Civil Aviation Authority

# SAFETY NOTICE

**Number: SN–2021/007**

**Issued: 5 March 2021**

# Airworthiness of Aging Ex-Military Aircraft

**This Safety Notice contains recommendations regarding operational safety.**

Recipients must ensure that this Notice is copied to all members of their staff who need to take appropriate action or who may have an interest in the information (including any 'in-house' or contracted maintenance organisations and relevant outside contractors).

| **Applicability:** | |
|---|---|
| **Aerodromes:** | Not primarily affected |
| **Air Traffic:** | Not primarily affected |
| **Airspace:** | Not primarily affected |
| **Airworthiness:** | All BCAR A8-23 / A8-24 / A8-25 / CAMO Organisations |
| **Flight Operations:** | Ex-Military Aircraft and CAP 632 Operators |
| **Licensed/Unlicensed Personnel:** | All Maintenance Engineers |

## 1 Introduction

1.1 Currently in the UK there are various Ex-Military aircraft operating on a National Permit to Fly (PtF).

1.2 This Safety Notice (SN) is published to raise awareness of the challenges relating to older Ex-Military aircraft types with regards to the following topics:

- Identifying potential aircraft system failure modes
- Reviewing approved maintenance programmes (AMP) and mandatory permit directives (MPD) regularly
- Sourcing and storing of replacement components
- Consideration of implementing a Safety Management System (SMS)

1.3 Where possible, operators and organisations should look to implement the recommendations outlined in this SN as this may assist with preserving the longevity of the current fleet of ageing Ex-Military aircraft.

## 2 Aircraft System Analysis for Potential Failure Modes

2.1 Following an accident involving a turbojet powered aircraft in 2015, it was recognised that ageing Ex-Military aircraft were experiencing deterioration of elastomeric components within the engine fuel system as a result of chemical attack, air exposure and ageing effects. As a result,

MPD 2016-001 R1 was published to review the records of ageing fuel systems used on Ex-Military gas turbine jet engines to check that fuel system protection has been carried out in accordance with the manufacturer's instructions. If, however it was found compliance could not be demonstrated following an examination of the records, a Failure Mode and Effects Analysis (FMEA) of the elastomeric components in the engine fuel system units was required to determine the severity of each potential mode of failure, this would help form an alternative means of compliance (AMOC) in lieu of a fuel system overhaul.

2.2 Although MPD 2016-001 R1 mandates this approach for ageing engine fuel systems, it is highly recommended that a similar analysis is undertaken with other critical systems and components on the aircraft. This could include, but is not limited to:

- Flight Controls
- Electrical Power
- Hydraulic Power
- Landing Gear
- Emergency Escape Systems

2.3 When conducting analyses of potential critical system and component failure modes, organisations should also review the original AAN (Airworthiness Approval Note) against the OEM general and technical information, this is usually contained within the manufacturer's maintenance documents such as the AP-Vol 1. This type of analysis will increasingly be expected to be the standard practice when justifying the continued operation of ageing Ex-Military types.

2.4 In some cases, many decades have passed since the original AAN was issued when the aircraft was released from military service, it is entirely plausible that safety standards and operational data may have evolved since the AAN was issued.

2.5 Where applicable, all Flight Crew Reference Cards and Emergency Procedures should cover all flight critical failures which have been identified by the organisation.

## 3 Ageing Aircraft Component Storage and Availability

3.1 It is recognised that sourcing original replacement parts for ageing Ex-Military aircraft is becoming increasingly problematic due to the time elapsed since these aircraft left military service. Critical components should be identified, and the current and future availability of these parts should be assessed. A proactive approach and actively planning for when key components are no longer available will discourage the wrong behaviours being adopted to install unsatisfactory parts to aircraft.

3.2 Organisations which hold A8-23/24 approvals should ensure correct oversight and control is maintained and documented for the fabrication and production of parts as outlined in A8-23 para 9. This includes not only internal organisational oversight but that of third-party sub-contractors. It is important to stress that the manufacturing/fabrication procedures must be included within the company exposition.

