

Procedures for Approval of Master Minimum Equipment List

October 3, 2000	First issue	(KOKU-KU-KI-1193)
April 8, 2011	Amended	(KOKU-KU-KOU-1399, KOKU-KU-KI-1209)
June 30, 2011	Amended	(KOKU-KU-KOU-516, KOKU-KU-KI-280)

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Director, Airworthiness Division
Aviation Safety and Security Department
Japan Civil Aviation Bureau
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Subject: Procedures for Approval of Master Minimum Equipment List

1. Purpose

This Circular is to prescribe procedures of review and approval on the Master Minimum Equipment List (hereinafter referred to as “MMEL.”) required for type of aircraft designed in Japan, which prescribes the conditions, limitations and procedures for dispatch with its equipment inoperative.

The MMEL is used as a reference when an operator develops Minimum Equipment List (hereinafter referred to as “MEL.”) in an operation manual and maintenance manual in accordance with Article 214 of Ordinance for Enforcement of the Civil Aeronautics Act (Ordinance of Ministry of Transport No.56 established in 1952).

2. Applicability

The procedures apply to a type of aircraft designed in Japan and intending to obtain type certificate and to aircraft belonging to a group similar to the abovementioned aircraft (excluding those with maximal takeoff weight of less than 5,700kg), when they intend to obtain approval from the Japan Civil Aviation Bureau (JCAB) for the MMEL or its revised version.

3. Relevant documents

ICAO: Doc 9760 “Airworthiness Manual”, Volume II, Appendix C to Chapter 2

FAA: Order 8900.1 Volume 4. Chapter 4 “Minimum Equipment List (MEL) and Configuration Deviation List (CDL)”, Volume 8. Chapter 2 “Technical Groups, Boards and National Resources”

EASA: “Master Minimum Equipment List Procedures Manual” (JAA)

TCCA: TP 9155E “Master Minimum Equipment List/Minimum Equipment List Policy and Procedures Manual”

4. Application

When an applicant for the type certificate applies for approval of the MMEL, an application letter completed with the following items, and relevant documents should be submitted to the Flight Standards Division and the Airworthiness Division, Aviation Safety and Security Department, Japan Civil Aviation Bureau (JCAB), Ministry of Land, Infrastructure, Transport and Tourism.

- Name and address of the applicant
- Model and type of aircraft
- Type certificate number (only when MMEL is revised)
- Relevant documents

5. General process to develop the MMEL

The JCAB, receiving an application for the approval of MMEL, will establish the Flight Operations Evaluation Board (hereinafter referred to as “FOEB.”) and review the draft MMEL. Directors of the Flight Standards Division and the Airworthiness Division will appoint a chairperson of FOEB to preside over the FOEB. The chairperson of FOEB, with consent from Directors of the Flight Standards Division and the Airworthiness Division, will appoint members of the FOEB. An applicant for type-certification who applied for approval of MMEL (hereinafter referred to as the “applicant.”) will submit a draft MMEL to the FOEB. The FOEB will review the draft MMEL, point out corrections, if any, and notify them to the Applicant. Directors of the Flight Standards Division and the Airworthiness Division will review the MMEL reported from the chairperson of FOEB and when deeming it appropriate, approve and publish it.

6. MMEL evaluation method

The purpose of the MMEL is not to encourage the operation of aircraft with inoperative equipment. It is undesirable for aircraft to be dispatched with inoperative equipment and such operations are permitted only after careful analysis is completed for each equipment and safety of operation is confirmed as uncompromised. It is important to minimize the operation of an aircraft with inoperative equipment.

Most aircraft are designed and certified with redundant equipment such that the airworthiness requirements are satisfied with an adequate margin. In addition, aircraft are equipped with equipment that is not required under all operating conditions (e.g. instrument lights under visual meteorological conditions in daytime). In addition, aircraft are equipped with equipment for passenger services such as entertainment systems or galley equipment. If these equipment for passenger services are inoperative and it does not affect airworthiness, they need not be included in the MMEL. However, if the equipment for passenger services has another function related to safety, then this equipment must be included in the MMEL with an appropriate time limit for repair. In addition, the MMEL should not include items such as main wings and engines, etc. which obviously affect the airworthiness of aircraft if they are inoperative.

Unless an equipment which affects airworthiness is included in the MMEL, aircraft must not be operated with the equipment inoperative.

6-1. Level of safety

The MMEL permits the operation of an aircraft for limited periods of time with equipment inoperative if an acceptable level of safety can be maintained. To include equipment which can be inoperative for aircraft operation in the MMEL, various factors relating to safe operation must be considered. These include the consequence

to the aircraft and its occupants when another failure occurs, change in crew workload, decrease of work efficiency of crew and degradation in crew capability to cope with adverse environmental conditions.

