

Singapore Airworthiness Requirements Part 66 Aircraft Maintenance Licensing

Publication of the
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SINGAPORE AIRWORTHINESS REQUIREMENTS

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Issue 2, Amendment 6 is dated 24 September 2021.

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SECTION 1 – REQUIREMENTS

SAR-66.1 General

- (a) The Air Navigation Order (ANO) paragraph 11 provides for the grant of an aircraft maintenance licence (which may include a rating limiting the licence to any particular type of aircraft or equipment) if the applicant is a fit and proper person to hold the licence and is qualified by his knowledge and experience to do so.
- (b) The ANO paragraph 17A provides for the issuance of the Singapore Airworthiness Requirements (SAR), which include SAR Part 66 (SAR-66) containing the requirements which shall be complied with by the applicant for, or holder of, an aircraft maintenance licence.
- (c) This SAR-66 contains the requirements for the grant of an aircraft maintenance licence and conditions of its validity and use, for aeroplanes and helicopters of the following categories:
- Category A
 - Category B1
 - Category B2
 - Category C
- (d) Categories A and B1 are subdivided into subcategories relative to combinations of aeroplanes, helicopters, turbine and piston engines. The subcategories are:
- A1 and B1.1 Aeroplanes Turbine
 - A2 and B1.2 Aeroplanes Piston
 - A3 and B1.3 Helicopters Turbine
 - A4 and B1.4 Helicopters Piston

SAR-66.3 Effectivity

- (a) The SAR-66 was first issued on 4 June 2004. SAR-66 Issue 2 was issued and effective on 15 August 2006. Amendment 1 was issued and became effective on 23 July 2010. Amendment 2 was issued and became effective on 18 June 2011. Amendment 3 was issued and became effective on 11 April 2012. Amendment 4 was issued and became effective on 8 March 2013. Amendment 5 was issued and effective on 5 October 2018.
- (b) Amendment 6 is issued and became effective on 24 September 2021.

SAR-66.5 Definitions

For the purpose of this SAR-66, the following definitions shall apply:

'Aircraft' means any machine that can derive support in the atmosphere from the reactions of the air other than reactions of the air against the earth's surface.

'Aircraft maintenance licence' or *'AML'* means an aircraft maintenance licence granted under paragraph 11 of the ANO, endorsed with the privileges associated with the appropriate category as specified in SAR-66.20.

'Approved maintenance organisation' means an organisation approved in accordance with paragraph 8A of the Air Navigation Order.

'Approved training' means training conducted under special curricula and supervision approved by the Chief Executive, that is conducted within an approved maintenance training organisation.

'Certification' means the issuance of a certificate of release to service.

'Certifying staff' means those personnel who are authorised by the SAR-145 approved maintenance organisation to certify an aircraft or aircraft components for release to service.

'Credit' means recognition of alternative means or prior qualifications.

'Large aircraft' means an aircraft, classified as an aeroplane with a maximum take-off mass of more than 5,700 kg, or a multi-engined helicopter.

'The Authority' means the Civil Aviation Authority of Singapore (CAAS) established under Section 4 of the Civil Aviation Authority of Singapore Act.

'Organisation procedures' means the procedures applied by the SAR-145 approved maintenance organisation in accordance with the maintenance organisation exposition within the scope of the approval.

SAR-66.10 Application and Issue

- (a) An application for a SAR-66 aircraft maintenance licence or a variation to such a licence to add or delete a category, a type rating or a limitation endorsed on the licence, or the conversion of a foreign aircraft maintenance licence to a SAR-66 aircraft maintenance licence must be made in a form and in a manner specified by the DGCA.
- (b) An applicant who meets the appropriate requirements of SAR-66 and has paid all charges prescribed by the Authority may be granted a SAR-66 aircraft maintenance licence.
- (c) Upon receiving a SAR-66 aircraft maintenance licence, the holder shall forthwith sign his name thereon in ink with his ordinary signature.
- (d) A SAR-66 aircraft maintenance licence is valid for a period of not more than 2 years from the date of issue or renewal unless suspended or revoked by the Authority.
- (e) An applicant for the grant of a SAR-66 aircraft maintenance licence must:
- (1) be at least 21 years of age;
 - (2) be able to read, write and communicate to an understandable level in English in which technical documentation and procedures necessary to support the issue of certificate of release to service are written; and
 - (3) be able to demonstrate a need to hold the licence.
- (f) An applicant for a conversion of a foreign AML must also provide evidence of experience in certifying an aircraft in the category and rating being applied for.
- (g) For the purposes of subparagraph (f), the DGCA may grant a licence with the category and type rating as appropriate to the evidence of experience and type/task training submitted.

SAR-66.20 Privileges

- (a) An aircraft maintenance licence may be granted in one or more of the following categories:
- (1) Category A – an aircraft maintenance licence which permits the holder to issue

certificates of release to service following minor scheduled line maintenance and completion of simple tasks in line and base maintenance, as specified in SAR-145, within the limits of tasks specifically endorsed on the certification authorisation. The certification privileges are restricted to work that the authorisation holder has personally performed.

- (2) Category B1 – an aircraft maintenance licence which permits the holder to issue certificates of release to service and to act as B1 support staff following maintenance of the aircraft structure, powerplant, mechanical and electrical systems. Certification of work on avionics systems requiring only simple tests to prove their serviceability are also included in the privileges. Troubleshooting on avionics systems is not allowed. Category B1 shall automatically include the appropriate A subcategory.
 - (3) Category B2 – an aircraft maintenance licence which permits the holder to issue certificates of release to service and to act as B2 support staff following:
 - maintenance of avionics and electrical systems; and
 - performance of electrical and avionics tasks within powerplant and mechanical systems, requiring only simple tests to prove their serviceability.
 - (4) Category C – an aircraft maintenance licence which permits the holder to issue certificates of release to service following base maintenance on aircraft. The privileges apply to the aircraft in its entirety in a SAR-145 organisation.
 - (5) Notwithstanding sub-paragraph (3), the holder of a category B2 aircraft maintenance licence issued or renewed before 8 March 2013 shall have his privileges limited to the issuance of a certificate of release to service and to act as B2 support staff following maintenance of avionics and electrical systems. The limitations on the privileges may be removed at the next licence renewal or variation.
- (b) The holder of an aircraft maintenance licence may not exercise certification privileges unless:

- (1) he or she is in compliance with the applicable requirements of SAR-145; and
- (2) in the preceding 2-year period, he or she has had 6 months of maintenance experience relevant to the privileges of his or her aircraft maintenance licence.

Note: The aircraft maintenance licence alone does not permit the holder to issue certificates of release to service in respect of aircraft. To issue a certificate of release to service for such aircraft, the aircraft maintenance licence holder must in addition hold a SAR-145 certification authorisation with the appropriate privileges issued by the SAR-145 approved maintenance organisation.

- (c) Certifications shall be made in accordance with the procedures of the approved organisation and within the scope of the certification authorisation.

SAR-66.25 Basic knowledge requirements

- (a) An applicant for an aircraft maintenance licence or to vary the aircraft maintenance licence to add a category or subcategory to such an aircraft maintenance licence shall demonstrate knowledge of the appropriate subjects listed in Appendix 1, by taking the examinations in accordance with the standard set out in Appendix 2 of this SAR-66.
- (b) - *deleted* -
- (c) Full or partial credit against the basic knowledge requirements and associated examination may be given for any other technical qualification considered by the Authority to be equivalent to the SAR-66 knowledge standard.
- (ca) A basic knowledge examination for each module comprises of a Multiple Choice Question (MCQ) examination paper with the exception of Module M07, Modules M09 and M10, which comprise an MCQ examination paper each and a combined essay examination paper (the M50 paper).
- (d) For the purpose of an application for an aircraft maintenance licence or the addition of a category or subcategory to such an aircraft maintenance licence, a pass in a basic knowledge examination paper for all subject modules is valid for a period of 10 years, except for passes in the examination papers for Human Factors (Module M09) and Aviation Legislation (Module M10), where a pass in the MCQ examination paper and the

M50 essay examination paper are each valid for 5 years.

- (e) A person who fails a basic knowledge examination twice within a 3-month period shall be ineligible to reapply for that examination for 3 months.

