

TO :	<b>CIAC</b>	Date:	09/03/2016
Attn. :		Pag. (incl.this page):	19
Fax :		Our ref :	PSEAW109/2016/46322/159424
Ref. :	A109C IETP A109C S/N 7629 Aircraft Damage Evaluation (Annex A)	From:	<b>AW109 Product Support Engineering</b>
		Phone:	+1 215-268-9151
		Fax:	+1 215-281-0447
		e-mail:	<a href="mailto:micael.menendez@finmeccanica.com">micael.menendez@finmeccanica.com</a>
Copy to:	AWPC109-119.PSE.mbx, Said Torres, Javier Matos		
<input type="checkbox"/> Urgent <input type="checkbox"/> For review <input type="checkbox"/> Please Comment <input type="checkbox"/> RSVP <input checked="" type="checkbox"/> For info			
<b>SUBJECT: A109C S/N 7629 (TT: 1341.6 FH) – Damage Assessment</b>			

Dear Customer,

With reference to your request regarding the damage assessment of A109C S/N 7629 (reported in Annex A), including damage and separation of two of the Oil Reservoirs contained in the Main Rotor Lubrication system and subsequent damage to the Main Rotor System, we hereby provide our technical advice regarding the requirements necessary to determine the airworthiness of the helicopter:

- 1) Due to the lack of proper application of Extended Storage procedures described in Chapter 20-30 of the 109C MM on the Main Gear Box and 90-Degree Gearbox during the long period of helicopter inactivity prior to the reported event, the following components must be sent to Finmeccanica Helicopters Division for overhaul inspection and evaluation:
  - a. Main Gear Box (P/N 109-0400-02-107 S/N 400)
  - b. Tail Gear Box (P/N 109-0440-01-119 S/N HS1993)
- 2) Due to the lack of application of proper Extended Storage procedures required by Chapter 20-30 of the 109C MM during the inactive period of 05/09/2015 to 2/20/2016 leading up to the reported event, the following actions must be taken on the Fuel System:

**Note:** *The technical content of this document is approved under the authority of DOA no. EASA.21J.005. Please note that this document could be subject to approval from Local Airworthiness Authority, depending on the privileges granted to your organization.*

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**Finmeccanica - Società per azioni**

Registered office:

Piazza Monte Grappa, 4 - 00195 Roma - Italy

Tel. +39 06 324731 Fax +39 06 3208621

Head office:

Via Giovanni Agusta, 520

21017 Cascina Costa di Samarate (VA) - Italy

Tel. +39 0331 229111 Fax +39 0331 229605

Company Share Capital € 2,543,861,738.00 fully paid up

Tax Code & Company Register no. 00401990585

VAT no. 00881841001

R.E.A. no. 7031



- a. Defuel the tanks completely according to MM 12-10-4.
  - b. Remove, inspect and clean all fuel cells and related distribution and indicating components according to: MM 28-00 to 28-40.
  - c. Perform leakage test according to MM 28-10-14.
  - d. Perform functional checks detailed within MM 28-20 and 28-40.
- 3) Based on the initial results of the damage assessment, in order to verify the airworthiness of the dynamic system of the helicopter the following components/systems must be sent to Finmeccanica Helicopters Division for overhaul inspection and evaluation:
  - a. Dampers (P/N 109-0101-06-3 S/N 2220, 2193, 2450, 2182)
    - o Subject to dedicated investigation and analysis
  - b. Engine to Transmission Drive-shafts
  - c. Tail Rotor Driveshafts and Hangar Assys
  - d. Main Rotor System
  - e. Lubrication System, Main Rotor
  - f. Rotating Controls Installation, Main Rotor
  - g. Swashplate Assy
- 4) Ensure currency of all other maintenance and inspections required by Chapter 04 and Chapter 05 of the MPM.
- 5) Rectify all other defects reported in the damage evaluation according to the relevant chapters or the A109C IETP.
- 6) Contact Rolls Royce for any requirements regarding the engine ALLISON 250-C20R/1. It is important to note to the engine manufacturer both the details of this event and the lack of any extended storage preservation requirements leading up to the event.

Upon receipt and inspection of the components specified for return to Finmeccanica Helicopter Division for overhaul inspection, FHD will advise regarding any discrepancies or replacements required to return them to an airworthy condition.

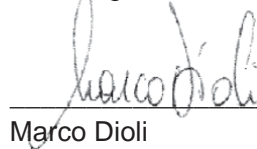
The results of all of the required inspections must be notified to Finmeccanica Helicopter Division Product Support Engineering. Additional actions may be required in the event of any noted discrepancies.



