

# **Guidelines for Producing a MEL**

## Introduction

These guidelines relate specifically to rules 91.537 Inoperative instruments and equipment and 91.539 Approval of minimum equipment list.

Before beginning any work on producing a Minimum Equipment List, it is advised that operators read these guidelines and then contact **Mr David Gill**, Team Leader Airworthiness Certification  
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## Chapter 1 – General

### 1.1 General

A Minimum Equipment List (MEL) is a document used by an operator to allow temporary aircraft operation with inoperative equipment and is approved under 21.539. The basic premise of the MEL is that, though it would be desirable to maintain the aircraft at all times with all installed equipment operative, under controlled conditions an acceptable level of safety can be maintained with specified items of equipment inoperative until repairs or replacement can be made. Controlled conditions may involve restrictions on certain flight operations, changes to in-flight operational procedures or temporary deactivation of components.

### 1.2 Terminology

**Aircraft Maintenance Manual (AMM).** The AMM is the source document for maintenance procedures for an aircraft. The term AMM can apply to either an aeroplane maintenance manual or a rotorcraft maintenance manual.

**Airworthiness Directive (AD)** is a mandatory airworthiness requirement for a particular make and model aircraft or installed equipment and is supplementary to the aircraft's original airworthiness approval.

**Air Transportation Association (ATA) Numbering System** is the standard ATA numbering system which refers to systems on different aircraft in a standardised manner. MMELs use the ATA numbering system.

**Deferred rectification** is the postponement of the repair or replacement of equipment or an instrument.

**Specific operations** are operations such as VFR, IFR, night, over water, in transponder mandatory airspace and the like.

**Master Minimum Equipment List (MMEL)** is a list of items of equipment and instruments that may be inoperative on a specific type of aircraft under stated conditions and is the basis for the development of an operator's MEL. The MMEL is approved by the aircraft's certifying authority and issued by them or the aircraft manufacturer.

**Minimum Equipment List (MEL)** is the specific inoperative equipment document for a particular make and model of aircraft by serial number and registration marks.

**Operations (O) and maintenance (M) procedures** in the MMEL refer to specific maintenance procedures the operator uses to disable or render items of equipment inoperative and to specific operating conditions and limitations, as appropriate—

- (a) An (O) symbol in column 4 of the MMEL indicates that a specific operations procedure must be accomplished before or during operation with the listed item of equipment inoperative. The flight crew usually perform these procedures but in some cases other personnel, such as maintenance personnel, may be qualified and authorised to perform the procedure.
- (b) An (M) symbol in column 4 of the MMEL indicates that a specific maintenance procedure must be performed before beginning an operation with the listed item of equipment inoperative. Maintenance personnel usually perform these procedures but in some cases, other personnel, such as flight crew, may be qualified and authorised to perform certain functions. Qualified maintenance personnel must perform procedures requiring specialised knowledge, skills, or the use of tools or test equipment.

**STC** means Supplemental Type Certificate, which is a major change in type design not great enough to require a new application for a type certificate under CAR Part 21. An example would be the installation of a power plant different from the one installed during type certification.

### 1.3 Operating with or without an MEL

1.3.1 Part 91 makes a provision for operations with inoperative instruments and equipment in accordance with an MEL and also that aircraft not exceeding 5700 kg MCTOW may operate without an MEL. Some aircraft operators may find it less onerous or complicated to operate without an MEL. An operator operating aircraft not exceeding 5700 kg MCTOW under Part 91 should carefully consider the MEL option to determine which method best suits their type of operation.

1.3.2 Operations conducted under CAR Parts 121, 125 or 135 do not have the option of operating with an inoperative instrument or equipment without an MEL.

1.3.3 Once an operator has an approved MEL for an aircraft, that operator may not exercise the option of operating that aircraft without an MEL when conducting Part 91 operations. This is because the MEL will usually make provision for all types of operations and any inoperability not covered by the MEL would not be acceptable under §91.537(b).

## 1.4 Relationship between the MMEL and the MEL

1.4.1 When an aircraft is certificated, the airworthiness regulatory authority determines the minimum operative instruments and equipment required for safe flight in that aircraft type in each authorised operating environment and develops a Master Minimum Equipment List. The FAA MMEL for a specific model is developed by the Flight Operations Evaluation Board (FOEB) responsible for that particular type of aircraft, under the philosophy that the failure of any of the instruments or items of equipment required or installed in the aircraft must be compensated by other factors which provide an acceptable level of safety or further flights must be suspended until repairs or replacements can be made.

1.4.2 The MMEL approved by the certification authority includes all items of equipment and other items which the authority finds may be inoperative and yet maintain an acceptable level of safety. The MMEL does not contain obviously required items such as wings, flaps, rudders and the like. The MMEL is then made available to operators as a basis for them to apply for an MEL approval.

