AAIB Bulletin No: 1/2003 **Ref: EW/A2001/6/10** **Category: 1.1**

Aircraft Type and Registration:	Lockheed L188C, G-FIZU
No & Type of Engines:	4 Allison 501-D13 turboprop engines
Year of Manufacture:	1960
Date & Time (UTC):	7 June 2001 at 1715 hrs
Location:	Approximately 10 nm south of Rennes, France
Type of Flight:	Public Transport
Persons on Board:	Crew - 4 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Crew Emergency Exit Door missing and hinge mechanism damaged
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	43 years
Commander's Flying Experience:	5,525 hours (of which 1,300 were on type) Last 90 days - 98 hours Last 28 days - 27 hours
Information Source:	AAIB Field Investigation

History of flight

The aircraft was climbing out of Rennes, bound for Bordeaux, with all visual and audible flight deck indications normal when, upon passing FL40, a loud bang was heard. The aircraft shook violently and depressurised. The commander immediately initiated a return to the departure airfield and, suspecting that the aircraft may have sustained structural damage, transmitted a MAYDAY call. After carrying out all relevant emergency checks an uneventful ILS approach was made back into Rennes and the aircraft landed safely. Examination of the aircraft at Rennes showed that the Crew Emergency Exit Door (CEED) was missing.

Although this event occurred within French airspace, it was agreed with the French authorities that the investigation would be conducted by the AAIB. The aircraft was not examined by the AAIB in France, only upon its return to the UK after repair.

Crew emergency exit door description

This aircraft, along with many others, was converted from the passenger to freighter role in accordance with a Supplemental Type Certificate (STC), issued by the aircraft manufacturer, and approved by the FAA. The CEED is a small door, approximately 2 feet x 6 feet in size, located within the Forward Freight Door, photograph 1. It is hinged along its top edge and opens outwards. The door is held in the closed position by two latches. Two manually operated Latch Handles which, when pushed down, each cause a claw mechanism to grab an airframe mounted spigot. These claws are in turn locked by the operation of a Door Lock/Hook Tensioning Handle. When this handle is placed in the LOCKED/CLOSED position a mechanism within the door draws the tops of the Latch Handles into the bottom of the door structure, which both draws the door tight shut and physically prevents the latches from opening, photographs 2 & 3.

In the cockpit there is a red DOOR UNSAFE warning light on the Master Warning Panel which illuminates when an unsafe condition is detected on any of the fuselage doors. A CEED unsafe condition is detected by a micro-switch mounted in the bottom edge of the door. This micro-switch operates when the bottom of the door is flush with the lower horizontal section of the door frame and this signals a 'door safe' indication to the crew, photographs 2 & 3. It is possible on loose fitting or doors with worn seals for the CEED to be closed, but not locked, and the door unsafe micro-switch operated to extinguish the DOOR UNSAFE indication. There are no micro-switches associated with the Latch Handles or the Door Lock/Hook Tensioning Handle. This could lead to the door apparently being safe, but not locked. It is possible that loading/ground crews may use this door for access to, or egress from, the aircraft without the knowledge of the flight crew.

Examination of the aircraft

The CEED from G-FIZU was not recovered. Minor repairs were carried out and a replacement emergency exit door was fitted to the aircraft before it could be flown from Rennes back to the UK. Examination of the aircraft by the AAIB, and conversations with the UK maintenance organisation which carried out the repairs, indicated that the only airframe damage was to the door forward hinge. There was no damage to the airframe mounted spigots with which the Latch Handle claws engage.

On the door which departed the aircraft, it was reported that there were no placards or markings on either the Door Lock/Hook Tensioning Handle or the door itself, to indicate the LOCK/CLOSED and UNLOCK/OPEN positions of the handle. A similar door is shown in photograph 2.

Examination of the aircraft's technical log showed no entries relating to the DOOR UNSAFE warning system and none had been reported to the ground staff at the aircraft's UK operating base.

