



NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594
May 10, 2020

Group Chairman's Factual Report

AIRWORTHINESS

DCA18FA144

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A. Airworthiness Group

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B. Summary

On April 20, 2018, at about 1420 CDT, a Caribbean Sun Airlines, dba World Atlantic Airlines, MD83, N807WA, right main landing gear collapse during landing roll at Alexandria airport (AEX), Alexandria, Louisiana, causing fuel and hydraulic fluid to leak and the right wing to contact the runway. The 94 passengers and 7 crew were evacuated, and no injuries were reported. The flight was contracted by ICE but operated under Part 121 regulations. Aircraft received substantial damage.

C. Details of the Investigation

1.0 Airplane Description

Registration Number:	N807WA
Airplane Serial Number:	53093
Airplane Manufacturer:	McDonnell Douglas
Model:	DC-9-83 (MD-83 Series)
Engine Manufacturer:	CFM International
Model:	CFM56 Series
Airplane Year:	2000
Airworthiness Certificate:	Standard
Approved Operations:	121
Aircraft Type:	Fixed Wing Multi-Engine
Engine Type:	Turbo Fan
Airplane Category:	Transport
Number of Engines:	2
MTOW Weight:	160,000 pounds
Total Time:	43,724 hours
Total Cycles:	39,539 cycles
Type Certificate	A6WE Revision 30

2.0 Fire Damage

There was no fire damage to the airplane.

3.0 Right main Landing Gear

The right main landing gear (MLG) shock strut cylinder fractured upon landing at AEX. The cylinder fractured around its entire circumference and a preliminary examination of the cylinder revealed that the fracture originated in area exhibiting features consistent with fatigue. A repetitive inspection of the cylinder in the observed fatigue features in accordance with service bulletin (SB-MD80-32A286-004) and airworthiness directive (AD-2004-05-03).

Five operators of McDonnell Douglas Model DC-9-81 (MD-81), DC-9-82 (MD-82), DC-9-83 (MD-83), DC-9-87 (MD-87), and Model MD-88 airplanes reported fracture and failure of a MLG shock strut cylinder that resulted in the MLG collapsing during landing roll out. The airplanes MLG shock strut cylinders fractured after accumulating between a total of 6,386 and 28,100 landings. The fractures began at cracks on the outer surface of the cylinders. The cracks were created by high stresses from vibration that can occur during airplane braking. Failure of a MLG shock strut cylinder due to cracking could lead to collapse of the MLGs and consequent reduced controllability of the airplane during landing.

The performance of repetitive dye penetrant and magnetic particle inspections will determine if a crack exists. Installing brake line hydraulic restrictors, if not previously accomplished per Service Bulletin MD80-32-276, would minimize vibration induced stress loads and minimize possibility of cylinder fracture.



Figure 1 – Right main landing gear fracture looking aft and inboard.



Figure 2 – Right main landing gear fracture looking inboard.



Figure 3 – Right main landing gear fracture looking forward.



Figure 4 – Right main landing gear fracture looking outboard.