1.4.3 An MEL is similar in content to the MMEL except that it is specific to a particular operator and to individual aircraft. An operator's MEL must be based on the MMEL for the particular aircraft type and model which has been approved by the certificating authority which issued the type certificate used as the basis for type acceptance in NZ. An MEL may not be less restrictive than the applicable MMEL. (An MEL is an authorised deviation from the certificated type design, not a reversion to the minimum requirements. The FAA wording is "An Approved MEL constitutes an approved change to the type design without requiring recertification.")

1.4.4 Operators are responsible for ensuring that the MEL reflects the current MMEL. If an operator identifies that an amended MMEL requires in turn an amendment to the MEL, the operator should prepare an appropriate revision

to the MEL and submit it to the CAA for approval.

1.4.5 As the FARs are the basic airworthiness standards called up by CAR Part 21 Appendix C, the most commonly applicable MMEL is the FAA one, which is controlled and issued directly by the FAA. The Authority can provide New Zealand operators with copies of the FAA MMEL as a Word document on a computer disc.

1.4.6 The FAA produces MMELs for all twin-engined aircraft and all turbine-powered aircraft, including helicopters. The FAA have also produced a generic MMEL applicable to single-engined aircraft. However due to the lack of duplicated systems and equipment required for single-engine aircraft certification this MMEL is limited to basically optional equipment fitted.

1.4.7 For aircraft which are type certificated by other than the FAA the MMEL will be that approved by the certification authority of that aircraft type. In that case the MMEL may be issued by the aircraft manufacturer.

## Chapter 2 – Operating aircraft without an MEL

### 2.1 CAR rule 91.537(b)

Operators and pilots who elect to operate an aircraft under Part 91 without an MEL must be familiar with this rule in detail and base their decision making on the rule which prescribes that—

*Aircraft that do not exceed 5700 kg MCTOW and do not have an MEL approved under 91.539 may be operated under this Part with inoperative instruments and equipment provided the inoperative instruments and equipment—*

- (a) *are not—*
  - (i) *part of the VFR day certification instruments and equipment prescribed in the applicable airworthiness requirements under which the aircraft was type certificated; or*
  - (ii) *required by this Subpart for specific operations; or*
  - (iii) *required by an airworthiness directive to be in operable condition; and*

- (b) *are placarded **Inoperative** and the required maintenance recorded in accordance with Part 43.*

## 2.2 Decision making

2.2.1 If an item of equipment or an instrument is found to be inoperative the determination as to whether the aircraft is serviceable for an operation must be in terms of the rule requirement. The operator evaluating the inoperative item must ensure it is not required either by Part 91 Subpart F, paragraphs 91.501 through 91.545, or as part of the basic equipment fit of the aircraft required to meet original certification requirements. An example of the latter is that FAA policy requires a two-engine aircraft to have two electrical power systems so that after a single in-flight electrical power system failure sufficient instruments and equipment remain fully operational to provide navigation, communications, and aircraft operations and monitoring. For these purposes battery power may not be considered a power source. Therefore two-engine aircraft cannot be dispatched with one generator inoperative, even under an MEL, unless it has an APU installed and operative in flight. (The policy was prompted by several accidents resulting from dispatch with one generator inoperative and the in-flight failure of the other generator.)

2.2.2 If the decision is that the aircraft is airworthy, you are reminded that 91.537(b)(2) requires the inoperative item to be *placarded **Inoperative** and the required maintenance recorded in accordance with Part 43.*

2.2.3 Another consideration in the decision making process is to determine if the inoperative item might affect the operation of any other items. An example would be in the case of a vertical speed indicator (VSI) determined not to be required for a VFR flight. The cause for the VSI being inoperative could be that there is a malfunction in the static system in which case the other instruments relying on this system could also be inoperative. If in doubt in such a case refer it to an LAME or maintenance organisation.

## Chapter 3 – Operating aircraft with an MEL

### 3.1 MEL Approval

3.1.1 An operator who either must or elects to operate with an MEL is required to have the MEL approved under 91.539.

3.1.2 Operators who have previously had an MEL approved under Regulation 108(2) will have to revise the MEL to include any changes to NZ regulatory requirements brought in under the new Rules. (Parts 26, 91, 121, 125, 129, 133 or 135.)

3.1.3 An application for an MEL approval or revision must be made by completing form CAA 24091/01 and submitting it to the Director, along with a copy of the draft MEL.

3.1.4 An MEL will only be approved for a particular operator and will apply to a specific make and model of aircraft. In the situation where more than one operator has operational control of a specific aircraft, the MEL for that particular aircraft may be approved for more than one operator.

