getting to grips with

MMEL and MEL

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getting to grips with MMEL and MEL

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AIRBUS

FOREWORD

The purpose of this "Getting to Grips with MMEL and MEL" Brochure is:

- To help Airbus Operators understand the Master Minimum Equipment List (MMEL) and the Minimum Equipment List (MEL)
- To explain how the Airbus MMEL is created and approved/accepted
- To provide guidance material for the creation and the use of the MEL.

The MMEL is an Airbus document, developed by the Flight Operations Support and Services Department. Operators use the Airbus MMEL as a reference for creating their own MEL, which is provided to their flight crews, line maintenance personnel, and/or flight operations personnel. It is important to note that an Operator's MEL cannot be less restrictive than the Airbus MMEL.

Both the MMEL and the MEL are legal documents that are either approved or accepted by Airworthiness Authorities.

The MMEL and the MEL consist of component and system lists that are attributed a "GO", "GO IF", or "NO GO" status, depending on their impact on the safety of a flight. These attributes are defined as follows:

- "GO" or "GO IF" items can remain inoperative for a limited period of time.
- "NO GO" items prevent the dispatch of the aircraft.

The MMEL and the MEL are both designed to ensure that an acceptable level of safety is respected, when an aircraft is dispatched with inoperative equipment. The MEL enables Operators to rapidly dispatch an aircraft, and avoid unnecessary delays or flight cancellations, without sacrificing safety.

This brochure is primarily designed to provide Operators with assistance in developing and optimizing their own MEL.

Please submit any questions you may have concerning this brochure to:

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EXECUTIVE SUMMARY

Chapter 1: General

MMEL/MEL General Presentation

The objective of the MMEL is to ensure:

- An acceptable level of safety, while operating an aircraft with inoperative equipment
- Aircraft profitability by avoiding Aircraft On Ground (AOG) situations.

MMEL/MEL Legal Bases

The applicable documents that serve as the reference for the creation of the MMEL and the MEL are provided by either Joint Aviation Authorities (JAA) or Federal Aviation Administration (FAA) documents.
These documents are:

Airworthiness Directives (ADs), published as a result of an in-flight event, always supersede any published MMEL/MEL dispatch requirement.

Chapter 2: MMEL Development Process

Development Principles to Justify Dispatch Conditions

Before proposing a new MMEL item to Airworthiness Authorities, the Airbus Flight Operations MMEL Department and safety specialists must substantiate the ability to **maintain an "acceptable level of safety" as required by an applicable regulation**, even if a specific system is inoperative.

Rectification Intervals

To maintain this "acceptable level of safety", and to prevent degraded maintenance, the MMEL establishes limitations on the amount of time that an aircraft can be operated with inoperative items.

Rectification Intervals	**A**	**B**	**C**	**D**
Consecutive Calendar Days (excluding the day of discovery)	**No standard Rectification Interval (refer to dispatch conditions)**	**3**	**10**	**120**

Rectification Intervals B, C, and D may be extended one time.

Failure Classification

For the A320 and the A330/A340 families, the Central Maintenance System (CMS) or the Centralized Fault Display System (CFDS) centralize the failures, and classify them, based on their effect on safety and in the cockpit. Only Class I failures may prevent aircraft dispatch and are addressed in the MMEL.

Chapter 3: Master Minimum Equipment List (MMEL)

Organization of the MMEL

The MMEL has four, or five (depending on the aircraft family), sections:

- **Section 00**: General information about the manual (organization, approval sheet, highlights…).
- **Section 00E**: List of ECAM warnings, and associated MMEL entries (if applicable), classified according to the ATA breakdown.
- **Section 01**: The approved/accepted part of the MMEL: All items that may be inoperative, their Rectification Intervals, their number installed, their number required for dispatch, and their associated remarks or exceptions.
- **Section 02**: The operational procedures required by Section 01. Due to the fact that the content of these procedures is not approved/accepted, Operators may choose not to follow Airbus procedures, and may create their own procedures.
- **Section 03**: Maintenance procedures extracted from the Aircraft Maintenance Manual (AMM), and required by Section 01. This Section is only available for the A300/A310 and A320 family.

MMEL Amendments (JAA Model)

An MMEL amendment is made via:

- Normal Revisions
- Temporary Revisions

The MMEL is:

- Approved by the DGAC for the A300 B2/B4 and A300/A310.
- Accepted by the JAA for the A320 family and the A330/A340. Then, the JAA recommends approval of these MMELs to National Authorities.

MMEL Amendments (FAA model)

An MMEL amendment is made via:

- Normal Revisions
- Interim Revisions

The MMEL is written and approved by the FAA for all Airbus families. However, an FAA MMEL is only created and published if the aircraft type is operated by FAA Operators.

Chapter 4: Minimum Equipment List (MEL)

From the DGAC/JAA MMEL to the MEL

Based on the MMEL, Operators create their own MEL, and obtain approval from their applicable National Authorities.

The DGAC/JAA MEL development process can include the following steps:

1) Definition of the MEL content
2) Review of "Reserved" Items
3) Review of "(If Installed)" Items
4) Review of "As required by regulations" Items
5) Review of Special Operations.

From the FAA MMEL to the MEL

The FAA MEL development process can include the following steps:

1) Definition of the MEL content
2) Check the applicability of each MMEL item
3) Review of "As required by FAR" Items
4) Review of Special Operations
5) Include the content of the (o) and (m) procedures.

MEL User Guide

The aim of the MEL is not to encourage aircraft operation with inoperative equipment, because it is not desirable for an aircraft to be dispatched in these conditions, and such a situation is permitted only as a result of careful analysis.
The MEL should, therefore, be consulted on ground, and only when a failure has been identified and confirmed.

Limits of MEL Applicability

According to the JAR MMEL/MEL.001, an MEL is applicable up to the commencement of the flight (i.e. the point when the aircraft begins to move under its own power, in preparation for takeoff).

In some cases, the MEL may need to be consulted in flight, in order to decide if it is necessary to perform an in-flight turn back. However, any decision to continue the flight must be subject to pilot judgment.
If there is an in-flight failure, the FCOM provides the procedures and limitations that the flight crew should apply.

Chapter 5: MMEL Evolutions

Less Paper in the Cockpit (LPC)

- LPC Concept

In 1998, Airbus decided to implement the Less Paper in the Cockpit (LPC) project. This concept is now available on all Fly-By-Wire aircraft and is based on conventional laptop PCs. It aims at reducing the amount of paper in a standard pilot flight bag.
The LPC package contains:

- A takeoff module
- A landing module
- A Weight and Balance (W&B) module
- An e-FCOM
- An e-MEL.

- LPC e-MEL

The LPC e-MEL tool is an electronic version of the MEL that provides quick and easy access to the information that is required in order to dispatch an aircraft.
This version is based on the paper MMEL and has five main parts:

- ECAM messages, and corresponding links to dispatch conditions
- Item breakdown, and corresponding dispatch conditions
- Operational procedures
- AMM deactivation tasks
- Operator documents.

The LPC e-MEL enables Operators to create and to consult their own MEL, according to local requirements, via two modules:

- The administrator module that deals with the customization of the MEL
- The MEL consultation module.

ABBREVIATIONS

§	Paragraph
-A-	
A/C	Aircraft
ACJ	Advisory Circular Joint
ACARS	Aircraft Communications Addressing and Reporting System
AD	Airworthiness Directive
ADPM	Aircraft Deactivation Procedures Manual
AFM	Aircraft Flight Manual
AMM	Aircraft Maintenance Manual
AOG	Aircraft On Ground
ATA	Air Transportation Association
ATC	Air Traffic Control
-B-	
BBS	Bulletin Board System
-C-	
CAT	Category
CDL	Configuration Deviation List
CFDS	Centralized Fault Display System
CG	Center of Gravity
CMS	Central Maintenance System
CMP	Configuration, Maintenance and Procedures
CRT	Cross-Reference Table
-D-	
DDG	Dispatch Deviation Guide
DGAC	Direction Générale de l'Aviation Civile (French Civil Aviation Authorities)
DH	Decision Height
-E-	
ECAM	Electronic Centralized Aircraft Monitoring
EIS	Entry Into Service
ER	Extended Range
ETOPS	Extended Twin Operations
-F-	
FAA	Federal Aviation Administration
FANS	Future Air Navigation System
FAR	Federal Aviation Regulations
FCOM	Flight Crew Operating Manual
FDE	Flight Deck Effect
FL	Flight Level
FOEB	Federal Operations Evaluation Board (FAA)
FOSP	Flight Operations Standard Package
FOVE	Flight Operations Versatile Environment
FQI	Fuel Quantity Indicating/Indication/Indicator
FWC	Flight Warning Computer

-H-

HTML	Hyper Text Markup Language

-I-

ICAO	International Civil Aviation Organization
IR	Intermediate Revision

-J-

JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
JOEB	Joint Operations Evaluation Board (JAA)

-K-

Kg	Kilogram

-L-

LEP	List of Effective Pages
LETR	List of Effective Temporary Revisions
LPC	Less Paper in the Cockpit

-M-

MCC	Maintenance Control Center
MCDU	Multipurpose Control and Display Unit
MEL	Minimum Equipment List
MFA	Memorized Fault Annunciator
MMEL	Master Minimum Equipment List
MOD	Modification
MP	Modification Proposal
MSN	Manufacturer Serial Number

-N-

NAA	National Aviation Authorities
NM	Nautical Mile
NTO	No Technical Objection

-O-

OCC	Operations Control Center
OEG	Operational Evaluation Group (DGAC)

-P-

PC	Personal Computer
PL	Policy Letter

-Q-

QRH	Quick Reference Handbook

-R-

REV	Revision
RIE	Rectification Interval Extension
RNP	Required Navigation Performance
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum

-S-

SB	Service Bulletin
SEQ	Sequence
SGML	Standard General Markup Language
SOP	Standard Operating Procedure
SSA	System Safety Assessment
STD	Standard

-T-

TC	Type Certificate
TGL	Temporary Guidance Leaflet
TOCG	Take Off Center of Gravity
TOW	Take Off Weight
TR	Temporary Revision

-U-

US	United States
UTC	Universal Coordinated Time

-W-

W&B	Weight and Balance
WBM	Weight and Balance Manual

-X-

XML	eXtended Mark-up Language

-Z-

ZFCG	Zero Fuel Center of Gravity
ZFW	Zero Fuel Weight

DEFINITIONS

The following are standard definitions of some of the MMEL/MEL related terms that are utilized throughout this brochure.

Item: An item is either a piece of equipment, a function, an instrument, or a system listed in the MMEL.

Revenue Flight: A revenue flight is any scheduled or non-scheduled air service performed by aircraft for the public transport of passengers, mail, or cargo, for remuneration or hire.

Non-revenue Flight: A non-revenue flight is not a revenue flight such as:

- Training flights
- Test flights
- Delivery flights
- Ferry flights (flight flown for a positioning, or other purpose, such as to enable the aircraft to undergo maintenance)
- Demonstration flights
- Positioning flights

MMEL: The MMEL lists all the safety-related items for which revenue flights are permitted, even if the items are inoperative at departure. The MMEL specifies the dispatch conditions: The conditions to be fulfilled and the procedures to be performed, in order to permit the revenue flights to be flown with the inoperative item for a limited period of time.

The MMEL serves as a basis for Operators in developing their own MEL.

MEL: The MEL is a required document, which must be created for each aircraft in an Operator's fleet. It is based on the aircraft MMEL, and includes the specific requirements of each National Authority. Furthermore, the MEL must be customized to take into account the specificities of each aircraft: Weight variant, options installed, software upgrades, hardware upgrades, retrofit status…

It is important to note that the MEL cannot be less restrictive than the MMEL.

Dispatch Conditions: The dispatch conditions are the conditions, given in Section 01 of the MMEL, to be fulfilled, in order to allow aircraft operation with a specific item inoperative.

"GO": An MMEL "GO" item is a safety-related item that may be inoperative at the dispatch of the aircraft without any specific condition or restriction.
MMEL "GO" items are addressed in the MMEL and have no dispatch condition.
However, a "GO" item always has a time limit, within with the failure must be corrected. This period of time is referred to as "Rectification Interval".

"GO IF": An MMEL "GO IF" item is a safety-related item that may be inoperative at the dispatch of the aircraft provided dispatch conditions are satisfied and/or specific restrictions are applied.
"GO IF" items are listed in the MMEL and have dispatch conditions requiring:

- Actions to be done, and/or
- Other equipment to be operative, and/or
- Checks to be performed, and/or
- Limitations to be taken into account, and/or
- Performance calculations to be computed, and/or
- Details on the conditions in which the item can be inoperative, and/or
- …

"NO GO": A piece of equipment, a function, an instrument, or a system… is called "NO GO" if it must be operative in order to permit the dispatch of the aircraft for a revenue flight. Generally, the MMEL does not list "NO GO".

All equipment/functions/instruments/systems related to the airworthiness of the aircraft, and not listed in the MMEL, are automatically required to be operative for dispatch (e.g. Wings, engines, etc).
(Refer to §3.2.5)

Inoperative: An item is deemed to be "inoperative", when it does not satisfactorily fulfill its intended function, regardless of the reason.

Therefore, an item is deemed to be inoperative, when:

- It does not work at all, or
- It does not perform one or more of the functions for which it was designed, or
- It does not consistently work within its designed operating limits or tolerances, or
- It is requested to be considered inoperative by the dispatch conditions, or
- It is not available due to a primary failure.

1. GENERAL

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1.1. INTRODUCTION

The Master Minimum Equipment List (MMEL) and the Minimum Equipment List (MEL) deal with system failures that have an impact on the safety of the aircraft.

Failures can have various effects on the aircraft, depending on the importance of the component within the system(s).

Obviously, the failure of a reading light in the cabin will not affect safety and should, therefore, not prevent aircraft dispatch. On the other hand, no Operator would envisage dispatching an aircraft with an inoperative engine.
However, in the case of a failed secondary hydraulic system indicator, it is not easy for an Operator to determine if it is possible to dispatch the aircraft, due to the fact that the aircraft has three independent hydraulic systems.

The purpose of the MMEL is to provide Operators with an efficient and reliable tool to rapidly determine if the aircraft can be dispatched without compromising the safety of the flight.

This brochure will attempt to answer the following three important questions:

How does Airbus create an MMEL?

MMEL Development Process
(Refer to §2)
MMEL
(Refer to §3)

How does the Operator create an MEL?

From the MMEL to the MEL
(Refer to §4.2 and §4.3)

How does the Operator use an MEL?

MEL User Guide
(Refer to §4.4)

1.2. HISTORICAL BACKGROUND

The International Civil Aviation Organization (ICAO), a specialized United Nations agency, was created on December 7, 1944 with the signing of the **Convention on International Civil Aviation**, in Chicago (U.S.A). The convention consists of 96 articles that establish the privileges and restrictions of all contracting states, and provide for the adoption of International Standards And Recommended Practices (SARPs) that regulate international air transportation.

The establishment of this convention was the first step in the creation of international regulations for air transportation, and provides the following official definition of the Minimum Equipment List (MEL) in "Annex 6- Chapter 6: Aeroplane instruments, equipment and flight documents":

> **6.1.2 The operator shall include in the operations manual a minimum equipment list (MEL), approved by the State of the Operator which will enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or systems become inoperative. Where the State of the Operator is not the State of Registry, the State of the Operator shall ensure that the MEL does not affect the aeroplane's compliance with the airworthiness requirements applicable in the State of Registry.**
>
> Note.- Attachment G contains guidance on the minimum equipment list.

Figure 1-1: Extract 1 from the ICAO Convention

Attachment G to ICAO Annex 6 explains the purpose of the MEL, and its philosophy:

> **If deviations from the requirements of States in the certification of aircraft were not permitted an aircraft could not be flown unless all systems and equipment were operable. Experience has proved that some unserviceability can be accepted in the short term when the remaining operative systems and equipment provide for continued safe operations**

Figure 1-2: Extract 2 from the ICAO convention

In the early 70's, and with the introduction of the A300B2, Airbus' first MMELs were already in accordance with the above-mentioned Convention and its regulations.

At that time, Airbus' MMELs were designed as follows:

AIRBUS INDUSTRIE

A 300

MASTER MINIMUM EQUIPMENT LIST

52 - DOORS		
1- CARGO DOOR ACTUATOR	2	(m) Both may be inoperative provided : 1) The integrity of yellow hydraulic system is not affected 2) The door is manually latched in the close position

SPECIMEN

Figure 1-3: Extract of the A300 B2/B4 MMEL

Today, Airbus' MMELs look like this:

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	MASTER MINIMUM EQUIPMENT LIST DOORS	01-52	P 2
		SEQ 002	REV 24

1. SYSTEM AND SEQUENCE NUMBERS ITEM	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH	5. REMARKS OR EXCEPTIONS
52-30 CARGO				
30-01 Cargo door actuator	C	4	2	a) One per door may be inoperative provided : 1) The integrity of yellow hydraulic system is not affected, and 2) Wind velocity does not exceed 30 kt, and 3) The operation of the door with a single actuator is limited to 10 open/close cycles, and 4) The Inspection Service Bulletin (ISB) 52-1070 has been successfully performed.
R				

SPECIMEN

Figure 1-4: Extract of the A320 MMEL

1.3. WHY AN MMEL?

Aircraft are designed with high reliability equipment and with system redundancies. The Type Certificate of an aircraft certifies the aircraft with all equipment in operative condition.

Nonetheless, failures can still occur, and flight delays or cancellations lead to high operating costs.

The primary objective of the MMEL is to, therefore, reconcile an **acceptable level of safety** with aircraft **profitability**, while operating an aircraft with inoperative equipment.

1.3.1. TO ENSURE A SAFE DISPATCH

The MMEL development is a process that involves many specialists within Airbus, such as MMEL specialists, system designers, safety specialists, etc.

For each MMEL item, specialists take into account the:

- Impact of the item's failure on the safety of the flight
- Results of flight and/or simulator tests
- Impact of the failure on crew workload
- Impact of multiple unserviceabilities
- Impact of the next critical failure.

The interaction between systems is extensively analyzed to ensure that multiple failures will not result in an unsatisfactory level of safety. In addition, the analysis not only considers the consequences of the item's failure, but also analyzes the consequences of the next critical failure (Refer to §2.2.2).

When an aircraft is dispatched by application of the MMEL/MEL, an acceptable level of safety is maintained by:

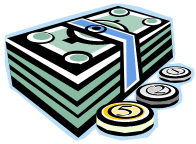
- The transfer of a function to another piece of equipment (redundancy), or
- The provision of required data by another piece of equipment (standby instruments), or
- The compliance with adequate limitations and/or procedures (flight crew and/or maintenance procedures).

The MMEL is a legal document, required for the dispatch of an aircraft. This document is also reviewed by the authorities prior to granting approval or acceptance.

As a result, the safe operation of an aircraft, with one or more pieces of inoperative equipment, is safely guaranteed by the MMEL/MEL.

For more information on the MMEL development process, please refer to §2.2.

1.3.2. TO INCREASE PROFITABILITY



The MMEL not only ensures the safe dispatch of an aircraft, but also contributes to ensuring that Operators obtain the maximum benefit from their Airbus fleet in their daily operations. The MMEL contributes to Operator profitability.

The first economical aspect is related to aircraft operation. The MMEL permits the operation of an aircraft with one or more pieces of equipment inoperative, when a failure is detected in flight or during ground servicing. The possibility to dispatch the aircraft prevents unscheduled maintenance, flight delays, or cancellations.

The second economical aspect of the MMEL is to optimize "initial provisioning" and, in this way, reduce storage costs.

The "initial provisioning" is a catalog listing of all the Line Replaceable Units (LRU), the corresponding number of spare parts, with their cost. This initial provisioning is based on a complex mathematical model that takes into account several factors, including the:

- Number of aircraft in the fleet
- Total number of flight hours per year
- Spare part unit price
- Quantity of items per aircraft…

This catalog enables Operators to order their spare parts several months in advance of aircraft delivery, in order to anticipate AOG situations.

One of the factors taken into account by the model is directly linked to the MMEL. This factor is referred to as the "Essentiality Code" (EC), and corresponds to the MMEL item attributes:

- EC=1: Corresponds to a "NO GO" item
- EC=2: Corresponds to a "GO IF" item
- EC=3: Corresponds to a "GO" item.

Examples:

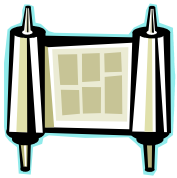
- *For a "NO GO" item, the corresponding spare parts should be available at each secondary base, in order to avoid flight delays or cancellations.*

- *For a "GO" or "GO IF" item, with its corresponding Rectification Interval, the applicable spare parts should be available at the home base. This organization enables Operators to plan the return of the aircraft to the home base. Consequently, the aircraft is able to continue its flight normally under MEL.*

The MMEL is, therefore, a major contributor to operational reliability, and may represent a way for Operators to significantly reduce operating costs.

1.4. MMEL/MEL LEGAL REQUIREMENTS

1.4.1. JAA POLICIES AND REGULATIONS



The legal policies and regulations for the creation of the Master Minimum Equipment List (MMEL) and the Minimum Equipment List (MEL) are provided in the Joint Aviation Regulations (JARs).

1.4.1.1. JAR-OPS 1.030

JAR-OPS 1.030 provides the basic rules that govern the MMEL and the MEL:

JAR-OPS 1.030 Minimum Equipment Lists - Operator's Responsibilities

a) An operator shall establish, for each aeroplane, a Minimum Equipment List (MEL) approved by the Authority. This shall be based upon, but no less restrictive than, the relevant Master Minimum Equipment List (MMEL) (if this exists) accepted by the Authority.

b) An Operator shall not operate an Aeroplane other than in accordance with the MMEL unless permitted by the Authority. Any such permission will in no circumstances permit operation outside the constraints of the MMEL

Figure 1-5: Extract of JAR OPS 1.030

The MMEL is an operational document, based on the JAR OPS-1, managed by the Airbus Flight Operations MMEL department, and examined by the operational divisions of the French DGAC and the JOEB/MMEL Subgroup of the JAA.

However, as mentioned in the ICAO Convention (Annex 6), the MMEL should also take into account applicable airworthiness requirements (JAR 25/FAR 25), to ensure that aircraft compliance with these requirements is not affected.

In this respect, the MMEL approval, or acceptance, process is linked to the certification process: **The MMEL is an approved deviation of the aircraft Type Certificate**.

Note: The MMEL is developed in parallel to the preparation of Type Certificate. However, the MMEL is not required for the issuance of the Type Certificate.

1.4.1.2. JAR-MMEL/MEL

JAR-MMEL/MEL provides the requirements for the creation and approval/acceptance of the MMEL and MEL.

All the JAR-MMEL/MEL references within this brochure are based on the 2005 issue.

The JAR-MMEL/MEL has two sections:

- Section 1: Requirements
  - Subpart A-General
    Includes the requirements for applying the JAR-MMEL/MEL (applicable regulations, airworthiness directives, limitations of MEL applicability, etc.), and a glossary of terms and acronyms used in the document.

  - Subpart B (C respectively)-MMEL (MEL respectively)
    Includes:
    - The definition of the MMEL (MEL respectively):
    - The applicable types of operations
    - The format and language to be used in the MMEL (MEL respectively)
    - All the required sections of the MMEL (reference to multiple unserviceabilities, Operational and Maintenance procedures, Rectification Intervals).
    - The conditions for approval.

- Section 2: Advisory Circular Joint (ACJ)
  Provides explanations and interpretations of the requirements in Section 1. An Operator that adopts following requirements published in the ACJ, can be confident in obtaining Authority approval.

  Examples:
  - ***ACJ MMEL/MEL.065(b) Format of MEL*** *(See JAR MMEL/MEL.065)*
    1. *The ATA 100/2200 specification numbering system is preferred*
    2. *A proposed five-column format for the technical pages of all MELs is shown in Appendix 1 to ACJ-MMEL/MEL.025.*
    3. *Appendix 2 of ACJ-MMEL/MEL.065 can be used as a model for the preamble.*

  - ***ACJ MMEL/MEL.030 Multiple Unserviceabilities*** *(See JAR MMEL/MEL.025)*
    1. *MMEL preamble should make it clear that not all combinations of unserviceabilities are considered.*
    2. *The MMEL cannot include all combinations of unserviceabilities. Therefore it has to be accepted that because of the variety of multiple unserviceabilities which could arise, it is likely that many of them will not be incorporated in the MMEL.*

1.4.1.3. JAR-OPS 1 MEL POLICY DOCUMENT (TGL 26)

JAR 25 provides the **Airworthiness Standards** for the issuance and modification of Type Certificates. JAR-OPS 1, however, provides the requirements that are applicable to the **operation** of an aircraft.

JAR-OPS 1 is applicable to all JAA Operators that operate an aircraft for commercial air transportation.

Items specifically required in JAR-OPS 1, are generally not specified in the MMEL, because they depend on the operational regulations of the country in which the aircraft is registered. These items are listed "As required by regulations" in Airbus MMELs (Refer to §4.2.2.4).

However, it became evident that Operators and Authorities needed guidance for the development and approval of their MELs, in order to fully comply with the instruments and equipment requirements provided in the JAR-OPS 1.

Guidelines for "As required by regulations" items can be found in the "JAR-OPS 1 MEL Policy document". It is also called: Temporary Guidance Leaflet (TGL) N°26 (Section 4, Part 3 of the JAA Administrative & Guidance Material).

TGL 26 is, therefore, designed to:

- Help Operators create their MEL
- Ensure MEL standardization for various JAA Operators
- Help Authorities in the MEL evaluation and approval process.

Therefore, Operators that follow JAR-OPS rules may find most of the dispatch requirements, for the "As required by regulations" items, in the TGL 26 (Refer to §4.2.2.4).

Non-JAA Operators can also follow the TGL 26 guidelines.

1.4.1.4. MMEL PROCEDURES MANUAL

The MMEL Procedures Manual, is issued by the JAA, and provides guidelines on the creation and approval/acceptance of the MMEL.
The MMEL Procedures Manual provides a centralized source of guidance information to facilitate the review of JAA MMELs and MELs.

Note: All the above-mentioned texts can be consulted on the following website: http://www.jaa.nl

1.4.2. FAA POLICIES AND REGULATIONS

In the JAA model: The aircraft manufacturer writes the MMELs. These MMELs are endorsed and recommended by the JAA for approval by the National Authorities.
In the FAA model: **The FAA writes and approves the MMELs**.
A comparison between the JAA and FAA MMEL approval process is provided in §3.3.3.3.

1.4.2.1. FAR 121.628

FAR 121.628 is the legal document used by the US FAA to create and approve FAA MMELs.

§ 121.628 Inoperable instruments and equipment.

(a) No person may take off an airplane with inoperable instruments or equipment installed unless the following conditions are met:

(1) An approved **Minimum Equipment List** exists for that airplane.

(2) The certificate-holding district office has issued the certificate holder operations specifications authorizing operations in accordance with an approved Minimum Equipment List. The flight crew shall have direct access at all times prior to flight to all of the information contained in the approved Minimum Equipment List through printed or other means approved by the Administrator in the certificate holders operations specifications. An approved Minimum Equipment List, as authorized by the operations specifications, constitutes an approved change to the type design without requiring re-certification.

Figure 1-6: Extract of FAR 121.628 extract

The above-mentioned requirements are repeated in FAR 125.201, FAR 129.14, and FAR 135.179, depending on the FAR under which the Operator is certificated.

1.4.2.2. POLICY LETTERS

Policy Letters are guidelines for the MMEL approval process, and for the use of the MEL. These Policy Letters are designed to help achieve standardized dispatch conditions for all aircraft types at the FAA MMEL/MEL level.

Note: All Policy Letters can be consulted on the following website: http://www.opspecs.com

1.4.2.3. MEL HANDBOOK

The FAA "**Air Transportation Operations Inspector's Handbook 8400.10**", Volume 4, Chapter 4, deals in particular with the creation of the MMEL, the MMEL approved process, and the Configuration Deviation List (CDL).

CHAPTER 4. MINIMUM EQUIPMENT LISTS (MEL) AND CONFIGURATION DEVIATION LISTS (CDL)

Section 1. General 4-561
Section 2. Master Minimum Equipment Lists (MMEL) Development and Approval Process 4-577
Section 3. MEL Approval Process 4-589
Section 4. MEL use in service 4-609
Section 5. Master Minimum Equipment List subsystem (MMEL subsystem) 4-623
Section 6. Configuration Deviation List (CDL) 4-637

Figure 1-7: Table of Contents of the MEL Handbook

1.4.2.4. FAR OPERATING RULES

Relevant FAR operating rules may be used to specify the "As required by FAR" items in the FAA MMELs.

FAR Operating rules extracts	
FAR 23	Airworthiness Standards: Normal, utility, acrobatic, and commuter category airplane
FAR 25	Airworthiness Standards: Transport Category Airplane
FAR 33	Airworthiness Standards: Aircraft Engines
FAR 91	General Operating and Flight Rules
FAR 121	Operating Requirements: Domestic, Flag, and Supplemental Operations
FAR 125	Certification and Operations: Airplanes having a seating capacity of 20 or more passengers, or a maximum payload capacity of 6000 pounds (2.7 tons), or more.
FAR 129	Operations: Foreign air carriers and foreign operators of US registered A/C engaged in common carriage.
FAR 135	Operating Requirements: Commuter and On-demand Operations and rules governing persons on-board such aircraft.

Figure 1-8: Applicable FAR Operating Rules

1.4.3. AIRWORTHINESS DIRECTIVES (ADS)

After the occurrence of an in-service event, Airworthiness Authorities may require specific actions to be taken. Such actions are published in Airworthiness Directives (ADs).

When applicable, an AD may require that the affected MMELs/MELs be updated, as indicated by the "Mandatory actions and compliance times" paragraph of the AD.

The rule to keep in mind in the above-mentioned case is that **an AD always supersedes any published MMEL/MEL dispatch requirement**. As soon as an AD requires an MMEL modification, Airbus usually issues an MMEL Temporary Revision.

The reference of the MMEL Temporary Revision is provided in the REFERENCE PUBLICATION section of the AD. However, this Temporary Revision may later be reissued or incorporated into an MMEL general revision, even if not required by an AD.
Therefore, the new issue of this MMEL Temporary Revision, or the MMEL general revision, is still compliant with the AD.

As a general rule, the MMEL/MEL restrictions established in an AD remain valid until the corrective actions, indicated in the AD, have been applied.

Please, keep in mind…

MMEL/MEL General Presentation

The objective of the MMEL is to ensure:

- An acceptable level of safety, while operating an aircraft with inoperative equipment
- Aircraft profitability by avoiding Aircraft On Ground (AOG) situations.

MMEL/MEL Legal Bases

The applicable documents that serve as the reference for the creation of the MMEL and the MEL are provided by either Joint Aviation Authorities (JAA) or Federal Aviation Administration (FAA) documents.
These documents are:

Airworthiness Directives (ADs), published as a result of an in-flight event, always supersede any published MMEL/MEL dispatch requirement.

2. MMEL DEVELOPMENT PROCESS

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2.2 Development Principles to Justify Dispatch Conditions 31

2.2.1 Qualitative Analysis: Consequences of the Failure 31

2.2.2 Qualitative Analysis: Consequences of the Next Critical Failure 34

2.2.3 Quantitative Analysis: Compliance with SSA 35

2.2.4 Summary of the Analysis Process 36

2.3 MMEL Rectification Intervals 38

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2.3.2 Rectification Interval Attribution to MMEL Items 39

2.3.3 Rectification Interval Extension 41

2.4 Failure Classification 42

2.4.1 Class I Failures 43

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2.4.3 Class III Failures 46

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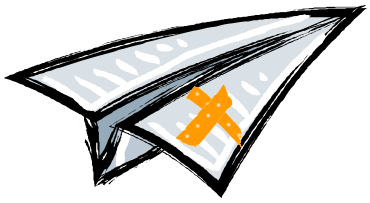
2.1. INTRODUCTION

An aircraft is type-certified with all of its required equipment operative. If deviations were not permitted either from this type-certified configuration, and/or from the equipment required by the operating rules, the aircraft could not be flown in revenue services unless such equipment is operative.



Aircraft operation has proven that, in specific conditions, and for a limited period of time, it is not necessary for every aircraft system or component to be operative, provided that the remaining operative instruments and equipment ensure an acceptable level of safety. Therefore, some conditional deviations from the Type Certificate requirements are authorized, in order to permit uninterrupted operation of the aircraft in revenue flight. These conditional deviations are referred to as "**dispatch conditions**", and are published in the MMEL.

When an aircraft is dispatched by application of the MMEL, operational and safety integrity of the aircraft is maintained. **The MMEL aims at ensuring safe and normal operation of the aircraft, even if some items are inoperative.** The MMEL does not grant the possibility to depart with a system inoperative, if the system failure impairs the aircraft operation, or the safety of the flight.

Due to the fact that the main purpose of the MMEL is to enable an aircraft to be dispatched for a limited period of time, Rectification Intervals have also been defined and incorporated in the Airbus MMEL.

In addition, Airbus has introduced the "failure classification" concept, in order to help Operators distinguish between the different failures, and to determine the appropriate flight crew or maintenance actions.

This section is designed to first provide insight into the justification methods, adopted by Airbus in the MMEL development process. It will then address the Rectification Interval and the "Failure Classification" concept.

2.2. DEVELOPMENT PRINCIPLES TO JUSTIFY DISPATCH CONDITIONS

The MMEL is the result of comprehensive research and analysis, including the review of numerous operational conditions and factors, for the purpose of ensuring the safe dispatch and normal operation of an aircraft for each MMEL item.

Before proposing a new MMEL item to Airworthiness Authorities (Refer to §3.3.3), Airbus must be able to substantiate that, even if the specific system is inoperative, it is still possible for the aircraft to **maintain an acceptable level of safety as intended by the applicable regulation**.

A **qualitative analysis** and, if necessary, a **quantitative analysis** is systematically done, in order to achieve this objective. **These analyses not only take into account the consequences of the item failure, but also the consequences of the next critical failure that could occur in flight.**

2.2.1. QUALITATIVE ANALYSIS: CONSEQUENCES OF THE FAILURE

A **qualitative analysis of the consequences of a failure** is performed first, and takes all aspects of aircraft operation into account. This analysis focuses on:

- The transfer of a function to an alternate operating component

  Example:

  On A320 aircraft, if the Bleed Control System 1 (associated with Engine 1) is inoperative, the Bleed Control System 2 completely takes over this function for both engines.

- The reference to other systems that perform the required function, or provide the required information

  Example:

  A system failure is monitored by the ECAM E/WD and is indicated by a FAULT light. Consequently, if the fault light fails, the system monitoring is still ensured by the ECAM E/WD.

- The adjustment of operational limitations

  Example:

  If the aircraft is dispatched with one brake inoperative, performance penalties must be applied, in order to adapt the operation of the aircraft to the actual aircraft braking capability.

- The adjustment of flight crew and/or maintenance procedures

  Example:

  If the pressure indicator on the slide bottle is inoperative, it is necessary to check the pressure of the slide bottle before the first flight of each day.

- The minimal adjustment to the flight crew's workload

  Example:

  On A340 aircraft, if the fuel temperature indicator on the outer tank is inoperative, the flight crew is requested to monitor the Total Air Temperature (TAT) during the entire flight.

A qualitative analysis is based on engineering judgment. This analysis may be based on the experience achieved from previous MMEL relief.

A qualitative analysis for the same item, on another aircraft type, is not directly applicable. A qualitative analyses have to take into account the differences in the architecture, and operational use, of the aircraft systems.

Flight and simulator tests can be a useful tool to evaluate the complexity of maintenance, and/or flight crew procedures, if an item is inoperative, and can help to evaluate the impact that an inoperative item may have on flight crew workload. The interactions between systems are fully analyzed to ensure that multiple failures do not result in an unsatisfactory level of safety.

The purpose of the qualitative analysis is to determine that **the failure of a candidate* system has no more than Minor** consequences** on the safety of the flight. Appropriate additional dispatch conditions, such as operational restrictions, flight crew procedures, or maintenance procedures, can be taken into account, in order to achieve this objective.

* A candidate system is a system that is likely to be included into the MMEL

** The standard definitions of failure effects classification are provided in Appendix 6.3 of this document

Example: *Failure of an engine starter valve on A300-600 aircraft.*

The air turbine starter is used to start the engine with the bleed from the APU:

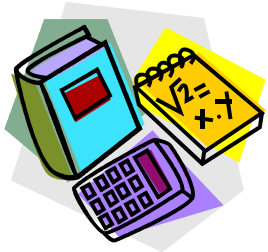
- *If the starter valve is in the open position, this will enable the APU bleed to go through a turbine that will start the engine*
- *If the starter valve is in the closed position, this will prevent hot bleed from the APU to enter the engine.*

Qualitative analysis has demonstrated that it is possible to safely fly the aircraft by securing the starter valve in the closed position:

- *The failure of the starter valve in the closed position has no effect on the safety of the flight. However, on ground, the flight crew should start the engine manually*
- *The failure of the starter valve in the open position could lead to an air turbine starter failure (because the turbine freely rotates with excess speed), and this may have an effect on the safety of the flight.*

Based on the above qualitative analysis of an engine starter valve failure, the MMEL addresses the starter valve item, and provides a corresponding flight crew and/or maintenance procedure to be applied in the case of a failure. These procedures explain how to manually start the engine on ground, and how to securely close the starter valve for the flight.

2.2.2. QUALITATIVE ANALYSIS: CONSEQUENCES OF THE NEXT CRITICAL FAILURE



When it is demonstrated that the consequences of a system failure are no more than **Minor**, the next step is to perform a **qualitative analysis of the next critical failure in flight**.

A failure will be labeled as the "next critical failure" when its consequences, in combination with the specific failure, have the most adverse effect on aircraft operations.

An analysis similar to the one described above (Refer to §2.2.1), is performed to demonstrate that the flight can be safely continued in acceptable conditions, even if an additional failure occurs during the flight.

Example:

The Fuel Engine LP Valve is "NO GO" because:

- *If the valve fails in the closed position, it is not possible to start the engine.*
- *If the valve fails in the open position, it is not possible to isolate the affected engine in the case of an engine fire.*

Therefore, the purpose of a qualitative analysis is to determine that **the next critical failure** after the failure of the MMEL candidate system **has no critical consequences** on the safety of the flight.

Dispatch conditions, such as operational restrictions, flight crew procedures, or maintenance procedures, can be taken into account to achieve this objective.

2.2.3. QUANTITATIVE ANALYSIS: COMPLIANCE WITH SSA

The certification process of an aircraft demonstrates compliance of the aircraft design with the safety objectives mandated by applicable regulations.
In order to assess this compliance, Airbus must estimate the consequences of aircraft failures.

As part of this certification process, **System Safety Assessments (SSA)** are performed to demonstrate aircraft compliance with applicable regulations.

An SSA is a systematic evaluation of the system that identifies the failure conditions to show that the safety objectives are met.

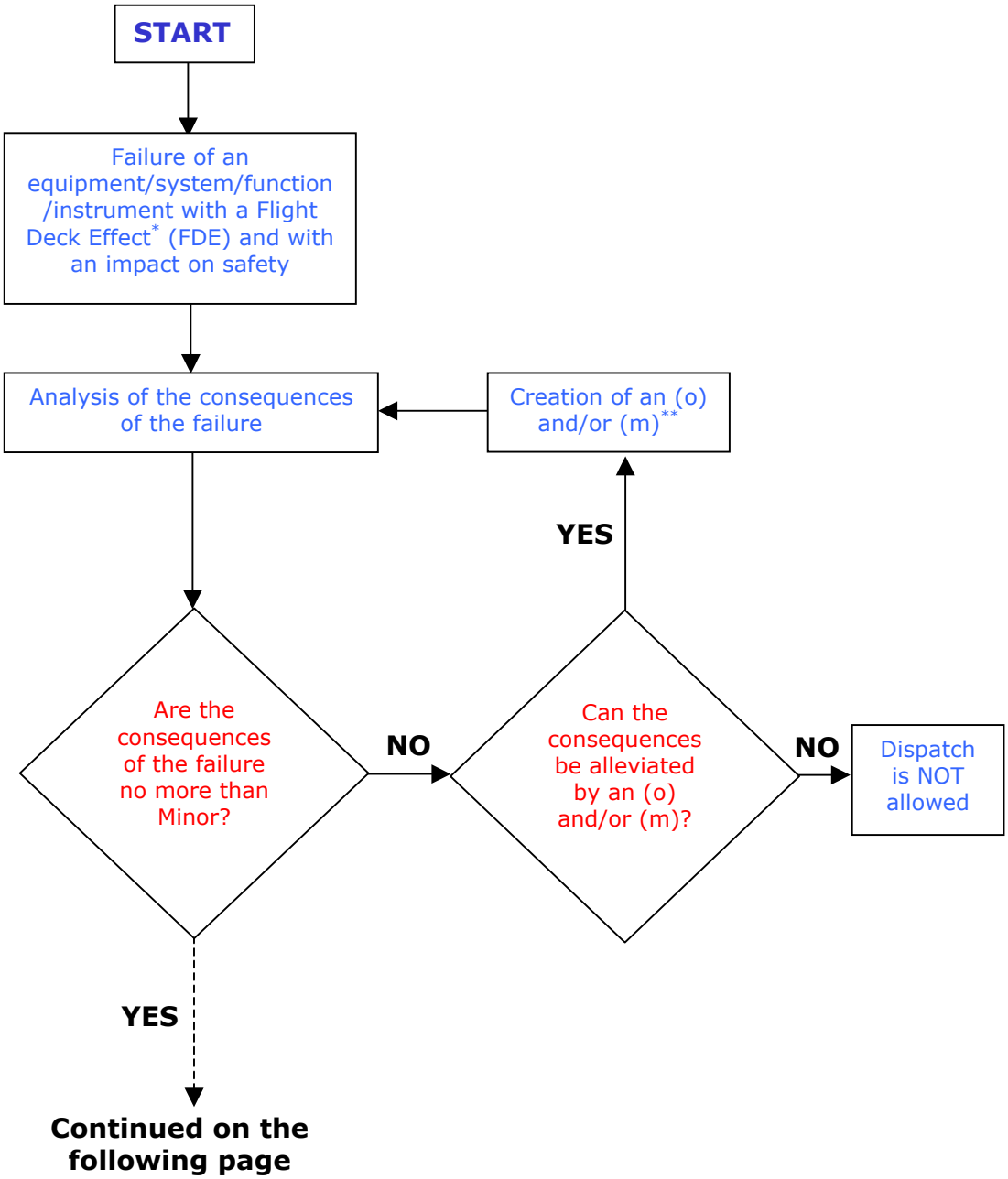
As part of the MMEL evaluation process, when the previous described qualitative analyses have been performed, an additional **quantitative analysis** may be completed.

