1. OBJECTIVE

1.1. This procedure has been prepared for the use and guidance of CAAI engineering department personnel, applicants and manufacturers and contains relevant information with respect to the philosophy, development and approval of the Master Minimum Equipment List (MMEL).

2. GENERAL

2.1. A Master Minimum Equipment List (MMEL) is an approved document created specifically to regulate the dispatch of a CAAI Type Certificated or Supplemental Type Certificated aircraft with inoperative equipment (unless otherwise stated, equipment includes instruments). It establishes the aircraft equipment allowed to be inoperative under certain conditions for a specific type of aircraft and forms the basis for an operator's Minimum Equipment List (MEL).

2.1.1. Where a change to the Type Certificate of Israeli Type Design Aircraft has an effect on the MMEL, the Type Certificate holder shall apply for approval of the necessary change(s) to the MMEL.

2.2. It is the TC/STC applicant's responsibility to produce a MMEL in order to allow the aircraft to be operated with specified equipment inoperative. Where possible, the approval process for such a MMEL will take place concurrently with the type certification process, but the development of an approved MMEL is not a condition for aircraft type certification.

2.3. It is important to note that any item related to the airworthiness of the aircraft, and not included in the MMEL, must be operative prior to flight. Items required by the ANRs are also required to be operative for dispatch.

2.4. MMEL Limitations:

2.4.1. Where there is a conflict between the MMEL/MEL and an Airworthiness Directive or any other Mandatory Requirement, it is the data or information contained in the Airworthiness Directive or the Mandatory Requirement (e.g. Continued Airworthiness requirement) which shall prevail.

2.4.2. In developing MMELs, no item shall be included which conflicts with the limitations or invalidates the emergency procedures of the Aircraft Flight Manual unless the AFM or Airworthiness Directive provide otherwise. In some instances when performance and/or handling qualities are significantly affected, it may be necessary for CAAI to approve specific limitations and/or operating procedures and include this detail in a Flight Manual Supplement (e.g. nosewheel steering, anti-skid braking, ground spoilers, etc. inoperative).

2.5. 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 some will not be covered in the MMEL.

2.6. Therefore, MMEL Preambles should make it clear that not all unserviceabilities are considered (see appendix 1).

3. Reference Material & Forms

3.1. Regulations 31a, 299 and 411f of the ANR (Operation of Aircraft and Rules of Flight), 1981

3.2. ICAO Master Minimum Equipment List/Minimum Equipment List Policy and Procedures Manual.

3.3. TPE 9155E – Transport Canada MMEL/MEL policy and procedures manual

3.4. JAR/MMEL/MEL

3.5. 14CFR Part 91 Section 91.213.

3.6. FAA AC 91-67 Minimum Equipment Requirements for General Aviation Operations Under FAR Part 91

4. Method

4.1. Draft MMEL

4.1.1. The draft MMEL is to be originated by the applicant and should be submitted to CAAI as early as possible in the type certification process.

4.1.2. The draft MMEL must be accompanied by appropriate engineering justification.

4.1.3. Applicable operating and maintenance procedures must be supplied in sufficient detail to permit an understanding of each associated MMEL item.

4.2. CAAI Review

4.2.1. CAAI engineers shall review the draft MMEL and changes required to the draft MMEL will be reported to the applicant.

4.3. Approval and Publication

4.3.1. The applicant will incorporate the required changes for approval by the head of CAAI engineering department. The applicant will then publish the final version of the revision or temporary revision and return a sufficient number of hard copies or an acceptable electronic copy to CAAI, who will ensure that copies of the approved MMEL are made available to CAAI Airworthiness

Inspection division personnel as well as publicly via the CAAI website. The applicant may distribute copies of the approved MMEL.

4.4. Format and Language of MMEL

4.4.1. The MMEL shall be provided with a relevant Preamble, Definitions and, if appropriate, clarifying Notes which shall adequately reflect the scope, extent and purpose of the List. The MMEL shall be written in the English language.

4.4.2. Standard Format:

4.4.2.1 The use of the ATA 100 specification system is preferred.

4.4.2.2 The use of a five (5) column format is preferred. See appendix (2).

4.5. Basis of Approval

4.5.1. The decision, as to whether a particular proposal for a MMEL is to be approved will be based on the criterion that the level of safety required by the standards specified for the design and operation of the aircraft type can be maintained. This finding will be based on the substantiated ability to maintain the required level of safety with an inoperative item.

4.5.2. This substantiation should be achieved by one or more of the following means:

4.5.2.1 The adjustment of operating limitations.

4.5.2.2 Ensuring the intended function of inoperative equipment is performed by other, operative equipment.

4.5.2.3 Reference to other instruments or equipment performing the required function or providing the required information.

