

This document is a translation made by SHK of the original response in Swedish to the safety recommendation. In case of discrepancies between this translation and the Swedish original text, the Swedish text shall prevail in the interpretation of the response.

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Measures taken by the Swedish Armed Forces in response to SHK's investigation RM 2019:02, report regarding accident involving a JAS 39C in Möljeröd

Background

In its final report RM 2019:02, the Swedish Accident Investigation Authority (SHK) has issued three recommendations to the Swedish Armed Forces (FM), to be taken care of no later than 20 November 2019. This statement specifies which measures the Armed Forces has taken or plans to take, as well as the delegation of responsibilities for each recommendation.

Recommendations

- 1) Investigate the need, if any and if deemed appropriate, to develop and introduce a function for information regarding the bird hazard being present in the vicinity of the airports from which the Armed Forces operates. (*RM 2019:02 R1*)
- 2) Investigate the need for, and if appropriate establish, a minimum altitude for ejection in the event of engine failure. (*RM 2019:02 R2*)
- 3) Develop a procedure for managing ground and environmental damage and decontamination following an air crash and ensure that this procedure is known within the Armed Forces and the various units. (*RM 2019:02 R3*)

Response to recommendation RM 2019:02 R1

Statistics regarding bird collisions involving all of FM's flight systems have been analysed from 1973–2019. The decommissioning of the bird warning system used by the Air Force from 1978 until 1998 did not entail any change in the slight downwards trend seen in the number of bird collisions.

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During the years that the bird warning system was operational, FM has, as somewhat of a contradiction, had a higher number of bird collisions per 10,000 fh than in the periods both before and after. A likely reason would be that pilots have a good basic awareness of when and where to expect a significant presence of birds. The method of being on the lookout for birds that is taught by the Air Force is likely more of a deciding factor in avoiding bird collisions than the actual bird forecasts. Another explanation model is that the presence of a warning system has in itself given pilots a false sense of security, meaning they have not taken cautionary measures in the same way when the presence of birds has been classed as low.

Bird collisions per 10,000 FH**Blue marking for the period where the bird forecasts were used**

[Diagram]

Per FH

Linearly (per FH)

Bird collisions per 10,000 FH**Blue marking for the period where the bird forecasts were used**

[Diagram]

Trainer SK 60

Draken

Viggen

Gripen

Today, there are more modern systems for warning of the presence of birds, which are based on radar surveillance of the area surrounding an airport. From 1973 until today, only around 42% of the bird collisions involving FM have occurred around airports during approach, climb, instrument approach, take-off, landing and movement on the ground. Considering the lower speeds usually used in TMA, it is not, historically speaking, around airports, but rather during tactical flights in training areas, that bird collisions with major damage to the aircraft usually occur.

At FM airports, the visual monitoring of birds is currently performed, and daily measures are taken to deter and sometimes hunt birds, as well as to adapt runway use to avoid birds, during those occasions where there is a high presence of birds.

Considering the above, FM does not consider the benefits of introducing a radar system to monitor bird presence around the airport to outweigh the costs of developing a separate system for this purpose. However, along with FMV, FM is investigating a warning system for both UAV and birds around airports. No decision regarding acquisition has been made at present, but any future warning systems for UAV around airports should be specified to also warn of the presence of birds.

The timeframe of the study regarding a warning system for UAV and birds has not been established at present.

Responsible for the study: FVC

The second proposal for a system for bird detection provided in the report is the possibility of modifying the radar of the JAS39 to detect birds. Out of the bird collisions involving FM since 2016 (when the JAS39 was introduced), around 32% have involved the JAS39, which means that around one third of the bird collisions could potentially be prevented with such a modification. A modification of the radar on the JAS39 is not currently included in the capacity development of the JAS39 and such a development of the radar, as it involves renegotiating the current development contract, would likely delay other important capacity increases in the JAS39 system, which are important to its tactical capabilities.

Considering the above, FM does not intend to initiate the development of a bird warning in the radar of the JAS39.

Response to recommendation 2019:02 R2

AOM JAS39¹ only indicates the lowest altitude for ejection in uncontrolled flight mode and the recommended lowest altitude for safe ejection during instrument descent. In the accident in question, the pilot ejected with external references after taking measures first to analyse the fault situation and then partially performed measures to restart the engine. He estimated visually that he ejected at around 150 m, but in reality he left the aircraft at just over 80 m.

FM makes the assessment that there is a risk that a fixed value, stating the lowest altitude for ejection, could be interpreted as a point until which you should remain and, for example, attempt to restart the engine, instead of a minimum altitude to exit the aircraft. Depending on the situation, this could be more of a negative than a support for the pilot. In addition, at the altitude discussed, one is dependent on external reference points to assess the altitude above the ground, unless one is over water.

