

Hong Kong Aviation Requirements

HKAR-66

**Licensing of Maintenance Personnel
(Certifying Staff - Maintenance)**

**Issue 2 Revision 3
31 January 2013**

**CAD 66
Civil Aviation Department
HONG KONG, CHINA**

HKAR-66

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PREAMBLES

The preambles are intended to be a summarised record of the main changes introduced by each amendment of HKAR-66.

ISSUE 1

1 December 2000

New requirement for the maintenance certifying staff to qualify for the issuing of certificates of release to service.

It should be noted that HKAR-66 is applicable to the release to service of aeroplanes and helicopters.

ISSUE 1 Revision 1

1 April 2002

Amend the effective and compliance dates stated in HKAR 66.3 from 1 January 2002 and 1 January 2004 to 1 April 2002 and 1 April 2004 respectively.

ISSUE 1 Revision 2

30 September 2002

Added a new Appendix 4 to Section 2 to provide guidance to complete the Record of Experience.

ISSUE 1 Revision 3

16 September 2008

Revised the suggested study material in Appendix 3 to Section 2.

Issue 2

20 February 2009

- Changed the structure of the HKAR-66 publication. There are four sections where Section 1 contains the requirements and Sections 2, 3 and 4 contain the Acceptable Means of Compliance (AMC), the Guidance Material (GM) and the Appendices respectively.
- Aligned, as applicable, the paragraph contents and numbering of the HKAR-66 to those of EASA Part 66.
- Transferred applicable paragraphs from HKAR 66.1 General to HKAR 66.70 Conversion provisions.
- Amended definitions of CAD and Director-General in HKAR 66.5

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- Amended HKAR 66.15 Eligibility to state that applicant shall be at least 18 years of age.
- Amended HKAR 66.30 Experience requirements to align with EASA Part 66.
- Amended HKAR 66.40 Continuity of the aircraft maintenance licence to reflect a maximum 5 years renewal period.
- Added HKAR 66.70 Conversion provisions to align with EASA Part 66.
- Removed INTERPRETATIVE / EXPLANATORY MATERIAL (IEM) from Section 2. Some of the IEM became Guidance Material (GM) at Section 3.
- Added definition of line and base maintenance at AMC 66.20(a) Privileges.
- Added knowledge and practical training requirements at AMC 66.45(d) Type/task training and ratings to align with EASA Part 66.
- Added AMC 66.70 Conversion provisions to provide information on HKAR-66 licence conversion.
- Added new Section 3 Guidance Material (GM) to provide relevant information.
- Added GM 66.20(b)(3) Privileges to specify the need of a general knowledge of the language used within the maintenance environment of certifying staff.
- Moved Section 2 Appendices 1 to 4 to the new Section 4 Appendices 1 to 4.
- Amended Section 4 Appendix 1 to align with Appendix 1 to EASA Part 66 applicable modules/subject and added Hong Kong Aviation Regulations at Module 10 to include the requirements of Safety Management System and Influence of psychoactive substances.
- Added Section 4 new Appendices 5 to 7.

ISSUE 2 Revision 1

30 November 2010

- Amended HKAR 66.30(b)(2) and AMC 66.30(b) to include a provision to accept three years of practical maintenance experience on operating aircraft for a graduated candidate holding an appropriate engineering degree for Category B applicant.
- Corrected minor typographical error at Section 4 Appendix 1 page 4-APP 1-3 the qualification matrix on basic subjects.

ISSUE 2 Revision 2

10 December 2012

- Amended address and telephone number of CAD in page ii and Appendix 3 of Section 4.

ISSUE 2 Revision 3

31 January 2013

- Amended HKAR 66.20(a)(3) Privileges to change the term “electrical power systems” to electrical systems.
- Amended Section 4 Appendix 1 - Basic Knowledge Requirements on Module 13 and 14 to align with EASA Part 66.
- Amended Section 4 Appendix 4 Table 1 and Table 2.
- Amended Section 4 Appendix 5 paragraph 2 - Type Training Standard for Category B2 certifying staff.
- Amended Section 4 Appendix 7 - Aircraft Type Practical Experience List of Tasks to add tasks on Integrated Modular Avionics (ATA 42), Cabin Systems (ATA 44) and Information Systems (ATA 46).

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SECTION 1 – REQUIREMENTS**1 GENERAL**

This Section 1 contains the Requirements for Licensing of Maintenance Personnel (Certifying Staff - Maintenance).

2 PRESENTATION

- 2.1 The requirements of HKAR-66 are presented in full page width on loose pages, each page being identified by the date of issue or issue/revision number under which it is reissued or amended.
- 2.2 Sub-headings are in bold typeface.
- 2.3 Explanatory Notes not forming part of the requirements appear in smaller typeface.
- 2.4 New, amended and corrected text is indicated by a marginal line.

HKAR 66.1
General

- (a) HKAR-145 requires appropriately authorised certifying staff to issue a certificate of release to service on behalf of the HKAR-145 approved maintenance organisation when they satisfy that all required maintenance tasks have been completed.
- (b) Certifying staff responsible for issuing the certificate of release to service must be qualified in accordance with the appropriate requirements of this HKAR-66 for aeroplanes and helicopters of the following categories:
- Category A
 - Category B1
 - Category B2
 - Category B3
 - Category C

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

Note: The application of HKAR-66 to airships and aircraft components will be considered in a future issue. Aircraft components include engines, auxiliary power units and propellers.

HKAR 66.3
Effectively

This HKAR-66 was first issued on 1 December 2000 and becomes effective on 1 April 2002.

HKAR 66.5
Definitions

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

'CAD' means Civil Aviation Department of the Hong Kong Special Administrative Region of the People's Republic of China.

'Director-General' means the Director-General of Civil Aviation who is authorised for the purpose under the Air Navigation (Hong Kong) Order 1995 by the Chief Executive of the Hong Kong Special Administrative Region of the People's Republic of China and includes any person who is delegated for that purpose.

'Aircraft maintenance licence' means a document issued as evidence of qualification confirming that the person to whom it refers has met the HKAR-66 knowledge and experience requirements for any aircraft basic category and aircraft type rating specified in the document.

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

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

'Simple light aeroplane' means an un-pressurised piston-engine aeroplane with a maximum take off mass less than 5700 kg and not fitted with a full authority coupled autopilot/flight director.

'Wooden aeroplane' means an aeroplane fitted with wooden wing spars.

