



# **EUROPEAN MILITARY AIRWORTHINESS REQUIREMENT**

**EMAR 66**

**AMC & GM**

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**STATUS**

The Status of the document can take 3 values:

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**NOTE:**

This EMAR AMC/GM relies on definitions laid down in EMAD 1.

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# ACCEPTABLE MEANS OF COMPLIANCE

## SECTION A

### TECHNICAL REQUIREMENTS

#### AMC 66.A.10 Application

1. Maintenance experience should be written up in a manner that the reader has a reasonable understanding of where, when and what maintenance constitutes the experience. A task-by-task account is not necessary but at the same time a bland statement “X years maintenance experience completed” is not acceptable. A logbook of maintenance experience is desirable and some NMAAs may require such a logbook to be kept. It is acceptable to cross-refer in the EMAR Form 19 to other documents containing information on maintenance.
2. Applicants claiming the maximum reduction in EMAR 66.A.30(a) total experience based upon successful completion of EMAR 147.A.200 approved basic training should include the EMAR 147 Certificate of Recognition for approved basic training.
3. Applicants claiming reduction in EMAR 66.A.30(a) total experience based upon successful completion of technical training in an organisation or entity recognised by the NMAA as an Approved Maintenance Training Organisation should include the relevant certificate of successful completion of training. Where the technical training was completed in another organisation (for example a CAA or EASA approved Maintenance Training Organisation), then advice should be sought from the NMAA to ensure the training received is acceptable to the NMAA.

#### AMC 66.A.20(b)2 Privileges

The 6 months maintenance experience in 2 years should be understood as consisting of two elements: duration and nature of the experience. The minimum to meet the requirements for these elements may vary depending on the size and complexity of the aircraft and type of operation and maintenance. See also EMAR 145.A.35(c) regarding experience requirements and EMAR AMC 145.A.35(c) regarding military exigencies.

##### 1. Duration:

Within an Approved Maintenance Organisation:

- 6 months working within the same organisation; or
- 6 months split up into different blocks, working within the same or in different organisations.

##### 2. Nature of the experience:

Depending on the category of the MAML, the following activities are considered relevant for maintenance experience:

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- Servicing;
- Inspection;
- Operational and functional testing;
- Troubleshooting;
- Repairing;
- Modifying;
- Changing components;
- Supervising these activities;
- Releasing aircraft to service.

For Category A MAML holders, the experience should include exercising the privileges, by means of performing tasks related to the authorisation. This means tasks as mentioned in EMAR AMC 145.A.30(g), including servicing, component changes and simple defect rectifications.

For Category B1 and B2, for every Military Aircraft Type Rating included in the authorisation the experience should be on that particular aircraft or on a similar aircraft within the same series. Two aircraft within the same series can be considered as similar when they have similar technology, construction and comparable systems, which means equally equipped, for example, with the following (as applicable to the MAML category):

- Propulsion systems (piston, turboprop, turbofan, turboshaft, jet-engine or pushpropellers); and
- Flight control systems (mechanical controls, hydromechanically powered controls or electromechanically powered controls); and
- Avionic systems (analogue systems or digital systems); and
- Weapon systems (including aircrew assisted escape systems and weapons carried); and
- Structure (manufactured of metal or composite).

For Category C, the experience should cover at least one of the aircraft types endorsed on the MAML.

For a combination of categories, the experience should include some activities of the nature shown in paragraph 2 in each category.

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A maximum of 20% of the experience duration required may be replaced by the following relevant activities on an aircraft type of similar technology, construction and with comparable systems:

- Aircraft maintenance related training as an instructor/assessor or as a student;
- Maintenance technical support/engineering;
- Maintenance management/planning.

The experience should be documented in an individual logbook or in any other recording system approved by the NMAA (which may be an automated / computerised one) containing the following data:

- Date;
- Aircraft type;
- Aircraft identification, i.e. registration;
- S1000D Chapter (optional);
- Operation performed e.g. 100 flight hours check, main landing gear wheel change, engine oil check and complement, Service Bulletin (or national equivalent) embodiment, troubleshooting, structural repair, ejection seat change...;
- Type of maintenance, i.e. base, line;
- Type of activity, i.e. perform, supervise, release;
- Category used: A, B1, B2 or C;
- Duration in days or partial-days.

### **AMC 66.A.20(b)3 Privileges**

The wording “*has the adequate competence to certify maintenance on the corresponding aircraft*” means that the MAML holder and, if applicable, the Approved Maintenance Organisation where he/she is contracted/employed, should ensure that he/she has acquired the appropriate knowledge, skills, attitude and experience to release the aircraft being maintained. This is essential because some systems and technology present in the particular aircraft being maintained may not have been covered by the training/examination/experience required to obtain the MAML and ratings. This is typically the case, among others, in the following situations:

- Work being carried out on a model/variant for which the technical design and maintenance techniques have significantly evolved from the original model used in the Military Aircraft Type Training/On-the-Job Training.



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- Specific technology, options and configurations which may not have been covered by the Military Aircraft Type Training/On-the-Job Training.
- Changes in the basic knowledge requirements of Appendix I to EMAR 66 not requiring re-examination of existing MAML holders (grandfathered privileges).
- Persons meeting the requirements of 6 months of experience every 2 years only on certain similar aircraft types as allowed by [EMAR AMC 66.A.20\(b\)2](#).
- Persons holding a MAML with limitations obtained through conversion of national qualifications (EMAR 66.A.70), where such limitations are going to be lifted after performing the corresponding basic knowledge examinations. In this case, the Military Aircraft Type Ratings endorsed in the MAML may have been obtained in the national system without covering all the aircraft systems (because of the previous limitations) and there will be a need to assess and, if applicable, to train this person on the missing systems.

Additional information is provided in EMAR AMC 145.A.35(a).

### **AMC 66.A.25 Basic knowledge requirements**

1. For an applicant being a person qualified by holding an academic degree in an aeronautical, mechanical or electronic discipline from a recognised university or other higher educational institute the need for any examination depends upon the course taken in relation to Appendix I to EMAR 66.
2. Knowledge gained and examinations passed during previous experiences, for example in civilian aviation and apprenticeships, may be credited where the NMAA is satisfied that such knowledge and examinations are equivalent to that required by Appendix I to EMAR 66.

### **AMC 66.A.30(a) Basic experience requirements**

1. For a Category C applicant holding an academic degree the representative selection of tasks should include the observation of hangar maintenance, maintenance planning, quality assurance, record-keeping, approved spare parts control and engineering. Where an NMAA requires further experience or a specific training syllabus, this should be clearly detailed.
2. Moved to [EMAR GM 66.A.30\(a\)1](#).
3. Moved to [EMAR GM 66.A.30\(a\)2](#).
4. Moved to [EMAR GM 66.A.30\(a\)3](#).

### **AMC 66.A.30(d) Basic experience requirements**

To be considered as 'recent maintenance experience', at least 50% of the required one year 'recent maintenance experience' should be gained within the 12-month period prior to the date of application for the MAML. The remainder of the 'recent maintenance experience' should have been gained within the 7-year period prior to application. It must

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be noted that the rest of the basic experience required by EMAR 66.A.30 must be obtained within the 10 years prior to the application as required by EMAR 66.A.30(f).

### AMC 66.A.30(e) Basic experience requirements

1. For Category A the additional experience of military aircraft maintenance should be a minimum of 6 months. For Category B1 or B2 the additional experience of military aircraft maintenance should be a minimum of 12 months.

2. Aircraft maintenance experience gained outside a military aircraft maintenance environment may include aircraft maintenance experience gained in the civil environment, other nation's armed forces, coast guards, police, etc., or in aircraft manufacturing.

### AMC 66.A.45(e) Military Aircraft Type Ratings

NOT APPLICABLE.

### AMC 66.A.45(d), (e)3, (f)1 and (g)1 Military Aircraft Type Ratings

NOT APPLICABLE.

### AMC 66.A.45 Military Aircraft Type Ratings

The following table summarises the Military Aircraft Type Rating requirements contained in EMAR 66.A.45, EMAR 66.A.50 and Appendix III to EMAR 66.

Note: OJT means "On-the-Job Training" (see Appendix III to EMAR 66, Section 6).

<b><u>Military Aircraft Type Rating requirements</u></b>		
<b>Aircraft Group</b>	<b>B1/ B2 MAML</b>	<b>C MAML</b>
All military aircraft are considered to be complex motorpowered aircraft	<b>MILITARY AIRCRAFT TYPE RATING</b> Military Aircraft Type Training: - Theory + examination - Practical + assessment <b>PLUS</b> OJT (for first aircraft in licence subcategory. For subsequent Military Aircraft Type Rating within the same category/sub-category, further OJT only if required by the NMAA)	<b>MILITARY AIRCRAFT TYPE RATING</b> Military Aircraft Type Training: - Theory + examination

**AMC 66.A.50(a) Limitations**

In case of partial qualification resulting from missing modules, the MAML should incorporate the relevant limitations in accordance with EMAR 66.A.50.

