

No: 12/90

Ref: EW/G90/07/37

Category: 1a

Aircraft Type and Registration: McDonnell Douglas DC-9-32, G-PKBM

No & Type of Engines: 2 Pratt & Whitney JT8D-15 turbofan engines

Year of Manufacture: 1974

Date and Time (UTC): 9 July 1990 at approximately 1505 hrs

Location: Over Stockton-on-Tees, Cleveland

Type of Flight: Public Transport

Persons on Board: Crew - 2 Passengers - (Not reported)

Injuries: Crew - None Passengers - None

Nature of Damage: Left outer landing gear door detached; minor damage to left main flap

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age: 40 years

Commander's Total Flying Experience: 4,509 hours (of which 1,669 were on type)

Information Source: Aircraft Accident Report Form submitted by the pilot

Circumstances

The aircraft was climbing through FL130 en route from London Heathrow to Teesside when, in the area of Brookmans Park, a slight vibration was noticed as the aircraft accelerated through 260 kt. No abnormal indications were observed on the flight deck other than vibration through the rudder pedals. The speed was increased to 280 kt, with no increase in the vibration level. A lower flight level than that planned was sought and obtained. After levelling-off at FL260 the speed was reduced to 250 kt. A moderate level of vibration was momentarily experienced during this deceleration. A direct route to Teesside was obtained and the vibration subsequently diminished during the remainder of the flight. The crew had discussed the possibility of a landing gear problem and decided to lower the gear a little earlier than normal. Light to moderate turbulence was experienced below 2500ft due to the gusty conditions. ATC were requested to visually inspect the aircraft during final approach and they reported that everything appeared normal. After an uneventful landing, it was found that the left outer landing gear door was missing. Later, the door was found in Stockton-on-Tees where it had struck three houses and damaged a motor car.