HKAR 66.7

Applicability

- (a) This HKAR-66 prescribes the requirements for the qualification of those personnel authorised by a HKAR-145 approved maintenance organisation to issue certificates of release to service.

Such personnel are required to hold a valid type rated HKAR-66 aircraft maintenance licence, which attests to their knowledge and experience and in the case of HKAR-145 a valid HKAR-145 certification authorisation which grants certification privileges to the individual.

Note: A type rated HKAR-66 aircraft maintenance licence normally does not confer any certification privileges on the holder in their own right. Such licence must be used in conjunction with a certification authorisation.

- (b) For the issue of HKAR-66 aircraft maintenance licence compliance is required with HKAR 66.15, HKAR 66.25 and HKAR 66.30 for the appropriate HKAR 66.20 basic category or categories.

The HKAR-66 aircraft maintenance licence will be endorsed with the relevant HKAR 66.20 basic category/categories and where appropriate any aircraft type ratings granted under HKAR 66.45.

Note: The HKAR-66 aircraft maintenance licence can be issued without any aircraft type ratings.

- (c) For the issue of HKAR-145 certification authorisation compliance is required with paragraph (b), HKAR 66.40, HKAR 66.45, HKAR 66.50 and HKAR 66.55.

Note: HKAR-145 contains additional requirements to qualify to make certification(s).

- (d) This HKAR-66 also prescribes the requirements for the qualification of those personnel who are permitted to issue certificate of release to service under the certification privileges specifically endorsed on the type rated HKAR-66 aircraft maintenance licence.

Note: A type rated HKAR-66 aircraft maintenance licence with certification privileges to make certification(s) is normally limited to simple light aeroplanes and some helicopters, as determined necessary by the Director-General.

HKAR 66.10**Application**

(See AMC 66.10)

- (a) An application for the grant or amendment of a HKAR-66 aircraft maintenance licence must be submitted to the Director-General on CAD Form DCA 35 (E) and in a manner prescribed by the Director-General.
- (b) An applicant who meets the appropriate requirements of HKAR-66 and has paid any charges prescribed by the Director-General is entitled to the HKAR-66 aircraft maintenance licence.

HKAR 66.15**Eligibility**

An applicant for an aircraft maintenance licence shall be at least 18 years of age.

HKAR 66.20**Privileges**

(See AMC 66.20 and GM 66.20)

- (a) Subject to compliance with paragraph (b), the following privileges shall apply:
- (1) A category A aircraft maintenance licence permits the holder to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the authorisation. The certification privileges shall be restricted to work that the licence holder has personally performed in a HKAR-145 organisation. Category A is sub-divided

into sub-categories relative to combinations of aeroplanes, helicopters, turbine and piston engines.

- (2) A category B1 aircraft maintenance licence shall permit the holder to issue certificates of release to service following maintenance, including aircraft structure, powerplant and mechanical and electrical systems. Replacement of avionic line replaceable units, requiring simple tests to prove their serviceability, shall also be included in the privileges. Category B1 shall automatically include the appropriate A sub-category. In addition, a category B1.2 aircraft maintenance licence permits the holder to exercise the privileges of the category B3 subject to the conditions and limitations specified in sub-paragraph (4). Category B1 is sub-divided into sub-categories relative to combinations of aeroplanes, helicopters, turbine and piston engines.

- (3) A category B2 aircraft maintenance licence shall permit the holder to issue certificates of release to service following maintenance on avionic and electrical systems.

Note: Category B2 aircraft maintenance licence holder can qualify for any A sub-category subject to compliance with the appropriate A sub-category requirements.

- (4) A category B3 certifying staff authorisation permits the holder to issue certificates of release to service following maintenance of simple light aeroplanes, including aircraft structure, power-plants, mechanical and electrical systems plus replacement of avionic units, requiring simple tests to prove serviceability. Notwithstanding the foregoing, the issue of certificates of release to service for wooden aeroplanes is only permitted when the category B3 holder has a rating for wooden aeroplanes.

- (5) A category C certifying staff authorisation permits the holder to issue certificates of release to service following base maintenance. The authorisation is valid for the aircraft in its entirety in a HKAR-145 organisation.

Note 1: HKAR-145 specifies the personnel required to support category C certifying staff in base maintenance, including in particular the requirement for qualified category B1 and B2 staff.

Note 2: HKAR-145 does not require a category C certifying staff for the certification of simple light aeroplanes as category B3 or B1.2 or B1.4 covers all maintenance.

- (b) The holder of an aircraft maintenance licence may not exercise certification privileges unless:

- (1) in compliance with the applicable requirements of HKAR-145.
- (2) in the preceding two-year period he/she has, either had six months of

maintenance experience in accordance with the privileges granted by the aircraft maintenance licence or, met the provision for the issue of the appropriate privileges.

- (3) he/she is able to read, write and communicate to an understandable level in the language(s) in which the technical documentation and procedures necessary to support the issue of the certificate of release to service are written.

HKAR 66.25

Basic knowledge requirements

(See AMC 66.25 and GM 66.25)

- (a) An applicant for an aircraft maintenance licence or the addition of a category or subcategory to such an aircraft maintenance licence shall demonstrate, by examination, a level of knowledge acceptable to the Director-General, in subject modules appropriate to the HKAR 66.20 category.

Note: HKAR-66 Section 4 Appendix 1 contains detailed information on levels of knowledge for categories A, B1, B2, B3 and C.

- (b) Full or partial credit against the basic knowledge requirements and associated examination will be given for any other technical qualification considered by the Director-General to be equivalent to the HKAR-66 knowledge standard.