3.3 Before acquiring components, it should also be confirmed that these replacement components have been stored in accordance with the OEM recommendations, including both the storage conditions and the period of storage time. Individuals and maintenance organisations have a responsibility to ensure any parts which are being fitted to an aircraft are in a serviceable condition. Correct component storage could improve reliability and ultimately the longevity of these ever increasingly difficult components to source. It needs to be acknowledged by all

parties that the unavailability of appropriate replacement components is the most likely reason for Ex-Military aircraft to be required to cease operation in the future.

3.4 Further guidance is contained within **Safety Notice SN-2020/005 – 'Ageing Aircraft Component Reliability and Associated Acceptance or Replacement Parts**.' This SN details the importance of bench testing components prior to installation as well as verifying the acceptability of components and associated release documentation.

## 4 Reviewing Approved Maintenance Programmes (AMP) and Current MPDs

4.1 Periodic review of the approved maintenance programme is required practice as outlined within BCAR A7-3 para 15.5, but it is essential that these programmes are considered as live documents. In the case of Ex-Military aircraft, it was never envisaged by the OEM that these aircraft would be operating many decades after leaving military service, thus many operators and organisations have developed a low utilisation maintenance schedule to reflect the significant reduction in flying hours per year. It is recommended that data found during maintenance inspections either during routine inspections or due to an unplanned defect rectification is reviewed as standard practice to ensure component lives are set at the correct interval. It may be required to limit component lives or introduce enhanced additional inspections. Data from engine ground runs and engine rundown times should also be included and result in updates where appropriate within the AMP.

4.2 Most Ex-Military aircraft are currently using a low utilisation maintenance schedule as detailed within the AMP. With this low utilisation aspect in mind it is crucial that all flight critical components have an appropriate inspection frequency and calendar life specified. These frequencies should be reviewed and adjusted to consider any operational data recorded and how many flying hours are logged per year.

4.3 Organisations should regularly review AMPs to ensure they are kept up to date through incorporating any new or existing requirements or guidance material such as CAP's, Safety Notices and MPD's where applicable and appropriate. Further guidance is outlined within CAP 1740 – 'Maintenance Programmes for Aircraft Operating on a National Permit to Fly'.

## 5 Safety Management System (SMS)

5.1 A Safety Management System (SMS) is an organised approach to managing safety, it allows the hazards and risks that could affect an organisation to be identified, assessed and prioritised so that appropriate mitigation measures can be put in place to reduce the risks to as low as reasonably practicable (ALARP).

5.2 Generally, there are four key components within an SMS, these are safety policy and objectives, safety risk management, safety assurance and safety promotion. For many organisations there will be some elements of an SMS already in place, in some cases it may just be the case of expanding existing organisational principles and values into a formal framework. If such a framework were introduced, it must include an interface with the aircraft Continuing Airworthiness Maintenance Organisation (CAMO).

5.3 Although it is not currently a mandatory requirement for operators or maintenance/CAMO organisations to implement an SMS, it is recommended that some consideration is given to implement such a framework, this approach has been widely accepted and implemented across the aviation industry in recent years.

5.4 Guidance for larger organisations is contained within CAP 795 and for smaller non-complex organisations guidance information is outlined in CAP 1059. Other useful information can be found on the CAA SMS Home page at **www.caa.co.uk/sms**.

## 6 Relevant Requirements or Guidance Material

6.1 The following sources contain useful information which should be used in conjunction with this SN.

- **CAA CAP 553** - BCAR Section A
- **CAA CAP 632** - Operation of Permit-to-Fly Ex-Military aircraft on the UK register
- **CAA CAP 795** – Safety Management Systems (SMS): Guidance for Organisations
- **CAA CAP 1059** – Safety Management Systems: Guidance for small, non-complex organisations
- **CAA CAP 1640** - Ex-Military Aircraft: Design, restoration and continuing airworthiness approval
- **CAA CAP 1740** – Maintenance Programmes for Aircraft Operating on a National Permit to Fly
- **MPD 2016-001 R1** – Engine Fuel System – Ageing Effects

## 7 Queries

7.1 Any queries or requests for further guidance as a result of this communication should be addressed to:

GA Unit, Safety & Airspace Regulation Group,
Civil Aviation Authority,
Aviation House,
Beehive Ring Road,
West Sussex,
RH6 0YR

E-mail: **GA@caa.co.uk**

## 8 Cancellation

8.1 This Safety Notice will remain in force until further notice