This quantitative analysis consists in reviewing all **SSA** that involve the considered system.

These analyses are performed to demonstrate that, even with a failed item, **safety objectives are still met** and that the aircraft can still be safely operated.

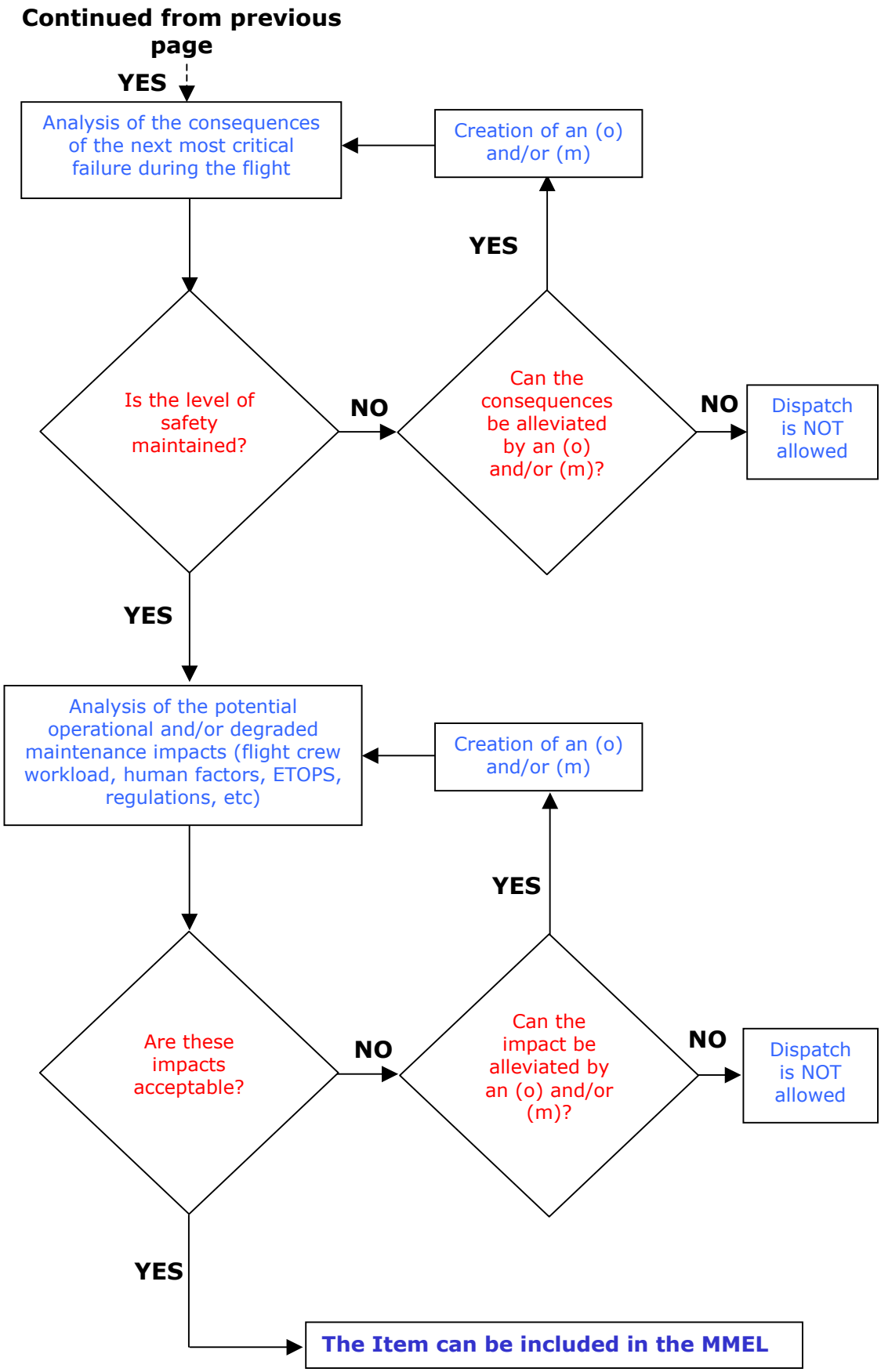
2.2.4. SUMMARY OF THE ANALYSIS PROCESS

The following diagram summarizes the various steps that are involved in the MMEL development process:



* A Flight Deck Effect (FDE) is any event that may be identified by the flight crew when in the flight deck (Refer to §4.4.2.1)

** (o) refers to flight crew procedures indicated in Section 01 of the MMEL
(m) refers to maintenance procedures indicated in Section 01 of the MMEL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YES
Analysis of the consequences of the next most critical failure during the flight
Creation of an (o) and/or (m)
YES
Is the level of safety maintained?
NO
Can the consequences be alleviated by an (o) and/or (m)?
NO
Dispatch is NOT allowed
YES
Analysis of the potential operational and/or degraded maintenance impacts (flight crew workload, human factors, ETOPS, regulations, etc)
Creation of an (o) and/or (m)
YES
Are these impacts acceptable?
NO
Can the impact be alleviated by an (o) and/or (m)?
NO
Dispatch is NOT allowed
YES
The Item can be included in the MMEL

2.3. MMEL RECTIFICATION INTERVALS

2.3.1. RECTIFICATION INTERVAL DEFINITION

The MMEL limits the period of time that an aircraft can be operated with inoperative items. These limits are defined to:

- Maintain an acceptable level of safety
- Prevent degraded maintenance
- Prevent multiple failures that may accumulate over time and, therefore, penalize safety and aircraft operations.

As specified in the Preamble of the MMEL, inoperative items should be repaired as soon as possible, and within the period of time defined by the **Rectification Intervals**.

Aviation Authorities required that Rectification Intervals be introduced in all Airbus MMELs. The following table indicates when these Rectification Intervals were introduced in the Airbus MMEL of each aircraft type:

	Aircraft Type	Revision Number	Revision Date
A300/A310	A300 B2/B4	REV 20	September 2000
	A300FFCC	REV 09	September 2000
	A310	REV 12	March 2000
	A300-600	REV 10	March 2000
A320	A319/A320/A321	REV 22	July 1998
A330/A340	A330	REV 11	June 2000
	A340	REV 12	June 2000

In accordance with the definition provided in JAR-MMEL/MEL.040, the following four Rectification Intervals (A, B, C, and D) have been introduced in Airbus MMELs:

Rectification Interval	**A**	**B**	**C**	**D**
Consecutive Calendar Days (excluding the day of discovery*)	**	**3**	**10**	**120**

* Not applicable to 'A' Rectification Intervals that specify a limited number of flights or flight hours. In this case, the 'A' Rectification Interval countdown starts from the first flight that follows the discovery of the failure.

** Category A does not specify a standard Rectification Interval. However, items in this category shall be rectified in accordance with the time limitation defined in the dispatch conditions of this item in MMEL section 01.

The inoperative item must be fixed prior to the expiration of the associated Rectification Interval. The countdown to the Rectification Interval excludes the day of discovery of the failure.

Example: If the failure is discovered at 10 a.m. on January 26th, the Rectification Interval will begin at midnight during the night of January 26th to January 27th.

However the MMEL dispatch conditions, that include any associated flight crew (o) and/or maintenance (m) procedures, must be applied from the very first flight that follows the discovery of the failure.

2.3.2. RECTIFICATION INTERVAL ATTRIBUTION TO MMEL ITEMS

The 'C' Rectification Interval corresponds to the maximum period of time that the Authorities will accept before repairing a basic/standard aircraft system. After the safety analysis of the system failure, it may be necessary to attribute the shorter, 'B' Rectification Interval.

Most of the optional systems on an aircraft are attributed a 'D' Rectification Interval.

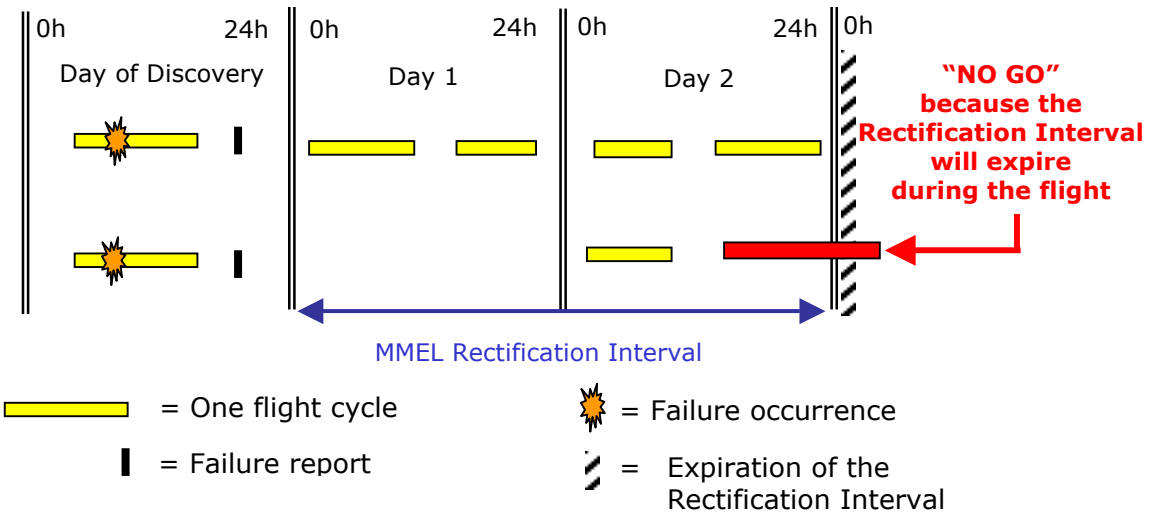
An 'A' Rectification Interval is used to take into account specific items that cannot be classified 'B', 'C', or 'D'. The duration of an 'A' Rectification Interval may be shorter or longer than the 'B', 'C', or 'D' Rectification Intervals.

Calendar Day/Flight Day:

- The JAA and the FAA both use the "**calendar day**" concept: A calendar day is a 24-hour period from midnight to midnight either in Coordinated Universal Time (UTC), or in local time, as decided by the Operator. The 'B', 'C' and 'D' Rectification Intervals are expressed in "**consecutive calendar days**". An 'A' Rectification Interval is also expressed in consecutive calendar days, unless the dispatch conditions specify a limited number of flights, flight hours, or flight days.

  Example: It is acceptable for the applicable item to be inoperative for two calendar days ('A' Rectification Interval).

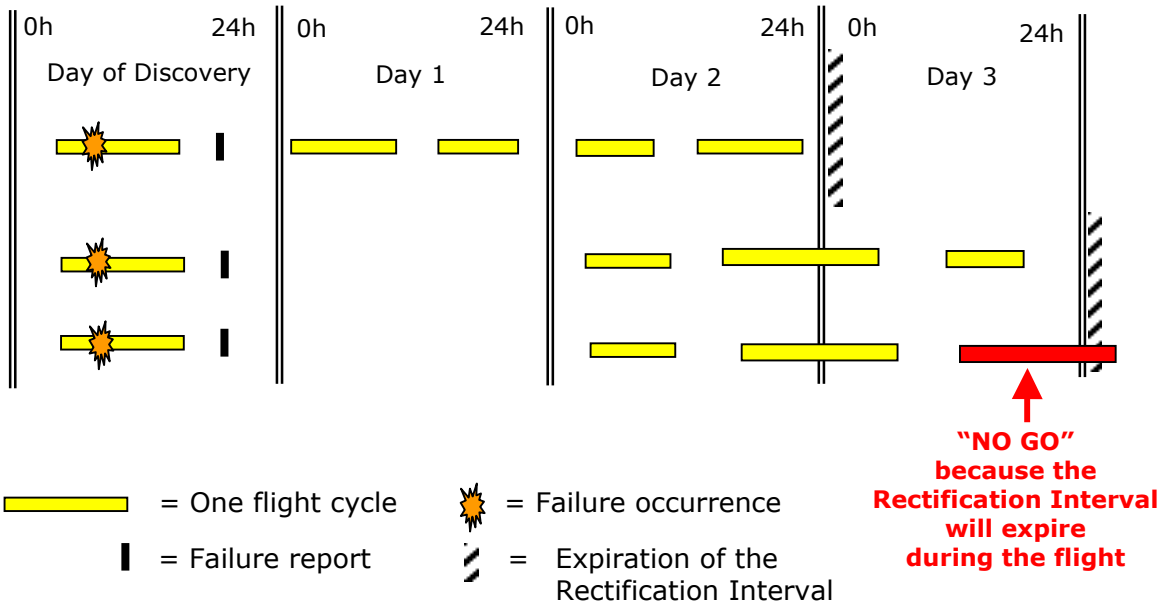
Calendar Day Concept



- Some 'A' Rectification Intervals may use the "**flight day**" concept: A flight day is a 24-hour period from midnight to midnight either in UTC, or local time, as decided by the Operator, during which the aircraft flies at least one time. Therefore two flight days might not be consecutive calendar days.

  Example: It is acceptable for the specific item to be inoperative for two flight days ('A' Rectification Interval)

Flight Day Concept



Dispatch of the aircraft is not permitted when the Rectification Interval specified in the MEL, has expired, unless the Rectification Interval is extended in accordance with a specific procedure provided in the JAR-MMEL/MEL, and described in the following paragraph (§2.3.3).

2.3.3. RECTIFICATION INTERVAL EXTENSION

Aircraft dispatch is not permitted if the Rectification Interval has expired. However, in accordance with the JAR-MMEL/MEL.081, Operators may be granted **a one-time extension** of the applicable Rectification Interval 'B', 'C', or 'D'. The Rectification Interval Extension (RIE) is not applicable to 'A' Rectification Intervals.

The JAR-MMEL/MEL.081 describes the one-time extension of Rectification Interval, and provides the requirements for its authorization for Operators:

> Subject to the approval of the Authority, the operator may use a procedure for the extension of the applicable Rectification Intervals B, C and D, for the same duration as specified in the MEL, provided:
>
> a) A description of specific duties and responsibilities for controlling extensions is established by the operator and accepted by the Authority, and
>
> b) The operator only grants a one time extension of the applicable Rectification Interval, and
>
> c) The Authority is notified of any extension granted within a timescale acceptable to the Authority, not to exceed one month, and
>
> d) Rectification is accomplished at the earliest opportunity.

Figure 2-1: JAR-MMEL/MEL.081

In exceptional circumstances, the Operators may directly negotiate, with their National Authorities, for a second extension of the Rectification Interval. This permission for a second extension is granted only by the National Authorities, and does not involve Airbus.

Note: What is the difference between a 10-day 'A' Rectification Interval and a 'C' Rectification Interval?
In both cases, the item must be rectified within 10 days. However, the difference is that **a one-time extension is not possible for an 'A' Rectification Interval**.

2.4. FAILURE CLASSIFICATION

At the initial design stage of an aircraft, each potential failure is identified and classified. The potential operational/maintenance consequences of the failure (and its impact on safety) are analyzed, taking into consideration the failure as a single failure, or as a failure combined with one or more failures.

At the aircraft level, failures are handled by:

- The maintenance panel for the A300/A310 family.

- The Centralized Fault Display System (CFDS) for the A320 family.
- The Central Maintenance System (CMS), for the A330/A340.

For the A320 family and A330/A340, the CFDS or the CMS centralize information about a faulty system and classify the failure as a class I, II, or III failure, depending on its operational and maintenance impact:

- Failures that result in an operational event in the cockpit are class I failures
- Failures that trigger an ECAM MAINTENANCE STATUS are class II failures
- Failures that do not result in an operational event in the cockpit, or that do not trigger an ECAM MAINTENANCE STATUS are class III failures.

With this failure classification of class I, II, or III, any items listed in the A320/A330/A340 MMELs may be given a “GO”, “GO IF”, or “NO GO” status.

This failure classification does not exist for the A300/A310 family.

Note: Authorities do not require this failure classification. It has been developed by Airbus, in order to help to distinguish between the different failures and to define appropriate flight crew or maintenance indications.
The notion of “failure classification” is not directly related to the notion of “failure effect”, as detailed in Appendix 6.3.

2.4.1. CLASS I FAILURES

Class I failures have operational consequences and may affect the dispatch of the aircraft. Therefore, **all class I failures are either listed in the MMEL or are "NO GO".**

Operators must refer to the MMEL to determine if a specific class I failure is "GO", "GO IF", or "NO GO".

The occurrence of a class I failure is automatically displayed to the flight crew by either:

- A warning or a caution on the overhead panel and/or on the windshield.
- A message(s) on the ECAM display unit
- Flag/loss of indication on the Primary Flight Display (PFD), Navigation Display (ND), System Display (SD), and/or Engine/Warning Display (E/WD)
- An indication in the flight deck and/or in the cabin.

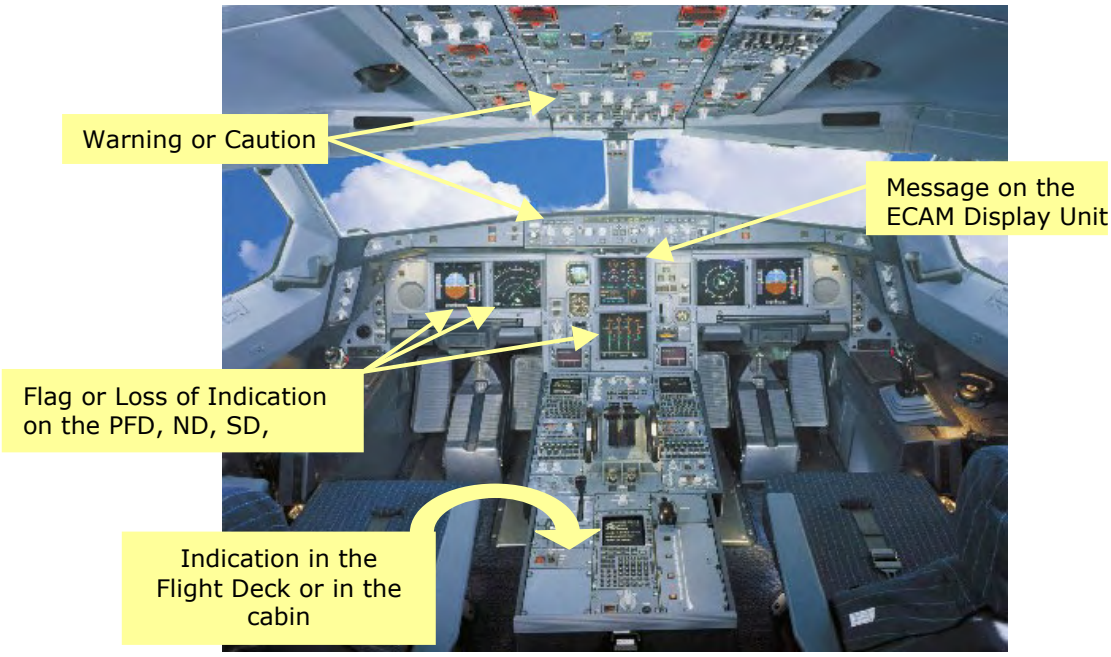


Figure 2-2: Cockpit Effects

2.4.2. CLASS II FAILURES

Class II failures:

- Do not have operational consequences
- Are indicated to the flight crew by a MAINTENANCE message on the ECAM STATUS page.

Figure 2-3: Class II Failure on the ECAM STATUS Page

Note: MAINTENANCE messages are only displayed when the aircraft is on ground, and appear before engine start-up (Phase 1), or after engine shutdown (Phase 10).

Class II failures are maintenance-related failures.

Based on safety analyses, Airbus demonstrated that all class II faults could remain un-rectified for a:

- **'C' Rectification Interval for the A320 family**
- **Maximum of 600 flight hours, or until the next A-check as mentioned in the introduction of the A330/A340 Troubleshooting Manual (TSM)**.

For the A320 family, all class II failures (MAINTENANCE messages) are addressed in the MMEL. The MMEL lists the corresponding items at the beginning of each ATA chapter. All class II failures, except two*, are "GO" without condition for a 'C' or a 'D' Rectification Interval. Operators should refer to the MMEL, in order to determine if a specific class II failure is "GO", "GO IF", or "NO GO".

Example: MMEL Item 21-00-01

21-00 MAINTENANCE MESSAGE DISPLAYED ON ECAM STATUS PAGE					
00-01 PACK	C				Dispatch with this MAINTENANCE message displayed on ECAM STATUS page is granted.

SPECIMEN

* **For the A320 family, the class II messages are "GO" without condition, except for the following two MAINTENANCE messages:**

- **BLUE RSVR**: This class II message is "NO GO" (Refer to MMEL Item 29-00-01) for aircraft not fitted with MOD 23119: Hydraulic power-Blue main hydraulic power-improve maintenance. Status of blue hydraulic reservoir.

00-01 BLUE RSVR	C				Dispatch with this MAINTENANCE message displayed on ECAM STATUS page is not allowed.

- **AIR BLEED**: This class II message is "GO IF" (Refer to MMEL Item 36-00-01).

00-01 AIR BLEED	C				Dispatch with this MAINTENANCE message displayed on ECAM STATUS page is granted provided ENG BLEED pb sw are selected OFF for takeoff with APU bleed supplying the air conditioning packs.

<u>For the A330/A340 family</u>, all class II failures are:

- **"GO" without condition**
- **Not listed in the MMEL. Operators can depart with one or more class II failures and do not have to refer to the MMEL.**

Class II failures must be rectified in accordance with the TSM. Therefore, it is permitted to fly with un-rectified class II failures until the next 'A' check. All class II failures should be rectified during 'A' checks. However, they can remain un-rectified between two 'A' checks.

Section 00 of the MMEL reminds that the handling of ECAM MAINTENANCE messages is addressed in the TSM.

<u>HANDLING OF ECAM MAINTENANCE STATUS</u>

<u>MAINTENANCE</u> messages displayed on ECAM <u>STATUS</u> page are for maintenance purpose only.

SPECIMEN

Dispatch with <u>MAINTENANCE</u> messages displayed on ECAM <u>STATUS</u> page is allowed without condition.

Management of these messages is handled by the Trouble Shooting Manual (TSM) and should be rectified within the timescale defined in the TSM.

2.4.3. CLASS III FAILURES

Class III failures:

- Do not have operational consequences
- Are **not listed in the MMEL**
- Are not indicated to the flight crew
- Are "GO" without condition.
- Can remain un-rectified for an unlimited period of time, and can be repaired at Operator's convenience

Operators can depart with one or more class III failures, and do not have to refer to the MMEL/MEL.

2.4.4. SUMMARY OF FAILURE CLASSES AND CONSEQUENCES

<table>
<tr><th>Failure/Fault classes</th><th>Class I</th><th>Class II</th><th>Class III</th></tr>
<tr><td>Operational Consequences</td><td>YES</td><td>NO</td><td>NO</td></tr>
<tr><td rowspan="2">Indication to the Flight Crew</td><td>YES</td><td>YES</td><td rowspan="2">NO</td></tr>
<tr><td>Automatically displayed with a direct cockpit effect</td><td>Available on ECAM <u>STATUS</u> page</td></tr>
<tr><td rowspan="2">Dispatch Consequences</td><td>YES
Refer to the MMEL</td><td>NO</td><td>NO</td></tr>
<tr><td>May be:
“GO”
“GO IF”
“NO GO”</td><td>“GO” without condition
Repair must be made:
• Within timescale (600 Flight Hours) defined in TSM introduction for the A330/A340
• Within 10 days for the A320
Exceptions for A320:
• BLUE RSVR
• AIR BLEED</td><td>MMEL not applicable

No fix time quoted for corrections: Handling left at Operator convenience</td></tr>
<tr><td>Indication to the Maintenance Team</td><td colspan="2">Printout automatically at the end of the flight:
• CFDS (A320)
• CMS (A330/A340)

Post-flight Report</td><td>Consultation on request via the CFDS/CMS Class III report</td></tr>
</table>

Please, keep in mind…

Development Principles to Justify Dispatch Conditions

Before proposing a new MMEL item to Airworthiness Authorities, the Airbus Flight Operations MMEL Department and safety specialists must substantiate the ability to **maintain an "acceptable level of safety" as required by an applicable regulation**, even if a specific system is inoperative.

Rectification Intervals

To maintain this "acceptable level of safety", and to prevent degraded maintenance, the MMEL establishes limitations on the amount of time that an aircraft can be operated with inoperative items.

Rectification Intervals	**A**	**B**	**C**	**D**
Consecutive Calendar Days (excluding the day of discovery)	**No standard Rectification Interval (refer to dispatch conditions)**	**3**	**10**	**120**

Rectification Intervals B, C, and D may be extended one time.

Failure Classification

For the A320 and the A330/A340 families, the Central Maintenance System (CMS) or the Centralized Fault Display System (CFDS) centralize the failures, and classify them, based on their effect on safety and in the cockpit. Only Class I failures may prevent aircraft dispatch and are addressed in the MMEL.

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3.1. INTRODUCTION

The MMEL is an Airbus document that lists equipment or functions, which are permitted to remain inoperative for a limited period of time, with associated conditions, in compliance with:

- Airworthiness requirements (flight safety, certification, flight crew workload)
- Operational requirements linked to the aircraft definition (performance and limitations, procedures, and systems' definition).

The equipment listed in the MMEL includes:

- Safety-related equipment required by:
  - Type Certification (either required by the JAR/FAR or by Airbus)
  - Operational rules (VHF, VOR, etc)
- Equipment installed by MOD/SB (optional equipment, new systems, new computer standards, etc).

The equipment not listed in the MMEL includes:

- Commercial/Convenience equipment that does not affect the airworthiness of the aircraft.
  Example: Entertainment systems, passenger convenience items.
- Maintenance items that, if they fail, do not affect the airworthiness of the aircraft. These equipment are neither required by the Type Certificate, nor by operational rules.
  Example: An LED in the avionic bay that duplicates information that is already available in the cockpit.

Therefore, all equipment/functions/instruments/systems related to the airworthiness of the aircraft, and not listed in the MMEL, are automatically required to be operative for dispatch (Example: Wings, engines, etc).

The Airbus MMEL reflects the JAA-prescribed five-column format.
The manual is divided into several sections that provide Airbus assessments on how to maintain an acceptable level of safety, when operating aircraft with inoperative equipment.

3.2. ORGANIZATION OF THE MMEL

The MMEL has the following sections:

All Airbus Families

MMEL Section 00:
Provides general information about the MMEL.

MMEL Section 00E:
Provides a link between the warnings or cautions that appear on the ECAM, and the relevant MMEL item. This section does not exist for A300 B2/B4 MMELs.

MMEL Section 01:
Provides the approved list of all the items that are permitted to be inoperative, in order to be able to dispatch the aircraft.

MMEL Section 02:
Provides flight crew operational procedures (o) that should be applied, if required by MMEL Section 01.

A300/A310 & A320 Families

MMEL Section 03:
Includes maintenance procedures (m) that should be applied, if required by MMEL Section 01.
All deactivation procedures, related to the MMEL are also available in the Aircraft Maintenance Manual (AMM)

A330/A340 Family

ADPM/AMM:
The aircraft Deactivation Procedures Manual (ADPM) provides the maintenance (m) procedures that should be applied, if required by MMEL Section 01.
All deactivation procedures, related to the MMEL, are also available in the Aircraft Maintenance Manual (AMM).

3.2.1. HOW TO CLASSIFY THE MMEL ITEMS?

In Airbus MMELs, items are classified according to the official ATA classification:

- A320/A330/A340 MMELs use **the ATA breakdown**.
- A300/A310 MMELs use only the ATA chapters. However, items within a particular chapter **are gathered historically**.

The following table indicates the ATA chapters that apply to the MMEL:

AIRCRAFT GENERAL

05 Time Limits/Maintenance Checks
06 Dimensions and Areas
07 Lifting and shoring
08 Leveling and Weighing
09 Towing and Taxiing
10 Parking, Mooring, Storage and Return to service
11 Placards and Markings
12 Servicing

MMEL Scope

STRUCTURE

51 Standard Practices and Structures
52 Doors
53 Fuselage
54 Nacelles/Pylons
55 Stabilizers
56 Windows
57 Wings

AIRFRAME SYSTEMS

20 Standard Practices
21 Air Conditioning
22 Auto Flight
23 Communications
24 Electrical power
25 Equipment/Furnishing
26 Fire Protection
27 Flight Controls
28 Fuel
29 Hydraulic Power
30 Ice and Rain Protection
31 Indicating/Recording Systems
32 Landing Gear
33 Lights
34 Navigation
35 Oxygen
36 Pneumatic
38 Water/Waste
45 Onboard Maintenance Systems
46 Information Systems
49 Airborne Auxiliary Power

POWER PLANT

70 Standard Practices-Engine
71 Power Plant
72 Engine
73 Engine Fuel and Control
74 Ignition
75 Air
76 Engine Controls
77 Engine Indicating
78 Exhaust
79 Oil
80 Starting

Figure 3-1: ATA Chapter Index and applicability to the MMEL

The following section illustrates how the MMEL items are numbered.

A320 and A330/A340 families:

MMEL items are assigned six digits.
The first two digits indicate the ATA chapter, and the last four digits indicate the system and function classification, in accordance with the ATA breakdown. The same numbering system is used for all maintenance and operational documentation.

Example:

MMEL 27-22-01

ATA Chapter 27: Flight Controls

Rudder Trim System

A300/A310 family:

MMEL items are assigned four digits.
The first two digits refer to the ATA chapter, and the last two digits identify the item. This identification is incremented each time a system is added to, or modified in, the MMEL. This results in an historical classification.

Example:

MMEL 27-10

ATA Chapter 27: Flight Controls

Rudder Travel System

3.2.2. HOW IS AN MMEL PAGE ORGANIZED?

3.2.2.1. A320 AND A330/A340 FAMILIES

- **Top of the MMEL Page**:

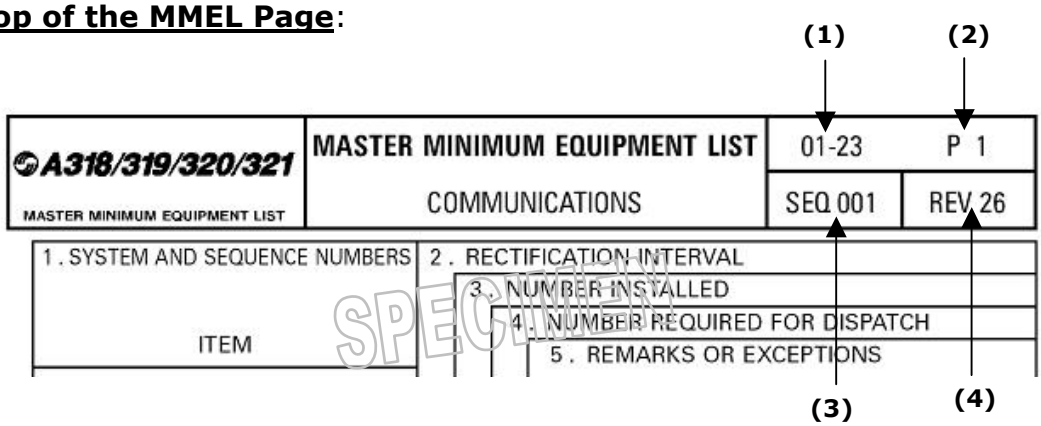


Figure 3-2: A320/A330/A340 - Top of the MMEL Page

1) Indicates the MMEL Section/ATA chapter (except for Section 00)

2) Indicates the MMEL page number

3) Indicates the sequence number: The sequence number is used for aircraft configuration management (Refer to §3.2.2.3).

4) Indicates the revision number of the MMEL and corresponds to the last revision at which the page was revised.

- **Bottom of the MMEL Page**:

MSN 0002-0004 0006-0187 0198-0625 0630 0644-2350

The bottom of the page specifies the Operator's aircraft MSNs listed in the Cross Reference Table (CRT) (Refer to §3.2.3) to which the page sequence applies.
However, instead of listing the applicable MSNs, Operators may prefer to list the applicable aircraft tail numbers, and can request this option.
The dash ("-") symbol between the MSN numbers is used to indicate that the sequence is not only applicable to the indicated MSN number, but also to all of the MSN numbers (as per the CRT) that are between these two numbers.
Example: '0644-2350' signifies that the page is applicable to all MSNs (listed in the CRT) from 0644 up to and including MSN 2350.

3.2.2.2. A300/A310 FAMILY

- **A310 and A300-600 top of the MMEL page**:

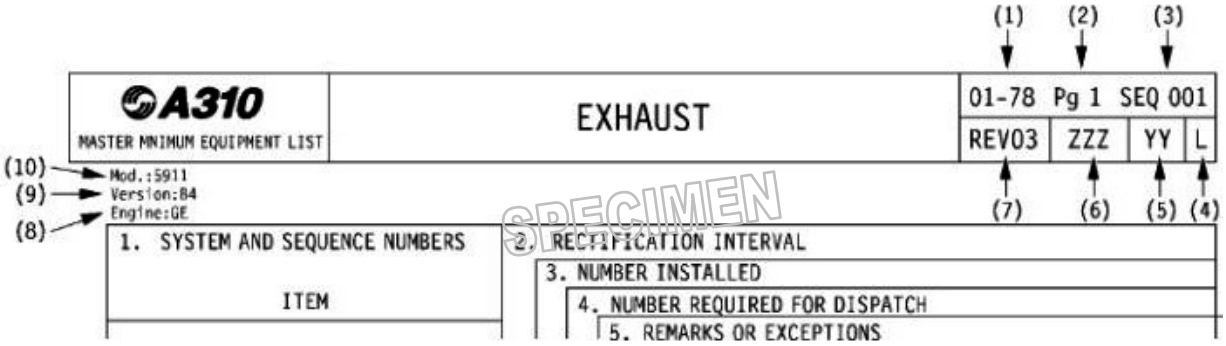


Figure 3-3: A310 - Top of the MMEL Page

1) Indicates the MMEL section and ATA chapter (except for Section 00).

2) Indicates the MMEL page number.

3) Indicates the Sequence number: The sequence number is used for aircraft configuration management (Refer to §3.2.2.3).

4) "L" indicates that the weight values are given in pounds. If this field is left blank, this signifies that the page is valid for tons, or both pounds and tons.

5) Indicates the applicable regulations:
   - AA for Australian regulations
   - UK for CAA regulations
   - US for FAA regulations
   - UR for Aviation Register regulations.

6) Indicates the Airline/Operator ICAO code.

7) Indicates the revision number of the MMEL that corresponds to the last revision at which the page was revised.

8) Indicates the applicable engines.

9) Indicates the applicable aircraft version/airframe.

10) Indicates the Validation criteria for this sequence, if applicable. It may contain the Modification (MOD)/Modification Proposal (MP)/ Service Bulletin (SB) number, or a CODE number (Refer to §3.2.2.3.3).

Note: Nothing is written on the bottom of A310/A300-600 MMELs pages.

- **A300 B2/B4**:

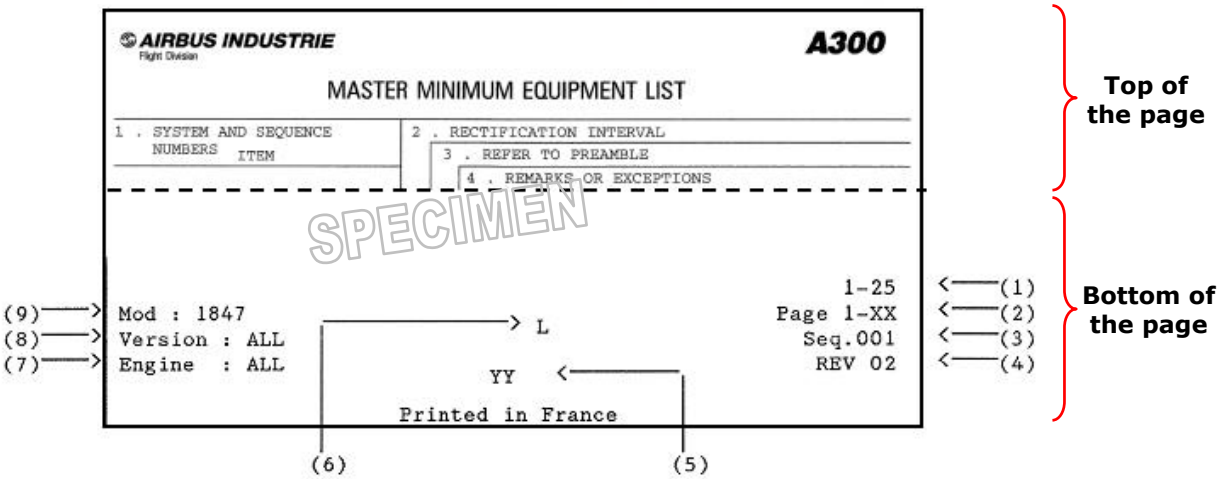


Figure 3-4: A300 B2/B4 Typical MMEL Page

1) Indicates the MMEL section and ATA chapter (except for Section 00).

2) Indicates the MMEL page number.

3) Indicates the Sequence number: The sequence number is used for aircraft configuration management (Refer to §3.2.2.3).

4) Indicates the revision number of the MMEL that corresponds to the last revision at which the page was revised.

5) Indicates the applicable regulations:

   - AA for Australian regulations
   - UK for CAA regulations
   - US for FAA regulations
   - UR for Aviation Register regulations.

6) "L" indicates that the weight values are given in pounds. If this field is left blank, this signifies that the page is valid for tons, or both pounds and tons.

7) Indicates the applicable engines.

8) Indicates the applicable aircraft version/airframe.

9) Indicates the Validation criteria for this sequence, if applicable. It may contain the Modification (MOD)/Modification Proposal (MP)/ Service Bulletin (SB) number, or a CODE number (Refer to §3.2.2.3.3).

3.2.2.3. HOW TO COPE WITH AIRCRAFT CONFIGURATION?

3.2.2.3.1. Aircraft Configurations and Page Sequences

An aircraft is designed with a basic/standard system configuration.

However, Operators may decide to modify some aspects of this basic configuration by selecting:

- A different system supplier than the one proposed by Airbus
- A different configuration for a specific system (e.g. carbon brakes instead of steel brakes)
- Optional equipment
- Other…

In addition, the systems of the initial aircraft design may also be updated by a new version.

Any variations from the basic/standard aircraft configuration can be done either on the assembly line or via retrofit, after the Entry-Into-Service (EIS) of the MSN. Therefore, there are in-service aircraft configurations that may differ from the basic/standard aircraft configuration.

For traceability reasons, each new system or version that is installed on an aircraft is identified via a:

- Modification (MOD) number, and/or
- Modification Proposal (MP) number, and/or
- Service Bulletin (SB) number.

MMEL dispatch conditions may vary from one aircraft configuration to another. Therefore, several sequences may exist for each MMEL page.

The page sequence:

- Is identified by the "SEQ" followed by a three-digit number
- Corresponds to a specific aircraft configuration that is identified via its validation criteria (Refer to §3.2.2.3.3)
- Has a different technical content than the other sequences of the same page.

Therefore, it is possible for an Operator to receive different sequences of the same page, if the aircraft in its fleet have different configurations.

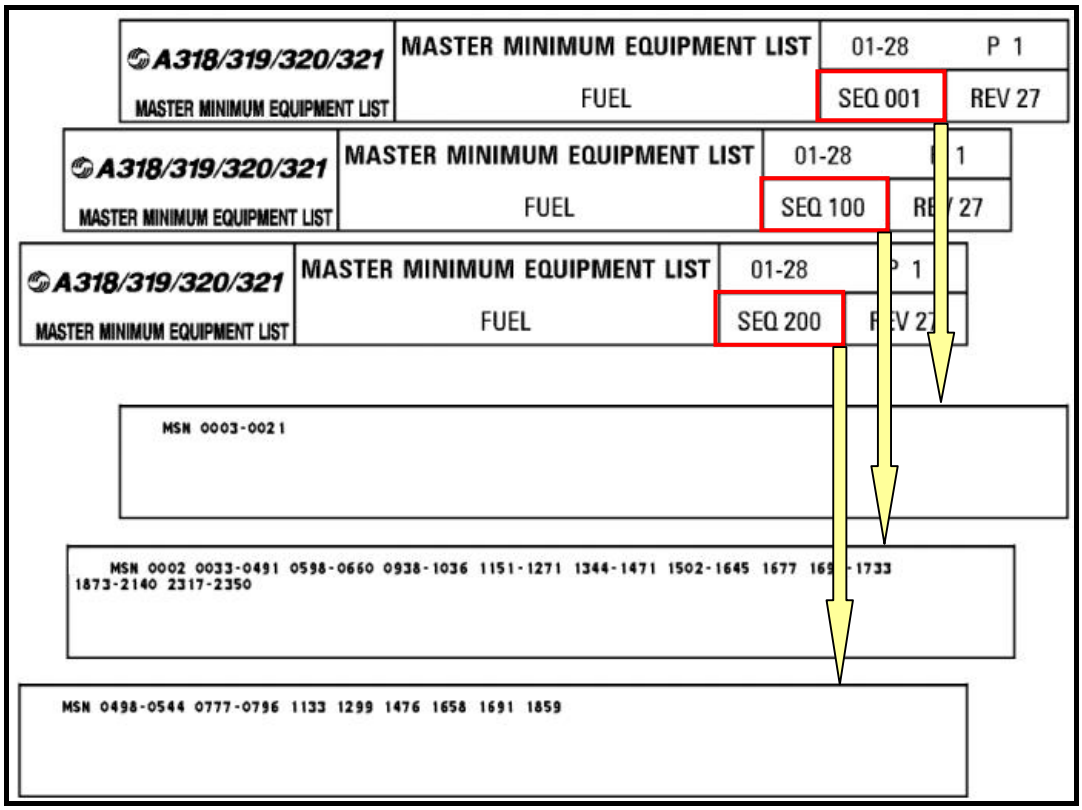


Figure 3-5: Page Sequence Number

The sequence (SEQ) numbers of a page enable Operators to differentiate between the different aircraft configurations. For each sequence, the List of Effective Pages (LEP) (Refer to §3.2.3):

- Enumerates the aircraft MSNs listed in the Cross Reference Table (CRT) to which the sequence applies.
- Indicates the corresponding aircraft configuration.

