turbine (LPT); approximately 40% of the LPT blades had broken. The tips of those blades still present showed signs of having rubbed against the locating segments which are fixed to the engine casing, and of suffering localized overheating. The Board therefore concluded that the primary cause of the accident was the catastrophic failure of the LPT.

4. The normal clearance between the LPT blades and the locating segments is small and only very limited axial movement is possible before they come into contact with each other. The contact in this engine was caused by a failure to allow sufficient clearance between the LPT blades and their fixed guide vanes. The incorrect clearance was caused by maladjustment during installation of the LPT resulting from an arithmetical error by the service tradesmen who assembled the engine. The vibration caused by the LPT blades rubbing against the locating segments was undetectable during static ground testing but the extra forces encountered during take-off increased the vibration and produced resonance which then caused the LPT blades to move forward in their mountings. This further aggravated the rubbing and caused contact between the blade roots and the rear inner lip of the guide vanes. These combined effects led to the total failure of the LPT.

SUBSEQUENT ACTION

5. Disciplinary action has been taken against the tradesmen involved. A review of the paperwork associated with critical engine build calculations has commenced with the intention of reducing the number and complexity of the calculations. A gauge has been manufactured to allow verification of dimensions at critical build stages.

CLAIMS

6. Two claims to a total value of £3126.34 have been settled in respect of this accident.