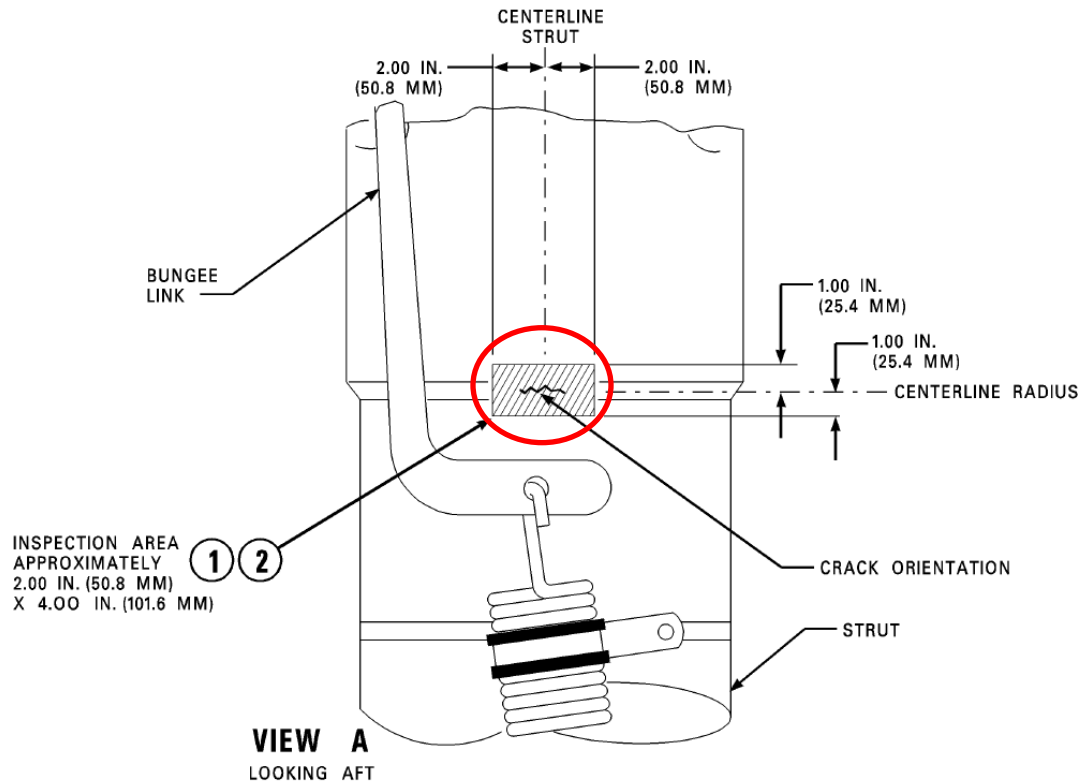


Figure 5 – Service Bulletin inspection area (forward side).



Figure 6 - Upper cylinder fatigue crack initiation site (forward side).



Figure 7 – Upper cylinder fatigue crack initiation site (forward side).



Figure 8 – Approximate fatigue crack initiation site on the lower cylinder (forward side).



Figure 9 – Lower cylinder fatigue crack initiation site (forward side).

3.1 Hydraulic Line Restrictor Valves

The two inboard and outboard hydraulic line restrictors for the RMG were removed, examined and bench tested at the manufacturer Crissair in Valencia, CA on May 10, 2018.

The restrictor valves were removed from the evidence bags and photographed. The part drawings indicated the restrictor valves should be marked with Crissair 99240/6F3710-1 (elbows), 99240/6F3708-1 (straights). Only a portion of Crissair and the part number was observed on each of the restrictor valves. No labeling was observed on the inboard forward restrictor valve.

3.1.1 Outboard Aft Restrictor Valve

No foreign object debris (FOD) was observed in the valve inlet filter when inspected under a microscope. The valve was installed on the test bench and the acceptance test procedure (ATP) was performed with no faults.

3.1.2 Inboard Aft Restrictor Valve

No FOD was observed in the valve inlet filter when inspected under a microscope. The valve was installed on the test bench and the ATP was performed with no faults.

3.1.3 Outboard Forward Restrictor Valve

No FOD was observed in the valve inlet filter when inspected under a microscope. The valve was installed on the test bench and the ATP was performed with no faults.

3.1.4 Inboard Forward Restrictor Valve

No FOD was observed in the valve inlet filter when inspected under a microscope. The valve was installed on the test bench and the ATP was performed with no faults.

3.2 Left Forward Door (L1) Evacuation Slide

The L1 slide did not deploy nor did it inflate and was sent to the manufacturer for further examination (Survival Factors Group Chairman's Factual Reports – Slide and Inflation Valve Teardowns).



Figure 10 - L1 door evacuation slide.

3.3 Damage to the Airframe Structure

The airplane sustained substantial damage to the right-wing.

Table 1 - Right Wing Damage

ID	Aircraft Location	Part	Location	Damage Description	Figure
1	R/H Wing	Leading Edge Slats	Figure 20	Runway contact damage	 Figure 11 – Inboard Slats
2	R/H Wing	Leading Edge Slats	Figure 20	Runway contact damage	 Figure 12 – Outboard Slats
3	R/H Wing	Wing Tip	Figure 20	Runway contact damage	 Figure 13 – Wing Tip
4	R/H Wing	Navigation light	Figure 20	Runway contact damage	 Figure 14 – Navigation Light
5	R/H Wing	Navigation lights	Figure 20	Runway contact damage	 Figure 15 – Navigation Lights