Other information

The flight crew of the accident aircraft were operating an aircraft that was on loan from another UK company whilst the aircraft they normally operated was in maintenance. The aircraft that the crew normally operated had been converted from a passenger to a freighter aircraft in accordance with an STC that had been approved by the FAA, but which had been issued by an organisation other than the aircraft manufacturer. The DOOR UNSAFE indication system on this aircraft was significantly different to that of the accident aircraft, in that the latch handle/claw/spigot arrangement was not employed. On the crews' normal aircraft, a Door Lock Handle, which rotates through 90°, extends two 'shoot' bolts into receptacles in the door frame. A micro-switch, also mounted in the door frame, is operated when one of the shoot bolts becomes fully extended and this removes the DOOR UNSAFE signal from the door. In addition, this Door Lock Handle is clearly marked to indicate the door LOCKED/CLOSED and UNLOCKED/OPEN positions, photograph 4.

Action taken by the operator and maintenance organisation

Since this accident, the aircraft operator and maintenance organisation has taken the following actions with regard to their aircraft which were converted to freighters by the aircraft manufacturer.

1. Placards have been applied to the Door Lock/Hook Tensioning Handle to highlight the LOCKED/CLOSED and UNLOCKED/OPEN positions of the handle, photograph 5.

1. The Door Lock/Hook Tensioning Handle has been safety wired to indicate movement of the door handle.

1. The Pre-Flight Check has been amended with an additional item which calls for a physical check of the Door Lock/Hook Tensioning Handle and Latch Handles, to ensure that they are in their LOCKED/CLOSED positions.

1. A Notice to Crews concerning the correct operation of the CEED has been published.

1. The possibility of modification action to eliminate the CEED on aircraft not requiring this door as an emergency exit is being investigated.

Safety recommendations

The potential for a serious accident exists should the CEED detach in flight. This incident has highlighted the possible confusion amongst this flight crew in the operation of this particular standard of CEED fitted to the L188C, as it differed from the standard with which they were

familiar. In addition, the STC in accordance with which this modification was installed, appears not to have taken into account the possibility that with worn door seals, a DOOR UNSAFE indication may be erroneously extinguished on the flight deck panel. As a result of this potential confusion, the following recommendations are made:

Recommendation 2002-31

The Civil Aviation Authority, together with the Federal Aviation Administration, ensure that action is taken aimed at preventing the accidental detachment of the Crew Emergency Exit Door, in flight, on all Lockheed Electra L188C aircraft that have been modified to freighter configuration in accordance with the door manufacturer's Supplemental Type Certificate.

