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**Subject: safety recommendations on the accident occurred on June 8<sup>th</sup> 2013, at Rome Fiumicino airport (Italy), to A320-200 registration marks HA-LWM.**

### **1. Synopsis**

On June 8<sup>th</sup> 2013, at 05.19 UTC, the aircraft A320-200 registration marks HA-LWM, flight WZZ7EK, while approaching the final destination of Rome Ciampino (LIRA) airport at the end of an uneventful flight departed from Bucharest airport with 165 pax and 6 crew on board, experienced a technical problem in getting the undercarriage downlocked. This circumstance was notified to the crew by the Master Warning and the triggering of the ECAM message "L/G GEAR NOT DOWNLOCKED".

During missed approach a standard procedure and following holding in Campagnano, the crew carried out a recycle and later on performed LG gravity extension as well as some g-force manoeuvres, but all measures were unsuccessful.

Consequentially, the crew requested to divert to Rome Fiumicino airport (LIRF) declaring an emergency landing.

Approaching Rome Fiumicino airport RWY 34R, the aircraft was instructed by TWR to go-around due to some incoherency in the information provided to the crew about the current position of the landing gear. A new approach to the RWY 34R was performed and the aircraft touched down on the runway at 06.09 UTC with the left LG only partially extracted. At landing, the mass of aircraft was estimated about 56.500 kg.

The flightcrew shutdown the left engine just before touchdown and the right one a few seconds later. The aircraft came to rest after scraping the left engine on the runway for about 1200 m (photo 1); the subsequent evacuation was uneventful and no injuries were suffered.



Photo 1

While on site, the investigators noticed the left door actuator only partially extended and the left LG not in the uplocked position, but stuck on the door also when the aircraft was lifted by airbags (photo 2). At removal of the jammed actuator, the door fully opened and the gear correctly extended and locked.



Photo 2

## 2. Findings

Early X-Ray carried out at the labs of the Italian Air Force on the failed actuator (P/N 114122-012, S/N CH1122581) revealed the presence of heavy debris in the damping housing (photo 3a, dashed lines) when compared to a new one (photo 3b); this finding was accompanied by the absence of some internal parts in the same area, presumably retaining ring, damping ring and spiraloX (arrows in photo 3a).

