

Closing MEL Items: Why Sooner is Better



It is not always possible to repair a system failure before the next flight. The MEL permits the dispatch of an aircraft with inoperative equipment or functions for a limited period of time, and under specific conditions, while maintaining an acceptable level of safety.

Current in-service data shows an increase in the number of requests for MEL extension indicating an increase of departures with multiple open MEL items. Even if dispatch under MEL always guarantees an acceptable level of safety, it increases the risk of exposure to multiple failures with their inherent operational consequences.

This article recalls the importance of fixing MEL items at the earliest opportunity to reduce this risk of exposure to multiple failures, and provides best practices where MEL extensions are necessary to maintain the highest possible margin of safety.

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CASE STUDY

Event Description

An A330 aircraft was dispatched on a non-ETOPS flight under MEL item 36-11-01A ENGINE BLEED AIR SUPPLY SYSTEM on engine 1. Before departure, ENG 1 BLEED push button switch was set to **OFF**, the X BLEED selector set to **OPEN** and APU and APU BLEED were confirmed as operative, as per the dispatch condition of the MEL item **(fig.1)**.

36-11-01

Engine Bleed Air Supply System

-- Entries --

Dispatch Condition 36-11-01A : Non ETOPS

Repair Interval	Nbr Installed	Nbr Required	Placard
C	2	1	Yes

(o) Refer to [MMEL/MO-36-11 Engine Bleed Air Supply System](#)

Qualifiers : ETOPS CREW_OPS CARGO_OPS NOGO_IF_36-12-01

One may be inoperative provided that:

1. ETOPS is not conducted, and

2. The associated ENG BLEED pb-sw is set to OFF, and

3. The X bleed valve is set to OPEN, and

4. The APU and APU bleed air supply system are operative.

Note

In the case of depressurization at altitudes higher than 37 400 ft (11 400 m) oxygen masks may drop down during the descent.

During the cruise phase at FL390, the **AIR ENG 1+2 BLEED FAULT** ECAM alert triggered. The flight crew followed the ECAM instructions and managed to reset the ENG 2 bleed system. 20 seconds later, the **AIR ENG 1+2 BLEED FAULT** ECAM alert triggered again. The flight crew attempted to reset the ENG 2 bleed system but the reset was unsuccessful.

The flight crew then declared a PAN PAN situation to ATC and requested to descend to FL100. The **CAB PR EXCESS CAB ALT** ECAM alert triggered. The flight crew put on their oxygen masks and performed an emergency descent. Passenger oxygen masks automatically deployed during the descent. At FL190, the flight crew started the APU and set APU BLEED to **ON**. The APU bleed remained ON until the end of the flight. At FL100, the flight crew again attempted a reset of the ENG 2 bleed system, which was successful.

A decision to divert was taken and the aircraft climbed to FL170, then performed an approach and landed without further events.

Event Analysis

Significant operational impact

With the MEL applied for the inoperative ENG 1 bleed air supply system, the failure of the ENG 2 bleed air supply system during the flight led to the loss of cabin pressure at cruise altitude requiring an emergency descent and diversion. This had a notable operational impact, including the impression on the passengers who were aware of the sudden descent and observed the deployment of the oxygen masks in the cabin.

An acceptable margin of safety

Despite the significant operational impact, an acceptable margin of safety was maintained throughout this event thanks to the correct application of the MEL item dispatch conditions and operational procedures by the flight crew.

The impacts of one inoperative engine bleed system, combined with a subsequent failure of the other engine bleed system, are described and addressed in the dispatch conditions and operational procedures of the MEL item. The condition of an

(fig.1) MEL item 36-11-01 Engine Bleed Air System

operative APU BLEED, and the likelihood of passenger oxygen masks deploying when at cruise altitude above 37 400 ft, are also described. ■



INFORMATION

The dispatch conditions are defined following a 3-step safety methodology that is detailed in a previous Safety first article “[A Recall on the Correct Use of the MEL](#)” and which ensures that an acceptable level of safety is always maintained.



POSSIBLE BUT TEMPORARY SOLUTIONS TO FACE DISPATCH CHALLENGES

Raise of Dispatch Challenges

An increase of the operational pressure to fly is observed. In addition, various operational constraints such as supply chain disruption affecting parts availability or the lack of qualified maintenance personnel may make it difficult to repair or replace the equipment within the time frame allowed by the MEL. This leads to an increase of the number of aircraft dispatched with open MEL items and therefore an increased exposure to multiple failure situations as described in the case study.

