

SkyWest Airlines
7682
NLG up landing, Ontario, Ca
May 23, 2010

May 27, 2010

The inspection was carried out on aircraft 7682 at the SkyWest facility in Fresno California. Present for the investigation were:

Patrick Jones	NTSB	Vahl Buchanan	FAA SLC
Joe Fuller	SKW	Otto Dietrich	Bombardier

Inspection observations and findings:

1. The NLG history is as follows
 - a. 20 330.3 TSN
 - b. 17,553 cycles
 - c. 1, 171 TSO
2. NLG uplock history as follows:
 - a. 17,410 CSN
 - b. 1171 CSO
 - c. 1171 CSI
 - d. 1390 TSI
3. The fly-by at Ontario CA prior to the landing showed no evidence of gear extension other than the nose gear doors open
4. Upon the start of the investigation in FAT the following was noted:
 - a. Nose gear doors and mechanism were removed
 - b. A new nose wheel steering manifold had been installed
 - c. A new nose wheel steering valve was installed
 - d. New WOW and Ctr harness was installed
5. No damage noted on the NLG torque links
6. NLG uplock roller is free to rotate and entry marks into uplock claw are centered and marks indicate through 360 deg of roller surface
7. Nose tires appear new and they were replaced in Ontario
 - a. Original tires were viewed and had slight flat spots
8. Main wheels were in good condition with nothing noteworthy
9. NLG doors were removed and carried on board the aircraft, the following measurements were made.
 - a. Doors eroded down to aft end 3.125 inches, forward end 7.50 inches
10. Removed hydraulic components showed signs of wear consistent with the NLG up scenario
11. Flight crew reports indicated that the Emergency Extend handle was hard to pull. Testing indicated the following:

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- a. If handle pulled quickly the uplock release at 8 inches of travel
 - b. When handle pulled slowly with force gage used uplock release was at 9.5 inches
 - c. Handle load to 9.5 inches was 25 lbs
 - d. Handle load from 9.5 to 10 inches travel went to 50 lbs
12. Uplock hook has side play, 0.015, but is free to move with no obstructions
13. Bypass valve for the NLG still has the restrictor installed **removed via SB 601R 32-102**

14. Bypass valve travels are as follows:

NLG doors Bypass valve with handle stowed	22/64 inch, 0.352
NLG Bypass valve with handle stowed	22/64 inch 0.352
NLG doors Bypass valve with handle extended	40/64 inch 0.640
NLG Bypass valve with handle extended	40/64 inch 0.640

15. With Emergency handle pulled the bypass stop was contacted
16. NLG uplock sensor gap at 0.036 inch
17. Steering collar to strut side movement minimal
18. Many extension and retractions carried out with No Faults noted. #3 A and B pumps on
- a. Hyd pressure with no demand = 3000psi
 - b. Hyd pressure extension no flt control movement drop to = 2800 psi
 - c. Hyd pressure extension with flt control movement drop to 2400 sii
19. NLG doors selector valve end cap lockwire does not conform to **SB 601R 32-104**
- a. End caps appear tight
20. NLG strut pressure is at 98 psi at 14.5 inches extension with aircraft on jacks
21. NLG tire pressure is not applicable as they were replace prior to the ferry flight
22. MLG tires were normal with pressures as follows with AC on jacks
- a. #1 = 181 #2 175 #3 178 #4 181

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1. Hydraulic samples were taken: and will be sent to lab for analysis:
 - a. #3 system return filter
 - b. Uplock retract actuator
 - c. Uplock actuator
2. Functional test of the landing gear manual release system carried out as per task 32-34-00-720-801 and system functions normally
3. Side play at NLG trunnion to bushing gap = **.009 should be 0.015 to 0.030**
4. Side play at NLG Drag Brace to bushing gap = **No gap noted, should be 0.015 to 0.030**
5. Measurement taken at uplock roller to uplock claw as per SB 601R 32-089 and clearance noted at **0.073 should be 0.125 to 0.205**

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Components PN and SN

Component	Part Number	Serial number
Nose Gear	601R85002-65	DCL685/02
Nose Gear uplock pin		
Nose Gear Drag brace	601R85002-53	DCL614/01
Nose Gear retract actuator	601R85002-7	DAY/0536
Nose Gear Up-lock	601R85002-81	NGL/0482/01
Nose Gear Selector valve	750006000	1908
Nose Gear MANUAL By-pass valve	400019000-001	1432
Nose Gear door By-pass valve	400019000-001	1433
Nose tires		
Right	5010598	MAY96-0662
Left	5010598	JAN10-0416
PSEU	601R50969	D691
Main Gear		
Right	1700-114	DCL625/01
Left	17002-113	DCL628/01
Main Gear side stay actuators		
Right	601R85001-95	01249
Left	601R85001-95	01811
Hydraulic system #3 return filter	AC3258F1297J	

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Actions from the investigation:

Items to be sent to Messier-Dowty for investigation

- ❖ Nose Landing gear assy.
- ❖ Drag Brace assy
- ❖ Uplock and actuator
- ❖ Retract Actuator
- ❖ WOW/CTR harness

Items to be sent to Tactair for investigation

- ❖ NLG Selector and NLG Door Selector valves, includes removed unit SN2003 removed May 22, 2010
- ❖ NLG Bypass valves

General Actions

- ❖ NTSB and Bombardier to generate a report from the FDR
- ❖ Bombardier to compare previous event with the most recent event
- ❖ NTSB to provide Bombardier with the Flight Crew reports
- ❖ Once the landing gear is removed
 - a. SKW to verify the dimensions between the NLG and NLG drag brace bushing flanges - Dimension should be 11.250 to 11.245
 - b. SKW to verify the dimensions between the NLG and NLG drag brace aircraft structure bushing flanges, - Dimension should be 11.265 to 11.275

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Otto Dietrich

Bombardier Aerospace
Hydro Mechanical Systems
Aux Accident investigator
In-Service Engineering