**AMC 66.A.50(b) Limitations**

NOT APPLICABLE.

**AMC 66.A.52 Extensions**

In case of extended qualification resulting from additional modules or sub-modules, the MAML should incorporate the relevant extensions in accordance with EMAR 66.A.52 and EMAR 66.B.116.

## **SECTION B**

### **PROCEDURES FOR NATIONAL MILITARY AIRWORTHINESS AUTHORITIES**

#### **AMC 66.B.20 Record-keeping**

1. The record-keeping system should ensure that all records are accessible whenever needed within a reasonable time. These records should be organised in a consistent way throughout the NMAA (chronological, alphabetical order, etc.).
2. All records containing sensitive data regarding applicants or organisations should be stored in a secure manner with controlled access to ensure confidentiality of this kind of data.
3. All computer hardware used to ensure data backup should be stored in a different location from that containing the working data in an environment that ensures they remain in good condition. When hardware or software changes take place, special care should be taken that all necessary data continues to be accessible at least through the full period specified in EMAR 66.B.20.

#### **AMC 66.B.100 Procedure for the issue of a MAML by the NMAA**

1. Applicants claiming the maximum reduction in EMAR 66.A.30(a) total experience based upon successful completion of an EMAR 147.A.200 approved basic training course should include the EMAR 147 certificate of recognition for approved basic training.
2. Applicants claiming reduction in EMAR 66.A.30(a) total experience based upon successful completion of training considered relevant by the NMAA and considered as a skilled worker in a technical trade should include the relevant certificate of successful completion of training.
3. Applicants claiming credit against the EMAR 66.A.30(a) total experience requirement by virtue of EMAR 66.A.30(e) non-military aircraft maintenance experience may only be granted such credit where the NMAA has recognised such non-military aircraft maintenance experience. The NMAA recognising non-military aircraft maintenance experience should have specified the person within the non-military environment who may make a statement that the applicant has met the relevant maintenance experience requirements. The applicant should include a detailed statement of such maintenance experience signed by that NMAA specified person in accordance with the conditions specified by the NMAA.
4. The NMAA should check that the experience record satisfies the above paragraphs in terms of content and the countersigning signature.

#### **AMC 66.B.105 Preparation for the issue of a MAML via a Maintenance Organisation approved in accordance with EMAR 145**

1. The maintenance organisation approved under EMAR 145 should include the procedure in the MOE and this procedure should be audited by the NMAA at least once

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in each 24-month period. This procedure should include a limitation stating that it is only applicable to the case where the NMAA for the EMAR 145 approval and for the EMAR 66 MAML is the same.

2. The AMO should check that the experience records have been properly countersigned.

3. The AMO may keep the experience record of applicants in a different form from that of the EMAR Form 19 application but such different form or manner should be acceptable to the NMAA.

### **AMC 66.B.110 Procedure for the change of a MAML to include an additional basic category or subcategory**

In the case of computer-generated MAMLs, the MAML should be reissued.

### **AMC 66.B.115 Procedure for the change of a MAML to include a Military Aircraft Type Rating or to remove limitations**

(a). Where the Military Aircraft Type Training has been conducted by an EASA Part-147 organisation recognized by the NMAA (EMAR 66.B.130 refers), there should be supporting documents confirming to the NMAA that:

- the Military Aircraft Type Training has been approved by the appropriate civilian competent authority; and
- the applicant has completed the elements of the approved Military Aircraft Type Training; and
- the trainee has been successfully examined/assessed.

(b). Military Aircraft Type Training will usually be subdivided into airframe and/or powerplant and/or avionics/electrical systems and/or military specific/weapons type training courses. The NMAA is responsible for approving the scope of the type training courses as they are applicable to each military aircraft type for which it has responsibility.

(c). The NMAA should develop adequate procedures for the acceptance of the OJT programme described in Section 6 of Appendix III to EMAR 66.

### **AMC 66.B.100 to 115**

NOT APPLICABLE.

### **AMC 66.B.120 Procedure for the renewal of a MAML validity**

NOT APPLICABLE.

### **AMC 66.B.130 Procedure for the direct approval of Military Aircraft Type Training**

NOT APPLICABLE.

### AMC 66.B.200 Examination Standard

1. Questions should be prepared in the national language but the use of aviation English is recommended wherever possible.
2. The primary purpose of essay questions is to determine that the candidates can express themselves in a clear and concise manner and can prepare a concise technical report, which is why only a few essay questions are required.
3. Retained in [EMAR GM 66.B.200](#).
4. For pass mark purposes, the essay questions should be considered as separate from the multiple choice questions.
5. Multiple Choice Question (MCQ) generation.

The following principles should be observed when developing MCQs:

- (a) The examination should measure clearly formulated goals. Therefore the field and depth of knowledge to be measured by each question should be fully identified.
- (b) All the questions should have a minimum of three alternative answers.
- (c) Questions that require specialised knowledge of specific military aircraft types should not be asked in a basic training examination.
- (d) The use of abbreviations and acronyms should generally be avoided. However, where needed, only internationally recognised abbreviations and acronyms should be used. In case of doubt use the full form, e.g. angle of attack =  $12^\circ$  instead of  $\alpha = 12^\circ$ .
- (e) Questions and answers should be formulated as simply as possible: the examination is not a test of language. Complex sentences, unusual grammar and double negatives should be avoided.
- (f) A question should comprise one complete positive proposition. No more than 3 different statements should appear among the suggested responses otherwise the candidate may be able to deduce the correct answer by eliminating the unlikely combinations of statements.
- (g) Questions should have only one true answer.
- (h) The correct answer should be absolutely correct and complete or, without doubt, the most preferable. Responses that are so essentially similar that the choice is a matter of opinion rather than a matter of fact should be avoided. The main interest in MCQs is that they can be quickly performed: this is not achieved if doubt exists about the correct answer.

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(i) The incorrect alternatives should seem equally plausible to anyone ignorant of the subject. All alternatives should be clearly related to the question and be of similar vocabulary, grammatical structure and length. In numerical questions, the incorrect answers should correspond to procedural errors such as corrections applied in the wrong sense or incorrect unit conversions: they should not be mere random numbers.

(j) Calculators are not allowed during examination. Therefore all calculations should be feasible without a calculator. Where a question involves calculations not feasible without a calculator, such as  $\sqrt{10}$  then the question should specify the approximate value of  $\sqrt{10}$ .

(k) Questions should refer to the EMAR 66 Appendix I (for Basic Training) or to EMAR 66 Appendix III (for Military Aircraft Type Training) examination syllabus.

### 6. Essay question generation:

(a) The purpose of the essay is to allow the knowledge examiner to determine if candidates can express themselves in a clear and concise manner in the form of a written response, in a technical report format using the technical language of the military aviation environment. The essay examination also allows the knowledge examiner to assess, in part, the technical knowledge retained by the individual and with a practical application relevant to a maintenance scenario.

(b) Questions should be written so as to be broad enough to be answered by candidates for all MAML categories or sub-categories (Categories A, B1 and B2) and comply with the following general guidelines:

- the question topic selected should be generic, applicable to all MAML categories and have a common technical difficulty level as indicated in EMAR 66, Appendix I;
- cover technology applicable to most areas of military aircraft maintenance;
- reflect common working practices;
- not be type specific and avoid subjects which are rarely found in practice;
- when drafting a question there is a need to ensure that consideration is given to the limited practical experience that most candidates will have.

(c) To make the questions and the marking procedures as consistent as possible, each question and model answer, with the key areas required (see below), should be reviewed independently by at least 2 persons with appropriate technical knowledge.

(d) When raising questions the following should be complied with:

- Each essay question should have a time allowance of 20 minutes.

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- A complete A4 side is provided for each question and answer, if required the answer can be extended onto the reverse side of the page.
- The question should be such that the answer expected will be at the level shown for that subject in the module syllabus.
- The question should not be ambiguous but should seek a broad reply rather than be limited in scope for answer.
- The question should lend itself to be written in a technical report style, in a logical sequence (beginning, middle and end), containing the applicable and relevant technical words needed in the answer.
- The question should be relevant to the category and level of difficulty listed in the syllabus, e.g. a description of a typical light aircraft system may not be acceptable for a typical fighter aircraft.
- As far as possible, questions should have a strong bias towards the practical maintenance of a system/component and the answer should show an understanding of normal and deteriorated conditions of an aircraft and its systems.
- The security classification of any military system must be considered when scoping a question.

Variations on alternative possible answers which have not been thought of may have to be taken into account to aid the knowledge examiner when marking. If considered relevant, the model answer should be amended to include these new points.

