GSAC

AIRWORTHINESS DIRECTIVE

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Inspection and/or modifications described below are mandatory. No person may operate a product to which this Airworthiness Directive applies except in accordance with the requirements of this Airworthiness Directive.

Translation of 'Consigne de Navigabilité' ref. : 2002-415(B) R2
In case of any difficulty, reference should be made to the French original issue.

AIRBUS

A340 aircraft

THSA - Repetitive inspection and modification of ball-nut transfer tubes, repetitive inspection and greasing of the screw/nut assembly (ATA 27)

1. **APPLICABILITY:**

AIRBUS A340 aircraft, models -211, -212, -213, -311, -312 and -313, all serial numbers.

2. **REASONS:**

2.1. Several cases of transfer tube disconnection from the ball-nut of the trimmable horizontal stabilizer actuator (THSA) P/N 47172 and 47147-400 were detected on the ground during greasing and maintenance.

This situation is caused by water ingress into the ball-nut resulting in the jamming of the ball transfer circuit when the water freezes.

If the three (independent) ball circuits are lost, then the THSA will operate on a fail-safe nut. This nut (which operates without balls) would then jam after several movements on the screw of the THSA. This degraded operation is not detectable in the cockpit by the crew as long as the THSA does not jam and could damage the ball screw and the fail-safe nut.

This situation was judged as unacceptable and the aim of the Airworthiness Directive (AD) 2001-357(B) R2 was to render mandatory the repetitive inspection of the transfer tubes and their collars in order to detect at an early stage any distortion or initiation of disconnection.

Further to a new case of transfer tube disconnection, AD 2001-357(B) R2 introduced a repetitive greasing task with reinforcement of the ball-nut maintenance greasing instructions.

In addition, the electrical flight control computers monitor the operation of the THSA and the jamming of this actuator could be detected and indicated by messages on the maintenance system and on the ECAM. In this case a mandatory inspection of the THSA is required before the next flight.

2.2. The AD 2002-037(B) required application of a final fix [related to inspection and greasing task required by AD 2001-357(B)] for the THSA P/N 47172 by application of the AIRBUS modification 49590/Service Bulletin (SB) AIRBUS A340-27-4089. It changes the THSA P/N from 47172 to 47172-300.

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2.3. <u>This new AD is issued</u>:

2.3.1. For THSA's P/N 47147-400 and 47172,

to repeat the ball transfer tube repetitive inspection actions every 150 FH, rendered mandatory by AD 2001-357(B) R2.

The ball-nuts of THSA's P/N 47147-400 and 47172 use ceramic balls both for the spacer and loaded balls. Following internal contamination, resistance to or jamming of ball transfer induces high loads in the transfer tubes leading to disconnection of the tubes. The loads are higher with ceramic balls due to a higher friction coefficient between the ceramic material and the screw/nut.

2.3.2. For all THSA's P/N 47147-XXX, 47172 and 47172-300,

The THSA has two load transmission channels allowing transfer of the loads to the secondary nut in case of malfunction of the primary nut. When the secondary nut is under load, the friction increases between the titanium nut and the steel screw and should lead to the jamming of the THSA after several movements. During bench tests with simulation of flight conditions and application of loads to the secondary nut significant damage was observed on the screw and secondary nut after several flights. If operation on the secondary nut is not detected by the flight control primary computer (FCPC), a malfunction of the primary channel can lead to damage to the screw and secondary nut and, in the extreme case, lead to unwanted runaway of the trimmable horizontal stabilizer.

In order to ensure full integrity of the primary and secondary channels of the THSA, a repetitive inspection of the screw/nut assembly every 700 flight hours (FH) is required by this AD.

2.3.3. For all THSA's P/N 47147-XXX, 47172 and 47172-300,

to extend to all THSA's the repetitive greasing actions every 700 FH, in replacement of those rendered mandatory every 150 FH by AD 2001-357(B) R2.

This greasing reduces the risk of contamination of the ceramic or metal ball circuits.

2.3.4. For THSA P/N 47172,

to restate the requirement for final fix (modification of THSA P/N 47172 to P/N 47172-300 by modification 49590/SB AIRBUS A340-27-4089) rendered mandatory by AD 2002-037(B), before December 31, 2003.

2.3.5. For THSA P/N 47147-400,

to render mandatory the final fix modification of THSA P/N 47147-400 to P/N 47147-500 (by modification 49591/SB AIRBUS A340-27-4099) before July 31, 2004.

Consequently, this AD replaces the AD's 2001-357(B) R2 and 2002-037(B).

2.4. The Revision 1 was issued:

- to confirm, in paragraph 3.2. "Compliance", that inspection of the screw/nut assembly is repetitive every 700 FH, as already mentioned in paragraph 2.3.2 "Reasons" of this AD at original issue,
- to give more details for a good understanding of the AD content.

2.5. Revision 2 of this AD takes into account the replacement of the AOT AIRBUS A340-27A4107 Revision 1, by AIRBUS SB A340-27-4107 Revision 2.