6-2. Maintaining the level of safety

- (a) The determination that a draft MMEL is appropriate is made by confirming that safety of aircraft operation is not compromised with the inoperative equipment.
- (b) The demonstration of safety is usually done by combining the following methods.
 - 1) Change of operational limitations
 - 2) Transfer of the function of inoperative equipment to other operating equipment
 - 3) Ensuring that crew can refer to other instruments or equipment to obtain necessary function and information
 - 4) Change of operational procedures and/or maintenance procedures
 - 5) Confirming no or minimal impact on crew workload
 - 6) Confirming minimal impact on crew training
 - 7) Conducting flight test demonstration/validation (Simulator and/or aircraft)
 - 8) Demonstrating safety by safety assessment

6-3 Justification for MMEL

When equipment which may be inoperative for aircraft operation are included in the MMEL, justification must be made from both design and operation perspectives and special procedures must be established as necessary. To provide justification from design and operation perspectives, technical methods which confirm acceptable level of safety are generally used. They include qualitative and quantitative safety analysis, demonstrations of system redundancy, and setting operational limitations of Aircraft Flight Manual (AFM).

6-4. Evaluation methods of MMEL

To evaluate level of safety for each MMEL item, the combinations of the following methods are generally used.

- 1) Confirming the equipment is optional
- 2) Confirming the equipment is installed for redundancy
- 3) A quantitative safety analysis
- 4) A qualitative safety analysis
- 5) Flight test/simulator test/bench tests

6-5. Optional equipment

When aircraft is installed with equipment which is over and above the required equipment and when safe operation is possible under specific flight conditions or a flight route even if the equipment is inoperative, the equipment may be included in the MMEL with a reason justifying its status as non-indispensable.

6-6. Equipment for redundancy

When the purposes or functions of inoperative equipment are supplemented by

other equipment, it may be included in the MMEL under a condition to conduct operational check of the alternative equipment. However, if two or more functions or information sources are required in the type certification of the aircraft, minimum equipment required may not be included in the MMEL by claiming that the equipment is installed for redundancy.

6-7. Quantitative safety analysis

- (a) Recently, it has become increasingly important for aircraft to have its complex systems operate safely, and systematic methods have been developed to achieve the level of safety. This level of safety is based upon the principle that the hazard resulting from event should be inversely proportional to the probability of its occurrence. Compliance is usually demonstrated by system safety assessment.
- (b) In the safety assessment, major, hazardous or catastrophic failure conditions which may occur within the system and the allowable probability of such occurrence are defined. For equipment whose failure may result in hazardous or catastrophic failure conditions (in this section, hereinafter referred to as “equipment whose failures would have great impact”), numerical probability analyses are basically needed to show compliance with the safety standard in terms of the allowable occurrence probability. For equipment which are not regarded as “equipment whose failures would have great impact”, the safety assessment may be simplified. The risk of each failure condition is determined based on the failure rate, number of relevant systems, and duration of exposure to risk.
- (c) When “equipment whose failures would have great impact” are included in the MMEL, the impact caused by their inoperative conditions must be taken into consideration in the safety assessment. The risk in temporary flight with the equipment inoperative must be defined and the probability of occurrence of the hazard must also be equivalent to or lower than that approved for the type certification.
- (d) In case the appropriateness of MMEL cannot be judged by the abovementioned analysis methods and standards, safety analysis must be conducted which quantitatively analyzes risk caused by failure of relevant equipment during operation with inoperative equipment or risk caused by the worst impact from environmental conditions or in-flight event. It must be shown that, taking into account the reduced exposure time during flights applying the MMEL, the probability of a particular hazard occurrence meets the minimum level required from the design and operational perspectives of the aircraft.

6-8. Qualitative safety analysis

In a qualitative analysis, the impact on all aspects of aircraft operation (e.g. crew workload, impact by applying multiple MMEL items, complexity of flight operation and maintenance procedures) caused by inoperative equipment must be taken into consideration. For this, the MMEL approved in the past can be used as a reference.

Note: Even in cases when the same item as that in the MMEL approved in the past is included in the MMEL of other types of aircraft, it does not necessarily ensure the acceptable level of safety. There is a need to show that the safety level of aircraft is maintained, taking into consideration the similarity of system operation and functions of aircraft in flight operation.

6-9. Evaluation by flight tests, simulator tests, and bench tests

To evaluate MMEL, flight tests, simulator tests, or bench tests must be conducted as necessary.