SAR-66.30 Experience requirements

- (a) An applicant for an aircraft maintenance licence shall have acquired:
 - (1) for category A and subcategories B1.2 and B1.4:
 - (i) 3 years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or
 - (ii) 2 years of practical maintenance experience on operating aircraft and completion of training considered relevant by the Authority as a skilled worker in a technical trade; or
 - (iii) 1 year of practical maintenance experience on operating aircraft and completion of a SAR-147 approved basic training course.
 - (2) for category B2 and subcategories B1.1 and B1.3:
 - (i) 5 years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or
 - (ii) 3 years of practical maintenance experience on operating aircraft and completion of training considered relevant by the Authority as a skilled worker, in a technical trade; or
 - (iii) 2 years of practical maintenance experience on operating aircraft and completion of a SAR-147 approved basic training course.
 - (3) for category C with respect to large aircraft:
 - (i) 3 years of experience exercising category B1.1, B1.3 or B2 privileges on large aircraft or as SAR-145 B1.1, B1.3 or B2 support staff working on large aircraft, or, a combination of both; or

- (ii) 5 years of experience exercising category B1.2 or B1.4 privileges on large aircraft or as SAR-145 B1.2 or
- (4) for category C with respect to aircraft other than large aircraft: 3 years of experience exercising category B1 or B2 privileges on aircraft other than large aircraft or as SAR-145 B1 or B2 support staff working on aircraft other than large aircraft, or a combination of both.
- (5) for category C obtained through the academic route: an academic degree in a technical discipline, from a university recognised by the Authority, and 3 years of experience working in a civil aircraft maintenance environment on a representative selection of tasks directly associated with aircraft maintenance, including 6 months of observation of base maintenance tasks.
- (b) An applicant for an addition of a category or subcategory to an aircraft maintenance licence shall have a minimum civil aircraft maintenance experience requirement appropriate to the additional category or subcategory of licence applied for as defined in Appendix 4 to this SAR-66.
- (c) For categories A, B1 and B2, the experience must be practical which means being involved with a representative cross section of maintenance tasks on operating aircraft.
- (d) For category A and subcategories B1.2 and B1.4, at least 1 year of the required practical maintenance experience must be recent maintenance experience on aircraft of the category/subcategory for which the initial aircraft maintenance licence is sought. For category B2 and subcategories B1.1 and B1.3, at least 2 years of the required practical maintenance experience must be recent maintenance experience on aircraft of the category/subcategory for which the initial aircraft maintenance licence is sought. For subsequent category/subcategory addition to an existing aircraft maintenance licence, the entire duration of maintenance experience as required in Appendix 4 to this SAR-66 must be recent. The required practical maintenance experience must be dependent upon the difference between the licence category/subcategory held and applied for. All recent practical maintenance experience must be demonstrated in a manner acceptable to the Authority.
- (e) For category C to be obtained through academic route, the 6 months of observation of base maintenance tasks as required in

B1.4 support staff working on large aircraft, or a combination of both.

SAR-66.30(a)(5) must be demonstrated in a manner acceptable to the Authority.

- (f) Notwithstanding paragraph (a), aircraft maintenance experience gained outside a civil aircraft maintenance environment may be accepted by the Authority when satisfied that such experience is equivalent to that required by SAR-66. Additional recent practical maintenance experience on the maintenance of civil aircraft shall, however, be required to ensure understanding of the civil aircraft maintenance environment.

SAR-66.40 Continuity of the aircraft maintenance licence

- (a) The aircraft maintenance licence holder shall inform the Authority of any change in the particulars which will affect the information contained in the licence.
- (b) The aircraft maintenance licence holder shall apply to the Authority to renew his licence within the 3-month period before the date of expiry of the licence.
- (c) An aircraft maintenance licence will be renewed provided the applicant is not suffering from any disability likely to adversely affect his or her technical skill or judgment.
- (d) Notwithstanding sub-paragraph (c), an aircraft maintenance licence held by a person who is not a Singapore citizen or permanent resident may not be renewed unless the licence holder is working for a CAAS approved organisation.
- (e) Failure to renew the aircraft maintenance licence shall invalidate any certification authorisation issued on the basis of such aircraft maintenance licence and may require recent aircraft maintenance experience and/or the re-sit of some examinations before re-issue of the licence. The Authority will decide for each particular case.

SAR-66.45 Type/task training and ratings

- (a) The holder of a category A aircraft maintenance licence may only exercise certification privileges on a specific aircraft type following the satisfactory completion of the relevant category A aircraft task training carried out by an appropriately approved SAR-145 or SAR-147 organisation. The training shall include theoretical training and practical hands-on training as appropriate for each task authorised. Satisfactory completion

- of training shall be demonstrated by an examination and/or by workplace assessment carried out by an appropriately approved SAR-145 or SAR-147 organisation.
- (b) Except as otherwise specified in paragraph (g), the holder of a category B1, B2 or C aircraft maintenance licence shall only exercise certification privileges on a specific aircraft type when the aircraft maintenance licence is endorsed with the appropriate aircraft type rating.
- (c) Except as otherwise specified in paragraph (h), ratings shall be granted following satisfactory completion of the relevant category B1, B2 or C aircraft type training accepted by the Authority, or conducted by an appropriately approved SAR-147 maintenance training organisation.
- (d) Category B1 and B2 approved type training shall include theoretical and practical elements and consist of the appropriate course in relation to the 66.20(a) privileges. Theoretical and practical training shall comply with Appendix 3 to this SAR-66.
- (e) The first type training for a holder of an academic degree seeking a category C licence as specified in 66.30(a)(5) must include both theoretical and practical training at either category B1 or B2 level.
- (f) Completion of approved aircraft type training, as required by paragraphs (b) to (e), shall be demonstrated by an examination. The examination shall comply with Appendix 3 to this SAR-66. The examinations in respect of category B1 or B2 or C aircraft type ratings shall be conducted by training organisations appropriately approved under SAR-147, the Authority, or the training organisation accepted by the Authority to conduct the approved type training course.
- (g) Notwithstanding paragraph (b), for aircraft other than large aircraft, the holder of a category B1, B2 or C aircraft maintenance licence may also exercise certification privileges, when the aircraft maintenance licence is endorsed with the appropriate group ratings, or manufacturer group ratings, unless the Authority has determined that the complexity of the aircraft in question requires a type rating.
- (1) Manufacturer group ratings may be granted after complying with the type rating requirements of 2 aircraft types representative of the group from the same manufacturer.
- (2) Full group ratings may be granted after complying with the type rating requirements of 3 aircraft types representative of the group from different manufacturers. However, no full group rating may be granted to B1 multiple turbine engine aeroplanes, where only manufacturer group rating applies.
- (3) The groups shall consist the following:
- (i) for category B1 or C:
- helicopter piston engine
 - helicopter turbine engine
 - aeroplane single piston engine - metal structure
 - aeroplane multiple piston engines - metal structure
 - aeroplane single piston engine - wooden structure
 - aeroplane multiple piston engines - wooden structure
 - aeroplane single piston engine - composite structure
 - aeroplane multiple piston engines - composite structure
 - aeroplane turbine - single engine
 - aeroplane turbine - multiple engine
- (ii) for category B2 or C:
- aeroplane
 - helicopter
- (h) Notwithstanding paragraph (c), ratings on aircraft other than large aircraft may also be granted, subject to satisfactory completion of the relevant category B1, B2 or C aircraft type examination and demonstration of practical experience on the aircraft type, unless the Authority has determined that the aircraft is complex, where paragraph (c) approved type training is required. In the case of category C ratings on aircraft other than large aircraft, for a person qualified by holding an academic degree as specified in 66.30(a)5, the first relevant aircraft type examination shall be at the category B1 or B2 level.

- (1) Category B1, B2 and C approved type examinations must consist of a mechanical examination for category B1 and an avionics examination for category B2 and both mechanical and avionics examination for category C.
- (2) The examination shall comply with Appendix 3 to this SAR-66. The examination may be conducted by the Authority, approved training organisations, or organisations accepted by the Authority.
- (3) Aircraft type practical experience shall include a representative cross section of maintenance activities relevant to the category.

authorisation is a fit and proper person to hold such licence and authorisation.

- (b) In the case where the Authority has determined that the safe operation of the aircraft is adversely affected the Authority may provisionally suspend the aircraft maintenance licence without prior notice.
- (c) The holder of an aircraft maintenance licence that has been suspended or revoked shall forthwith forward the licence to the Authority.

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SAR-66.50 Medical fitness

Certifying staff must not exercise the privileges of their certification authorisation if they know or suspect that their physical or mental condition renders them unfit to exercise such privileges.