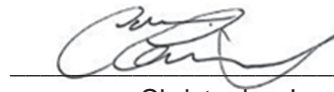
- This technical advice is contingent upon the fact that the subject helicopter(s) are not currently operating under any deviation/concession to the AW109 Maintenance Plan, and/or under any deviation/concession granted by local aviation authority for which Finmeccanica Helicopter Division has not previously endorsed in writing. It is also contingent upon the fact that no Mandatory BT(s) are overdue or under any concession/deviation for which Finmeccanica Helicopter Division has not previously endorsed in writing.

For any additional information do not hesitate to contact AW109 Product Support Engineering.

Best Regards,



Marco Dioli  
AW109 Chief Project Engineer



Christopher Lemieux  
AW109 Product Support Engineering Mgr.



**ANNEX A**  
**A109C S/N 7629 Aircraft Damage Evaluation**

**Subject:** A109C S/N 7629 Aircraft damage evaluation**Company:** Corporacion de la Industria Aeronautica Colombiana CIAC – Bogotá COL.**Owner:** Aeronautica Civil de Colombia

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**Aircraft Model:** A109C  
**Aircraft S/N:** 7629  
**Aircraft Reg. Number:** HK-3661G  
**Aircraft TT:** 1,341.6hrs  
**Aircraft Landings:** 1,319

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**Engine Model:** Allison 250-C20R/1  
**Engine #1 S/N:** CAE-295541. Cy: 1499  
**Engine #2 S/N:** CAE-295542. Cy: 1441

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**Event & Reporting Chronology:**

- ✦ **Feb/20/2016.** The event occurred at Bogota Colombia Int'l Airport. Several damages on M/R Hub Assy during ground run and taxing.
- ✦ **Feb/22/2016.** Customer reported the event and Marco Espejel created the PSE Request [Ref. ME-2016-36A-AOG-SN7629-ATA62-MR oil reservoirs broken and damage,(Due 2-12-16)]... **Annex A.**
- ✦ **Feb/24/2016.** Additional Customer's report provided from CIAC Engineering Dept... **Annex B.**
- ✦ **Feb/26/2016.** First Feedback from AWPC109-119 PSE Team requesting the following information:

*Micael Menendez wrote:*

*After a first analysis of the event, we need some information:*

- In the OR it's stated that two reservoirs are broken: which is their relative position? Side by side or opposite?*
- Can we have pictures of the reservoirs which didn't break?*
- Can you retrieve when the last preservation has been done? And which kind (see para 20-30 of the MM)?*
- Can we have evidence that the servicing of the dampers, of the reservoirs, of the MR grips and of the Landing Gears + Tyres has been performed I.A.W. Section 05-70 of the MPM?*
- This is a difficult question: can the Customer confirm to have used oil MIL-L-2104, grade 30 for the MR servicing?*

*We need the following parts (at least) back:*

- 109-0102-01-105                      OIL RESERVOIR (all)*
- 109-0110-71                         PITCH CHANGE LINK (the damaged ones ... BTW, which is their dash number?)*

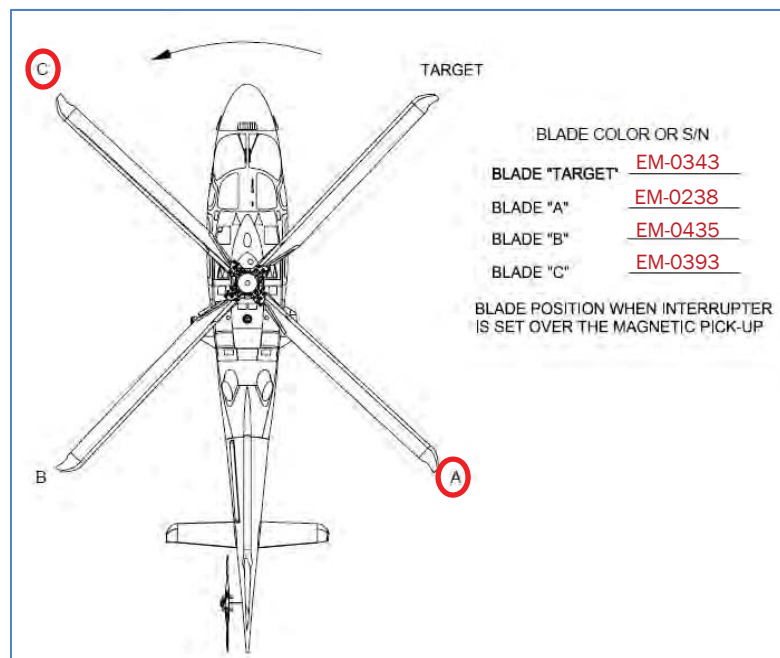
*The Tech. Depts. will decide if other parts are needed.*



