| EASA | AIRWORTHINESS DIRECTIVE |
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| | **AD No.: 2013-0138R1**<br><br>**Date: 15 July 2013**<br><br>Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) No 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation. |

This AD is issued in accordance with EU 748/2012, Part 21.A.3B. In accordance with EC 2042/2003 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [EC 2042/2003 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [EC 216/2008, Article 14(4) exemption].

| **Design Approval Holder's Name:** | **Type/Model designation(s):** |
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| EUROCOPTER | AS 332 and EC 225 helicopters |

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| TCDS Number: | EASA.R.002 |
| Foreign AD: | Not applicable |
| Revision: | This AD revises EASA Emergency AD 2013-0138-E dated 09 July 2013, which superseded EASA Emergency AD 2012-0250-E dated 21 November 2012. |
| **ATA 63** | **Main Rotor Drive – Main Gear Box Bevel Gear Vertical Shaft – Inspection / Modification / Replacement / Limitation** |
| Manufacturer(s): | Eurocopter (formerly EUROCOPTER France) |
| Applicability: | AS 332 C, AS 332 C1, AS 332 L, AS 332 L1, AS 332 L2 and EC 225 LP helicopters, all serial numbers (S/N), if equipped with Main Gear Box (MGB) bevel gear vertical shaft Part Number (P/N) 332A32-5101-00, P/N 332A32-5101-05, P/N 332A32-5101-10 or P/N 332A32-5101-15, all S/N. |
| Reason: | Two separate events occurred in 2012 of EC 225 LP helicopters carrying out an emergency ditching in the North Sea after warning indication of MGB loss of oil pressure and subsequent additional red alarm on the MGB emergency lubrication system (EMLUB).<br><br>In both cases, a full circumferential crack of the lower vertical shaft of the MGB bevel gear occurred in the area where the two sections of the shaft are welded together. As a result, the vertical shaft ceased to drive the main and backup oil pumps, leading to warning indications of the loss of the MGB main and standby oil lubrication systems. The crew activated the EMLUB system and, following a subsequent warning indicating failure of that system, performed a controlled ditching into the sea.<br><br>To address the unsafe condition of MGB bevel gear vertical shaft failure, EASA issued Emergency AD 2012-0250-E, which superseded previously issued AD 2012-0225-E, AD 2012-0115-E, AD 2012-0107, AD 2012-0104 and AD 2012-0087-E. Refer to EASA AD 2012-0250-E for further information on the required airworthiness actions.<br><br>Since that AD was issued, the investigation of Eurocopter has determined that the MGB bevel gear vertical shaft failures resulted from a combination of |

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| | several factors, including stress hot-spots induced by the shaft geometry, residual stresses in the shaft weld material resulting from the manufacturing process and corrosion pitting inside the shaft on areas where gear spline wear particles had accumulated (further descriptive information is provided in Eurocopter Safety Information Notice SIN 2600-S-00) .<br><br>Prompted by these findings, Eurocopter issued a batch of Alert Service Bulletins (ASB), as ASB No.EC225-04A009 Revision 3, ASB No.EC225-45A010 and ASB No.EC225-05A036 for the EC 225 helicopters, and ASB No.AS332-01.00.82 Revision 3 and ASB No.AS332-05.00.96 for the AS 332 helicopters, to provide modifications and instructions aiming at monitoring and detecting vertical shaft crack conditions, and in addition at reducing the likelihood of any shaft crack initiation.<br><br>For the reasons described above, this new AD supersedes AD 2012-0250-E, retaining its requirements for the EC 225 helicopters equipped with a Vibration Health Monitoring (VHM) system (also known as M'ARMS) pending mandatory modification with a M'ARMS MOD45 monitoring function, and requiring for the other EC 225 and all AS 332 helicopters to perform repetitive Non Destructive Testing (NDT) inspections by Ultrasonic or Eddy Current method, as applicable. In addition, this AD requires repetitive cleaning of the shaft and installation of a new MGB oil jet.<br><br>Revision 1 of this AD is issued to correct the mod number (**MOD 07-53021** instead of MOD 47.53021) referenced in paragraph 10.3 of Required Action(s) and Compliance Time section of this AD. |
| Effective Date: | Revision 1: 15 July 2013<br><br>Original issue: 10 July 2013 |
| Required Action(s) and Compliance Time(s): | Required as indicated, unless accomplished previously:<br><br>(1) For all EC 225 helicopters (regardless whether equipped or not with the Eurocopter M'ARMS VHM system), before next flight, after 10 July 2013 [the effective date of the original issue of this AD], update the Emergency Procedures of the RFM by inserting a copy of the Appendix 1 and 2 of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No.EC225-04A009 Revision 3, and a copy of the Appendix 3 of Eurocopter ASB No.EC225-04A009 Revision 3, in Section 3 of the RFM of the helicopter.<br><br>This can also be accomplished by incorporating a later applicable RFM revision.<br><br>(2) For EC 225 helicopters equipped with a serviceable M'ARMS system, and operated over areas where emergency landing to ground is not possible within 10 minutes at Vy, after 10 July 2013 [the effective date of the original issue of this AD], accomplish the following actions:<br><br>(2.1) Before next flight, install a placard "**MAXIMUM CONTINUOUS TORQUE LIMITED TO 70% DURING LEVEL FLIGHTS AT IAS≥ 60 KTS**" in full view of the pilots, in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No.EC225-04A009 Revision 3.<br><br>(2.2) Before next flight, download M'ARMS data to review records of the indicator named MOD-45, accumulated over the last 20 flight hours (FH), and report to Eurocopter any MOD-45 download with inadequate records acquisition rate or any MOD-45 indication exceeding red threshold, in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No.EC225-04A009 Revision 3, and, before next flight, accomplish Eurocopter instructions accordingly.<br><br>(2.3) Within 3 FH, and thereafter at intervals not to exceed values calculated in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No. EC225-04A009 Revision |