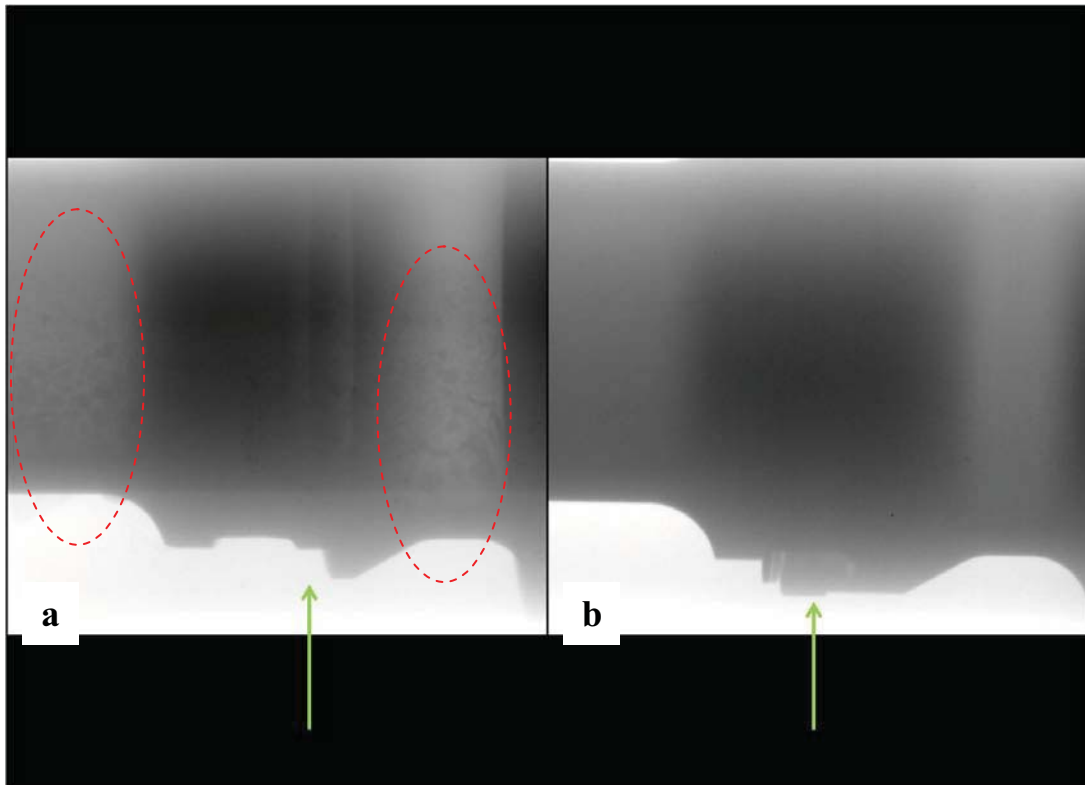


Photo 3

The following CT scan carried out at Astrium facilities (Bordeaux, France) confirmed this condition and clarified that debris was due to the spiraloX and the damping ring, as well as the damages on the lip of the damping housing, while the retaining ring was eventually shown twisted, but integer, stuck inside the damping housing (photo 4).

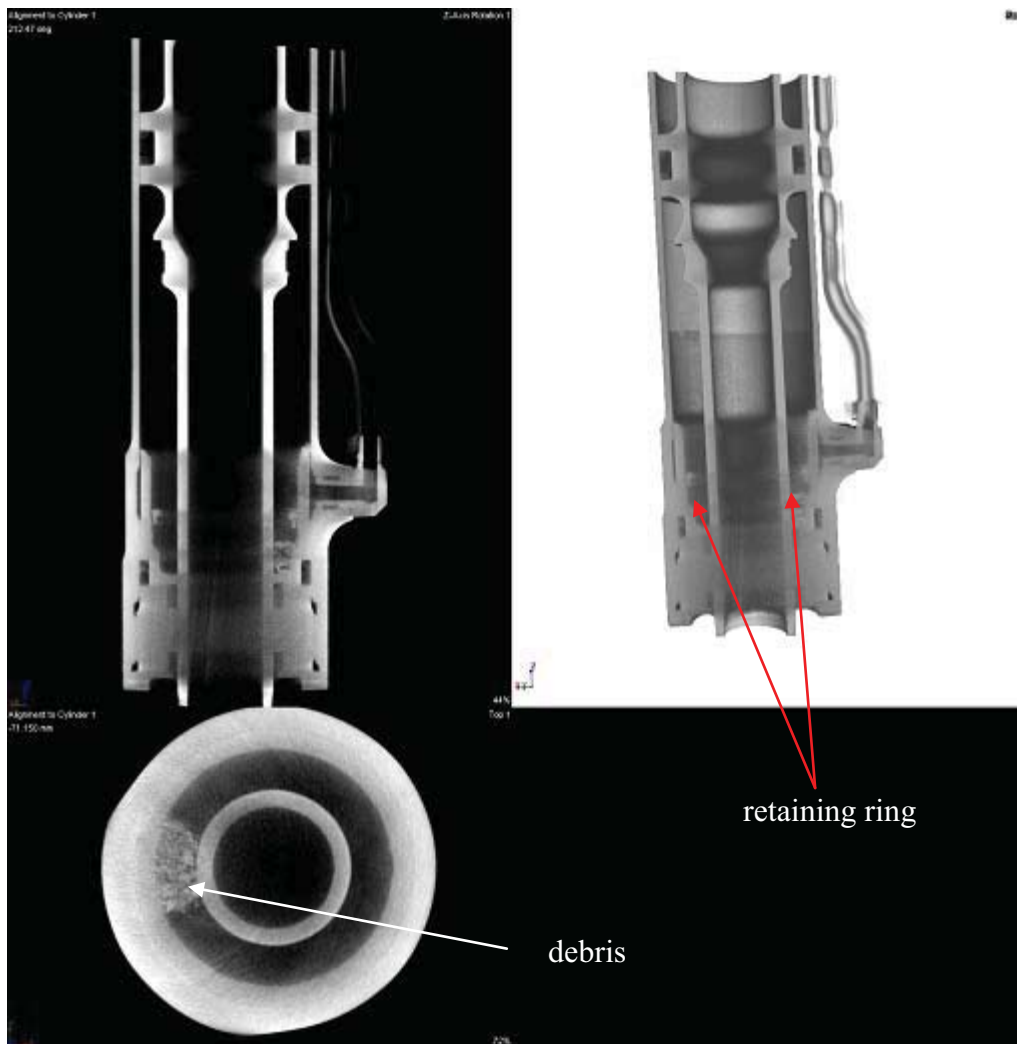


Photo 4

CT scan of the right door actuator showed all internal components in their correct position, but the spiralox appeared to be bent (photo 5).