3.1.5 The CAA may issue operators who use several aircraft of the same type a single MEL that either lists each aircraft by serial and registration numbers, or details the difference in equipment fit between aircraft within the MEL. If the operator fleet is listed in the MEL the operator must submit a revision to the MEL whenever an aircraft is added or removed from the fleet.

3.1.6 At any time after operating with an MEL, an operator may elect to operate without an MEL under 91.537(b). In such a case, the operator must request CAA to revoke the MEL, and receive advice that the MEL has been revoked, prior to operating under 91.537(b).

### 3.2 MEL Contents

3.2.1 To produce a NZ operator's MEL the applicable FAA, CAA or manufacturer's Approved MMEL must be amended to reflect NZ requirements. Approval will be facilitated if the exact wording of the MMEL is followed to the greatest possible extent. An Operator's MEL may not be less restrictive than the Approved MMEL, *unless the change is fully substantiated as meeting airworthiness requirements and FOEB policy guidelines.*

3.2.2 MELs may be submitted as Appendices to an Operator's Maintenance or Operations Manuals, but they will be assessed and **approved** as documents in their own right.

3.2.2 The operator should consider the following when preparing an MEL–

- (a) The title page of the MEL should contain a statement that the MEL is applicable to operations conducted under CAR

Part(s) number(s) 91, 121, 133 or 135 as applicable; and

- (b) Also contain a statement that the MEL is based on the MMEL at a stated revision date, and has been approved in accordance with CAR 91.539.
- (c) Operators must ensure that the MEL lists the items of equipment that are actually installed on the specific aircraft (Or covers differences between individual aircraft, if the MEL is applicable to more than one aircraft).
- (d) Equipment specifically required by the airworthiness rule under which the aircraft is type certificated, equipment required by AD, and equipment required for specific operations under the CAR's must be operative. It is important to note that all items related to the airworthiness of the aircraft that are not included on the MMEL must be operative.
- (e) Where the MMEL states "as required by FAR," the MEL should specify the exact conditions under which the item can be inoperative in NZ, as determined by the Rules.
- (f) The MEL must specify suitable limitations in the form of placards, maintenance procedures, crew operating procedures, and other restrictions to ensure an acceptable level of safety.
- (g) The MEL must specify those conditions under which an item may be inoperative. The remarks must also identify required maintenance or operational tasks. The symbol "O" or "M", placed in column 4 of the MMEL indicates that an (O) or (M) procedure is applicable to that item.
- (h) The MEL may not conflict with the AFM limitations or emergency procedures, any ADs, or the AMM.

3.2.3 An Operator's MEL should have the following minimum contents in the order listed below:

- (a) List of effective pages (LEP) giving the date and revision status of each individual page. The LEP defines the MEL and CAA approval of the MEL will be stamped here. The revision status of the MMEL on which the MEL was based should also be stated on the LEP. Each

MEL page must be numbered such that its revision status can be readily determined by reference to the LEP and so amendments can be readily incorporated.

- (b) Log of Revisions with space to list the revisions to the MEL, their date and a summary of the changes embodied.
- (c) Preamble (or Introduction) that details the general philosophy and conditions applicable to operating the aircraft in accordance with the provisions of that particular operators' MEL. The operator's MEL Preamble should follow the wording of the MMEL exactly, except where it is changed to include reference to NZ Regulations and the NZ CAA in place of Federal Regulations and the FAA.
- (d) List of Definitions explaining the terms or expressions used in the MEL, again exactly as per the MMEL but changed to reflect NZ Regulations where applicable. Any terms in the MMEL that are not used in the MEL may be deleted.
- (e) The basic text of the MEL with items in order by ATA Chapter Number, as per the MMEL. The pages of the MEL containing the equipment lists must be laid out such that each item of equipment is clearly identified, and:
  - the number fitted to the aircraft and the minimum number required for despatch are listed; and
  - the conditions applying to the operation of the aircraft with that particular item inoperative are clearly annotated; and
  - the repair category which applies to that item is noted in the appropriate column.

### 3.3 MEL Procedures

3.3.1 Where (O) or (M) procedures, as defined in the Definitions section of the MMEL, are called up in the MEL they must be published and be available as part of the MEL. (Because the certification authority when compiling the MMEL will have identified these procedures as required to be carried out to maintain the acceptable level of safety)

3.3.2 (O) or (M) procedures are not approved but rather are accepted when the technical content is assessed as satisfactory.

3.3.3 The MMEL contains guidelines as to what the required (O) and (M) procedures are intended to accomplish. The procedure in the MEL should detail the full actions required and not merely repeat the intent as given in the MMEL.