3, download M'ARMS data to review MOD-45 indicator acquisitions recorded over the last performed flights and report to Eurocopter any MOD-45 indication exceeding red threshold, in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No.EC225-04A009 Revision 3, and before further flight, accomplish Eurocopter instructions accordingly.

(2.4) If, during any MOD-45 review as required by paragraph (2.3) of this AD, the last MOD-45 record occurred between 2 FH and 3 FH before the actual accumulated FH, carry out one maintenance flight, with minimum required flight crew and no passengers, for M'ARMS acquisition of additional records in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No.EC225-04A009 Revision 3, and thereafter, before next flight, accomplish MOD-45 indicator record download and review in compliance with paragraph (2.3) of this AD.

(2.5) If, during any MOD-45 review as required by paragraph (2.3) of this AD, the last MOD-45 record occurred more than 3 FH before the actual accumulated FH, before next flight, inspect the installed MGB bevel gear vertical shaft, for absence of cracks in the area of the weld, by one NDT method (Eddy Current or Ultrasonic) in accordance with instructions of Eurocopter ASB No.EC225-04A009 Revision 3, and if any crack is found, before next flight, replace the vertical shaft with a serviceable part.

(2.6) Inspection of the installed MGB bevel gear vertical shaft, for absence of cracks in the area of the weld, by one NDT method in accordance with instructions of Eurocopter ASB No.EC225-04A009 Revision 3, allows, if no crack is found, to fly the helicopter up to maximum inspection intervals specified in Table 1 below, as applicable depending on the NDT inspection method, in lieu of the requirements of paragraph (2.3) of this AD.

Table 1

| **NDT inspection method** | **Interval inspection** (i.e. max. flight time permitted between two inspections) |
|---|---|
| Eddy Current inspection | 10 FH |
| Ultrasonic Inspection | 11,5 FH |

The Eddy Current inspection can be used until 30 September 2013. From 1 October 2013, the Ultrasonic inspection (at interval not to exceed 11,5 FH) is the only acceptable NDT method that can be used.

(2.7) For helicopters needing to operate at **non-reduced MCP flight regime**, in lieu of the actions as required by paragraph (2.1) and paragraph (2.3) of this AD, before next flight and, thereafter, at intervals not to exceed 8 FH, accomplish an Ultrasonic inspection of the installed MGB bevel gear vertical shaft, for absence of cracks in the area of the weld, in accordance with instructions of Eurocopter ASB No. EC225-04A009 Revision 3, and if any crack is found, before next flight, replace the vertical shaft with a serviceable part.

(3) For EC 225 helicopters equipped with a serviceable M'ARMS system, not later than 31 August 2013, modify the M'ARMS system of the helicopter by incorporating MOD 0726978 and MOD 0726994 (defined as "M'ARMS MOD45 monitoring") in accordance with the instructions of Eurocopter ASB No.EC225-45A010.