(e) Because of the difficulty in marking an essay answer using key points only, there is a need for the way in which the answer was written to be assessed and taken into consideration.

(f) The total points for each question should add up to 100 and will need to reflect both the combination of the technical (key point) element and the essay style element.

(g) Each key point should be graded upon its importance and have point weighting allocated to it. The total weight should represent 60% of the mark.

(h) Key points are the 'important elements' that may be either knowledge or experience-based and will include other maintenance-orientated factors such as relevant safety precautions or military regulations if applicable. Excessive reference to the need for Aircraft Maintenance Manual referral or safety checks may be considered wasteful.

(i) The answer should be analysed for the clarity and manner in which it is presented and have a weighting allocated to it which should represent 40% of the mark.



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- (j) The answer should show the candidate's ability to express himself/herself in technical language. This includes readability of the language, basic grammar and use of terminology.
- (k) The essay should start in the beginning and contain logical process steps to reach a conclusion.
- (l) Supporting diagrams should not be encouraged but, if used, should supplement the answer and not replace the need for a broad 'text-based' answer.
- (m) The essay should not be indexed, itemised or listed.
- (n) Within reason the candidate should not be penalised for incorrect spelling.
- (o) A zero mark should only be given in exceptional circumstances. Even if the student misunderstands the question and gives an answer to a different question, a sympathetic mark (even if only for the essay style) should be given. This could be up to the maximum percentage allowed in sub-paragraph (i) above.
- (p) The two allocated marks should be added together and written into the answer paper.
- (q) If an answer resulting in a borderline failure is principally due to "written essay errors", the paper should be discussed and the mark agreed, if possible, with another knowledge examiner.
- (r) Calculators may be used for designated sections of an examination where more complex calculations are required in order to assess deeper understanding of relevant engineering processes. Where calculators are allowed, these are to be either issued by the invigilator, or specifically approved for use in the examination.

### **AMC 66.B.305(a) Conversion report for licences or other qualifications**

1. Conversion reports prepared on the basis of EMAR 66.A.70 should include a comparison between the scope of the national qualification (i.e., the national qualification requirements) and the scope of the EMAR 66 MAML qualification (i.e. the EMAR 66 qualification requirements), which should be performed on the basis of a detailed analysis of the national and EMAR 66 basic qualification standards. The report should identify where a difference between the two standards exists and where such a difference would lead to a limitation or extension on the EMAR 66 MAML (see EMAR 66.A.50 and EMAR 66.A.52).

2. NOT APPLICABLE.

### **AMC 66.B.310 (a) Conversion report for Approved Maintenance Organisations authorisations**

1. Conversion reports prepared on the basis of EMAR 66.A.70 should include a comparison between the qualification required for each type of organisation authorisation and the scope of the EMAR 66 MAML qualification, which should be performed on the basis of a detailed analysis of the organisation and EMAR 66 basic qualification

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standards. The report should identify where a difference between the two standards exists and where such a difference would lead to a limitation or extension on the EMAR 66 MAML (EMAR 66.A.50 and EMAR 66.A.52 refer).

2. NOT APPLICABLE.

### **AMC 66.B.405(d) Examination credit report**

In this context, 'on a regular basis' should be taken to mean annually.

## **AMC to Appendix III to EMAR 66**

### **AMC to Section 1 of Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### ***Military Aircraft Type Training***

1. Military Aircraft Type Training may be sub-divided in airframe and/or powerplant and/or avionics/electrical systems type training courses.

- Airframe type training course means a type training course including all relevant aircraft structure and electrical and mechanical systems excluding the powerplant.
- Powerplant type training course means a type training course on the bare engine, including the build-up to a quick engine change unit.
- The interface of the engine/airframe systems should be addressed by either airframe or powerplant type training course.
- Avionics/electrical systems type training course means type training on avionics and electrical systems.

Type training for military specific systems (and their interfaces with other aircraft systems) may be included in these sub-divisions as appropriate, or carried out as a separate course.

2. Practical training may be performed either following or integrated with the theoretical elements. However, it should not be performed before theoretical training.

3. The content of the theoretical and practical training should:

- address the different parts of the aircraft which are representative of the structure, the systems/components installed and the cabin; and
- include training on the use of technical manuals, maintenance procedures and the interface with the operation of the aircraft.

Therefore it should be based on the following elements:

- Type design including relevant type design variants, new technology and techniques;
- Feedback from in-service difficulties, occurrence reporting, etc;
- Significant applicable airworthiness directives and service bulletins or national equivalent;
- Known human factor issues associated with the particular aircraft type;

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- Use of common and specific documentation, (when applicable, such as MMEL, AMM, MPD, TSM, SRM, WD, AFM, tool handbook), philosophy of the troubleshooting, etc;
  - Knowledge of the maintenance on-board reporting systems and ETOPS maintenance conditions where applicable;
  - Use of special tooling and test equipment and specific maintenance practises including critical safety items and safety precautions;
  - Significant and critical tasks/aspects from the MMEL, CDL, Fuel Tank Safety (FTS), airworthiness limitation items (ALI) including Critical Design Configuration Control Limitations (CDCCL), CMR and all ICA documentation such as MRB, MPD, SRM, AMM, etc., when applicable.
  - Maintenance actions and procedures to be followed as a consequence of specific certification requirements, such as, but not limited to, NVIS (Night Vision Imaging Systems);
  - Knowledge of relevant inspections and limitations as applicable to the effects of environmental factors or operational procedures such as cold and hot climates, wind, moisture, sand, de-icing / anti-icing, etc.
4. Limited avionic system training should be included in the Category B1 Military Aircraft Type Training as the B1 privileges include work on avionics systems requiring simple tests to prove their serviceability.
5. Electrical systems should be included in both categories of B1 and B2 Military Aircraft Type Training.
6. The theoretical and practical training should be complementary and may be:
- Integrated or split
  - Supported by the use of training aids, such as trainers, virtual aircraft, aircraft components, synthetic training devices (STD), computer based training devices (CBT), etc.

### **AMC to Paragraph 3.1(d) of Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### ***Training Needs Analysis for the Theoretical Element of the Military Aircraft Type Training***

1. NOT APPLICABLE.
2. The purpose of the Training Needs Analysis (TNA) is to adapt and justify the duration of the course for a specific aircraft type. This means that the TNA is the main driver for determining the duration of the course.

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3. The content and the duration deriving from this TNA may be supported by an analysis from the (Military) Type Certificate holder.

4. NOT APPLICABLE.

5. When developing the TNA the following should be considered:

a) The TNA should include an analysis identifying all the areas and elements where there is a need for training as well as the associated learning objectives, considering the design philosophy of the aircraft type, the operational environment, the type of operations and the operational experience. This analysis should be written in a manner which provides a reasonable understanding of which areas and elements constitute the course in order to meet the learning objectives.

b) As a minimum, the Training Need Analysis (TNA) should take into account all the applicable elements contained in paragraph 3.1 of EMAR-66 Appendix III and associated AMCs.

c) The TNA should set-up the course content considering the Appendix III objectives for each level of training and the prescribed topics in the theoretical element table contained in paragraph 3.1 of EMAR-66 Appendix III.

d) For each chapter described in the theoretical element table contained in paragraph 3.1 of EMAR 66 Appendix III, the corresponding training time should be recorded.

e) Typical documents to be used in order to identify the areas and elements where there is a need for training typically include, among others, the Aircraft Maintenance Manual, MRB report, CMRs, airworthiness limitations, Troubleshooting Manual, Structural Repair Manual, Illustrated Parts Catalogue, Airworthiness Directives and Service Bulletins or national equivalent.

f) During the analysis of these documents:

- Consideration should be given to the following typical activities:
  - o Activation/reactivation;
  - o Removal/Installation;
  - o Testing;
  - o Servicing;
  - o Inspection, check and repairs;
  - o Troubleshooting / diagnosis.

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- For the purpose of identifying the specific elements constituting the training course, it is acceptable to use a filtering method based on criteria such as:
  - o Frequency of the task;
  - o Human factor issues associated to the task;
  - o Difficulty of the task;
  - o Criticality and safety impact of the task;
  - o In-service experience;
  - o Novel or unusual design features (not covered by EMAR 66 Appendix I);
  - o Similarities with other aircraft types;
  - o Special tests and tools/equipment.
- It is acceptable to follow an approach based on:
  - o Tasks or groups of tasks, or
  - o Systems or subsystems or components.