3.3.4 The operator should develop O and M procedures using guidance provided in the manufacturer's—

- (a) DDPG;
- (b) aircraft flight and/or maintenance manuals;
- (c) recommendations;
- (d) engineering specifications; or
- (e) other appropriate sources.

3.3.5 If the (O) and (M) procedures are already stated in the AFM, the maintenance manual, or other available Authority-approved source, the operator needs to show only the reference, such as, O: AFM, pp. 3-8 through 3-10, paragraph. 3-47. If the operator uses this reference format in the MEL, the referenced source must be readily available to the ground support personnel, and a copy of the references source must be carried in the aircraft and be readily available to the flight crew member.

3.3.6 If the (O) and (M) procedures are not in the AFM, the maintenance manual, or other available Authority-approved source, or if the operator wishes to use a different procedure, then the operator must list the procedure in the MEL. The procedure will have to be drafted by the operator and must utilise sound operating and engineering techniques.

3.3.7 There must be instructions governing the use of the MEL including;

- procedures for authorising personnel to defer maintenance in accordance with the MEL;
- procedures for advising the pilot in command of any inoperative or removed items prior to a flight;
- procedures for control of deferred items;

- procedures for certification of cleared MEL items;
- and instructions for placarding of inoperative or removed items.

These procedures may either be contained in the operator's existing suite of manuals, or can be located in the MEL itself.

### 3.4 Conducting operations with an MEL

3.4.1 In addition to carrying a copy of the MEL onboard the aircraft, the operator must have onboard any technical manuals needed to accomplish (O) and (M) procedures.

3.4.2 **Inoperative Items Before Flight.** As an example, during a pre-flight inspection for a VFR-day flight, the pilot discovers a navigation light is inoperative. In such a case the sequence of events should be—

- (a) The pilot checks the aircraft's MEL to determine under what, if any, flight conditions the aircraft could be operated without navigation lights. The MEL indicates that the aircraft may be operated during daylight hours without operable navigation lights.
- (b) The pilot checks the procedures document and deactivates the navigation lights by pulling the correct circuit breaker and having it collared by an appropriately certificated person.
- (c) The pilot places a placard that indicates that the lights are inoperative near the navigation light control.
- (d) The pilot examines the conditions of the proposed flight and determines that the flight can be completed during daylight hours and thus be conducted safely without navigation lights.

3.4.3 **Failures during flight.** An MEL applies only to the take-off of an aircraft with inoperative instruments or equipment. The pilot's operating handbook or the AFM indicate procedures to follow for instrument or equipment failure in flight. The pilot in command should handle the in-flight failure in accordance with those procedures. As soon as possible after landing, the pilot-in-command must enter a notation of the inoperative equipment in the aircraft's maintenance records, logbooks, or the technical log. Before the next takeoff, the pilot must apply the MEL to the inoperative equipment as per the

procedures in paragraph 3.5.2. above. An MEL allows the pilot-in-command to defer rectification on many items under the following conditions:

- (a) The aircraft is in a condition for safe flight, and
- (b) For the inoperative item, the pilot has followed the specific conditions, limitations, and procedures in an approved MEL .

**3.4.4 Correcting MEL Inoperative Items.**

The MEL permits operations with inoperative items of equipment for the minimum period of time necessary until the equipment is repaired. It is important that operators have repairs done at the earliest opportunity in order to return the aircraft to its design level of safety and reliability.

- (a) Operators shall establish procedures to ensure inoperative items are repaired or replaced within the specified time requirements in the MEL. MEL items are assigned Repair Category Intervals in accordance with the MMEL.
- (b) Under Part 91 operations the MMEL Repair Categories are not applicable. Items of inoperative equipment, approved by the MEL to be inoperative, must be inspected or repaired by qualified maintenance personnel, or maintenance deferred, at the next 100 hour, annual, progressive, or unscheduled inspection.

**3.4.5 Record-keeping Requirements.**

A record of inoperative equipment must remain in the aircraft technical log or the aircraft maintenance record so that pilots will be aware of all discrepancies; and

- (a) If the operator elects to use the aircraft maintenance record to log inoperative items, that portion of the record must be carried onboard the aircraft during all operations.
- (b) Corrective actions and maintenance procedures shall be accomplished and recorded in accordance with CAR 43 and 91.
- (c) Failure to record an inoperative item in the technical log may result in an operation of the aircraft contrary to the CAR because subsequent pilots would not be able to determine the airworthiness of the aircraft.

**3.4.6 Aircraft Used in Multiple Operations.**

If an aircraft is to be operated under several CAR Parts such as 121 or 135 in addition to Part 91, the operator may—

- (a) establish the MEL for compliance with the more restrictive requirements of the likes of CAR Parts 121 and 135; or
- (b) address the specific requirement of each CAR Part in the MEL.