SAR-66.55 Evidence of qualification

Certifying staff qualified in accordance with this SAR-66 may be issued with an aircraft maintenance licence by the Authority as evidence of one of the qualifications necessary for the grant of a SAR-145 certification authorisation. Certifying staff must be able to produce their licence if requested by an authorised person within a reasonable time.

SAR-66.60 Equivalent safety cases

The Authority may exempt any person, required to be qualified in accordance with SAR-66, from any requirement in SAR-66 when satisfied that a situation exists not covered by SAR-66 and subject to compliance with any supplementary condition(s) the Authority considers necessary to ensure equivalent safety.

SAR-66.65 Revocation, suspension or limitation of the SAR-66 aircraft maintenance licence

- (a) The Authority may, on reasonable grounds after due enquiry, revoke, suspend or limit the aircraft maintenance licence or direct the SAR-145 approved maintenance organisation to revoke, suspend or limit the SAR-145 certification authorisation if the Authority is not satisfied that the holder of the licence and

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APPENDIX 1

BASIC KNOWLEDGE REQUIREMENTS

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2. SAR-66 AML EXAMINATION MODULES

Qualification on basic subjects for each aircraft maintenance licence category or subcategory must be in accordance with the following matrix. Applicable subjects are indicated by an 'X':

Module No.	Module Name	Cat A or B1 Aeroplanes with:		Cat A or B1 Helicopters with:		Cat B2
		Turbine Engine	Piston Engine	Turbine Engine	Piston Engine	Avionics
M01	Mathematics	X	X	X	X	X
M02	Physics	X	X	X	X	X
M03	Electrical Fundamentals	X	X	X	X	X
M04	Electronic Fundamentals	X	X	X	X	X
M05	Digital Techniques / Electronic Instrument Systems	X	X	X	X	X
M06	Materials and Hardware	X	X	X	X	X
M07	Maintenance Practices	X	X	X	X	X
M08	Basic Aerodynamics	X	X	X	X	X
M09	Human Factors	X	X	X	X	X
M10	Aviation Legislation	X	X	X	X	X
M11A	Turbine Aeroplane Aerodynamics, Structures and Systems	X				
M11B	Piston Aeroplane Aerodynamics, Structures and Systems		X			

Module No.	Module Name	Cat A or B1 Aeroplanes with:		Cat A or B1 Helicopters with:		Cat B2
		Turbine Engine	Piston Engine	Turbine Engine	Piston Engine	Avionics
M12	Helicopter Aerodynamics, Structures and Systems			X	X	
M13	Aircraft Aerodynamics, Structures and Systems					X
M14	Propulsion					X
M15	Gas Turbine Engine	X		X		
M16	Piston Engine		X		X	
M17 ¹	Propeller	X	X			

¹ Candidates who do not have examination credit in Module 17 may be considered for the grant of a SAR-66 Category A1 or B1.1 licence with limitation against propeller.

SINGAPORE AIRWORTHINESS REQUIREMENTS**SAR 66****APPENDIX 2****BASIC EXAMINATION STANDARD****1 Standardisation Basis for Examinations**

- 1.1 All basic examinations will be in multiple-choice or essay question format as specified below.
- 1.2 Each multiple-choice question will have three answers of which only one is correct. The candidate is allowed a total time per module based on a nominal average of 75 seconds per question.
- 1.3 Each essay question requires the preparation of a written answer and the candidate will be allowed 30 minutes to answer each question.
- 1.4 The pass mark for each SAR-66 module is 75 %.
- 1.5 Penalty marking will not be applied on the multiple-choice papers.
- 1.6 The answer to an essay question is expected to follow a 'report' style that presents a logical progression from introduction to conclusion. The essay will be marked for contents and overall presentation. Contents will account for 60 % of the marks, while overall presentation will account for the remaining 40 %.
- 1.7 To pass an essay examination paper, besides obtaining an overall score of 75 %, the candidate must also obtain at least 75 % in each question in the paper.
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- 1.9 - *deleted* -
- 1.10 - *deleted* -
2. -*deleted* -
3. -*deleted* -
- 3.1 -*deleted* -

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APPENDIX 3

TYPE TRAINING AND EXAMINATION STANDARD

1 Type training levels

The three levels listed below define the objectives that a particular level of training is intended to achieve.

LEVEL 1 **General Familiarisation** - A brief overview of the airframe, systems and powerplants as outlined in the Systems Description Section of the Aircraft Maintenance Manual.

Objectives: Upon completion of the course, the student will be able to:

1. Identify safety precautions related to the airframe, its systems and powerplant.
2. Identify maintenance practices important to the airframe, its systems and powerplant.
3. Define the general layout of the aircraft's major systems.
4. Define the general layout and characteristics of the powerplant.
5. Identify special tooling and test equipment used with the aircraft.

LEVEL 2 **Ramp and Transit** - Basic system overview of controls, indicators, principal components including their location and purpose, servicing and minor troubleshooting.

Objectives: In addition to the information contained in the Level 1 General Familiarisation course, at the completion of this Level 2 Ramp and Transit training, the student will be able to:

1. Recall the safety precautions to be observed when working on or near the aircraft, powerplant and systems.
2. Demonstrate knowledge of the main ramp and transit (through-flight) activities of the following:
 - (a) Doors, windows and hatches;
 - (b) Electrical power supplies;
 - (c) Fuel;
 - (d) Auxiliary power unit;
 - (e) Powerplant;
 - (f) Fire protection;
 - (g) Environmental Control Systems;
 - (h) Hydraulic power;
 - (i) Landing gear;
 - (j) Flight controls;
 - (k) Water/waste;

- (l) Oxygen;
 - (m) Flight and service interphone;
 - (n) Avionics; and
 - (o) Cabin equipment/furnishings.
3. Describe systems and aircraft handling particularly access, power availability and sources.
 4. Identify the locations of the principal components.
 5. Explain the normal functioning of each major system, including terminology and nomenclature.
 6. Perform the procedures for ramp and transit servicing associated with the aircraft for the following systems: Fuel, Power Plants, Hydraulics, Landing Gear, Water/Waste, and Oxygen.
 7. Demonstrate proficiency in use of crew reports and on-board reporting systems (minor troubleshooting) and determine aircraft airworthiness per the MEL/CDL.
 8. Identify and use appropriate documentation.
 9. Locate those procedures for replacement of components for ramp and transit activities identified in objective 2.

LEVEL 3 ***Line and Base Maintenance Training*** - Detailed description, operation, component location, removal/installation, BITE and troubleshooting procedures to maintenance manual level.

Objectives: In addition to the information contained in Level 1 and Level 2 training, at the completion of Level III Line and Base Maintenance training, the student will be able to:

1. Perform system, engine, component and functional checks as specified in the maintenance manual.
2. Correlate information for the purpose of making decisions in respect of fault diagnosis and rectification to maintenance manual level.
3. Describe procedures for replacement of components unique to aircraft type.

2 Type training standard

Type training must include a theoretical and practical element.

2.1 Theoretical element

As a minimum, the elements in the syllabus below that are specific to the aircraft type must be covered. Additional elements introduced due to technological changes shall also be included.

Training levels are those levels defined in paragraph 1 above.

After the first type course for category C certifying staff all subsequent courses need only be to Level 1.