Note: For a given page, that may contain several items, the standard (STD) aircraft configuration refers to the aircraft configuration without any MOD/MP/SB affecting the items of this page.

3.2.2.3.2. The Importance of Service Bulletin Reporting

Each time a Service Bulletin (SB) is installed on an aircraft, the aircraft configuration changes. The installation of an SB may also affect MMEL dispatch conditions (Refer to §3.3.4.3).

It is, therefore, important that Operators report all SB installations, by filling out the designated SB Reporting Sheet and returning it to the Airbus Techpub Department. This helps to ensure that both the MMEL and the operational documentation are kept up-to-date. Prompt and accurate SB reporting ensures:

- **A maximum level of safety for the dispatch and operation of the aircraft**
- **Optimum Airbus fleet operations.**

3.2.2.3.3. Validation Criteria

An aircraft's configuration includes a combination of several MOD/MP/SB, and depends on the engine type, and/or on the aircraft version (A330-200 or A330-300, A318 or A321, etc.).

Validation criteria manage and identify the numerous aircraft configurations. These validation criteria are indicated in the List of Effective Page (LEP), and specify the applicability of each sequence of a page. For the A300/A310 family, these validation criteria are also indicated on each page.

Validation criteria can be one or more of the following:

- A MOD number, an MP number, or an SB number.
  Example: M: 25510
- An engine type: If no engine type is specified, the sequence of the page is applicable to all engine types.
  Example: M: 24105/IAE (applicable to aircraft with MOD 24105 and IAE engines)
- An aircraft version or airframe.
  Example: A300 B2 or A300 B4

Note: If no validation criterion is specified, the sequence of the page applies to the STD aircraft configuration.

- A combination of MODs and MPs:

Combination	Page Applicable to Aircraft with	Explanation
22013=24105=27189	• MOD 22013, **or** • MOD 24105, **or** • MOD 27189	"=" signifies "or"
20024+22013	• MOD 20024 **and** MOD 22010	"+" signifies "and"
40912=43239=(40912+41038)	• MOD 40912, **or** • MOD 43239, **or** • MOD 40192 **and** MOD 41038	Parentheses are only improved for clarity.
STD=(20071+28478)	• A standard configuration (aircraft without MOD 20071 and without MOD 28478), **or** • MOD 20071 **and** MOD 28478	"STD" signifies that the configuration is basic/standard, and no MOD/MP/SB affect the items described on the page.
CODE 0124P	• A combination of MODs/MPs grouped by this CODE number. The combinations are defined in MMEL Section entitled "List of Equivalence Codes" (Refer to §3.2.3).	When a page is applicable to a complex combination of MODs/MPs, CODE numbers are created in order to group and simplify these combinations.

3.2.3. SECTION 00 CONTENTS

The MMEL consists of several sections. The first is Section 00, and provides **general information about the manual**.

The following illustrates the various parts of Section 00:

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	GENERAL CONTENTS	00-00	P 1
		SEQ 002	REV 23

	SECTION	
	00	GENERAL
	00-00	Contents
	00-01	Letter of transmittal (if necessary)
	00-02	Organization of the manual
	00-03	Normal revision – Filing instructions
	00-04	Normal revision – Highlights (If available)
	00-05	Normal revision – List of Effective Pages (LEP)
	00-06	Normal revision – List of normal revisions
	00-07	Normal revision – approval sheet
	00-08	Temporary revisions – Record of temporary revisions
	00-09	Temporary revisions – Filing instructions
	00-10	Temporary revisions – List of effective temporary revisions
	00-11	List of MOD / MP / SB affecting the manual
	00-12	List of MOD / MP / SB grouping numbers (if necessary)
	00-13	Cross reference table
	00-14	List of abbreviations
R	00-15	Correspondance beteen CODE number and MOD / MP numbers (if necessary)

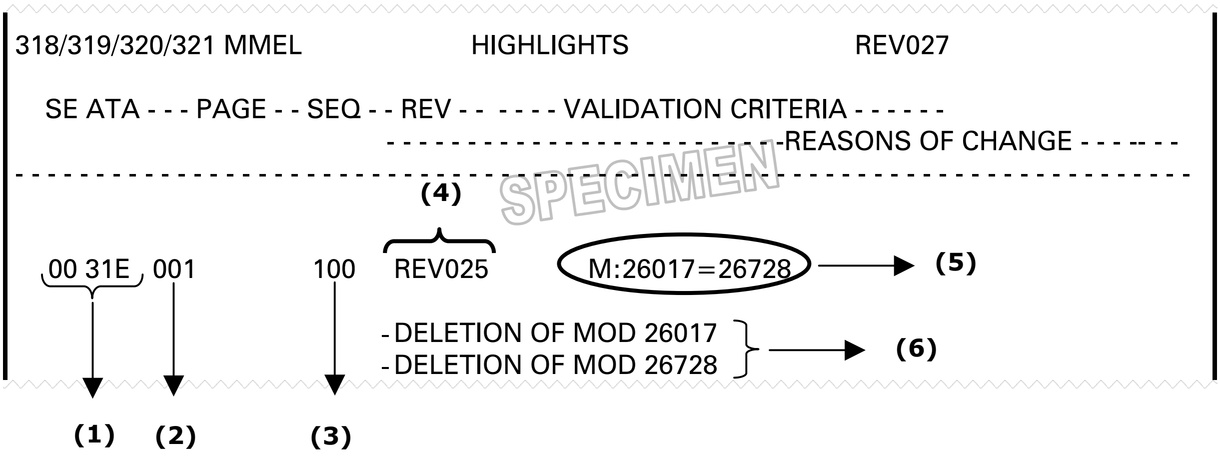
SPECIMEN

Figure 3-6: MMEL Section 00 - Table of Contents

Note: The chapter numbers and titles in Section 00 may vary between one aircraft family and another.

- **00-00: Contents** - See above example.
- **00-01: Letter of Transmittal** (Refer to §3.3.4.1)
- **00-02: Organization of the manual** - Includes general information about how the manual is organized.
- **00-03: Filing instructions** (Refer to §3.3.4.1)

- **00-04: Highlights** - Lists and describes the changes, and the reasons for the changes, that are introduced by the revised page.



1) Section and ATA chapter

2) Page number

3) Sequence number

4) Revision number

5) Validation criteria of the page sequence (Refer to §3.2.2.3.3)

6) Reasons for change*

---

* The reasons for a change may be:

- A technical amendment, briefly described, affecting the page.
  Example: *"The second AFT CRG DET FAULT has been deleted"*
  "Introduce relief for one parking brake motor"

- The deletion or incorporation of modifications for aircraft configuration management purposes, or for the installation of a new system.
  Example: *"Deletion of MOD 26017"*

- **00-05: List of Effective Pages** (LEP) - Lists all the pages of the manual that are applicable to the Operator's fleet and indicates the applicability of each sequence via the validation criterion and the concerned aircraft MSNs. The MMEL content must correspond to the LEP. The LEP can be used to ensure that the MMEL is up-to-date and that no pages are missing.

```
318/319/320/321 MMEL                LIST OF EFFECTIVE PAGES                REV027

M   SE ATA - - - PAGE - - SEQ - - REV - - - VALIDATION CRITERIA - - -VALIDATION AIRPLANE -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

R   01 21   012            100      REV027        M: 24105/IAE     | 0598-0660 0936-1036
                                                                    | 1191-1271 1344-1470
                                                                    | 1505-1645 1677
                                                                    | 1699-1733 1936
```

(1) (2)

1) Page status:
   - New pages are indicated by an 'N'
   - Revised pages are indicated by an 'R'.
2) Aircraft validation: Lists the MSNs, included in the Cross Reference Table (CRT), to which the sequence applies.
   - *<u>Example</u>: "0598 0938 1677"= The sequence is only applicable to MSNs 0598, 0938, and 1677.*
   - *<u>Example</u>: "0598-0660"= The sequence is applicable to all MSN numbers, from 0598 through 0660, that are listed in the Cross Reference Table (CRT).*
   - *<u>Example</u>: "ALL"= The sequence is applicable to all aircraft listed in the CRT.*

- **00-06: List of Normal Revisions** - Includes a record of all Normal Revisions, and the date of these revisions (Refer to §3.3.4.1)
- **00-07: Normal Revision Acceptance Sheet** - Authorities stamp.
- **00-08: Record of Temporary Revisions** - May be used by Operators to keep track of Temporary Revisions.
- **00-09: Temporary Revisions–Filing instructions** (Refer to §3.3.4.2)
- **00-10: List of effective Temporary Revisions** (LETR) - Lists all of the Temporary Revisions that affect the manual (Refer to §3.3.4.2).

- **00-11: List of MOD/MP/SB affecting the manual** - Lists the MODs, MPs, and SBs which installation on the aircraft affect the MMEL, and provides their modification numbers, titles, and validity. If the MOD/MP/SB does not apply to the entire fleet listed in the Cross Reference Table (CRT), the validity is indicated in the list of the registration numbers of the affected aircraft.

```
  318/319/320/321 MMEL
VOLUME :
LIST OF MOD/MP/SB AFFECTING THE MANUAL                    REVISION  :  027

REV    MOD      MP                TITLE
            SB                                  VALIDITY
                                  SPECIMEN
027    - - - - -   P2878         INDICATING RECORDING SYSTEM – SDAC -
   - - - - - - - - - - - - - -      DEFINE A PIN PROGRAM FOR REAR C.C.   }→(5)
        (1)          (3)          VENTILATION
                                          ALL → (4)
015    21224     - - - - - - -     AIR CONDITIONING – AVIONICS EQUIPMENT
   21-1015 01                       VENTILATION – REDUCE LEVEL OF
                                    VIBRATION AT WALL HEAT EXCHANGER
        (2)                                 ALL
```

1) Modification number (if applicable)

2) Service Bulletin number (if applicable)

3) Modification Proposal (if applicable)

4) Aircraft validation - Lists the registration numbers of the aircraft that have the MOD/MP/SB

5) Title of the MOD/MP/SB.

- **00-12: List of MOD/MP/SB grouping numbers**

- **00-13: Cross Reference Table** (CRT) - provides the list of aircraft that are taken into account by the MMEL, and indicates the link between the MSN number and the registration number of an aircraft in the fleet.

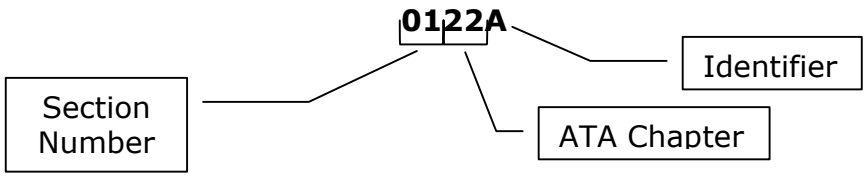
- **00-14: List of abbreviations**

- **00-15: Correspondence between CODE Number and MOD/MP numbers** - A CODE number is a combination of MOD numbers and MP numbers, and is created for clarity reasons. CODE numbers are part of the validation criteria (Refer to §3.2.2.3.3) that is used to identify the aircraft configuration and are indicated in the List of Effective Pages (LEP). For the A300/A310 family, the CODE numbers are also indicated at the top of the page.

EQUIVALENCE CODES	DESIGNATION
0122A	Mod : 24035 or 24160 or 24211 or (24035 + 24211)

SPECIMEN

CODE numbers are created, in accordance with the following specific format:



3.2.4. SECTION 00E CONTENTS

This section is applicable to all Airbus families except the A300 B2/B4 because these aircraft do not have ECAM.

The purpose of Section 00E is to help Operators determine which MMEL item is being referred to, when the ECAM displays a caution/warning.
For each ECAM caution/warning, Section 00E suggests one, or more, associated MMEL items (listed in Section 01).

ECAM messages can be:

- Messages requiring flight/cabin crew coordination
  Example: SMOKE LAVATORY SMOKE

- Abnormal configuration for flight phase
  Example: F/CTL SPD BRK STILL OUT

- Abnormal configuration
  Example: AIR PACK 1 (2) OFF

- Abnormal system configuration
  Example: FUEL ENG 1 (2) LP VALVE OPEN

- Systems discrepancy/disagree
  Example: NAV ALTI DISCREPANCY

- Inoperative system/loss of function, with operational impact
  Example: COND ZONE REGUL FAULT

- Inoperative system/loss of function, without operational impact
  Example: ELEC ESS TR FAULT.

The format of Section 00E is displayed below:

A340 MASTER MINIMUM EQUIPMENT LIST	ECAM WARNINGS / MMEL ENTRY AIR CONDITIONING	00-21E SEQ 001	P 1 REV 16

ECAM WARNING	DISPATCH CONDITION	REMARK
AIR		
HOT AIR SYS 1 (2) FAULT	Refer to MMEL 21-03-03	
PACK 1+2 FAULT	Refer to MMEL 21-52-01	
PACK 1 (2) OFF	Refer to MMEL 21-52-01	
PACK 1 (2) OVHT	Refer to MMEL 21-52-01	
PACK 1 (2) REGUL FAULT	Refer to MMEL 21-52, or Refer to MMEL 21-53	

SPECIMEN

Figure 3-7: Section 00E - Format of the A320/A330/A340 MMEL

The "DISPATCH CONDITION" column may indicate the following:

- **"Refer to MMEL XX-XX-XX"**: Apply the item indicated in Section 01.
- **"Refer to FCOM"/"Apply ECAM procedure"**: Apply the relevant procedure.
- **"Refer to the affected system"**: Enter the MMEL item in Section 01 that corresponds to the affected system.
- **"Not Applicable"**: The MMEL is not the appropriate document to be consulted.
- **"NO DISPATCH"**: The aircraft cannot be dispatched when this message is displayed on the ECAM.

Depending on the type of failure, several dispatch conditions may be associated with one ECAM warning. In this case, the flight crew may refer to the "REMARK" column to find out the conditions for dispatch:

Example:

AUTO BRK FAULT	NO DISPATCH, or	If normal braking is lost (BRAKE RELEASED message is not displayed on ECAM E/WD
	Refer to MMEL 32-42-04, or	If auto brake function is affected (BRAKE RELEASED message is displayed on ECAM E/WD)
	Refer to MMEL 32-42-05	If a tachometer is affected (BRAKE RELEASED message is displayed on ECAM E/WD)

SPECIMEN

The "REMARK" column may also include the note "Actual caution/warning" and/or "False caution/warning" to distinguish between the system failure, and its monitoring system failure, when necessary:

DOOR CARGO	NO DISPATCH, or Refer to MMEL 52-70-01	Actual caution False caution

SPECIMEN

- **"Actual caution"** or **"Actual warning"**
  In this case, the system that is monitored by the caution/warning has failed.

  Example: In the above extract, from the A320 family MMEL, if the ECAM indicates that the cargo door is open, and if this door is confirmed to be open, then the aircraft cannot be dispatched.

- **"False caution"** or **"False warning"**
  In this case, the system that is monitored by the caution/warning is still operative, but the monitoring system has failed.
  Therefore, the MMEL provides the conditions for dispatch because troubleshooting has shown that the system itself is operative (Refer to §4.4.2.3).

  Example: In the above extract, from the A320 family MMEL, if the ECAM indicates that the cargo door is open, but this door is confirmed to be closed, the aircraft can still be dispatched by applying the MMEL item 52-70-01.

Note: The objective of Section 00E is to help Operators identify the corresponding MMEL item, when the ECAM displays a caution or a warning. **Section 00E does not replace troubleshooting actions, and does not replace Section 01, which is the approved/accepted section of the MMEL.**

3.2.5. SECTION 01 CONTENTS

3.2.5.1. ALL AIRBUS FAMILIES EXCEPT A300 B2/B4

Section 01 has five columns:

1. SYSTEM AND SEQUENCE NUMBERS ITEM	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH	5. REMARKS OR EXCEPTIONS

Figure 3-8: Section 1 for all Airbus aircraft, except the A300 B2/B4

Column 1: "ITEM"

This column lists the items for which the MMEL may allow aircraft dispatch.
Some items are listed as "**(If Installed)**" or "**(Reserved)**" in the "ITEM" column (Refer to §4.2.2.3).

Column 2: "RECTIFICATION INTERVAL"

This column indicates the Rectification Interval (Refer to §2.3).

If no Rectification Interval is specified, the item is "NO GO".

"**As required by regulations**" items are listed with a dash ("-") symbol in column 2. This does not mean that the item can be left un-rectified indefinitely, but rather that the appropriate Rectification Interval must be established in the MEL, in accordance with the Operators' national operational requirements (Refer to §4.2.2.4).

Column 3: "NUMBER INSTALLED"

This column indicates, for a specific item, the quantity installed on the aircraft.
The dash ("-") symbol indicates that the quantity can vary.

Column 4: "NUMBER REQUIRED FOR DISPATCH"

This column indicates the minimum quantity of the item that must be operative for dispatch.
The dash ("-") symbol indicates that the quantity can vary.

Column 5: "REMARKS OR EXCEPTIONS"

This column provides the dispatch conditions, if any, that must be satisfied before dispatching the aircraft with the specific item inoperative. If there is a dispatch condition in this column, the item is said to be "GO IF". If there is no text in this column, the dispatch is possible without any specific condition or restriction: The item is said to be "GO" ("GO" without condition, as opposed to "GO IF").

For some items, Operators may have the choice between several solutions for dispatching the aircraft. Each solution has equal emphasis and is named either "exception", "proviso", or "dispatch condition". Each dispatch condition has its own Rectification Interval and its own restrictions.

Exceptions/provisos are numbered in a specific format:
Example:

28-12 TANK VENTING SYSTEM					
12-01 Overpressure Protector					
E) In Additional Center Tank	C	1	0	(o)	a) May be inoperative provided: 1) Manual transfer from ACT to center tank is operative, and 2) ...

SPECIMEN

"01–28–12-E)–a)" corresponds to the dispatch condition a) of item 28-12-01-E).

Column 5 may contain the following symbols:

- ***** Indicates that the inoperative equipment has to be placarded in the cockpit to inform flight crew that it is not serviceable.

- **(o)** indicates that there is an associated operational procedure for the flight crew. Operational procedures are usually performed by qualified flight, or cabin crew, but may be accomplished by other qualified and approved personnel (Refer to §3.2.6). As a general rule, the flight crew must refer to the operational procedures in section 02 of the MMEL/MEL, in order to obtain information on the content of the procedure before each flight.

- **(m)** Indicates that there is an associated maintenance procedure. Maintenance personnel usually perform maintenance procedures, but flight crew, or other qualified and approved personnel may perform some elementary maintenance tasks (Refer to §3.2.7). The flight crew has to ensure that the maintenance (m) procedure, associated with an MMEL/MEL item, is correctly performed.

  Asterisk (*) symbols, the operational (o) procedures and the maintenance (m) procedures are all part of the dispatch conditions and must be performed and satisfied for dispatch of the aircraft under MMEL/MEL.

- This column may also contain **Notes**. The notes are part of section 01 of the MMEL and are, therefore, approved/accepted by the Authorities. The aircraft must be dispatched in accordance with the notes, if any, that are associated with the MMEL dispatch conditions for a particular item, or group of items. The notes may be used for the following purposes:

  - To provide additional information related to dispatch conditions. However this additional information does not modify the requirements and restrictions of the dispatch conditions
  - To specify the scope of the dispatch conditions of the applicable item. The aircraft must be dispatched in accordance with the note.
  - To restrict the associated dispatch conditions for some specific conditions. The aircraft must be dispatched accordingly
  - To provide additional relief for some specific conditions. The aircraft can be dispatched in accordance with the note.

  Section 00-02 of the MMEL, "Organization of the manual", provides additional information about the notes.

  The notes have the following three levels:

- Note Level 1: These notes apply to all items that are listed below the note, and relate to a system, or subsystem.

Example: This note applies to item "21-26-01: Blower fan" ***and*** *item "21-26-02 Extract fan".*

21-26 AVIONICS EQUIPMENT VENTILATION						***NOTE*** ***During ground operation, proper avionics ventilation should be provided.***
26-01 Blower fan	C	2	1	*	(o)	Except for ER operation, may be inoperative provided: 1) BLOWER pb sw is set at OVRD, and 2) Both air conditioning packs are operative, and 3) VENT AVNCS SYS FAULT ECAM caution is not present.
26-02 Extract fan	C	1	0	*	(o)	Except for ER operation, may be inoperative provided: 1) Blower fan is operative, and 2) EXTRACT pb sw is set at OVRD, and 3) Both air conditioning packs are operative, and 4) VENT AVNCS SYS FAULT ECAM is not present.

SPECIMEN

- Note Level 2: These notes apply to all dispatch conditions that relate to a specific item.

  Example: This note applies to item "33-20-02: Cabin signs", exceptions a) ***and*** *b).*

20-02 Cabin signs (No Smoking/Fasten Seat Belt/Return to Seat)					____ *NOTE* _____ *AUTO function may be inoperative* _____
	C	-	-	*	a) One or more signs may be inoperative and passengers may be carried provided: 1) Passenger Address system is operative, can be clearly heard throughout the cabin during the flight, and is used to alert the cabin attendants when passengers must return to seat, seat belts should be fastened and smoking is prohibited, and 2) Call and cabin interphone systems are operative - or -
	C	-	-	*	b) No seat may be occupied from which a passenger cannot see a readily legible "No Smoking/Fasten Seat Belt" sign, and that seat must be blocked.

SPECIMEN

- Note level 3: These notes apply only to the specific dispatch condition that is associated with a specific item.

  Example: This note applies only to item 27-44-01: Stabilizer actuator Electrical Motor, exception b).

44-01 Stabilizer Actuator Electrical Motor	C	3	2		a) Motor 3 may be inoperative. - or -
	C	3	2		b) Except for ER operations, motor 2 may be inoperative. *Note: With motor 2 inoperative, ELAC 1 pitch channel is inoperative.*

SPECIMEN

How to Identify "NO GO" Items?

Even if the philosophy of the MMEL is to list only the "GO" and the "GO IF" items, some "NO GO" items are still listed.

The "NO GO" items in Section 01 appear as follows:

- *Example: Item 34-13-01-A) Indications on PFD*

34-10 AIR DATA INERTIAL					
13-01 INDICATION ON PFD					
A) Actual airspeed Reference line and scale		2	2		

SPECIMEN

When no Rectification Interval is specified, and when the number in the "NUMBER INSTALLED" column is the same as the number in the "NUMBER REQUIRED FOR DISPATCH" column, the related item **must be operative** for dispatch.

- *Example: Item 25-11-01-B)-a) Pilot seat-Horizontal adjustment*

25-11 COCKPIT SEATS					
11-01 Cockpit seat adjustment system					
B) Pilot seat					
a) Horizontal adjustment	C	2	2		Mechanical control must be operative for each pilot.

SPECIMEN

Dispatch with the mechanical control inoperative is not permitted, however, dispatch without the electrical control is permitted. The number in the "NUMBER INSTALLED" column is equal to the number in the "NUMBER REQUIRED FOR DISPATCH" column. The entire system is required for dispatch but the dispatch is permitted with an inoperative part (in this case the electrical control).

- *Example: Item 34-10-01-A) IR*

34-10 AIR DATA INERTIAL Reference system (ADIRS)						
10-01 ADIRS A) IR	C	3	2		(o)	a) IR2 or IR3 may be inoperative. Note: With IR3 inoperative, takeoff shall not be performed in CONF 1+F

SPECIMEN

Dispatch with IR1 inoperative is not permitted.

- *Example: Item 21-26-01 Blower fan*

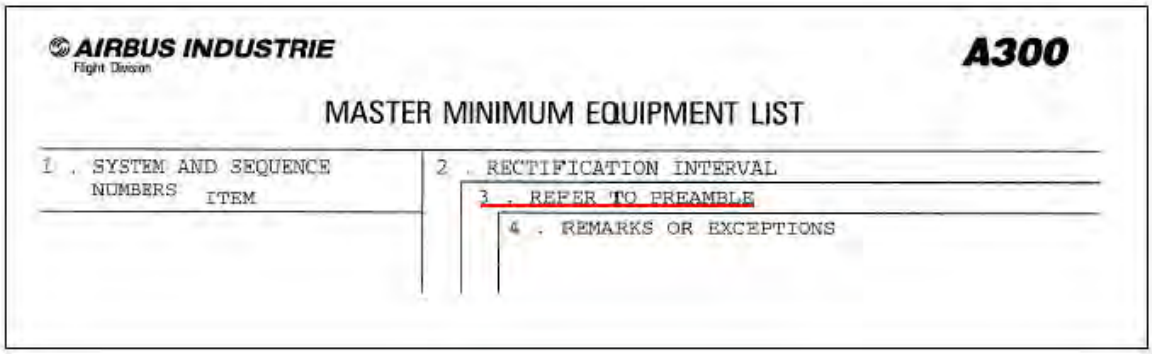
26-01 Blower fan	C	1	0	*	(o)	a) Except for ER operation, may be inoperative provided: 1) BLOWER pb sw is set at OVRD, and 2) Both air conditioning packs are operative, and 3) VENT AVNCS SYS FAULT ECAM caution is not present.

SPECIMEN

Dispatch with the blower fan inoperative for ER operations (ETOPS) is not permitted.

3.2.5.2. A300 B2/B4

The explanations provided in chapter 3.2.5.1 also apply to columns 1, 2, and 4 of the A300 B2/B4 MMEL. The only difference between the A300 B2/B4 MMEL and the MMELs of the other Airbus aircraft families MMELs is the "REFER TO PREAMBLE" column. This column replaces the "NUMBER INSTALLED" and the "NUMBER REQUIRED" columns, as illustrated in the figure below:


AIRBUS INDUSTRIE
Flight Division

A300

MASTER MINIMUM EQUIPMENT LIST

1 . SYSTEM AND SEQUENCE NUMBERS ITEM	2 . RECTIFICATION INTERVAL	3 . REFER TO PREAMBLE	4 . REMARKS OR EXCEPTIONS

Figure 3-9: Section 1 Format on A300 B2/B4 MMEL

For a specific item, the number in the "REFER TO PREAMBLE" column indicates:

- The number of operative items required for dispatch, if there is no remark or exception listed in column 4 (case 1).
- The number of items installed on the aircraft, if dispatch conditions are listed in column 4. Then the number required is determined by the dispatch conditions (case 2).

See illustration of these two cases on the following page.

Case 1:No exceptions or remarks listed in column 4.
→ 0 corresponds to the number required for dispatch.
Dispatch is possible with zero "PUMP PRESS LO arrow lt" operative without any condition

AIRBUS INDUSTRIE Flight Division A300

MASTER MINIMUM EQUIPMENT LIST

1 . SYSTEM AND SEQUENCE NUMBERS ITEM	2 . RECTIFICATION INTERVAL	3 . REFER TO PREAMBLE	4 REMARKS OR EXCEPTIONS
29 - HYDRAULIC POWER (Cont'd)			
13 - "PUMP PRESS LO" arrow lt.	C	0	*
14 - PUMP PRESSURE m.i.	C	5	* (o) All may be inoperative provided associated PRESS LO lt. are operative

SPECIMEN

Case 2:Exceptions or remarks listed in column 4
→ 5 corresponds to the number installed.
Dispatch is possible with zero "PUMP PRESS m.i." operative provided associated "PRESS LO lt." are operative.

How to Identify "NO GO" Items?

Even if the philosophy of the MMEL is to list only the "GO" and the "GO IF" items, some "NO GO" items are still listed.
When an "NO GO" item is listed in the MMEL, the "RECTIFICATION INTERVAL" column is empty, and the number in the third column refers to the **number installed**.

Example: MMEL 21-3: Air Conditioning-Ram air inlet

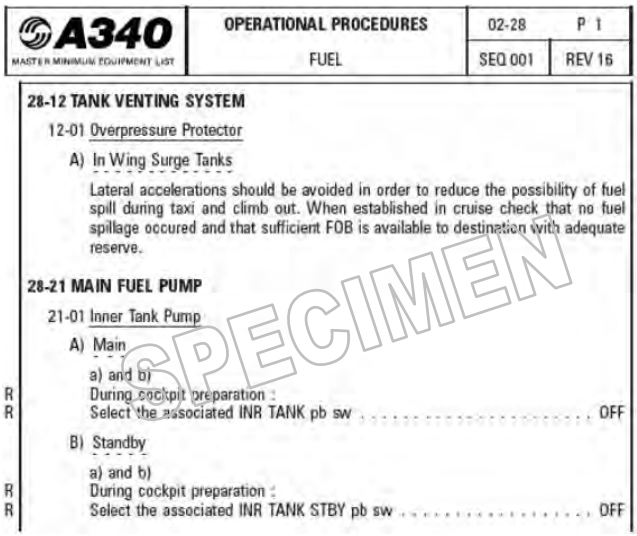
3 – Ram air inlet		1	

SPECIMEN

3.2.6. SECTION 02 CONTENTS

This non-approved section lists all of the operational procedures required by an MMEL entry in Section 01. These requirements are indicated in Section 01 by a (o) symbol in the "REMARKS OR EXCEPTIONS" column.

Usually, the flight crew performs operational procedures. However, other personnel may be qualified and authorized to perform certain functions. The satisfactory accomplishment of all procedures, regardless of who performs them, is the responsibility of the Operator. As a general rule, the flight crew must refer to operational procedures in the Section 02 of the MMEL/MEL to be informed of the content of the procedure.



A340 MASTER MINIMUM EQUIPMENT LIST	OPERATIONAL PROCEDURES	02-28	P 1
	FUEL	SEQ 001	REV 16

28-12 TANK VENTING SYSTEM

12-01 Overpressure Protector

A) In Wing Surge Tanks

Lateral accelerations should be avoided in order to reduce the possibility of fuel spill during taxi and climb out. When established in cruise check that no fuel spillage occured and that sufficient FOB is available to destination with adequate reserve.

28-21 MAIN FUEL PUMP

21-01 Inner Tank Pump

A) Main

a) and b)

R During cockpit preparation :

R Select the associated INR TANK pb sw . . . . . OFF

B) Standby

a) and b)

R During cockpit preparation :

R Select the associated INR TANK STBY pb sw . . . . . OFF

SPECIMEN

Figure 3-10: Section 02 Format

Even if the Authorities approval/acceptance is not required for Section 02 (and 03) of the MMEL, Authorities do approve/accept the inclusion (in Section 01) of the (o) (and (m)) symbol that requires an associated operational (and maintenance) procedure to be included in Section 02 (and 03).
Following JAR-MMEL/MEL.035: "*The intent of these procedures shall be identified during the development of the MMEL. However, the procedures themselves will not be subject to approval".*

3.2.6.1. PERIODICITY OF OPERATIONAL PROCEDURES

In the case of an inoperative item with an associated (o) procedure, the procedure must be accomplished **before each flight**, unless a periodicity is clearly specified in the dispatch conditions in Section 01, or in the (o) procedure of Section 02.

If, for any reason, it is not possible to comply with the requirements and the content of the (o) procedure, the aircraft cannot be dispatched with the associated item inoperative.

3.2.6.2. TYPES OF OPERATIONAL PROCEDURES

There are different types of operational procedures in Section 02 of the MMEL:

- Procedures that require the flight crew to perform an action: This type of procedure must be accomplished, in addition to the Standard Operating Procedures (SOP) of the Flight Crew Operating Manual (FCOM), as indicated in the (o) procedure. This type of procedure may also provide the flight crew with an abnormal procedure to be followed in the case of a subsequent failure in flight.
  Example:

> 11-01 Bleed Air Supply System
>
> For take off, switch OFF the packs or use APU bleed.
> C-BLEED sel . . . . . .OPEN
> PACK FLOW . . . . . LO
> AFT CRG HOT AIR (if installed) . . . . . OFF

SPECIMEN

- Procedures that provide the flight crew with performance penalties: These performance penalties must be considered during flight preparation and must be applied, in order to dispatch the aircraft.

  Example: Dispatch with brakes inoperative.

- Procedures that only provide information to the pilot, and could involve additional checks, or performance/comfort impacts: The flight crew should take this additional information into account.

  Examples:

> 23-01 Extraction fan
>
> Main zone controller will command a fixed temperature of 15°C which may have adverse effect on passenger comfort.

SPECIMEN

> 23-01 AFT CARGO Extraction Fan
>
> For livestock transportation refer to livestock transportation manual.

SPECIMEN

> 11-01 Anti ice control valve
>
> - Eng 1 must be started first
> Set X BLEED selector at SHU during ENG 1 start.
> - Use "CROSS BLEED ENG START" procedure to start ENG 2.
> - Fuel consumption is increased by 1 %.

SPECIMEN

3.2.7. SECTION 03 CONTENTS

3.2.7.1. A320 AND A300/A310 FAMILIES

This non-approved section lists all of the maintenance procedures required by an MMEL entry in Section 01. These requirements are indicated in Section 01 by a (m) symbol in the "REMARKS OR EXCEPTIONS" column. Section 03 of the MMEL (except for the A330/A340 family), or the Aircraft Maintenance Manual (AMM), gives the specific maintenance procedure to be applied. If there is a discrepancy between Section 03 of the MMEL and the AMM, the AMM is the final authority.

Normally maintenance personnel perform maintenance procedures. However, other personnel may be qualified and authorized to perform certain functions. The satisfactory accomplishment of all maintenance procedures, regardless of who performs them, is the responsibility of the operator.

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	MAINTENANCE PROCEDURES AIR CONDITIONING	03-21	P 2
		SEQ 001	REV 25

21-26-02	EXTRACT FAN – AIR COND VALVE CHECK	
ACCESS ZONE : 824 / cockpit	ACCESS ITEM : Direct	
GSE : nil		
ASSOCIATED CIRCUIT BREAKERS		
FIN	DESIGNATION	LOCATION

PROCEDURE

1 – On ventilation panel 22VU
Release EXTRACT pushbutton switch (OVRD legend comes on)
If BLOWER FAULT warning appears, it means that extract fan may be seized.
Switch on the cabin fans or air conditioning and make sure that BLOWER FAULT warning disappears.

2 – On avionics compartment
Check that air conditioned inlet valve 21 HQ is open (the position indicator of the valve is at 0).

3 – Time limitation on ground with electrical network supplied :

OAT (°C)	≤ 38	45	55
Max time	No limit	3 h	35 mn

SPECIMEN

Figure 3-11: Section 03 Format on A320 MMEL

Unless specifically permitted by Section 01, an inoperative item must not be removed from the aircraft.

In the AMM (for the A320 and A330/A340 families), the DEACTIVATION/ REACTIVATION INDEX cross-references the item number (either in the CDL, or in the MMEL) with its associated task number in the AMM.

Example: On A340 Item 01-22-30-01: Auto thrust Function

30-01 Autothrust function	C	1	1	*		a) May be inoperative on one engine
						- or -
	C	1	0	*	(m)	b) May be inoperative provided all thrust lever position sensors are operative

SPECIMEN

Refer to the AMM DEACTIVATION/REACTIVATION INDEX:

A340

AIRCRAFT MAINTENANCE MANUAL

DEACTIVATION / REACTIVATION INDEX

MANUAL ITEM	DESCRIPTION	TASK NUMBER
MMEL 22-30-01	Autothrust Autothrust Function	22-30-00-040-802 22-30-00-440-802

SPECIMEN

The associated maintenance tasks are in Chapter 22 and have the same reference number:

TASK 22-30-00-040-802

Autothrust Function - Check of all Throttle Control Units

1. Reason for the Job

Refer to the MMEL TASK: 22-30-01
Autothrust
Autothrust Function

SPECIMEN

3.2.7.2. A330/A340 FAMILY

The A300/A310/A320 Section 03 of the MMEL contains a summary of specific maintenance tasks extracted from the Aircraft Maintenance Manual (AMM).

Section 03 was created for the following historical reasons:

- Presence of a flight engineer in the cockpit
- Unavailability of digitalized documentation.

The procedures in the AMM provide more detail and more schematics than the summary in the MMEL. The revision cycle of the AMM is also more frequent than that of the MMEL.

Nowadays, the AMM is available in a digital format, and is therefore much easier to transport.

For the above-mentioned reasons, and also to avoid inconsistencies by duplicating information that is already available in the AMM, Airbus has elected not to create a Section 03 for the A330/A340 family.

3.2.7.3. PERIODICITY OF MAINTENANCE PROCEDURES

When a maintenance procedure is required, the periodicity may be indicated in the dispatch conditions of Section 01.

- If nothing is specified in Section 01, the maintenance procedure must be performed only one time, and before the first flight under relevant MMEL item.

  Example:

43-01 FWD CARGO compartment heating	D	1	0	*	(o)(m)	a) All components may be inoperative provided the associated trim air valve is secured closed,

SPECIMEN

- If the periodicity is specified in Section 01, the maintenance procedure must be performed, according to this periodicity.

  Example:

21-01 AGENT 1 and 2 DISCH Light	C	4	2	*	(m)	a) One may be inoperative for each engine provided respective bottle is checked properly charged prior to the first flight of each day.

SPECIMEN

- If the dispatch conditions consist of a Test/Check procedure **without** a specified periodicity, then it is acceptable to accomplish the (m) procedure only one time, and **before the first flight** under the relevant MMEL item.

  Example:

63-03 Hot Air Pressure Regulating Valve	C	1	0		(m)	a) May be inoperative provided it is secured closed,

SPECIMEN

If, for any reason, it is not possible to comply with the requirements and the content of the (m) procedure, the aircraft cannot be dispatched with the associated item inoperative.

3.2.7.4. TYPES OF MAINTENANCE PROCEDURES

There are different types of maintenance procedures:

- The Deactivation Procedure:
  The purpose of a deactivation procedure is to deactivate and secure a system in a recommended position, before dispatching the aircraft. This procedure must be performed only one time, and before the first flight under an MMEL item.
  Example:

43-01 FWD CARGO compartment heating	D	1	0	*	(o)(m)	a) All components may be inoperative provided the associated trim air valve is secured closed,

SPECIMEN

- The Test/check Procedure:
  The purpose of a test/check procedure is to verify the integrity of the remaining system. Either this procedure must be performed only one time, and before the first flight under an MMEL item, or it must be performed each time it is required by the MMEL dispatch condition in Section 01.
  Example:

21-01 AGENT 1 and 2 DISCH Light	C	4	2	*	(m)	a) One may inoperative for each engine provided respective bottle is checked properly charged prior to the first flight of each day.

SPECIMEN

3.3. MMEL AMENDMENTS

3.3.1. REASON FOR MMEL AMENDMENTS

The MMEL needs to be updated, throughout an aircraft's lifetime, in order to maintain an acceptable level of safety, to alleviate/modify existing dispatch conditions, or to reflect changes in the aircraft's configuration.

In order to maintain an acceptable level of safety, when the dispatch conditions are changed, the MMEL is amended taking the following into consideration:

- In-service events (Operator experience)
- Authorities' requirements
- Quality issues.

The MMEL might be further amended, due to:

- System improvement
- New aircraft design.

Dispatch conditions can also be created or modified, in order to permit or restrict dispatch, after the installation of new systems on the aircraft via Service Bulletin (SB) or new Modifications (MOD).

Section 01 of the MMEL is approved for A300/A310 families, and accepted for A320 and A330/A340 families. Therefore, an MMEL project must be submitted to the Authorities, in order to explain and substantiate each MMEL amendment.

There are two ways of updating the MMEL (Refer to §3.3.4):

- Normal Revisions: These are issued approximately one time every year, to cover non-urgent corrections, changes, and/or to add new data.

- Temporary Revisions: These are issued to cover urgent matters that occur between two Normal Revisions. Temporary Revisions are printed on yellow paper. The Authorities approve/accept each Temporary Revision of Section 01. Temporary Revisions contain data that must be rapidly included in the MMEL, due to in-service events, the installation of new systems, Airworthiness Directives, …

3.3.2. MMEL AMENDMENTS SUBSTANTIATION

Any MMEL amendment that is associated with an item in Section 01 of the MMEL must be submitted to the applicable Airworthiness Authorities for approval/acceptance. When such an amendment is necessary, Airbus establishes an MMEL project that includes the following sections:

- Subject: Item name

- Description of the Item:
  How the item works within a system, the item's purpose, the number of items installed…

- Dispatch Condition proposal

- Consequences of the Failure of the considered item:
  This section reviews:
  - How the flight crew, or the maintenance personnel, detects that the system is inoperative (ECAM caution, missing indication, function not available, maintenance check…)
  - The consequences of the failure on the flight
  - The possible interaction between the inoperative system/equipment with other systems.

  After analyzing the consequences for the flight, this section must demonstrate that it is safe and acceptable to dispatch the aircraft with the inoperative item (Refer to §2.2.1).

- Consequences of the **Next** Critical Failure in Flight:
  In addition to the analysis of the failure of the considered item, it is necessary to take into account the next critical failure in flight, and its impact on aircraft safety, how to compensate for the loss of safety, and its impact on crew workload…
  This section must prove that the next critical failure in flight will impact neither the safety nor the operation of the flight (Refer to §2.2.2).

- Purpose of the associated operational (o) procedure (if applicable).
  This section details the intent of the operational (o) procedure (Refer to §3.2.6).

- Purpose of the associated maintenance (m) procedure (if applicable).
  This section details the intent of the maintenance (m) procedure (Refer to §3.2.7).

Refer to Appendix 6.4, for more explanations on the content of an MMEL project.