(4) Modification of an EC 225 helicopter as required by paragraph (3) of this

AD constitutes terminating action for all the requirements of paragraph (2) of this AD.

(4.1) Concurrent with the modification as required by paragraph (3) of this AD, accomplish the following actions:

(4.1.1) Remove the placard, as previously required by paragraph (2.1) of this AD, from the helicopter.

(4.1.2) Update the RFM of the helicopter by inserting the RFM supplement SUP.7 at Revision Normal RN0 (code-date 13-20) in accordance with the instructions of Eurocopter ASB No.EC225-45A010.

This can also be accomplished by incorporating a later applicable RFM revision.

(4.1.3) Update the Master Minimum Equipment List (MMEL) of the helicopter by inserting a copy of paragraph 4.E of Eurocopter ASB No.EC225-45A010 in Section 45.00.00 of the MMEL.

This can also be accomplished by incorporating a later applicable MMEL revision.

(4.2) Within 25 FH after modifying the helicopter as required by paragraph (3) of this AD, and, thereafter, at intervals not to exceed 25 FH, check the M'ARMS system in accordance with the instructions of Eurocopter ASB No. EC225-45A010.

(4.3) After modification of the helicopter as required by paragraph (3) of this AD, if during operation the helicopter experiences a lightning strike, before next flight, accomplish the applicable corrective actions in accordance with the instructions of Eurocopter ASB No.EC225-45A010.

(5) For EC 225 helicopters not equipped with a M'ARMS system, and EC 225 helicopters equipped with an unserviceable M'ARMS system, after 10 July 2013 [the effective date of the original issue of this this AD], accomplish one of the actions specified in paragraph (5.1) or (5.2) or (5.3) of this AD, as applicable:

(5.1) Before next flight, install a placard "**OPERATIONS WHICH DO NOT ENABLE EMERGENCY LANDING ON THE GROUND WITHIN 10 MINUTES AT Vy ARE PROHIBITED**" in full view of the pilots, in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No.EC225-04A009 Revision 3.

(5.2) For helicopters operated over areas where emergency landing to ground is not possible within 10 minutes at Vy, **at reduced MCP flight regime**:
Before next flight, install a placard "**MAXIMUM CONTINUOUS TORQUE LIMITED TO 70% DURING LEVEL FLIGHTS AT IAS≥ 60 KTS**" in full view of the pilots, in accordance with instructions of Eurocopter EC225 ASB No.04A009 Revision 2 or ASB No. EC225-04A009 Revision 3. Concurrently, and thereafter at intervals not to exceed the values specified in Table 1 of this AD, as applicable depending on the NDT inspection method, inspect the installed MGB bevel gear vertical shaft, for absence of cracks in the area of the weld, in accordance with instructions of Eurocopter ASB No.EC225-04A009 Revision 3, and if any crack is found, before next flight, replace the vertical shaft with a serviceable part.

(5.3) For helicopters operated over areas where emergency landing to ground is not possible within 10 minutes at Vy, **at non-reduced MCP flight regime**:
Before next flight and, thereafter, at intervals not to exceed 8 FH, accomplish an Ultrasonic inspection of the installed MGB bevel

gear vertical shaft, for absence of cracks in the area of the weld, in accordance with instructions of Eurocopter ASB No.EC225-04A009 Revision 3, and if any crack is found, before next flight, replace the vertical shaft with a serviceable part.

(6) Following rectification of the M'ARMS system for an EC 225 helicopter equipped with an unserviceable Eurocopter M'ARMS system, the requirements of paragraph (2), or the requirements of paragraphs (3) and (4) of this AD, as applicable, must be applied to that helicopter. Concurrently, the placard as previously required by paragraph (5.1) or (5.2) of this AD, as applicable, must be removed from the helicopter.

(7) For all AS 332 helicopters (regardless whether equipped or not with Eurocopter EuroARMS or EuroHUMS VHM system), after 10 July 2013 [the effective date of the original issue of this AD], accomplish either the action specified in paragraph (7.1) of this AD, or the actions specified in paragraph (7.2) of this AD:

(7.1) Before next flight, install a placard "**OPERATIONS WHICH DO NOT ENABLE EMERGENCY LANDING ON THE GROUND WITHIN 10 MINUTES AT Vy ARE PROHIBITED**" in full view of the pilots, in accordance with instructions of Eurocopter AS332 ASB No.01.00.82 Revision 2 or ASB No.AS332-01.00.82 Revision 3.