### M/R Lag Damper P/N 109-0101-06-3 identification:

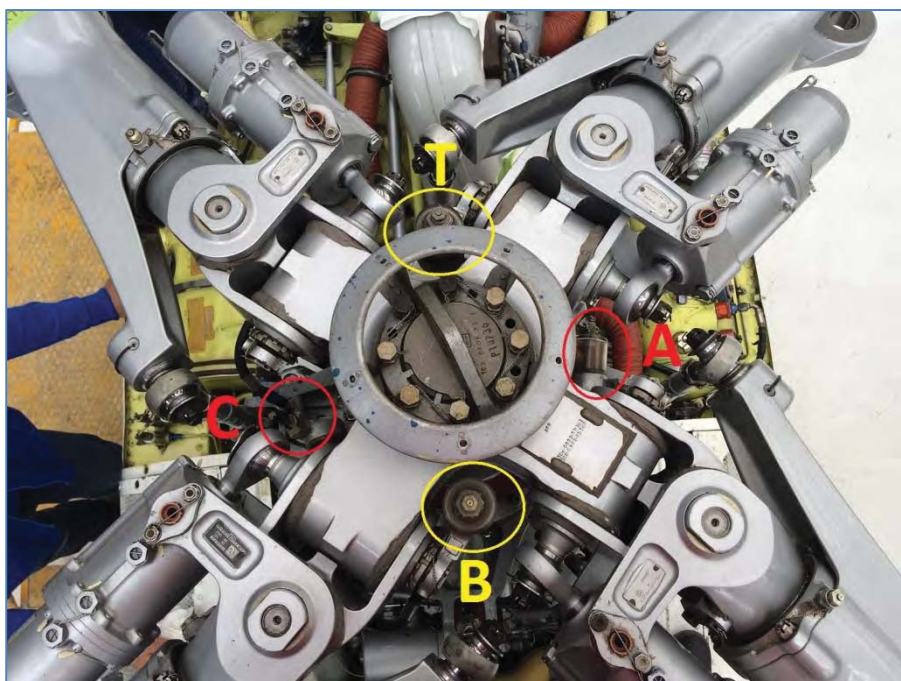
Note: See Annex C for Lag Dampers Historical Records and Overhaul Certification

Position	S/N	TSO	TSO date	Indication Pin position
<b>Target</b>	2220	10.32hrs	22/Nov/2010	Extended – OK
<b>A</b>	2193	10.32hrs	22/Nov/2010	Retracted – Fail
<b>B</b>	2450	10.32hrs	22/Nov/2010	Extended – OK
<b>C</b>	2182	10.32hrs	22/Nov/2010	Retracted – Fail



### M/R Oil Reservoirs condition:

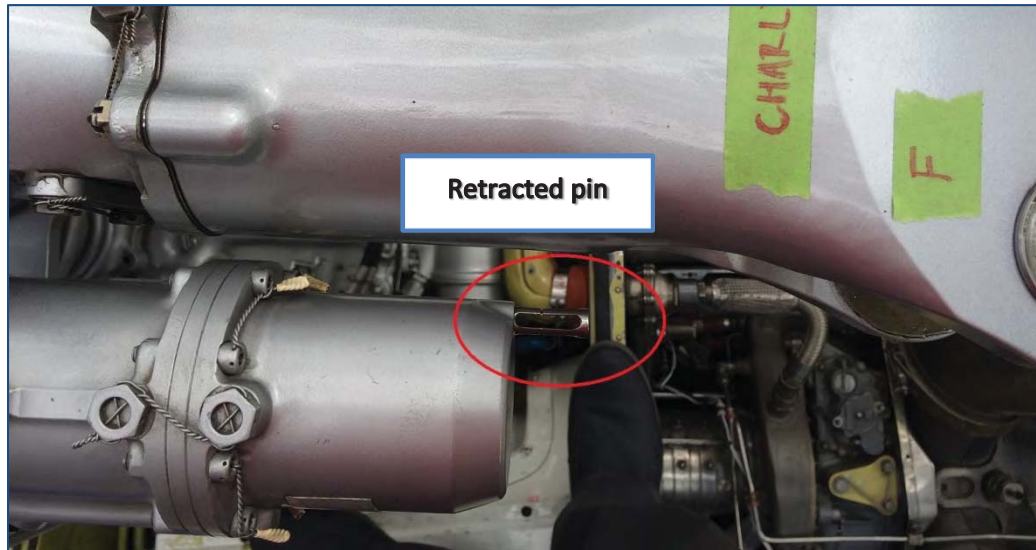
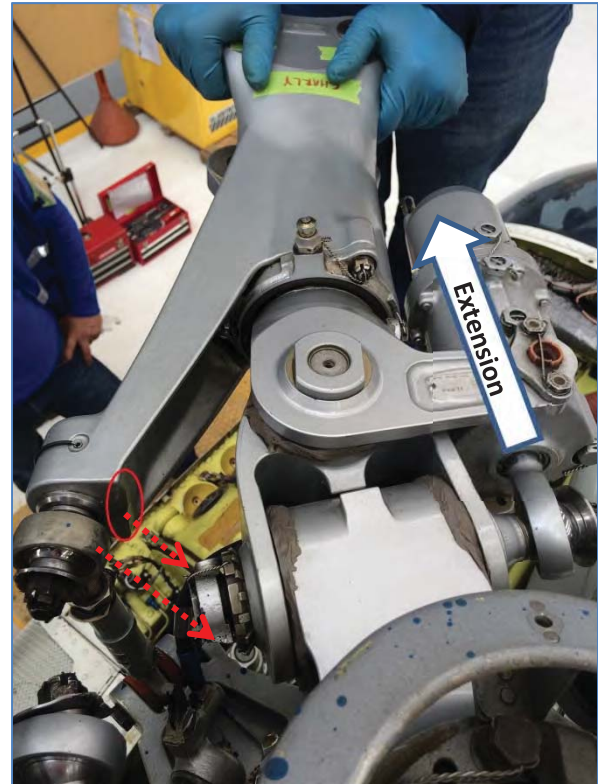
Position	Condition
<b>Target</b>	Installed
<b>A</b>	Broken
<b>B</b>	Installed
<b>C</b>	Broken