HKAR 66.30

Experience requirements

(See AMC 66.30 and GM 66.30)

- (a) An applicant must meet a minimum civil aircraft maintenance experience requirement appropriate to the HKAR-66 aircraft maintenance licence sought, which will be reduced by the Director-General when satisfied that either HKAR-147 approved training or other appropriate technical training has been received. For category A, B1, B2 or B3 the practical maintenance experience means being involved with a representative cross section of maintenance tasks on aircraft.
- (b) An applicant for an aircraft maintenance licence shall have acquired:
 - (1) for categories A and B3 and subcategories B1.2 and B1.4:
 - (i) three years of practical maintenance experience on operating aircraft, if the applicant has no previous relevant technical

training; or

- (ii) two years of practical maintenance experience on operating aircraft and completion of training considered relevant as a skilled worker, in a technical trade; or
 - (iii) one year of practical maintenance experience on operating aircraft and completion of a HKAR-147 approved basic training course.
- (2) for category B2 and subcategories B1.1 and B1.3:
- (i) five years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or
 - (ii) three years of practical maintenance experience on operating aircraft and completion of training considered relevant as a skilled worker, in a technical trade; or
 - (iii) three years of practical maintenance experience on operating aircraft and completion of training acceptable to CAD for a graduated candidate holding an appropriate engineering degree; or
 - (iv) two years of practical maintenance experience on operating aircraft and completion of a HKAR-147 approved basic training course.
- (3) for category C with respect to large aircraft:
- (i) three years of experience exercising category B1.1, B1.3 or B2 privileges on large aircraft or as HKAR-145 B1.1, B1.3 or B2 support staff, or, a combination of both; or
 - (ii) five years of experience exercising category B1.2 or B1.4 privileges on large aircraft or as HKAR-145 B1.2 or B1.4 support staff, or a combination of both; or
- (4) for category C with respect to non large aircraft:
- three years of experience exercising category B1 or B2 privileges on non large aircraft or as HKAR-145 B1 or B2 support staff, or a combination of both; or
- (5) for category C obtained through the academic route:
- an applicant holding an academic degree in a technical discipline, from a university or other higher educational institution recognised by the Director-General, three years of experience working in a civil

aircraft maintenance environment on a representative selection of tasks directly associated with aircraft maintenance including six months of observation of base maintenance tasks.

- (c) An applicant for an extension 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 Section 4 Appendix 6.
- (d) For all applicants, at least one year of the required experience must be recent maintenance experience on aircraft typical of the category/sub-category for which the initial HKAR-66 aircraft maintenance licence is sought. For subsequent category/sub-category additions to an existing HKAR-66 aircraft maintenance licence, the additional recent maintenance experience required may be less than one year, but at least three months and will be dependent upon the significance of the difference between the licence category/sub-category held and the category/sub-category addition. Such experience should be typical of the additional licence category/sub-category sought.
- (e) Aircraft maintenance experience gained outside a civil aircraft maintenance environment will be accepted by the Director-General when satisfied that such maintenance is equivalent to that required by HKAR-66 but additional experience of civil aircraft maintenance will be required to ensure understanding of the civil aircraft maintenance environment.

HKAR 66.40

Continuity of the aircraft maintenance licence

(See GM 66.40)

- (a) An aircraft maintenance licence shall remain valid for the period as specified in it, but not exceeding five years. The Director-General may renew the licence from time to time upon the Director-General satisfies that the applicant is a fit person and is qualified in accordance with HKAR-66.
- (b) Any certification privileges based upon an aircraft maintenance licence becomes invalid as soon as the aircraft maintenance licence is invalid.
- (c) The aircraft maintenance licence is only valid when issued, renewed and/or amended by the Director-General and when the holder has signed the document.

HKAR 66.45**Type/task training and ratings**

(See GM 66.45)

- (a) Category A certifying staff 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 HKAR-145 or HKAR-147 organisation. The training shall include practical hands on training and theoretical 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 HKAR-145 or HKAR-147 organisation.
- (b) Except as otherwise specified in paragraph (g), the holder of a category B1, B2, B3 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, B3 or C aircraft type training approved by the Director-General or conducted by an appropriately approved HKAR-147 maintenance training organisation.
- (d) Category B1, B2 and B3 approved type training shall include theoretical and practical elements and consist of the appropriate course in relation to the HKAR 66.20 (a) privileges. Theoretical and practical training shall comply with Section 4 Appendix 5 to this HKAR 66.
- (e) Category C approved type training shall comply with Section 4 Appendix 5 to this HKAR 66. In the case of a category C person qualified by holding an academic degree as specified in HKAR 66.30 (b)(5), the first relevant aircraft type theoretical training shall be at the category B1 or B2 level. Practical training is not required.
- (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 Section 4 Appendix 5 to this Part. The examinations in respect of category B1 or B2 or B3 or C aircraft type ratings shall be conducted by training organisations appropriately approved under HKAR-147, the Director-General, or the training organisation conducting the approved type training course.
- (g) Notwithstanding paragraph (b), for aeroplanes less than 5700 Kg maximum take off mass and helicopters less than 2730 Kg maximum take off mass, a category B1 or B2 or B3 aircraft maintenance licence may be endorsed with the appropriate aircraft manufacturer group type ratings or aircraft group type ratings unless the Director-General 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 two 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 three 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 of the following:
 - (i) for category B1, B3 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 aeroplanes less than 5700 Kg maximum take off mass and helicopters less than 2730 Kg maximum take off mass may also be granted, subject to satisfactory completion of the relevant category B1, B2, B3 or C aircraft type examination and demonstration of practical experience on the aircraft type, unless the Director-General has determined that the aircraft is complex, where paragraph (c) approved type training is required. Aircraft type practical experience shall include a representative cross section of maintenance activities relevant to the category.

HKAR 66.50**Medical fitness**

(See GM 66.50)

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.

HKAR 66.55**Evidence of qualification**

(See GM 66.55)

Certifying staff qualified in accordance with this HKAR-66 will be issued with an aircraft maintenance licence by the Director-General as evidence of qualification in accordance with HKAR-66. Certifying staff must be able to produce their licence if requested by an authorised person within a reasonable time.

HKAR 66.60**Equivalent safety cases**

(See AMC 66.60)

The Director-General may exempt any person, required to be qualified in accordance with HKAR-66, from any requirement in HKAR-66 when satisfied that a situation exists not covered by HKAR-66 and subject to compliance with any supplementary condition(s) the Director-General considers necessary to ensure equivalent safety. Such exemption and supplementary condition(s) must be agreed by the Director-General to ensure continued recognition of the person.

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

(See GM 66.65)

- (a) The Director-General may, on reasonable grounds after due enquiry, revoke, suspend or limit the HKAR-66 aircraft maintenance licence or direct the HKAR-145 approved maintenance organisation to revoke, suspend or limit the HKAR-145 certification authorisation if the Director-General is not satisfied that the holder of the licence and authorisation is a fit and proper person to hold such licence and authorisation subject to the conditions of paragraph (a)(1) or (a)(2) as appropriate.
- (1) Before revoking or limiting the HKAR-66 aircraft maintenance licence or directing the HKAR-145 approved maintenance organisation the Director-General must first give at least 28 days notice to the affected party or parties in writing of his/her intention so to do and the reasons for its proposal and must offer the affected party or parties an opportunity to make representations and the Director-General will consider those representations.
 - (2) In the case where the Director-General has determined that the safe operation of the aircraft is adversely affected the Director-General may in addition to sub-paragraph (a)(1) provisionally suspend the HKAR-66 aircraft maintenance licence without prior notice until the sub-paragraph (a)(1) procedure is complete.