### g) The TNA should:

- Identify the learning objectives for each task, group of tasks, system, subsystem or component;
- Associate the identified tasks to be trained to the regulatory requirements (table in Paragraph 3.1 of Appendix III to EMAR 66);
- Organise the training into modules in a logical sequence (adequate combination of chapters as defined in Appendix III of EMAR 66);
- Determine the sequence of learning (within a lesson and for the whole syllabus);
- Identify the scope of information and level of detail with regard to the minimum standard to which the topics of the TNA should be taught according to the set-up objectives.
- Address the following:
  - o Description of each system/component including the structure (where applicable);
  - o System/component operation taking into account:

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- a. Complexity of the system (e.g. the need of further break down into subsystems, etc.);
  - b. Design specifics which may require more detailed presentation or may contribute to maintenance errors;
  - c. Normal and emergency functioning;
  - d. Troubleshooting;
  - e. Interpretation of indications and malfunctions;
  - f. Use of maintenance publications;
  - g. Identification of special tools and equipment required for servicing and maintaining the aircraft;
  - h. Maintenance Practices;
  - i. Routine inspections, functional or operational tests, rigging/adjustment, etc.
- Describe the following:
    - o The instructional methods and equipment, teaching methods and blending of the teaching methods in order to ensure the effectiveness of the training;
    - o The maintenance training documentation/material to be delivered to the student;
    - o Facilitated discussions, questioning session, additional practiced-oriented training, etc;
    - o The homework, if developed;
    - o The training provider's resources available to the learner.
  - h) It is acceptable to differentiate between issues which have to be led by an instructor and issues which may be delivered through interactive simulation training devices and/or covered by web based elements. Overall time of the course will be allocated accordingly.
  - i) The maximum number of training hours per day for the theoretical element of Military Aircraft Type Training should not be more than 6 hours. A training hour means 60 minutes of tuition excluding any breaks, examination, revision, preparation and aircraft visit. The NMAA may allow deviation from this standard when it is properly justified that the proposed number of hours follows pedagogical and human factors principles. These principles are especially important in those cases where:

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- Theoretical and practical training are performed at the same time;
- Training and normal maintenance duty / apprenticeship are performed at the same time.

j) The minimum participation time for the trainee in order to meet the objectives of the course should not be less than 90% of the tuition hours of the theoretical training course, unless the NMAA approves otherwise. Additional training may be provided by the training organisation in order to meet the minimum participation time. If the minimum participation defined for the course is not met, a certificate of recognition should not be issued.

k) The TNA is a living process and should be reviewed/updated based on operational feedback, maintenance occurrences, airworthiness directives or national equivalent, major service bulletins impacting maintenance activities or requiring new competencies for mechanics, alert service bulletins, feedback from trainees or customer satisfaction, evolution of the maintenance documentation such as Maintenance Review Boards, Maintenance Planning Documents, Maintenance Manuals, etc. The frequency at which the TNA should be reviewed/updated is left to the discretion of the organisation conducting the course.

NOTE: The examination is not part of the TNA. However, it should be prepared in accordance with the learning objectives described in the TNA.

### **AMC to Paragraphs 1(b), 3.2 and 4.2 of Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### ***Practical Element of the Military Aircraft Type Training***

1. The practical training may include instruction in a classroom or in simulators but part of the practical training should be conducted in a real maintenance or manufacturer environment.
2. The tasks should be selected because of their frequency, complexity, variety, safety, criticality, novelty, etc. The selected tasks should cover all the chapters described in the table contained in paragraph 3.2 of Appendix III to EMAR 66.
3. The duration of the practical training should ensure that the content of training required by paragraph 3.2 of Appendix III to EMAR-66 is completed.
4. The organisation providing the practical element of the Military Aircraft Type Training should provide trainees a schedule or plan indicating the list of tasks to be performed under instruction or supervision. A record of the tasks completed should be entered into a logbook which should be designed such that each task or group of tasks may be countersigned by the designated assessor. The logbook format and its use should be clearly defined.



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5. In paragraph 4.2 of Appendix III to EMAR 66, the term “designated assessors appropriately qualified” means that the assessors should demonstrate training and experience on the assessment process being undertaken and be authorised to do so by the organisation.

Further guidance about the assessment and the designated assessors is provided in [Appendix III to AMC to EMAR 66](#).

6. The practical element (for powerplant and avionic systems) of the Military Aircraft Type Rating Training may be subcontracted by the approved EMAR 147 organisation under its quality system according to the provisions of EMAR 147.A.145(d)3 and the corresponding Guidance Material.

7. The practical element of the Military Aircraft Type Training can be performed concurrently with the OJT element if both are performed on the same military aircraft type and in a real maintenance environment.

### **AMC to Paragraph 1(c) of Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### ***Differences Training***

Approved difference training is not required for different variants within the same aircraft type rating (as specified by the NMAA) for the purpose of Military Aircraft Type Rating endorsement on the MAML.

However, this does not necessarily mean that no training is required before a certifying staff authorisation can be issued by the AMO (refer to [EMAR AMC 66.A.20\(b\)3](#)).

### **AMC to Section 5 of Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### ***Type Examination Standard***

NOT APPLICABLE.

### **AMC to Section 6 of Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### **On-the-Job Training (OJT)**

1. “A maintenance organisation appropriately approved for the maintenance of the particular aircraft type” means an EMAR 145 AMO holding an A rating for such aircraft.

2. The OJT should include a number of tasks that are carried out under ‘one to one’ supervision (ie one supervisor dedicated to one trainee) and should involve actual work task performance on aircraft/components, covering line and/or base maintenance tasks.

3. The use of simulators for OJT should not be allowed.

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4. Appendix II to AMC to EMAR 66 contains a list of tasks, from which a representative sample appropriate to the type and licence (sub-) category applied for, should be extracted and approved by the NMAA. The OJT should cover at least 50% of this approved extracted list. Some tasks should be selected from each paragraph of the approved extracted list. Other tasks than those in the Appendix II may be considered as a replacement when they are relevant. Typically, in addition to the variety and the complexity, the OJT tasks should be selected because of their frequency, safety, novelty, etc.

5. Up to 50% of the required OJT may be undertaken before the aircraft theoretical Military Aircraft Type Training starts.

6. The organisation providing the OJT training should provide trainees a schedule or plan indicating the list of tasks to be performed under supervision. A record of the tasks completed should be entered into a logbook which should be designed such that each task or group of tasks is countersigned by the corresponding supervisor. The logbook format and its use should be clearly defined.

7. Regarding the day-to-day supervision of the OJT programme in the EMAR 145 AMO and the role of the supervisor(s), the following should be considered:

- It is sufficient that the completion of individual OJT tasks is confirmed by the direct supervisor(s), without being necessarily a direct evaluation by the assessor.
- During the day-to-day OJT performance, the supervision aims at overseeing the complete process, including task completion, use of manuals and procedures, observance of safety measures, warnings and recommendations and appropriate behaviour in the maintenance environment.
- The supervisor(s) should personally observe the work being performed to ensure safe completion and should be readily available for consultation, if needed during the OJT performance.
- The supervisor(s) should countersign the tasks and release the maintenance tasks as the trainee is not yet qualified to do so.
- The supervisor(s) should therefore:
  - o have certifying staff or support staff privileges relevant to the OJT tasks;
  - o be competent for the selected tasks;
  - o be safety-orientated;
  - o be capable to coach (setting objectives, giving training, performing supervision, evaluating, handling trainee's reactions and cultural issues, managing objectively and positively debriefing sessions, determining the need for extra training or reorientate the training, reporting, etc.);
  - o Be designated by the EMAR 145 AMO to carry out the supervision.

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8. Regarding the assessor, the following should be considered:

- The function of the assessor, as described in Section 6 of Appendix III to EMAR 66, is to conduct the final assessment of the completed OJT. This assessment should include confirmation of the completion of the required diversity and quantity of OJT and should be based on the supervisor(s) reports and feedback.
- In Section 6 of Appendix III to EMAR 66, the term “designated assessor appropriately qualified” means that the assessor should demonstrate training on and experience of the assessment process being undertaken and should be authorised to do so by the EMAR 145 AMO.

Further guidance about the assessment and the designated assessors is provided in Appendix III to AMC to EMAR 66.

9. The procedures for OJT should be included in the MOE of the EMAR 145 AMO (a new chapter 3.15 must be included in the MOE for this purpose).

### **AMC to Appendix III “Military Aircraft Type Training and Examination Standard, and On-the-Job Training”**

#### ***Military Aircraft Type Training and On-the-Job Training***

The theoretical and practical training providers, as well as the OJT provider, may contract the services of a language translator in the case where training is imparted to students not conversant in the language of the training material. Nevertheless, it remains essential that the students understand all the relevant maintenance documentation.

During the performance of examinations and assessments, the assistance of the translator should be limited to the translation of the questions, but should not provide clarifications or help in relation to those questions.

## APPENDICES TO AMCs

### Appendix I - Military Aircraft Type Ratings for EMAR Form 26 Military Aircraft Maintenance Licence

The NMAA is responsible for publishing the Military Aircraft Type Ratings that it will endorse on the EMAR Form 26 MAML. It is the responsibility of the EMAR 145 AMO to ensure that any certification privileges issued to the MAML holder are appropriate for the Military Aircraft Type Rating held (EMAR 145.A.35(b)).