3.3.3. MMEL APPROVAL/ACCEPTANCE PROCESS

3.3.3.1. DGAC/JAA PROCESS

MMEL projects are submitted to the French DGAC (for the A300/A310 family) or to the JAA (for the A320 and A330/A340 families), and are discussed in specific meetings: Operational Evaluation Group (OEG-DGAC) or Joint Operations Evaluation Board (JOEB-JAA) meetings.

Note: OEG and JOEB chairmen are always member of an operational Authority.

Depending on the aircraft family:

- For the A300/A310 family: The French DGAC approves MMEL projects at an OEG meeting. **The A300/A310 MMELs are approved by the DGAC.**

- For the A320 and A330/A340 families: Projects are accepted by the JAA, at a JOEB meeting. **The JAA does not approve the MMEL**, but **recommends approval** to the National Aviation Authorities (NAAs). There is one JAA JOEB chairman per aircraft family, and this chairman is responsible for ensuring that the MMEL is produced in accordance with JAA policy and requirements. If the MMEL is in accordance, the chairman then recommends the MMEL to the NAAs for approval.

The following illustrates the general organization of an OEG/JOEB meeting:

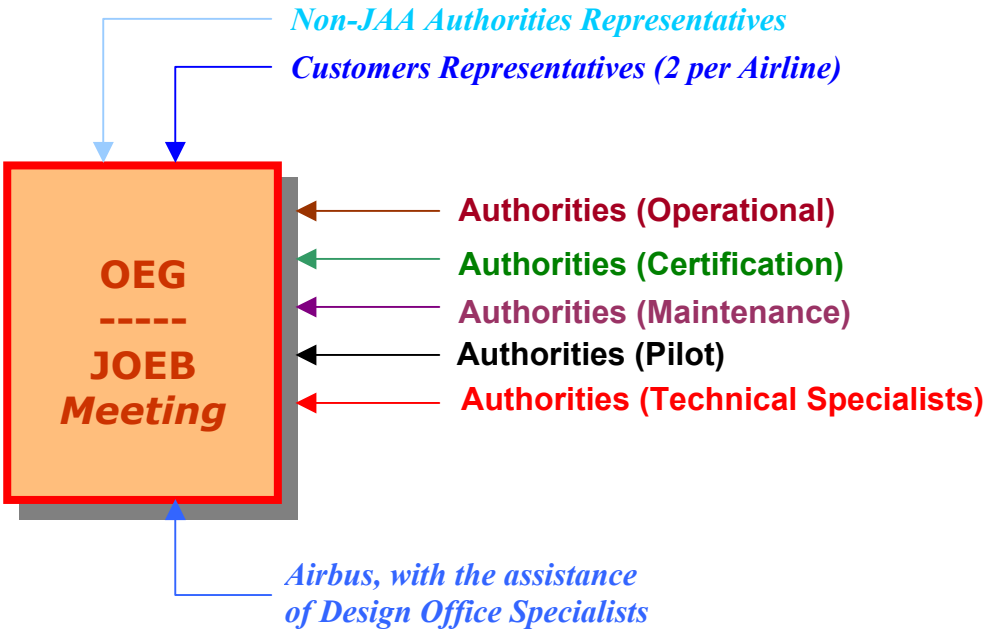


Figure 3-12: OEG/JOEB Organization

Airbus presents the MMEL project at a dedicated OEG/JOEB meeting. During the meeting, Airbus' proposed MMEL amendment (item) is reviewed and the proposal may be:

- ACCEPTED:
  - Accepted
  - Accepted pending certification review: The action is then left to the JAA design specialists.
- PENDING additional information. The action is then left to Airbus.
- REJECTED.

3.3.3.2. FAA PROCESS

In the JAA model, it is the aircraft manufacturer that is responsible for initiating and developing the MMEL projects. In the FAA model the projects are built by a lead Airline.

The "ATA specification 110: MMEL Agenda Proposal & Coordination Process" was published by the FAA to provide: "*guidelines and milestones for developing and submitting proposed MMEL agenda items*". It includes: "*assignment of **a lead airline** to work with aircraft manufacturers, and FOEB chairman to develop a draft MMEL revision agenda for consideration at an FOEB*".

The ATA "MMEL Agenda proposal and coordination process" provides a format for proposed FOEB agenda items:

FORMAT FOR PROPOSED FOEB AGENDA ITEMS

1. System(s) Description - should include a description of the system or equipment under consideration, its function and other details that will aid in evaluating the proposal. If possible, any variations within the fleet should also be defined, such as different numbers installed on aircraft, etc. If possible, a schematic diagram or other system drawing should be included for clarification.
2. Certification Basis (optional) - This may be included to explain any certification requirements, or lack thereof associated with the agenda item.
3. Effect of Failure - the effect of the failure on the aircraft/system should be clearly explained. Consideration must be given to the possible interaction of the inoperative system or equipment with other systems. A clear description of the effects will avoid any misconceptions and improper conclusions by the evaluator.
4. Effects of addition Enroute Failures - in addition to including an evaluation of the potential outcome of operating with items that are inoperative, documentation should consider the subsequent failure of the next critical component, the interrelationships between items that are inoperative, the impact on aircraft flight manual procedures (AFM) and the increase in flight crew workloads.
5. Procedures - any operations (O) and/or maintenance (M) procedures required for the proposed dispatch condition should be defined. It is preferred that the detailed O and/or M procedure be identified. However, in some cases a general outline and description of the functions to be accomplished by the procedure should be adequate for presentation at the FOEB. The intent of providing this information is to help support the agenda item and in no way means that the FAA is approving the procedure(s).

Figure 3-13: Extract from ATA Specification 110

3.3.3.3. MAIN DIFFERENCES BETWEEN FAA AND DGAC/JAA CONCEPT

There are several differences between the DGAC/JAA and the FAA with regards to the approval process of the MMEL. The major differences are:

- The FAA publishes the MMEL on the Bulletin Board System (BBS) for all the FAA-approved MMEL revisions.
  The aircraft manufacturer publishes the MMELs for all DGAC approved/JAA accepted MMEL revisions.

- Contrary to the JAA model: Before submitting a project to the FAA, the MMEL project is first reviewed by the Operators and the aircraft manufacturer at a dedicated meeting, referred to as the "industry meeting".

- The MMEL that is published by the US FAA contains only Section 01. On the other hand, for all DGAC approved/JAA accepted MMELs, the aircraft manufacturer also publishes the operational and maintenance procedures that apply to an MMEL item.

- Contrary to the JAA: When there is no declared US Operator for a specific aircraft type, the FAA does not develop a corresponding MMEL.

- The FAA uses Policy Letters (PL) to ensure the same dispatch conditions for all aircraft.

- Operators are informed of changes that occur between two Normal Revisions via Interim Revisions (for the FAA model), and via Temporary Revisions (for the JAA model).

The following table summarizes the main differences between the two concepts:

Concepts	FAA	DGAC/JAA
Lead Airline	X	
Lead Aircraft Manufacturer		X
Industry Meeting	X	
Authority Publishes MMEL	X	
Aircraft Manufacturer Publishes MMEL		X
Bulletin Board System (BBS)	X	
Application of Policy Letters	X	
Publication of Temporary Revisions		X
Publication of Interim Revisions	X	

3.3.4. INCORPORATION OF MMEL AMENDMENTS

3.3.4.1. NORMAL REVISIONS

Normal Revisions, also called General Revisions, are periodically issued to take into account non-urgent corrections and changes, and to add new information.

Normal Revisions are issued approximately one time per year for each Airbus aircraft family.
Normal Revisions impact Section 01 of the MMEL, and must, therefore, be approved/accepted by the Authorities.

As specified in JAR-MMEL/MEL.060: Operators shall revise their MELs in accordance with the new MMEL Normal Revision within **90 days from the date of revision**. Authorities might require a reduced time scale for the implementation of safety-related revisions.

Normal Revisions permit Airbus and the Operators to:

- Reflect the new modifications embodied on the aircraft
- Actualize/Improve/Modify already listed items
- Add new items, if necessary.

Each Normal Revision includes:

- A Letter of Transmittal
- Filing instructions
- A List of Normal Revisions
- An updated List of Effective Pages (LEP)
- The new/revised pages in Section 00, 00E, 01, 02 and/or 03.

If necessary, a new List of Effective Temporary Revisions (LETR, Refer to §3.3.4.2) is also issued at the same time as a Normal Revision to take into account a change in the applicability of a Temporary Revision, or the addition/cancellation of a Temporary Revision to the list.

Letter of Transmittal:

The Letter of Transmittal is a way of communicating between the Airbus MMEL department and Operators. The Letter of Transmittal is sent to Operators with a Normal Revision with recommendations and general information.

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	GENERAL	00-01	P 1
	LETTER OF TRANSMITTAL	SEQ 001	REV 26

GENERAL

1) Starting with present REV 26, the A318/319/320/321 MMEL is now accepted by the JOINT AVIATION AUTHORITIES (JAA) and recommended as the basis for preparation and authorisation of individual operator's Minimum Equipment Lists (MELs).

2) Updating of your manual must be made using the filing instructions in 00–03.

TEMPORARY REVISIONS

SPECIMEN

1) All temporary revisions having an index E must be removed.

2) All temporary revisions having an index G must be kept, except otherwise indicated in the TEMPORARY REVISIONS (TR) INSTRUCTIONS SHEET.

3) All temporary revisions having an index Z must be kept after introduction of revision 26 except if cancelled by the Filing Instructions.

Figure 3-14: MMEL Letter of Transmittal

Filing Instructions:

Filing instructions enable Operators to update their MMELs when a new Normal Revision is issued. These Filing instructions are indispensable to the successful incorporation of a new MMEL Normal Revision, and to ensuring that the MMEL is updated correctly. The Filing instructions must be linearly followed from beginning to end, and include the following instructions:

REMOVE column: Signifies that the pages in this column must be removed from the manual. A new page, if associated with an INSERT instruction, may replace the page. If not, the page is cancelled.

INSERT column: Signifies that the pages in this column must be inserted in the manual. If not associated with a REMOVE instruction, the page is new and does not replace an existing page.

NOTES column: Indicates "EFFECTIVITY CHANGE ONLY", if the page is revised due to a change in the applicable MSNs, and not a technical amendment.

After incorporating the new Normal Revision, via the filing instructions, the MMEL must correspond to the List of Effective Pages (LEP).

A310 MMEL VOL. REV014 FILING INSTRUCTIONS

PLEASE INCORPORATE THE REVISION AS FOLLOWS:

REMOVE			INSERT			NOTES	
01.52	P001	SEQ001 REV012	01.52	P001	SEQ001 REV014		(1)
			01.52	P002	SEQ001 REV014		
			01.52	P003	SEQ001 REV014		(2)
01.73	P001	SEQ175 REV012					
			01.73	P001	SEQ175 REV013		
01.77	P001	SEQ080 REV012					(3)
01.77	P001	SEQ180 REV012	01.77	P001	SEQ180 REV012	EFFECTIVITY CHANGE ONLY	
02.21	P001	SEQ001 REV013	02.21	P001	SEQ001 REV014		

SPECIMEN

Figure 3-15: Normal Revision - Filing Instructions

Examples:

1) *In Section 01-52, Sequence 001 of Page 001, issued at REV014 of the MMEL, replaces the same page sequence issued at REV012 of the MMEL.*

2) *In Section 01-52, Sequence 001 of Page 003 is a new page inserted by REV014 of the MMEL.*

3) *In Section 01-77, Sequence 080 of Page 001, issued at REV012 of the MMEL, is no longer applicable and must be removed from the MMEL.*

When a new Normal Revision is issued, **Operators receive only the new/revised pages** and not the entire MMEL, unless more than 50% of the pages are new/revised. If more than 50% of the pages are new/revised, Operators will receive a completely new MMEL.

As a result, in order to keep the MMEL up-to-date, the Filing instructions must be applied to the previous up-to-date MMEL Normal Revision. The Filing instructions of a new Normal Revision only apply to the previous Normal Revision and not to any Normal Revision.

For example, if an Operator has just received Normal Revision 05, but has an MMEL at Revision 03, the Operator must first introduce Normal Revision 04 (in accordance with the filing instructions for Revision 04), and then introduce Normal Revision 05 (in accordance with the filing instructions for Revision 05). Otherwise, some new/revised pages for Revision 04 may be forgotten.

List of Normal Revisions:

Each time a Normal Revision is issued the MMEL "List of Normal Revisions" is completed for tracking purposes, and to show which Normal Revision is the most recent.

A310 MASTER MINIMUM EQUIPMENT LIST	LIST OF NORMAL REVISIONS	00-07 Pg 1 SEQ 001 REV 14

The following list must be filled by each manual holder

REVISION NUMBER	ISSUE DATE	DATE FILED	INITIALS
01	MAR 1984		
02	AUG 1986		
03	MAR 1988		
04	JAN 1990		
05	DEC 1990		
06	MAR 1992		

SPECIMEN

Figure 3-16: MMEL List of Normal Revisions

List of Effective Pages: (Refer to §3.2.3)

The content of the MMEL must comply with the List of Effective Pages (LEP).

The LEP can be used to ensure that the MMEL is up-to-date and no pages are missing.

3.3.4.2. TEMPORARY REVISIONS

Temporary Revisions are issued between two Normal Revisions in order to rapidly include urgent matters in the MMEL. These can be due to:

- An in-service event
- A new system or new system standard
- An Airworthiness Directive
- The aircraft status.

These Temporary Revisions are printed on yellow paper. The Temporary Revisions of the Section 01 of the MMEL are approved/accepted by the relevant Authority.

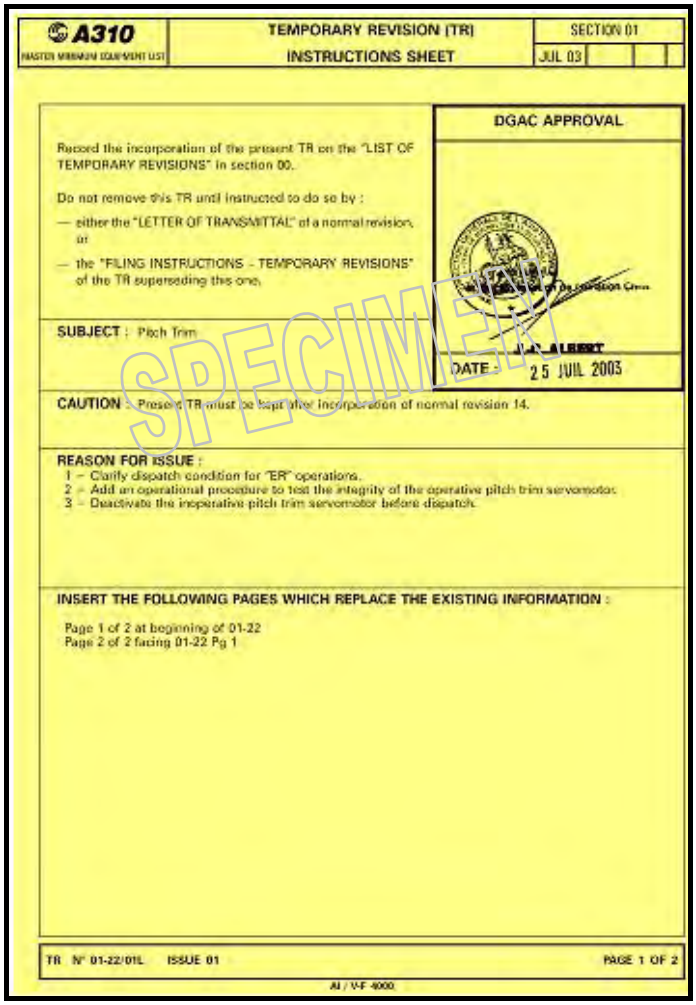
Each Temporary Revision includes:

- An instruction sheet
- An exhaust page (i.e. the new/modified pages in Section 00, 00E, 01, 02, and/or 03)
- Temporary Revision - Filing Instructions
- An updated List of Effective Temporary Revisions (LETR).

Instruction Sheet:

The instruction sheet contains, at least:

- The approval stamp
- The subject of the Temporary Revision
- The cautions concerning the validity of the Temporary Revision with regards to the next Normal Revision, or the validity of the Temporary Revision (engine, MOD/SB)
- The reason for issue
- The filing instructions that indicate how to correctly insert the Temporary Revision in the MMEL.



A310 MASTER MINIMUM EQUIPMENT LIST

TEMPORARY REVISION (TR)
INSTRUCTIONS SHEET

SECTION 01
JUL 03

DGAC APPROVAL

Record the incorporation of the present TR on the "LIST OF TEMPORARY REVISIONS" in section 00.

Do not remove this TR until instructed to do so by :

— either the "LETTER OF TRANSMITTAL" of a normal revision, or

— the "FILING INSTRUCTIONS - TEMPORARY REVISIONS" of the TR superseding this one.

SUBJECT : Pitch Trim

DATE : 25 JUL 2003

SPECIMEN

CAUTION : Present TR must be kept after incorporation of normal revision 14.

REASON FOR ISSUE :
1 – Clarify dispatch condition for "ER" operations.
2 – Add an operational procedure to test the integrity of the operative pitch trim servomotor.
3 – Deactivate the inoperative pitch trim servomotor before dispatch.

INSERT THE FOLLOWING PAGES WHICH REPLACE THE EXISTING INFORMATION :

Page 1 of 2 at beginning of 01-22
Page 2 of 2 facing 01-22 Pg 1

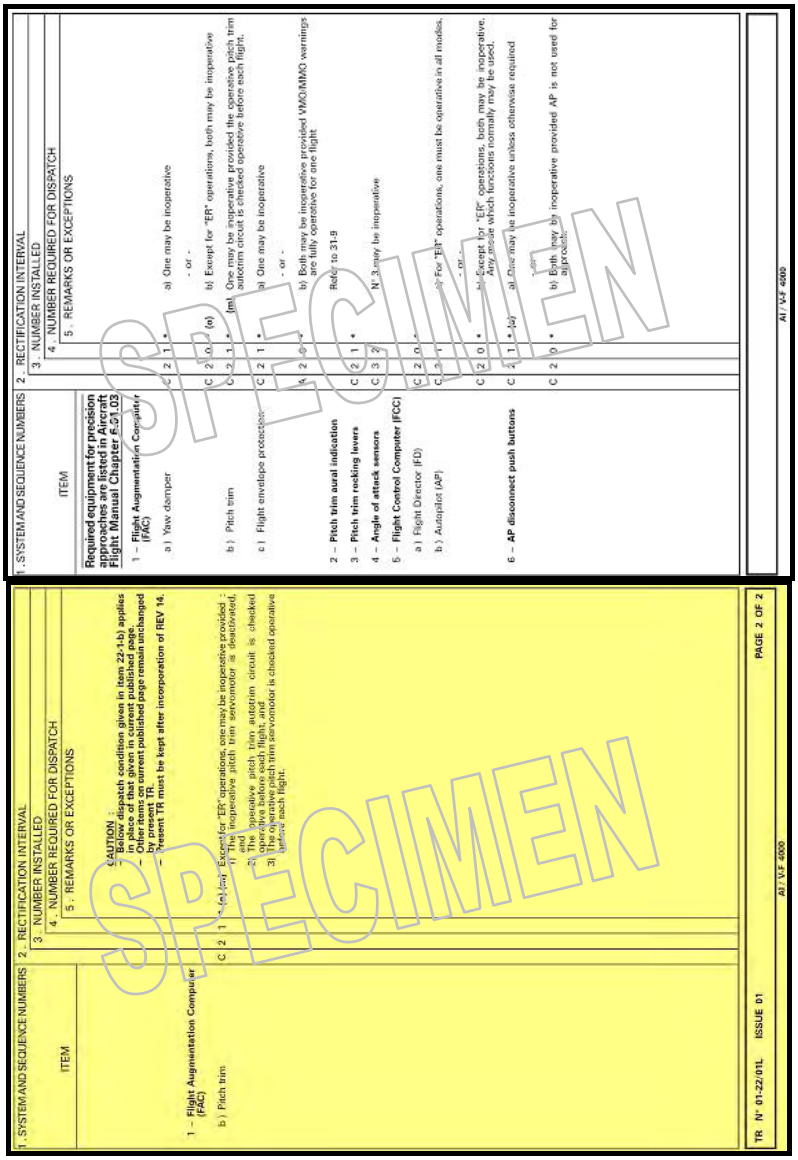
TR N° 01-22/01L ISSUE 01 PAGE 1 OF 2

AI / VF 4000

Figure 3-17: Temporary Revision - Instruction Sheet

Exhaust Page:

This exhaust page is in the same format as the MMEL and contains the modified item(s) or procedure(s). This page must be inserted in the MMEL facing the corresponding MMEL Normal Revision page, as specified by the filing instructions provided in the "Instruction Sheet". This page may be applicable to any section of the MMEL (Section 00E, 01, 02 or 03).



1. SYSTEM AND SEQUENCE NUMBERS | 2. RECTIFICATION INTERVAL | 3. NUMBER INSTALLED | 4. NUMBER REQUIRED FOR DISPATCH | 5. REMARKS OR EXCEPTIONS

ITEM	1. SYSTEM AND SEQUENCE NUMBERS	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH	5. REMARKS OR EXCEPTIONS
CAUTION : - Record dispatch condition given in item 22-1-b) applies in place of that given in current published page. - Other items on current published page remain unchanged by present TR. - Present TR must be kept after incorporation of REV 14.					
1 – Flight Augmentation Computer (FAC)					
b) Pitch trim	C	2	1	*	Except for "ER" operations, one may be inoperative provided : 1) The inoperative pitch trim servomotor is deactivated, and 2) The operative pitch trim autotrim circuit is checked operative before each flight, 3) The operative pitch trim servomotor is checked operative before each flight.
Required equipment for precision approaches are listed in Aircraft Flight Manual Chapter 6.01.03					
1 – Flight Augmentation Computer (FAC)					
a) Yaw damper	C	2	1	*	a) One may be inoperative - or - b) Except for "ER" operations, both may be inoperative
b) Pitch trim	C	2	1	*	(a) One may be inoperative provided the operative pitch trim autotrim circuit is checked operative before each flight.
c) Flight envelope protection	C	2	1	*	a) One may be inoperative - or - b) Both may be inoperative provided VMO/MMO warnings are fully operative for one flight.
2 – Pitch trim aural indication					Refer to 31-9
3 – Pitch trim rocking levers	C	2	1	*	
4 – Angle of attack sensors	C	3	2		N° 3 may be inoperative
5 – Flight Control Computer (FCC)					
a) Flight Director (FD)	C	2	0	*	
b) Autopilot (AP)	C	3	1	*	For "ER" operations, one must be operative in all modes. - or - Except for "ER" operations, both may be inoperative. Any mode which functions normally may be used.
6 – AP disconnect push buttons	C	2	0	*	
	C	2	1	* (a)	a) One may be inoperative unless otherwise required - or - b) Both may be inoperative provided AP is not used for approach.
	C	2	0	*	

TR N° 01-22/01L ISSUE 01 PAGE 2 OF 2 AI V4 #009

AI V4 #009

SPECIMEN

Figure 3-18: Temporary Revision - Exhaust Page

Note: The technical content of a Temporary Revision page supersedes the technical content of the applicable item (or procedure) published in the MMEL Normal Revision page. The Temporary Revision does not modify other not applicable items (or procedures, or ECAM messages) that are in the MMEL Normal Revision.

Temporary Revisions - Filing Instructions:

The REMOVE column lists the Temporary Revisions to be removed from the manual. The INSERT column lists the new Temporary Revisions to be inserted in the MMEL. The NOTE column indicates "EFFECTIVITY CHANGE ONLY" if the effectivity of the Temporary Revision has been revised for the Operator's fleet.

A300 MMELTR VOL. TEMPORARY REVISIONS FILING INSTRUCTIONS

PLEASE UPDATE TEMPORARY REVISIONS AS FOLLOWS:

REMOVE T.R.		INSERT T.R.		NOTES
00-01/01F	01			
01-22/01F	01			
		01-52/01G	01	
		01-52/02G	01	

SPECIMEN

Figure 3-19: Temporary Revision - Filing Instructions

List of Effective Temporary Revisions (LETR):

The LETR lists the Temporary Revisions that are effective and applicable to the Operator's fleet. The new Temporary Revisions are indicated by an 'N' and the revised Temporary Revisions (new issue) by an 'R'. Operators should refer to the LETR to ensure that all applicable Temporary Revisions are incorporated in their MMELS.

A300600 MMEL LIST OF EFFECTIVE TEMPORARY REVISIONS 01 JUN 2003

M -TR NUMBER--	ISSUE SEQ	--DATE-- ----VALIDATION CRITERIA----- ----VALIDATION PER AIRPLANE-----	M -TR NUMBER--	ISSUE SEQ	--DATE-- ----VALIDATION CRITERIA----- ----VALIDATION PER AIRPLANE-----
01-78/01Z GE	01	JUL 1999 GE 0726-0804			
01-78/01Z PW	01	JAN 1999 PW 0358-0543			
02-78/01Z GE	01	JUL 1999 GE 0726-0804			
02-78/01Z PW	03	MAY 1999 PW 0358-0543			

SPECIMEN

Figure 3-20: List of Effective Temporary Revisions

Note:

- The applicability of a Temporary Revision is usually indicated in the List of Effective Temporary Revisions (LETR). However, Temporary Revisions may be issued and sent to all Operators of this aircraft type. **It is the Operators' responsibility** to check, by referring to the 'CAUTION' or 'REASON FOR ISSUE' on the Instructions Sheet of the Temporary Revision, if this Temporary Revision is applicable to all, or part of, their fleets and, if necessary, to complete the 'Record of Temporary Revisions' table.
- In any case, all Temporary Revisions that are listed in the LETR must be in the MMEL. However, if a Temporary Revision is not applicable to the Operator's fleet, this Temporary Revision should not be inserted in the MEL.

Temporary Revisions (TRs) are numbered as follows:

Example: 01-52/01A ENG ISSUE 01	
01	MMEL Section
52	ATA Chapter
01	TR Number in the ATA chapter
A	Index letter
ENG	Engine validity (if applicable)
ISSUE 01	Issue number

The new issue of a Temporary Revision always supersedes any preceding issue of the Temporary Revision.
For example, Temporary Revision N° 01-22/01L ISSUE 02 supersedes Temporary Revision N° 01-22/01L ISSUE 01.

'Z' Temporary Revisions:

Temporary Revisions that are indexed with the letter Z are usually issued to cover technical issues waiting for a final fix solution. These Temporary Revisions may be kept in the MMEL, after subsequent Normal Revisions are received, if no final fix is found.
As soon as a final fix is available, and applied on the aircraft, the Temporary Revision is cancelled and can be removed from the MMEL. The removal of a 'Z' Temporary Revision is usually indicated either in the Letter of Transmittal or in the List of Effective Temporary Revisions.
Example: 01-52/01Z ISSUE 01

3.3.4.3. INTERMEDIATE REVISIONS

Intermediate Revisions are issued between two Normal Revisions to cover:

- Aircraft configuration changes impacting the MMEL (retrofit of a Service Bulletin reported to Airbus, refer to §3.2.2.3.2),
- Changes in the Operator's fleet composition (new aircraft or new Operator of Airbus aircraft).

IRs are numbered in an ascending sequence (e.g. 17A, 17B, 17C… for Intermediate Revisions issued between Normal Revisions 17 and 18).

Intermediate Revisions are accompanied by filing instructions and an updated List of Effective Pages (LEP) (Refer to §3.3.4.1).

A new List of Effective Temporary Revisions (LETR - Refer to §3.3.4.2), is also issued with an Intermediate Revision, if necessary, to cover a change in the applicability of a Temporary Revision, or if a Temporary Revision is cancelled or added to the list.

Contrary to Normal Revisions that are automatically issued by Airbus to cover MMEL changes for the entire Airbus fleet, Intermediate Revisions are issued upon Operator request and are for their specific needs only.

Please, keep in mind...

Organization of the MMEL

The MMEL has four, or five (depending on the aircraft family), sections:

- **Section 00**: General information about the manual (organization, approval sheet, highlights…).
- **Section 00E**: List of ECAM warnings, and associated MMEL entries (if applicable), classified according to the ATA breakdown.
- **Section 01**: The approved/accepted part of the MMEL: All items that may be inoperative, their Rectification Intervals, their number installed, their number required for dispatch, and their associated remarks or exceptions.
- **Section 02**: The operational procedures required by Section 01. Due to the fact that the content of these procedures is not approved/accepted, Operators may choose not to follow Airbus procedures, and may create their own procedures.
- **Section 03**: Maintenance procedures extracted from the Aircraft Maintenance Manual (AMM), and required by Section 01. This Section is only available for the A300/A310 and A320 family.

MMEL Amendments (JAA Model)

An MMEL amendment is made via:

- Normal Revisions
- Temporary Revisions

The MMEL is:

- Approved by the DGAC for the A300 B2/B4 and A300/A310.
- Accepted by the JAA for the A320 family and the A330/A340. Then, the JAA recommends approval of these MMELs to National Authorities.

MMEL Amendments (FAA model)

An MMEL amendment is made via:

- Normal Revisions
- Interim Revisions

The MMEL is written and approved by the FAA for all Airbus families. However, an FAA MMEL is only created and published if the aircraft type is operated by FAA Operators.

4. MINIMUM EQUIPMENT LIST (MEL)

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4.2.1 MEL Legal Requirements 106

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4.4.5 Operations Outside the Scope of the MEL 166

4.5 Organization Recommendations to Operators 168

4.6 Limits of MEL Applicability 172

4.1. INTRODUCTION

The MMEL is a document created and published by Airbus to serve as bases for Operators in the creation process of the MEL. The MMEL is a technical document that takes into account the aircraft's design to ensure a safe dispatch of the aircraft.

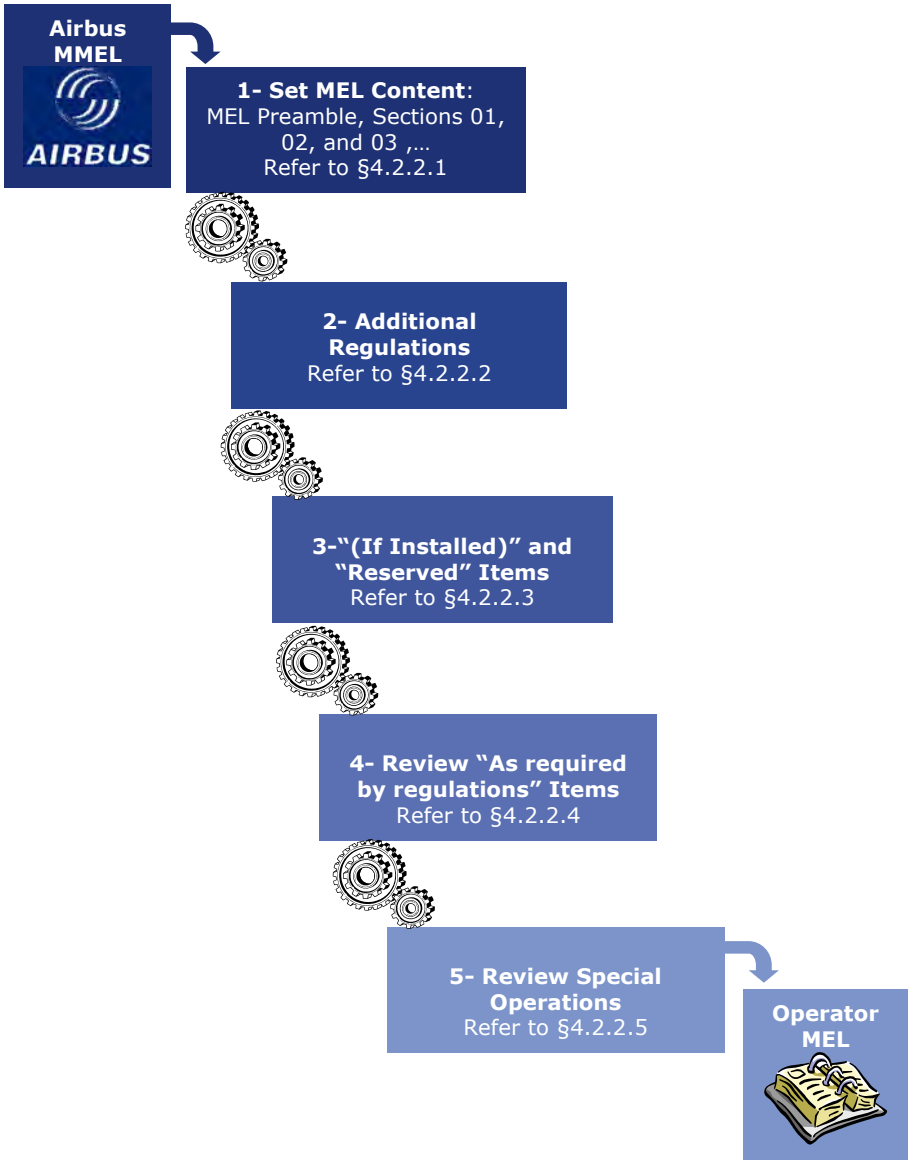
However, the MMEL does not include specific operational information and/or restrictions with regards to the use of the aircraft (e.g. Special Operations (Refer to §4.2.2.5)), or specific operational information and/or restrictions required by the Operator's local authorities (e.g. Additional Regulations (Refer to §4.2.2.2)).

JAR-OPS 1.1045 states that "*the MEL must include the navigational equipment and take into account the required navigation performance for the route and area of operation.*"

The Operator must take all these aspects into account during the MEL creation process.

4.2. FROM THE DGAC/JAA MMEL TO THE MEL

Operators only use the MMEL as a guideline to prepare and create their own MEL. The MEL preparation process can include the following steps:



Note: It is recommended that Operators produce a combined document that takes into account the dispatch of the aircraft, by grouping together the MEL and the CDL (Refer to §4.2.3). This ensures a better dispatch reliability by improving efficiency and reactivity for aircraft dispatch.

4.2.1. MEL LEGAL REQUIREMENTS

According to JAR MMEL/MEL.050 Subpart C:
"The MEL is a document that lists the equipment which may be temporarily inoperative, subject to certain conditions, at the commencement of flight. ***This document is prepared by the Operator*** *for its own particular aircraft taking account of their aircraft configuration and the relevant operational and maintenance conditions in accordance with a procedure approved by the Authority".*

Operators should create their customized MEL, by referring to the following documents:

- JAR MMEL/MEL Subpart C issued 2005 (Refer to §1.4.1.2)
- JAR-OPS 1 MEL POLICY DOCUMENT (i.e. TGL 26) issued June 2004 (Refer to §1.4.1.3).

Operators must also ensure that they refer to the latest version of the JAA MMEL, in order to develop the MELs.

The latest JAA MMELs and MMEL supplements can be viewed on, or downloaded from, the CJAA website or directly from the Airbus website, that provides MMELs and a revision service.

The MEL must be based on the relevant MMEL that is approved by the Authorities, and **should not be less restrictive than the MMEL**. The regulations require that all Operators prepare an updated MEL that is carried onboard the aircraft.

The MEL should not be a photocopy of the manufacturer's MMEL because the MMEL does not take into account such operational requirements as:

- The type of Operator network
- National Operational Regulations
- Crew training
- Consistency with other aircraft types
- Special operations (Refer to §4.2.2.5)
- Operational restrictions, due to adverse conditions, etc.

Due to the fact that the Operator's MEL is approved by National Authorities, the Operators must take care in creating their MEL.
If Operators adhere to the guidelines that are provided in the above-referenced legal documents, and by Airbus (Refer to §4.2.2), the National Authorities will usually approve their Operator MEL.

4.2.2. HOW TO CREATE THE MEL?

4.2.2.1. MINIMUM CONTENT

The JAR MMEL/MEL indicates that the Operator's MEL should include at least the following sections:

1. **Section 01:**
   Provides the list of all equipment that may be inoperative for dispatch, which is approved by the relevant National Authority. This list is established by using the approved/accepted Section 01 of the MMEL. The dispatch conditions and the Rectification Intervals of an item in the MEL must not be less restrictive than the ones provided for this item in the MMEL.

   Regarding this section, Authorities recommend that Operators:

   - Use the five-column format, as in the MMEL
   - Include the MEL Preamble. The purpose of the preamble is to provide Operators with guidance concerning the philosophy and use of the MEL. The JAA publishes an MMEL preamble that Operators can use (see Appendix 1 to ACJ-MMEL/MEL.065 or Appendix 6.2 of this document).
   - Include notes and definitions that enable users to easily and correctly interpret the MEL.
   - Include the Letter of Approval, and the Amendment Record Page.
   - Include the revision status of the MMEL, and the JAA MMEL supplement.

2. **Section 02:** (Refer to §3.2.6)
   Provides the associated operational procedures that are extracted from Section 02 of the MMEL.

3. **Section 03:** (Refer to §3.2.7)
   Provides the associated maintenance procedures that are extracted from Section 03 of the MMEL. This section is optional, as these procedures may be available in the Operations Manual (the content of the Operations Manual is defined in JAR-OPS 1.1045, Subpart P).

Note: It is the Operator's responsibility to include the list of ECAM cautions and warnings that correspond to the MMEL entries taken from Section 00E of the MMEL.

Operational and Maintenance Procedures:

When Section 01 of the MMEL requires an operational procedure, or a maintenance procedure, Operators must include it in the MEL. In most cases, the procedures that are published in the MMEL can be introduced in the Operator's MEL.

However, Operators may decide to produce their own customized operational and maintenance procedures. These procedures may be inserted into the appropriate MEL pages, and can then be submitted by Operators to their National Authorities.

The operational and maintenance procedures that are published in the MMEL are not systematically subject to approval during the MMEL approval/acceptance process (Refer to §3.2.6).

However, some local authorities may require Operators to submit these procedures (ready and completed) during the MEL approval process (Refer to JAR-MMEL/MEL.075 (a)).

Note: It is the Operator's responsibility to define the roles of the flight crew, and/or maintenance personnel, in these procedures.

4.2.2.2. ADDITIONAL REGULATIONS

In addition to JAA requirements, the Operators may also need to fulfill other requirements, when developing their MEL.
These requirements may come from:

- Local authorities of the state of registration through an **MMEL supplement**.
  An MMEL supplement usually involves items that are specific to the manufacturer's MMEL. The supplement only addresses the differences with the manufacturer MMEL upon which it is based.
  Operators must pay special attention to these MMEL supplements, because an MMEL supplement overwrites and supersedes any entry in the manufacturer's MMEL.

- A **Supplemental Type Certificate** (STC) holder
  An STC is issued for all major design changes to type-certified products when the change is not significant enough to require a new Type Certificate.
  As a result, if a design change has an effect on the MMEL, the STC holder publishes its own MMEL items to take into account the new design. The STC holder may be Airbus, if Airbus is responsible for this design change, but it may also be a system supplier.
  The JAR-MMEL/MEL.046 imposes the TC or STC holder to "*positively inform all known operators when a revision to the JAA MMEL is published*".

- Local authorities of any state in which the aircraft will be operated.
  In some cases, Operators may have to fulfill specific requirements in order to be authorized, by the foreign authorities, to operate their aircraft in the applicable foreign country.

4.2.2.3. HOW TO COPE WITH "IF INSTALLED" AND "RESERVED" ITEMS?

As previously stated, aircraft configurations may be different from one aircraft to another. Therefore, a system that is not installed on an aircraft may be listed in the first column of Section 01 of the MMEL as:

- **"(Reserved)"**:
  This notation indicates that these items are listed in the MMEL for management purposes. "Reserved" indicates that the system is not installed on the aircraft to which the page sequence applies. Therefore, the name of the item and its associated dispatch conditions are intentionally left blank. However, other aircraft may have the system installed and in this case, a different MMEL page sequence applies to these aircraft and includes the corresponding dispatch conditions.

  Operators may decide to either remove or keep the "(Reserved)" items from their MEL.

  On one hand, keeping the "(Reserved)" items in the MEL could be confusing when using the MEL.
  On the other hand, pagination inconsistencies may occur, if Operators remove the "(Reserved)" items from their MEL.

Example: A320 MMEL Item 21-53-04: Air Conditioning Ram Air Inlet/Outlet Flap.

- *A320 MMEL item 21-53-04, on page 16 applicable to SEQ 001. These aircraft do not have the system installed.*

21-53 PACK CONTROL AND INDICATING

53-04 (Reserved)

SPECIMEN

A320 MMEL 01-21 P16
SEQ 001

- *A320 MMEL item 21-53-04, on page 16 applicable to SEQ 100. These aircraft have the system installed.*

21-53 PACK CONTROL AND INDICATING

53-04	Air Conditioning Ram Air Inlet/Outlet Flap (Door)	C	4	0	(o)(m)	One or more may be inoperative in open position.

SPECIMEN

A320 MMEL 01-21 P16
SEQ 100

- **"(If Installed)"**:
  The "(If installed)" notation indicates that all aircraft may not have this item, because it is not required to be installed. However, contrary to "Reserved" items, and for documentation management purposes, these items are listed in the MMEL for all aircraft even if they are not applicable to all aircraft.

  During the MEL creation process, the MMEL "(If installed)" items should be managed as follows:

  - If the item is not installed on the aircraft, then the item should be handled as a "Reserved" item
  - If the item is installed on the aircraft, then the item should remain in the MEL, and the "(If installed)" notation should be deleted from the MEL.

  Examples:
  - *A340 Item 21-21-04: Lower Deck Cabin Crew Rest Compartment ventilation*

21-04 Lower Deck Cabin Crew Rest Compartment (If Installed)	D	1	0	(m) May be inoperative provided: 1) The isolation valve is closed, and 2) The lower deck cabin crew rest compartment is locked closed and placarded inoperative.

SPECIMEN

  - *A340 MMEL, item 23-73-01-E) Prerecorded Announcement Music Reproducer (PRAM)*

E) Prerecorded Announcement and Music Reproducer (PRAM) (If Installed)	D	1	0	(o)

SPECIMEN

Note: If an MMEL "(If installed)" item is inoperative, **the Operator may not physically remove it from the aircraft for dispatch purposes**.