- (b) For the Director-General to consider a person to be not a fit and proper person means that there is clear evidence that the person has knowingly carried out or been involved in one or more of the following activities:
- (1) Obtained the HKAR-66 aircraft maintenance licence and/or the HKAR-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 the maintenance record.
 - (6) The issue of 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.

HKAR 66.70**Conversion provisions**

(See AMC 66.70 and GM 66.70)

- (a) Personnel qualified to exercise certification privileges in accordance with Hong Kong aviation regulations valid before the effective date of HKAR-66, remain eligible to exercise those privileges.
- (b) Personnel undergoing a qualification process equivalent to the appropriate HKAR-66 requirements before 1 April 2004, may complete such qualification process in accordance with the Hong Kong aviation regulations. The qualifications gained will be recognised as pre-existing certification privileges in accordance with paragraph (a).
- (c) Personnel qualified in accordance with paragraph (a) or (b) must be issued a HKAR-66 aircraft maintenance licence. Limitations will be applied where appropriate to the basic licence and to aircraft types or group ratings reflecting the scope of the certification privileges previous held prior to

conversion. To remove limitations, the relevant conversion examinations must be passed and any appropriate experience requirements met.

- (d) Personnel qualified in accordance with paragraph (a) or (b) remain eligible to exercise the certification privileges except in the case of adding other basic categories/sub-categories. Appropriate additional requirements of HKAR-66 will apply to such extension. Personnel qualified in accordance with paragraph (a) or (b) may extend the scope of their qualification to include new aircraft types subject to compliance with Hong Kong aviation regulations valid before the effective date of HKAR-66.

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SECTION 2 – Acceptable Means of Compliance (AMC)**1 GENERAL**

- 1.1 This Section contains Acceptable Means of Compliance that has been agreed for inclusion in HKAR-66. 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.
- 1.2 Where a particular HKAR paragraph does not have an Acceptable Means of Compliance or any Guidance Material, it is considered that no supplementary material is required.

2 PRESENTATION

- 2.1 The Acceptable Means of Compliance is presented in full page width on loose pages, each page being identified by the date of issue or the issue/revision number under which it is reissued or amended.
- 2.2 A numbering system has been used in which the Acceptable Means of Compliance uses the same number as the HKAR paragraph to which it refers. The number is introduced by the letters AMC to distinguish the material from the HKAR itself.
- 2.3 Explanatory Notes not forming part of the AMC text appear in a smaller typeface.
- 2.4 New, amended or corrected text is indicated by a marginal line.

AMC 66.10**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 blank statement “X years maintenance experience completed” is not acceptable. A log book of maintenance experience is desirable. It is acceptable to cross refer in the application form to other documents containing information on maintenance.
2. Applicants claiming the maximum reduction in HKAR 66.30(b) total experience based upon having successfully completed HKAR 147.200 approved basic training should include the HKAR-147 certificate of recognition for approved basic training.
3. Applicants claiming reduction in HKAR 66.30(b) total experience based upon having successfully completed technical training in an organisation or institute recognised by the Director-General as a competent organisation or institute, should include the relevant certificate of successful completion of training.

AMC 66.20(a)**Privileges**

The following definition of line and base maintenance should apply:

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

- trouble shooting;
- defect rectification;
- component replacement with use of external test equipment if required. Component replacement may include components such as engines and propellers;
- 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;
- 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 as defined by the Director-General are fulfilled.

Maintenance tasks falling outside these criteria are considered to be base maintenance.

Note: Aircraft maintained in accordance with "progressive" type programmes need to be individually assessed in relation to this paragraph. In principle, the decision to allow some "progressive" checks to be carried out is determined by the assessment that all tasks within the particular check can be carried out safely to the required standards at the designated line maintenance station.

AMC 66. 20(b)(2)

Privileges

The required 6-month 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

Basic knowledge requirements

1. The basic knowledge examinations may be conducted by an appropriately approved HKAR-147 training organisation or by the Director-General.
2. For an applicant being a person qualified by holding an academic degree in a aeronautical, mechanical or electronic discipline from a recognised university or other higher educational institute the need for any examination will depend upon the course taken in relation to Section 4 Appendix 1 to HKAR-66.

Note: Any university or other higher educational institute accredited by the Hong Kong Council for Academic Accreditation is recognised by the Director-General.

3. Knowledge gained and examinations passed during previous experiences, for

example, in military aviation and civilian apprenticeships will be credited where the Director-General is satisfied that such knowledge and examinations are equivalent to that required by Section 4 Appendix 1 to HKAR-66.

AMC 66.30 (b)**Experience requirements**

- 1 While an applicant to a 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.
- 2 For a category C applicant through the academic route 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.
- 3 For a graduated candidate category B applicant holding an appropriate engineering degree means an applicant holding an academic degree in a technical discipline from a university or other higher educational institution and has successfully completed a structured training programme, acceptable to the Director-General. The 3 years experience means working in a civil aircraft maintenance environment on a selection of tasks including the maintenance planning, quality assurance, and at least 24 months practical experience in line and/or base maintenance.
- 4 A skilled worker is a person who has successfully completed a course of training, acceptable to the Director-General, involving the manufacture, repair, overhaul or inspection of mechanical, electrical or electronic equipment. The training would include the use of tools and measuring devices.
- 5 Practical experience means maintenance experience on operating aircraft which is intended to be the experience of being involved in relevant maintenance tasks on aircraft which are being operated by airlines, air taxi organisations, general aviation, etc.

AMC 66.30(d)**Experience requirements**

- 1 To be considered as recent experience, at least 50% of the required recent

experience should be gained within the 12-month period prior to the date of application for the HKAR-66 aircraft maintenance licence. The remainder of the recent experience should have been gained within the 7-year period prior to application.

- 2 Different aircraft types may be considered to be typical when the construction and operation of the airframe, powerplant, systems including avionic systems are of similar technology.