In-service reports also show that the number of incorrectly applied MEL items is increasing.



INFORMATION

The Safety first article “[A Recall on the Correct Use of the MEL](#)” describes how to use the MEL and gives recommendations on how to identify the correct MEL item associated with the failure.

MMEL/MEL Extension Management

In limited cases, the initial MEL repair interval time can be extended to face the dispatch challenges described above.

One-time extension of an MEL

A one-time extension of standard repair intervals (B, C, D) is possible as defined by regulations (EASA Part-ORO.MLR.105(f), CS MMEL.135 and TCCA CASA 2022-02 for repair intervals B, C and D; FAA OpsSpecD095 for repair intervals B and C). Where applicable, this one-time extension is taken into account in the safety analysis of each MMEL item. An acceptable level of safety is therefore maintained for such cases. A dedicated process for the application of one-time extensions must be defined with the operator's national airworthiness authority.

Operations outside MEL conditions but still within the MMEL

The MEL defined by the operator for their aircraft is either as restrictive or more restrictive than the MMEL provided by the OEM for the aircraft type. An operator has the option to operate the aircraft outside the conditions of their MEL provided it complies with the equivalent conditions of the MMEL. An acceptable level of safety is maintained as the dispatch remains within the certified MMEL scope. It is however considered as a deviation from the operator's MEL and formal approval must be given by their relevant national aviation authority each time this option is required.

In AOG situations

To avoid AOG situations, under exceptional circumstances, Airbus has developed a process called **Approved Deviation to OSD-MMEL (ADOM)**. It is a document issued by Airbus to support operators if they need to urgently dispatch an aircraft outside of the scope of the MMEL. For each ADOM, a safety analysis is performed following the same safety methodology as for the development of the MMEL items refined to the actual aircraft status and the planned mission to ensure that sufficient safety margins are maintained. Additional limitations can be required.





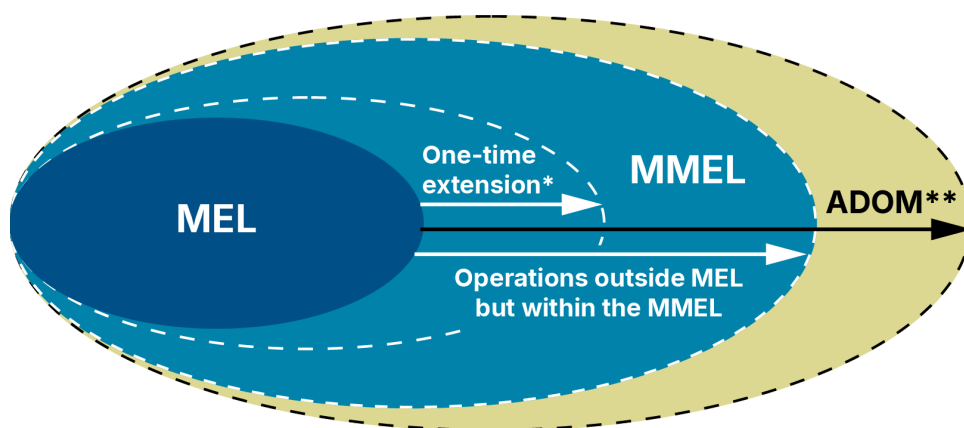
INFORMATION

An **ADOM** is an **EASA approved document** and can be used only for **deviation from the EASA MMEL**. It cannot be applied for the FAA MMEL or the TCCA MMEL. For the FAA MMEL, extensions for intervals A and D and additional extensions can be granted on a case-by-case basis by the FAA according to FAA AC 120-125 and FAA Order 8900.1 Vol 4, Chap 4, Section 3, 4-688.

ADOM can be used:

- to **further extend the repair interval A** or the other intervals B, C and D following the first extension, or
- to **dispatch the aircraft with a combination of open MEL items not permitted by MMEL**, or
- when the **operational or maintenance procedure cannot be applied**.

It is a document issued by Airbus **on a case-by-case basis** following analysis of the specific aircraft configuration and conditions. It is valid for a limited period of time and operators have to obtain authorisation from their relevant national aviation authority to apply the MEL deviation in accordance with the ADOM.



