No: 11/92 **Ref: EW/G92/06/17** **Category: 1a**

Aircraft Type and Registration:	Boeing 737-42C, G-UKLF
No & Type of Engines:	2 CFM 56-3-C1 turbofan engines
Year of Manufacture:	1991
Date & Time (UTC):	22 June 1992 at 0610 hours
Location:	Manchester International Airport
Type of Flight:	Public Transport
Persons on Board:	Crew - 7 Passengers - 101
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to trailing edge flaps, wing/fuselage fairing and landing gear downlock link
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	40 years
Commander's Flying Experience:	8,663 hours (of which 2,420 were on type) Last 90 days - 173 hours Last 28 days - 83 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

G-UKLF was a higher gross-weight variant of the Boeing 737-400 series of aircraft with modifications, including larger tyres, which enable it to operate at gross weights up to 150,000 lb compared with the standard 143,500 lb.

The aircraft was took off from runway 24 at Manchester with a wind direction and speed of 280°/04 kt and a temperature of +14°. Shortly after rotation the crew felt a rumble through the airframe and passengers and cabin crew also reported sensing vibration from the left side of the aircraft during the take-off roll. Manchester ATC reported tyre debris on the runway and the crew decided to burn off excess fuel and return. The subsequent landing, in normal configuration and using minimum braking, was uneventful and the aircraft turned-off the runway to be met by the emergency services. The passengers disembarked by the forward steps and the aircraft was towed to a stand. Upon inspection substantial damage to the trailing-edge flaps was found, as well as dents in the wing/fuselage fairing and the landing gear downlock link was bent. It was evident that further tyre debris had been shed during the landing roll and further pieces were recovered from the runway. The tyre carcass remained on the wheel in a deflated condition and the debris was identified as the remains of the tread.

The wheel and tyre were despatched to the tyre manufacturer for examination. The tyre itself was Part Number DR24822/T and was on its fourth retread life (R4). Upon receipt it was found to be leaking air, but it was not immediately clear where from. It was only when the tyre was sectioned that it was found to emanate from the carcass itself. Two casing plies near the inner liner had fractured and chafed over a small length and progressively chafed adjacent plies until contact was made with the inner liner, which contained the inflation gas. The subsequent splitting of the liner would have allowed the gas to rapidly escape into the casing at a rate well above the capacity of the awl vents (which allow normal leakage to escape from the casing). The consequent change in structural integrity of the tyre allowed part of the tread to shed during take-off and the remainder was stripped during the subsequent landing with a deflated tyre stripped the remainder.

As soon as this failure mechanism was discovered, the manufacturer withdrew all DR24822/T R3 and R4 tyres from service for examination, R4 being the highest remould level achieved on this tyre. Of the 12 tyres involved, incipient looseness was found in one R3 and three R4, all from the same operator as G-UKLF. It was felt that the reason for this may be that the nature of their operation probably involved frequent operation at high gross weights, in high ambient temperatures and with quick turn-rounds and consequent heat build-up.

The tyre manufacturer has announced its intention to introduce a new tyre, P.No. DR24824/T, with a new manufacturing process and tread pattern to alleviate the fatigue stresses which led to the failure on G-UKLF. All tyres to the previous part number remained restricted to R2.