#### Notes:

When there is a change to a Military Aircraft Type Rating (or to an engine designation in the rating) which affects MAMLs already issued, the Military Aircraft Type Ratings on the MAML may be modified when the MAML is next submitted to the NMAA for an amendment unless there is an urgent reason to modify the MAML.

The Military Aircraft Type Ratings published by an NMAA for the MAML may be subject to change. MAML holders and EMAR 145 AMOs should ensure they frequently check the latest version issued by the NMAA.

## **Appendix II - Aircraft Type Practical Experience and On-the-Job Training List of Tasks**

### **Time limits/Maintenance checks**

100 hour, “B” or “C” checks or other military equivalent inspection.  
Assist carrying out a scheduled maintenance check i.a.w. Aircraft Maintenance Manual.  
Review Aircraft maintenance log for correct completion.  
Review records for compliance with Airworthiness Directives (or national equivalent).  
Review records for compliance with component life limits.  
Procedure for inspection following heavy / hard landing.  
Procedure for inspection following excessive load factor.  
Procedure for inspection following exceeding engine limits.  
Procedure for inspection following lightning strike.

### **Dimensions/Areas**

Locate component(s) by zone/station number.  
Perform symmetry check.

### **Lifting and Shoring**

Assist in:  
Jack aircraft nose or tail wheel.  
Jack complete aircraft.  
Sling or trestle major component.

### **Leveling/Weighing**

Level aircraft.  
Weigh aircraft.  
Prepare weight and balance amendment.  
Check aircraft against equipment list.

### **Towing and Taxiing**

Prepare for aircraft towing.  
Tow aircraft.  
Be part of aircraft towing team.

### **Parking and Mooring**

Tie down aircraft.  
Park, secure and cover aircraft.  
Position aircraft in maintenance dock.  
Secure rotor blades.

### **Placards and Markings**

Check aircraft for correct placards.  
Check aircraft for correct markings.

### **Servicing**

Refuel aircraft.  
Defuel aircraft.  
Carry out tank to tank fuel transfer.  
Check/adjust tire pressures.  
Check/replenish oil level.  
Check/replenish hydraulic fluid level.  
Check/replenish accumulator pressure.  
Charge pneumatic system.  
Grease aircraft.  
Connect ground power.  
Service toilet/potable water system.  
Perform pre-flight/daily check.

### **Vibration and Noise Analysis**

Analyse helicopter vibration problem.  
Analyse noise spectrum.  
Analyse engine vibration.

### **Air Conditioning**

Replace combustion heater.  
Replace flow control valve.  
Replace outflow valve.  
Replace safety valve.  
Replace vapour cycle unit.  
Replace air cycle unit.  
Replace cabin blower.  
Replace heat exchanger.  
Replace pressurisation controller.  
Clean outflow valves.  
Deactivate/reactivate cargo isolation valve.  
Deactivate/reactivate avionics ventilation components.  
Check operation of air conditioning/heating system.  
Check operation of pressurisation system.  
Troubleshoot faulty system.

### **Auto flight**

Install servos.  
Rig bridle cables.  
Replace controller.  
Replace amplifier.  
Replacement of the auto flight system LRUs.  
Check operation of auto-pilot.  
Check operation of auto-throttle/auto-thrust.  
Check operation of yaw damper.  
Check and adjust servo clutch.

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Perform autopilot gain adjustments.  
Perform mach trim functional check.  
Troubleshoot faulty system.  
Check autoland system.  
Check flight management systems.  
Check stability augmentation system.

### **Communications**

Replace V/UHF com unit.  
Replace HF com unit.  
Replace existing antenna.  
Check operation of radios.  
Perform antenna VSWR check.  
Perform Selcal operational check.  
Perform operational check of passenger address system.  
Functionally check audio integrating system.  
Repair co-axial cable.  
Troubleshoot faulty system.

### **Electrical Power**

Charge lead/acid battery.  
Charge Ni-Cad battery.  
Check battery capacity.  
Deep-cycle Ni-Cad battery.  
Replace integrated drive/generator/alternator.  
Replace switches.  
Replace circuit breakers.  
Adjust voltage regulator.  
Change voltage regulator.  
Amend electrical load analysis report.  
Repair/replace electrical feeder cable.  
Troubleshoot faulty system.  
Perform functional check of integrated drive/generator/alternator.  
Perform functional check of voltage regulator.  
Perform functional check of emergency generation system.

### **Equipment/Furnishings**

Replace carpets.  
Replace crew seats.  
Replace passenger seats.  
Check inertia reels.  
Check seats/belts for security.  
Check emergency equipment.  
Check ELT for compliance with regulations.  
Repair toilet waste container.  
Remove and install ceiling and sidewall panels.  
Repair upholstery.  
Change cabin / cargo configuration.

Replace cargo loading system actuator.  
Test cargo loading system.  
Replace escape slides/ropes.

### **Fire protection**

Check fire bottle contents.  
Check/test operation of fire/smoke detection and warning system.  
Check cabin fire extinguisher contents.  
Check smoke detector system.  
Check cargo panel sealing.  
Install new fire bottle.  
Replace fire bottle squib.  
Troubleshoot faulty system.  
Inspect engine fire wire detection systems.

### **Flight Controls**

Inspect primary flight controls and related components in accordance with AMM.  
Extending/retracting flaps & slats.  
Replace horizontal stabiliser.  
Replace spoiler/lift damper.  
Replace elevator.  
Deactivation/reactivation of aileron servo control.  
Replace aileron.  
Replace rudder.  
Replace trim tabs.  
Install control cable and fittings.  
Replace slats.  
Replace flaps.  
Replace powered flying control unit.  
Replace flat actuator.  
Rig primary flight controls.  
Adjust trim tab.  
Adjust control cable tension.  
Check control range and direction of movement.  
Check for correct assembly and locking.  
Troubleshoot faulty system.  
Functional test of primary flight controls.  
Functional test of flap system.  
Operational test of the side stick assembly.  
Operational test of the Trimmable Horizontal Stabiliser.  
Trimmable Horizontal Stabiliser system wear check.

### **Fuel**

Water drain system (operation).  
Replace booster pump.  
Replace fuel selector.  
Replace fuel tank cells.  
Replace/test fuel control valves.



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Replace magnetic fuel level indicators.  
Replace water drain valve.  
Check/calculate fuel contents manually.  
Check filters.  
Flow check system.  
Check calibration of fuel quantity gauges.  
Check operation feed/selectors.  
Check operation of fuel dump/jettison system.  
Fuel transfer between tanks.  
Pressure defuel.  
Pressure refuel (manual control).  
Deactivation/reactivation of the fuel valves (transfer defuel, X-feed, refuel).  
Troubleshoot faulty system.

### Hydraulics

Replace engine-driven pump.  
Check/replace case drain filter.  
Replace standby pump.  
Replace hydraulic motor pump/generator.  
Replace accumulator.  
Check operation of shut off valve.  
Check filters/clog indicators.  
Check indicating systems.  
Perform functional checks.  
Pressurisation/depressurisation of the hydraulic system.  
Power Transfer Unit (PTU) operation.  
Replacement of PTU.  
Troubleshoot faulty system.

### Ice and rain protection

Replace pump.  
Replace timer.  
Inspect repair propeller deice boot.  
Test propeller de-icing system.  
Inspect/test wing leading edge de-icer boot.  
Replace anti-ice/deice valve.  
Install wiper motor.  
Check operation of systems.  
Operational test of the pitot-probe ice protection.  
Operational test of the Total Air Temperature ice protection.  
Operational test of the wing ice protection system.  
Assistance to the operational test of the engine air-intake ice protection (with engines operating).  
Troubleshoot faulty system.

### Indicating/recording systems

Replace Flight Data Recorder (FDR).  
Replace cockpit voice recorder.  
Replace clock.

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Replace master caution unit.  
Perform FDR data retrieval.  
Troubleshoot faulty system.  
Implement Electro-Static Discharge and Soldering procedures.  
Inspect for High Intensity Radiated Field requirements.  
Start/stop Engine Indication System procedure.  
Bite test of the Centralized Fault Display Interface Unit.  
Ground scanning of the central warning system.