Introduction Module Title	
General Time limits/maintenance checks Levelling and weighing Towing and taxiing Parking/mooring Servicing Standard practices-only type particular B2 module-safety items/mechanical interface B1 module-safety items/avionics interface Aircraft(dimensions/weights MTOW etc)	

	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Blade tracking and vibration analysis	-	-	-	-	3	1	3	1	-
Transmissions	-	-	-	-	3	1	3	1	-
Airframe structure	-	-	-	-	3	1	3	1	1
Main rotor	-	-	-	-	3	1	3	1	-
Tail rotor/rotor drive	-	-	-	-	3	1	3	1	-
Rotor flight control	-	-	-	-	3	1	3	1	-
Airframe Structure	3	1	3	1	-	-	-	-	1
Fuselage Doors	3	1	3	1	-	-	-	-	-
Fuselage	3	1	3	1	-	-	-	-	-
Fuselage Windows	3	1	3	1	-	-	-	-	-
Wings	3	1	3	1	-	-	-	-	-
Stabilisers	3	1	3	1	-	-	-	-	-
Flight Control Surfaces	3	1	3	1	-	-	-	-	-
Nacelles/Pylons	3	1	3	1	-	-	-	-	-
Zonal & Station Identification Systems	1	1	1	1	1	1	1	1	1
Air Supply	3	1	3	1	3	1	3	1	1
Air Conditioning	3	1	3	1	3	1	3	1	1
Pressurisation	3	1	-	-	-	-	-	-	1
Safety & Warning Devices	3	1	-	-	-	-	-	-	1
Instrument Systems	3	1	3	1	3	1	3	1	3
Avionics Systems	2	1	2	1	2	1	2	1	3
Electrical Power	3	1	3	1	3	1	3	1	3
Equipment & Furnishings	3	1	3	1	3	1	3	1	-
Electronic Emergency Equip. Requirement & Cabin Entertainment Equipment	-	1	-	-	-	-	-	-	3
Fire Protection	3	1	3	1	3	1	3	1	1
Flight Controls	3	1	3	1	3	1	3	1	2
Sys. Operation: Electrical/Fly-by-Wire	3	1	-	-	-	-	-	-	3
Fuel Systems	3	1	3	1	3	1	3	1	1
Hydraulic Power	3	1	3	1	3	1	3	1	1
Ice & Rain Protection	3	1	3	1	3	1	3	1	1
Landing Gear	3	1	3	1	3	1	3	1	1

	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Lights	3	1	3	1	3	1	3	1	3
Oxygen	3	1	3	1	-	-	-	-	1
Pneumatic/Vacuum	3	1	3	1	3	1	3	1	1
Water/Waste	3	1	3	1	-	-	-	-	1
On-board Maintenance Systems	3	1	3	1	-	-	-	-	3
Turbine Engines:									
Constructional arrangement and operation	-	-	-	-	-	-	-	-	1
Engine Performance	3	1	-	-	3	1	-	-	1
Inlet	3	1	-	-	3	1	-	-	-
Compressors	3	1	-	-	3	1	-	-	-
Combustion Section	3	1	-	-	3	1	-	-	-
Turbine Section	3	1	-	-	3	1	-	-	-
Exhaust	3	1	-	-	3	1	-	-	-
Bearings and Seals	3	1	-	-	3	1	-	-	-
Lubricants and Fuels	3	1	-	-	3	1	-	-	-
Lubrication Systems	3	1	-	-	3	1	-	-	-
Fuel Systems	3	1	-	-	3	1	-	-	1
Engine controls	3	1	-	-	3	1	-	-	1
FADEC	2	1	-	-	2	1	-	-	3
Air Systems	3	1	-	-	3	1	-	-	-
Starting & Ignition Systems	3	1	-	-	3	1	-	-	-
Engine Indicating Systems	3	1	-	-	3	1	-	-	3
Power Augmentation Systems	3	1	-	-	-	-	-	-	-
Turbo-prop Engines	3	1	-	-	-	-	-	-	-
Turbo-shaft Engines	-	-	-	-	3	1	-	-	-
Auxiliary Power Units (APUs)	3	1	-	-	-	-	-	-	1
Powerplant Installation	3	1	-	-	3	1	-	-	-
Fire Protection Systems	3	1	-	-	3	1	-	-	1
Engine Monitoring and Ground Operation	3	1	-	-	3	1	-	-	-
Engine Storage and Preservation	3	1	-	-	3	1	-	-	-
Piston Engines:									
Engine Performance	-	-	3	1	-	-	3	1	1
Engine Construction	-	-	3	1	-	-	3	1	1
Engine Fuel Systems	-	-	3	1	-	-	3	1	1
Carburetors	-	-	3	1	-	-	3	1	-
Fuel injection systems	-	-	3	1	-	-	3	1	-
Engine Controls	3	1	-	-	3	1	-	-	1
FADEC	-	-	2	1	-	-	2	1	3
Starting and Ignition Systems	-	-	3	1	-	-	3	1	-
Induction, Exhaust and Cooling Systems	-	-	3	1	-	-	3	1	-
Supercharging/Turbocharging	-	-	3	1	-	-	3	1	-
Lubricants and Fuels	-	-	3	1	-	-	3	1	-
Lubrication Systems	-	-	3	1	-	-	3	1	-
Engine Indication Systems	-	-	3	1	-	-	3	1	3
Powerplant Installation	-	-	3	1	-	-	3	1	-
Engine Monitoring and Ground Operation	-	-	3	1	-	-	3	1	-
Engine Storage and Preservation	-	-	3	1	-	-	3	1	-
Propellers:									
Propeller — General	3	1	3	1	-	-	-	-	1
Propeller Construction	3	1	3	1	-	-	-	-	-
Propeller Pitch Control	3	1	3	1	-	-	-	-	-
Propeller Synchronising	3	1	3	1	-	-	-	-	-

	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Propeller Electronic Control	2	1	2	1	-	-	-	-	3
Propeller Ice Protection	3	1	3	1	-	-	-	-	-
Propeller Maintenance	3	1	3	1	-	-	-	-	-

2.2 Practical element

The practical training element must consist of the performance of representative maintenance tasks and their assessment in order to meet the following objectives:

- Ensure safe performance of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks such as engine run, etc, if required.
- Correctly use all technical literature and documentation for the aircraft.
- Correctly use specialist/special tooling and test equipment, perform removal and replacement of components and modules unique to type, including any on-wing maintenance activity.

3 Type training examination standard

Where aircraft type training is required, the examination must be written and complies with the following:

- Format of the examination is of the multiple-choice type. Each multiple-choice question must have three alternative answers of which only one must be the correct answer. The time for answering is based upon a nominal average of 120 seconds per level 3 question and 75 seconds per level 1 or 2 question.
- The examination must be of the closed book type. No reference material is permitted. An exception will be made or the case of examining a B1 or B2 candidate's ability to interpret technical documents.
- The number of questions must be at least one question per hour of instruction subject to a minimum of two questions per syllabus subject. The Authority will assess the number and level of questions on a sampling basis when approving the course.
- The examination pass mark is 75 %.
- Penalty marking will not to be used to determine whether a candidate has passed.
- End of module phase examinations cannot be used as part of the final examination unless they contain the correct number and level of questions required.

4. Type examination standard

Where type training is not required, the examination must be oral, written or practical assessment based, or a combination thereof.

Oral examination questions must be open.

Written examination questions must be essay type or multiple-choice questions.

Practical assessment must determine a person's competence to perform a task.

Examination subjects must be on a sample of subjects drawn from paragraph 2 type training/examination syllabus, at the indicated level.

The examination must ensure that the following objectives are met:

- (a) Properly discuss with confidence the aircraft and its systems.
- (b) Ensure safe performance of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks such as engine run, etc, if required.
- (c) Correctly use all technical literature and documentation for the aircraft.
- (d) Correctly use specialist/special tooling and test equipment, perform removal and replacement of components and modules unique to type, including any on-wing maintenance activity.

SINGAPORE AIRWORTHINESS REQUIREMENTS

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APPENDIX 4

EXPERIENCE REQUIREMENTS FOR EXTENDING AN AIRCRAFT MAINTENANCE LICENCE

- (1) The table below shows the experience requirements for adding a new category or subcategory to an existing SAR-66 licence.
- (2) The experience must be recent practical maintenance experience on operating aircraft in the category or subcategory relevant to the application.
- (3) The experience requirement will be reduced by 50 % if the applicant has completed an approved SAR-147 course relevant to the category or subcategory.

To:	A1	A2	A3	A4	B1.1	B1.2	B1.3	B1.4	B2
From:									
A1		6 months	6 months	6 months	2 years	6 months	2 years	1 year	2 years
A2	6 months		6 months	6 months	2 years	6 months	2 years	1 year	2 years
A3	6 months	6 months		6 months	2 years	1 year	2 years	6 months	2 years
A4	6 months	6 months	6 months		2 years	1 year	2 years	6 months	2 years
B1.1	None	6 months	6 months	6 months		6 months	6 months	6 months	1 year
B1.2	6 months	None	6 months	6 months	2 years		2 years	6 months	2 years
B1.3	6 months	6 months	None	6 months	6 months	6 months		6 months	1 year
B1.4	6 months	6 months	6 months	None	2 years	6 months	2 years		2 years
B2	6 months	6 months	6 months	6 months	1 year	1 year	1 year	1 year	

SINGAPORE AIRWORTHINESS REQUIREMENTS

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APPENDIX 5

PRACTICAL EXPERIENCE FOR AIRCRAFT OTHER THAN LARGE AIRCRAFT

LIST OF TASKS

Time limits/Maintenance checks

100 hour check (general aviation aircraft).
 'B' or 'C' check (transport category aircraft).
 Review records for compliance with airworthiness directives.
 Review records for compliance with component life limits.
 Procedure for inspection following heavy landing.
 Procedure for inspection following lightning strike.