AMC 66.30(e)**Experience requirements**

- 1 For category A certifying staff the additional experience of civil aircraft maintenance will be a minimum of 6 months. For category B1 or B2 certifying staff the additional experience of civil aircraft maintenance will be a minimum of 12 months.
- 2 Aircraft maintenance experience gained outside a civil aircraft maintenance environment can include aircraft maintenance experience gained in armed forces, police, etc., or in aircraft manufacturing.

AMC 66.45(a)**Type/task training and ratings**

- 1 For category A certifying staff specific training on each aircraft type will be required reflecting the authorised task(s) as indicated under HKAR 66.20 (a) (1).
- 2 The training shall include practical hands on training and theoretical training as appropriate for each task authorised. Satisfactory completion of training may be demonstrated by an examination and/or by workplace assessment carried out by an appropriately approved HKAR-145 or HKAR-147 organisation.

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;
 - (d) Known human factors issues associated with the particular aircraft type.
- 2 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.
 - 3 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.
 - 4 The practical training must comprise a period of 4 months 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 two weeks for applicant with such previous experience.
 - 5 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 HKAR-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 Director-General 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 HKAR-147 school or other course provider.

Where the practical training element is conducted by a maintenance organisation approved under HKAR-145, under its own responsibility, its acceptance by the Director-General 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 HKAR-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 either directly for each individual – depending on the individuals 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 HKAR-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 Director-General. The duration of the practical type training element should take into account significant differences between types and be acceptable to the Director-General. These differences will require considerably more practical training for certifying staff who 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.

- 6 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 trouble shooting, 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.

- 7 The practical assessment should also 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 trouble shooting, repairs, adjustments (rigging), replacements and functional/operational checks etc including engine operation (ground running) if required.

AMC 66.45(e)

Type/task training and ratings

- 1 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.

- 2 Type training for category C certifying staff may be at a general level, corresponding to at least level I of ATA specification 104, where applicable providing the applicant has previously attended and passed at least one full training course corresponding to the relevant B1 or B2 category. Practical training is not normally required.

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), flight guidance systems, etc .
- 2 A “multiple engines” group automatically includes the corresponding “single engine” group.
- 3 For piston helicopters less than 2730 Kg maximum take off mass, the following category B1.4 helicopter group ratings are possible:

Manufacturers single piston helicopters
All single piston helicopters.
- 4 For turbine helicopters less than 2730 Kg maximum take off mass, the following category B1.3 helicopter group ratings are possible:

Manufacturers single turbine helicopters
Manufacturers twin turbine helicopters
All single turbine helicopters
All twin turbine helicopters.

Note: Specific manufacturer such as Beech, Bell, Cessna, Agusta, etc., will be quoted.
- 5 Category B3 type ratings are granted as individual aeroplane types until sufficient experience and appropriate aeroplane types meeting the requirement of HKAR 66.30(b) and HKAR 66.45(d) have been obtained when group type ratings will, on application to the Director-General, be granted.

The following category B1.2/B3 aeroplane group ratings are possible:

Manufacturers single piston engine aeroplanes
Manufacturers twin piston engine aeroplanes
All single piston engine aeroplanes
All twin piston engine aeroplanes
All wooden aeroplanes

Note: Specific manufacturer such as Beech, Bell, Cessna, Agusta, etc., will be quoted.

AMC 66.45(h)**Type/task training and ratings**

- 1 Type experience should cover an acceptable cross section of tasks from Section 4 Appendix 7. For the first aircraft type of each manufacturer group, at least 50% of the Appendix 7 tasks, as applicable to the concerned aircraft type and licence category, should be performed. For the second aircraft type of each manufacturer group, this should 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 or logbook showing the Appendix 7 tasks performed by the applicant as specified by the Director-General.

AMC 66.60**Equivalent safety cases**

All proposed equivalent safety cases should be agreed in principle with the Director-General before they are submitted to the Director-General for consideration as an acceptable case.

AMC 66.70**Conversion provisions**

- 1 HKAR 66.70(a) 'personnel qualified to exercise certification privileges' means:
 - a. Personnel holding a pre HKAR-66 licence with or without certification privileges, or,

- b. Personnel holding a pre HKAR-66 licence with or without certification privileges and a current HKAR-145 certification authorisation, or,
 - c. Personnel do not hold any Hong Kong licence, but, hold a current HKAR-145 certification authorisation in accordance with that HKAR-145 approved maintenance organisation's approved procedures.
- 2 HKAR 66.70(b) 'personnel undergoing a qualification process' means:
- a. Personnel who have passed some of the examinations leading to a Hong Kong licence, or,
 - b. Personnel undergoing a course of approved basic or type training.
- 3 Personnel holding pre HKAR-66 qualifications in accordance with paragraphs HKAR 66.70(a) or (b) will be granted a HKAR-66 aircraft maintenance licence per HKAR 66.70(c) in the appropriate category or sub-category without further examination except that such licence will contain limitations in relation to the certification privileges previous held prior to conversion.
- 4 Personnel who wish to remove limitations from their HKAR-66 licence as specified in HKAR 66.70(c) or to add other basic category/sub-category to their HKAR-66 licence as specified in HKAR 66.70(d) have to sit and pass the appropriate conversion examinations. Modules/sub-modules, listed in Section 4 Appendix 1 with the exception of human factors, that are required for conversion examinations should limit to those technical subjects that have not previously been examined and/or not covered by relevant experience by the personnel.
- 5 The policies with regard to conversion examinations are as follows.
- a. With regard to those subjects not previously examined, this means those subjects that are contained in each relevant subject module of Section 4 Appendix 1 but were not, or are not, specified in the relevant Hong Kong licence standard. Where if the total number of multi-choice questions required for the conversion examination is less than 15, then such conversion examination is not required. This is based on the consideration that the difference in technical knowledge is so minimal that such examination is deemed not necessary.