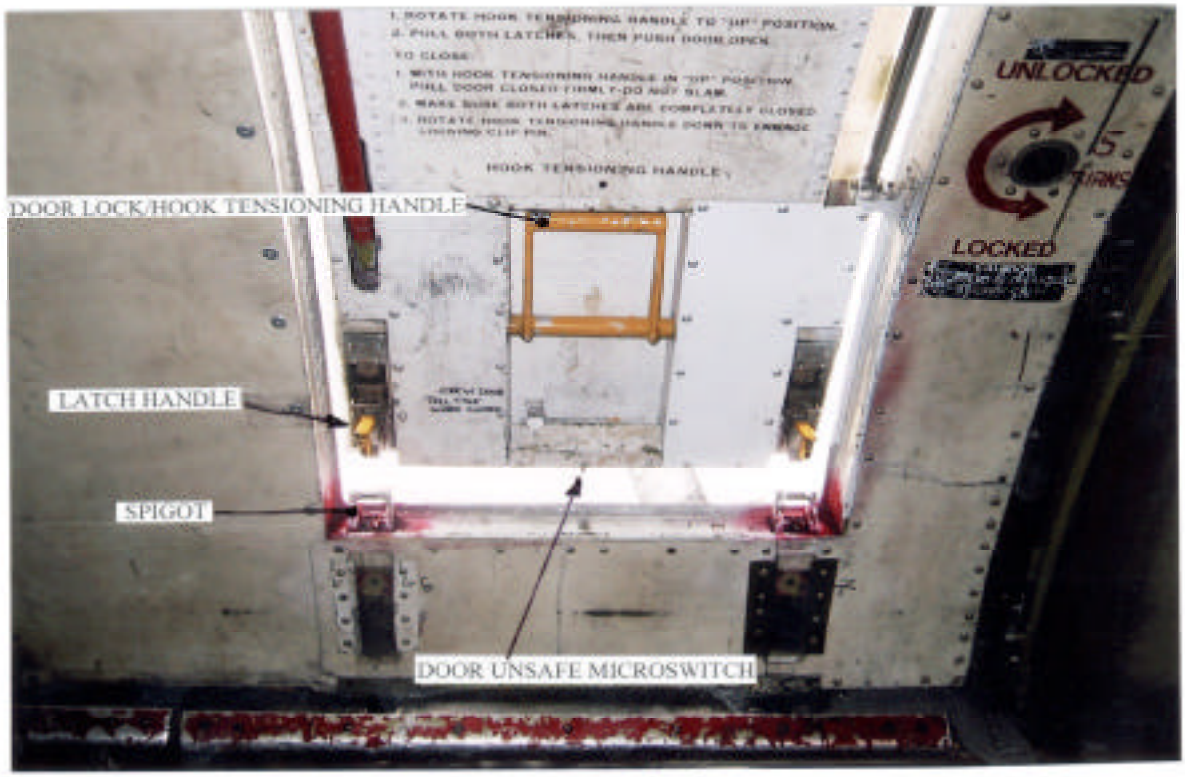
Recommendation 2002-32

The Federal Aviation Administration should re-examine the manufacturer’s Supplemental Type Certificate associated with the design of the installation of the Crew Emergency Exit Door on G-FIZU, to ensure that a DOOR UNSAFE indication is presented to the flight crew whenever the door is not properly locked closed.

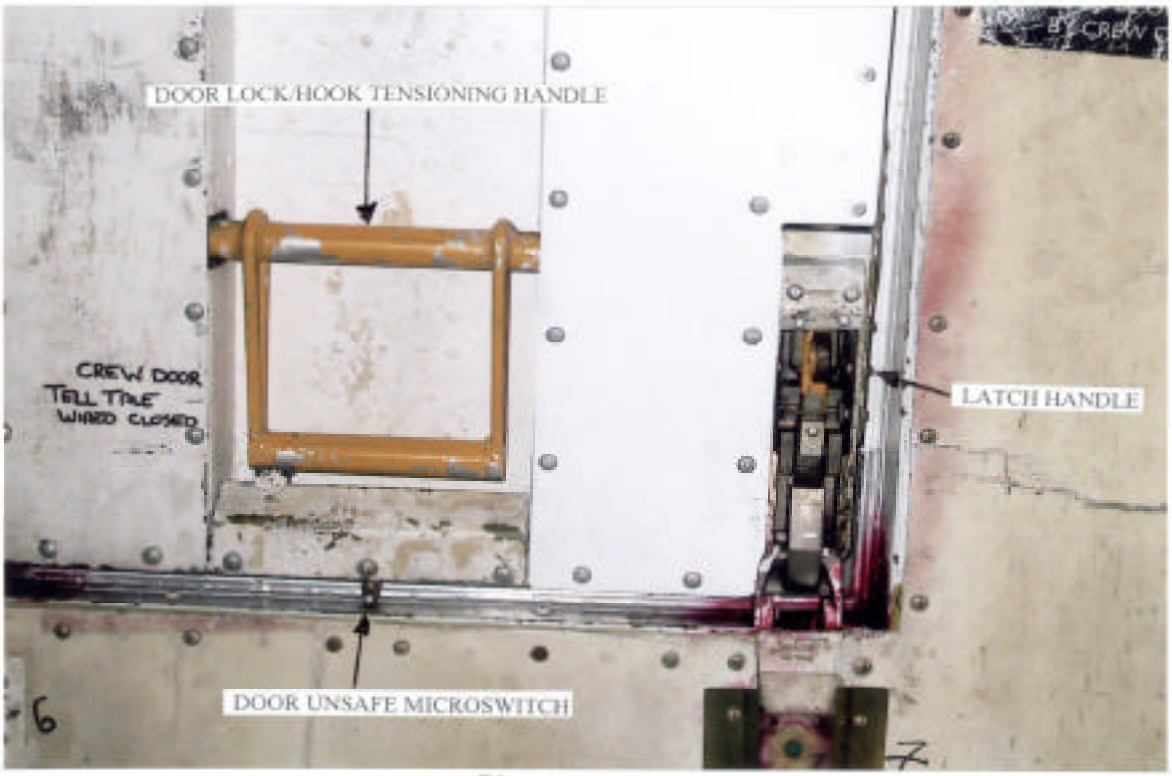
Recommendation 2002-33

The Civil Aviation Authority, together with the Federal Aviation Administration, should ensure that when more than one modification, or Supplemental Type Certificate, is approved for similar additions or improvements on an aircraft type, then the method of operation of that modification should be clearly indicated, and information relating to its operation should be made readily available to flight and ground crews.