### **Landing Gear**

Build up wheel.  
Replace main wheel.  
Replace nose wheel.  
Replace steering actuator.  
Replace truck tilt actuator.  
Replace gear retraction actuator.  
Replace uplock/downlock assembly.  
Replace shimmy damper.  
Rig nose wheel steering.  
Functional test of the nose wheel steering system.  
Replace shock strut seals.  
Servicing of shock strut.  
Replace brake unit.  
Replace brake control valve.  
Bleed brakes.  
Replace brake fan.  
Test anti-skid unit.  
Test gear retraction.  
Change bungees.  
Adjust micro switches/sensors.  
Charge struts with oil and air.  
Troubleshoot faulty system.  
Test auto-brake system.  
Replace rotorcraft skids.  
Replace rotorcraft skid shoes.  
Pack and check floats.  
Flotation equipment.  
Check/test emergency landing gear extension.  
Operational test of the landing gear doors.

### **Lights**

Repair/replace rotating beacon.  
Repair/replace landing lights.  
Repair/replace navigation lights.  
Repair/replace formation lights.  
Repair/replace interior lights.  
Replace ice inspection lights.  
Repair/replace emergency lighting system.  
Perform emergency lighting system checks.

Troubleshoot faulty system.

### **Navigation**

Calibrate magnetic direction indicator.  
Replace airspeed indicator.  
Replace altimeter.  
Replace air data computer.  
Replace VOR/TACAN unit.  
Replace ADI.  
Replace HSI.  
Check pitot static system for leaks.  
Check operation of directional gyro.  
Functional check doppler.  
Functional check TCAS.  
Functional check DME.  
Functional check ATC Transponder.  
Functional check flight director system.  
Functional check inertial navigation system.  
Complete quadrantal error correction of ADF system.  
Update flight management system database.  
Check calibration of pitot static instruments.  
Check calibration of pressure altitude reporting system.  
Troubleshoot faulty system.  
Check marker systems.  
Compass replacement direct/indirect.  
Check Satcom.  
Check GPS.

### **Oxygen**

Inspect on-board oxygen equipment.  
Purge and recharge oxygen system.  
Replace regulator.  
Replace oxygen generator.  
Test crew oxygen system.  
Perform auto oxygen system deployment check.  
Troubleshoot faulty system.

### **Pneumatic systems**

Replace filter.  
Replace air shut off valve.  
Replace pressure regulating valve.  
Replace compressor.  
Recharge dessicator.  
Adjust regulator.  
Check for leaks.  
Troubleshoot faulty system.

### **Vacuum systems**

Inspect the vacuum system in accordance with AMM.  
Replace vacuum pump.  
Check/replace filters.  
Adjust regulator.  
Troubleshoot faulty system.

### **Water/Waste**

Replace water pump.  
Replace tap.  
Replace toilet pump.  
Perform water heater functional check.  
Troubleshoot faulty system.  
Inspect waste bin flap closure.

### **Central Maintenance System**

Retrieve data from Central Maintenance Unit (CMU).  
Replace CMU.  
Perform Bite check.  
Troubleshoot faulty system.

### **Structures**

Assessment of damage.  
Sheet metal repair.  
Composite material repair.  
Treat corrosion.  
Apply protective treatment.  
Replace static wicks

### **Doors**

Inspect passenger door in accordance with AMM.  
Rig/adjust locking mechanism.  
Adjust air stair system.  
Check operation of emergency exits.  
Test door warning system.  
Troubleshoot faulty system.  
Remove and install passenger / cargo / paratroops doors in accordance with AMM.  
Remove and install emergency exit in accordance with AMM.  
Inspect cargo door in accordance with AMM.

### **Windows**

Replace windshield.  
Replace direct vision window.

Replace cabin window.  
Repair transparency.

### **Wings**

Skin repair.  
Replace tip.  
Replace rib.  
Replace integral fuel tank panel.  
Check incidence/rig.

### **Propeller**

Assemble prop after transportation.  
Replace propeller.  
Replace governor.  
Adjust governor.  
Perform static functional checks.  
Check operation during ground run.  
Check track.  
Check setting of micro switches.  
Assessment of blade damage in accordance with AMM.  
Dynamically balance prop.  
Troubleshoot faulty system.

### **Main Rotors**

Install rotor assembly.  
Replace blades.  
Replace damper assembly.  
Check track / tabs.  
Check static balance.  
Check dynamic balance.  
Troubleshoot.

### **Rotor Drive**

Replace mast.  
Replace drive coupling.  
Replace clutch/freewheel unit.  
Replace drive belt.  
Install main gearbox.  
Overhaul main gearbox.  
Check gearbox chip detectors.

### **Tail Rotors**

Install rotor assembly.  
Replace blades.  
Troubleshoot.

### **Tail Rotor Drive**

Replace bevel gearbox.  
Replace universal joints.  
Overhaul bevel gearbox.  
Install drive assembly.  
Check chip detectors.  
Check/install bearings and hangers.  
Check/service/assemble flexible couplings.  
Check alignment of drive shafts.  
Install and rig drive shafts.

### **Rotorcraft flight controls**

Install swash plate.  
Install mixing box.  
Adjust pitch links.  
Rig collective system.  
Rig cyclic system.  
Rig anti-torque system.  
Check controls for assembly and locking.  
Check controls for operation and sense.  
Troubleshoot faulty system.

### **Power Plant**

Replace engine.  
Repair cooling baffles.  
Repair cowling.  
Adjust cowl flaps.  
Repair faulty wiring.  
Troubleshoot.  
Assist in dry motoring check.  
Assist in wet motoring check.  
Assist in engine start (manual mode).

### **Piston Engines**

Remove/install reduction gear.  
Check crankshaft run-out.  
Check tappet clearance.  
Check compression.  
Extract broken stud.  
Install helicoil.  
Perform ground run.  
Establish/check reference RPM.  
Troubleshoot.

### **Turbine Engines**

Replace module.  
Replace fan blade.  
Hot section inspection/boroscope check.  
Carry out engine/compressor wash.  
Carry out engine dry cycle.  
Engine ground run.  
Establish reference power.  
Trend monitoring/gas path analysis.  
Troubleshoot.

### **Fuel and control, piston**

Replace engine driven pump.  
Adjust Automatic Mixture Control.  
Adjust ABC (Aluminium piston, Brass cylinder, Chrome plated).  
Install carburetor/injector.  
Adjust carburetor/injector.  
Clean injector nozzles.  
Replace primer line.  
Check carburetor float setting.  
Troubleshoot faulty system.

### **Fuel and control, turbine**

Replace FCU.  
Replace Engine Electronic Control Unit (FADEC).  
Replace Fuel Metering Unit (FADEC).  
Replace engine driven pump.  
Clean/test fuel nozzles.  
Clean/replace filters.  
Adjust FCU.  
Troubleshoot faulty system.  
Functional test of FADEC.

### **Ignition systems, piston**

Change magneto.  
Change ignition vibrator.  
Change plugs.  
Test plugs.  
Check High Tension. leads.  
Install new leads.  
Check timing.  
Check system bonding.  
Troubleshoot faulty system.

### **Ignition systems, turbine**

Perform functional test of the ignition system.

Check glow plugs/igniters.  
Check High Tension leads.  
Check ignition unit.  
Replace ignition unit.  
Troubleshoot faulty system.

### **Engine Controls**

Rig thrust lever  
Rig RPM control.  
Rig mixture HP cock lever.  
Rig power lever.  
Check control sync (multi-eng).  
Check controls for correct assembly and locking.  
Check controls for range and direction of movement.  
Adjust pedestal micro-switches.  
Troubleshoot faulty system.

### **Engine Indicating**

Replace engine instrument(s).  
Replace oil temperature bulb.  
Replace thermocouples.  
Check calibration.  
Troubleshoot faulty system.

### **Exhaust, piston**

Replace exhaust gasket.  
Inspect welded repair.  
Pressure check cabin heater muff.  
Troubleshoot faulty system.

### **Exhaust, turbine**

Change jet pipe.  
Change shroud assembly.  
Install trimmers.  
Inspect/replace thrust reverser.  
Inspect/replace variable nozzle section  
Replace thrust reverser component.  
Deactivate/reactivate thrust reverser.  
Operational test of the thrust reverser system.

### **Oil**

Change oil.  
Check filter(s).  
Adjust pressure relief valve.  
Replace oil tank.  
Replace oil pump.  
Replace oil cooler.



Replace firewall shut off valve.  
Perform oil dilution test.  
Troubleshoot faulty system.

### **Starting**

Replace starter.  
Replace start relay.  
Replace start control valve.  
Check cranking speed.  
Troubleshoot faulty system.

### **Turbines, piston engines**

Replace turbo-blower.  
Replace heat shields.  
Replace waste gate.  
Adjust density controller.

### **Engine water injection**

Replace water/methanol pump.  
Flow check water/methanol system.  
Adjust water/methanol control unit.  
Check fluid for quality.  
Troubleshoot faulty system

### **Accessory gear boxes**

Replace gearbox.  
Replace drive shaft.  
Inspect magnetic chip detector.

### **APU**

Removal/installation of the APU.  
Removal/installation of the inlet guide-vane actuator.  
Operational test of the APU emergency shut-down test.  
Operational test of the APU.