Dimensions/Areas

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

Lifting and Shoring

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

Levelling/Weighing

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

Towing and Taxiing

Tow aircraft.
 Be part of aircraft towing team.

Parking and mooring

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

Placards and Markings

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

Servicing

Refuel aircraft.
 Defuel aircraft.
 Check tyre pressures.
 Check oil level.
 Check hydraulic fluid level.
 Check accumulator pressure.
 Charge pneumatic system.
 Grease aircraft.
 Connect ground power.
 Service toilet/water system.
 Perform pre-flight/daily check.

Vibration and Noise Analysis

Analyse helicopter vibration problem.
 Analyse noise spectrum.

Air Conditioning

Replace combustion heater.
 Replace outflow valve.
 Replace vapour cycle unit.
 Replace air cycle unit.
 Replace cabin blower.
 Replace heat exchanger.
 Replace pressurisation controller.
 Clean outflow valves.
 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.
 Check operation of auto-pilot.
 Check operation of auto-throttle.
 Check operation of yaw damper.
 Check and adjust servo clutch.
 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 VHF com unit.
 Replace HF com unit.
 Replace existing antenna.
 Replace static discharge wicks.
 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 generator/alternator.

Replace switches.
 Replace circuit breakers.
 Adjust voltage regulator.
 Amend electrical load analysis report.
 Repair/replace electrical feeder cable.
 Troubleshoot faulty 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.
 Repair upholstery.
 Change cabin configuration.

Fire protection

Check fire bottle contents.
 Check operation of warning system.
 Check cabin fire extinguisher contents.
 Check lavatory smoke detector system.
 Install new fire bottle.
 Replace fire bottle squib.
 Troubleshoot faulty system.
 Inspect engine fire wire detection systems.

Flight Controls

Replace horizontal stabiliser.
 Replace elevator.
 Replace aileron.
 Replace rudder.
 Replace trim tabs.
 Install control cable and fittings.
 Replace flaps.
 Replace powered flying control unit.
 Replace flat actuator.
 Adjust trim tab.
 Adjust control cable tension.
 Check control range and sense of movement.
 Check for correct assembly and locking.
 Troubleshoot faulty system.

Fuel

Replace booster pump.
 Replace fuel selector.
 Replace fuel tank cells.
 Check filters.
 Flow checks system.
 Check calibration of fuel quantity gauges.
 Check operation feed/selectors.
 Troubleshoot faulty system.

Hydraulics

Replace engine driven pump.
 Replace standby pump.
 Replace accumulator.
 Check operation of shut off valve.
 Check filters.
 Check indicating systems.
 Perform functional checks.
 Troubleshoot faulty system.

Ice and rain protection

Replace pump.
 Replace timer.
 Install wiper motor.
 Check operation of systems.
 Troubleshoot faulty system.

Indicating/recording systems

Replace flight data recorder.
 Replace cockpit voice recorder.
 Replace clock.
 Replace master caution unit.
 Replace FDR.
 Perform FDR data retrieval.
 Troubleshoot faulty system.
 Implement ESDS procedures.
 Inspect for HIRF requirements.

Landing Gear

Build up wheel.
 Replace main wheel.
 Replace nose wheel.
 Replace shimmy damper.
 Rig nose wheel steering.
 Replace shock strut seals.
 Replace brake unit.
 Replace brake control valve.
 Bleed brakes.
 Test anti skid unit.
 Test gear retraction.
 Change bungees.
 Adjust micro switches.
 Charge struts.
 Troubleshoot faulty system.
 Test out brake system.

Lights

Repair/replace rotating beacon.
 Repair/replace landing lights.
 Repair/replace navigation lights.
 Repair/replace interior 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 unit.
 Replace ADI.
 Replace HIS.
 Check pitot static system for leaks.
 Check operation of directional gyro.
 Functional check weather radar.
 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.
 Test AVM.

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 compressor.
 Recharge dessicator.
 Adjust regulator.
 Check for leaks.
 Troubleshoot faulty system.

Vacuum systems

Replace vacuum pump
 Check/replace filters
 Adjust regulator
 Troubleshoot faulty system

Water/Waste

Replace water pump.
 Replace tap.
 Replace toilet pump.
 Troubleshoot faulty system.

Central Maintenance System

Retrieve data from CMU.
 Replace CMU.
 Perform BITE check.
 Troubleshoot faulty system.

Airborne Auxiliary power

Install APU.
 Inspect hot section.
 Troubleshoot faulty system.

Structures

Sheet metal repair.
 Fibre glass repair.
 Wooden repair.
 Fabric repair.
 Recover fabric control surface.
 Treat corrosion.
 Apply protective treatment.

Doors

Rig/adjust locking mechanism.

Adjust air stair system.
 Check operation of emergency exits.
 Test door warning system.
 Troubleshoot faulty system.

Windows

Replace windshield.
 Replace window.
 Repair transparency.

Wings

Skin repair.
 Recover fabric wing.
 Replace tip.
 Replace rib.
 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.
 Dress out blade damage.
 Dynamically balance prop.
 Troubleshoot faulty system.

Main Rotors

Install rotor assembly.
 Replace blades.
 Replace damper assembly.
 Check track.
 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.

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

Build up ECU.
 Replace engine.
 Repair cooling baffles.
 Repair cowling.
 Adjust cowl flaps.
 Repair faulty wiring.
 Troubleshoot.

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.
 Hot section inspection.
 Engine ground run.
 Establish reference power.
 Trend monitoring/gas path analysis.
 Troubleshoot.

Fuel and control, piston

Replace engine driven pump.
 Adjust AMC.
 Adjust ABC.
 Install carburettor/injector.
 Adjust carburettor/injector.
 Clean injector nozzles.
 Replace primer line.
 Check carburettor float setting.
 Troubleshoot faulty system.

Fuel and control, turbine

Replace FCU.
 Replace engine driven pump.
 Clean/test fuel nozzles.
 Clean/replace filters.
 Adjust FCU.
 Troubleshoot faulty system.

Ignition systems, piston

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

Ignition systems, turbine

Check glow plugs/ignitors.
 Check H T 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 sense of operation.
 Adjust pedestal micro-switches.
 Troubleshoot faulty system.

Engine Indicating

Replace engine instruments(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.

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.
 Troubleshoot faulty system.

Starting

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

Turbines, piston engines

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

Engine water injection

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

Accessory gear boxes

Replace gearbox.
Replace drive shaft.
Check chip detector.

SINGAPORE AIRWORTHINESS REQUIREMENTS**SAR 66****SECTION 2 - ACCEPTABLE MEANS OF COMPLIANCE (AMC) AND
INTERPRETATIVE/EXPLANATORY MATERIAL (IEM)****1 GENERAL**

- 1.1 This section contains Acceptable Means of Compliance (AMC) and Interpretative/Explanatory Material (IEM) that have been included in the SAR-66 to assist holders of or applicants for an aircraft maintenance licence in meeting the necessary requirements.
- 1.2 Where a particular SAR paragraph does not have an Acceptable Means of Compliance or any Interpretative/Explanatory Material, it is considered that no supplementary material is required.
- 1.3 In addition, Advisory Circulars issued by the Authority may contain further Acceptable Means of Compliance and/or Interpretative/Explanatory Material.

2 PRESENTATION

- 2.1 The Acceptable Means of Compliance and Interpretative/Explanatory Material are presented in full-page width on loose pages, each page being identified by the date of issue or the change number under which it is amended or re-issued.
- 2.2 A numbering system has been used in which the Acceptable Means of Compliance and Interpretative Material uses the same number as the paragraph in SAR to which it refers. The number is preceded by the letters AMC or IEM to distinguish the material from the SAR itself.
- 2.3 The acronyms AMC and IEM also indicate the nature of the material and for this purpose the two types of material are defined as follows:
 - (a) Acceptable Means of Compliance (AMC) illustrate a means, or several alternative means, but not necessarily the only possible means by which a requirement can be met. It should however, be noted that where a new AMC is developed, any such AMC (which may be additional to an existing AMC) may be amended into the document or issued as a separate Advisory Circular.
 - (b) Interpretative/Explanatory Material (IEM) helps to illustrate the meaning of a requirement.
- 2.4 Explanatory notes not forming part of the AMC text appear in a smaller typeface.