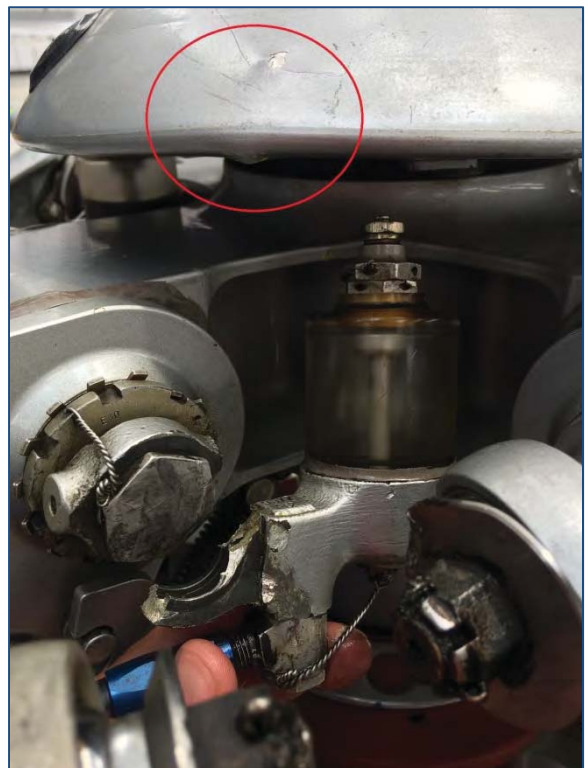
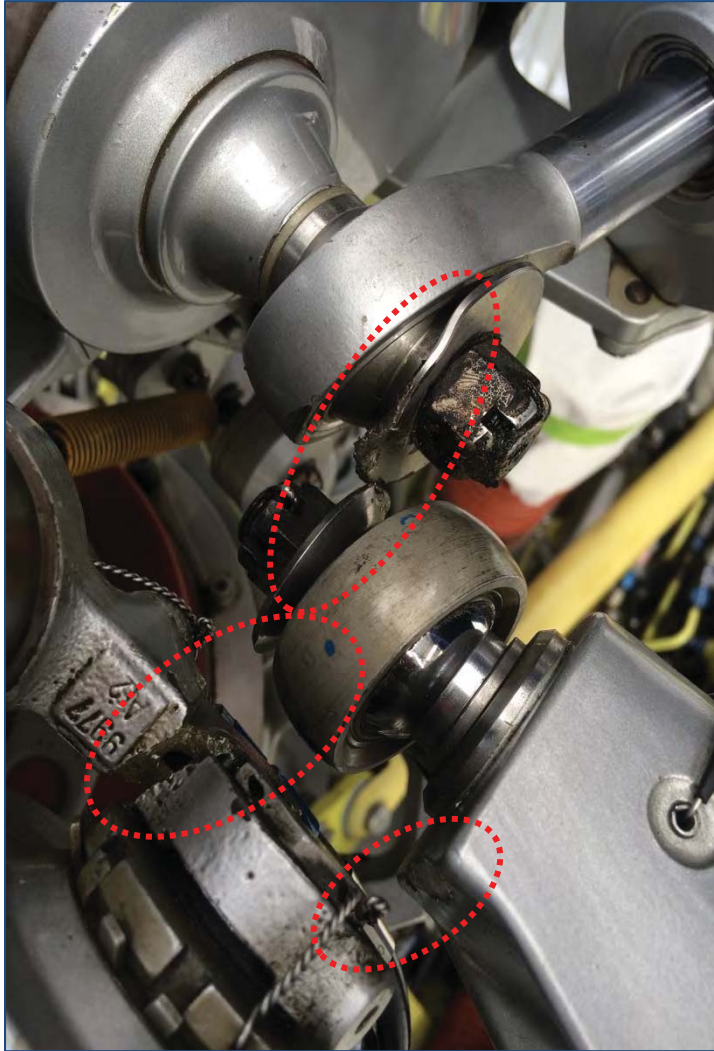
## Discoveries from damage pattern (Example of "C" Blade):