- b. With regard to those subjects covered by relevant experience, this means the knowledge requirement for those subjects that are contained in each relevant subject module of Section 4 Appendix 1 has been assessed and considered to be satisfied by the applicant's past and current experience. A good example is module M7 'Maintenance Practices'.
 - c. With regard to sub-paragraphs a and b, it should generally be acceptable to partially exempt personnel from conversion examinations on subject modules in relation to Section 4 Appendix 1, dependant upon their existing qualification, expertise and experience as specified in sub-paragraphs d and e.
 - d. 'Mechanical' personnel do not need to be examined in modules M1, M2, M6, M7, M8 or M10 except that to support conversion to module M11 or M12 personnel will need to be examined in module M8 and to support conversion to module M16 or M17 personnel will need to be examined in module M2 subject 2.3. 'Mechanical' personnel will need to be examined in modules M3, M4 M5 and as applicable in whole or in part in modules M11, M12, M15, M16 or M17 unless previously examined under the Hong Kong aviation regulations prior to HKAR-66. Modules M13 and M14 are not relevant to the mechanical discipline.
 - e. 'Avionic' personnel do not need to be examined in modules M1, M2, M4, M6, M7, or M10. 'Avionic' personnel will need to be examined in modules M3, M5, M8, M14 and the applicable parts of module M13 unless previously examined under the Hong Kong aviation regulations prior to HKAR-66. Modules M11, M12, M15, M16 and M17 are not relevant to the avionic discipline.
 - f. The exemption for human factors (HF), module M9, is only applicable to those personnel who have attended a CAD approved HF training course before the conversion.
- 6 Personnel undertaking conversion to the full HKAR-66 licence will still need to show that they meet the experience requirement of HKAR 66.30.

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SECTION 3 – Guidance Material (GM)**1 GENERAL**

- 1.1 This Section contains Guidance Material that has been agreed for inclusion in HKAR-66.
- 1.2 Where a particular HKAR paragraph does not have an Acceptable Means of Compliance or any Guidance Material, it is considered that no supplementary material is required.

2 PRESENTATION

- 2.1 The Guidance Material is presented in full page width on loose pages, each page being identified by the date of issue or the issue/revision number under which it is reissued or amended.
- 2.2 A numbering system has been used in which the Guidance Material uses the same number as the HKAR paragraph to which it refers. The number is introduced by the letters GM to distinguish the material from the HKAR itself.
- 2.3 Guidance Material (GM) helps to illustrate the meaning of a requirement.
- 2.4 Explanatory Notes not forming part of the GM text appear in a smaller typeface.
- 2.5 New, amended or corrected text is indicated by a marginal line.

GM 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: Line maintenance certifying mechanic.
 - Category B1: Maintenance certifying technician – mechanical.
 - Category B2: Maintenance certifying technician – avionic.
 - Category B3: Simple light aeroplane maintenance certifying technician.
 - 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. Tasks permitted by 66.20 (a) (1) to be certified under the category A certification authorisation as part of minor scheduled maintenance or simple defect rectification are as specified in HKAR-145 and agreed by the Director-General. HKAR-145 contains a typical example list of such task.
4. For the purposes of category A minor scheduled line maintenance means any minor check up to but not including the A check where functional tests can be carried out by the aircrew to ensure system serviceability. In the case of an aircraft type not controlled by a maintenance programme based upon the A/B/C/D check principle, minor scheduled line maintenance means any minor check up to and including the weekly check or equivalent.
5. The category B1 and B3 licence also permits the certification of work involving avionic systems, providing 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.
6. The category B2 will need to be qualified as category A in order to carry out simple mechanical tasks and be able to make certifications for such work.
7. The category C certification authorisation permits 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 mechanics and both category B1 and B2 staff have signed for the maintenance under their respective specialization. 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 and B2 staff before issue of the certificate of release to service. Category C personnel who also hold category B1 to B2 qualifications may perform both roles in base maintenance.

GM 66.20(b)(3)**Privileges**

1. Holders of an HKAR-66 aircraft maintenance licence may not exercise certification privileges unless 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 licence holder is able to:
 - read and understand the instructions and technical manuals in use within the organisation ;
 - 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 maintenance organisation procedures;
 - communicate at such a level 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 66.25(a)**Basic knowledge requirements**

The levels of knowledge are directly related to the complexity of certifications appropriate to the particular HKAR 66.1 category, which means that category A must demonstrate a limited but adequate level of knowledge, whereas category B1, B2 and B3 must demonstrate a complete level of knowledge in the appropriate subject modules.

Category C certifying staff must meet the relevant level of knowledge for B1 or B2.

GM 66.30(b)**Experience requirements**

Maintenance experience on operating aircraft means the experience of being involved in maintenance tasks on aircraft which are being operated by airlines, air taxi organisations, etc. 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.

GM 66.40**Continued validity of the aircraft maintenance licence**

- 1 The Director-General will issue the HKAR-66 aircraft maintenance licence with a period of five years and the licence holder remains responsible for making application for renewal to the Director-General by completing the relevant sections of CAD Form DCA 35A.
- 2 Licence will normally be renewed provided that during the 24 months preceding the date of expiry of the licence the holder has been engaged for periods totalling at least six months on the maintenance of operating aircraft.

Note: Relevant aircraft maintenance activities such as quality auditing or surveillance, teaching in aeronautical engineering subjects or performing duties as a flight engineer are considered as maintenance of operating aircraft.
- 3 Application for renewal will not be accepted if there are more than 60 days before expiry of the licence.
- 4 Where the Director-General permits the use of a particular HKAR-66 type rated aircraft maintenance licence for the release of aircraft that is not required to be maintained by a HKAR-145 approved maintenance organisation, the licence holder has to demonstrate six months of maintenance experience in each 12-month period to ensure continuity of such licence. In the case where it is not possible to demonstrate such maintenance experience, the Director-General will specify the conditions to re-establish continuity of the licence.
- 5 It is the responsibility of the licence holder to ensure that his licence remains valid. Any certifications, issued by the licence holder after the licence has expired, will be invalidated and the Certificate of Airworthiness of the aircraft being certified will also be affected. In addition, any HKAR-145 certification authorisation granted on the basis of a current licence will be invalidated should that licence expires.

GM 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 Director-General prior to the type rating endorsement. It is strongly recommended that the agreement on the practical training duration be reached before the training starts. For applicants from an HKAR-145 organisation, the required duration may be approved through the organisation's MOE procedures.
2. While it is not feasible to establish a formula giving the required training duration in all cases, the following may be used as a guideline:
 - (a) For a first type training course with no recent recorded maintenance experience four months practical training 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 HKAR-147.
3. The minimum two weeks practical training is normally required for all type training courses. This includes the addition of similar type ratings on an HKAR-66 licence (differences courses). There may be cases where the practical differences training required is less than two weeks for example an engineer with an HKAR-66 type license in category B2 on an Airbus A330 with PW 4000 engines who takes a differences course to an Airbus A330 with Rolls Royce Trent engines.

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 availability of aircraft its duration may need to be subsequently extended in order to fulfil the required list of supervised tasks.