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3. COMPLIANCE:

3.1. THSA's P/N 47147-400 and 47172 inspection

3.1.1. Unless already accomplished, not later than 150 FH counted from the last inspection as per AD 2001-357(B) R2:

visually inspect the transfer tubes and the collars of the ball-nut of the THSA in accordance with the instructions given in SB A340-27-4093 Revision 3.

3.1.2. If the rejection criteria defined in paragraph 3.B(1)c) of the SB mentioned in paragraph 3.1.1. of this AD are met, replace the THSA by an airworthy THSA before the next flight in accordance with the instructions of the paragraph 3.B(1)c) of the SB mentioned in paragraph 3.1.1. of this AD.

3.1.3. Repeat the THSA inspection and/or replacement actions as described in paragraphs 3.1.1. and 3.1.2. above at intervals not exceeding 150 FH.

3.1.4. If one of the "PRIM X PITCH FAULT" or "STAB CTL FAULT" messages is displayed on the ECAM associated with the "PITCH TRIM ACTR (1CS)" maintenance message, inspect and replace, if necessary, the THSA before the next flight following the messages display in accordance with paragraphs 3.1.1 and 3.1.2 above.

3.1.5. In case of anomaly, inform AIRBUS of the inspection results.

3.2. Screw/nut assembly inspection of all THSA's P/N 47147-XXX, 47172 and 47172-300 to ensure the integrity of the primary and secondary load paths

3.2.1. Unless already accomplished, not later than 700 FH from the effective date of this AD at original issue, visually inspect the ball screw assembly and check the gap at the secondary nut trunnion in accordance with the instructions of AIRBUS SB A340-27-4107 Revision 2 paragraphs 3.B.(1) and 3.B.(2).

3.2.2. Repeat the inspection defined in above paragraph 3.2.1. at intervals not exceeding 700 FH.

3.2.3. If one of the "PRIM X PITCH FAULT" or "STAB CTL FAULT" messages is displayed on the ECAM associated with the "PITCH TRIM ACTR (1CS)" maintenance message, inspect and check the THSA before the next flight following the messages display in accordance with paragraph 3.2.1. above.

3.2.4. If the rejection criteria as defined in paragraph 3.B.(3). of the SB AIRBUS A340-27-4107 Revision 2 are met, before the next flight following the inspection of paragraph 3.2.1. and paragraph 3.2.2. of this AD, replace the THSA by an airworthy THSA in accordance with the instructions of the paragraph 3.B.(3). of the SB AIRBUS A340-27-4107 Revision 2.

3.2.5. In case of anomaly, inform AIRBUS of the inspection results.

3.3. Ball-nut greasing of all THSA's P/N 47147-XXX, 47172 and 47172-300

3.3.1. Before accumulation of 700 FH since the last greasing of the ball-nut, grease the THSA ball-nut in accordance with the instructions defined in AMM 12-22-27 page block 301.

3.3.2. Repeat the greasing task defined in above paragraph 3.3.1. at intervals not exceeding 700 FH.

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3.3.3. If, during the greasing procedure, the new grease is expelled from the transfer tube (instead of from the drain hole), before the next flight following this greasing procedure:

- for THSA P/N 47147-2XX, 47147-3XX, 47147-400 and 47172, replace the THSA by an airworthy THSA,
- for THSA P/N 47147-500 and 47172-300, contact AIRBUS.

3.4. Modification of THSA P/N 47172

Before December 31, 2003, modify the ball-nuts of THSA P/N 47172 in accordance with the instructions of SB AIRBUS A340-27-4089, THSA P/N 47172 becomes P/N 47172-300.

Note: This action renders the instructions for inspections every 150 FH of paragraph 3.1. above null and void.

3.5. Modification of THSA's P/N 47147-400 and 47147-2XX/3XX

Before July 31, 2004,

- modify the ball-nuts of THSA P/N 47147-400 in accordance with the instructions of SB AIRBUS A340-27-4099, THSA P/N 47147-400 becomes P/N 47147-500.
- modify THSA's P/N 47147-200, -210, -213, -300, -313 and -350 in accordance with the instructions given in AIRBUS SB A340-27-4099 and AIRBUS SB A340-27-4059. The THSA's P/N 47147-2XX/3XX become P/N 47147-300.

Note: This action renders the instructions for inspections every 150 FH of paragraph 3.1 above null and void.

REF.: - AIRBUS Service Bulletin A340-27-4059
- AIRBUS Service Bulletin A340-27-4089
- AIRBUS Service Bulletin A340-27-4093 Revision 3
- AIRBUS Service Bulletin A340-27-4099
- AIRBUS Service Bulletin A340-27-4107 Revision 2
(Any later approved version of the above SB's is acceptable)
AMM 12-22-27 page block 301.

This Revision 2 replaces AD 2002-415(B) R1, issued on September 04, 2002.

EFFECTIVE DATES :

Original AD : AUGUST 17, 2002
Revision 1 : SEPTEMBER 14, 2002
Revision 2 : NOVEMBER 09, 2002