- Due mechanical damage found on Grip Assy P/N 709-0101-10-101 and Pitch link upper rod end 709-0101-18-105 is assumed the damper exceeded extension limits (retracting damper indicator pin position )



## Discoveries from damage pattern (Example of "C" Blade)... continue

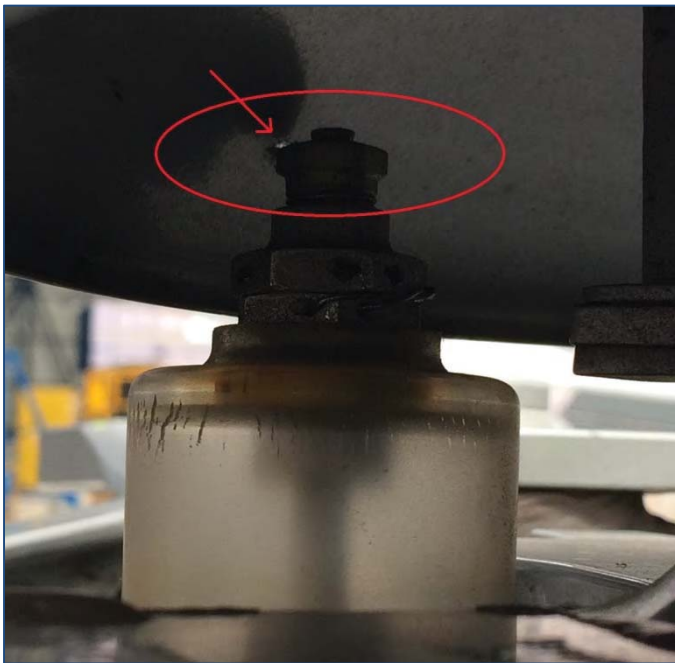
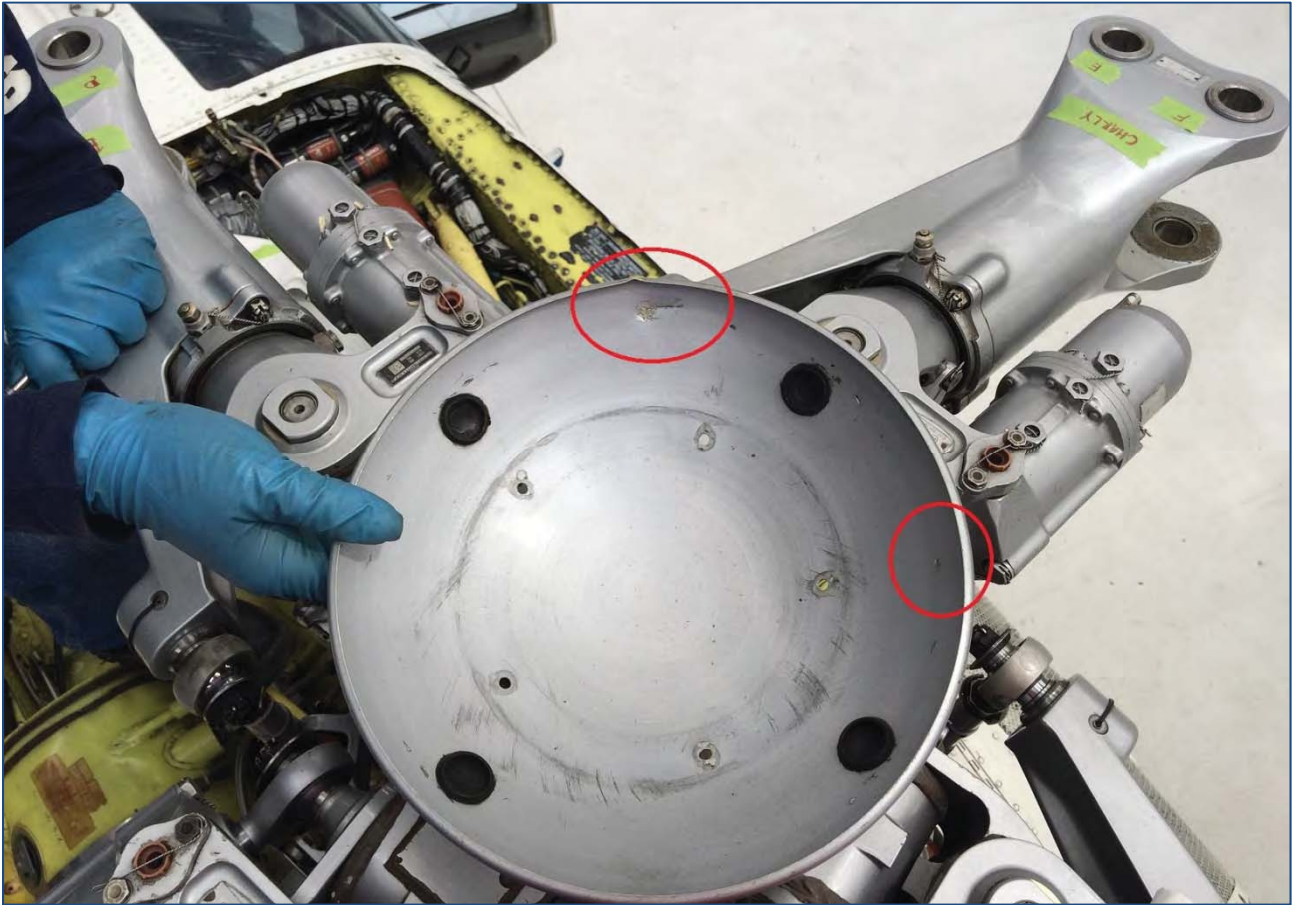
- When Lag Damper extended, the Grip Assy and Pitch Link rod end impacted the Body Oil Reservoir Assy P/N 109-0102-03-5 and Bolt P/N 109-0102-06-3. Also both flat washers P/N 109-0101-65-1 impacted each other.