4.2.2.4. HOW TO COPE WITH "AS REQUIRED BY REGULATIONS" ITEMS?

The JAR-MMEL/MEL provides the following definition for an MMEL "As required by regulations" item: "*The item is subject to certain provisions (restrictive or permissive) expressed in the applicable operational requirements".*

Therefore, the MMEL cannot specify dispatch conditions or Rectification Intervals for such items, because they depend on national regulations. The national regulation may either allow or forbid the dispatch of the aircraft.

These MMEL items are listed "As required by regulations" in the "REMARKS OR EXCEPTIONS" column of Section 01. Operators must replace the "As required by regulations" text by the applicable dispatch condition, as indicated by the Operators' national regulations. Operators must also address the corresponding Rectification Interval in the MEL, according to their national regulations.

If the Airbus MMEL specifies a restriction, in addition to the "As required by regulations" text, this MMEL restriction must also be included in the MEL, above the national requirements (Refer to the example below).

For an item not listed "As required by regulations" in the MMEL, and if national regulations specify dispatch conditions that are less restrictive than the one in the MMEL, the MMEL has authority over the national regulations. This is because the MMEL may include aircraft design specificities that may not be known to the National Authorities.

In order to manage the "As required by regulations" items, Airbus recommends that Operators follow the **JAR-OPS 1 MEL POLICY DOCUMENT (TGL 26)** (Refer to §1.4.1.3). TGL 26 is based on JAR regulations and provides Operators with the applicable dispatch conditions for "As required by regulations" items.
However, if TGL 26 guidance is not judged to be satisfactory, the Operator, in coordination with its Local Authority, may use other regulations.

TGL 26 also provides a flow chart that explains the use of TGL 26 in the MEL development process:

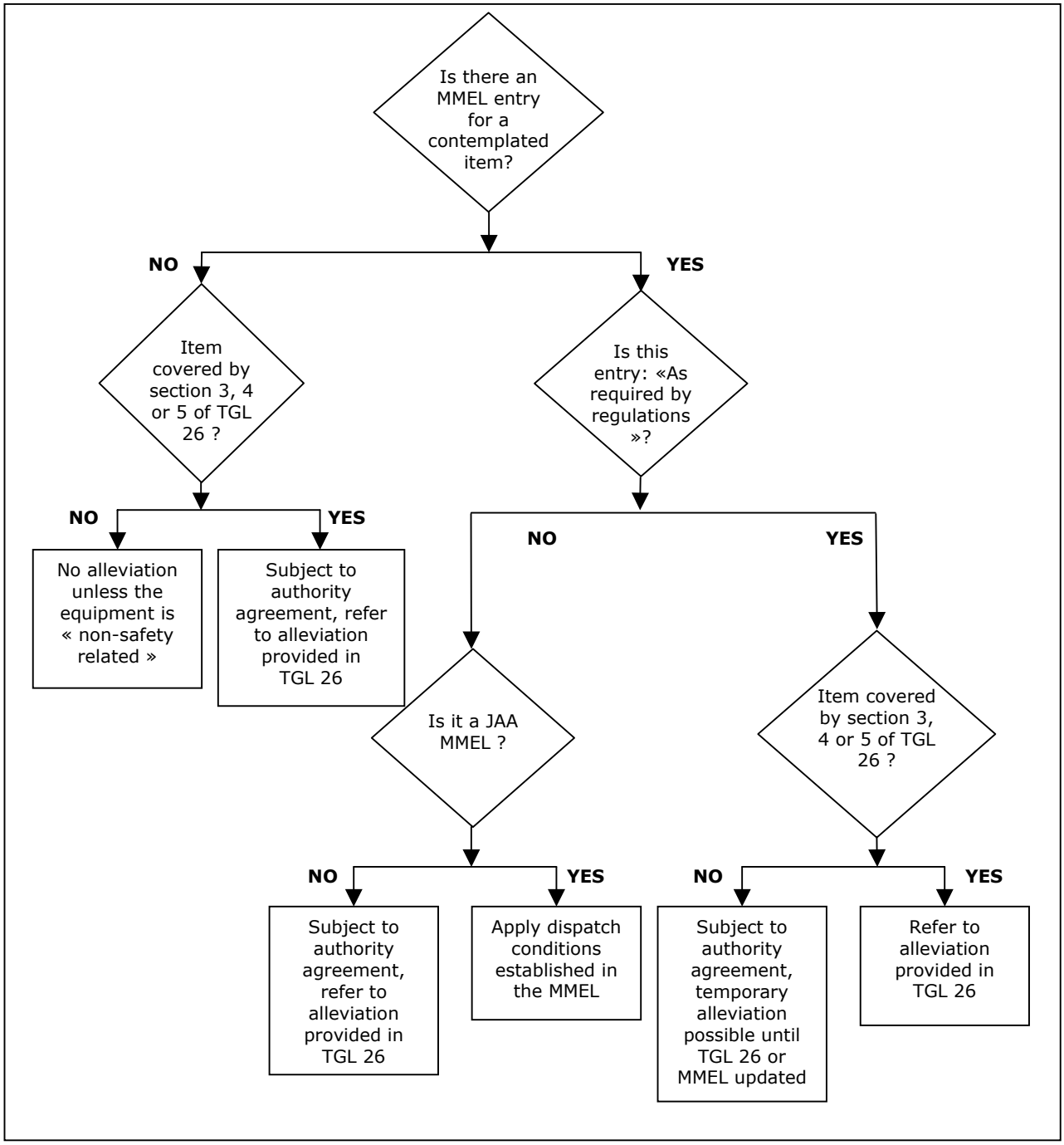


Figure 4-1: Flow Diagram for the Use of TGL 26 in a MEL

For the MEL approval process, it is necessary to fully complete the dispatch conditions for all the "As required by regulations" items.

***Example**: Below is an example of how to deal with "As required by regulations" items.*

The VHF communication system is covered in the Airbus A330 MMEL by item 23-12-01, listed "As required by regulations":

12-01 VHF System A330 MMEL	--	3	--		**As required by regulations** Note: For ER operations VHF1 must be operative

SPECIMEN

JAA TGL 26 provides Operators with advice on how to deal with this item:

23-12 VHF Communications *(JAR-OPS 1.860/865)* TGL 26	C	--	2		When flying IFR, or VFR over routes not navigated by visual reference to landmarks: Any in excess of two, and not powered by an emergency bus, may be inoperative.

SPECIMEN

It is important to keep in mind that JAA TGL 26 is only a generic document designed to provide guidelines for all aircraft types falling under JAR-OPS 1. JAA TGL 26 is not aircraft-specific and cannot, therefore, be directly integrated in an Operator MEL.

In the above example, the JAA TGL 26 requires that the VHF, powered by an emergency bus, must be operative. For A330 aircraft, the emergency bus powers VHF 1.
However, it is important to note that, for other aircraft types, it could be a different VHF.

Therefore, when preparing the dispatch conditions for "As required by regulations" items, Operators must take into account the aircraft type and the TGL 26 requirements.

In the example, as per JAA TGL 26, and considering A330 aircraft, two VHF are required for dispatch, and VHF 1 is "NO GO". Therefore, the Operator may submit the following MEL proposal to its National Authority:

A330 MEL	23-12 VHF	C	3	2	VHF 2 or VHF 3 may be inoperative.

EXAMPLE

However, it is possible that some National Authorities differ from JAA, and these National Authorities may not have the same requirement for VHF powered by an emergency bus. For Operators that depend on these other National Authorities, VHF 1 may not be required for dispatch.

The National Authority may decide to permit dispatch with the VHF powered by an emergency bus inoperative for its Operators, and therefore alleviate the dispatch conditions, as follows:

A330 MEL	23-12 VHF	C	3	2	One may be inoperative.

EXAMPLE

However, a note in the A330 MMEL indicates that VHF 1 must be operative for ER operations.
MMEL notes correspond to aircraft manufacturer requirements that Operators must respect, and that are independent of National Regulations. Operators must, therefore, comply with this note, and the MEL proposal may be as follows:

A330 MEL	23-12 VHF System				
	A) VHF 1	C	1	0	Except for ETOPS, may be inoperative provided VHF 2 and VHF 3 are operative.
	B) VHF 2 and VHF 3	C	2	1	One may inoperative.

EXAMPLE

4.2.2.5. SPECIAL OPERATIONS (CATII/CATIII/RNP/RVSM/ETOPS…)

The MMEL does not include operational recommendations for special operations, except for ETOPS operations, as these special operations do not affect the airworthiness of the flight.

However, these special operations should be included in the MEL and adapted to the specific needs of each Operator. For example, it is understandable that Operators that do not operate in Reduced Vertical Separation Minimum (RVSM) airspace do not need to include RVSM requirements in their MELs.

4.2.2.5.1. CATII/CATIII Operations

For more information, Operators should refer to the "Getting to Grips with CAT II/CAT III Operations" brochure published by Airbus Customer Services.

The objective of CAT II / CAT III operations is to ensure a high level of safety, when landing in low visibility conditions. It is an efficient way for Operators to maintain their schedule throughout the year, without any diversions due to weather conditions, even if this represents a significant investment.

The conditions that are required, in order to obtain approval for CAT II / CAT III operations depend on the:

- Aircraft
- Airfield
- Operator
- Flight crew.

The Authorities take into account the Decision Height (DH), and the Runway Visual Range (RVR) to define CAT II and CAT III conditions, as follows:

		ICAO	FAA	JAA
CAT II	**DH**	100ft ≤ DH<200ft		
	RVR	350m ≤ RVR 1200ft ≤ RVR	350m ≤ RVR < 800m 1200ft ≤ RVR < 2400ft	300m ≤ RVR 1000ft ≤ RVR
CAT III A	**DH**	No DH or DH<100ft		DH < 100ft
	RVR	200m ≤ RVR 700ft ≤ RVR		
CAT III B	**DH**	No DH or DH<50ft		
	RVR	50m ≤ RVR<200m 150ft ≤ RVR<700ft		75m ≤ RVR <200m 250ft ≤ RVR <700ft
CAT III C	**DH**	No DH		
	RVR	No RVR Limitation		

The JAA, and/or ICAO define these heights in legal documents:

Decision Height: The wheel height above the runway elevation by which a go-around must be initiated unless adequate visual reference has been established, and the aircraft position, and approach path have been assessed as satisfactory to continue the approach and landing in safety (JAA).

Runway Visual Range: It is the range over which the pilot of an aircraft on the centerline on a runway can see the runway surface markings, or the lights delineating the runway, or identifying the centerline (ICAO).

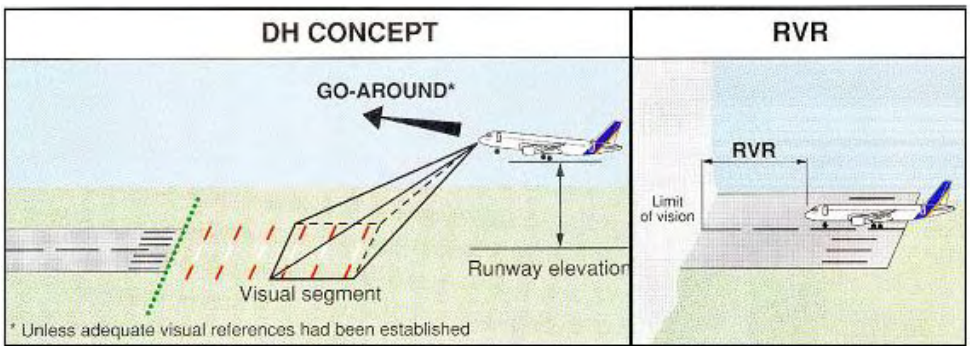


Figure 4-2: DH and RVR Concept

For CAT II / CAT III operations, the JAA imposes that, for each aircraft, there be a list of equipment required to be operative, in order to enable the aircraft to land in poor weather conditions.

Examples of these lists (one for each aircraft type) can be found in *"Appendix 6.5:* Required CATII/CATIII Equipment*"*.

The MMEL does not include these requirements, however, the Operator should include them in their customized MEL.

Operators should then refer to the AFM, or the FCOM when preparing their MEL:

		Refer to
A300/A310	AFM	6.01.03
	FCOM	2.02.03
A320	AFM	4.03.00
	FCOM	QRH 5.04
A330/A340	AFM	4.03.00
	FCOM	QRH 5.04

Note: If one of the pieces of equipment required for CAT II / CAT III is listed in the MEL with dispatch conditions, it must be clearly stated that CAT II / CAT III operations are not authorized.

4.2.2.5.2. RNP and RVSM Operations

For more information, Operators should refer to the "Getting to Grips with Modern Navigation" brochure published by Airbus Customer Services.

- Required Navigation Performance (RNP):

Required Navigation Performance (RNP) is a statement on navigation performance accuracy, essential to operations within a defined RNP airspace.
RNP airspace is a generic term that refers to airspace, route(s), and procedures, where minimum navigation performance requirements (RNP) have been established. An aircraft must meet, or exceed these performance requirements to fly in this airspace.

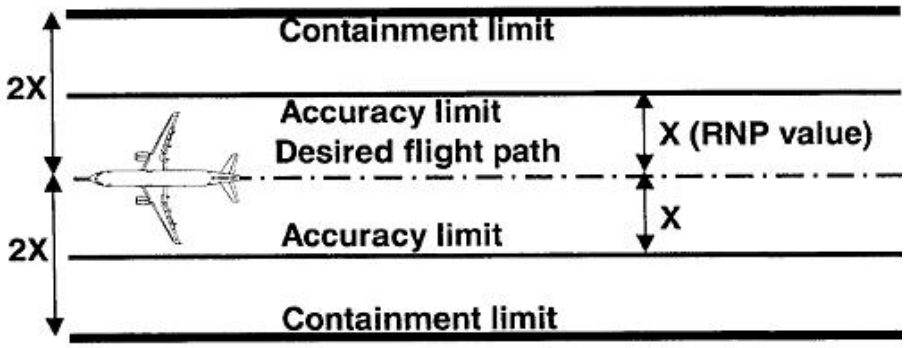


Figure 4-3: RNP Performance Requirements

Note: RNP-X: A designator is used to indicate the minimum navigation system requirements needed to operate in an area, on a route, or for a procedure. The designator specifies all of the navigation system requirements, specified for the considered RNP type, and is indicated by the value of X (in NM).

- Reduced Vertical Separation Minimum (RVSM)

RVSM airspace is defined as an airspace, or route, where aircraft are vertically separated by 1 000 ft (instead of 2 000 ft) between FL 290 and FL 410 inclusive.
The objective is to increase the route capacity of saturated airspace, while maintaining the same level of safety. This is achieved by imposing requirements on equipment, and by training of personnel, flight crew, and ATC controllers.

The minimum equipment required for RVSM is:

- Two independent altitude measurement systems
- One secondary surveillance radar transponder
- One altitude alert system
- One automatic altitude control system.

The typical list of required equipment on Airbus aircraft is:

Equipment	Number Required	Remarks
ADR or ADC	2	For A320, ADIR1+ADIR2 is required
ATC transponder	1	
FCU	1	For altitude selection, climb, descent AP mode selection
Autopilot	1	
FWC	1	For altitude alert function
PFD or altimeters	2	

To obtain operational approval to fly within RVSM airspace, the Operator must ensure that:

- Each individual aircraft is certified for RVSM
- Flight crews have received adequate instructions and briefing notes
- The maintenance program has been reviewed for RVSM
- The operational documentation has been amended.

The **requirements for RNP and RVSM are not included in Airbus MMELs because these requirements are specific to the Operator's operations**. However, these restrictions should be fully taken into account by the Operator MEL.

Operators must then refer to the AFM, or the FCOM, when preparing their MEL:

			RNP	RVSM
A300 B2/B4	**GE**	AFM	6.01.08	6.01.07
		FCOM	8.03.18	8.03.17
	PW	AFM	6.01.08	6.01.07
		FCOM	8.02.17	8.02.16
A300-600		AFM	6.01.02	6.01.05
		FCOM	2.18.95	2.18.90
A310		AFM	6.01.02	6.01.05
		FCOM	2.18.95	2.18.90
A320		AFM	4.03.00	4.03.00
		FCOM	2.04.51	2.04.50
A330		AFM	4.03.00	4.03.00
		FCOM	2.04.46	2.04.45
A340		AFM	4.03.00	4.03.00
		FCOM	2.04.51	2.04.50

4.2.2.5.3. Future Air Navigation System (FANS)

For more information, Operators should refer to the "Getting to Grips with FANS" brochure published by Airbus Customer Services.

FANS is a global system concept that upgrades the communication, navigation, and surveillance systems, in order to deal with the evolution of air traffic throughout the world.

The aim is, via a combined use of air and ground entities, to:

- Increase airspace capacity
- Enhance operational efficiency, while ensuring the best level of safety.

In order to apply for operation of FANS route, each Operator should submit its MEL to the applicable Authority.
The MEL should take provisions for specific operating systems, related to datalink communication at dispatch, so as to consider the consequences of their failures.

The MEL items for datalink communication may differ depending on the route (oceanic, continental, remote areas). However, a minimum amount of equipment must be operative:

Minimum equipment required for CNS/ATM	
ATA 46-20: Cockpit Information System	ATSU 1 DCDU 1 ATC MSG pb
ATA 23: Communications	VDR3 SATCOM
ATA 22: Auto flight	1FMGC
ATA 34: Navigation	1 GPS

Airbus' policy is to not include FANS considerations in the MMEL. Therefore, if the Operator wishes to include FANS-related items, it is the Operator's responsibility to revise its MELs.

4.2.2.5.4. Extended Twin Operations (ETOPS)

For more information, Operators should refer to the "Getting to Grips with ETOPS" brochure published by Airbus Customer Services.

Contrary to other special operations, ETOPS operations, also named Extended Range (ER) operations, affect the safety and the airworthiness of the flight. Therefore, ETOPS restrictions have been introduced in the MMEL, and should be reflected in the MEL. The MMEL reflects the Configuration, Maintenance and Procedures (CMP) Dispatch Standards requirements.

The dispatch requirements applicable to an ETOPS flight are identified, in the Airbus MMELs, as follows:

- "For ER operations…", or
- "Except for ER operations…".

Example:

81-01 FCU	C	1	1		a) Except for ER operations, one channel may be inoperative provided 2 RMP, all DU, both RA, both LGCIU, both FAC, both cabin pressure controllers, the three ADIRs and standby altimeter are operative. - or -
	A	1	1		b) For ER operations, one channel may be inoperative for one flight provided 2 RMP, all DU, both RA, both LGCIU, both FAC, both cabin pressure controllers, the three ADIRs and standby altimeter are operative.

SPECIMEN

Note: ETOPS dispatch requirements are not to be considered when airborne. For example, it is not required that the MEL be referred, to assess the aircraft's status before entering the ETOPS segment.

As illustrated in the "Getting to Grips with ETOPS":

ETOPS restrictions have been defined in accordance with the aircraft's maximum certified diversion time (e.g. for operations longer than 120 minutes diversion time, the APU is required to be operative for A310 and A300-600 aircraft).

The prevailing criteria for the creation of an MMEL for ETOPS are mainly:

- The effect of an increased average diversion time on the safety analysis
- The availability of certain functions or equipment in emergency electrical configuration
- In the case of an additional failure in flight:
  - The effect on crew workload
  - The effect on the cockpit, and cabin environment control
  - The consideration that icing conditions are more likely during a diversion at low altitude.

Therefore, in creating its own MEL, the Operator must introduce these additional ETOPS restrictions, that must be approved by its National Authorities.

In addition, the Operator MEL must take into account:

- The National Regulations
- Such network specific aspects, as:
  - Maximum and average diversion time
  - Equipment at en-route alternate airports
  - Navigation and communication means
  - Average meteorological conditions.
- The flight crew procedures and training.

Note: The Operator can take advantage of ETOPS regulations, and reduce the requirements for shorter diversion time (typically 75 or 90 minutes). For each applicable route, Operators will need to negotiate this with their National Authorities for each particular route.

4.2.2.6. WEIGHT AND BALANCE MANUAL (WBM) INTEGRATION

For each MMEL item that refers to the Weight and Balance Manual (WBM), Airbus recommends that Operators include the associated WBM information in the MEL.

4.2.2.6.1. General Presentation

The WBM is the reference document for weight, balance, and loading. This document is published by Airbus, and provided to Operators at the aircraft delivery. It includes all information that is necessary in order to determine the loading instructions, or to produce the load and trim sheet.

The WBM is divided into the following three sections:

- Section 0.00: Introductory pages that describe the manual (e.g. Table of Contents, List of Effective Pages, List of Figures, Record of Normal and Temporary Revisions)
- Section 1: Weight and Balance (W&B) control, that describes generic W&B data for the applicable aircraft (Refer to the following paragraph)
- Section 2: Aircraft weighing report, that provides the results of the aircraft weighing (operating empty weight and CG position).

4.2.2.6.2. Section 1 of the WBM

Section 1 of the WBM is divided into 9 sections:

- **General**: Generic information (e.g. List of abbreviations, weight definitions, conversion factors, drawings, and description of the general characteristics of the aircraft).
- **Limitations**: The different W&B limitations applied to the aircraft (e.g. certified limits, bending moments due to payload, and cargo compartment maximum loads).
- **Fuel**: Influence of refueling on the aircraft CG position, and description of the fuel tanks (e.g. maximum capacity, H-arm as a quantity function).
- **Fluids**: W&B information concerning the fluids onboard the aircraft (e.g. engine fluids, APU oil, hydraulic system fluids, potable water, toilets fluids)
- **Personnel**: W&B information for the flight crew, the cabin crew, and the passengers.
- **Interior Arrangement**: Information on the different stowage capacities of the aircraft.
- **Cargo**: The first section details the opening sizes of the cargo hold doors, and stations. The second section provides methods and recommendations for cargo loading.

- **Actions on Ground**: Information about jacking points, weighing on jacks, or on wheels, W&B information about removable equipment.
- **Examples**:
  - A typical loading diagram
  - Operational empty weight and CG build-up
  - The cargo, passengers, and fuel vectors.

4.2.2.6.3. MMEL Items Affecting the Weight and Balance Procedures or Limitations

There are two groups of MMEL items that have an impact on the aircraft's W&B procedures/limitations:

- Items affecting the Load and Trim sheet check process, or its results: These items are mainly listed in ATA chapter 28 (Fuel). They may affect the TOW/TOCG, or the ZFW/ZFCG determination, the operational envelopes, or the usable fuel for the flight.
  These items are mainly the result of inoperative valves in the open or closed position, inoperative pumps, loss of CG control, and loss of FQI accuracy.

<u>Example</u>: A320 item 28.21.02: Center tank pump

21-02 Center tank pump	C	2	0	* (o)	a) One or both may be inoperative provided 1) There is no fuel in this tank or fuel in this tank is considered as unusable and as part of ZFW and is taken into account for CG determination, and 2) Center tank pumps are switched off

SPECIMEN

- Items affecting the loading instructions: These items are listed in various ATA chapters. They introduce additional constraints on passenger load, or cargo load.

Example: A320 item 25-50-01 affecting W&B, and not related to ATA Chapter 28:

50-01 Cargo Loading System (If Installed)				Refer to Weight and Balance Manual

SPECIMEN

In the WBM Section 1.10: Limitations:

A320

WEIGHT AND BALANCE MANUAL

05. Loading of forward cargo hold (compartment 1)

The aircraft restraint system must be unimpaired and must be used except in the case of floating pallets ; refer to paragraph 1.10.05.E.

SPECIMEN

A. Forward cargo hold (compartment 1) capacity

CAUTION : IN THE CASE OF MALFUNCTION OF ANY PART OF THE CARGO LOADING SYSTEM, RESTRICTIONS MAY BE IMPOSED ON PALLET / CONTAINER GROSS WEIGHTS OR THEIR POSITION IN THE CARGO HOLD.
Refer to paragraph 1.10.05.D.

Then, in paragraph 1.10.05.D of the WBM: Cargo equipment malfunction limitations:

A320

WEIGHT AND BALANCE MANUAL

SPECIMEN

D. Cargo equipment malfunction limitations

The following tables give the identification of latch types and the ULD load restrictions to be applied in case of missing or inoperative equipment.

4.2.3. CONFIGURATION DEVIATION LIST (CDL) INTEGRATION

4.2.3.1. CDL GENERAL PRESENTATION

The Configuration Deviation List (CDL) is a reference document that enables the aircraft to be dispatched, even if some secondary airframes, or engine, parts are missing. These parts may be detected during maintenance checks, or pre-flight exterior inspections.
The CDL is included in the Flight Manual (Chapter 6 – Appendices and Supplements), and is approved by Airworthiness Authorities.

Dispatch authorization may be granted, along with the following associated requirements:

- Operational restrictions
- Performance penalties
- Maintenance actions.

Note:
- Any item that is not in the CDL must be considered necessary for the flight.
- Even if not required by Airworthiness Authorities, **Airbus recommends grouping the CDL and the MEL in the same document**.

4.2.3.2. USE OF THE CDL

The CDL is written in accordance with the following rules:
- When not specified, repairs, or replacement, of an item must be done at the first suitable airport. This rule allows some flexibility in the dispatch conditions. However, it is important to remember that flying under CDL is a deviation from the normal aircraft operation, and that extending the length of time that the aircraft is in operation with a missing part may generate additional degradation, and may require the aircraft to be taken out of service.
- No more than one part, or one combination of missing parts of a specific system may be missing (i.e. one item for each ATA, unless otherwise specified).
- Parts of different systems may be simultaneously missing.
- Performance penalties are **cumulative**, except if otherwise specified.
- If no performance penalty is provided for a missing item, it is considered **negligible**. When several negligible items are missing at the same time, the rule is as follows:
  - If there are no more than 3 negligible items, the cumulated performance penalty is not significant.
  - Starting from the fourth negligible item, all of the performance-limited weights must be reduced by 50 kg, for each additional missing item.

- The CDL deals with missing parts only. For damage tolerance, the Operator must refer to the Aircraft Maintenance Manual (AMM). If the item must be removed, then, it may be in the CDL.
- All the items are listed according to the ATA chapter classification.

The layout of the CDL is as follows:

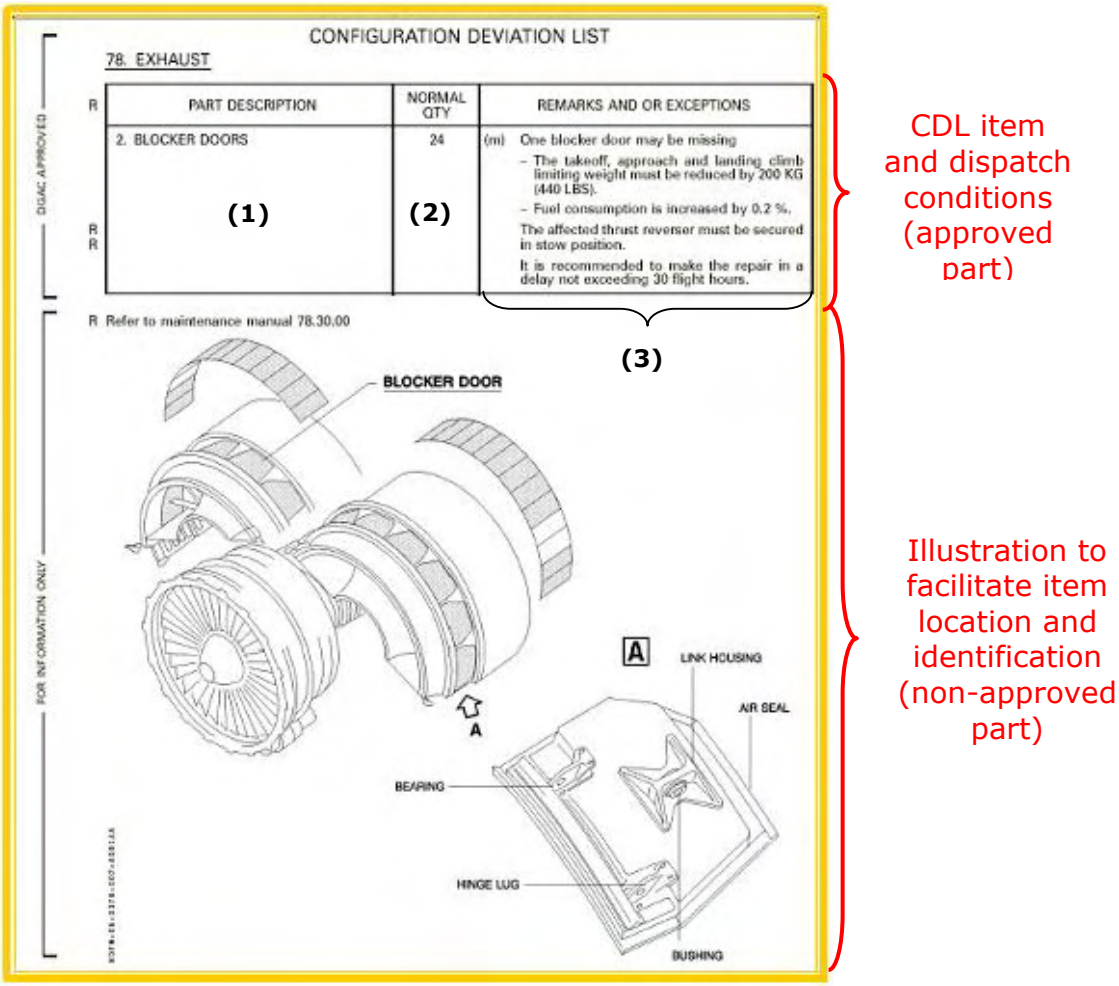
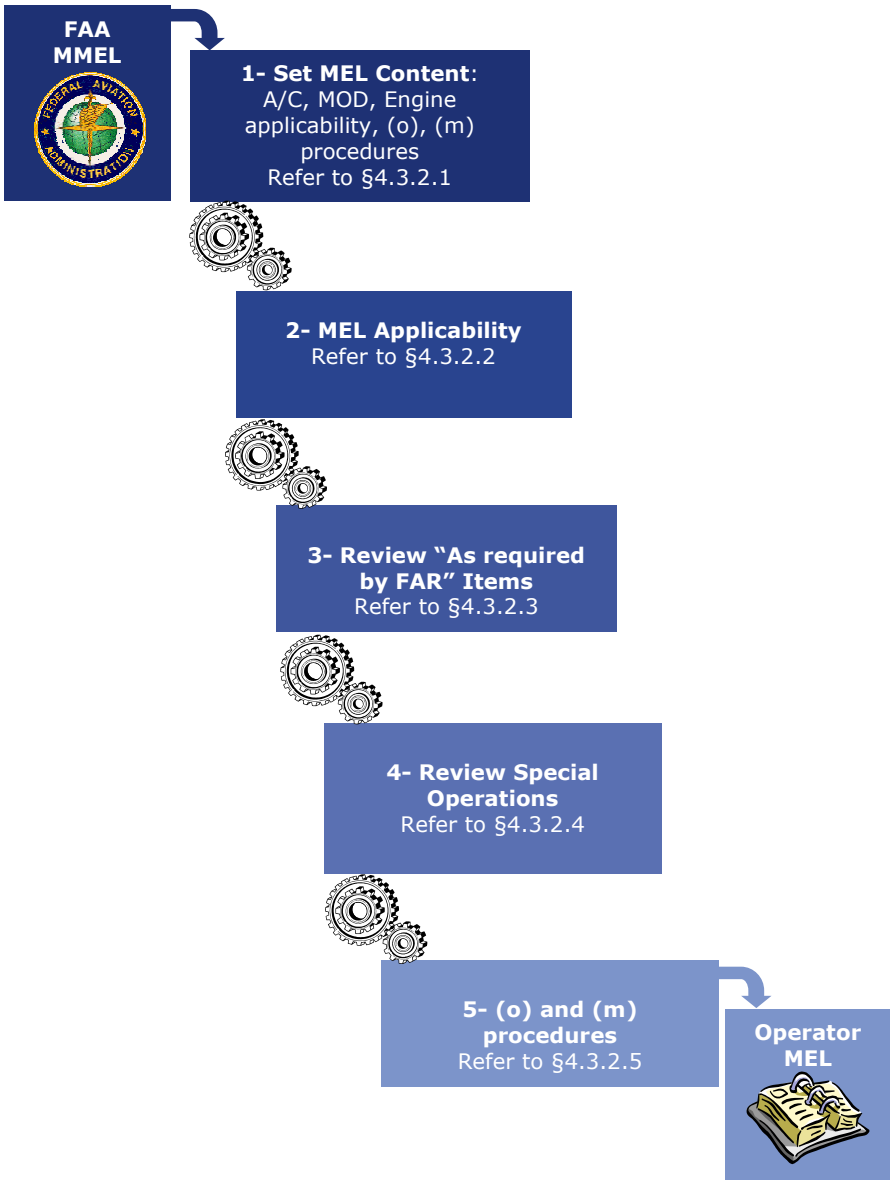


Figure 4-4: Example of CDL Page Layout

1) Item identification and description
2) Normal item quantity onboard the aircraft
3) Dispatch conditions: May include impact on performance, increased fuel consumption, and repair delay.

4.3. FROM THE FAA MMEL TO THE MEL

As in the DGAC/JAA model, Operators only use the FAA MMEL as a guideline to prepare and develop their own MEL.
The MEL development process can include the following steps:



4.3.1. MEL LEGAL REQUIREMENTS

According to the FAA MEL handbook (Refer to §1.4.2.3):
"The MEL is derived from the MMEL and is applicable to an individual Operator. The Operator's MEL takes into consideration the Operator's particular aircraft configuration, operational procedures and conditions. When approved and authorized for use, the MEL permits operation of the aircraft under specified conditions with certain inoperative equipment."

Operators should create their customized MEL, using the following documents:

- The manufacturer's manuals (MMEL, AMM, AFM…)
- FAA MEL handbook (Refer to §1.4.2.3)
- FAR operating rules (Refer to §1.4.2.4)
- Any necessary Policy Letter, or Airworthiness Directive (Refer to §1.4.2.2 and §1.4.3).

In order for an MEL to be acceptable, four general criteria must be fulfilled:

- **Equally or More Restrictive**: The Operator's MEL must not be less restrictive than the MMEL, the FAR, the operations specifications, the approved Flight Manual limitations, certification maintenance procedures, or Airworthiness Directives.
- **Appropriate**: The MEL must be appropriate for the applicable aircraft.
- **Specific**: The operational and maintenance procedures must be specific to the aircraft and its operations.
- **Applicability**: An MEL should be applicable to the FAR under which the Operator is certificated.

In order for an MEL to be approved, the following information should be submitted:

- Proposed MEL items and dispatch conditions
- Necessary (o) and (m) procedures, which may be based on the aircraft manufacturer's recommended procedures
- A description of the MEL management program
- Any required guidance material developed by the Operator, such as training material, and deferral procedures, for both operational and maintenance procedures.

4.3.2. HOW TO CREATE THE MEL?

4.3.2.1. MINIMUM CONTENT

According to the FAA, there are three categories of items that may be in the Operator's MEL:

- MMEL items
- Passenger convenience items: Items related to passenger convenience, comfort, or entertainment (e.g. galley equipment, movie equipment, in-flight telephones, ashtrays, stereo equipment, and overhead reading lamps).
- Administrative control items (e.g. cockpit procedure cards, medical kits, delaminated windshields, and life vests).

In addition to the above listed items, with their associated (o) and (m) procedures, the MEL Handbook requires the Operator MEL to contain at least a:

- **Cover Page**, with the Operator's name, and the aircraft model to which the MEL applies
- **Table of Contents**
- **Log of Revisions**, that identifies the revision and the revision date. It may also include a list of the revised pages.
- **Preamble and Definitions**: The standard MMEL preamble and definitions section must be reproduced word-for-word in each MEL
- **Control Page**, used as a method for keeping track of the status of the MEL. A control page must include at least:
  - The Operator's name
  - A list of all the MEL pages
  - The MMEL revision number on which the MEL is based
  - A signature block.
- **Additional items**: The Operator may include more information sections, in addition to the FAA sections.

4.3.2.2. MEL APPLICABILITY

As the FAA MMEL is not customized to a particular aircraft, it is important to first check the applicability of each MMEL item.

Items that are not applicable to each aircraft of a particular type may appear in several formats:

- **Items applicable to aircraft with a specific engine**
  Example: A320 family-FAA MMEL-Rev 15.
  Item 24-20-01 Engine Driven Generator Channel
  Part 1): This item is only applicable to aircraft with a CFM 56-5 engine. Therefore, Operators should delete this item from their MEL, if the aircraft of their fleet do not have this engine.

20-01 Engine Driven Generator Channel (IDG, GCU, Line Contactor)					
1) CFM 56-5 Engines Only	B	2	1	(O)	Except for ER operations, one may be inoperative provided: a) APU and APU driven generator channel are verified to operate normally and used throughout the flight, b) All busses can be powered, c) All indications and warnings associated with the remaining engine and APU driven generator channels are verified to operate normally, d) Galley automatic shedding is verified to operate normally, and e) Aircraft remains at or below FL330 (Continued)

SPECIMEN

- **Items applicable to aircraft with a specific MOD**

  Example: A320 family-FAA MMEL-Rev 15.
  Item 27-23-02 ECAM Rudder Travel Limiter Position Indication.
  This item is only applicable to aircraft with MODs 31040 and 30369.
  Therefore, Operators should delete this item from their MEL if the aircraft of their fleet do not have these MODs.

23-02	ECAM Rudder Travel Limiter Position Indication (Aircraft with Mod 31040 and Mod 30368)	C	1	0	(O)

SPECIMEN

- **"***" Items**: The triple asterisk symbol is used for items that may be installed on some aircraft models, but are not required for certification. This symbol cannot appear in an MEL.
  Therefore, the "***" symbol must be removed from the item denomination if the item is installed on the aircraft. If the item is not installed, the item should be removed from the MEL.

33-01 ***	Bulk Cargo Door Balance Mechanism	C	1	0	(M)	May be inoperative or damaged provided: a) A safety hold device is used to maintain the door in the open position, and b) A visual check is made to confirm that the door is correctly closed and locked after each use.

SPECIMEN

4.3.2.3. HOW TO COPE WITH "AS REQUIRED BY FAR" ITEMS?

In the FAA MMEL, some items are listed "As required by FAR". This is indicated in the "REMARKS OR EXCEPTIONS" column. This wording is not permitted in the MEL.

As stated in the definitions section of the FAA MMEL:

> *""As required by FAR" means that the listed item is subject to certain provisions (restrictive or permissive) expressed in the Federal Aviation Regulations operating rules. The number of items required by the FAR must be operative. When the listed item is not required by FAR it may be inoperative for time specified by repair category."*

When an item appears in the MMEL with the "As required by FAR" wording, the Operator's MEL must contain the specific conditions that apply to the item.
These conditions can be found by checking the applicable regulations (e.g. FAR 129 for foreign Operators of US registered aircraft engaged in common carriage). These regulations may help Operators develop the appropriate provisions that apply to their specific operations.

<u>Example</u>: Below is an example of the 25-65-01 First Aid Kits item, on a typical A310, seating 240 passengers, for an Operator under FAR 121.

65-01 First Aid Kits A310 MMEL	D	--	--		Any in excess of those required by FAR may be incomplete or missing provided required distribution is maintained

SPECIMEN

According to FAR 121.803: First Aid Kits

> *"(c) For treatment of injuries, medical events, or minor accidents that might occur during flight time each airplane must have the following equipment that meets the specifications and requirements of appendix A of this part:*
> *(1) Approved first-aid kits.*
> *(2) In airplanes for which a flight attendant is required, an approved emergency medical kit*
> *(3) In airplanes for which a flight attendant is required, an approved emergency medical kit as modified effective April 12, 2004.*
> *(4) In airplanes for which a flight attendant is required and with a maximum payload capacity of more than 7500 pounds, an approved automated external defibrillator as of April 12, 2004"*

And according to appendix A for part 121 – First-Aid Kits and Emergency Medical Kits:

> *(3) The minimum number of first-aid kits required is set of forth in the following table:*

No. of passengers seats	*No. of first-aid kits*
0-50	*1*
51-150	*2*
151-250	*3*
More than 250	*4*

The above regulation may help Operators to complete the "NUMBER REQUIRED" and "REMARKS OR EXCEPTIONS" columns of their MEL.

Note: If the Operator has an MEL for multiple aircraft, and the equipment is not installed on all aircraft, or if there is a variable quantity between aircraft, the Operator's MEL will not reference specific aircraft quantities. **Therefore, the "NUMBER INSTALLED" column may contain a dash.**

A proposal for item 25-65-01 regarding First Aid Kits could be:

65-01	First Aid Kits	C	--	3	Any in excess of 3 may be incomplete or missing provided required distribution is maintained

A310 MEL

SPECIMEN

4.3.2.4. SPECIAL OPERATIONS (CATII/CATIII/RNP/RVSM/ETOPS…)

The MMEL does not include operational recommendations for special operations (except for ETOPS). However, special operations should be taken into account at the MEL level.

For more information on special operations, refer to §4.2.2.5

4.3.2.5. OPERATIONAL AND MAINTENANCE PROCEDURES

The FAA MMEL does not include the content of operational and maintenance procedures. However, when a required procedure is linked to a particular item, this is specified in the "REMARKS OR EXCEPTIONS" column, and the subject of the procedure is provided in the dispatch conditions.

Example: Item 36-12-02: APU Bleed Valve in the A320 Family MMEL

12-02	APU Bleed Valve	C	1	0	(M)	May be inoperative secured closed provided APU bleed switch is selected OFF

SPECIMEN

In this example, the Operators should include detailed steps for closing and testing the APU bleed valve and installing the placard, in the maintenance procedure.

An acceptable procedure should at least indicate:

- How the procedure is accomplished
- In what order the elements of the procedure should be accomplished
- The actions that are necessary to complete the procedure.

The written procedures may be:

- In the "REMARKS OR EXCEPTIONS" column of the MEL
- As an appendix of the MEL
- In a separate document. In this case, the MEL should include a reference to the location of the procedures.

Note: Operational and maintenance procedures may be based on the aircraft manufacturer's recommended procedures.