6-10. Items which must not be included in the MMEL (Prohibited Items)

- (a) Equipment which have a significant impact on takeoff, landing or climb performance or speed provided in approved AFM when inoperative may not be included in the MMEL. However, it may be included if these impacts are substantiated with adequate data and specified in the MMEL.
- (b) Items which are contradictory to the operational limitations or which invalidate the emergency procedures set by AFM or TCD (Japanese Airworthiness Directive) may not be included in the MMEL unless alternative operational limitations or procedures are set in the AFM or TCD. If items in the MMEL are contradictory to the requirements such as TCD or other mandatory requirement, the requirements have priority over the items in the MMEL.
- (c) Equipment included in the Configuration Deviation List (CDL) may not be included in the MMEL.

7. MMEL development policy

7-1. Document describing detailed review criteria

The basic policy for assessing individual MMEL item may be defined in a document by the JCAB as necessary.

7-2. MMEL page format

In the MMEL format, columns of the name of applicable equipment, the repair interval category, the number of equipment installed, the number of equipment required for dispatch, and remarks or exceptions must be included.

See the example of the form shown in appendix 1.

7-3. MMEL Format

- (a) MMEL should contain:
 - 1) Cover/approval page
 - 2) Record of revisions
 - 3) Reason for revisions
 - 4) List of effective pages
 - 5) Table of contents
 - 6) Explanation of symbols used in the MMEL

- 7) Definition of any terms having special meaning in the context of the MMEL
- 8) A preamble

Each item of equipment listed in the MMEL should be listed in accordance with the Air Transport Association (ATA) specification system. The number of equipment installed, the number of equipment required to be operative for dispatch should be stated in the appropriate columns. The applicant should discuss a language for the MMEL with JCAB.

- (b) Any conditions and limitations required to maintain an acceptable level of safety shall be included in the "Remarks or Exceptions" column.

7-4. Operational and maintenance procedures

Any item in the MMEL which would require an operational or maintenance procedure to maintain the appropriate level of safety shall be identified by a symbol in the "Remarks or Exceptions" column of the MMEL.

Basically, this will be "(O)" for operational procedures and "(M)" for maintenance procedures.

When setting operational or maintenance procedures is needed, the procedures must be submitted to the FOEB during the MMEL approval process. The FOEB will not approve the procedures themselves, but may review their contents as necessary (note: the operational and maintenance procedures will be approved in the operator's MEL). When setting operational limitations, operational and maintenance procedures, and remarks for individual MMEL items, all intended operations (day, night, VMC, IMC, rain, icing, Category II/III, RNP/RNAV, RVSM, and ETOPS operations etc.) must be considered.

7-5. Equipment required by operational requirements

When equipment is required to be installed under particular circumstances by the laws and regulations in Japan, the statement "required by the laws and regulations in Japan" may be written in the remarks or exceptions column of the MMEL.

7-6. Repair Interval Category

- (a) The MMEL shall provide repair intervals category for each inoperative item.
When this interval is defined by the number of days, the interval starts from the day following the day of discovery. When the interval is defined by the flight cycles or flight time, the interval starts from the first flight after the failure was discovered.
- (b) The category will be determined as follows:
 - 1) Category A
Items in this category shall be repaired within the time interval specified in the MMEL.
 - 2) Category B
Items in this category shall be repaired within 3 consecutive calendar days excluding the day of discovery.
 - 3) Category C

Items in this category shall be repaired within 10 consecutive calendar days, excluding the day of discovery.

4) Category D

Items in this category shall be repaired within 120 consecutive calendar days, excluding the day of discovery.

To be categorized as Category D, the equipment must be an optional equipment or excess equipment which is installed more than required, and which an operator can deactivate, remove from, or install on aircraft at its discretion. More specifically, to be categorized as category D, the equipment must meet all of the following criteria:

- 1) inoperation of the equipment does not adversely affect crew workload,
- 2) the crew do not rely on the function of the equipment on a routine or continuous basis, and
- 3) the crew's training and normal procedures do not need the function of the equipment.

8. Responsibility of applicant

8-1. Preparation of draft MMEL

The applicant should develop the draft MMEL and submit it to FOEB as early as possible in the type certification process. Opinions from aircraft operators (including the expected operators, the same applies to the following) should be reflected in the draft if supported by the applicant. Review process of the MMEL will take place concurrently with the type certification process, but the approval of MMEL is not a condition of type certification. MMEL approvals must, however, be completed prior to the entry into service.

8-2. Preparation of explanatory document to show the appropriateness of the MMEL

When an applicant submits the draft MMEL to the FOEB, a document to explain the appropriateness of the MMEL from design and operational standpoint must be attached. The document must include a relevant page, applicable regulation and/or relevant guidance material, and justification provided by the applicant for each item. The applicant must also submit information on the aircraft and its systems to FOEB, as necessary.

