

**Enstrom 280FX,
G-OJBB**

**Rhobell Fawr,
Dolgellau, Gwynedd**

25 August 2021

Accident

Investigation Synopsis

The helicopter suffered a loss of thrust from the tail rotor while hovering close to the ground near a mountain top, resulting in a loss of control and hard landing. Subsequent examination of the tail rotor gearbox revealed damage to the bevel gears and failure of a bearing, which was consistent with a lack of lubrication. The investigation found inconsistencies in the way maintenance was performed on the tail rotor gearbox, compared to the helicopter manufacturer's maintenance instructions. It is likely that insufficient oil was added to the tail rotor gearbox when it was serviced 25 flying hours prior to the accident.

Three Safety Recommendations are made relating to information in the helicopter Maintenance Manual regarding the required oil quantity and maintenance servicing interval for the tail rotor gearbox.

Safety Recommendation 2023-001

Justification

The engineer's target fill level when replenishing the TRGB oil was the centre of the sight glass. This differed from the MM Section 4-15 servicing requirement which stated: 'Add 5oz./.147l of oil if servicing the transmission after draining or slowly add oil until oil flows from the filler port.'

It was not clear how the engineer had come to this understanding, but the investigation considered factors which may have contributed. Of note is that the target oil level for the main rotor gearbox is at the centre of the sight glass, and this may have been a source of confusion. Additionally, MM Section 4-15 included a note which stated that: 'When the tail rotor transmission is properly serviced (5 oz/.147 l), the sight glass will be completely full. The [tail rotor] transmission oil level is serviceable until the oil level is at the center [sic] of the sight glass.' The language employed in the second sentence of this note focuses solely on the serviceable condition. It does not draw attention to the point at which the TRGB oil level would become unserviceable, nor contain any cautions or warnings regarding the TRGB oil level. Nor did this section highlight the different target fill levels for the main and tail rotor gearboxes.

Therefore, the following safety recommendation was made:

Safety Recommendation 2023-001

It is recommended that Enstrom Helicopter Corporation amends the wording in Section 4-15 of the Enstrom F28F and 280F series Maintenance Manual, to clearly identify the minimum and maximum oil levels required for tail rotor gearbox operation.

Date Safety Recommendation made: 29 December 2022

LATEST RESPONSE

Response received: 07 April 2023

Enstrom are reviewing the wording of section 4-15 with the intent of clarifying the proper minimum and maximum oil levels and clarifying when oil should be added and when the oil should be changed. Enstrom also anticipate adding guidance as to when the sight glass should be cleaned. This will be covered in the Service Information Letter initially, and it will be transferred into the appropriate maintenance manual as they are revised.

Safety Recommendation Status **Closed**

AAIB Assessment **Adequate**

Action Status **Planned Action Completed**

RESPONSE HISTORY

N/A

Safety Recommendation 2023-002

Justification

The MM was not consistent in the quantity of oil specified for the TRGB, with three differing values quoted: '5 ounces/.15 litres', '5 US Ounces/.15 Litres' and '5 oz /.147 l'. Although the difference between 5 US ounces and 5 imperial ounces is less than 6 ml, and which alone would not result in significant underfilling of the TRGB oil level such that it was unserviceable, it could result in less than the optimum amount of oil being added during maintenance. Additionally, inconsistency in the specified quantity could create confusion.

Therefore, the following safety recommendation was made:

Safety Recommendation 2023-002

It is recommended that Enstrom Helicopter Corporation amends the Enstrom F28F and 280F series Maintenance Manual to achieve a consistent reference to the required quantity of oil for the tail rotor gearbox.

Date Safety Recommendation made: 29 December 2022

LATEST RESPONSE

Response received: 07 April 2023

Enstrom agrees. This is a potential source of confusion and should be corrected. Initially, the Service Information Letter will confirm the correct quantity. As with the previous recommendation, the manuals will be corrected the next time they are revised.

Safety Recommendation Status Closed

AAIB Assessment Adequate

Action Status Planned Action Completed

RESPONSE HISTORY

N/A

Safety Recommendation 2023-003

Justification

Up to August 2020 G-OJBB was maintained under the CAA's LAMP(H), which stated that 50 hour, 100 hour and annual check items should be accomplished at an annual inspection. For the task specifically relating to transmission oil change it stipulated a maintenance interval of 100 hours or 'in accordance with the type design organisation recommendations.' G-OJBB's maintenance programme (SDMP) at the time of the accident was based entirely on the helicopter and engine manufacturer's recommended maintenance schedule. Part-ML does not define a MIP for light rotorcraft and therefore contains no additional requirements for the periodicity of specific maintenance inspections. The absence of such information in regulation places emphasis on the need for clarity in the manufacturer's maintenance instructions.

Therefore, the following safety recommendation was made:

Safety Recommendation 2023-003

It is recommended that Enstrom Helicopter Corporation amends the 100 hr/Annual checklist and other related sections of the Enstrom F28F and 280F series Maintenance Manual to clearly reflect the intended periodicity for changing the tail rotor transmission oil.

Date Safety Recommendation made: 29 December 2022

LATEST RESPONSE

Response received: 07 April 2023

Enstrom believes the issue surrounding this safety recommendation is a result of the mechanic's (engineer's) somewhat loose interpretation of required maintenance period combined with some ambiguity as to what constitutes "servicing" the transmission. The Service Information Letter will attempt to clarify the maintenance period, however as the AAIB noted, some of the "flexibility" in the interpretation is a result of the CAA's regulations. Enstrom cannot anticipate all of the possible inconsistencies of all of the regulatory authorities around the world. Enstrom will clarify when the transmission oil should be changed, when it should be "topped off", and when it can be checked (via the sight glass) and returned to service without further action.

We expect to be able to release this Service Information Letter on or before 28 April 2023.

Safety Recommendation Status Closed

AAIB Assessment Partially Adequate

Action Status Planned Action Completed

Feedback rationale

Although Enstrom had declined to change the 100hr / annual checklist itself, additional clarity has been provided in the SIL and this, in part, addresses the intent of Safety Recommendation 2023-003. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

N/A