4.4. MEL USER GUIDE

The MEL is a document that is used to alleviate a situation. Its purpose is not to encourage the operation of aircraft with inoperative equipment. It is not desirable for an aircraft to be dispatched with inoperative equipment, and such operations are only permitted after careful analysis of each item, to ensure that an acceptable level of safety is maintained.

Operators must take into account the fact that the continued operation of an aircraft with inoperative items should be minimized.

The MEL should follow MMEL dispatch conditions, and associated limitations/operational procedures, to guarantee efficient and safe operation of the aircraft.

4.4.1. GENERAL PRINCIPLES ON MEL USE

The MEL should be consulted, only when a failure is completely **identified and confirmed**.

However, the MEL is neither a troubleshooting guide nor a pre-flight checklist.

The following outlines some MEL principles:

"NO GO" Items:

"NO GO" items must not be checked operative before each flight. By default, all the aircraft items are considered operative, unless reported or considered as inoperative.

Class II and Class III Failures:

For the definition of the different failure classes, and their possible impact on the MMEL, **refer to §2.4**.

Multiple Unserviceabilities:

As stated in ACJ MMEL/MEL.030, the MMEL does not consider all combinations of unserviceabilities: *"It has to be accepted that because of the variety of multiple unserviceabilities which could arise, it is likely that many will not be covered in the MMEL"*.

Therefore, if several pieces of equipment are inoperative, Operators should consult the MEL for each item, to check if there are any incompatibilities between all associated dispatch conditions. It is the flight crew's responsibility to assess the situation and to decide whether or not to accept multiple unserviceabilities.

Example: Some items affecting takeoff performance may individually be inoperative taking into account some penalties provided either by TLO/LPC computations or by Section 02 of the MEL. However, as these performance penalties are cumulative, the addition of several items may lead to a prohibited takeoff.

Tables established by Airbus, for takeoff with multiple unserviceabilities are provided in appendix 6.6.

However, the most safety related cases are identified during the MMEL creation process. In this case, when an MMEL item requires one or several other items to be operative, it is clearly stated in the dispatch conditions.

In-Flight Failure:

The MEL is not applicable if there is an in-flight failure (Refer to §4.6). The procedures and limitations to be applied in flight are available in the FCOM and the QRH. However, the MEL may be consulted in flight, only to decide whether to perform an in-flight turn back, depending on:

- The "GO"/"NO GO" status of the failed item
- The possibility to repair the failure at the destination.

Final Decision to Dispatch an Aircraft:

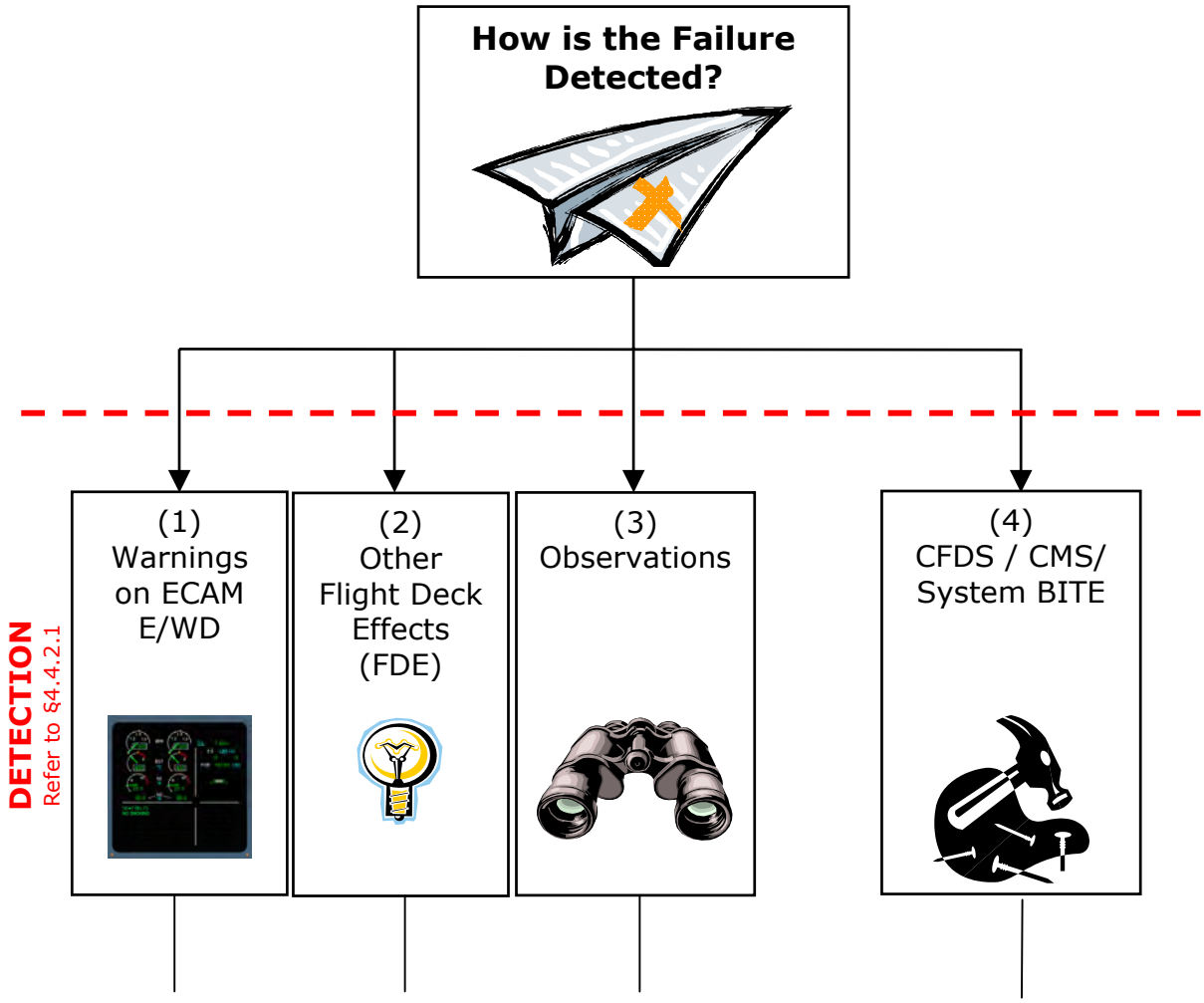
The JAR-OPS 1.085 states the responsibilities and duties of the flight crew.
As per paragraph (f)(11) of JAR-OPS 1.085:
"The commander shall decide whether or not to accept an aeroplane with unserviceabilities allowed by the CDL or MEL".

To make his decision, the Captain should take into account the:

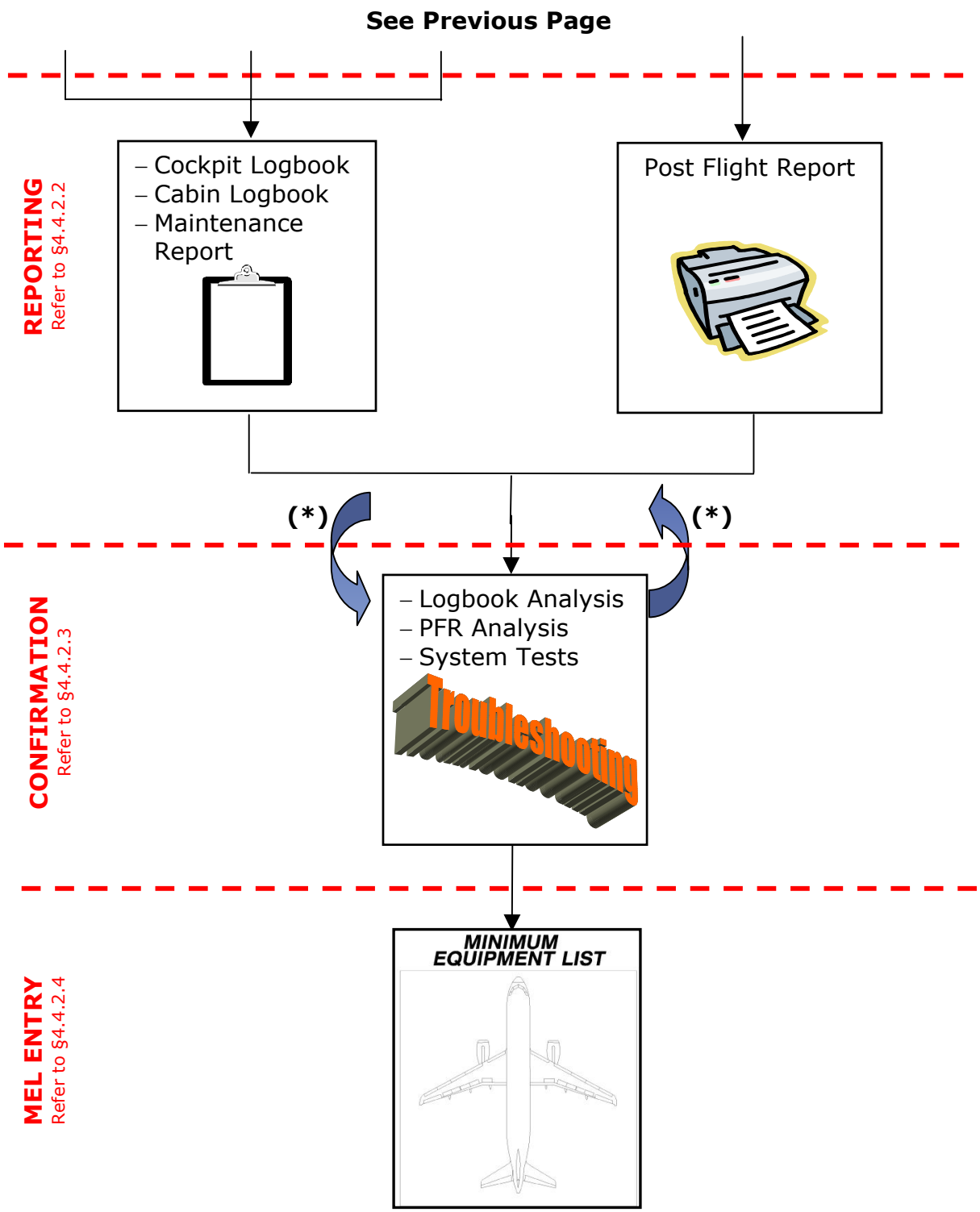
- Type of flight or flight time
- Crew workload
- Limitations
- Departure and destination airport
- Maximum altitude
- Weather conditions
- Crewmembers sensitivity.

4.4.2. HOW TO USE THE MEL?

There are several ways in which flight crews, maintenance personnel, or cabin crews can detect and report failures:



See Following Page



(*) The reporting and the confirmation steps are closely-linked. For instance:

- The Post-Flight Report (i.e. reporting) is printed at the end of the flight and its analysis leads to the identification of the failure (i.e. confirmation).
- The logbook entry (i.e. reporting) is performed after the completion of the troubleshooting actions (i.e. confirmation).

4.4.2.1. HOW IS A FAILURE DETECTED?

1. Failure Detected by an ECAM Message on the E/WD

The Electronic Centralized Aircraft Monitoring Computer (ECAM) is installed on all Airbus aircraft, except the A300 B2/B4 aircraft.

The ECAM provides the flight crew with information on the current state of various aircraft systems on ground, or in flight.
In particular, the ECAM provides:

- Memos
- Warning/caution messages.

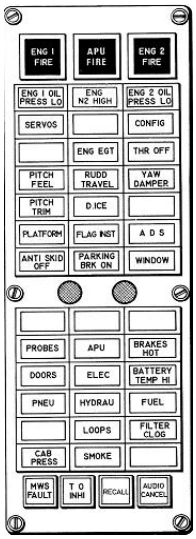
For the A320 and A330/A340 families, the messages are displayed on the lower part of the upper ECAM Display (Engine/Warning Display (E/WD)).

For the A300-600/A310 family, the messages are displayed on the left ECAM display that is not divided into two parts as for the A320 and A330/A340 families.

Note:

For the A300 B2/B4 aircraft, the Master Warning Panel (MWP) warns the flight crew of failures.

When a fault is detected in a system, the associated light comes on.



2. Failure Detected by other Flight Deck Effects (FDE)

A Flight Deck Effect (FDE) is an event that may be identified by the flight crew when in the flight deck. A FDE may be:

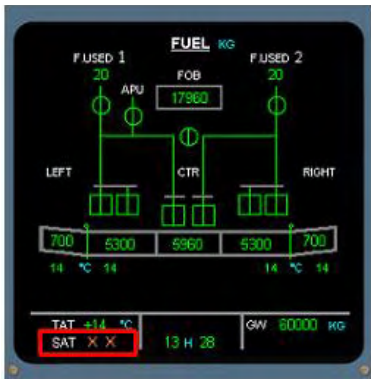
- Tactile: Stick shakers to indicate an impeding stall condition
- Aural: Sounds that are transmitted in the cockpit through loudspeakers
- Visual: Local warnings such as annunciator lights, magnetic indicators, flags, etc.

For instance, an FDE may be:

- Data that is invalid, unavailable, or incorrect on the ECAM, Navigation Display (ND), or Primary Flight Display (PFD):

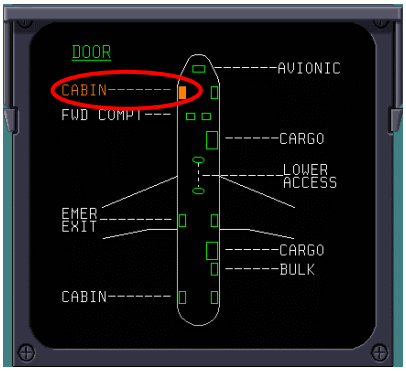
Examples:

Loss of SAT Indication:



Loss of Speed Scale on PFD:

Incorrect information displayed on an ECAM system display page:



The door is indicated as not locked when it is closed.

- Broken pushbutton/pushbutton-switch/switch/selector:

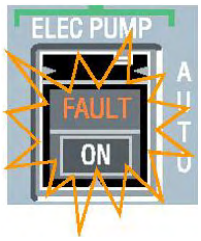
Example: Audio Switching selector on the A320 overhead panel

- Equipment reported inoperative on a system page of the ECAM system display.

Example: Inoperative spoiler indicated on ECAM FLT/CTL page:

- Equipment reported inoperative by a FAULT light.

Example: Electrical pump failure:



- Failure of an annunciator light.

Example: An annunciator light on the overhead panel does not come on during the ANN LT TEST.

- Broken needle/analog display/digital display on the overhead panel, instrument panels or pedestal.

Example: Standby altitude:

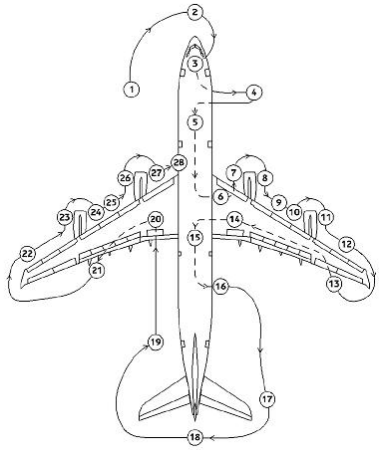
3. Failure Detected by Observations

Observations may be reported either by the flight crew, the cabin crew, or maintenance personnel.

For instance:

- Flight Crew during Exterior Inspection:

  Example:
  Missing tie bolt on a main wheel.



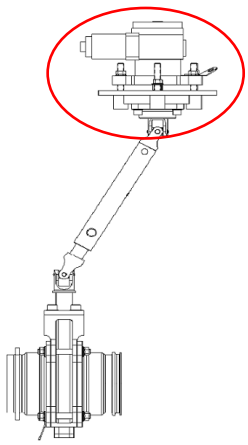
- Maintenance Inspection:

  This category concerns failures that are not monitored, but may be detected during scheduled or unscheduled maintenance.

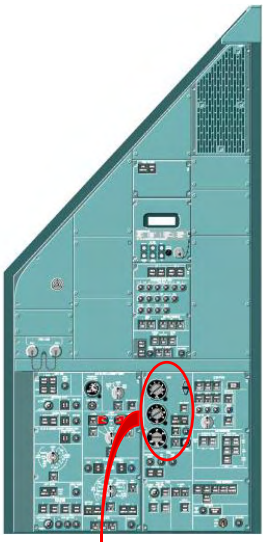
  Example:

  Failure of one of the Twin Motor Actuators (TMA): The TMA enables the cross feed valve to open or close.

  The state of these two motors is not monitored. Therefore, if only one of these motors fails, the failure will not be identified if the maintenance personnel do not check it.



○ MAINTENANCE PANEL (for the A300/A310 family):



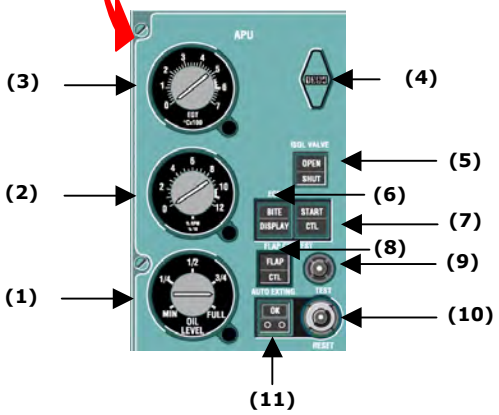
The MAINTENANCE PANEL is located at the rear of the cockpit. This panel monitors the system failures that may occur during the flight. Failures are indicated by:

- FAULT lights
- Memorized Fault Annunciators (MFA).

Maintenance personnel also use this panel for performing system tests/system BITE tests, and reading system state indications.

The maintenance personnel may report the failure of a system by checking the MAINTENANCE PANEL.

Example: APU panel

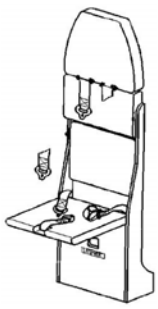


(1) Oil Quantity Indication
(2) RPM Indication
(3) EGT Indication
(4) Operating Hours
(5) ISOL VALVE Indication
(6) ECB-BITE Display MFA
(7) START CTL MFA
(8) FLAP CTL MFA
(9) FLAP CTL TEST Pushbutton
(10) AUTO EXTING TEST RESET Switch
(11) AUTO EXTING-OK Light.

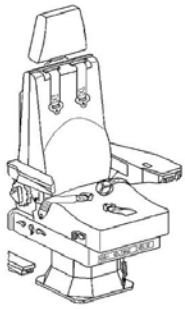
○ Miscellaneous:

Examples:

Broken Cabin Attendant Seat Harness



Broken Armrest in the Cockpit



4. Failure Detected by the CFDS/CMS, system BITE

At the aircraft level, failures are handled by the Centralized Fault Display System (CFDS) for the A320 family, or the Central Maintenance System (CMS) for the A330/A340 family.

This data can be accessed from the CFDS via the Multipurpose Control and Display Unit (MCDU).

Maintenance personnel usually access the CFDS/CMS in order to begin their actions.

The maintenance personnel may also report a system failure after having performed a BITE test on the system.

4.4.2.2. HOW IS A FAILURE REPORTED?

- Aircraft/Cabin Logbook:

The flight/cabin crew makes a report in the aircraft logbook of any failures, and abnormal events that have had an effect on the cockpit/cabin, during the flight.

According to the JAR-OPS 1.420: *"A commander shall ensure that all known or suspected technical defects and all exceedances of technical limitations occurring while he was responsible for the flight are recorded in the aircraft technical log."*

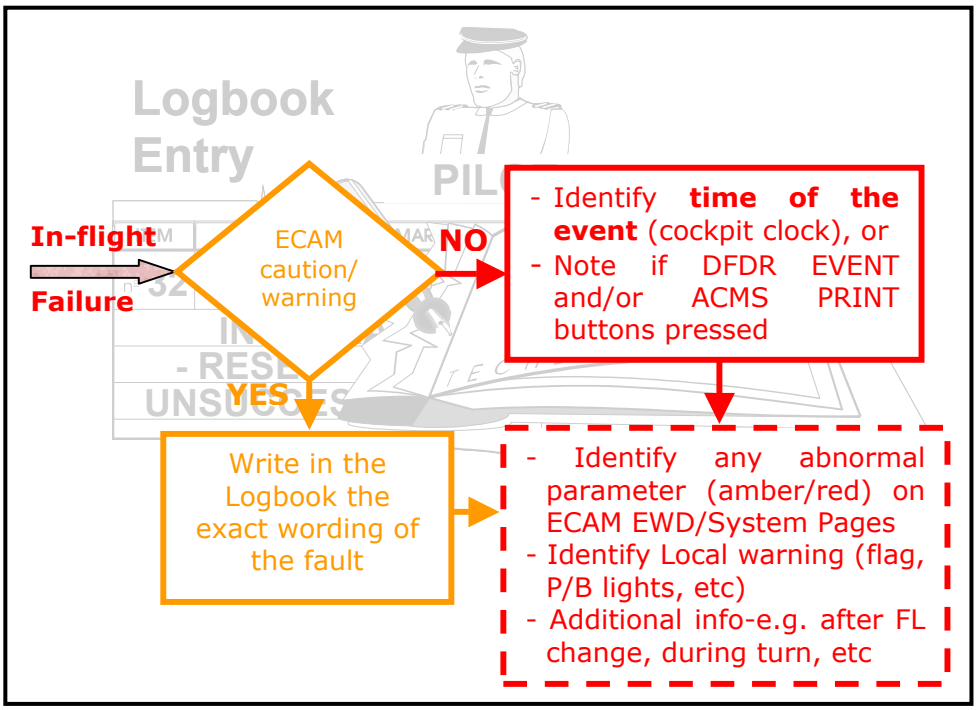


Figure 4-5: Logbook Concept

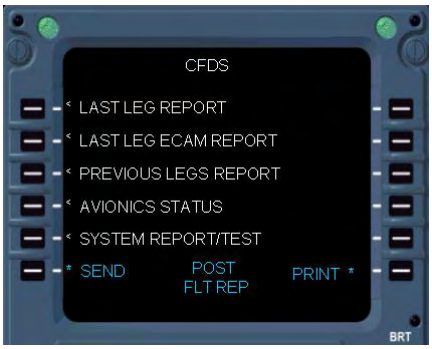
- Maintenance Report:

Maintenance personnel issue a maintenance report during scheduled checks. The report includes any reported failures, and all the actions performed during the check.

- <u>Post Flight Report (PFR) (except for A300/A310 family):</u>

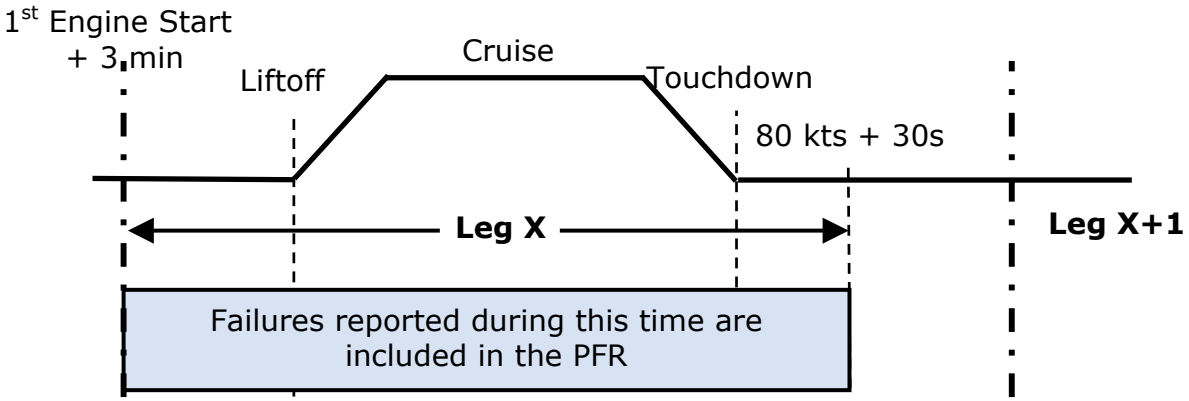
For aircraft with a Centralized Fault Data System (CFDS), or a Central Maintenance System (CMS), the Post Flight Report (PFR) may also be used to confirm a failure that has already been reported by the flight/cabin crew.

The PFR is the sum of the last leg report (Class I and Class II failures recorded during last flight leg), and the last leg ECAM report (ECAM warnings/cautions messages observed by the flight crew during the last flight leg).



```
A/C ID    DATE  GMT     FLTN      CITY PAIR
D-AIPA  29 JAN 2304    LH4747     GCTS EDDF

+-------------------------------+
|      MAINTENANCE      |      DB/N
| POST FLIGHT REPORT    |     DLH001
+-------------------------------+

A/C ID        DATE        GMT         FLTN        CITY PAIR
D-AIPA        29 JAN      1507/1935   LH4747      GCTS EDDF

ECAM WARNING MESSAGES
---------------------
GMT PH ATA
1511 04 36-21 AIR ENG1 BLEED FAULT
1527 06 34-00 NAV ADR 3 FAULT
1527 06 27-00 FKTL
1744 06 32-00 WHEEL TYRE LO PR (2)

FAILURE MESSAGES
----------------
GMT PH ATA                                  SOURCE     IDENT.
1511 04 36-11-52 PRESS REG-V 4001HA1        BMC 1
1511 04 34-48-00 DMC1: NO TCAS DATA         EIS 1      EIS 3/EIS 2
1527 06 34-11-17 ADM19FP8                   ADR 3      EFCS 1/AFS
                                                       EFCS 2
1748 06 31-61-12 DMC2: NO ECP DATA          EIS 2
1744 06 32-41-13 CHECK TIRES 1/2 PRESS      TPIS
                 2649/2650GM
1744 06 32-49-18 TIRE 1 ROTATING MECH 7GV   TPIS
                 OR PRESS TRANSDUCER 13GV
1921 08 34-55-31 DMC3: NO VOR1 DATA         EIS 3      EIS 2/EIS 1
                                                       AFS
```

The PFR is printed at the end of each flight, and records all the failures that are detected by the CFDS/CMS and that occur between the first engine start + 3 minutes and the arrival at 80kts + 30 seconds.



<u>Note</u>: In case of discrepancies between the logbook and the PFR, the logbook always supersedes the PFR.

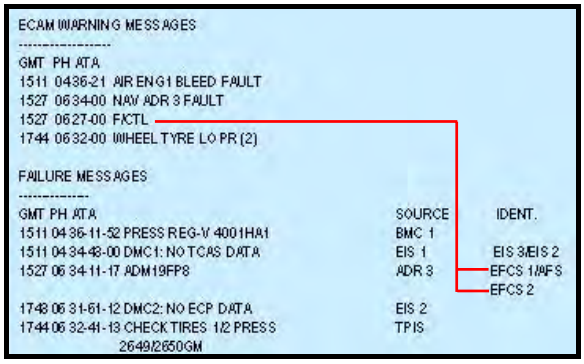
4.4.2.3. HOW IS A FAILURE CONFIRMED?

The MEL is used on ground, only after a failure has been confirmed.

The flight crew or line maintenance team may confirm the failure by:

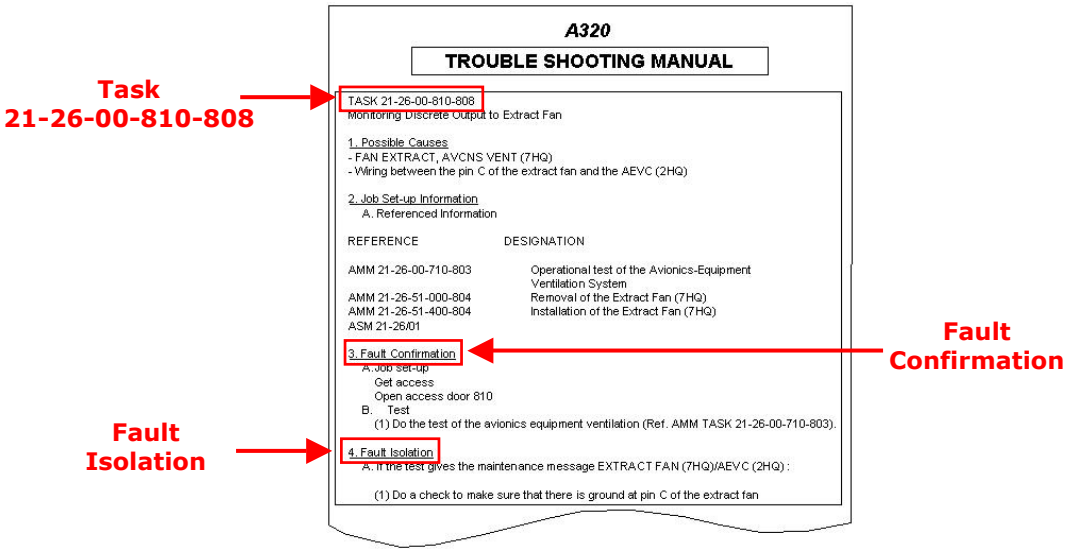
- Consulting the logbook entry
- Analyzing the PFR:
  This involves correlating the effects in the cockpit with the PFR identifiers.

  <u>Example</u>: In the following PFR, the Class II fault detected by the F/CTL maintenance status originated from the failure of ADR3 that triggered the ECAM caution NAV ADR 3 FAULT.



- A system test:
  Hardware tests can be performed for all systems when the aircraft is on ground, without specific Operator action. The test results can allow the flight crew or line maintenance to confirm the failure of one of the components of a system, or of an interacting system.

If the above steps do not confirm the failure, then the Troubleshooting Manual (TSM) should be consulted.



The TSM, or Fault Isolation Manual for A300 B2/B4, is a manual developed by Airbus that enables the confirmation, isolation, and correction of failures reported in the logbook.

The maintenance personnel may enter the TSM either by ECAM messages, or any other flight deck effect, or observations.

The TSM may include:

- The possible causes of the failure
- A test of the system to confirm the failure
- An analysis of the failure effects, and appropriate actions to isolate the system failures.

Troubleshooting is not always necessary, when an evident simple failure is detected, because this would unnecessarily delay the aircraft dispatch.

Troubleshooting is necessary to identify the correct MEL item to be referred to, when:

- Several MEL items in Section 00E are associated with the ECAM message
- There is a need to identify an actual or a false caution
- There is a need to identify the item associated with a FDE.

For example, if Section 00E of the MEL associates only one item with the ECAM message, the flight crew can immediately go to Section 01 of the MEL to find the associated dispatch conditions.

To conclude, the failure confirmation process is presented in Figure 4-6:

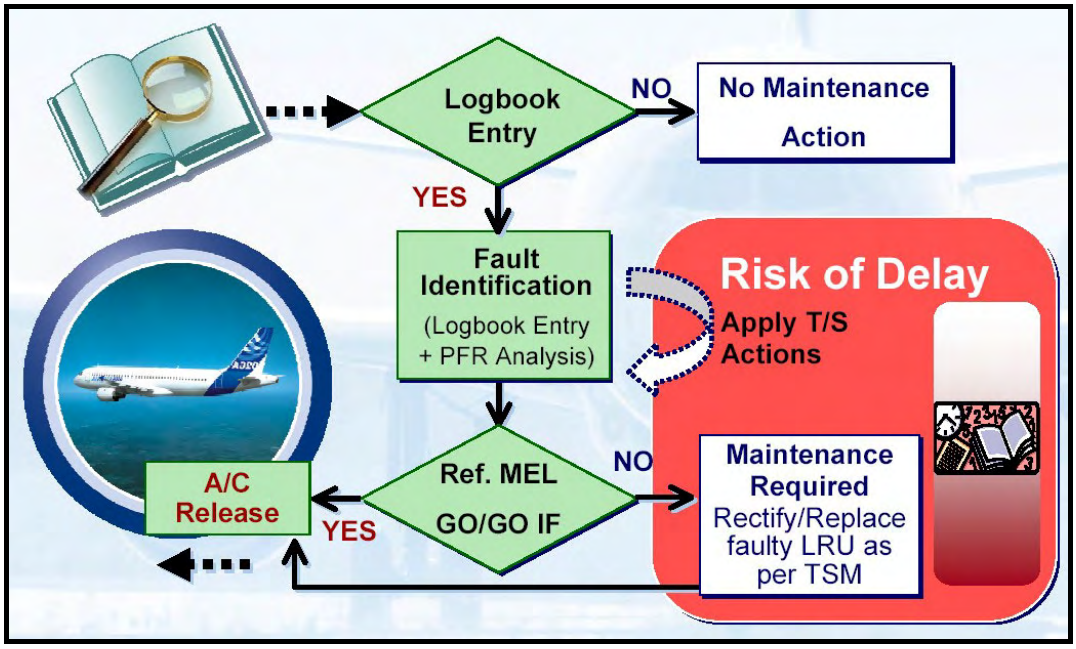


Figure 4-6: Failure Confirmation Process

<u>Example</u>: Identifying an actual or a false caution.

Let us imagine a failure that has the following effects in the cockpit for the A320 family:

- *The message <u>HYD</u> G ENG 1 PUMP LO PR is displayed on the ECAM E/WD*
- *The ENG 1 PUMP SWITCH comes on, on the overhead panel*
- *The ENG 1 low pressure indication appears on the ECAM <u>HYD</u> page.*

According to Section 00E of the MEL, this ECAM message may cause a "NO DISPATCH" situation if the Engine 1 pump is confirmed inoperative (actual caution).

However, if troubleshooting establishes that the warning is false, the aircraft will be dispatched in accordance with MEL item 29-30-04-I).

G ENG 1(2) PUMP LO PR	NO DISPATCH, or Refer to MMEL 29-30-04-I)	Actual caution False caution

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Therefore, it is necessary to conduct troubleshooting actions in order to identify whether or not the caution is actual or false. This would avoid unnecessary delay in the dispatch of the aircraft.

As stated in the TSM, the possible causes associated with this ECAM message are the following:

- *Failure of the engine pump: PUMP-G, ENG 1*
- *Failure of a pressure switch: PRESS SW-G PUMP, ENG 1*
- *Failure of the overhead panel pushbutton: ENG 1 PUMP P/BSW.*

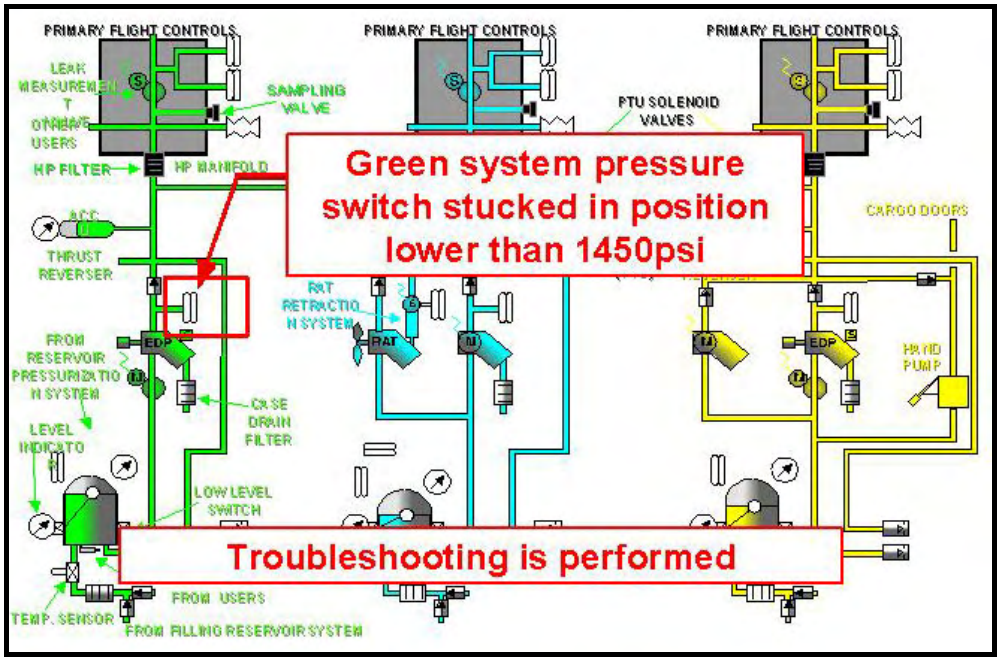
If all of the above-listed FDE are present, the TSM indicates that the Operator should check the pressure of the green system on the ECAM HYD page:

- *If the indicated pressure is less than 1 667 psi, the failure may derive from either the engine pump, the engine 1 pump pushbutton, or a wiring discontinuity*
- *If the indicated pressure is more than 1 812 psi, the failure may come from the pressure switch, or from a wiring discontinuity.*

In this example, the indicated pressure is 3 000 psi.

Therefore, according to the TSM, the failure may come either from a wiring discontinuity between the pressure switch and the connectors, or the pressure switch itself.

However, in both cases, the failure does not come from the engine pump. Thus, the caution triggered on ECAM is a false caution.



The aircraft can be dispatched under MEL item 29-30-04-I):

I)	ENG PUMP LO PR	C	2	0	(o)	One or both may be inoperative provided: 1) Associated system pressure indication is operative and, 2) Engine pumps operation is checked prior to each flight if warning is erroneously displayed.

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However, the analysis of the above case reveals other items that should be considered inoperative, due to the failure of this pressure switch. These other items include:

- *The ENG 1 PUMP SWITCH on the overhead panel, because it will stay on until the pressure switch is fixed: MEL item 29-30-01-A).*

A)	FAULT LIGHT	C	4	0	*	One or more may be inoperative provided the associated reservoir quantity indication is operative.

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- *The pump state indication on the ECAM HYD page, because the LOW indication will remain on the ECAM until the pressure switch is fixed: MEL item 29-30-03-F).*

F)	Pumps	C	3	0		

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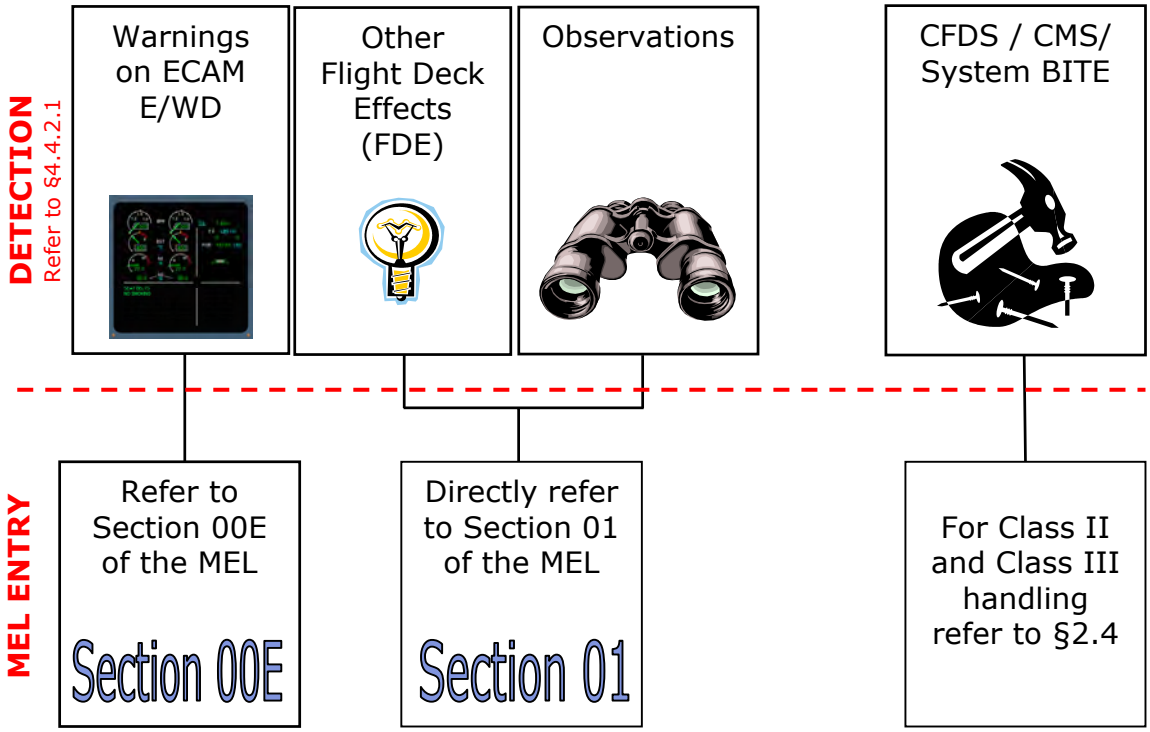
4.4.2.4. HOW IS THE MEL ENTERED?

When the failure is confirmed, the associated MEL item must be determined, either by referring to:

- Section 00E of the MEL if an ECAM WARNING is associated with the failure, or
- Section 01 of the MEL, using the ATA breakdown classification if no ECAM WARNING is associated with the failure (failure reported by a Flight Deck Effect or an observation).



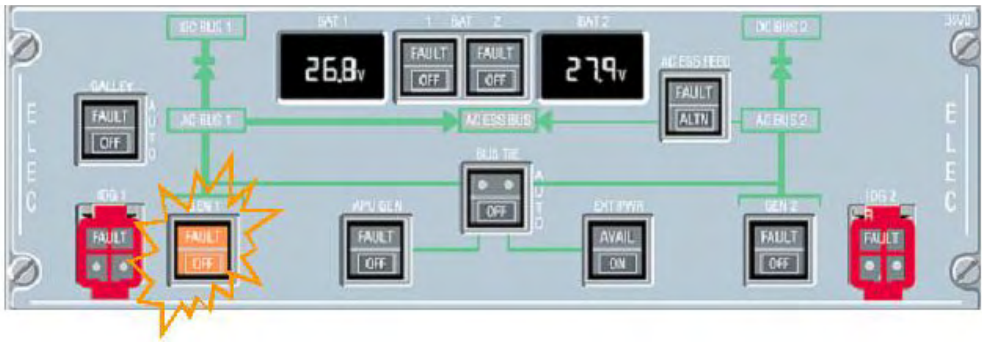
If there is no corresponding item in the MEL, this means that:

- It is a "NO GO" item if the system affects the airworthiness of the aircraft, or
- It is a "GO" item if the system does not affect the airworthiness of the aircraft. In this case, the aircraft may be dispatched without restriction and the MEL should not be used.

Examples:

- ***MEL entry following a warning on the ECAM E/WD with only one related MEL item:***

*Let us consider the following ECAM message: "**ELEC GEN 1 FAULT**", with its associated light on the overhead panel for the A320 family:*



The process is divided in three or four parts (depending whether or not there are operational, and/or maintenance procedures).

