

No: 4/92

Ref: EW/G92/01/13

Category: 1a

Aircraft Type and Registration: BAe 146-100, G-OJET

No & Type of Engines: 4 Lycoming ALF 502-R5 turbofan engines

Year of Manufacture: 1982

Date & Time (UTC): 31 January 1992 at 1958 hrs

Location: Ronaldsway Airport, Isle of Man

Type of Flight: Public Transport

Persons on Board: Crew - 5 Passengers - 80

Injuries: Crew - None Passengers - None

Nature of Damage: Damage to main gear door, flap, fairing, tyre, hydraulic system and electrical system

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age: 31 years

Commander's Flying Experience: 9,400 hours (of which 1,001 were on type)

Information Source: Aircraft Accident Report Form submitted by the pilot

The intended flight was to be from Ronaldsway to London Heathrow. At about 1858 hrs the take-off was commenced on runway 27 with 24° of flap at a take-off weight (TOW) of 35096 kg. The runway surface was dry and there was a surface wind of 220°/10 kt. At an indicated airspeed of about 95 to 100 kt, a light vibration was felt by both pilots and at about 102 kt the anti-skid caution on the master warning panel (MWP) illuminated. Near the V₁ (decision) speed of 105 kt the vibration increased markedly. The take-off was continued and during rotation and initial climb the 'flap fault', hydraulic and rudder valve MWP warnings illuminated. On selection of the landing gear to 'UP', the right main gear indicator showed 'RED' as did the gear selector handle light. The vibration reduced to a light airframe 'tremble', which persisted throughout the flight. Flap was selected to 18° and no further flap selections were made until the descent. The yellow hydraulic system high temperature annunciator illuminated for a few seconds and the yellow system quantity annunciator illuminated for about five minutes, but then extinguished. The aircraft was levelled at 5000 feet and took up an extended holding pattern to the east of the Island under the radar control of Ronaldsway ATC.

During the hold, the hydraulic system indications were: yellow system, 3000 psi and 1/8 quantity; green system, zero gauge pressure, full gauge contents, pressure and quantity annunciators on. The upper anti-skid fault light was on and the brake temperature indicator showed maximum overheat on

the inner right wheel. The normal and emergency (green system) checklists were completed. The commander decided to divert to Prestwick at Flight Level 70 and made a gradual descent from the TRN VOR, under Prestwick radar control, to position on a 10 nm final approach to runway 13.

During the descent, the emergency checklist was used and the landing gear extended and locked-down satisfactorily on the emergency system. Successive flap selections were made to full landing configuration. No handling difficulties were encountered. Landing weight was about 32000 kg with about 1200 kg of fuel on board. An uneventful landing made at 2125 hrs. Minimal braking was used and the aircraft was taxied clear of the runway using differential power. The engines were shut down on the taxiway.

Subsequent examination of the aircraft showed that the No. 3 (right inboard) tyre had burst and had damaged the electrical and hydraulic systems on the oleo leg, in addition to denting the gear door, the flap and inboard flap fairing. Tyre tread had been found on the runway at Ronaldsway. The tyre was sent to Dunlop for investigation. Most of the electrical looms on the oleo had been damaged, including the anti-skid wiring and the brake temperature wiring which had 'shorted-out', giving rise to the associated 'full-scale' indication. The landing gear uplock proximity switch wiring was also damaged. Many of the hydraulic pipes on the oleo had been damaged and some of this had caused the loss of the green hydraulic system contents. It was also established that the wiring to the green and yellow quantity gauges on the flight deck had been 'crossed' during earlier maintenance. During repairs, it was found that the hydraulic system power transfer unit (PTU) had failed, but this was considered a likely consequence of PTU operation with the green system contents gone.

The Dunlop investigation of the tyre showed that it was an 'issue one' tyre which had been remoulded twice. It had completed 487 landings since the last remould. 'Issue one' tyres have additional 'breaker' plies (*ie* extending between the tyre shoulders). Considerable 'looseness' between the plies had developed, initiating at the shoulders. This had occurred over a period of time and might have been exacerbated by the one-sided shoulder wear exhibited by the tyre. This wear was typical of tyres which had been fitted to those BAe 146 aircraft on which Dowty Rotol modification AC10358 had not been embodied, and G-OJET was such an aircraft. The Dowty modification, which was also the subject of BAe Service Bulletin 32-27-70088B, introduced a revised landing gear geometry to reduce uneven tyre wear. This modification is classified as 'Optional'. Dunlop also stated that there was a 'braking-flat' on the tyre and although it had shed its tread at Ronaldsway, it did not burst at that time but during the landing roll at Prestwick, and that this may have been due in part to the loss of anti-skid capability on the right landing gear.

Dunlop advise that all remaining 'issue one' tyres have been withdrawn from service as a precautionary measure and replaced by 'issue two' tyres, which are considered less susceptible to the effects of heavy shoulder wear.