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SERVICE : 662 In-Service Engineering      PAGE:      1 DE / OF 4  
DEPT. :

RÉDACTEUR: BAMPEL      DATE:      2010-09-02  
PREPARED BY:

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**SUBJECT:****CRJ200, Examination of MLG LH Door****PART IDENTIFICATION:**

<b>Description</b>	LH MLG Door
<b>Part Number</b>	601R31178-169
<b>Detail Description</b>	Door Hinge Attachment
<b>Part Number</b>	601R31599-11
<b>Serial No</b>	P43895
<b>Manufacturer</b>	BOMBARDIER
<b>Aircraft Model</b>	CRJ 200
<b>Serial No.</b>	7411
<b>Operator</b>	ASA
<b>Landings</b>	20849
<b>Service Time Hrs</b>	23888

BOMBARDIER APPROVES THE RELEASE OF THIS DOCUMENT TO THE NTSB FOR THE PURPOSE OF ENHANCING AVIATION SAFETY.

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**BACKGROUND:**

Bombardier Materials and Processes Engineering Laboratory (BAMPEL) was requested to examine the door attachment hinge P/N 601R31599 for the cause of resistance to movement, after the incident as quoted from NTSB Preliminary Report ID ERA09IA338:

On June 11, 2009, about 1840 eastern daylight time, a Bombardier CL600-2B19, N857AS, operating as Delta Connection flight 5414, landed with the left main landing gear partially extended at the Hartsfield Jackson Atlanta International Airport, Atlanta, Georgia. The airplane was operated by Atlantic Southeast Airlines (ASA). The airline transport rated pilot, commercial rated co-pilot, one flight attendant, and 19 passengers were not injured. The airplane received minor damage. Visual meteorological conditions prevailed at the time, and an instrument flight rules flight plan was filed for the 14 Code of Federal Regulations Part 121 flight. The flight originated at Columbus, Georgia at 1725.

While configuring the airplane for landing, the flight crew observed a landing gear disagree message, and the left main gear indicated that it was not down and locked. The Quick Reference Handbook (QRH) procedures were accomplished, which included cycling the landing gear handle and the use of the alternate gear extension (manual release) system. The left main gear continued to indicate that it was not down and locked. A flight crew on a parallel approach confirmed that the left main gear was not extended. The captain declared an emergency and the airplane landed on runway 27R. The captain used right aileron to keep the left wing up as long as possible. The left wing eventually dropped to the runway and the airplane came to a stop at the runway's left edge. The captain commanded an evacuation and all passengers departed the airplane using the left and right forward doors.

**PROCEDURE:**

The following methods were used in the investigation:

- 1) Radiography
- 2) Visual Examination
- 3) Dimensional Check

**FINDINGS:**

For the ease of understanding, hinges were identified as positioned on the aircraft, “AFT” for the hinge that exhibit resistance to movement and “FWD” for the other hinge.

**Radiography**

The radiographs were taken from the hinges on LH MLG Door prior to disassembling, for any noticeable evidences and for comparison purposes between the two hinges.

- Evidences of differences were identified with respect to bushings and metal washers (shim) positions.
- Positions of the bushings in the hinges were not equidistant
- Washers from the FWD hinge, located adjacent to inner bushing/hinge, appear to be not flat, when compare to the washers from the AFT hinge

**Visual Examination**

Examinations of the Hinges was carried out by means of a stereomicroscope and revealed the following findings.

*FWD Hinge and Attachment Fitting*

- Evidence of an approximate equal distant gap between the hinge and door attachment fitting
- Signs of damage on the hinge were detected located below the pin’s head and attachment fitting.
- Evidence of damages was found on the metal shim, buckled, indications of wear and sheared metal.
- Compressive damages (slightly elongated) on the PTFE washer

*AFT Hinge and Attachment Fitting*

- Evidence of gap variance between the hinge and door attachment fitting
- Signs of damage on the hinge were noticed below the pin’s head and attachment fitting.

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- Evidence of damages was found on metal shim, buckled, and wear
- Compressive damage (slightly elongated) and circular tear on the PTFE washer

**Dimensional Check**

Hinge and Attachment Fitting Assemblies were submitted to the QC Tooling and Experimental department for dimensional check and the results are as follows:

*FWD Hinge and Attachment Fitting*

<b>Part Description and Number</b>	<b>Requirements</b>	<b>Found</b>
Pin MLG Door Restraint 601R38536 #310	0.2485-0.2495"	0.2488-0.2493"
Bushing-Clamp-Up NAS74A4E0110 #384	0.2495-0.2510"	0.2495-0.2500"
Bushing-Plain Press Fit NAS75-4-007 #430	0.2500-0.2515"	0.2507-0.2510"

*AFT Hinge and Attachment Fitting*

<b>Part Description and Number</b>	<b>Requirements</b>	<b>Found</b>
Pin MLG Door Restraint 601R38536 #310	0.2485-0.2495"	0.2482-0.2485"
Bushing-Clamp-Up NAS74A4E0110 #384	0.2495-0.2510"	0.2492-0.2508"
Bushing-Plain Press Fit NAS75-4-007 #430	0.2500-0.2515"	0.2500-0.2513"

**CONCLUSION:**

- Examination revealed evidences of differences with respect to bushings and washers positions
- Mechanical damages were detected on hinge, and pin
- Evidence of deformation and sheared metal washers was found.
- Indications of compressive damages were observed on Teflon® washers.