No: 12/92 **Ref: EW/G92/09/26** **Category: 1a**

Aircraft Type and Registration:	Boeing 737-3YO, G-MONM
No & Type of Engines:	2 CFM 56-3-B1 turbofan engines
Year of Manufacture:	1988
Date & Time (UTC):	22 September 1992 at 0735 hrs
Location:	Luton Airport, Bedfordshire
Type of Flight:	Public Transport
Persons on Board:	Crew - 7 Passengers - 145
Injuries:	Crew - None Passengers - None
Nature of Damage:	Severe damage to right stabilizer leading edge, underside, and right elevator
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	59 years
Commander's Flying Experience:	17,950 hours (of which 5,364 were on type) Last 90 days - 149 hours Last 28 days - 30 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, and telephone enquiries by AAIB

The aircraft was operating a scheduled service from Luton to Alicante. It pushed back from stand four at 0726 hours, and subsequently taxied for departure from Runway 26, entering the Runway at the central intersection 'C' to backtrack. The aircraft entered the turning circle at the Runway 26 threshold, made a 180° right turn to line up, and made a Flap 5°, full thrust, rolling take-off at 0735 hours. The first officer was the handling pilot, and nothing untoward was noticed by the aircraft's crew during the departure. The aircraft was transferred from the Luton ATC frequency to London ATCC as normal, and continued the flight to Alicante uneventfully.

At 0801 hours, the next aircraft awaiting departure reported that a significant number of paving blocks were displaced from the turning circle at the threshold of Runway 26 (Figure 1). Inspection by the airport operations vehicles revealed that some 130 square metres of paving blocks had become displaced. As no previous departing aircraft had reported the damage to the surface, ATC considered that the aircraft most likely to be involved was the previous departure, G-MONM. London ATCC were asked to pass a message to the aircraft to contact the airline urgently.

By this time, the aircraft was over France, under French ATC control. The message to contact the company finally got through to the aircraft while over the Bordeaux region, approximately one hour after its departure. The commander made contact with the company by HF radio, but at this time the operations department were not aware of the problem at Luton. A short time later, company operations received the information, and attempted to re-contact the aircraft through the HF SELCAL system. This was unsuccessful.

The damage to the aircraft (Figure 2) was observed by the crew during the turn-round inspection at Alicante, and the return flight was abandoned. The company were informed and, after consultation with the manufacturer, a working party was dispatched to make temporary repairs to the aircraft prior to its empty ferry flight back to the UK. The right hand stabilizer assembly and elevator were replaced after its return.

The damage consisted of some 18 holes in the underside skin of the right stabilizer, the largest measuring some 18 inches by 6 inches, and most having bent and jagged edges. Some damage to the internal rib structure was also apparent. The leading edge was dented, with a large hole below. The right elevator had several smaller holes in its skin.

The turning circle at each end of the Runway at Luton is currently surfaced with a pattern of Marshall concrete paver blocks, each of dimension 100 by 200 mm, 80 mm thick, weighing 185 kg/square metre. These are laid on a sand bedding, the inter-brick gaps being filled with Paveseal compound. Apart from the weight of the bricks, their close proximity and sealing, there is no adhesive medium to keep the bricks in contact with the sand bedding. In addition, inspection of the sand layer after the event revealed it to be saturated with water, some 25mm of rain having fallen in the area on 17/18 September. Some areas of Paveseal jointing degradation were also apparent. Temporary repairs to the damaged area were carried out to enable operations to continue, and frequent inspections of the surface were carried out, especially after departures of Boeing 737-300/400 aircraft.

A firm of consultant civil engineers was commissioned by the airport authority to investigate the damage to the surface, and produce recommendations for the avoidance of a recurrence. This report concluded that the *"most likely mode of failure of the pavement is that an area of low pressure, created immediately aft of the engine exhaust nozzle by the entrainment of free air by the jet blast stream, was of sufficiently low value to cause the pavement to lift, probably in a blister-like shape."*

As a result of the report, the airport authority requested the CAA to issue a NOTAM. This came into effect on 7 October 1992, announcing a temporary operational restriction on the use of the Runway turning circles, stating that they should be used only for aircraft manoeuvring at low engine power. Jet

aircraft with low slung engines are prohibited from commencing their take-off run from within the 85 metre turning circles. This NOTAM is valid until 31 December 1992, by which time the airport authority expects that contractors will have completely resurfaced the turning circles with Marshall Asphalt, after removing all the paver blocks and sand.