Photograph 1
Crew Emergency Exit Door set into the Forward Freight Door

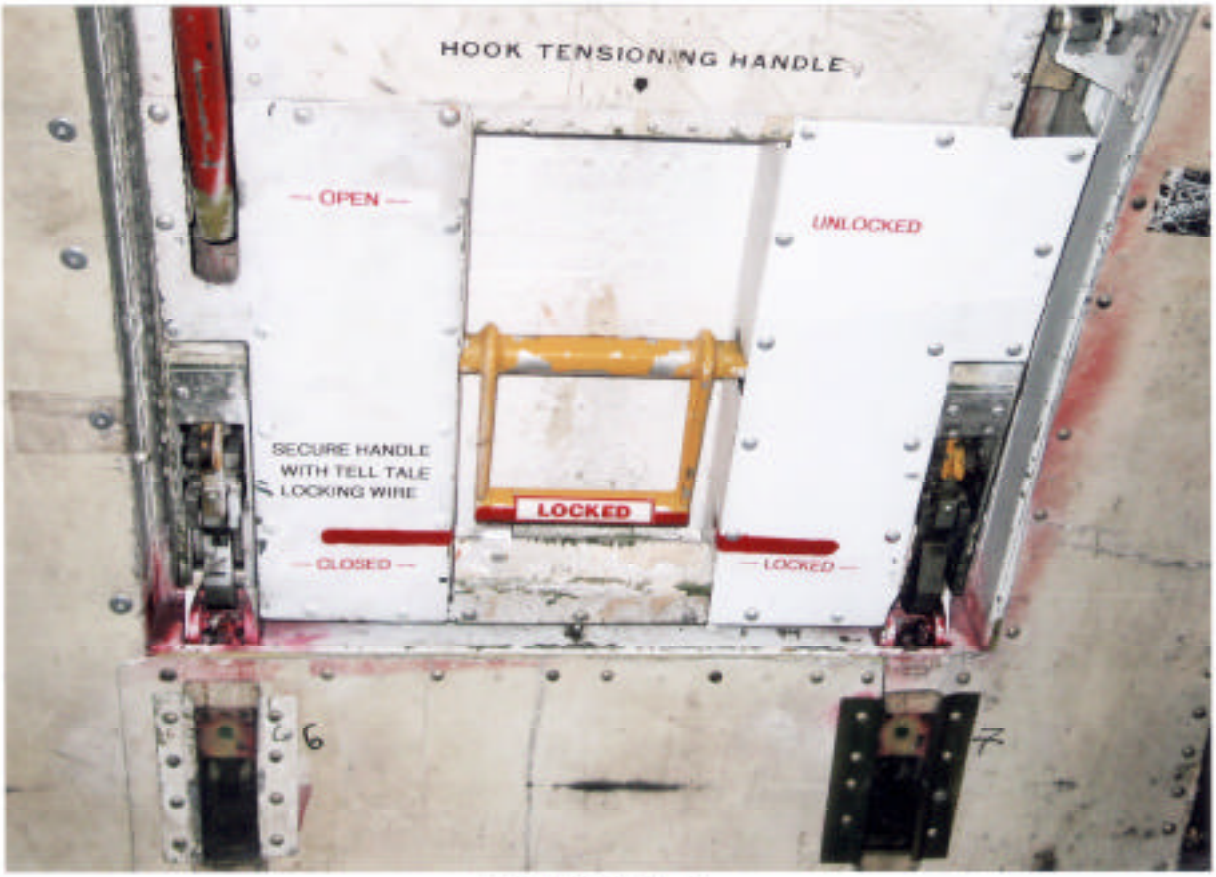


Photograph 2
Replacement Crew Emergency Exit Door fitted to G-FIZU in the UNLOCKED/OPEN position



Photograph 3
Replacement Crew Emergency Exit Door fitted to G-FIZU in the LOCKED/CLOSED position

Photograph 4
Crew Emergency Exit Door fitted to the aircraft normally operated by the accident flight crew



Photograph 5
Placards applied to the Crew Emergency Exit Door by the maintenance organisation