The following bench test and disassembly were carried out on both actuators at the manufacturer premises of General Electric UK in Cheltenham. At installation on the test rig, the actual length of the failed actuator was measured 957.3 mm, 82.7 mm less than the full extension length of 1040.0 mm.

When pressure was slowly increased, no movement was observed till it reached 300 psi; at this value a jolt to 1000.0 mm length was observed and pressure suddenly decreased to 70 psi. A further jolt to 1010.0 mm was observed only when pressure was raised again to 280 psi. The test was stopped when at 1037.0 mm, when the pressure reached 1000 psi, once it was clear the pure mechanical nature of the failure.

Test bench on the right actuator showed regular and smooth movement of the piston to full stroke position at 17 psi.

The disassembly provided full confirmation of all the above mentioned evidences on the left actuators, while on the right one, in addition of the dishing of the spiralox, it showed some presence

of debris most likely associated with an initial deterioration of the edge of the damping housing that was also observed.

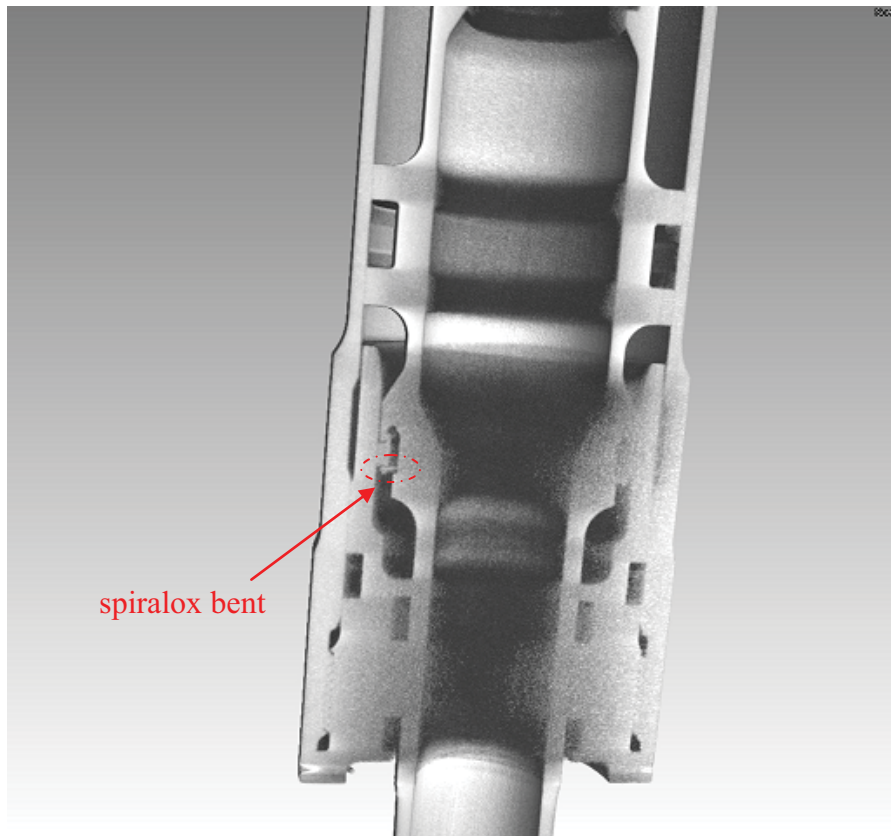


Photo 5

At the time of the event both actuators had accumulated 5386 FH and 2560 cycles, and they were installed on aircraft since new on February 20<sup>th</sup> 2012.

