No: 12/83 Ref: EW/C843

Aircraft type and registration:	McDonnell Douglas DC 10–30 G–BEBL (Multi-jet public transport aircraft)
Year of manufacture:	1976
Date and time (GMT):	18 August 1983 at 1215 hrs
Location:	London (Gatwick) Airport
Type of flight:	Public Transport
Persons on board:	Crew – 14 Passengers – 204
Injuries:	Crew – Nil Passengers – Nil
Nature of damage:	Major damage to No 1 engine and minor heat damage to left wing and flaps
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	50 years
Commander's total flying experience:	16,250 hours (approximately 1,200 of which were on type)

The aircraft lined up for take-off on runway 26. As power was increased for take-off, the air traffic ground movement controller saw a torching flame approximately 50 feet long behind the No 1 engine and pressed the crash alarm. At about the same time, the engine failure warning illuminated in the cockpit. The crew abandoned the take-off, bringing the aircraft to rest some 600 metres from the start of the take-off roll, and shut down the No 1 engine. The tower controller, on hearing the crash alarm, immediately passed overshoot instructions to landing aircraft. On reaching the aircraft, the airfield fire service reported to the Commander that there were no external signs of fire. The aircraft, attended by fire vehicles, then taxied back to the ramp where the passengers disembarked normally. The fire crew inspected the runway and extinguished two small grass fires that had been ignited by debris from the failed engine.

Examination of the aircraft showed that there was a large area of the underside of the left wing that was heavily sooted and some areas that had been heat affected and distorted. Detailed examination revealed that no structural damage had occurred.

The engine was removed and transported to an approved overhaul agency for a strip inspection.

The strip examination revealed that a retainer ring, part number 3245–030 had become meshed between the main driving gear and the variable stator vanes (VSV) pilot valve gear within the main engine control (MEC). The result was a seizure of the main drive into the MEC, causing the drive shaft between the engine driven fuel pump and the MEC to break in rotational shear. This resulted in the loss of the N_2 input to the MEC. The MEC sensed the loss of the N_2 input and scheduled additional fuel flow to the engine. The VSV pilot valve seized in the VSV CLOSE position causing the VSV's to go to their fully closed position. With the closing of the VSV's the high pressure (HP) compressor oversped and cooling air to the HP turbine was drastically reduced. This loss of cooling air, coupled with the increased fuel flow, resulted in the burning out of the HP turbine area of the engine. In addition, during the strip examination of the MEC, numerous fragments of gear teeth and a laminated shim washer, part number 3003–089, were found lying loose within the unit. The laminated shim washer was undamaged circumferentially. Examination of the unit showed that the retainer ring and laminated shim washer were missing from their correct location on the governor drive shaft, part number 3024–536. The retainer ring, when in its correct position, is located above a ring retaining, part number 218686, which is also called an Eaton ring. The Eaton ring is normally located in a circumferential groove on a splined area of the governor drive shaft. During the strip

examination the Eaton ring was found on the governor drive shaft, but not located in its groove. Examination of the governor drive shaft found it to be intact, indicating that the retainer ring and laminated shim washer had not become free from the shaft during service. The only way that these items could have become free from the drive shaft was by removal of the shaft. The only time the governor drive shaft is removed is during manufacture or overhaul. This MEC had not been overhauled since manufacture. Evidence was seen to indicate that at some time the items had been correctly installed while the MEC was in service.

During the examination of this unit it was demonstrated that it was possible to withdraw accidentally the governor drive shaft sufficiently to allow the retainer ring and laminated shim washer to become free from the drive shaft. This accidental withdrawl of the governor drive shaft can occur during the check on the shaft bearing end play. A check on the governor drive shaft bearing end play was carried out in June 1982 and again in June 1983.

It is understood that the MEC manufacturer is amending the maintenance/overhaul procedures with the aim of reducing the likelihood of a similar occurence in the future.

They will also issue a warning to operators and maintenance organisations of the dangers of withdrawing the governor drive shaft.