### **Attack systems**

Replace Head Up Display.  
Replace Map / Tactical Situation Display.  
Replace Multi-function Display.  
Replace Weapons Management Display.  
Removal/installation/functional check of laser designator systems.

**Radar / surveillance**

Functional check of air to air radar.  
Functional check of air to surface / terrain following / mapping radars.  
Functional check of weather radar.  
Removal/installation/functional check of FLIR.  
Removal/installation/functional check of Electro-Optical cameras.

**Weapon systems**

Removal/installation of guns/cannons.  
Removal/installation of mission specific equipment.  
Harmonisation/calibration of weapon aiming devices.  
Removal/installation/functional check of interface between mission computer and missiles/bombs/rockets/pods.

**Crew escape**

Removal/installation of ejection seats.  
Removal/installation of crew survival kits.  
Inspection of canopy/window jettison devices.

**Reconnaissance**

Removal/installation/functional check of cameras / reconnaissance pods.

**Electronic warfare**

Removal/installation of chaff/flares dispenser.  
Removal/installation/functional check of Electronic Counter Measures systems.  
Removal/installation/functional check of missile warning systems.

### **Appendix III - Evaluation of the competence: assessment and assessors**

This Appendix applies to the competence assessment performed by the designated assessors (and their qualifications).

#### **1) What does “competence” mean and areas of focus for assessment?**

The assessment should aim at measuring the competence by evaluating three major factors associated to the learning objectives:

- Knowledge;
- Skills;
- Attitude;

Generally, knowledge is evaluated by examination. The purpose of this document is not to describe the examination process: this material mainly addresses the evaluation of “skills” and “attitude” after training containing practical elements. Nevertheless, the trainee needs to demonstrate to have sufficient knowledge to perform the required tasks.

“Attitude” is indivisible from the “skill” as this greatly contributes to the safe performance of the tasks.

The evaluation of the competence should be based on the learning objectives of the training, in particular:

- the (observable) desired performance. This covers what the trainee is expected to be able to do and how the trainee is expected to behave at the end of the training;
- the (measurable) performance standard that must be attained to confirm the trainee’s level of competence in the form of tolerances, constraints, limits, performance rates or qualitative statements; and
- the conditions under which the trainee will demonstrate competence. Conditions consist of the training methods, the environmental, situational and regulatory factors.

The assessment should focus on the competencies relevant to the aircraft type and its maintenance such as, but not limited to:

- Environment awareness (act safely, apply safety precautions and prevent dangerous situations);
- Systems integration (demonstrate understanding of aircraft systems interaction – identify, describe, explain, plan, execute);

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- Knowledge and understanding of areas requiring special emphasis or of novelty (areas peculiar to the aircraft type, domains not covered by EMAR 66 Appendix I, practical training elements that cannot be imparted through simulation devices, etc.);
- Using reports and indications (the ability to read and interpret);
- Aircraft documentation finding and handling (identify the appropriate aircraft documentation, navigate, execute and obey the prescribed maintenance procedures);
- Perform maintenance actions (demonstrate safe handling of aircraft, engines, components and tools);
- Aircraft final/close-up and report (apply close-up, initiate appropriate actions/follow-up/records of testing, establish and sign maintenance records/logbooks).

### 2) How to assess

As far as feasible, the objectives of the assessment should be associated with the learning objectives and the passing level; it means that observable criteria should be set in order to measure the performance and should remain as objective as possible.

The general characteristics of effective assessment are: objective, flexible, acceptable, comprehensive, constructive, organised and thoughtful. At the conclusion, the trainee should have no doubt about what he/she did well, what he/she did poorly and how he/she can improve.

The following is a non-exhaustive list of questions that may be asked to assist assessment:

- What are the success factors for the job?
- What are typical characteristics of a correct behaviour for the task?
- What criteria should be observed?
- What level of expertise is expected?
- Is there any standard available?
- What is the pass mark? For example:
  - “Go-no go” situation;
  - How to allocate points? Minimum amount to succeed;
  - “Must know or execute” versus “Good to know or execute” versus “Don’t expect the candidate to be an expert”.

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- Minimum or maximum time to achieve? Use time effectively and efficiently.
- What if the trainee fails? How many times is the trainee allowed to fail?
- When and how should the trainee be prepared for the assessment?
- What proportion of judgment by the instructor out of collaboration with the trainee is needed during the evaluation stage?

The assessment may be:

- diagnostic (prior to a course), formative (re-orientate the course on areas where there is a need to reinforce) or summative (partial or final evaluation);
- performed task-by-task, as a group of tasks or as a final assessment;

One method might be an initial assessment to be performed by the trainee himself, then discussing areas where the perceptions of the trainee's performance by the assessors differ in order to:

- develop the self-assessment habits;
- make the assessment more acceptable and understandable to both parties.

In addition, many other aspects should be appropriately considered during the assessment process such as stress and environmental conditions, difficulty of the test, history of evaluation (such as tangible progresses or sudden and unexpected poor performance made by the trainee), amount of time necessary to build competence, etc.

All these reasons place more emphasis on the competence of the assessor.

### 3) Who should assess

In order to qualify, the assessor should:

- Be proficient and have sufficient experience and knowledge in:
  - human performance and safety culture;
  - the aircraft type;
  - training/coaching/testing skills;
  - instructional tools to use;
- Understand the objective and the content of the practical elements of the training that is being assessed;

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- Have interpersonal skills to manage the assessment process (professionalism, sincerity, objectivity and neutrality, analysis skills, sense of judgement, flexibility, capability of evaluating the supervisor's or instructor's reports, handling of trainee's reactions to failing an assessment taking into account the trainee's cultural environment, being constructive, etc.);
- Be ultimately designated by the organisation to carry out the assessment.

The roles may be combined for:

- the assessor and the instructor for the practical elements of the Military Aircraft Type Rating Training; or
- the assessor and the supervisor for the On-the-Job Training

provided that the objectives associated to each role are clearly understood and that the competence and qualification criteria according to the organisation's procedures are met for both functions. Whenever possible (depending on the size of the organisation), it is recommended to split the roles (two different persons) in order to avoid any conflict of interests.

When the functions are not combined, the role of each function should be clearly understood.

# GUIDANCE MATERIAL

## SECTION A

### TECHNICAL REQUIREMENTS

#### GM 66.A.3 MAML categories

Individual Military Aircraft Maintenance Licence (MAML) holders need not be restricted to a single category. Provided that each qualification requirement is satisfied, any combination of categories may be granted.

#### GM 66.A.20(a) Privileges

1. The following definitions apply:

**Electrical system** means the aircraft electrical power supply source, plus the distribution system to the different components contained in the aircraft and relevant connectors. Lighting systems are also included in this definition. When working on cables and connectors which are part of these electrical systems, the following typical practices are included in the privileges:

- Continuity, insulation and bonding techniques and testing;
- Crimping and testing of crimped joints;
- Connector pin removal and insertion;
- Wiring protection techniques.

**Avionics system** means an aircraft system that transfers, processes, displays or stores analogue or digital data using data lines, data buses, coaxial cables, wireless or other data transmission medium, and includes the system's components and connectors. Examples of avionics systems include the following:

- Autoflight;
- Communication, Radar and Navigation;
- Instruments (see NOTE below);
- Integrated Modular Avionics (IMA);
- On-Board Maintenance Systems;
- Information Systems;
- Fly-by-Wire Systems (related to S1000D“Flight Controls”);
- Fibre Optic Control Systems.

NOTE: Instruments are formally included in the privileges of the B2 MAML holders. However, maintenance on electro-mechanical and pitot-static components may also be released by a B1 MAML holder.

**Armament, rescue and escape systems and other military-specific systems** means systems associated with the carriage, targeting and release of weapons; reconnaissance and surveillance equipment; self-protection, electronic warfare and aircrew escape systems. Examples of armament, rescue and escape systems and other military-specific systems include the following:

- weapons;
- weapons release/launch mechanisms;
- Ejection seats.

**Simple test** means a test described in approved maintenance data and meeting all the following criteria:

- The serviceability of the system can be verified using aircraft controls, switches, Built-in Test Equipment (BITE), Central Maintenance Computer (CMC) or external test equipment not involving special training;
- The outcome of the test is a unique go–no go indication or parameter, which can be a single value or a value within an interval tolerance. No interpretation of the test result or interdependence of different values is allowed;
- The test does not involve more than 10 actions as described in the approved maintenance data (not including those required to configure the aircraft prior to the test, i.e. jacking, flaps down, etc., or to return the aircraft to its initial configuration). Pushing a control, switch or button, and reading the corresponding outcome may be considered as a single step even if the maintenance data shows them separated.

**Troubleshooting** means the procedures and actions necessary to identify the root cause of a defect or malfunction using approved maintenance data. It may include the use of BITE or external test equipment.