(fig.2) Possible MMEL/MEL extensions

Any MEL extension must be agreed with the Operator's local authorities

*** Not applicable to repair interval A**

**** Applicable to EASA MMEL only**

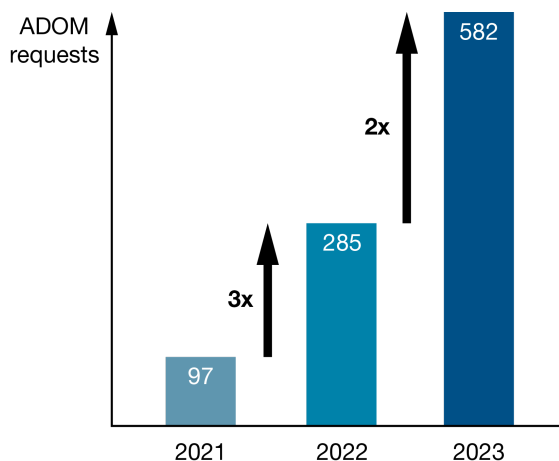


KEYPOINT

The ADOM is only issued if the safety analysis demonstrates that **an acceptable level of safety margin can still be maintained**.

Increase of ADOM Requests

The number of ADOM requests has increased significantly each year since 2021. One reason is the difficulty to obtain parts due to the post pandemic supply chain challenges. This can further delay the repair or replacement of the affected equipment, increasing the exposure to multiple failure situations as described in the case study above. ■



(fig.3) Evolution of the number of ADOM requests between 2021 and 2023



KEYPOINT

The ADOM has to be used on an exceptional basis.

BEST PRACTICES FOR SAFE DISPATCH

Dispatch with open MEL items requires specific attention from both flight crews and maintenance crews with dedicated tasks. In case of extended MEL items and multiple MEL items, those tasks can take more time, be more complex and have a significant impact on the crew's workloads.

Best Practices for Flight Crews

Aircraft acceptance

It is the responsibility of the flight crew to review all open MEL items, confirm that the associated dispatch conditions and limitations are taken into account, and are compatible with the flight and the crew workload. It is also necessary to confirm that any applicable maintenance procedures described in the MEL dispatch conditions have been performed and are recorded in the technical logbook. The flight crew have to also assess the consequences of the inoperative equipment in combination with other possible, or multiple, failures. The complexity of their tasks can increase with multiple open MEL items. The captain has the final decision to accept the aircraft or can refuse to depart if they conclude that the number of open MEL items is impacting too much on the flight crew workload during a flight or erodes the margin of safety.



Best Practices for Maintenance Crews

As part of the dispatch, the maintenance crew has to define an equipment repair or replacement strategy at the earliest opportunity and order the necessary parts as soon as possible. It is important to confirm the time limited MELs do not expire before the next confirmed maintenance opportunity. They should also take actions to prevent accumulation of multiple open MEL items, especially where they can directly impact the flight crew workload and increase the risk of multiple failure situations.

Extended MEL items and the number of open MEL items can increase the workload and the complexity of these monitoring actions of the maintenance crews. ■



BEST PRACTICE

It is important that both the maintenance crew, who are responsible to apply and close the MEL items, and the flight crew, who manage the dispatch conditions of the open MEL items during the flight, are aware of each other's tasks. They can better assess the operational consequences of their decisions and find more appropriate solutions to reduce the risks associated with multiple open MEL items situations.

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Dispatch of aircraft with MEL items is a common practice in operations. It enables the repair and replacement of inoperative equipment at a next maintenance opportunity within a defined timeframe. Each MEL item is assessed to ensure that an acceptable level of safety is always maintained when it is applied.

Certain situations, such as spares availability issues, may cause a delay in the repair or replacement of the inoperative equipment. Aviation authorities and Airbus have defined possibilities to extend the MEL time limit on a case-by case basis. These include operating outside the MEL conditions, but within the constraints of the MMEL, or requesting an ADOM, which is an approved document issued by Airbus to temporarily operate beyond the MMEL conditions. Both of these actions must be authorized by the operator's own national aviation authority.

In-service reports show that the number of ADOM requests received by Airbus is increasing, as is the number of dispatches of aircraft with multiple open MEL items. This requires extra vigilance, especially to anticipate the potential consequences of multiple failure situations in flight. Communication and collaboration between the maintenance crew and the flight crew is essential to understand and to mitigate these risks together.

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