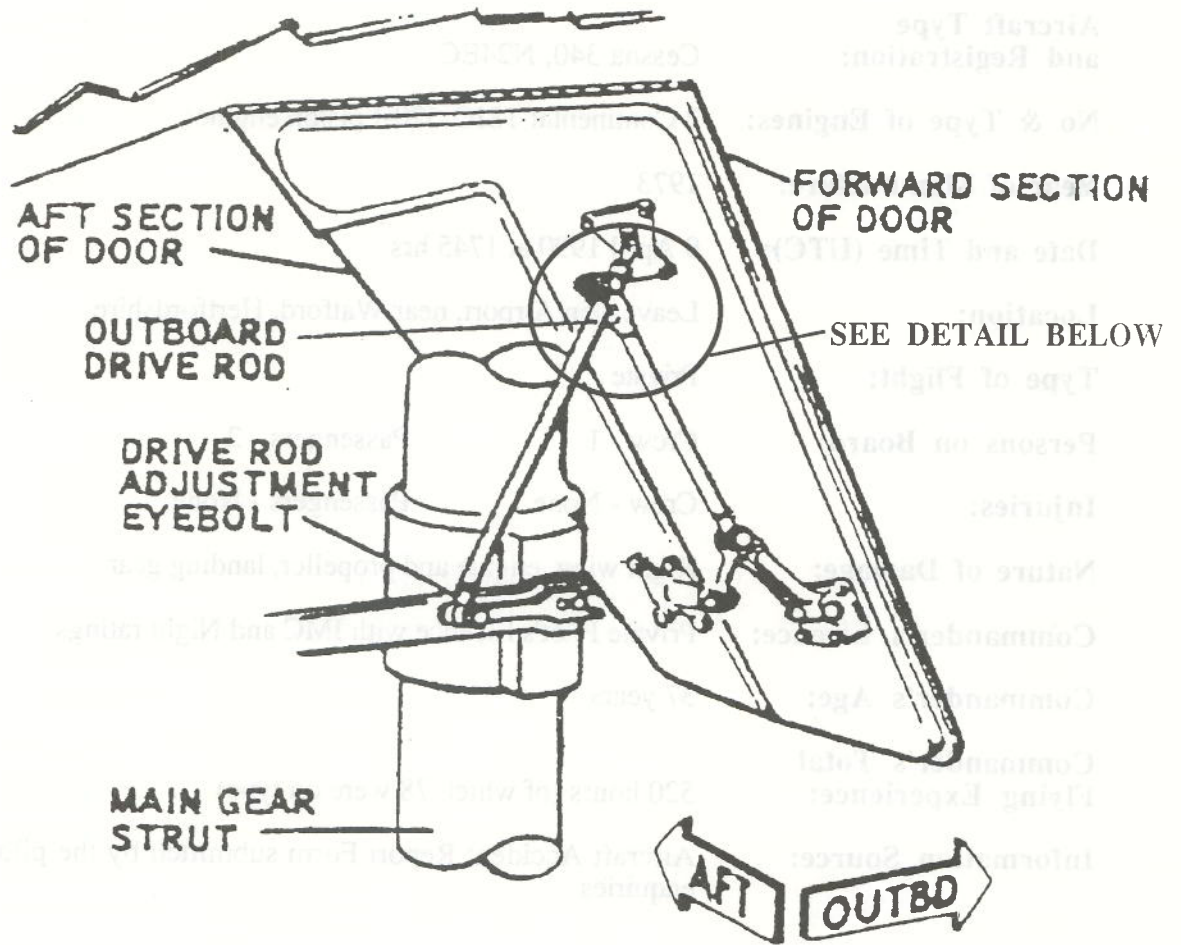
Examination of the aircraft

Inspection revealed that the main landing gear outboard door drive rod had become detached from the eye end fitting, but the latter had remained attached to the door assembly (see Figure). The securing nut and bolt that attached the end fitting to the rod was not found. Thus either the bolt had failed or the nut had come undone, allowing the bolt to fall out. The door had then failed its hinge attachment and separated from the aircraft striking the left main flap as it fell away, causing a dent and puncturing the skin.

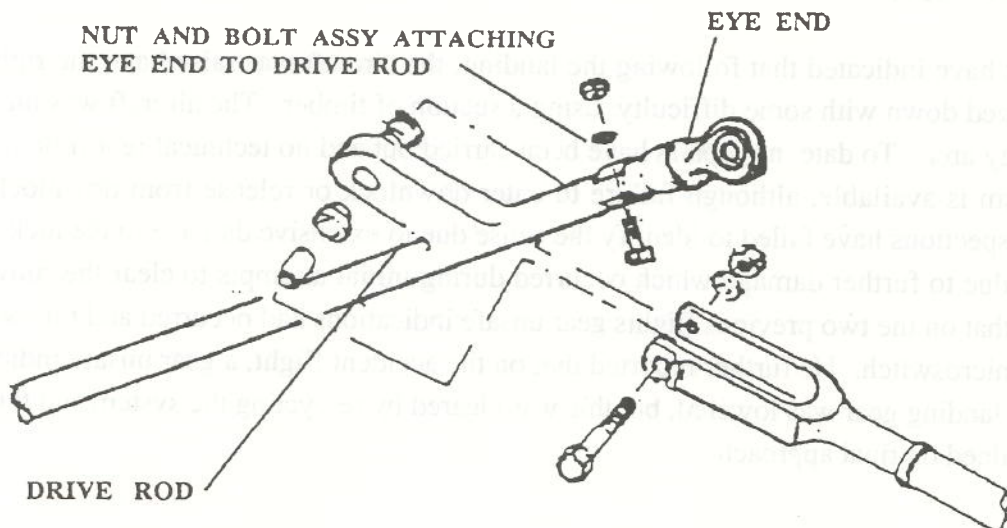
A more detailed examination revealed little evidence of lubrication on either the left or right landing gear linkages. However, there was no indication that lack of lubrication or linkage seizure had caused the problem. Furthermore, it was observed that there was no elongation of the mating holes on the drive rod or eye-end fitting, suggesting that no excessive load had been applied to the drive rod.

A fleet inspection of main landing gear door linkages revealed that differing types of bolt secured the eye-end fitting to the drive rod and that the orientation of the bolt also varied between aircraft. The correct orientation was 'head-down' in order to reduce the possibility of interference with the door fitting. It was then found that the Illustrated Parts Catalogue and the Overhaul Manual called up different bolt types. The advice of the aircraft manufacturer was therefore sought. Their response was that the correct configuration was an NAS 1404-12 pan-headed bolt installed head-down, although different bolts, albeit of the same strength, had been used on earlier installations. However, the same retaining nut, an NAS 679A4 locknut, was used regardless of the type of bolt. This was also the only joint on the door assembly which did not employ a castellated nut and split pin.

The aircraft manufacturer further stated that there had been 18 cases of the subject door becoming detached in flight, with the horizontal stabilizer having suffered severe damage in one instance. However only one, or possibly two, cases were ascribed to loose or mis-rigged linkages. The manufacturer plans to issue an Alert Service Bulletin (No. A32-244) calling for an inspection for cracks, corrosion and general security of these linkages. The FAA is considering mandatory action on this subject in the near future.



GEAR EXTENDED



DC9 MAIN LANDING GEAR DOOR ASSY DETAIL