Maintenance records of these actuators, that are subject to monitoring/inspection in accordance to AD 2011-0069R1 issued by EASA on April 11<sup>th</sup> 2012, didn't reveal any previous anomaly or malfunction. However, a review of A320 family WizzAir fleet maintenance records showed that rejection of the same P/N due to slow opening had already occurred twice in 2013.

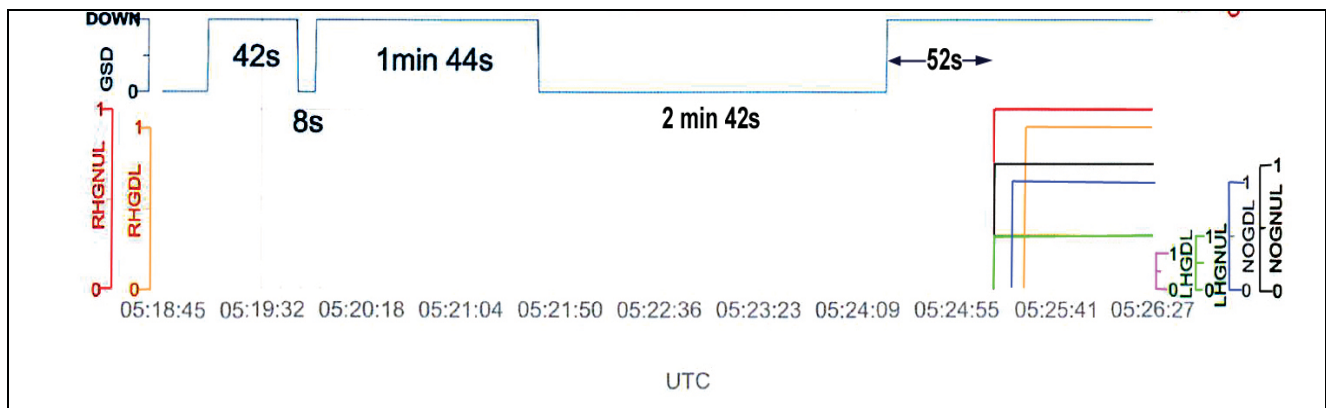
Internal analyses carried out by Airbus, based on the observation that PFR message on the accident flight did not show the expected preliminary "TGT POS" fault message after a 4s confirmation time, have revealed that repetitive checks of CFDS messages were indeed not effective for aeroplanes fitted with landing gear control interface unit (LGCIU) interlink communication ARINC 429 [applied in production through Airbus Modification (mod.) 39303, or in service through Airbus Service Bulletin (SB) A320-32-1409]. To fix this finding the AOT A32N001-13 was issued by the manufacturer on June 24<sup>th</sup> 2013, and mandated since June 27<sup>th</sup> through the Emergency AD 2013-132-E issued by EASA on the following day.

In terms of operational procedures, DFDR data showed that before applying the gravity extension procedure, the crew had executed the following sequence of actions:

- normal extension of the L/G with lever kept in the "DOWN" position for 42" with indication of "L/G GEAR NOT DOWNLOCKED";

- recycle of the landing gear by moving the lever in the “UP” position for 8”, followed by repositioning it in the “DOWN” position during 1’44”;
- L/G lever moved again in the “UP” for 2’42”;
- L/G lever repositioned “DOWN”;
- 52” later, activation of gravity extension.

This sequence of actions seems in disagreement with the OEB 209/1 dated Feb 2011 and following modifications (OEB 44.00 dated 25 Nov 11 and OEB 44.01A issued on 30 May 2012) that recommends the flight crew, if ECAM triggers the “L/G GEAR NOT DOWNLOCKED” warning, to wait for 2 minutes after the recycling of the landing gear, before extending the landing gear by gravity.



This requirement is also incorporated in the above mentioned AD 2011-0069R1, however the recital states that inserting a copy of this AD into the AFM is an acceptable method to comply with it. The Flight Warning Computer standard H2F5 installed on the aircraft event includes the OEB reminder function, while on aircraft where the following H2F7 standard is installed the complete procedure including the 2 minutes waiting time before free fall is displayed on the ECAM.

After gravity extension, observing that the problem was not resolved, the crew operated several more actions on the system: returned the handcrank in the original position, recycled the lever and tried to operate again the freefall mechanism; finally, just before landing two more recycles were attempted. However, since the first activation of the gravity extension, the left landing gear reached a transit condition (“not uplocked”, “not downlocked”) that was permanently maintained until landing during the remaining 44’ of flight, independently on the actions undertaken.