(7.2) For helicopters operated over areas where emergency landing to ground is not possible within 10 minutes at Vy:
Before next flight, and thereafter at intervals not to exceed the values specified in Table 2 below, as applicable to helicopter Model, accomplish an Eddy Current inspection of the installed MGB bevel gear vertical shaft, for absence of crack in the area of the weld, in accordance with instructions of Eurocopter ASB No.AS332-01.00.82 Revision 3, and if any crack is found, before next flight, replace the vertical shaft with a serviceable part.

Table 2

| **Helicopter Model** | **Interval inspection** (i.e. max. flight time permitted between two Eddy Current inspections) |
|---|---|
| AS 332 L2 | 10 FH |
| AS 332 C, AS 332 C1, AS 332 L, AS 332 L1 | 11 FH |

Note: Eddy Current is the only possible NDT inspection method for the AS 332 helicopters.

(8) For all AS 332 helicopters (regardless whether equipped or not with Eurocopter EuroARMS or EuroHUMS VHM system), installation of a MGB bevel gear vertical shaft with a P/N 331A32-3115-xx constitutes terminating action for the requirements of this AD for that helicopter. Concurrently, remove the placard, which was installed as required by paragraph (7.1) of this AD, from the helicopter.

(9) For all EC 225 and AS 332 helicopters, not later than 31 August 2013, remove any MGB bevel gear vertical shaft with a P/N 332A32-5101-00, P/N 332A32-5101-05, P/N 332A32-5101-10 or P/N 332A32-5101-15, having a S/N from M330 (inclusive) through M340 (inclusive) and from S/N M370 (inclusive) through M5000 (exclusive), and replace it with a serviceable part.

(10) For all EC 225 and AS 332 helicopters, after 10 July 2013 [the effective date of the original issue of this AD], accomplish the following actions:

(10.1) Initially, within the compliance time thresholds specified in Table 3

below, as applicable, and thereafter at intervals not to exceed 400 FH or 24 months, whichever occurs first, clean the inside of the installed MGB bevel gear vertical shaft in accordance with the instructions of Eurocopter ASB No.EC225-05A036 or ASB No.AS332-05.00.96, as applicable to helicopter Model.

Table 3

| **Shaft S/N** | **Compliance time** (whichever occurs first) |
|---|---|
| S/N before S/N M5000 (exclusive) | Within 150 FH or 1 month |
| S/N after S/N M5000 (inclusive), and with less than 250 FH since new or overhaul | Before accumulation of 400 FH |
| S/N after S/N M5000 (inclusive), and with 250 FH or more since new or overhaul | Within 150 FH or 1 month |

(10.2) Concurrent with each cleaning, for those MGB bevel gear vertical shaft having a S/N before S/N M5000 (exclusive), as required by paragraph (10.1) of this AD, replace the plug in the shaft bore hole, with a new plug P/N 332A088901-20, corresponding to MOD 332A088901, in accordance with instructions of Eurocopter ASB No.EC225-05A036 or ASB No.AS332-05.00.96, as applicable to helicopter Model.

(10.3) Within 150 FH, modify the MGB of the helicopter by incorporating MOD 07-53021 for replacement of one MGB oil jet in accordance with instructions of Eurocopter ASB No.EC225-05A036 or ASB No. AS332-05.00.96, as applicable to helicopter Model.

Ref. Publications:

Eurocopter EC225 ASB No.04A009 Revision 2 dated 21 November 2012 and ASB No.EC225-04A009 Revision 3 dated 08 July 2013.

Eurocopter ASB No. EC225-45A010 original issue, dated 08 July 2013.

Eurocopter ASB No. EC225-05A036 original issue, dated 08 July 2013.

Eurocopter AS332 ASB No.01.00.82 Revision 2 dated 21 November 2012 and ASB No.AS332-01.00.82 Revision 3 dated 08 July 2013.

Eurocopter ASB No. AS332-05.00.96 original issue, dated 08 July 2013.

The use of later approved revisions of these documents is acceptable for compliance with the requirements of this AD.

Remarks:

1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.
2. Based on the required actions and the compliance time, EASA have decided to issue a Final AD with Request for Comments, postponing the public consultation process until after publication.
3. Enquiries regarding this AD should be referred to the Safety Information Section, Executive Directorate, EASA. E-mail: ADs@easa.europa.eu.
4. For any question concerning the technical content of the requirements in this AD, please contact:
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