The CAA are also aware that several other airports around the UK have paved manoeuvring area surfaces of similar construction, and have written to each airport operator concerned informing them of the situation at Luton, and the requirement to inspect the surfaces frequently. They will also offer advice to airport operators on the use of such surfaces in future construction of manoeuvring areas.

FIG 1. DAMAGE TO THE RUNWAY THRESHOLD TURNING CIRCLE

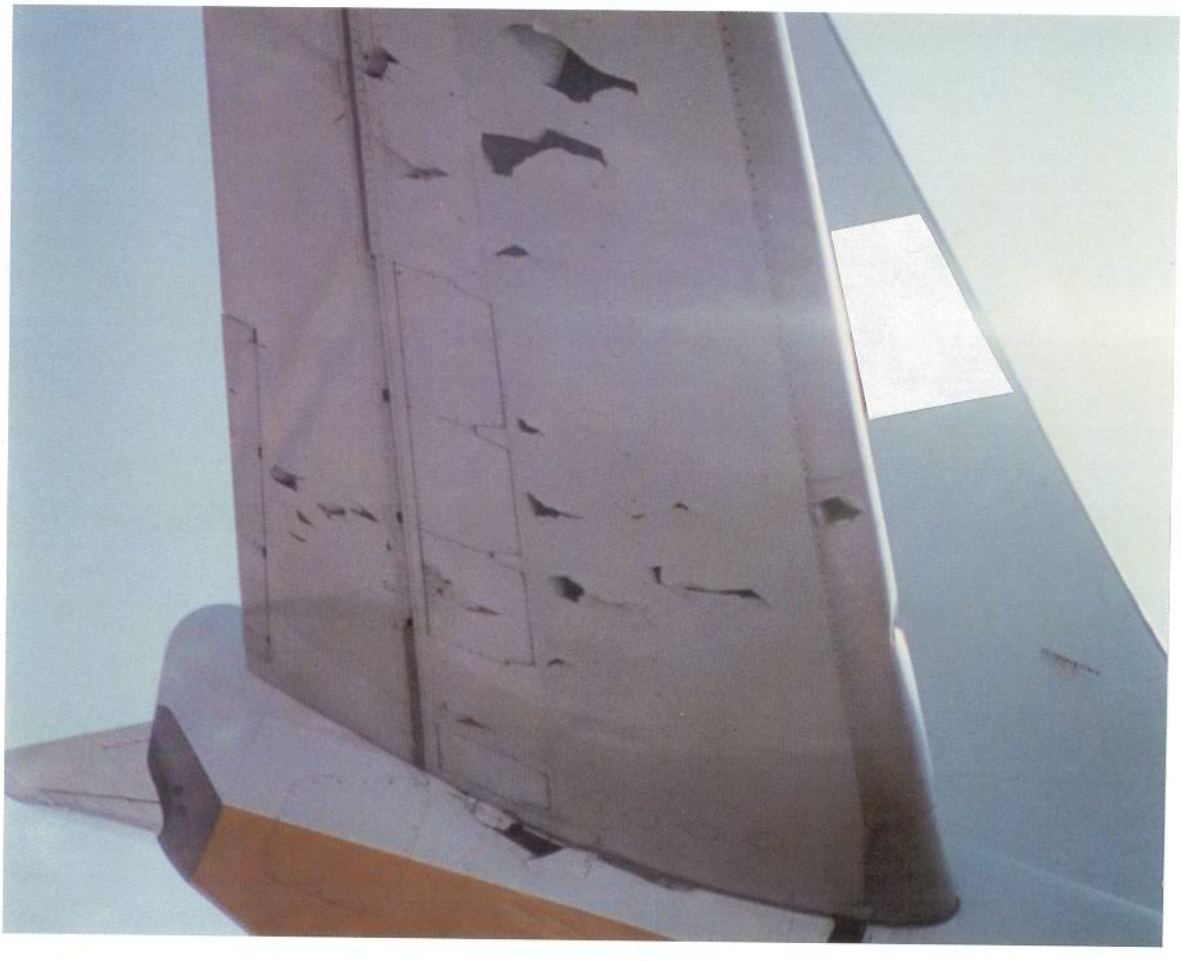

FIG 2. DAMAGE TO THE RIGHT STABILIZER AND ELEVATOR