As there is an ECAM warning displayed on the E/WD, the flight crew can refer to Section 00E of the MEL to get an idea of the applicable item(s):

Electrical: ATA 24

Section 00E

ATA 24

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	ECAM WARNINGS / MMEL ENTRY	00 24E	P 1
	ELECTRICAL	SEQ 100	REV 25

ECAM WARNING	DISPATCH CONDITION	REMARK
ELEC		
AC BUS 1 FAULT	NO DISPATCH	
AC BUS 2 FAULT	NO DISPATCH	
AC ESS BUS FAULT	NO DISPATCH	
AC ESS BUS SHED	NO DISPATCH, or Refer to MMEL 24-27-07	Actual warning False warning
GEN 1 (2) FAULT	Refer to MMEL 24-20-01	
GEN 1 (2) OFF		Not applicable

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MEL entry is directly identified: The user will have to refer to MEL 24-20-01 (Engine Driven Generator Channel) in Section 01.

When the MEL entry has been determined in Section 00E, the flight crew should refer to the correct MEL item in Section 01.

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	MASTER MINIMUM EQUIPMENT LIST	01-24	P 1
	ELECTRICAL	SEQ 125	REV 26

	1. SYSTEM AND SEQUENCE NUMBERS ITEM	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH		5. REMARKS OR EXCEPTIONS
R R R R	**24-00 MAINTENANCE MESSAGE DISPLAYED ON ECAM STATUS PAGE**					
R R R	00-01 DC BUS TIE	C				Dispatch with this MAINTENANCE message displayed on ECAM STATUS page is granted.
R R R	00-02 GPCU	C				Dispatch with this MAINTENANCE message displayed on ECAM STATUS page is granted.
R R R	00-03 AC GEN	C				Dispatch with this MAINTENANCE message displayed on ECAM STATUS page is granted.
	24-20 AC GENERATION					
	20-01 Engine Driven Generator Channel (IDG, GCU, Line Contactor)	C	2	1	*(o)(m)	Except for ER operations one may be inoperative provided 1) APU and APU – driven generator channel are operative and used throughout the flight, and 2) APU fuel pump is operative, and 3) All busses can be powered, and 4) Indications and warnings for the remaining engine and APU – driven generator channels are operative, and 5) Flight altitude is limited to 33500 ft, and 6) Fuel recirculation system associated with the operative IDG is checked operative prior to each flight, and 7) Galley automatic shedding is operative.

Equipment must be placarded

Operational Procedure

Maintenance Procedure

Exception: The failure is "NO GO" in the case of an ETOPS flight.

Rectification Interval C

Dispatch Conditions "GO IF".

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In this section, the flight crew can identify the dispatch conditions, and/or limitations.
The "REMARKS OR EXCEPTIONS" column also indicates, if applicable, that there are associated operational or maintenance procedures.
The next step is then to enter Section 02 for the operational procedure, and Section 03 (or AMM for A330/A340 family) for the maintenance procedure.

Check operational procedure in Section 02:

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	OPERATIONAL PROCEDURES	02-24	P 1
	ELECTRICAL	SEQ 001	REV 21

24-20 AC GENERATION

20-01 Engine driven generator channel

On ground with electrical network supplied from APU or external power :
GALLEY . . . . . CHECK AUTO
C/B ELEC/GALLEY/GND/FLT/LOGIC (122VU S24) . . . . . PULL
R Check that a part of the operative galley equipment does not operate.
C/B ELEC/GALLEY/GND/FLT/LOGIC (122VU S24) . . . . . PUSH

Note : Disregard this procedure if main galleys are not connected.

After engines start, with APU running :
GEN 1 . . . . . OFF
GEN 2 . . . . . OFF
Check on ECAM ELEC page that all AC BUS are supplied.
GEN (operative) . . . . . ON
BAT 1 and 2 . . . . . OFF then ON
After less than 10 seconds :
APU GEN . . . . . OFF
Check on ECAM ELEC page that all AC BUS are supplied.
APU GEN . . . . . ON

Note : If necessary, the IDG may be disconnected.

APU fuel consumption with APU GEN ON

FL	GND	200	250	300	350	390
KG/H	130	65	65	51	43	39
LB/H	287	144	144	113	95	86

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Associated operational procedure to be completed before each flight

Check maintenance procedure in Section 03:

A318/319/320/321 MASTER MINIMUM EQUIPMENT LIST	MAINTENANCE PROCEDURES ELECTRICAL	03-24	P 1
		SEQ 025	REV 23

24-20-01	ENGINE DRIVEN GENERATOR CHANNEL – FUEL RECIRCULATION CHECK	
ACCESS ZONE : Cockpit	ACCESS ITEM :	
GSE : Nil		
ASSOCIATED CIRCUIT BREAKERS		
FIN	DESIGNATION	LOCATION

PROCEDURE

1 – Energize the aircraft electrical circuit with ground power unit.
2 – Start the ECAM system.
3 – On the ECAM control panel, push the STS pushbutton switch.
4 – On the lower ECAM display unit, check on the STATUS page that « ENG 1 (2) FADEC » message is not displayed
  – If the message is displayed for the engine with the operative IDG, verify :
    a) that the two following failure messages are not simultaneously displayed
      . FUEL TEMP SENS/HC/EEC1(2) and
      . HMS-TC FAILSAFED1(2)
    b) that none of the following messages is displayed
      . ACOC OIL TEMP TC/HC/EEC
      . IDG OIL TEMP TC/HC/EEC
      . ACOC AIR MOD VLV/HC/EEC
      . FUEL DIV RET VLV/HC/EEC
      . HMS FUEL OVTMP
      . HMS ENG OIL OVTMP
      . HMS IDG OIL OVTMP
      . HMS IDG OVTMP W/RECIRC
      . FUEL DIV RET VLV/EEC.
5 – On the panel 50VU :
  – release the ENG/FADEC GND PWR/1(2) pushbutton switch (the ON legend comes on).

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Associated maintenance procedure to be applied according to the periodicity given in Section 01.

- ***MEL entry following a warning on ECAM E/WD with several associated MEL items:***

*Let us consider the following ECAM message: "**BRAKES RELEASED**", with no other Flight Deck Effect for the A330 family.*

As per Section 00E of the MMEL, there are two items that may be related to this ECAM message:

A330 MASTER MINIMUM EQUIPMENT LIST	ECAM WARNINGS / MMEL ENTRY	00-32E	P 1
	LANDING GEAR	SEQ 001	REV 14

ECAM WARNING	DISPATCH CONDITION	REMARK
BRAKES		
PARK BRK LO PR	Apply ECAM procedure	
RELEASED	Refer to MMEL 32-42-01, or Refer to MMEL 32-42-05	
RESIDUAL BRAKING	Refer to MMEL 32-42-01	

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There are two items related to this ECAM message. Therefore, the MEL requires conducting further **troubleshooting** actions to clearly identify the correct MEL entry.

Note: *For further information on troubleshooting actions and how to confirm a failure, please refer to §4.4.2.3.*

Then, to access the relevant information from the MEL, follow the steps given in the first example: Go to Section 01, and then, if necessary, Section 02 for operational procedures and/or Section 03 (or AMM for A330/A340 family) for maintenance procedures.

- ***MEL entry following a Flight Deck Effect:***

On A300 B2/B4 aircraft, the flight crew is warned of failures by:

- *A combination of tactile, visual, or aural warnings*
- *The MWP, that groups warning lights and provides a synthesis of different warnings*
- *The flight engineer panel that monitors and controls equipment. It is located aft of the cockpit, on the right hand side.*

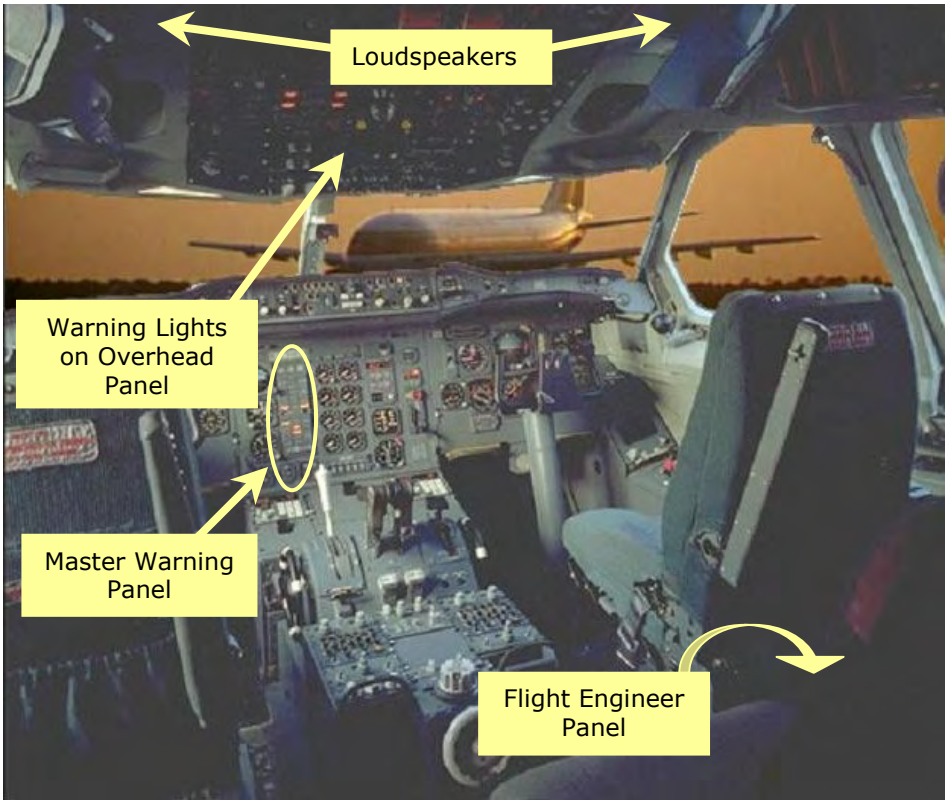
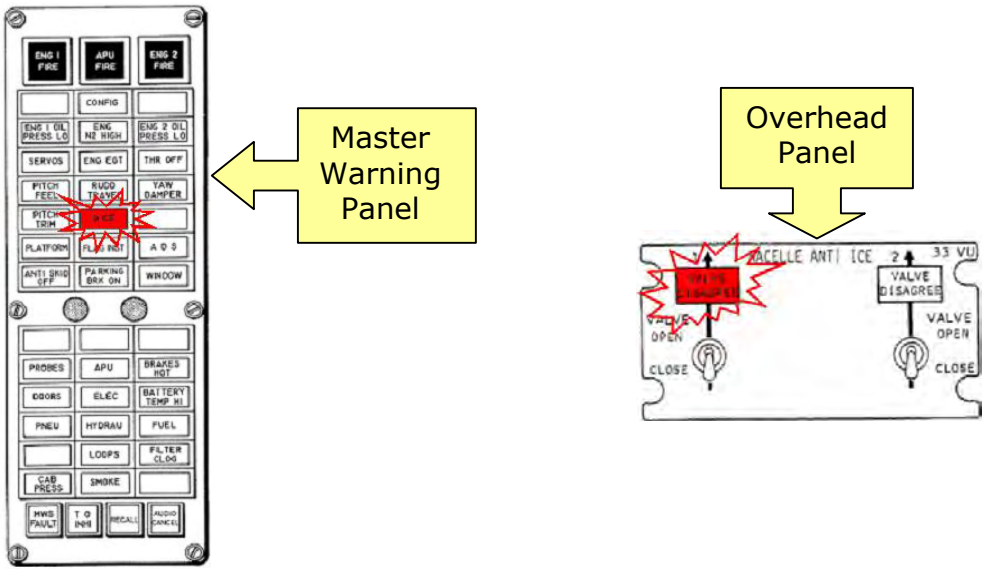


Figure 4-7: A300 B2/B4 Cockpit

The considered failure leads to two FDEs:

- *The "D ICE" light comes on, on the Master Warning Panel*
- *The "VALVE DISAGREE" light comes on, on the overhead panel.*



When a light comes on, on the MWP, and/or on the overhead panel, and/or on the flight engineer panel, the flight crew should take the necessary troubleshooting actions, in order to identify the faulty system or functions, and the associated ATA chapter.

In this example, the identified faulty system is the Nacelle anti-ice valve. Therefore, the flight crew can go to MEL Section 1, Chapter 30: "Ice and Rain Protection", Item 1-a):

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MASTER MINIMUM EQUIPMENT LIST

1 . SYSTEM AND SEQUENCE NUMBERS ITEM	2 . RECTIFICATION INTERVAL	3 . REFER TO PREAMBLE	4 . REMARKS OR EXCEPTIONS
R 30 - ICE AND RAIN PROTECTION			
R Nacelle anti-ice			
R 1 - VALVES	C	2	* (m) a) One may be inoperative in the closed position provided the aircraft is not operated in icing conditions
R			- or -
R	C	2	* (o) (m) b) One or both may be inoperative in the open position provided : 1) Affected NACELLE ANTI-ICE VALVE switches are in the OPEN position, and 2) Performance penalties are applied (Refer to AFM chapter 5)

Then, to access the relevant information from the MEL, follow the steps given in the first example: Go to Section 01, and then, if necessary, Section 02 for operational procedures and/or Section 03 (or AMM for A330/A340 family) for maintenance procedures.

- ***MEL entry following a flight crew observation:***

Let us consider that a flight crewmember discovers a crack on the lateral window during cockpit preparation on an A300/A310 family aircraft.

As there are no ECAM messages linked with this observation, the flight crew has to refer directly to Section 01 of the MEL.

The crack is located on a lateral window. Therefore, the correct ATA chapter to be referred to is ATA 56: Windows.

A300-600 MASTER MINIMUM EQUIPMENT LIST | WINDOWS | 01-56 Pg 1 SEQ 001 | REV 11

1. SYSTEM AND SEQUENCE NUMBERS / ITEM	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH		5. REMARKS OR EXCEPTIONS
1 – **Windshields**					***NOTE*** ***A cockpit window with minor damages (as described in associated maintenance procedure) is considered operative, but the vision through this cockpit window must be acceptable to the pilot.***
a) Front (Pilkington and SPS TGA 300 series windshields)	A	2	2	(o) (m)	External ply may be cracked for one flight provided : 1) Vision through the affected front windshield is not unacceptably impaired, and 2) The aircraft is not operated in icing conditions, and 3) The other front windshield is not damaged.
a) Front (SPS A340 series PPG windshields	A	2	2	(o) (m)	External ply may be cracked for ten flights provided : 1) Vision through the affected front windshield is not unacceptably impaired, and 2) The aircraft is not operated in icing conditions, and 3) The other front windshield is not damaged.
b) Lateral windows	A	4	4	(o) (m)	External ply may be cracked for one flight provided : 1) Vision through the affected lateral window is not unacceptably impaired, and 2) The aircraft is not operated in icing conditions, and 3) The other lateral window is not damaged.
2 – **Passenger compt. windows**	C	–	–		One or more inner/outer panes may be cracked provided the flight is not pressurized.

Then, to access the relevant information from the MEL, follow the steps given in the first example: Go to Section 01, and then, if necessary, Section 02 for operational procedures and/or Section 03 (or AMM for A330/A340 family) for maintenance procedures.

4.4.3. SPECIFIC MMEL/MEL TERMINOLOGY

The MMEL has its own specific terminology that is explained below:

"Refer to":

"Refer to", in column 5 of Section 01, indicates that there is another item to be applied in the MMEL.
When there are (o) and/or (m) procedures associated with both items, **all** the procedures have to be applied in order to comply with the dispatch conditions.

Example:

51-01 Pack Flow Control Valve	C	2	1		(m)	One may be inoperative provided: 1) It is secured closed, and 2) Associated air conditioning pack is considered inoperative Refer to 21-52-01
52-01 Air Conditioning pack	C	2	1	*	(o)(m)	a) One may be inoperative provided: 1) Flight altitude is limited to 31,500ft (9,600m), and 2) Pack controller associated with the non-affected air conditioning pack is operative on both channels, and 3) Affected PACK pb sw is selected OFF, and associated pack flow control valve is checked closed on ECAM BLEED or CAB PRESS page, and 4) Remaining pack failure must be considered for fuel planning.

Operational and Maintenance procedures to apply

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"Considered inoperative":

Usually, the dispatch conditions that state that another item is "considered operative" are associated with the wording "Refer to".

51-01 Pack Flow Control Valve	C	2	1	(m)	One may be inoperative provided: 1) It is secured closed, and 2) Associated air conditioning pack is considered inoperative. Refer to 21-52-01

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"Operative"/"checked operative":

Some dispatch conditions use the term "operative" or "checked operative". The definitions are provided below with some examples:

- When an MMEL item specifies that a system "must be operative", it does not imply that its status must be confirmed. An item is considered operative, as long as it is not reported to be malfunctioning.

a) Mask	C	4	--	*	One must be operative for each cockpit occupant.

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- When an MMEL item specifies that a system "must be checked operative", it means that it must be checked, and confirmed operative within the time limit specified in the MMEL.

E) PUMP LO PR	C	5	0	(o)	One or more may inoperative provided associated system pressure indication is operative. If the HYD G ENG 1(4)(1+4) PUMP LO PR caution is displayed on ECAM E/WD associated green pump must be checked operative before each flight.

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"**(Reserved)**" items:

For more information on the management (at the MEL level), of items listed as "(Reserved)" in the MMEL, please refer to §4.2.2.2.

Rectification Interval Interpretation while Operating ETOPS:

The MMEL/MEL sometimes provides different Rectification Intervals for ETOPS and non-ETOPS operations. Usually, a more restrictive interval is introduced for ETOPS operations.
Therefore, the aircraft cannot be ETOPS operated after the expiry of the Rectification Interval applicable to ETOPS operations.
However, if the Rectification Interval is longer for non-ETOPS operations, the aircraft can still be operated until the expiry of this Rectification Interval, but only for non-ETOPS operations.

81-01 FCU	C	1	1	a) Except for ER operations, one channel may be inoperative provided 2 RMP, all DU, both RA, both LGCIU, both FAC, both cabin pressure controllers, the three ADIRs and standby altimeter are operative.
				- or -
	A	1	1	b) For ER operations, one channel may be inoperative for one flight provided 2 RMP, all DU, both RA, both LGCIU, both FAC, both cabin pressure controllers, the three ADIRs and standby altimeter are operative.

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In the example above, the FCU can be inoperative for 10 days under non-ETOPS, whereas it can be inoperative only for one flight under ETOPS.
For example, if a failure was recorded at 10:00 on 26 January, the aircraft can be ETOPS operated for only one flight, and non-ETOPS operated up to 24:00 of 5 February.
However, it is not possible to operate the aircraft under non-ETOPS for 3 days, then change to ETOPS for one flight, and then finally go back to non-ETOPS for seven more days.
It is important to understand that if an Operator decides to operate its aircraft for one flight under ETOPS, this **ETOPS flight has to be the first flight under this MEL item**.

4.4.4. RECTIFICATION INTERVAL EXTENSION

It is possible for an Operator to extend Rectification Intervals B, C and D, in accordance with a definite procedure detailed in the JAR-MMEL/MEL.

For more information on the Rectification Interval Extension (RIE), refer to §2.3.3

4.4.5. OPERATIONS OUTSIDE THE SCOPE OF THE MEL

In special circumstances, exceptional dispatch permission may be granted to an Operator, if the MEL does not allow the dispatch of the aircraft with the specific item inoperative.

4.4.5.1. JAR-MMEL/MEL.090 AND JAR-OPS 1.030(B)

As the MEL might be more restrictive than its corresponding MMEL in order to comply with National Requirements, the MEL may block the dispatch of an aircraft while the MMEL would allow its dispatch.
JAR-MMEL/MEL.090 specifies that, "*subject to the approval of the Authority, the operator may be exempted from compliance with the appropriate MEL provided that such exemption complies with applicable limitations in the MMEL*".

JAR-OPS 1.030(b) also states that "*an operator shall not operate an aircraft that is not in accordance with the MEL specifications, unless permitted by the Authority Any such permission will, under no circumstances, permit operations outside the constraints of the MMEL*". (Refer to §1.4.1.1).

There is no technical objection to allow the dispatch of the aircraft in accordance with the applicable MMEL for this specific case. However, Airbus cannot grant the Operator permission to dispatch the aircraft, because aircraft manufacturers cannot interfere with National Regulations. The Operators should approach their National Authorities, as specified by the JAR-MMEL/MEL.090, and justify their concerns.

4.4.5.2. NO TECHNICAL OBJECTION (NTO)

In exceptional circumstances, Airbus may provide, at the Operator's request, a No Technical Objection (NTO) to allow the dispatch of an aircraft outside the scope of the MMEL.

An NTO is statement written by Airbus that responds to an Operator's request to use an aircraft in a specific configuration, or with procedures that deviate from the current ones.

The NTO is a case-by-case process, based on engineering judgment with respect to the status of the aircraft as indicated by the Operator to Airbus.

In accordance with JAR-OPS 1.010, it is the responsibility of the Operators to obtain the local Airworthiness Authority's permission before dispatching an aircraft outside the scope of the MMEL.

An NTO is valid only for a specific aircraft MSN that operates under the specific requirements provided in the answer section of the NTO.

An NTO is issued in exceptional circumstances and will have a temporary validity.

4.5. ORGANIZATION RECOMMENDATIONS TO OPERATORS

4.5.1. ANALYSIS OF DISPATCH DELAYS

The analysis of the number and duration of delays at dispatch has revealed that a significant amount are followed by MEL application, and that the rate of MEL related delays can significantly vary from one Operator to another.

Even if the MEL has been adequately defined to take into account Operators specificities (i.e. the maintenance facilities, spares pooling, crew training, etc.), all these efforts may be ineffective if the application; or lack of application of the MEL leads to a delay.

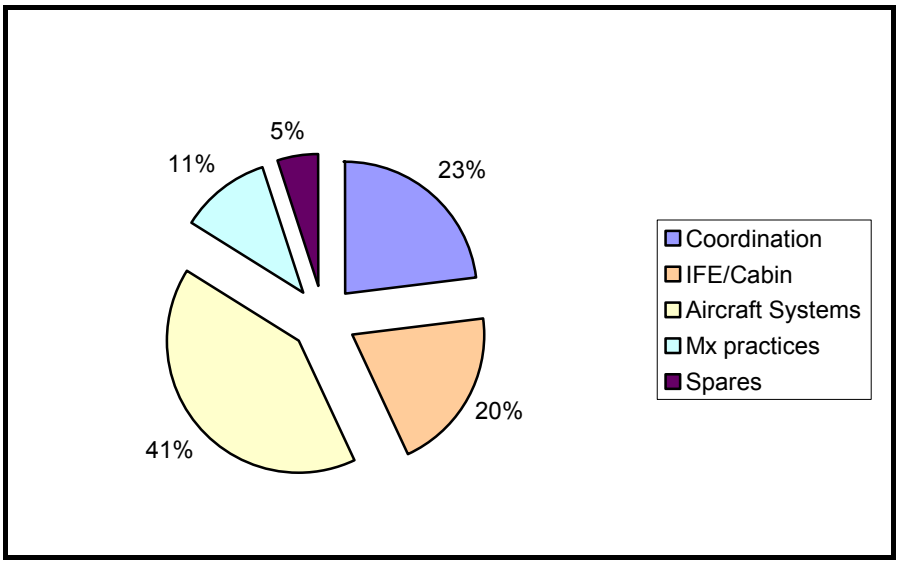


Figure 4-8: Reasons for Delays

23% of dispatch delays are due to coordination deficiencies such as:

- **MEL clarification and coordination**
- Delayed line mechanics
- Communication
- Planning
- Recurring defect control and rectification plans.

These delays are often due to a lack of procedures to be followed by the MEL users. Therefore, these delays can be avoided if all of the people involved in the dispatch are aware of the rules that should be applied.

Based on best industry practices, Airbus has developed a set of recommendations to help Operators to minimize the number of these delays.

4.5.2. STANDARD OPERATOR ORGANIZATION

It is difficult to establish rules that apply to each Operator due to various factors: Size of airline, work sharing policies, maintenance and flight operations.
However, based on a standard Operator operational organization (refer to Figure 4-9), Airbus has written some basic recommendations that will generally be applicable to any Operator's organization.

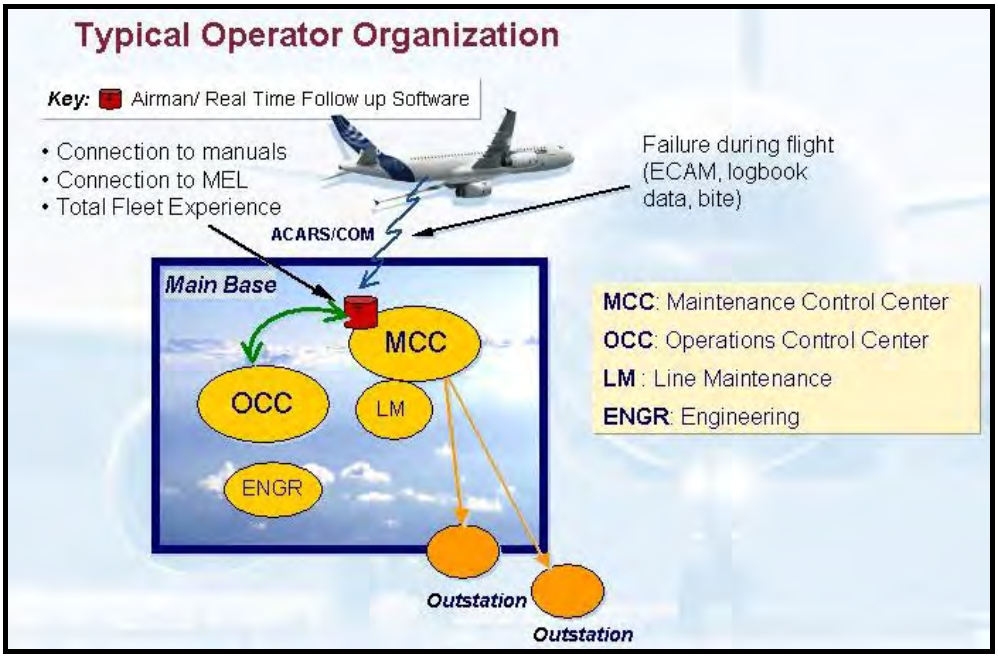


Figure 4-9: Typical Operator Organization

4.5.3. DEFINITION OF THE ROLES

- **Maintenance Control Center (MCC)**

The MCC addresses all the defects reported by the flight crew to ensure smooth operations. MEL use is part of the decisions that the MCC can take to release an aircraft. Because the MCC manages the entire fleet, it is the primary MEL day-to-day user.

Even if line maintenance can perform some tests on the aircraft systems after aircraft arrival, the MCC basically relies on the information reported by the flight crew and the Aircraft Communications Addressing and Reporting System (ACARS).

The MCC may perform:

- **Diagnostic Support**:
  As soon as a defect has been reported, the MCC starts to analyze the specific defect with the objective to avoid any operational interruption. This process will lead to corrective actions applied on the aircraft, after landing or after an aircraft release through MEL application.
  The analysis process is a real time process. Therefore, it is important to start it as soon as possible, when the defect as been reported by the crew.

- **Advance Troubleshooting and Planning**:
  When alerted, the MCC can investigate the aircraft history, as reported in the previous technical logs or maintenance reports, and start the fault identification process. The analysis of the precursors of the failure, together with the flight crew report can, in some cases, enable the MCC to provide a precise diagnostic and plan the necessary actions (repair of the defect or MEL application), before the aircraft arrives at destination.

- **Advance Notification of Emerging Problems**:
  The MCC follows the entire history of the aircraft, whereas the flight crew may only fly the aircraft for one or several flights. Therefore, the MCC has a better overview and is in a better position to initiate preventive maintenance action, when necessary.
  For example, it is best to correct, as soon as possible, any minor failures that are reported (i.e. failures that do not prevent the dispatch of the aircraft and do not necessitate MEL application like class III failures (Refer to §2.4.3) but which are, by experience, precursors of a more significant failure). At least the maintenance tools and/or spare parts necessary to release the aircraft should be made available at the destination, especially in outstations.

- **Operation Control Center (OCC)**

  The MCC informs the Operation Control Center (OCC) whenever there is a risk of a flight plan deviation due to MEL application or maintenance activities. The dispatcher is then informed either by the MCC or the OCC to take the necessary corrective action. The dispatcher and the MCC (or OCC) stay in close contact to exchange information on issues such as estimated time to fix, potential cancellation, aircraft swap, passenger boarding, etc.
  Flight Operations can also facilitate MEL deviation assessment and plan in advance for possible scheduled disruptions.

- **Engineering**

  The Operator's engineering department also has a role to play in the dispatch process by performing reliability analysis, and identification of recurring problems. This quantitative feedback is used to identify the main operational reliability drivers, and improve the operational and maintenance procedures on a mid or long term basis.
  It is important that procedures be established and followed in order to allocate adequate delay codes, commonly agreed by maintenance personnel and flight crew, so that the collected data will be accurate.
  The engineering department can also provide assistance to line maintenance when facing technical issues or interpretation problems.
  For example, the engineering department may develop alternate MEL maintenance procedures to fit particular requirements such as a lack of ground support in some outstations, etc.

4.6. LIMITS OF MEL APPLICABILITY

JAA Concept

JAR MMEL/MEL.001 limits the MEL application up to the commencement of flight.

According to JAR-MMEL/MEL.005, the "commencement of flight" is: "*The point when an aircraft begins to move under its own power for the purpose of preparing for takeoff*".

However, if a failure occurs during the taxi phase, before the start of the takeoff roll, any decision to continue the flight must be **subject to pilot judgment and good airmanship** (Refer to ACJ-MMEL/MEL.001 in JAR-MMEL/MEL). The procedures for handling these failures must be defined by the Operator in the MEL.

It is common sense that the commander might decide to continue the flight if the item is listed "GO" or "GO IF" in the MEL, and if the failure is clearly identified. In this case Airbus recommends the commander to apply the MEL item (for example MEL performance penalties and operational restrictions, if any, must be applied). However, the commander must return to the blocks if the item is "NO GO", or if the MEL requires the completion of a maintenance procedure.

Therefore, the MEL should be consulted on ground, but only when the failure has been clearly identified and confirmed.
An analysis of the failure must then be performed using the information detected by the flight crew before referring to the MEL.

The MEL is not a troubleshooting guide or a pre-flight checklist.

In some particular cases, the MEL should only be consulted in flight to decide on an in-flight turn back depending on:

- The "GO"/"NO GO" status of the failed function
- The possibility to repair the failure at the destination.

However, if there is an in-flight failure, the FCOM provides the procedures and limitations to be applied.

JAR-OPS 1.085(f) states: "*The commander shall decide whether or not to accept an aeroplane with unserviceabilities allowed by the CDL or MEL*".

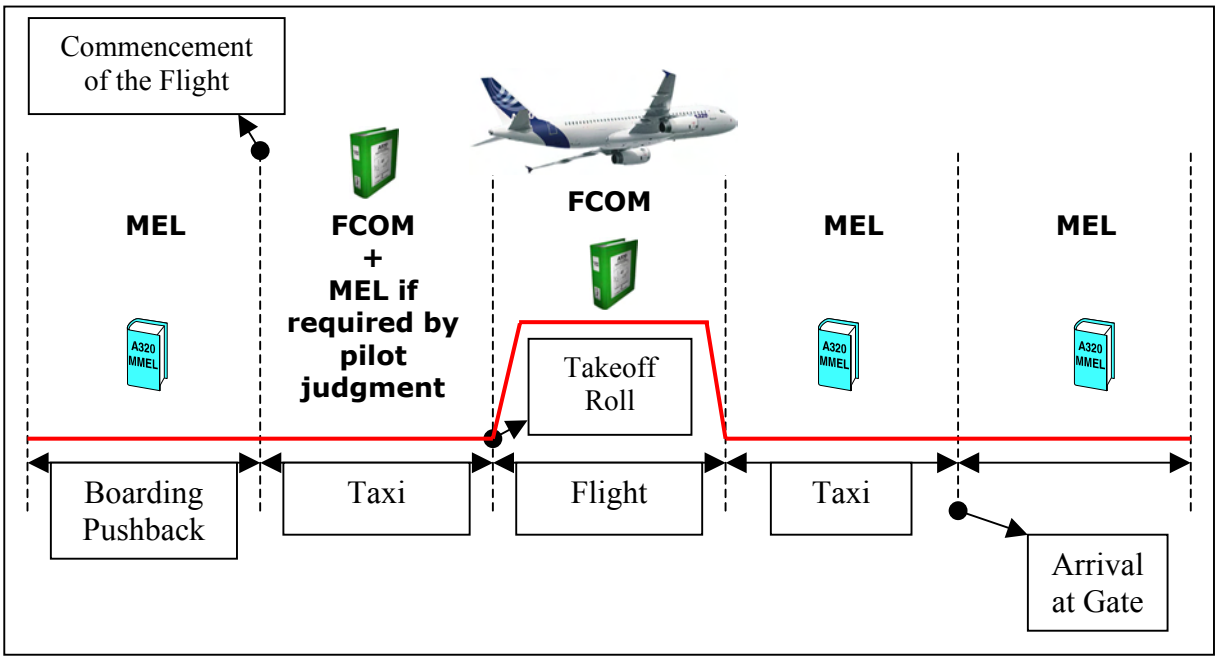


Figure 4-10: JAA MEL Applicability

FAA Concept

The FAA policy regarding MEL applicability is provided in the Air Transportation Operations Inspector's Handbook 8400.10.
For FAA Operators, the MEL has to be available to flight crew at all times prior to dispatch.

The limits of applicability are also provided in paragraph 1159 of *Volume 4 – Chapter 4 – Section 4: MEL Use in Service*.

Following this regulation, the MEL is not applicable to discrepancies, or malfunctions that occur, or that are discovered in flight. When the flight has departed, the flight crew must deal with any equipment failure in accordance with the approved AFM.

According to the FAA, the "departure of flight" is: "*The time that the aircraft begins movement for the purpose of takeoff*".

To clarify the expressions: "Departure of a flight", or "time for dispatch or release", the FAA has published the Policy Letter N°88 (PL-88).

The PL-88 explains the FAA policy for the handling of a system failure that is discovered after "blocking out", before takeoff.
The aim of this PL is to clarify the action to be taken by the Operator, and its personnel, when discovering a failure after the aircraft departs from the block.
The "departure of a flight" is interpreted as the time when the aircraft is either pushed-back from the blocks, or is towed from the blocks for the purpose of takeoff.

The PL-88 suggests:
"*The Procedure should provide for the pilot in command to be able to communicate with the dispatch and maintenance organizations, if required, to review the situation and determine whether the flight should:*

1) *Return to the blocks for repairs (the failed equipment is a "NO GO" item), or*
2) *Return to the blocks to accomplish an (m) procedure specified in the MEL before continuing the flight, or*
3) *Continue using the alternate procedure (abnormal procedure) for operating with that failed item.*

The air carrier procedure may also provide for the flight to continue when the pilot in command determines that the flight can be operated safely using the alternate procedure under the conditions of the dispatch release, without communicating with the dispatch and maintenance organizations.
Note that if as in other cases, the conditions for a flight are changed to the extent that the original dispatch or flight release is no longer valid, then a new dispatch or flight release or an amended release is required."

Please, keep in mind…

From the DGAC/JAA MMEL to the MEL

Based on the MMEL, Operators create their own MEL, and obtain approval from their applicable National Authorities.

The JAA MEL development process can include the following steps:

1) Definition of the MEL content
2) Review of "Reserved" Items
3) Review of "(If Installed)" Items
4) Review of "As required by regulations" Items
5) Review of Special Operations.

From the FAA MMEL to the MEL

The FAA MEL development process can include the following steps:

1) Definition of the MEL content
2) Check the applicability of each MMEL item
3) Review of "As required by FAR" Items
4) Review of Special Operations
5) Include the content of the (o) and (m) procedures.

MEL User Guide

The aim of the MEL is not to encourage aircraft operation with inoperative equipment, because it is not desirable for an aircraft to be dispatched in these conditions, and such a situation is permitted only as a result of careful analysis.
The MEL should, therefore, be consulted on ground, and only when a failure has been identified and confirmed.

Limits of MEL Applicability

According to the JAR MMEL/MEL.001, an MEL is applicable up to the commencement of the flight (i.e. the point when the aircraft begins to move under its own power, in preparation for takeoff).

In some cases, the MEL may need to be consulted in flight, in order to decide if it is necessary to perform an in-flight turn back. However, any decision to continue the flight must be subject to pilot judgment.
If there is an in-flight failure, the FCOM provides the procedures and limitations that the flight crew should apply.

5. MMEL EVOLUTIONS

5.1 Less Paper in the Cockpit (LPC) 178

5.1.1 LPC Concept 178

5.1.2 LPC e-MEL 180

5.2 A380 Electronic MEL 188

5.1. LESS PAPER IN THE COCKPIT (LPC)

5.1.1. LPC CONCEPT

In 1998, Airbus decided to launch the Less Paper in the Cockpit (LPC) project. This project aims at offering a complete and mature solution for performance computation tools, and electronic documentation.

The LPC concept originates from the need to:

- Find a new way to manage operational documentation in the flight deck
- Reduce the amount of paper manuals in the standard pilot flight bag
- Reduce revision and distribution cycles
- Ease and improve the updating process
- Provide an accurate computation of performance analysis (using real time computation).

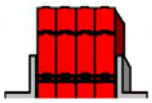
This concept is based on conventional laptop PCs to minimize the initial investment.

The Airbus LPC package contains:

- A takeoff module, that was the first to be released in 2000. This module enables real-time computation of takeoff performance data as well as a real-time update of runways and aircraft data. It provides access to the highest takeoff weight, or to the maximum flexible temperature.

- A landing module, which uses the same interface as the takeoff module. It has two main functions:
  - Computation of Landing dispatch conditions using the exact aircraft configuration, the expected runway conditions at destination as well as the Operator policy in terms of approach climb constraints.
  - Computation of landing performance in flight in abnormal and emergency cases, overweight landing, or use of autobrakes and/or autoland.

- A Weight and Balance (W&B) module, that can be customized according to Operator requirements. It performs direct calculation of TOW, TOCG, ZFW, ZFCG, as well as under or extra load. It permits loading simulation during flight preparation, or direct calculation following last-minute changes. In addition, this module enables the calculation of TOCG for abnormal fuel distribution to account for any MEL item affecting fuel.



- e-FCOM: This module provides electronic distribution, updates, and consultation of flight operation information. It contains the Airbus FCOM, the Operation Engineering Bulletins (OEBs), and all Temporary Revisions (TRs). Like all modules, the e-FCOM can be customized to answer Operator requirements. Airbus provides all the tools necessary to administer the modules.

- e-MEL: This module is designed with the same interface as the e-FCOM. It provides electronic access to ECAM warning messages (Section 00E), dispatch conditions (Section 01), operational procedures (Section 02), **maintenance tasks extracted from the AMM**, as well as Operator documents. This module provides a real communication protocol between e-documentation and performance calculation modules (Refer to §5.1.2).

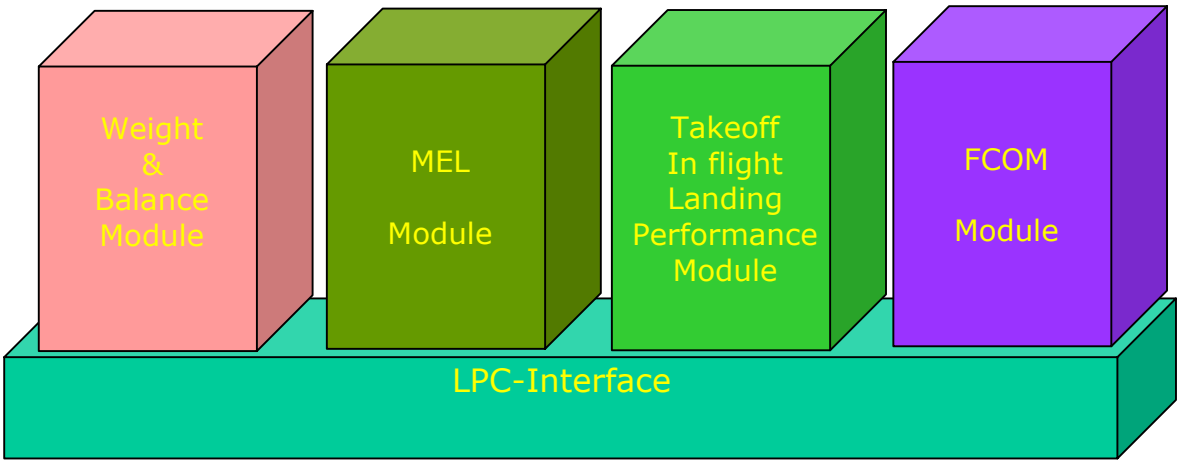


Figure 5-1: LPC Modules

In order to exchange data between modules, Airbus has developed a JAVA based module called Flight Operations Versatile Environment (FOVE).
It handles data integrity checks, flight number and tail number selection.

Examples:

- *An inoperative item that is listed in the e-MEL, is taken into account in the takeoff and landing performance calculation tool.*
- *The trim setting obtained in the W&B module appears on the MCDU page of the takeoff module.*

This module manages the exchange of data between modules, but it has also been developed to enable a single entry point to all LPC applications. Therefore, the Operator can easily customize data for each aircraft registration number and select a precise flight number, departure and destination airport.

5.1.2. LPC E-MEL

The MMELs for the A320 and A330/A340 families are provided by Airbus in SGML format. This format has been designed by the Air Transportation Association (ATA) to provide a way for aircraft manufacturers and Operators to easily exchange information. In order to edit the MMEL using publishing software, Airbus created the MMEL Starter pack in 1998, that translates the SGML format into Adobe FrameMaker. FrameMaker is a powerful publication editor.

The LPC e-MEL tool is an electronic version of the MEL. It aims at providing easy access to information required to dispatch the aircraft.