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IEM 66.1 General

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AMC 66.10 Application and Issue

1 *-deleted-*

- 2 To demonstrate a need to hold a SAR-66 aircraft maintenance licence, the applicant must show that he or she is working for, or will be working for, a SAR-145 approved maintenance organisation.

AMC 66.20 (a) Privileges

- 1 Certifying staff may be granted a SAR-145 certification authorisation in relation to the SAR-66 category/subcategories held, subject to the aircraft maintenance licence being valid at the time of the issuance of the authorisation.

AMC 66.20 (a) (1) Privileges

- 1 For the purposes of category A, minor scheduled line maintenance means any scheduled minor check performed during line maintenance which are limited to the following groups of tasks:
- (a) Visual inspections that will detect obvious unsatisfactory conditions / discrepancies but do not require extensive in-depth inspection. The scope of these inspections may include internal structure, systems and powerplant items which are visible through quick opening access panels / doors;
 - (b) Tests that determine the serviceability of aircraft systems using switches, Built-In-Test-Equipment (BITE) or external test equipment not involving special training. The results of such a test must be a clear go-no go indication or parameter, which does not involve interpretations of the test results or is dependent on other test results; and
 - (c) Routine fluid servicing.
- 2 In addition to minor scheduled line maintenance, a category A certifying staff may also perform limited tasks in both line and base maintenance. This list of tasks is specified in SAR-145.
- 3 A category A certifying staff is not permitted to perform defect diagnosis, or supervise individuals and certify for their work.

AMC 66.20 (a) (2) Privileges

The category B1 licence also permits the certification of work involving avionic systems, provided the serviceability of the system can be established by a simple self-test facility, other on-board test systems/equipment or by simple ramp test equipment. Defect rectification involving test equipment which requires an element of decision making in its application - other than a simple go/no-go decision - cannot be certified.

AMC 66.20 (a) (3) Privileges

The category B2 licence holder will need to be qualified as category A in order to carry out simple mechanical tasks and be able to make certifications if he or she was needed to exercise the privileges of a category A licence holder.

AMC 66.20 (a) (4) Privileges

The category C certification authorisation permits the certification of scheduled base maintenance by the issue of a single certificate of release to service for the complete aircraft after the completion of all such maintenance. The basis for this certification is that the maintenance has been carried out by competent technicians and categories A, B1 and B2 staff have signed for the maintenance under their respective specialisations. 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 A, B1 and B2 staff before issue of the certificate of release to service. Category C personnel who also hold category B1 or B2 qualifications may perform both roles in base maintenance.

Note: It should be noted that the category C certifier is to be considered as a maintenance management role. Whilst category C certifying staff may also hold the appropriate category B1 or B2 type rated licences to act within base maintenance to support the category C signatory, the company should adopt procedures to prevent any conflict of interest, clearly stating that for any maintenance input the individual may work as either a category C signatory or a supporting category B1 or B2 signatory but not both. Licence holders should also be aware that such operations are unacceptable. The conflict of interest between doing the task and managing the task has been criticised previously in Air Accident Investigation Reports as a causal factor and companies should take steps to avoid this occurring.

IEM 66.20 (a) Privileges

- 1 The following titles shown against each category designator below are intended to provide a readily understandable indication of the job function:

Category A:	Certifying technician
Category B1:	Line maintenance certifying engineer - mechanical
Category B2:	Line maintenance certifying engineer - avionic
Category C:	Base maintenance certifying engineer

- 2 Individual aircraft maintenance licence holders need not be restricted to a single category. Provided that each qualification requirement is satisfied, any combination of categories may be granted.

3 ~~–deleted–~~

4 Definitions

For the purposes of SAR-66.20(a), unless the context otherwise requires —

Electrical system means the aircraft's electrical power supply source, including the distribution system to the different components contained in the aircraft and relevant connectors and lighting systems

Note: When working on cables and connectors which are part of these electrical systems, the following typical practices are included in the privileges:

- (a) Continuity, insulation and bonding techniques and testing;
- (b) Crimping and testing of crimped joints;
- (c) Connector pin removal and insertion;
- (d) 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:

- (a) Autoflight;
- (b) Communication, Radar and Navigation;
- (c) Instruments (see NOTE below);
- (d) In-Flight Entertainment Systems;
- (e) Integrated Modular Avionics (IMA);
- (f) On-Board Maintenance Systems;
- (g) Information Systems;
- (h) Fly-by-Wire Systems (related to ATA27 "Flight Controls");
- (i) Fibre Optic Control Systems.

Note: Instruments are formally included in the privileges of the B2 licence holders. However, maintenance on electromechanical and pitot-static components may also be released by a B1 license holder.

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

- (a) 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.
- (b) 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.
- (c) 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, including:

- (a) trouble shooting;
- (b) defect rectification;
- (c) component replacement with the use of external test equipment, if required. Component replacement may include components such as engines and propellers;
- (d) 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;
- (e) minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means;
- (f) for temporary or occasional cases (Airworthiness Directives, hereinafter AD; service bulletins, hereinafter SB) the quality manager may accept base maintenance tasks to be performed by a line maintenance organisation provided all requirements are fulfilled. The Authority will prescribe the conditions under which these tasks may be performed.

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

- 5 A holder of a Category B2 licence issued before 8 March 2013 is not permitted to certify electrical and avionics tasks within powerplant and mechanical systems unless he concurrently holds a Category B1 qualification that grants him the privileges to certify such tasks.

From 8 March 2013, an aircraft maintenance licence holder who holds a Category B1 qualification which restricts the holder to certifying electrical and avionics tasks within powerplant and mechanical systems may be granted a Category B2 licence that will allow the holder to certify electrical and avionics tasks within powerplant and mechanical systems.

AMC 66.20 (b) Categories and Certification Privileges

The required 6-month maintenance experience should be on aircraft structure, powerplant and systems as appropriate to the category or subcategory and relevant to the type or group rating held. Experience should be supported by documentary evidence.

AMC 66.25 (a) Basic Knowledge requirements

- 1 Basic knowledge examinations may be attempted at the conclusion of each SAR-66 subject module of a CAAS approved basic training course.
- 2 Basic knowledge examinations are conducted without the use of training notes.
- 3 Examination subjects required for each category are given in SAR-66 Appendix 1. Candidates may apply for such examinations online at www.caas.gov.sg.
- 4 A pass in the basic knowledge examination paper obtained before 1 July 2013, which would have been valid for 5 years or 10 years, as the case may be, from the date the pass was obtained, shall be deemed to be a valid pass for an issuance of an aircraft maintenance licence.

IEM 66.25 (a) Basic Knowledge requirements

- 1 Basic knowledge examinations are conducted by the Authority.
- 2 – *deleted* –
- 3 The levels of knowledge are directly related to the complexity of certifications appropriate to the particular SAR- 66.1 (sub)category, which means that category A must demonstrate a limited but adequate level of knowledge, whereas category B1 and B2 must demonstrate a complete level of knowledge in the appropriate subject modules.
- 4 Category C certifying staff from the academic route must also meet the relevant level of basic knowledge for category B1 or B2. This can be demonstrated by passing the full complement of the basic knowledge examinations for either category.

AMC 66.25 (c) Basic Knowledge requirements

- 1 An applicant who obtains Grade B4 or better in the GCE 'O' Levels Elementary Mathematics or Additional Mathematics subjects will be credited with basic knowledge requirements for the subject module Mathematics (M01) for Category A only.

- 2 An applicant who obtains a pass grade in a Mathematics subject, as part of an engineering course in a polytechnic or university, will be credited with basic knowledge requirements for the subject module Mathematics (M01) for Category B1, Category B2 and Category C.
- 3 ~~–deleted–~~

AMC 66.25 (d) Basic Knowledge requirements (Barring period)

A person who fails a basic knowledge examination subject in two consecutive attempts will be ineligible to apply for the same examination for a period of 3 months from the date of the last attempt, unless the period between the two attempts is more than 3 months.

