**No: 8/92** **Ref: EW/C92/5/5** **Category: 1a**

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| **Aircraft Type and Registration:** | Fokker F28-4000, F-GDFD |
| **No & Type of Engines:** | 2 Rolls-Royce RB183-2 turbofan engines |
| **Year of Manufacture:** | 1979 |
| **Date & Time (UTC):** | 27 May 1992 at 1750 hrs |
| **Location:** | London Gatwick Airport |
| **Type of Flight:** | Public Transport |
| **Persons on Board:** | Crew - 5 Passengers - 62 |
| **Injuries:** | Crew - None Passengers - None |
| **Nature of Damage:** | None |
| **Commander's Licence:** | Airline Transport Pilot's Licence (France) |
| **Commander's Age:** | 43 years |
| **Commander's Flying Experience:** | Approximately 10,000 hours (of which 4,000 were on type) |
| **Information Source:** | AAIB Field Investigation |

## History of the flight

The aircraft landed at London Gatwick Airport at 1652 hrs after an uneventful 1 hour 20 min flight from Bordeaux, crewed by 2 pilots and 3 cabin staff. During the turnround, the aircraft was refuelled to 7000 kg of fuel, and 62 passengers were boarded for the return flight to Bordeaux. The aircraft left the stand at 1737 hrs and taxied for departure from runway 08R. The calculated take-off weight was 31027 kg, and the speeds calculated for an 11° flap take-off were V1/VR = 131 kt, and V2 = 136 kt. Longitudinal trim was in the centre of the allowable range at 19.9% MAC. At 1748 hrs, take-off progressed uneventfully until after rotation. As the aircraft left the ground, the stick shaker and audio warning began to operate. The Captain noted that the indicated angle of attack (alpha) at that time was around 6 or 7°. Retraction of the gear, and the selection of flaps up at 400 feet AGL, had no effect on the stick shaker or audio warning.

The Captain, who was the handling pilot, elected to make a right hand visual circuit at 1000 feet, to land back on runway 08R. The aircraft then made a short visual circuit, and landed at 1753 hrs using 42° Flap, with a VREF = 123 kt. The landing was normal, and the stick shaker and audio warning,

which had both been operating continuously since take-off, ceased on touchdown. The aircraft returned to the parking area, and the passengers deplaned normally. The emergency services had been alerted by ATC and were standing by to assist, but were not required.

The airport weather at the time of the incident was recorded by the flight crew as 065°/12 kt, CAVOK, temperature +21°C, QNH 1008 mb, QFE 1001 mb.

Several complaints from local residents concerning the flight path of the aircraft were received by the airport authority.

The aircraft checklists did not contain any procedure to be followed in the event of false activation of the stall warning system.

### Air Traffic Control

Replay of the Gatwick Tower frequency (124.225 MHz) tape recording indicated that the aircraft had been cleared for take-off at 1748 hrs. At 1749:30, having been asked by ATC to change to a London Control frequency, the pilot requested to turn downwind, stating that he had a problem and requested to land. ATC responded with a request to turn right onto a heading of 180° and maintain 2000 feet. The pilot replied by stating that he was turning right downwind. The controller then queried whether the aircraft could maintain altitude. The pilot replied in the affirmative, maintaining 1700 feet. ATC requested the aircraft to call Gatwick Radar on frequency 118.6 MHz. The pilot responded that he would do so. However, the aircraft remained on the Tower frequency, reporting on the downwind leg at 1000 feet one minute later. The previous frequency change instruction was then cancelled by ATC, and the pilot reported that he had the field in sight.

Another aircraft, a Boeing 737, was on short final approach to the runway at this time, and ATC queried whether the F28 had the landing traffic in sight, to which no reply was forthcoming. Meanwhile, the B737 was given landing clearance, and ATC again queried whether the F28 had the runway in sight. This time, the pilot replied that he had the runway and the landing traffic in sight. He was then asked by ATC what was the nature of the problem. The pilot replied, hesitantly in english, that he had "the shaker,....the stick shaker". He was then asked to confirm that he had "3 greens" (Landing Gear down and locked indication). Initially, the pilot replied in the negative, but followed this by saying that he had "5 greens". By this time, the B737 had vacated the runway, and the F28 was cleared to land.

## Radar Data

To establish the aircraft's flight path, a replay was made of the secondary radar data recording from the Pease Pottage radar station, south of Gatwick. The data was plotted on a large scale Ordnance Survey map of the Gatwick area, and annotated with the mode C altitude data for each return. Mode C altitude data resolution is to the nearest 100 feet increment.

This showed that the aircraft had initially climbed on runway heading to 1700 feet above runway threshold elevation (195 feet AMSL), before commencing a continuous descending right turn onto the downwind leg. The aircraft levelled off at approximately 700 feet above threshold elevation on the downwind leg (an indication of 900 feet on the aircraft's altimeters when set to airfield QNH value), a significant proportion of this leg being flown over Crawley town. A continuous turn onto final approach was then made, again descending, until rolling out onto a final approach just under 1 nm from the runway threshold, indicating at 200 feet above threshold elevation at that time.

## Flight Recorder Data

The Flight Data Recorder was a Sundstrand Digital Flight Data Recorder with 23 analogue parameters and 12 discretes. A satisfactory replay was obtained using AAIB replay facilities.

After take-off the aircraft climbed initially to 1900 feet Radio Altitude (RA). The maximum angle of attack recorded was around 9° just after take-off, reducing to about 3° during the climbout. At 1600 feet RA and 200 kt IAS the aircraft began a right turn with 30° bank, which continued onto a downwind heading of 270° M. The aircraft descended on the downwind leg to a minimum height of 550 feet RA, then climbed slightly to around 700 feet RA before making a continuous right turn with up to 35° bank, rolling out on the runway heading 080° M at 180 feet RA and 161 kt IAS. Landing Flap was achieved at 110 feet RA, and the final approach speed reduced to 131 kt IAS at touchdown.

The Cockpit Voice Recorder was not replayed, as power had remained on the aircraft for longer than the 30 minute duration of the tape loop.

## Engineering Aspects

The stall protection system, which is duplicated in all essentials, provides a continuous indication of angle of attack together with warnings in various forms of the approach of a stall condition. The warnings include activation of stick shakers and audio signals, the angle of attack at which the warnings are activated being a function of angle of attack and rate of change of angle of attack. The

main component of the system is the stall protection computer. The angle of attack information is supplied by two vane-type transducers located of each side of the forward fuselage and the angle of attack indicator is fed with information directly from these vanes. Examination of the aircraft found that the right-hand stall protection circuit within the stall protection computer had failed.

There is a stall protection system test facility in the cockpit which independently tests the left and right systems. The test is only required to be carried out before the first flight of each day, and on the day of the incident this test indicated that the system was serviceable. The incident flight was the sixth flight for the aircraft on that day, so no test of the stall protection system was required to be carried out prior to departure.