**Additional, this impact moves the Oil reservoir assy upward hitting the Fairing Cover P/N 109-0855-40-101**



Damages on Fairing Cover P/N 109-0855-40-101 (internal view)

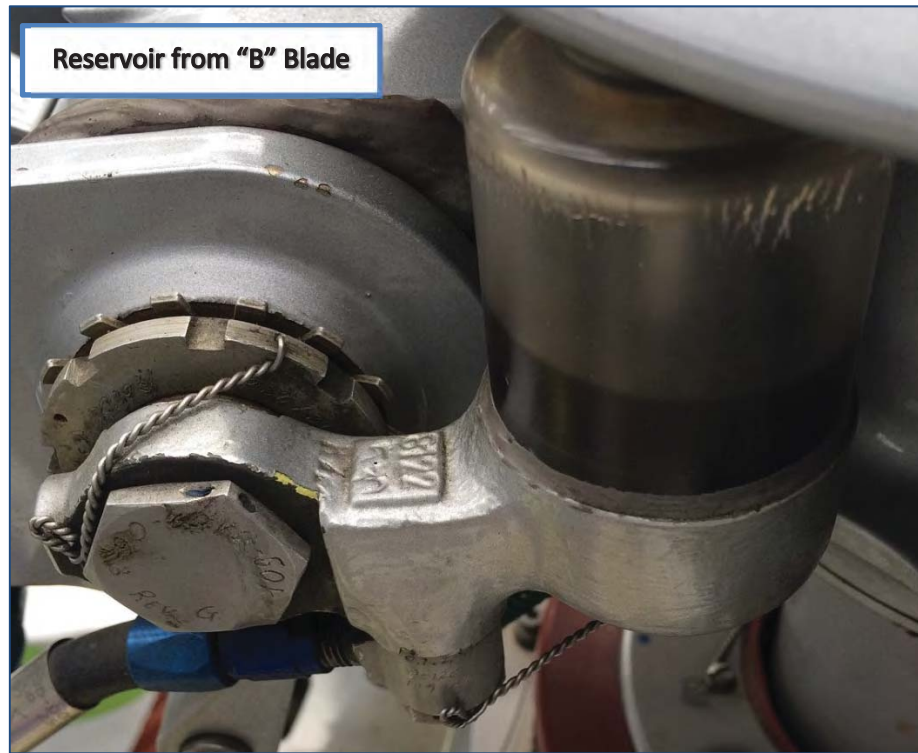


Same damage pattern on "A" Blade side.