AMC 66.30 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 development.
- 2 While an applicant to a SAR-66 category C licence may be qualified by having 3 years experience as category B1 or B2 certifying staff only in line maintenance, it is however recommended that any applicant to a category C holding a B1 or B2 licence demonstrate at least 12 months experience as a B1 or B2 base maintenance support staff. B1 or B2 support staff are those who ensure that all relevant tasks or inspections have been carried out to the required standard before the category C certifying staff issues the certificate of release to service.
- 3 All aircraft maintenance licence applicants are required to provide a letter from their employer certifying that they meet the prescribed civil aircraft maintenance experience requirement in accordance with SAR-66.30(a). In addition, the applicant must demonstrate recent practical maintenance experience on operating aircraft and in the relevant (sub)category by submitting a schedule of experience (SOE) for the minimum number of days as shown below:
 - (i) for category A or subcategory B1.2 or B1.4 licence – at least 180 days in the 1-year period immediately preceding the date of application of an aircraft maintenance licence.
 - (ii) for category B2 or subcategory B1.1 or B1.3 licence – at least 360 days in the 2-year period immediately preceding the date of application of an aircraft maintenance licence.
 - (iii) for category C licence via academic route – at least 180 days, including a minimum of 90 days on observation of base maintenance tasks in the 1-year period immediately preceding the date of application of an aircraft maintenance licence.
 Note: Non-base maintenance tasks may be demonstrated with records of such tasks in a logbook which must be countersigned by the supervisor.
 - (iv) for category C licence via B1 or B2 route – at least 180 days as a base maintenance support staff in the 1-year period immediately preceding the date of application for the extension of the aircraft maintenance licence. No SOE is necessary but the employer must ensure compliance with this requirement when supporting any application for a category C licence.
 - (v) for additional category/sub-category – SOE for the necessary duration indicated in Appendix 4 to SAR-66.

IEM 66.30 (a) Experience requirements

- 1 Practical maintenance experience on operating aircraft means the experience of having actively participated in the carrying out of maintenance tasks on aircraft which are being operated by airlines. The point being to gain sufficient experience in the environment of commercial maintenance as opposed to only the training school environment. Such experience may be combined with approved training so that periods of training can be intermixed with periods of experience rather like the apprenticeship.
- 2 The time necessary for any additional classroom training should be added to the practical maintenance experience time.
- 3 A skilled worker is a person who has successfully completed a course of training, acceptable to the Authority, involving the manufacture, repair, overhaul or inspection of mechanical, electrical or electronic equipment. The training would include the use of tools and measuring devices.

IEM 66.30 (d) Experience requirements

Recent practical maintenance experience may be presented in a form of a schedule of experience (SOE). Persons applying for an aircraft maintenance licence should submit a compilation of such a schedule as part of the licence application.

Recent practical maintenance experience is the experience gained in an appropriate (sub)category immediately before the date of application for an initial grant or extension of an aircraft maintenance licence. As a guide, all computations pertaining to the number of minimum working-day necessary to comply with a SOE requirement for a basic licence should be based on 180 days per year. For example, a requirement for a 2-year of recent practical maintenance experience should be interpreted as a requirement to demonstrate such experience in a SOE for a minimum of 360 days (180 days x 2) in the 2-year period immediately preceding the date of application for an aircraft maintenance licence. Similarly, a requirement for a 6-month of practical maintenance experience should be interpreted as a minimum of 90 days (180 days divided by 2) of SOE accumulated in the 6-month period immediately preceding the date application for a SAR-66 aircraft maintenance licence or its extension.

AMC 66.40 Continued validity of the aircraft maintenance licence

- 1 The aircraft maintenance licence is only valid if issued and/or amended by the Authority and the holder has signed the document in ink after having checked the correctness of the information contained therein.
- 2 A holder of an AML should note that a licence which has expired cannot be back-dated and consequently any certifications made in the intervening period would be deemed to be void.
- 3 If the AML has expired for more than 24 months, the applicant may have to show a pass in examinations as determined by the Authority, which minimally includes a valid pass in modules M09 (Human Factors) and M10 (Aviation Legislation).
- 4 A re-issued AML will be valid for a period of not more than 24 months, starting from the date of the grant of the licence.

IEM 66.40 Continued validity of the aircraft maintenance licence

- 1 Validity of the aircraft maintenance licence is not affected by recency of maintenance experience whereas the validity of the SAR-66.20 privileges is affected by maintenance experience as specified in SAR-66.20 (b).
- 2 The SAR-145 approved maintenance organisation issues the SAR-145 certification authorisation when satisfied that compliance has been established with the appropriate paragraphs of SAR-145 and SAR-66. In granting the SAR-145 certification authorisation the SAR-145 approved maintenance organisation needs to be satisfied that the person holds a valid aircraft maintenance licence. With regard to continued validity of the SAR-145 certification authorisation, due consideration should be given to the currency of maintenance experience and training in accordance with SAR-145.

AMC 66.45 (a) Type/task training and ratings

- 1 An individual holding a SAR-66 category A licence is eligible to hold an authorisation for one or more tasks. Specific task training on each aircraft type will be required reflecting the authorised task(s) as indicated under SAR-66.20(a)(1). Satisfactory completion of training may be demonstrated by an examination and/or by workplace assessment carried out by an appropriately approved SAR-145 or CAAS approved training organisation. The certification authorisation cannot be granted by the SAR-145 approved maintenance organisation until the individual has undertaken the required task specific training on the aircraft types that the licence holder is to be authorised upon and has met the additional requirements of SAR-145.35.
- 2 The category A task training requires both theoretical and practical training as appropriate to the task to be authorised. The theoretical training may require a degree of classroom training on the relevant aircraft systems for a particular type at ATA104 level 3. The theory training is therefore not dissimilar to that required for the full licensed aircraft engineer type training in the relevant systems, but will not extend to any significant level of defect diagnosis. This reflects the category A certifying staff holding responsibility for making the same certifications as a licensed aircraft engineer would within the limits of the licence and corresponding authorisation. The practical training should be relevant to the task and should allow the category A certifying staff to demonstrate that he or she can carry out the task and the associated function checks to permit the aircraft's release to service.
- 3 Consider the following examples:
 - (i) Passenger Seat Belt change – given the simplicity of the task, theoretical training in this case would be straightforward and may be limited to the orientation of the belt and the reasons for it. The practical training would need to establish the competence of the individual to correctly perform the required task. This should include the ability to establish the belt to be fitted is the correct part number (and modification standard), that it is serviceable and shows that he or she can fit it and check its security and operation after fitment.
 - (ii) Brake Unit change – This task is more complex and would require detailed theoretical knowledge in order to accomplish it. It should be noted however that it is not intended that the category A certifying staff replace brake units other than where there is an obvious leak or the unit is worn to limits (as evidenced by a brake wear indicator). If a technical log or other entry states that the aircraft pulls to the left, although a brake change might rectify the problem the category A certifying staff cannot diagnose this fault. A brake change is normally associated with other maintenance tasks. A wheel has to be removed and refitted. Brake fans may have to be disturbed. Anti-skid systems may have to be disturbed. Hydraulic systems have to be disconnected. There may also be a need to disassemble hydraulic pipeline and electrical cabling runs.

The theoretical training required therefore should cover the scope of the operational systems noted above (those shown are not necessarily exhaustive) to the ATA104 level 3 depth to the

point where the category A certifying staff understands the systems and their operation and can check them after he or she has completed the task without further reference to a licensed aircraft engineer. If there is a problem with the operational checks a licensed aircraft engineer must be summoned. The practical training needs to reflect the practical ability and competence to do the job.

- 4 Tasks should be performed three times or more until competence is established. Where the individual wishes to progress onto a similar task on another aircraft the process must be repeated unless it can be demonstrated that the tasks is in all respects the same to that already held, e.g. a brake unit change on several Airbus models may be the same but it does vary significantly to the same task on an aircraft of Boeing manufacture.
- 5 When the task training is complete, the individual must also demonstrate an understanding of the organisation's procedures and the paperwork control systems that are in use before being authorised. This should cover those procedures that are both general and type specific as relevant to the task authorisation being issued. The task authorisation when issued should show the individual tasks that are authorised as well as the relevant aircraft types.