4. Except in those cases where the HKAR-147 organisation determines the practical training required it is the responsibility of the maintenance organisation to determine that the duration of practical training is commensurate with the candidates' recency and experience. However, in either case the Director-General must satisfy that the practical training is of sufficient duration before adding a type rating.

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 both B1 and B2 categories type training.

GM 66.45(d) and (e)

Type/task training and ratings

HKAR-66 Section 4 Appendix 5 type training levels are based upon ATA 104 (Air Transport Association) corresponding type training levels.

GM 66.45(f)

Type/task training and ratings

The examinations in respect of category B1 or B2 or B3 or C aircraft type ratings may be conducted by training organisations appropriately approved under HKAR-147, the Director-General or an organisation authorised by the Director-General to conduct such examination.

GM 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, where applicable, colour vision, is particularly important in this respect.

- 4 In the context of this HKAR, mental condition means psychological integrity, particularly in operational attitudes or any relevant personality factor.

GM 66.55**Evidence of qualification**

Authorised person means any person who is required to establish that the holder has a valid HKAR-66 aircraft maintenance licence including the scope of such licence. Authorised persons include the HKAR-145 approved maintenance organisation for the purpose of qualifying the holder for issue/renew/amendment of the HKAR-145 certification authorisation and any officer from the CAD.

Reasonable time means within 5 working days.

GM 66.65**Revocation, suspension or limitation of the HKAR-66 aircraft maintenance licence**

The procedures for handling representation regarding revocation, suspension or limitation of the HKAR-66 aircraft maintenance licence are contained in HKAR-2 Administrative & Guidance Material Chapter 24.

GM 66.70**Conversion provisions**

For example a technical limitation could be where a person holds a pre HKAR-66 licence limited to the release of the airframe and engine but not the electrical power system. This person would be issued with an HKAR-66 aircraft maintenance licence in the B1 category with a limitation excluding electrical power generation and distribution systems.

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APPENDIX 1

Basic Knowledge Requirements

1. Knowledge Levels - Category A, B1, B2, B3 and C Certifying Staff

Basic knowledge for category A, B1, B2 and B3 certifying staff are indicated by the allocation of knowledge levels indicators (1, 2 or 3) against each applicable subject area in this Appendix 1. Category C certifying staff with a mechanical background should meet the category B1 basic knowledge levels. Category C certifying staff with an avionic background should meet the category B2 basic knowledge levels.

The knowledge level indicators are defined as follows:

LEVEL 1 *A familiarisation with the principal elements of the subject.*

Objectives: The student should be familiar with the basic elements of the subject.

The student should be able to give a simple description of the whole subject, using common words and examples.

The student should be able to use typical terms.

LEVEL 2 *A general knowledge of the theoretical and practical aspects of the subject*

An ability to apply that knowledge.

Objectives: The student should be able to understand the theoretical fundamentals of the subject.

The student should be able to give a general description of the subject using, as appropriate, typical examples.

The student should be able to use mathematical formulae in conjunction with physical laws describing the subject.

The student should be able to read and understand sketches, drawings and schematics describing the subject.

The student should be able to apply his knowledge in a practical manner using detailed procedures.

LEVEL 3 *A detailed knowledge of the theoretical and practical aspects of the subject.*

A capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.

Objectives: The student should know the theory of the subject and interrelationships with other subjects.

The student should be able to give a detailed description of the subject using theoretical fundamentals and specific examples.

The student should understand and be able to use mathematical formulae related to the subject.

The student should be able to read, understand and prepare sketches, simple drawings and schematics describing the subject.

The student should be able to apply his knowledge in a practical manner using manufacturer's instructions.

The student should be able to interpret results from various sources and measurements and apply corrective action where appropriate.

Note: The HKAR-2 Administrative & Guidance Material Chapter 23 contains an explanation of the basic knowledge objective relative to each subject.

2. Modularisation

Qualification on basic subjects for each HKAR-66 aircraft maintenance licence category or sub-category should be in accordance with the following matrix. Applicable subjects are indicated by an "X":

SUBJECT/ MOUDULES	A or B1 AEROPLANE WITH:		A or B1 HELICOPTER WITH:		B2	B3
	TURBINE ENGINE(S) A1 / B1.1	PISTON ENGINE(S) A2 / B1.2	TURBINE ENGINE(S) A3 / B1.3	PISTON ENGINE(S) A4 / B1.4	AVIONICS	SIMPLE LIGHT AEROPLANE
1	X	X	X	X	X	X
2	X	X	X	X	X	X
3	X	X	X	X	X	X
4	- / X	- / X	- / X	- / X	X	-
5	X	X	X	X	X	-
6	X	X	X	X	X	X
7	X	X	X	X	X	X
8	X	X	X	X	X	X
9	X	X	X	X	X	X
10	X	X	X	X	X	X
11	X	X	-	-	-	X
12	-	-	X	X	-	-
13	-	-	-	-	X	-
14	-	-	-	-	X	-
15	X	-	X	-	-	-
16	-	X	-	X	-	X
17	X	X	-	-	-	X
18	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
19	-	Optional	-	-	-	Optional

SUBJECT/MODULES

1. Mathematics
2. Physics
3. Electrical Fundamentals
4. Electronic Fundamentals
5. Digital Techniques / Electronic Instrument Systems
6. Materials and Hardware
7. Maintenance Practices
8. Basic Aerodynamics
9. Human Factors
10. Aviation Legislation
11. Aeroplane Aerodynamics, Structures and Systems
12. Helicopter Aerodynamics, Structures and Systems
13. Aircraft Aerodynamics, Structures and Systems
14. Propulsion
15. Gas Turbine Engine
16. Piston Engine
17. Propeller
18. Reserved
19. Wooden Aeroplanes

Note 1: The subject modules may be sub-divided into sub-modules for the purpose of training and/or examination.

Note 2: The levels specified in this Appendix will be subjected to regular review in the light of experience.