4.5.2.4 A change in operating procedures; and/or

4.5.2.5 A change in maintenance procedures

4.5.3. Methods of Justification of MMEL items:

4.5.3.1 The assessment of an acceptable level of safety for a MMEL item often involves more than one of the following methods of justification:

4.5.3.1.1. The equipment may be considered optional;

4.5.3.1.2. the equipment may be considered redundant;

4.5.3.1.3. a quantitative safety analysis and/or

4.5.3.1.4. a qualitative analysis.

4.5.4. Optional Equipment:

4.5.4.1 When aircraft Type Certification includes optional equipment, there is no necessity for such equipment to be operative, if it is in excess of that required for safe operation for a particular flight condition or route of flight. Inclusion in the MMEL can be accepted on this basis.

4.5.5. Redundant Items:

4.5.5.1 If the purpose or function of the considered component/system can be carried out by other equipment, then it may be accepted on a redundancy basis with the provision that the alternative equipment can be confirmed to be operative. Redundancy cannot be claimed as justification for inclusion of an item if the two (or more) sources of the function or information are required by the aircraft type certification basis. In this case, another means of justification such as the safety analysis method must be used.

4.5.6. Quantitative Safety Analysis

4.5.6.1 The increasing dependency of modern aircraft on the safe operation of complex systems has resulted in the development of structured techniques to achieve the necessary level of safety. This level of safety is based upon the principle that the hazard resulting from an event should be inversely proportional to the probability of its concurrence. Compliance is usually

demonstrated by conducting a system safety assessment.

4.5.6.2 The safety assessment establishes the major, hazardous or catastrophic situations or failure conditions which the system is capable of providing and the allowable probability of concurrence. For those systems whose failure is critical, i.e. results in hazardous or catastrophic situations, a numerical probability analysis is usually required to demonstrate compliance with the allowable probability of concurrence. For non-critical components/systems, the safety assessment may be greatly simplified. The risk of any specific failure condition is a function of failure type, the number of such systems and the time of exposure to risk.

4.5.6.3 When items of equipment from systems performing critical functions, are included in the MMEL, account shall be taken of their inoperability in the safety assessment. The additional risk resulting from occasional flights with such equipment inoperative should be established and should be compatible with the expected probability of equipment failure as established during the certification process. If the item cannot be justified by the previous means or criteria, then a safety analysis must be carried out, involving a quantitative analysis of the likely risk of the worst effects that can result from additional failures, events and/or environmental conditions occurring during a flight with the particular inoperative item in question. It must be shown that, bearing in mind the reduced exposure time when operating under a MMEL, the probability of a particular hazard has not been increased beyond the levels dictated by the minimum standards specified for the design and operation of the aircraft type.

4.5.7. Qualitative Safety Analysis

4.5.7.1 If an item is to be acceptable for inclusion in a MMEL, a qualitative analysis must be used to consider the impact that the proposed inoperative item has on all other aspects of the aircraft's operation. The qualitative analysis must consider the impact on crew workload, the impact of multiple MMEL items, and the complexity of maintenance and/or operational procedures. It

may reflect experience with previous MMEL approvals.
NOTE: A previous MMEL approval of the same item on another aircraft type does not on itself imply that the required level of safety has been met. Factors which must be considered are similarity of system operation and similarity of the aircraft operational role.

4.6. Multiple Unserviceabilities

4.6.1. The MMEL should provide guidance on the effects of multiple unserviceabilities which may have a significant effect upon safety.

4.7. Operational and Maintenance Procedures

4.7.1. Operational and Maintenance Procedures are necessary to support certain MMEL items. These Procedures should be identified to CAAI during the MMEL approval process, however, the procedures themselves will not be subject to approval in the context of MMEL development.

4.7.2. These procedures shall be referenced in the MMEL and published concurrently with the MMEL as a guide for operators.

4.7.3. The procedures shall be appropriately amended, as and when the MMEL is revised. For initial TC approval, the MEL procedure should be demonstrated by the operator in the course of the TC Test Program.

4.8. Prohibited Items

4.8.1. The MMEL shall not include any item of equipment which, if inoperative, is likely to significantly affect the take-off, landing or climb performance of the aircraft or associated landing speeds presented in the approved Aircraft Flight Manual (AFM), unless the AFM specifies the effect and the MMEL draws attention to this fact.

4.8.2. No item shall be included in the MMEL which conflicts with the limitations, or invalidates or reduce the ability to perform an emergency procedure in the AFM or in an airworthiness directive unless the AFM or directive provide otherwise.

4.8.3. The MMEL shall not include any part or structural component of the aircraft which is the subject of the Configuration Deviation List (CDL).

4.9. Equipment Required by Operating Regulation

4.9.1. When an item of equipment is required to be installed and operative under particular circumstances by the ANR or by CAAI such equipment should be defined in the remarks column of the MMEL by the words "As required by Regulation".

