No: 3/92 **Ref: EW/C92/1/1** **Category: 4**

INCIDENT

Aircraft Type and Registration:	BAe 146-200, G-CHSR
No & Type of Engines:	4 Lycoming ALF 502-R5 turbofan engines
Year of Manufacture:	1987
Date & Time (UTC):	8 January 1992 at 0658 hrs
Location:	London Stansted Airport, Essex
Type of Flight:	Public Transport
Persons on Board:	Crew - 6 Passengers - 25
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	57 years
Commander's Flying Experience:	17,920 hours (of which 1,200 were on type)
Information Source:	AAIB Field Investigation

History of the Flight

The aircraft was taxiing for take-off on runway 23 at Stansted Airport on a scheduled service to Frankfurt, Germany. With 25 passengers and 27 kg of freight its weight and centre of gravity were within the prescribed limits for the flight. The two flight crew were well rested and qualified to undertake the flight. The weather at Stansted was overcast with a visibility of 15 km, temperature +10°C and a surface wind of 204°/16 kt. The runway surface was wet with good braking action.

The aircraft was cleared to holding point 'S' via 'taxiway 3 outer'. Approaching the left turn prior to hold 'S', ATC asked the crew if they were "READY FOR AN IMMEDIATE TAKE-OFF ?" The commander, who was the handling pilot, indicated that they would be ready and the tower confirmed "CLEARED FOR TAKE-OFF, SURFACE WIND 200°/10 KT, AIRCRAFT 4 MILES FINALS". The commander then asked for the line-up checks, advanced the throttles slightly to compensate for the up sloping taxiway and selected the Thrust Modulation System (TMS) ON, and the TAKE-OFF MODE. The first officer stated that at this point he heard the engines spool up slightly and saw that the

blue demand arrows on the TMS control panel were illuminated. Before turning onto the runway the first officer noted that the taxi speed had increased somewhat. Intending to execute a rolling take-off, the commander manoeuvred the aircraft to enter the runway at approximately 45°. He advised the first officer of the possible hazard of skidding on the runway threshold markings. The aircraft continued to accelerate during the turn and, with approximately 45° to go to runway heading and while straightening the aircraft, a juddering was felt, nose wheel steering effectiveness was lost and the aircraft slid towards the right hand edge of the runway. Although the commander eventually managed to straighten the aircraft the right main landing gear left the paved surface and sank into the soft grass. The throttles, which had not been advanced to the take-off position, were closed and the aircraft was brought to rest some 650 feet from the start of the runway.

The crew advised ATC, the cabin crew and passengers of the situation. The commander then shut down Nos 3 and 4 engines and exited the aircraft in order to inspect the landing gear. With no apparent damage and with the tyres resting in ruts only two inches deep the captain decided to restart the engines and attempt to taxi back onto the runway. However, the aircraft encountered further areas of soft grass making this attempt unsuccessful. All four engines were then shut down and the passengers and crew left the aircraft using the normal exits. The aircraft was later towed clear of the area and subsequent engineering investigation showed that, although the tyres and brake units had been contaminated with mud, there was no damage to the aircraft.

Flight Recorders

There was no record of events on the Cockpit Voice Recorder (CVR) as recordings made at the time were subsequently overwritten during the aircraft recovery phase.

The aircraft was fitted with a Plessey 1584 J1 Digital Flight Data Recorder (DFDR). Analysis of the data supported the crew's account of events. Recordings of the N1 settings for all four engines showed that, on average, power settings of between 50% and 54% N1 were used prior to the aircraft reaching hold 'S' and throughout the taxi onto the runway. The flight idle N1 setting during taxi is normally 26%. A maximum IAS of 62.8 kt and lateral acceleration of 0.436 'g' were recorded during the incident.

Thrust Modulation System

The TMS is capable of operating in several modes which generally correspond to specific flight regimes. The basic operating modes are: TO (Take-Off), MCT (Maximum Continuous Thrust), TGT (Turbine Gas Temperature), DESC (Descent) and SYNC (Engine Synchronisation).

The TMS exercises its control of engine power through a linear actuator that forms the last link in the cable between the power lever in the cockpit and the fuel control unit on the engine. Without the TMS this link would consist of a solid fixed length push-pull tube. In the TMS installation the push-pull tube is replaced by the actuator. A screw-jack permits the actuator to extend or retract in response to the commands from the Thrust Modulation Computer. The length of the stroke limits the system's control authority. Since the friction resistance of the teleflex cable to the power lever is much higher than that of the fuel control unit, the system will not back-drive the power lever. The power lever thus sets the central point about which the actuator will exercise its control. No power lever movement takes place as the actuator trims the fuel control unit.

The TO mode senses pressure altitude and outside air temperature to determine the correct take-off power setting. Power trim authority of the TMS is limited however by mechanical stops that restrict the range of extension or retraction. This movement equates to only about ½ inch either side of centre. With the TO mode selected, movement of the power levers above the flight idle position will signal the actuators to trim engine power to the take-off value. The actuators will be driven toward their extended position and will be fully extended in about 3.5 seconds. If the power levers have not been advanced to the take-off position by that time the blue arrow (advance power lever) engine annunciators will illuminate.

As a result of this incident the operator has issued an operational notice to pilots highlighting the effects of premature selection of TMS TO and specifying that this selection should only be made by the pilot in the right hand seat having first checked that the power levers are at idle.