**Line maintenance** means any maintenance that is carried out before flight to ensure that the aircraft is fit for the intended flight. It may include:

- troubleshooting;
- defect rectification;
- component replacement with the use of external test equipment, if required. Component replacement may include components such as engines and propellers;



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- scheduled maintenance and/or checks including visual inspections that will detect obvious unsatisfactory conditions/discrepancies but do not require extensive in-depth inspection. It may also include internal structure, systems and powerplant items which are visible through quick opening access panels/doors;
- minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means.

**Base Maintenance** means any task falling outside the criteria that are given above for *Line Maintenance*.

### 2. NOT APPLICABLE.

3. The Category C MAML permits certification of scheduled base maintenance by the issue of a single “certificate of release to service for aircraft” after the completion of all such maintenance. The basis for this certification is that the maintenance has been carried out by competent mechanics and Category B1, B2 support staff, as appropriate, who have signed for the maintenance tasks under their respective specialisation. The principal function of the Category C certifying staff is to ensure that all required maintenance has been called up and signed off by the Category B1, B2 support staff, as appropriate, before issue of the “certificate of release to service for aircraft”. Only Category C personnel who also hold the appropriate Category B1 or B2 endorsement may perform both roles in base maintenance.

### GM 66.A.20(b)2 Privileges

The sentence “*met the provision for the issue of the appropriate privileges*” included in EMAR 66.A.20(b)2 means that during the previous 2 years the person has met all the requirements for the endorsement of the corresponding Military Aircraft Type Rating. This supersedes the need for 6 months of experience for the first 2 years. However, the requirement of 6 months of experience in the preceding 2 years will need to be met after the second year.

### GM 66.A.20(b)4 Privileges

1. Holders of a MAML may only exercise certification privileges when they have a general knowledge of the language used within the maintenance environment including knowledge of common aeronautical terms in the language. The level of knowledge should be such that the MAML holder is able to:

- read and understand the instructions and technical manuals used for the performance of maintenance;
- make written technical entries and any maintenance documentation entries, which can be understood by those with whom they are normally required to communicate;
- read and understand the AMO procedures;

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- communicate at such a level so as to prevent any misunderstanding when exercising certification privileges.

2. In all cases, the level of understanding should be compatible with the level of certification privileges exercised.

### **GM 66.A.25(a) Basic knowledge requirements**

The levels of knowledge for each MAML (sub)category are directly related to the complexity of the certifications related to the corresponding MAML (sub)category, which means that Category A should demonstrate a limited but adequate level of knowledge, whereas Category B1 and B2 should demonstrate a complete level of knowledge in the appropriate subject modules.

### **GM 66.A.25(d) Basic knowledge requirements**

Where the relevant basic knowledge requirements remain unchanged, no additional training is required for credit renewal.

### **GM 66.A.30(a) Basic experience requirements**

1. While an applicant for a Category C MAML may be qualified by having 3 years' experience as a Category B1 or B2 certifying staff only in line maintenance, it is however recommended that any applicant for a Category C holding a B1 or B2 MAML demonstrate at least 12 months experience as a B1 or B2 support staff.

2. A 'skilled worker' is a person who has successfully completed training acceptable to the NMAA and involving the manufacture, repair, overhaul or inspection of mechanical, electrical, electronic or, where applicable, military-specific equipment. The training would include the use of tools and measuring devices.

3. Maintenance experience on operating military aircraft:

- Means the experience of being involved in maintenance tasks on aircraft which are being operated by the military and state aircraft;

- Should cover a wide range of tasks in length, complexity and variety;

- Aims at gaining sufficient experience in the real environment of military aircraft maintenance as opposed to only the training school environment;

- May be combined with EMAR 147 approved training so that periods of training can be intermixed with periods of experience, similar to an apprenticeship.

4. Within the meaning of [EMAR AMC 66.A.30\(a\)](#) paragraph 1, the term "engineering" refers to activities performed within an EMAR 145 organisation or within a CAMO that are associated with repairs and modifications (which may or may not need to be further processed for approval) in accordance with the MOE.

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5. Where the practical element of the Military Aircraft Type Training is performed concurrently with the OJT element and both are performed on the same military aircraft type and in a real maintenance environment, this can count towards the experience requirements detailed in EMAR 66.A.30.

### **GM 66.A.40 Continued validity of the Military Aircraft Maintenance Licence**

The validity of the MAML is not affected by recency of maintenance experience whereas the validity of the EMAR 66.A.20 privileges is affected by maintenance experience as specified in EMAR 66.A.20(b).

### **GM 66.A.45 Military Aircraft Type Ratings**

Moved to [EMAR AMC 66.A.45](#).

### **GM 66.A.70 Conversion provisions**

1. As described in point EMAR 66.A.70, the conversion provisions apply to the holder of a valid certifying staff qualification prior to the date of entry into force of EMAR 66. This means that the signature of that person was sufficient to declare that the maintenance had been properly performed and the aircraft was ready for service and fit for flight in respect to such maintenance.

2. The conversion applies to “certifying staff qualifications” such as, for example:

- Holding a pre-existing national licence or equivalent (or completed the process to obtain such a national licence);
- Having completed a qualification process defined by the NMAA to become certifying staff;
- Having completed the qualification requirements for certifying staff within an AMO, as defined in its procedures.

This does not mean that in order to be entitled to a conversion process, the applicant has to be exercising certification privileges. A person may hold a “certifying staff qualification” while not having certification privileges (or while exercising very limited certification privileges below his/her qualification) for different reasons such as, for example, the following:

- The person is working as “support staff” in the base maintenance environment;
- The person has been authorised only for a very limited range of tasks (lower than what he/she would be entitled if his/her qualification were considered) since the person is working in a line station where the scope of tasks is very limited;
- The person holds a licence or national equivalent with a wider scope than the scope of the organisation where he/she is employed;
- The person is working outside the military aviation environment or is temporarily on leave due to different reasons (medical, personal, etc.).

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These persons are entitled to have the conversion performed in accordance with the full scope of their qualification and the full privileges that they would be entitled to hold on the basis of such qualification.

3. NOT APPLICABLE.

4. Although only those “certifying staff qualifications” gained prior to the introduction of EMAR 66 are eligible for conversion, this does not mean that the application for conversion has to be submitted prior to those dates. The applicant is entitled to have the conversion performed irrespective of when he/she applies for conversion.

5. NOT APPLICABLE.

6. A limitation may be needed where a person holds a pre-existing licence or other qualification for the maintenance of aircraft which covered, to the standard of EMAR 66 Appendix I and II, all the modules/subjects corresponding to the B1 MAML except for electrical power systems. This person would receive an EMAR 66 MAML in the B1 Category with a limitation (exclusion) on electrical power systems.

For removal of limitations, refer to EMAR 66.A.50(c).

### **GM 66.A.70(c) Conversion provisions**

NOT APPLICABLE.

### **GM 66.A.70(d) Conversion provisions**

NOT APPLICABLE.

## SECTION B

### PROCEDURES FOR NATIONAL MILITARY AIRWORTHINESS AUTHORITIES

#### GM 66.B.200 Examination Standard

Paragraphs 1,2, 4 – 6 moved to [EMAR AMC 66.B.200](#)

3. The reason that oral type questions may not be used as the primary means of examination is because of the difficulty in establishing consistency of standards between knowledge examiners or from one day to another. However, nothing prevents knowledge examiners from meeting potential certifying staff for the purpose of ensuring those potential certifying staff understand their obligations and responsibilities in the application of the EMARs.

#### GM 66.B.300 General

NOT APPLICABLE.

#### GM 66.B.305(b)3 Conversion report for licences or other qualifications

In order to remove any limitation, full compliance with the missing modules of EMAR 66 needs to be demonstrated.

#### GM 66.B.310(b)3 Conversion report for Approved Maintenance Organisations authorisations

As conversions performed on the basis of EMAR 66.A.70 are aimed to maintain the privileges of the pre-existing authorisations, the limitations or extensions introduced on the EMAR 66 MAML are not linked to possible differences between the qualification required for the authorisation and the EMAR 66 MAML qualification. This conversion does not include such comparison.

In order to remove any limitation, full compliance with the missing modules of EMAR 66 needs to be demonstrated.

#### GM 66.B.410 Examination credit validity

In the case of credits expired in accordance with EMAR 66.A.25(d) and EMAR 66.B.410(b), the new application for credits will lead to a reassessment in accordance with EMAR 66.B.405 and EMAR 66.B.410 only in those cases where the requirements contained in Appendix I to EMAR 66 have changed. This may lead to a requirement for further examinations on particular modules/sub-modules/subjects.

#### GM 66.B.500 Revocation, suspension or limitation of the MAML

The NMAA may define the term 'negligent maintenance'.