Note: Other MMELs such as those for U.S. manufactured aircraft may contain phrases such as "As required by FARs". Such phrases should be interpreted to mean "As required by Regulation".

4.10. Rectification Interval

4.10.1. The MMEL shall provide A, B, C and D Rectification Intervals.

4.10.2. The category of each inoperative item shall be determined according to the requirements specified below.

4.10.3. Where a time period is specified it shall start at 00:01 on the calendar day following the day of discovery.

4.10.4. Category A:

4.10.4.1 No standard interval is specified, however, items in this category shall be rectified in accordance with the conditions stated in the MMEL.

4.10.5. Category B:

4.10.5.1 Items in this category shall be rectified within three consecutive calendar days, excluding the day of discovery.

4.10.6. Category C:

4.10.6.1 Items in this category shall be rectified within ten consecutive calendar days, excluding the day of discovery.

4.10.7. Category D:

4.10.7.1 Items in this category shall be rectified within one hundred and twenty consecutive calendar days, excluding the day of discovery.

4.10.7.2 To be approved for Category D, the item must meet the following criteria:

4.10.7.2.1. The absence of the item does not affect crew workload.

4.10.7.2.2. The pilots do not rely on the function of that item on a routine or continuous basis, and,

4.10.7.2.3. The pilot's training, subsequent habit patterns and procedures do not rely on the use of that item.

4.10.7.3 Category D relief will generally not be approved for equipment which is considered to increase the level of safety, even if that equipment is of an optional nature.

APPENDIX 1- MMEL Preamble

A Master Minimum Equipment List (MMEL) is developed by the Type Certificate holder and approved by CAAI to improve aircraft utilization and thereby provide more convenient and economic air transportation for the public. The MMEL includes those items of equipment related to airworthiness and operating requirements and other items of equipment which CAAI finds may be inoperative and yet maintain an acceptable level of safety by appropriate conditions and limitations; it does not contain obviously required items such as wings, flaps, and rudders. The MMEL is the basis for development of individual operators' MELs which take into consideration the operator's particular aircraft equipment configuration and operational conditions.

An operator's MEL may differ in format from the MMEL, but cannot be less restrictive than the MMEL. The individual operator's MEL, when approved, permits operation of the aircraft with inoperative equipment.

Equipment not required by the operation being conducted and equipment in excess of operational requirements are included in the MEL with appropriate conditions and limitations.

The MEL must not deviate from Airworthiness Directives or any other Mandatory Requirement. It is important to remember that all equipment related to the airworthiness and the operating requirements of the aircraft not listed in the MMEL must be operative. Suitable conditions and limitations in the form of placards, maintenance procedures, crew operating procedures and other restrictions as necessary are specified in the MEL to ensure that an acceptable level of safety is maintained.

The MEL is intended to permit operation with inoperative items of equipment for a period of time until rectifications can be accomplished. It is important that rectifications be accomplished at the earliest opportunity. In order to maintain an acceptable level of safety and reliability the MMEL establishes limitations on the duration of and conditions for operation with inoperative equipment. The MEL provides for release of the aircraft for flight with inoperative equipment.

When an item of equipment is discovered to be inoperative, it is reported by making an entry in the Aircraft Maintenance Record/Logbook. The item is then either rectified or may be deferred per the MEL or other approval means acceptable to CAAI prior to further operation. MEL conditions and limitations do not relieve the operator from determining that the aircraft is in a condition for safe operation with items of equipment inoperative.

When these requirements are met, an Airworthiness Release, Aircraft Maintenance Record/Logbook entry, or other approved documentation is issued. Such documentation is required prior to operation with any item of equipment inoperative.

Operators are responsible for exercising the necessary operational control to ensure that an acceptable level of safety is maintained. The exposure to additional failures during continued operation with inoperative systems or components must also be considered. Wherever possible, account has been taken in this MMEL of multiple inoperative items. However, it is unlikely that all possible combinations of this nature have been accounted for. Therefore, when operating with multiple inoperative items, the inter-relationships between those items and the effect on aircraft operation and crew workload must be considered.

Operators are to establish a controlled and sound rectification programme including

the parts, personnel, facilities, procedures and schedules to ensure timely rectification. This programme should identify the actions required for maintenance discrepancy messages.

WHEN USING THE MEL, COMPLIANCE WITH THE STATED INTENT OF THE PREAMBLE, DEFINITIONS AND THE CONDITIONS AND LIMITATIONS SPECIFIED IN THE MEL IS REQUIRED.

APPENDIX 2- MMEL Format

AIRCRAFT:	**REVISION NO:**	**PAGE:**
	DATE:	

(1) Systems & Sequence Numbers Item	(2) ***Rectification Interval*** Cat***egory***	(3) Number Installed	(4) Number Required for Dispatch	(5) Remarks or Exceptions