AMC 66.45 (d) Type/task training and ratings

- 1 The training should give adequate detailed theoretical knowledge of the aircraft, its main parts, systems, equipment, interior and applicable components, including training in the systems in use for technical manuals and maintenance procedures. The course should also take into account the following:
 - (a) in service experience on the aircraft type;
 - (b) feedback from in-service difficulties/occurrence reporting etc;
 - (c) significant airworthiness directives and/or service bulletins; and
 - (d) known human factors issues associated with the particular aircraft type.
- 2 Limited avionics system training should be included in the category B1 type training as the B1 privileges include the replacement of avionic line replaceable units. Electrical systems should be included in the type training for both categories B1 and B2.
- 3 Theoretical training should be supported by training aids such as aircraft system components. Ground simulator time, engine ground running and computer based training (CBT) etc may also be utilised.
- 4 Knowledge is also recommended of relevant inspections and limitations as applicable to the effects of environmental factors such as cold and hot climates, wind, moisture, etc.
- 5 The practical training must comprise a period of 4 months (minimum of 80 working days) for applicants with no recent recorded previous practical experience of aircraft of comparable construction and systems, including the engines, but this can be reduced to a minimum of 2 weeks for applicant with such previous experience.
- 6 A programme of structured on-job-training (OJT) may be prepared to satisfy the practical training requirement.

Where the practical training element is conducted by or under the responsibility of the training organisation under a SAR-147 approval or a direct type course approval, it should be considered as part of the approved course and as such, its acceptance by the Authority should be supported by a detailed syllabus showing its content and duration. The individual practical training records should be designed in a manner that they demonstrate compliance with the detailed practical training syllabus. Such records may take the form of an individual training logbook. The logbook should be designed such that tasks may be countersigned by the SAR-147 school or other course provider.

Where the practical training element is conducted by a maintenance organisation approved under SAR-145, under its own responsibility, its acceptance by the Authority should be supported by a detailed syllabus showing its content and duration. The individual practical training records should be designed in a manner that they demonstrate compliance with the detailed practical training syllabus. Alternatively, the practical training element may consist of a structured OJT programme. In this case the maintenance organisation approved under SAR-145 should provide applicants for a type rating a logbook indicating a list of tasks to be performed under supervision. The logbook should be designed such that tasks may be countersigned by the supervisor. The list of tasks should be accepted directly for each individual – depending on the individual's previous experience, or indirectly through the acceptance of a procedure giving delegation to the maintenance organisation.

In all cases the practical element should include an acceptable cross section of maintenance tasks, which, in the case of a structured OJT, can be tailored to accommodate the operating profile of the SAR-145 organisation whilst also supplementing the theoretical course elements. The means by which the practical element is supervised and the control of the standard should be acceptable to the Authority. The duration of the practical type training element should take into account significant differences between types and be acceptable to the Authority. These differences will require considerably more practical training for certifying staff that are not familiar with the new techniques and technologies. Some examples of differences may include, but are not limited to, the following elements: Fly by wire, glass cockpit avionics, significant structural differences, etc.

- 7 Before grant of the aircraft type, the applicant should be able to:
 - (a) demonstrate by knowledge examination a detailed understanding of applicable systems, their operation and maintenance;
 - (b) ensure safe performance of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks, as appropriate, for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks such as engine run, etc, if required;
 - (c) correctly use all technical literature and documentation for the aircraft; and
 - (d) correctly use specialist/special tooling and test equipment, perform removal and replacement of components and modules unique to type, including any on-wing maintenance activity.

IEM 66.45 (d) Type/task training and ratings

- 1 The required duration of practical training must be accepted on a case by case basis by the Authority prior to the type rating endorsement. The agreement on the practical training contents and duration should be reached before the training starts.
- 2 While it is not feasible to establish a formula giving the required training duration in all cases, the following may be used as guidelines:
 - (a) For a first type training course with no recent recorded maintenance experience, 4 months (minimum of 80 working days) of practical training on specific aircraft type is required.
 - (b) Some factors that may lead to a reduction in the maximum duration of 4 months practical training required are as follows:
 - experience on aircraft type of a similar technology, construction and systems including engines;
 - recency on type;

- the quantity of the practical experience. For example experience gained will depend upon the environment e.g. line maintenance environment with one aircraft per week would permit limited experience compared with the constant base maintenance check environment;
 - the quality of the practical experience. The type of tasks carried out. These tasks should reflect, at a minimum, those tasks specified by the practical training needs matrix developed by the organisation approved under SAR-147.
- 3 The minimum 2 weeks practical training is normally required for all type training courses. A proportionate amount of practical training should be included in the case of a differences or bridging type course.

It should be noted however that while AMC 66.45(d) specifies a practical training duration between 2 weeks and 4 months, in the case of a structured OJT performed at line stations, due to the occasional unavailability of aircraft, its duration may need to be extended in order to fulfill the required list of supervised tasks.

- 4 Except in those cases where the SAR-147 organisation determines the practical training required it is the responsibility of the maintenance organisation to determine that the duration of practical training commensurates with the candidates' experience. In either case the organisation must establish an acceptable system to determine and ensure that the practical training is sufficient in content and duration with respect to a particular target population.

AMC 66.45 (e) Type/task training and ratings

Category C certifying staff may not carry out the duties of category B1 or B2, or equivalent within base maintenance, unless they hold the relevant B1 or B2 category and have passed type training corresponding to the relevant B1 or B2 category.

AMC 66.45 (g) Type/task training and ratings

- 1 "Aircraft types representative of a group" means that:
- for the B1 category the aircraft type should include typical systems and engines relevant to the group (e.g. retractable undercarriage, pressurisation, variable pitch propeller, etc. for the single piston engine metal subgroup) and,
 - for the B2 category the aircraft type should include complex avionics systems such as radio coupled autopilot, EFIS (Electronic flight instrument system), full authority digital engine control (FADEC), flight guidance systems, etc.
- 2 A "multiple engines" group automatically includes the corresponding "single engine" group.

AMC 66.45 (h) Type/task training and ratings

- 1 Type experience should cover an acceptable cross section of tasks from Appendix 5 to this SAR-66. For the first aircraft type of each manufacturer group, at least 50% of the Appendix 5 tasks, as applicable to the concerned aircraft type and licence category should be performed. For the second aircraft type of each manufacturer group, this may be reduced to 30%. For subsequent aircraft types of each manufacturer group, this should be reduced to 20%.
- 2 Type experience should be demonstrated by the submission of records of practical experience showing the SAR-66 Appendix 5 tasks performed by the applicant.

IEM 66.50 Medical fitness

- 1 Medical opinion considers that alcohol present in the blood stream in any quantity affects the ability to make decisions. It is the responsibility of all certifying staff to ensure that they are not adversely affected.
- 2 The use of any legally administered drug, or medicines, including those used for the treatment of a disease or disorder, which has been shown to exhibit adverse side effects, which affect the decision making ability of the user, should be administered according to medical advice. No other drugs should be used.
- 3 Certifying staff are responsible for ensuring that their physical condition does not adversely affect their ability to satisfactorily certify the work for which they are responsible. Eyesight, including colour vision, is particularly important in this respect.
- 4 In the context of this SAR-66, mental condition means psychological integrity, particularly in operational attitudes or any relevant personality factor.

IEM 66.55 Evidence of qualification

Authorised person means any person who is required to establish that the holder has a valid aircraft maintenance licence including the scope of such licence. Authorised persons include the SAR-145 approved maintenance organisation for qualifying the holder for issue/amendment of the SAR-145 certification authorisation and any officer of the Authority.

Reasonable time means within 2 working days.

AMC 66.60 Equivalent safety cases

All proposed equivalent safety cases should be submitted to the Authority for consideration as an acceptable case.

IEM 66.65 Revocation, suspension or limitation of the aircraft maintenance licence

The Authority may revoke, suspend or limit an aircraft maintenance licence if the person has knowingly carried out or involved in one or more of the following activities:

- 1 Obtained the aircraft maintenance licence and/or the SAR-145 certification authorisation by falsification of submitted evidence.
- 2 Failed to carry out requested maintenance combined with failure to report such fact to the organisation that requested the maintenance.
- 3 Failed to carry out required maintenance resulting from own inspection combined with failure to report such fact to the organisation for whom the maintenance was intended to be carried out.
- 4 Negligent maintenance.
- 5 Falsification of maintenance records.

- 6 Issuing a certificate of release to service knowing that the maintenance specified on the certificate of release to service has not been carried out or without verifying that such maintenance has been carried out.
- 7 Carrying out maintenance or issuing a certificate of release to service when adversely affected by alcohol or drugs.

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