8-3. Documents on the operational and maintenance procedures

Approval of the operational and maintenance procedures themselves will not be a part of the MMEL approval process, but rather, the MEL approval process. Nevertheless, the applicant must submit to FOEB a document describing operational and maintenance procedures for reference for approval of each MMEL item.

8-4. Coordination for flight tests and test witnesses

Members of the FOEB may conduct flight tests or witness tests in flight, simulator and bench tests conducted to evaluate the appropriateness of MMEL items. The

applicant must coordinate their attendance at these tests, as required.

8-5. Participation of operators

Operators of the aircraft are encouraged to participate in the MMEL development and approval process. The FOEB chairperson may request the operator through the applicant to attend the FOEB meetings, as required. In response to the request from the FOEB chairperson, the applicant must coordinate the participation of the aircraft operator.

8-6. Preparation of MMEL draft revision

FOEB review is required for revision of the MMEL. Similar to the application for initial approval, the applicant (holder) of the type certificate must apply for approval of the revision (for the application procedures, refer to section 4.). If the operator requests the revision, the applicant must coordinate with the applicant (holder) of the type certificate.

9. Composition and responsibility of the FOEB

9-1. Composition of the FOEB

The FOEB shall comprise the operations inspector, air-carrier airworthiness engineer, aeronautical engineer, inspector of airmen licensing and other suitable personnel of the JCAB. One of these members shall be appointed as FOEB chairperson.

In addition, the FOEB chairperson may request the appointment of persons such as staff of the JCAB other than FOEB members, applicants and operators as advisers to attend the FOEB meetings.

9-2. Responsibility of the chairperson

The FOEB chairperson conducts the following work.

- (a) To coordinate FOEB activities with the department in charge of type certification, applicants, operators of the aircraft, and foreign authorities.
- (b) To hold the FOEB meetings on draft MMEL prepared by the applicant, review it, and formulate member's opinions.
- (c) To coordinate the FOEB meetings schedules, agenda and meeting minutes.
- (d) To maintain records detailing decisions made and reasons for them for each MMEL item.
- (e) To notify the applicant of the FOEB's opinions and reasons for correcting the draft MMEL.
- (f) To hold FOEB meetings, determine the FOEB-approved draft MMEL, and submit it to the Directors of the Flight Standards Division and the Airworthiness Division for their approval.
- (g) To discuss the need for MMEL revision after entry into service, if necessary.
- (h) To review the draft MMEL revision prepared by the applicant in response to the application for MMEL revision.

10. Preparation and approval procedures of the MMEL

10-1. Review in the FOEB

The chairperson will preside over the conduct of the FOEB. The necessary corrections for the draft MMEL identified by the FOEB review and reasons for the corrections are notified to the applicant.

10-2. Approval and Publication

After discussing the correction identified by the FOEB, the applicant must incorporate them in the draft and submit it to the FOEB chairperson. If the FOEB chairperson confirms that the corrected MMEL is sufficient to solve all issues, he/she reports on the MMEL to the Directors of the Flight Standards Division and Airworthiness Division. If the Directors of the Flight Standards Division and the Airworthiness Division deem the draft MMEL appropriate, they approve and publish it.

11. Revision to MMEL

In principle, application for approval of revision to the MMEL must be submitted by the type certificate applicant (holder).

11-1. FOEB Review

The FOEB reviews the MMEL draft revision and notifies the necessary corrections and reasons to the applicant.

11-2. Approval and publication

After discussing the corrections identified by the FOEB, the applicant must incorporate them in the draft and submit it to the FOEB chairperson. If the FOEB chairperson confirms that the corrected MMEL is sufficient to solve all issues, he/she reports on the MMEL to the Directors of the Flight Standards Division and the Airworthiness Division. If the Directors of the Flight Standards Division and the Airworthiness Division deem the draft MMEL appropriate, they approve and publish it.

12. Miscellaneous provision

Notwithstanding the provisions of this Circular, when the Directors of the Flight Standards Division and the Airworthiness Division deem it necessary, they may review and approve the MMEL by another method.

Supplementary provision

1. This Circular applies from October 3, 2000.

Supplementary provision (April 8, 2011)

1. This Circular applies from April 8, 2011.

Supplementary provision (June 30, 2011)

1. This Circular applies from June 30, 2011)

Appendix 1. Form and Entries for the Master Minimum Equipment List

MASTER MINIMUM EQUIPMENT LIST

Aircraft	Revision No.:	Page
	Date:	

1. System and Sequence No. Item.	2. Repair interval category		
	3. Number installed		
		4. Number required for dispatch	
			5. Remarks or Exceptions
	2	1	(M)
	3	0	(O)