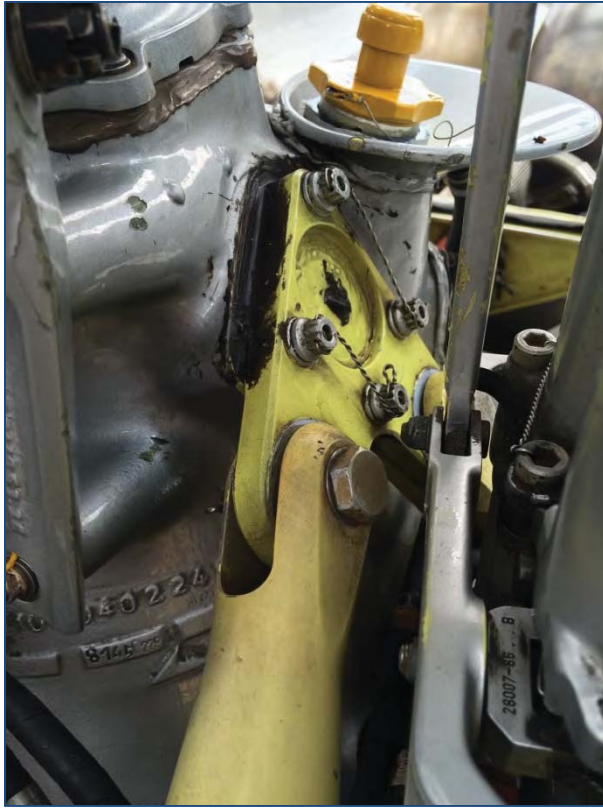




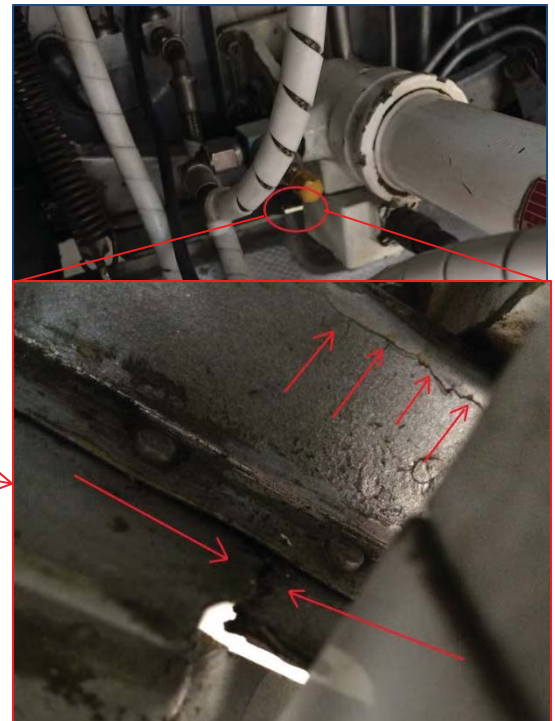
Oil Reservoirs didn't break



No damage found on Main Gearbox supports, either servo mounting area.



Evident fuselage damages in the MLG RH Support Assy area.





MLG Strut Shock Absorber Assy LH with 2 ½ in length against 1 ¾ in length on RH



**MLG Strut Shock Absorber**  
**P/N 109-0502-86-103**  
**S/N MN23**  
  
**Length: 2 ½ in**

**MLG Strut Shock Absorber**  
**P/N 109-0502-86-104**  
**S/N MN47**  
  
**Length: 1 ¾ in**

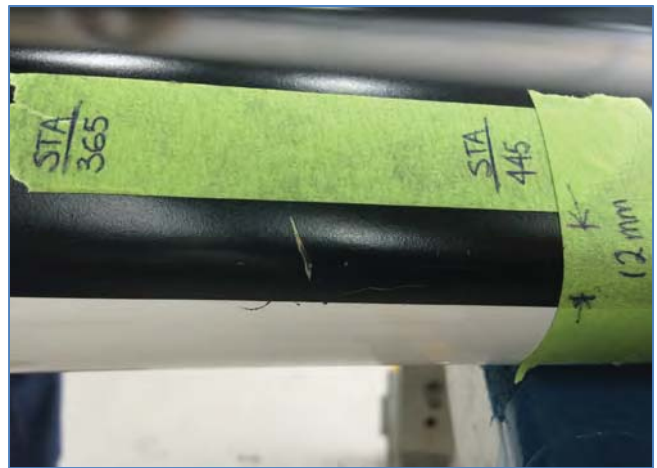
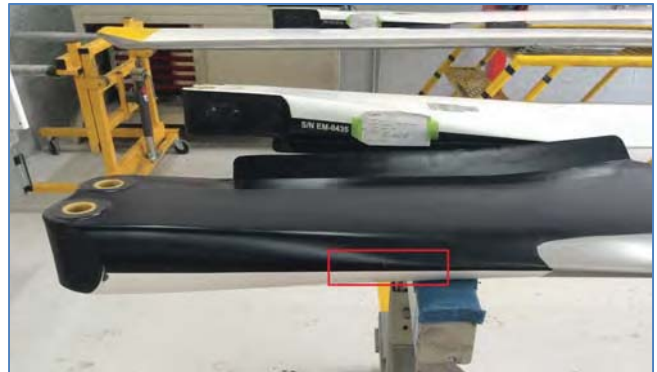


**Notes:**

1. After Nitrogen servicing on both MLG Strut Shock Absorber IAW MM, no leaks detected. Correct length reached.
2. No discrepancies noted on NLG Strut Shock Absorber, either in the attachment area.

