Boeing 707-351C, 5X-JET

AAIB Bulletin No: 6/99 Ref: EW/G99/01/03 Category: 1.1

Aircraft Type and Registration:	Boeing 707-351C, 5X-JET
No & Type of Engines:	4 Pratt & Whitney JT3D-3B turbofan engines
Year of Manufacture:	1966
Date & Time (UTC):	4 January 1999 at 2235 hrs
Location:	London Gatwick Airport
Type of Flight:	Public Transport (Cargo) Positioning
Persons on Board:	Crew - 4 - Passengers - 2
Injuries:	Crew - None - Passengers - None
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence (Uganda)
Commander's Age:	45 years
Commander's Flying Experience:	19,000 hours (of which 12,000 were on type)
	Last 90 days - N/K
	Last 28 days - N/K
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by AAIB

The aircraft was operating a positioning flight from Lagos (Nigeria) to Manston (Kent International Airport), in order for some maintenance work to be carried out, which included the fitment of an Airborne Collision Avoidance System. The aircraft initially took off from Lagos at 1245 hrs but the landing gear would not retract normally. The commander elected to re-land at Lagos in order to rectify the problem and the aircraft landed at 1312 hrs. It was determined that the problem was caused by the right main landing gear truck levelling deboost valve lever, which was outside its normal operating range. The flight engineer attempted to rectify the fault in conjunction with the company's maintenance agency, although no entries relating to this problem were made in the aircraft's Technical Log prior to the incident flight.

The aircraft departed from Lagos again at 1552 hrs. On this occasion, the crew reported that the landing gear retracted with the exception of the right main landing gear, which remained down.

The commander commented that he had departed with a total of 120,000 lbs of fuel in case such an event occurred. This figure was well in excess of the minimum total fuel requirement indicated on

the flight's computerised flight plan/flight log. The flight plan (which had been prepared for another similar aircraft in the fleet, registration 5N-ARQ, but without allowance for a flight with any landing gear down) indicated that the planned cruise True Air Speed was between 465 kt and 446 kt at Flight Levels 390 and 370 for the route. The trip distance was 2,733 nm and the estimated elapsed time en route was 6 hours 22 minutes. London Gatwick Airport was shown as the landing alternate. The total flight plan fuel requirement, which included a 30 minute holding contingency and 25 minutes of reserve fuel, was 79,912 lb, giving a total fuel endurance of 7 hours 38 minutes.

The aircraft proceeded along the flight planned route initially. After one hour of flight, the aircraft was some 13 minutes behind the planned flight progress. This increased progressively until the aircraft was some 28 minutes behind planned progress after three hours flight time, and this delay was then maintained until landing.

From the flight log, the aircraft passed over Valencia (VLC) VOR (Spain) at 2057 hrs, the crew noting that the total fuel remaining at that time was 28,000 lbs (the flight plan requirement at that stage was 27,800 lbs). This was the last fuel check recorded by the crew on the flight log.

The flight plan route entered French airspace along UN863 from ANETO-BARBA-Agen (AGN) VOR. The aircraft passed ANETO at 2123 hrs UTC at FL310. It was then requested by ATC to route towards Cognac (CGC) VOR, instead of its original flight plan route of AGN-UN856-PEROT-UN858-BAMES-UB191-Abbeville (ABB) VOR. The aircraft was thus taken on a slightly more westerly route than originally planned. After passing CGC VOR, the aircraft was routed direct to BARLU reporting point near Cherbourg on the north coast of France.

At 2213 hrs, the crew called Brest Radar Control and requested a diversion to London Gatwick for operational reasons. When queried about the reason, the crew reported that the aircraft was running short of fuel and the most direct route to Gatwick was requested. At 2218 hrs, while still tracking north towards BARLU, the crew queried whether there was any airport close by that was available for landing. The controller responded by transferring the aircraft to the London Control frequency of 135.05 MHz.

On initial contact with London Control at 2220 hrs, the aircraft was given a direct routing from BARLU to Mayfield (MAY) VOR for landing at Gatwick. The crew requested a priority landing due to a low fuel state. The controller enquired as to whether the crew was declaring an emergency, to which the response was the declaration of a MAYDAY. The crew informed the controller that the aircraft was operating a ferry flight with the landing gear down all the way. At 2222 hrs, the crew was requested to activate transponder squawk 7700 and was informed that the distance from London Gatwick was 107 nm. At 2226 hrs, in response to a request from ATC, the crew indicated that the fuel endurance remaining was 15 minutes. The aircraft was put onto a discrete frequency for priority ATC handling throughout the intermediate and final approach phases.

The weather at London Gatwick at the time was surface wind from 190° at 7 kt, visibility 7,000 metres in rain, scattered cloud base 400 feet, broken cloudbase 500 feet, temperature +10°C, QNH 1011 mb. The runway in use was Runway 26L, but ATC elected to offer the aircraft a straight in approach to Runway 08R in order to minimise the track distance to touchdown. The upper wind at 2,000 feet was from 230° at 43 kt and this information was passed to the crew. The aircraft was given radar vectoring towards the ILS for Runway 08R and progressive continuous descent clearance. Landing clearance was passed at 2238 hrs with the current surface wind of 180° at 8 kt.

The aircraft was turned onto final approach at about 6 nm from touchdown but drifted through to the north of the approach centreline. Advisory descent altitudes (based on the SRA procedure) were passed as the aircraft continued towards the runway. The Tower controller reported that the Approach (deviation) Monitoring Alarm system was triggered as the aircraft passed about 2.5 nm from touchdown, but the controller had visual contact with the aircraft. At 2242 hrs, on passing 2 nm from touchdown at about 850 feet, the crew reported that the runway was in sight. A normal landing followed at 2243 hrs and the aircraft was transferred from Approach to Tower Control. The aircraft was externally inspected by the Airport Fire Service before transfer to Ground Control for taxi to parking stand C7.

The actual elapsed flight time was 6 hours 50 minutes. After landing, the arrival fuel quantity entered in the aircraft's Technical Log was 4,400 lbs. The following items were amongst those entered as defects in the Technical Log for this sector:

> *'Gear/Door Red Warning Light on after TO indicating gear/door not locked up (with the gear lever up)'*
>
> *'Fuel quantity gauge No 4 (the system) u/s'*
>
> *'The FMS overheat usually after 4 hrs flight'*

The engine monitoring log, completed by the crew during the flight at 270 kt IAS, Mach 0.7, FL290, aircraft weight 206,000 lbs (corresponding to a time of approximately 1720 hrs, some 1.5 hours after departure) indicated that the total fuel flow was 16,600 lbs per hour.

The Departure Fuel shown for this sector in the Technical Log indicated a total quantity as entered by the crew of 119,600 lbs. The aircraft's Load Sheet indicated that the departure Ramp Fuel quantity was 120,000 lbs, and Take-off Fuel 119,000 lbs. AAIB calculations (by adding the individual tank quantities entered in the Technical Log) gave a total Departure Fuel of 117,900 lbs.

The commander's report indicated that after 305 minutes flying time (2057 hrs UTC), the aircraft progress was 29 minutes behind planned progress but there was over 10,000 lbs fuel advantage. Figure 1 shows the planned fuel consumption plotted against distance to landing, compared with that actually achieved as recorded by the crew on the flight log. It is apparent that as the aircraft passed Valencia VOR at 2057 hrs (with some 730 nm to destination), the excess fuel had already been consumed and that the remaining portion of the flight with the landing gear down would continue with a greater fuel flow than had been planned.

As a result of their own review of the incident the operator has made several changes to their procedures.