ID	Aircraft Location	Part	Location	Damage Description	Figure
6	R/H Wing	Trailing Edge	Figure 20	Runway contact damage	 Figure 16 – Trailing Edge
7	R/H Wing	Inboard Flap	Figure 20	Runway contact damage	 Figure 17 Inboard Flap
8	R/H	Inboard Flap & SOB Fairing	Figure 20	Failed gear contact with the flap and the SOB	 Figure 18 Inboard Flap & SOB
9	R/H Wing	Lower Wing Skin	Figure 20	Abrasion damage	 Figure 19 – Lower Skin Panel

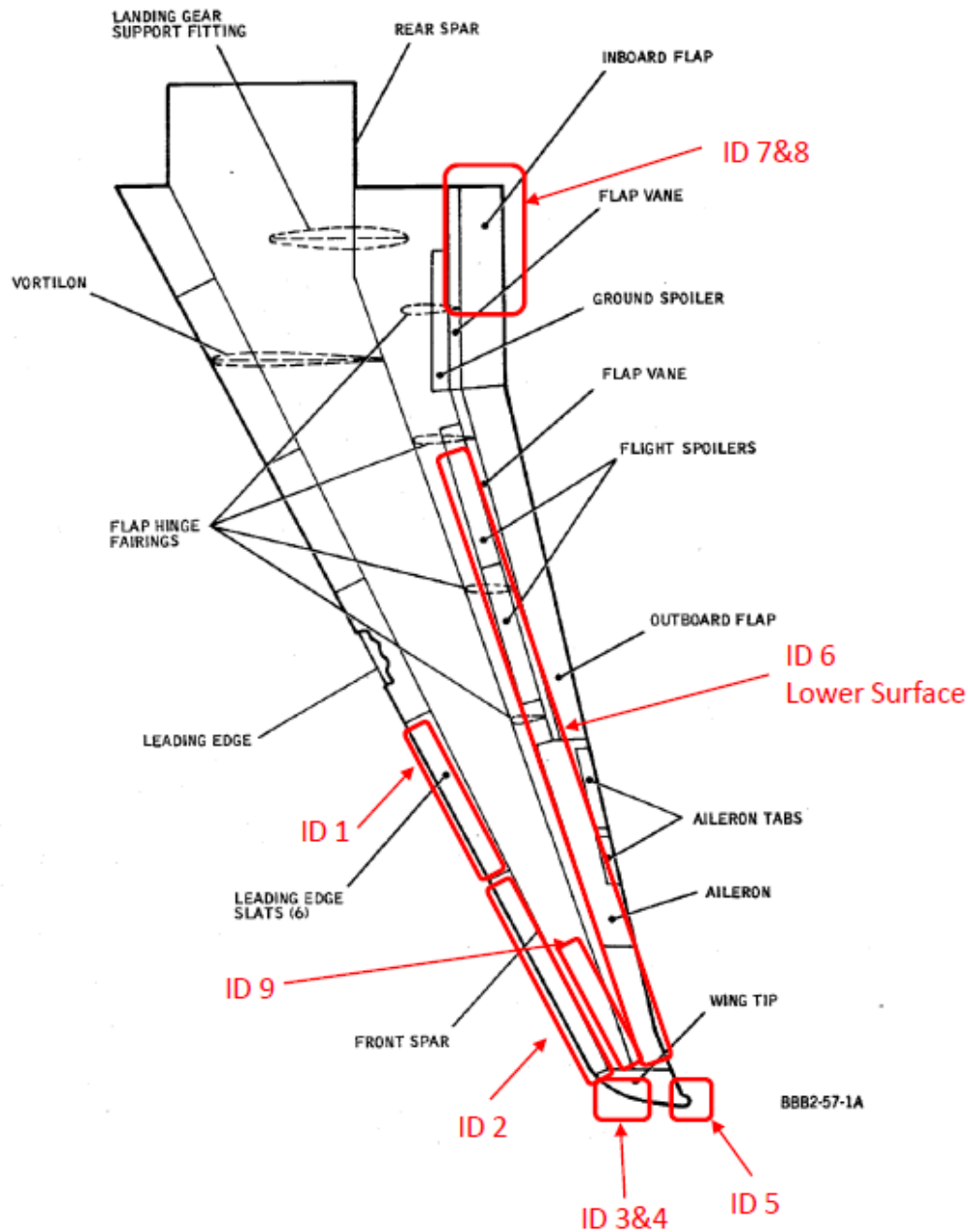


Figure 20 - Right wing damage (lower surface).

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