### 3. Considerations

Recurrence of the accident, that seems fully coherent with the previous event occurred at Newark Liberty International airport (NJ, USA) on January 10<sup>th</sup> 2010 to the A319 aircraft registration marks N816UA, that led to the AD 2011-0069, poses serious concerns about the effectiveness of the mitigation actions currently in place while taking into account the massive fleet potentially affected by the issue.

In particular, although the Emergency AD 2013-132-E sounds as an essential tool to restore the conditions established by the existing AD 2011-0069R1, the ANSV considers necessary to urgently

intervene with additional measures in order to improve the effectiveness of the existing safety measures. In fact, analysis of CFDS during the maintenance action required by the AD 2011-0069R1 can only highlight a delay as a difference with respect to the opening time of other actuators installed onboard the aircraft, but it can't be thought as an ultimate signal of correct functioning of the parts because it does not provide actual measurements of the performance of each single actuator.

In addition, also the recent introduction of the P/N 114122-014 as indicated by the SB 32-1407 released in May 2013, that it is intended to fix the problem through a new design of the internal damping mechanism, if effective, could still require too long a time to ensure the highest safety standard before completion of the retrofit of the fleet.

Finally, some additional concerns comes from the spiralox dishing and some damages of the damping housing observed on the right door actuator while still showing regular and efficient performance. In fact, this condition could be thought as representative of an early stage of ongoing degradation that may lead to failure in an unknown number of cycles.

#### **4. Safety Recommendations**

Based on the previous considerations and in the meanwhile of achieving any further outcome from the safety investigation currently ongoing, ANSV considers necessary to issue to EASA the following safety recommendations.

##### **Recommendation ANSV-6/1052-13/1/A/13**

Introduce a modification to the existing AOT A320-32A1390 and the related point of AD 2011-0069R1, requiring, in addition to the threshold check of 30 seconds taken for the door to open to the point of actuator vertical, the actual measurement of the time taken to get the vertical position and add the task of reporting the trend. The part should then be removed for further investigation when a delay exceeding a specified time (to be established by the manufacturer; e.g.: 3 seconds) is observed with respect to the baseline of the curve.

This kind of action would provide an absolute evaluation of the intrinsic performance of each single actuator and it is then expected to be much more effective than the current analysis of CFDS that only provides relative measurements.

##### **Recommendation ANSV-7/1052-13/2/A/13**

In order to have a better and clear traceability of the maintenance performed on the single aircraft part, it would be desirable to require a worksheet for each single S/N and not generically referred to the MLG door actuator. EASA is therefore recommended to review the maintenance practices/requirements regarding the above mentioned matter.

##### **Recommendation ANSV-8/1052-13/3/A/13**

In order to avoid excessive workload in stressful condition like an emergency landing due to L/G not locked, it would be advisable to require that the content of the OEB 209/1 (and its following modifications) and associated point in EASA AD 2011-0069R1 to be included in the related abnormal and emergency checklists.

**Recommendation ANSV-9/1052-13/4/A/13**

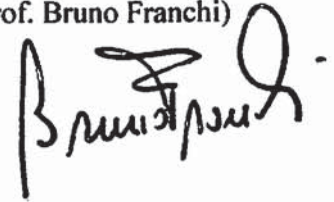
In order to avoid any possible flightcrew misinterpretation about the effective meaning of the 2 minutes waiting time after recycling required to activate the L/G gravity extension, it would be advisable to review the activation procedure; in particular it is recommended to specify that the freefall mechanism must be activated after a minimum time of 2 minutes with the lever kept in the lower position, and no other shorter intermediate recycles are allowed.

**Recommendation ANSV-10/1052-13/5/A/13**

In a case of jammed door, when the gravity extension is activated, there is no chance for the crew to restore a clean configuration of the aircraft. This, under specific adverse circumstances, may become critical by leading to excessive fuel consumption.

EASA is therefore recommended to consider the possibility to review the logic of the system in order to remove this potential scenario.

President of ANSV  
(Prof. Bruno Franchi)

A handwritten signature in black ink, appearing to read 'Bruno Franchi', with a horizontal line extending from the end of the signature.