**Main Rotor Blades P/N 709-0103-01-101 removed for inspection (visually & tapping)**

Position	S/N	Condition
Target	EM-0343	<ul style="list-style-type: none"> <li>Paint scratches between STA 365 &amp; 445</li> <li>12 mm scratch (0.002in depth) – no voids detected</li> <li>No airworthiness compromised</li> </ul>
A	EM-0238	OK
B	EM-0435	OK
C	EM-0393	OK



All Blades root bushing  
inspected IAW OM 62-12-25  
with satisfactory results



Main Rotor Blade Retention bolts inspected. 2 of them; P/N 109-8101-47-105 S/N S221 & V55 (from MRB S/N EM-0435 "B") with mechanical damages out of tolerances. Seems old discrepancy.

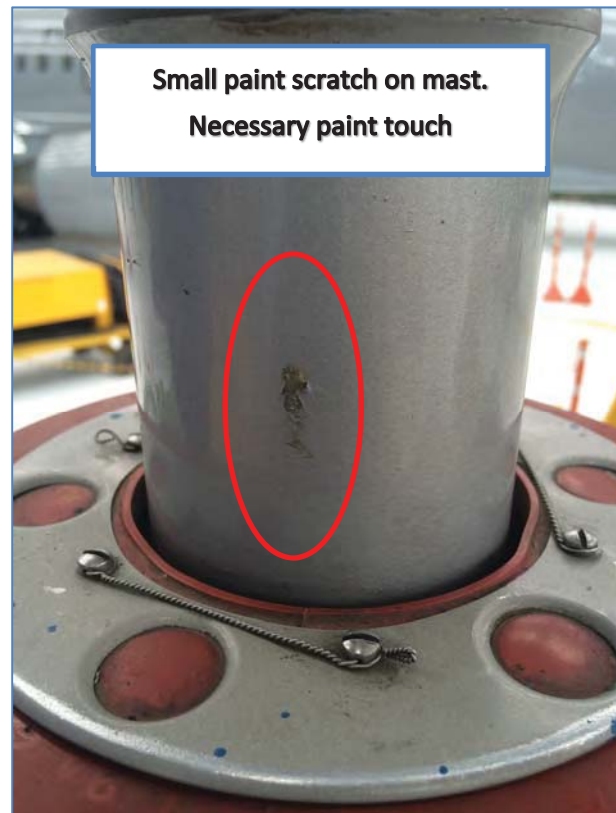


**Excessive roughness detected on  
Swashplate Assy Duplex Bearing  
P/N 109-0101-21-1.**

**Swashplate Assy  
P/N 109-0110-01-109 S/N 400**

**Suggested Swashplate Assy be  
sent to Overhaul for further  
evaluation**

Main Rotor Hub Assy P/N 109-0101-01-115 S/N 468 removed for better inspection.



**Damage on Lower Conical ring set P/N 109-0101-21-1 S/N A0128, replacement required**



General Visual Inspection in Engines area without discrepancies noted.



General Visual Inspection TRDS, TGB & T/R Rotating Controls without discrepancies noted. Also borescope inspection was performed inside the Tailboom, torque check to Fuselage-Tailboom attachment bolts with satisfactory results.





Landing Gear extension/retraction test (4 cycles) performed without discrepancies noted.



**Note:** Hydraulic Dual Indicator P/N 109-0729-87-101 is not working.



### Instrument Panel discrepancies:

- ✦ Even if the customer didn't report any engine exceedance occurred, both Turbine Outlet Temperature Indicators P/N 109-0900-14-101 show "red light" at the bottom as indication of exceedance occurred. Recommend to contact Rolls-Royce Technical Representative for additional assistance.
- ✦ Torquemeter Indicator P/N 109-0729-30-111 shows 40% from Engine #1.



### Additional discrepancies from M/R Hub Assy/Rotating Controls:

Grip Assy P/N 709-0101-10-101		
Position	S/N	Condition
Target	A0180	Nicks
A	A0158	Mechanical damage
B	A0167	Nicks
C	A0175	Mechanical damage
Note: "A" & "C" are scrap and recommend "T" & "B" send to OH Shop for further evaluation.		

Pitch Links Assy P/N 109-0110-71-107		
Position	S/N	Condition
Target	M010902199	Damaged upper rod end
A	Illegible	Damaged upper rod end
B	M020400334	Damaged upper rod end
C	M020400335	Damaged upper rod end
Note: Recommend send to OH Shop for further evaluation.		