¹ Aircraft Operations Manual JAS39

If the pilot had been IMC at the time of the engine failure, he would have very likely ejected sooner, as he would have needed to determine the altitude using the altimeter

What constitutes a suitable lowest altitude also depends on several factors, including whether IMC or VMC is applicable, whether one is over water or over land, the possibility of reaching water or loadbearing ice, the nature of the terrain below the aircraft, the wind direction, the flight mode, etc. This makes it difficult to define a lowest altitude that applies in all cases.

On the other hand, FM does consider that set values constitute good support and, as mentioned, a lowest altitude for safe ejection during instrument descent is described in AOM as a support for the pilot.

Considering the above, FM concludes that no additional text regarding a lowest altitude for ejection in the event of engine failure should be added to the existing wording in AOM. FM instead intends to clarify the altitude down to which safe ejection can be carried out in the event of engine failure descent, similar to the corresponding instructions for instrument descent.

In addition, as part of OPC² JAS39 in 2020, FM intends to practice emergency ejections in the event of engine failure at low altitude in a simulator. This will allow all active JAS39 pilots in FM to both practice this and to increase their theoretical knowledge of the lowest altitude for ejection in the event of an engine failure in a JAS39. This is already practiced in a corresponding manner during conversion training on the JAS39.

Timeframe: OPC is carried out in 2020.

Responsibility of: Head of Flight Operations

Response to recommendation 2019:02 R3

Measures taken:

At the time of the accident, an investigation was conducted regarding which central level within the Armed Forces was to support the local manager according to applicable FM ArbO and FIB³. A reference was given to FIB 2017:1, which includes provisions on the investigation of accidents, near accidents and deviations. Chapter 2, Section 2 states that the Armed Forces Investigative Commission of Inquiry (FMUK) is the agency's central body for the investigation of accidents, near accidents and deviations within the Armed Forces' area of responsibility. FMUK is to be appointed for each specific inquiry. Contact was initiated with FLYGI and SÄKINSP respectively. It was noted that FIB 2017:1 has no relation to ground damage or regulation of ground damage.

² OPC: Operations Proficiency Check

³ Internal regulations of the Swedish Armed Forces

However, there is an applicable FIB 2017:3 regarding settlement of claims regarding material damage (repealing FIB 2003:1). FIB 2017:3 regulates some financial aspects and otherwise states that settlement of claims is largely a legal responsibility. The definition of ground damage according to this regulation refers to damage incurred during exercise or training activities. An organisational unit has the decision-making power in cases relating to compensation claims for ground damage amounting to no more than SEK 100,000; however, if the ground damage was caused by a vessel or flight operation, or if the claim refers to a building, an organisational unit may only make a decision in the matter if the compensation claim amounts to no more than SEK 50,000. It is also noted that FIB 2017:3 cannot be used for regulation of ground damage in the event of an accident!

Planned measures:

In the case of this accident, the possibility of using a central ground damage claims adjuster was also raised at an early stage. This competence is not available at the unit in question and was needed in order to promptly continue the investigation of the air crash. Previously, each Air Force unit had a certified ground damage claims adjuster. The certificate was issued by LEDS JUR prior to the reorganisation in 2013. The role was removed within the Air Force units in the new current organisation.

FM recommends appointing a central function responsible for ground damage at Headquarters, and that certified ground damage claims adjusters are reintroduced at the Air Force units. It should be possible to engage a certified ground damage claims adjuster in the event of an aviation accident, and a register of those certified must be established by the Armed Forces. In addition, a review of all documents regulating accident procedures must be done to ensure clarity and uniformity. It is possible that new internal regulations are produced.

Timeframe: Finished in Q3 2020.

Responsibility of: C LEDS

In order to further establish which procedure is applicable for the management of ground and environmental damage and decontamination after an aviation accident, there is a Military Aircraft Recovery Manual (Handbok Bärgning Militära Luftfartyg 2019) at each operational location, which provides a role description, responsibilities, environmental measures, etc. The manual has not yet been approved.

FM intends to adopt the manual promptly and publish it on its intranet Emilia in order to make the manual known within the Armed Forces and its various units.

In addition, the Air Force units' accident checklists will be updated.

Timeframe: Finished in Q3 2020.

Responsibility of: C LEDS

Statement

Participating in the preparation of this matter were Major General Carl-Johan Edström, Colonel Anders Janson, Lieutenant Colonel Adam Nelson, Captain Peter Elison, Lieutenant Colonel Hans-Björn Fischhaber and Armed Forces Legal Adviser Helena Severin.

This statement has been approved by Supreme Commander Micael Bydén. Also participating in the final processing were Christina Sonberg and Armed Forces Legal Adviser Lisa Eurén Höglund, with Major Carl Johan Frödin reporting.

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