This version is based on the FrameMaker MMEL, and consists of four main parts:

- ECAM messages, and related links to dispatch conditions
- Item breakdown, and related dispatch conditions
- Operational procedures
- AMM deactivation tasks.

The LPC e-MEL is available on all Fly-By-Wire aircraft (A320 and A330/A340 families).
The Operator can decide whether to have the MMEL in paper format or in electronic format.

The LPC e-MEL enables the Operator to create and consult its own MEL according to local requirements:

- The Administrator converts the SGML MMEL data into FrameMaker with the Airbus Starter Pack. The administrator performs customizations with FrameMaker and exports the result.
- The administrator can launch the AMM tool to connect the MEL with the deactivation tasks that are extracted from the AMM in PDF format. The AMM tool will automatically extract the deactivation tasks from the AMM and create an associated connection with the e-MEL.
- The Administrator can process the FrameMaker export using the MEL Administration tool: The administrator can use the MEL Administration tool to perform general customizations, and to generate HTML files for validation purposes.
- The Administrator generates the e-MEL, which can be used alone, or in conjunction with the other LPC applications.

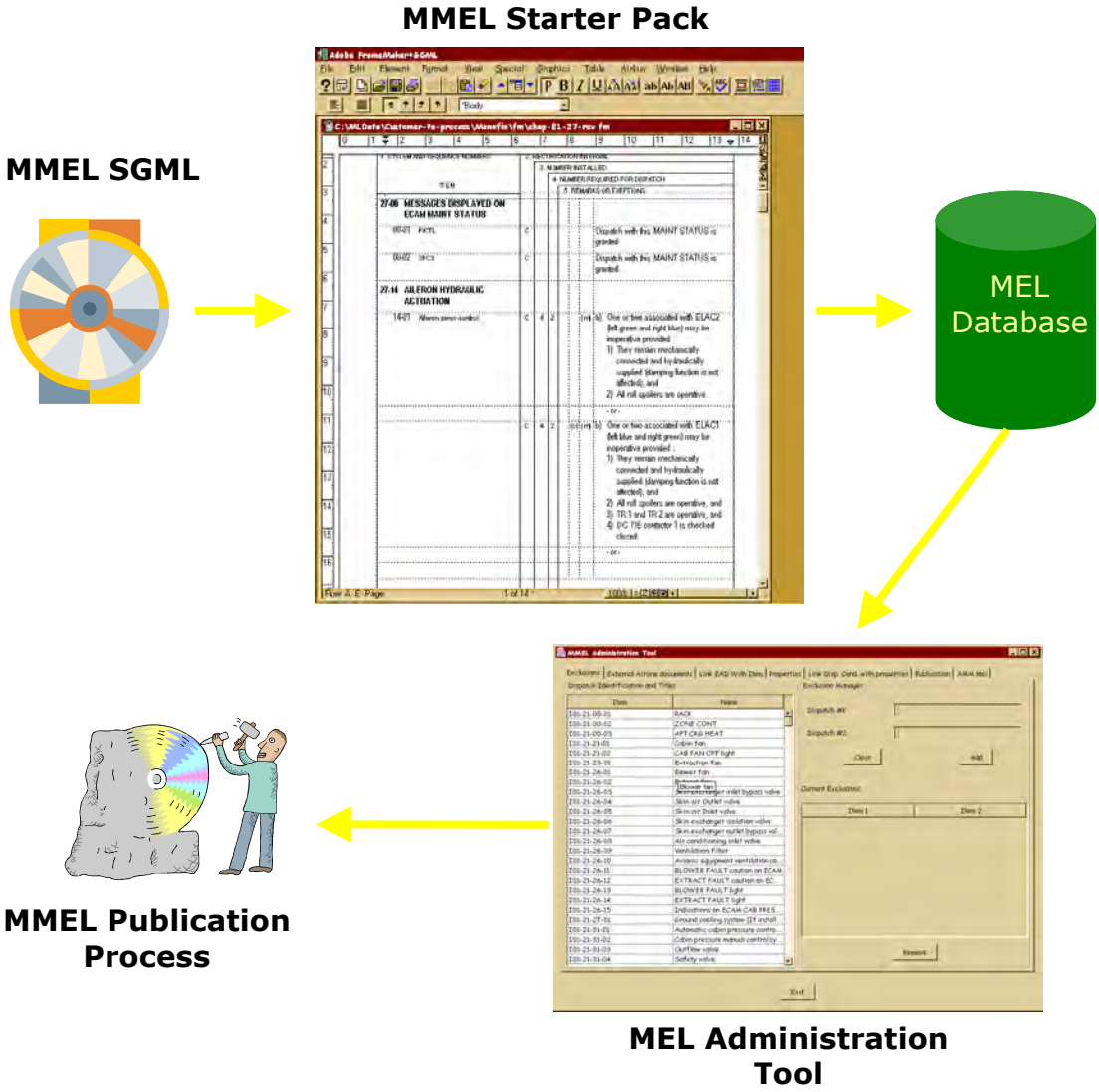


Figure 5-2: MEL Customization Process

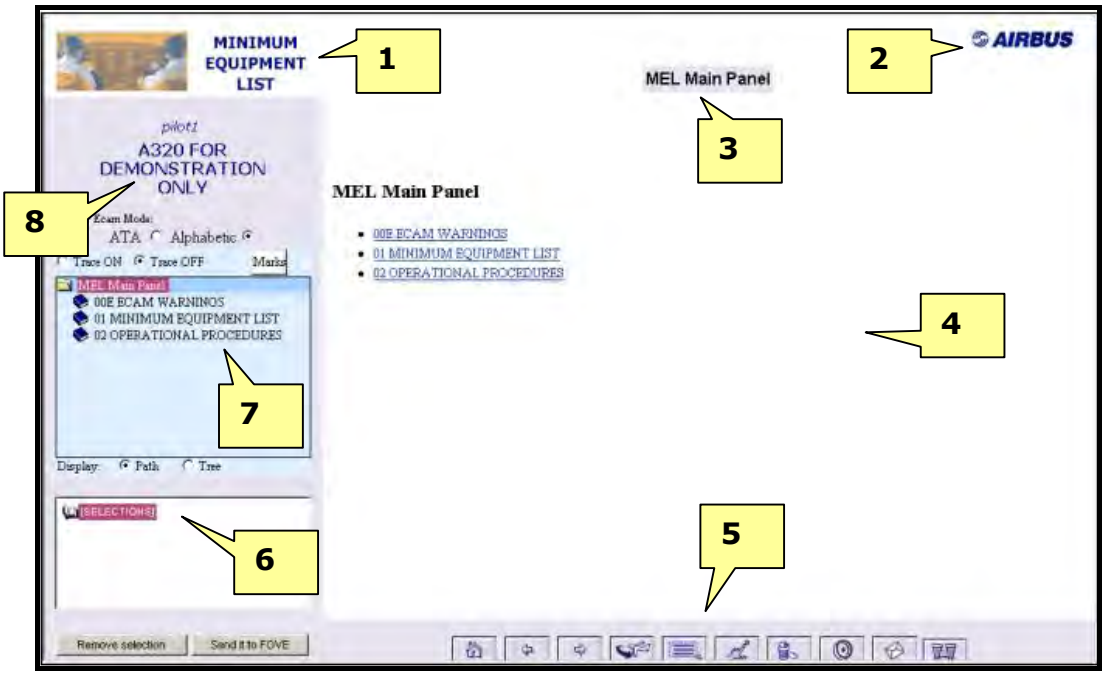


Figure 5-3: LPC MEL Main Panel

In the consultation module, the MEL main panel is divided into 8 frames:

1) Title of the application
2) Provider of the application
3) Title of the data currently being consulted
4) Data frame
5) Generic functions (return to main page, previous/next document, change of aircraft type, change of effectivity, bookmark information, clear bookmark list, zoom, send e-mail, start the search engine)
6) FOVE basket connection
7) Navigation tree
8) Operator frame.

The flight crew can use the MEL main panel to access:

- ECAM messages, classified either by ATA chapter, or in alphabetical order. In alphabetical mode, the flight crew only has to enter the beginning of the ECAM message, and the list will automatically scroll down to provide suitable messages. It is, therefore, not necessary to know the corresponding ATA chapter for a particular message.
  By double clicking on the related ECAM message, the flight crew goes directly to the corresponding remarks.

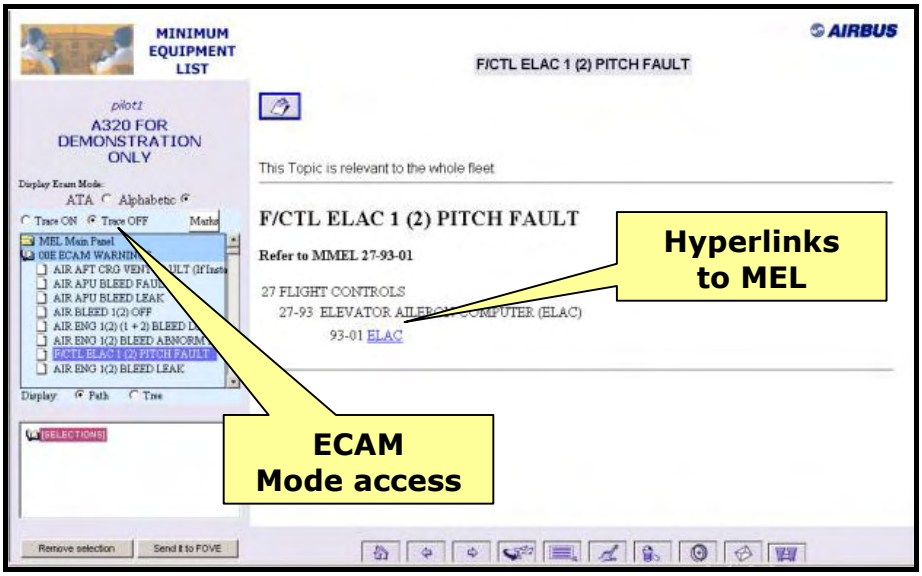


Figure 5-4: LPC MEL ECAM Messages

- MEL part:
  By clicking on the hyperlink in the remarks corresponding to the ECAM message, the flight crew can view the dispatch conditions associated with the item.
  The upper part of the frame contains the ATA breakdown of the item.
  An icon warns the flight crew that the equipment has to be placarded. The following table displays the remark number (if any), the Rectification Interval, the number installed, and the number required. The last part of the table provides possible links to operational, and/or maintenance procedures.

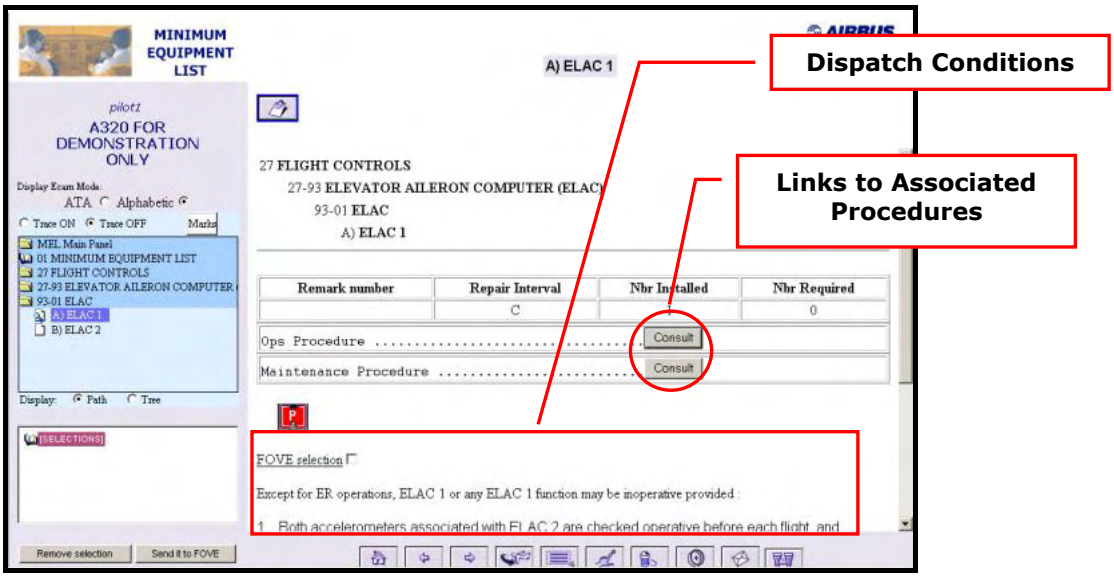
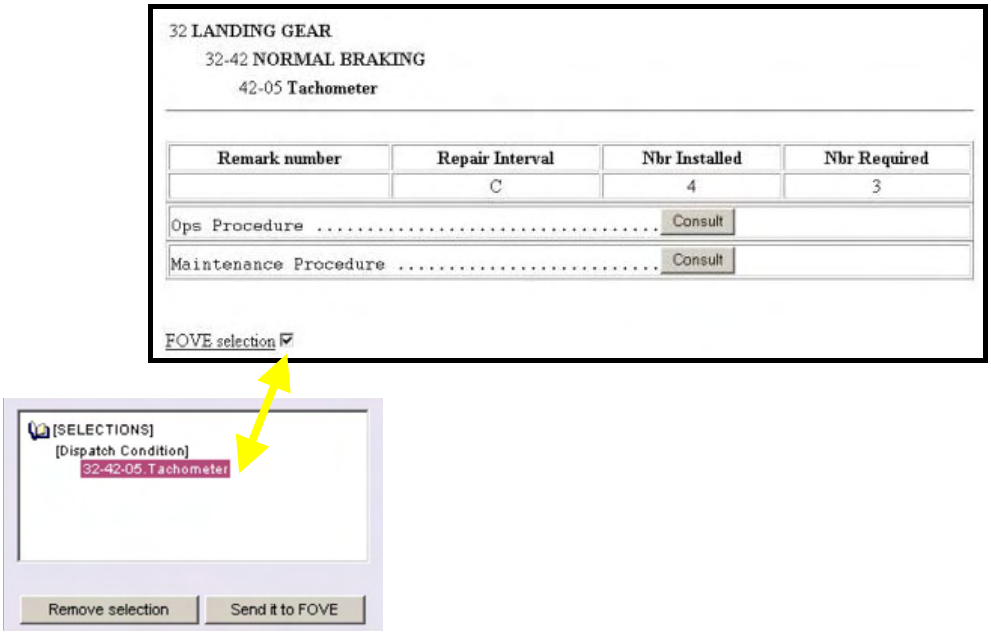


Figure 5-5: LPC MEL Dispatch Conditions

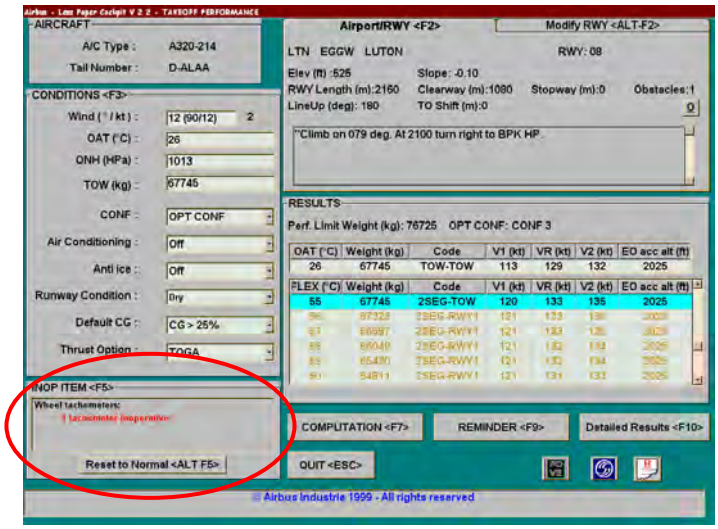
- Operational procedures, and maintenance tasks:
  These procedures are available from the links provided in the MEL part.
  Maintenance tasks are extracted from the AMM in PDF format. These procedures are, therefore, presented in PDF format in the data frame.

Figure 5-6: LPC MEL Operational & Maintenance Procedures

- FOVE basket:
  The purpose of the FOVE basket is to store all the information produced by the LPC modules. By doing so, all potential client modules may access the FOVE basket, and retrieve the information accordingly.
  <u>Example</u>: *The flight crew starts the e-MEL, and selects an inoperative item: "32-42-05: Tachometer".*
  By clicking on "Send it to FOVE", the e-MEL supplies the FOVE basket.



Then, the flight crew goes to the takeoff module (for example). The tachometer inoperative is automatically placed in the "INOP Item" frame:



- In addition to these modules, the LPC MEL provides bookmarks that enable the flight crew to quickly come back to certain locations:
  - This button is used to mark any information
  - During the consultation, clicking on this button displays a list of bookmarks. This list provides an access to the information that has already been consulted.
  - At any moment the flight crew can remove all the bookmarks from the list by clicking on this button.

- The button represents the e-MEL search engine.
  To search for a particular word, the flight crew can either directly enter one or several words, or select the word(s) by clicking on the corresponding letter.

The e-MEL provides a wide range of tools for processing the MEL, from the beginning to the publishing phase, on a conventional laptop PC on board the aircraft. The e-MEL leads the way into a new age of portable, innovative, and effective tools, to meet Operators requirements.

Please, keep in mind…

Less Paper in the Cockpit (LPC)

- LPC Concept

In 1998, Airbus decided to implement the Less Paper in the Cockpit (LPC) project. This concept is now available on all Fly-By-Wire aircraft and is based on conventional laptop PCs. It aims at reducing the amount of paper in a standard pilot flight bag.
The LPC package contains:

- A takeoff module
- A landing module
- A Weight and Balance (W&B) module
- An e-FCOM
- An e-MEL.

- LPC e-MEL

The LPC e-MEL tool is an electronic version of the MEL that provides quick and easy access to the information that is required in order to dispatch an aircraft.
This version is based on the paper MMEL and has five main parts:

- ECAM messages, and corresponding links to dispatch conditions
- Item breakdown, and corresponding dispatch conditions
- Operational procedures
- AMM deactivation tasks
- Operator documents.

The LPC e-MEL enables Operators to create and to consult their own MEL, according to local requirements, via two modules:

- The administrator module that deals with the customization of the MEL
- The MEL consultation module.

5.2. A380 ELECTRONIC MEL

TO BE ISSUED LATER

6. APPENDIX

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6.1. LEGAL TEXTS AND RELATED WEB LINKS

This appendix provides useful information on the legal texts that have been used during the creation process of this brochure.

Some of these documents are available on the related website for free consultation and/or downloading. Other ones are only available for purchasing.

- JAA: Website http://www.jaa.nl
  - JAR-MMEL/MEL issued in 2005
  - JAR-OPS 1 issued in March 2003
  - JAR-OPS 1 MEL POLICY DOCUMENT (TGL 26) issued in June 2004
  - MMEL Procedures Manual version 1

- FAA: Website http://www.faa.gov
  - MEL handbook 8400.10 issued in February 1994
  - FAR Operating rules
  - Policy Letters downloadable via the website http://www.opspecs.com

- Miscellaneous:
  - UK CAA: Website http://www.caa.co.uk
    - CAP549 issued in August 2003

  - TCCA: Website http://www.tc.gc.ca
    - TP 9155 F issued in February 2002

6.2. MEL PREAMBLE SPECIMEN

The MEL preamble presented below is only a specimen available in appendix 1 to ACJ MMEL/MEL.065 in the JAR-MMEL/MEL.

(SPECIMEN)
JOINT AVIATION AUTHORITIES
(OPERATOR'S NAME)
MINIMUM EQUIPMENT LIST
(AIRCRAFT TYPE)
PREAMBLE

NOTE:
This specimen Preamble is intended only as an example of what is required and operators may, with the agreement of their Authority, vary the format and content of their MEL Preambles to suit their own needs and agreements.

1. INTRODUCTION

This Minimum Equipment List (MEL) is based on the (Certificating Authority) Master Minimum Equipment List (MMEL) (Revision, dated).

This MEL takes into consideration (the operator's) particular aircraft equipment, configuration and operational conditions, routes being flown and requirements set by the appropriate Authority.

This MEL will not deviate from any applicable Airworthiness Directive or any other Mandatory Requirements and will be no less restrictive than the MMEL.

The MEL is intended to permit operations with inoperative items of equipment for a period of time until rectification can be accomplished.

Rectifications are to be accomplished at the earliest opportunity.

MEL conditions and Limitations do not relieve the Commander from determining that the aircraft is in a fit condition for safe operation with specified unserviceabilities allowed by the MEL.

The provisions of the MEL are applicable until the aircraft commences the flight.

Any decision to continue a flight following a failure or unserviceability which becomes apparent after the commencement of the flight must be the subject of pilot judgement and good airmanship. The Commander may continue to make reference to and use of the MEL as appropriate.

By approval of the MEL the Authority permits dispatch of the aircraft for revenue, ferry or training flights with certain items or components inoperative provided an acceptable level of safety is maintained by use of appropriate operational or maintenance procedures, by transfer of the function to another operating component, or by reference to other instruments or components providing the required information.

Note:
For dispatch with airframe or engine parts missing, refer to the CONFIGURATION DEVIATION LIST (CDL).

2. CONTENTS OF THE MEL

The MEL contains only those items required by Operating Regulations or those items of airworthiness significance which may be inoperative prior to dispatch, provided that appropriate limitations and procedures are observed. Equipment obviously basic to aircraft airworthiness such as wings, rudders, flaps, engines, landing gear, etc. are not listed and must be operative for all flights. It is important to note that:
ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRCRAFT AND NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE;

3. CRITERIA FOR DISPATCH

The decision of the Commander of the flight to have allowable inoperative items corrected prior to flight will take precedence over the provisions contained in the MEL. The Commander may request requirements above the minimum listed whenever in his judgement such added equipment is essential to the safety of a particular flight under the special conditions prevailing at the time.

The MEL cannot take into account all multiple unserviceabilities. Therefore, before dispatching an aircraft with multiple MEL items inoperative, it must be assured that any interface or inter-relationship between inoperative items will not result in a degradation in the level of safety and/or an undue increase in crew workload. It is particularly in this area of multiple discrepancies and especially discrepancies in related systems, that good judgement – based on the circumstances of the case, including climatic and en-route conditions – must be used.

4. MAINTENANCE ACTION

Every effort shall be made by Maintenance to correct all technical defects as early as practicable and that the aircraft be released from a maintenance station in fully operational condition. The Commander must be informed by Maintenance as soon as practicable, should it be impossible to rectify the inoperative item prior to departure.

Whenever an aircraft is released by Maintenance for dispatch with items inoperative, the following is required:

The technical log book aboard the aircraft must contain a detailed description of the inoperative item(s), special advice to the flight crew, if necessary, and information about corrective action taken.

When they are accessible to the crew in flight, the control(s), and/or indicator(s) related to inoperative unit(s) or component(s) must be clearly placarded.

Note: To the extent practical, placards should be located adjacent to the control or indicator for the item affected; however, unless otherwise specified, placard wording and location should be determined by the operator.

If inadvertent operation could produce a hazard such equipment must be rendered inoperative (physically) as given in the appropriate maintenance procedure.

The relevant operational and maintenance procedures are contained in (identify the particular Manual, Section, Chapter or Part etc. authorised by the appropriate Authority).

5. RECTIFICATIONS INTERVALS

Inoperative items or components, deferred in accordance with the MEL, must be rectified at or prior to the rectification intervals established by the following letter designators given in the “Rectification Interval Category” column of the MEL.

Category A
No standard interval is specified, however, items in this category shall be rectified in accordance with the conditions stated in the Remarks or Exceptions column (5) of the MEL.

Where a time period is specified in calendar days it shall start at 00:01 on the calendar day following the day of discovery.

Category B
Items in this category shall be rectified within three (3) consecutive calendar days, excluding the day of discovery.

Category C
Items in this category shall be rectified within ten (10) consecutive calendar days, excluding the day of discovery.

Category D
Items in this category shall be rectified within one hundred and twenty (120) consecutive calendar days, excluding the day of discovery.

6. RECTIFICATION INTERVAL EXTENSIONS

Subject to the approval of the Authority, the operator may use a procedure for the extension of the applicable Rectification Intervals B, C and D, for the same duration as specified in the MEL in accordance with JAR-MMEL/MEL.081.

7. DEFINITIONS

For the purpose of this MEL the following definitions shall apply:

(a) "Visual Meteorological Conditions" (VMC) means the atmospheric environment is such that would allow a flight to proceed under the Visual Flight Rules applicable to the flight. This does not preclude operating under Instrument Flight Rules.

(b) "Day" operation is any flight conducted from the point of take-off to landing between 30 minutes before sunrise and 30 minutes after sunset.

(c) "Dash" (-) in columns 3 and 4 indicates a variable quantity.

(d) "Icing Condition" – the atmospheric environment is such that ice can form on the aircraft or in the engine(s)

(e) "Commencement of the flight" The point when an aircraft begins to move under its own power for the purpose of preparing for takeoff.

(f) "Inoperative" means that the equipment malfunctions to the extent that it does not accomplish its intended purpose or is not consistently functioning within its desired operating limits or tolerances.

Some equipment has been designed to be fault tolerant and are monitored by computers which transmit fault messages to a centralised computer for the purpose of maintenance. The presence of this category of messages does not mean that the equipment is inoperative.

(g) "Combustible Materials" is material which is capable of catching fire and burning.

NOTE: This is not an exhaustive list and operators should include in their MELs any definition which is considered to be relevant.

8. CENTRALISED MESSAGE SYSTEM (if appropriate)

This aircraft is equipped with a system (such as ECAM/EICAS) which provides different level of systems information messages (Warning, Caution, Advisory, Status, Maintenance etc.). Any aircraft discrepancy message that affects dispatch will normally at status message level or higher. Therefore, systems conditions that result only in a Maintenance Message are not normally addressed in the MEL as they, in themselves, do not prohibit dispatch of the aircraft. However, maintenance discrepancy messages must be recorded and corrected in accordance with the approved maintenance program.

9. OPERATIONS OUTSIDE THE SCOPE OF THE MEL

Those operators which are authorised by the appropriate Authority in accordance with JAR MMEL/MEL.090 operate outside the conditions of the MEL should set out in the MEL preamble the arrangements and procedures for such operations as agreed with their Authority.

6.3. FAILURE EFFECT CLASSIFICATION

As per JAR 25.1309, the failures should be classified regarding the consequences of the flight as below:

Effect	Consequences of the failure
No Safety effect	No effect on safety.
Minor	Airworthiness is not significantly affected, and any actions are well within the capacity of the crew.
Major	Results in: • A significant reduction in safety margins or functional capabilities, or • A significant increase in crew workload or crew efficiency impaired, or • Physical distress to passengers, or cabin crew, or flight crew.
Hazardous	Results in: • A large reduction in safety margins or functional capabilities, or • Physical distress or excessive workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely, or • Serious or fatal injury to a relatively small number of the occupants other than the flight crew.
Catastrophic	Results in the loss of the aircraft and/or in multiple fatalities.

6.4. GENERAL MMEL PROJECT TEMPLATE

1.SYSTEM AND SEQUENCE NUMBERS ITEM	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH	5. REMARKS OR EXCEPTIONS	
Item reference and designation (use ATA breakdown designation)	C	4	3	*	Dispatch condition 1 - or -
	B	4	2	*(o)	Dispatch condition 2 - or -
	A	4	0	*(o)(m)	Dispatch condition 3

As required

Subject:
Item reference number and designation

Description of the item/system:
This section of the MMEL project shall contain a brief description of the item and how it is involved in the system:

- What is its purpose?
- Is it required by any regulatory rule of JAR/FAR 25?
- How many of the items are installed?
- Is the item/system optional or basic?

Proposal:
This section of the MMEL project shall contain:

- A description, in some words, of the proposal
- An exact definition of the condition in which the item may be inoperative

  Note: If nothing is specified, the item may be inoperative in whatever condition (valve open or closed, switch permanently in one of its possible positions, etc.).

Consequences of the failure of the considered item:
This section of the MMEL project shall explain:

- How is the failure detected? (ECAM caution, missing indication, etc.)
- How the whole system behaves when the item is inoperative:
  - What is the impact on the safety of the flight?
  - What are the available redundancies?
  - What is the potential impact on crew workload?
  - Will the failure be detected by an ECAM caution(s) during the flight? Must these messages be followed or disregarded?
  - Is a placard necessary to inform the crew that the item is inoperative?
  - Is a failure stable or not? Is a deactivation necessary?

  Example: A valve that is inoperative in closed position and that may, for any reason, during the flight, move to the open position. If the consequences have an impact on the safety of the flight, the valve should be deactivated in the desired position.

Consequences of the next critical failure in flight:

This section of the MMEL project shall identify and describe the worst next failure the aircraft could encounter during the next flight:

- What is the impact on the safety of the flight?
- How is the loss of safety compensated? (i.e. dispatch conditions and/or redundancies)
- Are there any other inoperative items that should not be cumulated with this one?
- How many of the considered items are necessary for dispatch?
- Is a maintenance procedure necessary? If yes, what is its periodicity?
  Examples:
  - *Once before using the item for deactivation tasks.*
  - *Regularly to check that some other systems are available.*
- Is there a limited exposure time dictated by the SSA for operation with this item inoperative?

Purpose of the associated (o) procedure (if applicable)

As said in §3.2.6 of this Getting to Grips brochure, the Section 02 of the MMEL is not approved. Therefore, it is not necessary to produce a "ready for use" procedure in the MMEL project.
However, the project shall clearly explain what is the crew expected to do. If there is a check to be done, this section shall also give and explain its periodicity.

Purpose of the associated (m) procedure (if applicable)

As for the operational procedure, the MMEL project shall not give a "ready for use" procedure. However, it must be clearly explain what is the aim of the maintenance procedure, because it may influence the wording of the dispatch condition.

Example:

- *If the maintenance procedure requires to check that the considered item really works, the dispatch conditions in Section 01 of the MMEL will state: "is checked operative"*
- *If no, the dispatch conditions in Section 01 of the MMEL will only state: "is operative", which means that the item is not reported to be inoperative.*

6.5. REQUIRED CATII/CATIII EQUIPMENT

Example for A320 family
(see AFM 4.03.00)

REQUIRED EQUIPMENT	CAT II	CAT III SINGLE	CAT III DUAL
AP/FD	1 AP engaged	1 AP engaged	2 AP engaged
AP disconnect P/B	2	2	2
AUTOTHRUST	0	1	1
ILS RECEIVER	2	2	2
ATTITUDE INDICATION	N° 1 + N° 2 + STBY	N° 1 +N° 2 +STBY	N° 1 +N° 2 +STBY
PFD/ND DISPLAYS	2/1	2/2	2/2
RADIO ALTIMETER	1 (But two displays)	2	2
AUTO CALL OUT RADIO ALTIMETER	1***	1	1
DH INDICATION	1*	1*	1*
FLIGHT WARNING COMPUTER	1	1	2
"AP OFF" warning	1	1	2
"AUTOLAND" light	1	1	1
RAIN REPELLENT (if activated) or WINDSHIELD WIPERS	1**	1**	1**
WINDOW HEAT	1**	1**	1**
NOSEWHEEL STEERING	1*****	1*****	1
ANTI–SKID	1*****	1*****	1
BSCU channel	1*****	1*****	1
BEAM EXCESSIVE DEVIATION	1*	2	2
FMA	1	2	2
"A/THR OFF" caution	0	1	1
RUDDER TRAVEL LIMIT	1****	1****	1****
YAW - DAMPER/RUDDER TRIM	1/1	1/1	2/2
ELAC	1	1	2
ADR/IR	2/2	2/2	3/3

* One unit required for the PNF
** One unit required for PF
*** Required only for autoland
**** Required only for autoland with crosswind higher than 12 kt.
***** Required only for automatic roll out

Example for A330/A340 family

(see AFM 4.03.00)

REQUIRED EQUIPMENT	CAT II	CAT III SINGLE	CAT III DUAL
AP/FD	1 AP engaged	1 AP engaged	2 AP engaged
AP disconnect P/B	2	2	2
AUTOTHRUST	0	1	1
ILS RECEIVER	2	2	2
ATTITUDE INDICATION	N° 1 + N° 2 + STBY	N° 1 +N° 2 +STBY	N° 1 +N° 2 +STBY
PFD/ND DISPLAYS	2/1	2/2	2/2
RADIO ALTIMETER	1 (But two displays)	2	2
AUTO CALL OUT RADIO ALTIMETER	1***	1	1
DH INDICATION	1*	1*	1*
FLIGHT WARNING COMPUTER	1	1	2
"AP OFF" warning	1	1	2
"AUTOLAND" light	1	1	1
RAIN REPELLENT (if activated) or WINDSHIELD WIPERS	1**	1**	1**
WINDOW HEAT	1**	1**	1**
NOSEWHEEL STEERING	1*****	1*****	1
ANTI–SKID	1*****	1*****	1
BSCU Channel	1*****	1*****	1
BEAM EXCESSIVE DEVIATION	1*	2	2
FMA	1	2	2
"A/THR OFF" caution	0	1	1
FLIGHT CONTROL VERTICAL ACCELEROMETERS	1	1	2
FLIGHT CONTROL LATERAL ACCELEROMETERS	2	2	3
FLIGHT CONTROL GYROMETERS	4	4	6
PRIM	1	1	N°1 + N°2 or N°3
ADR/IR	2/2	2/2	3/3

* One unit required for the PNF
** One unit required for PF
*** Required only for autoland
***** Required only for automatic roll out

Example for A300/A310 family

(see AFM 6.01.03)

REQUIRED EQUIPMENT	CAT II	CAT III
AP/FD	1 AP in CMD (with LAND mode engaged)	2 AP in CMD + 1 FD (with LAND mode engaged)
AP disconnect P/B	2	2
AUTOTHROTTLE	0	1
AFS FLIGHT MODE ANNUNCIATOR (FMA)	1	2
ILS RECEIVER	2	2
BEAM EXCESSIVE DEVIATION WARNING	2	2
HORIZON	N° 1 + N° 2 + STBY	N° 1 + N° 2+ STBY
EFIS CRT's	3	4
RADIO ALTIMETER	1 (BUT TWO DISPLAYS)	2
AUTO CALL OUT RADIO ALTIMETER	0	1***
DH INDICATION	1*	1*
FLIGHT WARNING COMPUTER	1	2
"AP OFF" warning	1	2
"AUTOLAND" light	1	2
ATS warning	0	1
ENGINE TRIM	0	1
WINDSHIELD WIPERS or RAIN REPELLENT (if activated)	1**	1**
WINDOW HEAT	1	1
ANTISKID SYSTEM	0	1****

* One unit required for the CM2.
** One unit required for CM1.
*** Radio altimeter AUTO CALL OUT setting must be in accordance with approved procedures of the operator.
**** Required only for CAT III without decision height

6.6. TAKEOFF WITH MULTIPLE FAILURE

This appendix and these tables are established by Airbus to provide Operators with guidelines for takeoff with multiple unserviceabilities. Establishment of these guidelines is based on several data available to Operators:

- Section 01 of the MMEL: ATA chapters 27, 32, and 78 containing items, which may affect takeoff performance (Thrust reversers, brakes, spoilers, etc.)
- The Aircraft Flight Manual (digitized or not, depending on the aircraft family)
- The FCOM Volume 2 that provides takeoff performance on wet and contaminated runways
- The performance calculation programs:
  - Takeoff and Landing Optimization component of the Performance Engineers' Program (PEP-TLO)
  - Takeoff module of the Less Paper in the Cockpit environment (LPC-TO).

According to these tables, aircraft dispatch may be:

- Allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC
- Allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC. However, aircraft dispatch is not recommended by Airbus on performance limited runway.
- Not allowed as per Section 01 of the MMEL and/or computation is not possible.

It is thereby expressly stated these tables are provided for convenience only and that the Operator remains the sole responsible for the operation of the aircraft in the purpose of takeoff with multiple failures.

A300: Takeoff with Multiple Failures
Aircraft without MOD 4161

	Thrust Reversers (One or both) (78-1)			Antiskid system (partially failed) (32-8)			Main wheel Brakes (One brake or one brake per landing gear) (32-13)			Ground Spoilers Control System (27-14)			Spoiler and speedbrake surfaces (One or two pairs) (27-13)		
Spoiler and speedbrake surfaces (One or two pairs) (27-13)													*	*	*
Ground Spoilers Control System (27-14)										*	*	*			
Main wheel Brakes (One brake or one brake per landing gear) (32-13)							*	*	*						
Antiskid system (partially failed) (32-8)				*	*	*									
Thrust Reversers (One or both) (78-1)	*	*	*												

Each cell in the table is divided into three columns:
- **1st column: DRY runway**
- **2nd column: WET runway**
- **3rd column: CONTAMINATED runway**

DRY	WET	CONTA

* **Diagonal of the table is used to cover dispatch with single failure of each system.**

Each color corresponds to the following dispatch condition:

	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC.
	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC. However, dispatch is not recommended by Airbus on performance limited runway.
	Dispatch is not allowed as per Section 01 of the MMEL and/or computation is not possible.

A300/A300 FFCC: Takeoff with Multiple Failures
Aircraft with MOD 4161

	Thrust Reversers (One or both) (78-1)			Green Brake system (32-3)			Antiskid system (32-8)			Main wheel Brakes (One brake or one brake per landing gear) (32-13)			Ground Spoilers Control System (27-14)			Spoiler and speedbrake surfaces (One or two pairs) (27-13)		
Spoiler and speedbrake surfaces (One or two pairs) (27-13)																*	*	*
Ground Spoilers Control System (27-14)													*	*	*			
Main wheel Brakes (One brake or one brake per landing gear) (32-13)										*	*	*						
Antiskid system (32-8)	**	**		**	**		*	*	*									
	**	**		**	**													
Green Brake system (32-3)				*	*	*												
Thrust Reversers (One or both) (78-1)	*	*	*															

Each cell in the table is divided into three columns:

- 1st column: DRY runway
- 2nd column: WET runway
- 3rd column: CONTAMINATED runway

DRY	WET	CONTA

* Diagonal of the table is used to cover dispatch with single failure of each system.

** 1st line: Antiskid partially failed
2nd line: Antiskid totally failed

Each color corresponds to the following dispatch condition:

	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC.
	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC. However, dispatch is not recommended by Airbus on performance limited runway.
	Dispatch is not allowed as per Section 01 of the MMEL and/or computation is not possible.

A300-600/A310: Takeoff with Multiple Failures

	Thrust Reversers (One or both) (78-1)			Antiskid system (32-12)			Main Landing gear tachometers (32-11)			Green Brake system (32-7)			Main wheel Brakes (One brake or one brake per landing gear) (32-6)			Ground Spoilers Control System (27-15)			Spoiler and speedbrake surfaces (One or two pairs) (27-1)		
Spoiler and speedbrake surfaces (One or two pairs) (27-1)																			*	*	*
Ground Spoilers Control System (27-15)																*	*	*			
Main wheel Brakes (One brake or one brake per landing gear) (32-6)													*	*	*						
Green Brake system (32-7)										*	*	*									
Main Landing gear tachometers (32-11)							*	*	*												
Antiskid system (32-12)				*	*	*															
Thrust Reversers (One or both) (78-1)	*	*	*																		

Each cell in the table is divided into three columns:

- 1st column: DRY runway
- 2nd column: WET runway
- 3rd column: CONTAMINATED runway

DRY	WET	CONTA

* Diagonal of the table is used to cover dispatch with single failure of each system.

Each color corresponds to the following dispatch condition:

	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC.
	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC. However, dispatch is not recommended by Airbus on performance limited runway.
	Dispatch is not allowed as per Section 01 of the MMEL and/or computation is not possible.

A330/A340: Takeoff with Multiple Failures

	Thrust Reversers (78-30-01)			Main wheel Brake (32-42-01), or Green Brake System (32-42-02), or Tachometer (32-42-05)			Ground Spoilers Control System (27-92-01)			One pair of spoilers, or Two pairs of spoilers Surfaces 1 and 2) (27-64-01)		
One pair of spoilers, or Two pairs of spoilers Surfaces 1 and 2) (27-64-01)										*	*	*
Ground Spoilers Control System (27-92-01)							*	*	*			
Main wheel Brake (32-42-01), or Green Brake System (32-42-02), or Tachometer (32-42-05)				*	*	*						
Thrust Reversers (78-30-01)	*	*	*									

Each cell in the table is divided into three columns:

- 1st column: DRY runway
- 2nd column: WET runway
- 3rd column: CONTAMINATED runway

DRY	WET	CONTA

* Diagonal of the table is used to cover dispatch with single failure of each system.

Each color corresponds to the following dispatch condition:

	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC.
	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC. However, dispatch is not recommended by Airbus on performance limited runway.
	Dispatch is not allowed as per Section 01 of the MMEL and/or computation is not possible.

A320 Family: Takeoff with Multiple Failures

	Thrust Reversers (78-30-01)			Main wheel Brake (32-42-01), or Green Brake System (32-42-02), or Tachometer (32-42-05)			Ground Spoilers Control System (27-92-02)			One pair of spoilers, or Two pairs of spoilers (27-64-01-B,-C,-D,-E)			One pair of spoiler N°5 (27-64-01-A)		
One pair of spoiler N°5 (27-64-01-A)													*	*	*
One pair of spoilers, or Two pairs of spoilers (27-64-01-B,-C,-D,-E)										*	*	*			
Ground Spoilers Control System (27-92-02)							*	*	*						
Main wheel Brake (32-42-01), or Green Brake System (32-42-02), or Tachometer (32-42-05)				*	*	*									
Thrust Reversers (78-30-01)	*	*	*												

Each cell in the table is divided into three columns:

- 1st column: DRY runway
- 2nd column: WET runway
- 3rd column: CONTAMINATED runway

DRY	WET	CONTA

* Diagonal of the table is used to cover dispatch with single failure of each system.

Each color corresponds to the following dispatch condition:

	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC.
	Dispatch is allowed as per Section 01 of the MMEL and computation is possible using TLO or LPC. However, dispatch is not recommended by Airbus on performance limited runway.
	Dispatch is not allowed as per Section 01 of the MMEL and/or computation is not possible.