MODULE 1. MATHEMATICS

		A	Level B1/3	B2
1.1	Arithmetic Arithmetical terms and signs, methods of multiplication and division, fractions and decimals, factors and multiples, weights, measures and conversion factors, ratio and proportion, averages and percentages, areas and volumes, squares, cubes, square and cube roots.	1	2/2	2
1.2	Algebra			
	a) Evaluating simple algebraic expressions, addition, subtraction, multiplication and division, use of brackets, simple algebraic fractions;	1	2/2	2
	b) Linear equations and their solutions; Indices and powers, negative and fractional indices; Binary and other applicable numbering systems; Simultaneous equations and second degree equations with one unknown; Logarithms.	-	1/-	1
1.3	Geometry			
	a) Simple geometrical constructions;	-	1/1	1
	b) Graphical representation; nature and uses of graphs, graphs of equations/functions;	2	2/2	2
	c) Simple trigonometry; trigonometrical relationships, use of tables and rectangular and polar co-ordinates.	-	2/2	2

MODULE 2. PHYSICS

Students should become conversant with Metric, Imperial (British) and US units and measurements.

		Level		
		A	B1/3	B2
2.1	Matter	1	1/1	1
<p>Nature of matter : the chemical elements, structure of atoms, molecules; Chemical compounds; States: solid, liquid and gaseous; Changes between states.</p>				
2.2	Mechanics			
2.2.1	Statics	1	2/2	1
<p>Forces, moments and couples, representation as vectors; Centre of gravity; Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Nature and properties of solid, fluid and gas; Pressure and buoyancy in liquids (barometers).</p>				
2.2.2	Kinetics	1	2/2	1
<p>Linear movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal/centripetal forces); Periodic motion: pendular movement; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency.</p>				

SECTION 4**HKAR-66**

		A	Level B1/3	B2
2.2.3	Dynamics			
a)	Mass; Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;	1	2/2	1
b)	Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).	1	2/2	2
2.2.4	Fluid dynamic			
a)	Specific gravity and density;	2	2/2	2
b)	Viscosity, fluid resistance, effects of streamlining; effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.	1	2/2	1
2.3	Thermodynamics			
a)	Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition;	2	2/2	2
b)	Heat capacity, specific heat; Heat transfer: convection, radiation and conduction; Volumetric expansion; First and second law of thermodynamics; Gases: ideal gases laws; specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and	-	2/1	2

		A	Level B1/3	B2
	<p>compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps;</p> <p>Latent heats of fusion and evaporation, thermal energy, heat of combustion.</p>			
2.4	<p>Optics (Light)</p> <p>Nature of light; speed of light;</p> <p>Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses;</p> <p>Fibre optics.</p>	-	2/-	2
2.5	<p>Wave Motion and Sound</p> <p>Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves;</p> <p>Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.</p>	-	2/-	2

MODULE 3. ELECTRICAL FUNDAMENTALS

		A	Level B1/3	B2
3.1	Electron Theory	1	1/1	1
	Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.			
3.2	Static Electricity and Conduction	1	2/1	2
	Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.			
3.3	Electrical Terminology	1	2/2	2
	The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.			
3.4	Generation of Electricity	1	1/1	1
	Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.			
3.5	DC Sources of Electricity	1	2/2	2
	Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells;			

		Level		
		A	B1/3	B2
	<p>Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.</p>			
3.6	<p>DC Circuits</p> <p>Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.</p>	-	2/2	2
3.7	<p>Resistance / Resistor</p> <p>a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.</p> <p>b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge.</p>	-	2/1	2
		-	1/1	1

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		A	Level B1/3	B2
3.8	Power Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy.	-	2/1	2
3.9	Capacitance / Capacitor Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.	-	2/1	2
3.10	Magnetism a) Theory of magnetism; Properties of a magnet; Action of a magnet suspended in the Earth's Magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.	-	2/2	2

		Level		
		A	B1/3	B2
b)	Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.	-	2/2	2
3.11	Inductance / Inductor Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self induction; Saturation point; Principle uses of inductors.	-	2/1	2

SECTION 4**HKAR-66**

		Level	
	A	B1/3	B2
3.12 DC Motor / Generator Theory	-	2/2	2
Basic motor and generator theory;			
Construction and purpose of components in DC generator;			
Operation of, and factors affecting output and direction of current flow in DC generators;			
Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors;			
Series wound, shunt wound and compound motors;			
Starter Generator construction.			
3.13 AC Theory	1	2/2	2
Sinusoidal waveform: phase, period, frequency, cycle;			
Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power;			
Triangular/Square waves;			
Single / 3 phase principles.			
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits	-	2/1	2
Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel;			
Power dissipation in L, C and R circuits;			
Impedance, phase angle, power factor and current calculations;			
True power, apparent power and reactive power calculations.			

		A	Level B1/3	B2
3.15	Transformers Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.	-	2/1	2
3.16	Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	-	1/1	1
3.17	AC Generators Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Calculation of line and phase voltages and currents; Calculation of power in a three phase system; Permanent Magnet Generators.	-	2/2	2
3.18	AC Motors Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.	-	2/1	2

MODULE 4. ELECTRONIC FUNDAMENTALS

		A	Level B1	B2
4.1	Semiconductors			
4.1.1	Diode			
a)	Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes.	-	2	2
b)	Materials, electron configuration, electrical properties; P and N type materials: effects of impurities on conduction, majority and minority carriers; PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions; Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation; Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers; Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Schottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.	-	-	2

		A	Level B1	B2
4.1.2	Transistors			
a)	Transistor symbols; Component description and orientation; Transistor characteristics and properties.	-	1	2
b)	Construction and operation of PNP and NPN transistors; Base, collector and emitter configurations; Testing of transistors; Basic appreciation of other transistor types and their uses; Application of transistors: classes of amplifier (A, B, C); Simple circuits including: bias, decoupling, feedback and stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, flip-flop circuits.	-	-	2
4.1.3	Integrated Circuits			
a)	Description and operation of logic circuits and linear circuits / operational amplifiers.	-	1	-
b)	Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct; Advantages and disadvantages of positive and negative feedback.	-	-	2

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		Level		
		A	B1	B2
4.2	Printed Circuit Boards Description and use of printed circuit boards.	-	1	2
4.3	Servomechanisms			
	a) Understanding of the following items: Open and closed loop systems, feedback, follow up, analogue transducers; Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.	-	1	-
	b) Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue transducer, null, damping, feedback, deadband; Construction, operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters; Servomechanism defects, reversal of synchro leads, hunting.	-	-	2

**MODULE 5. DIGITAL TECHNIQUES
ELECTRONIC INSTRUMENT SYSTEMS**

		Level		
		A	B1	B2
5.1	Electronic Instrument Systems Typical systems arrangements and cockpit layout of electronic instrument systems.	1	2	3
5.2	Numbering Systems Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.	1	1	2
5.3	Data Conversion Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	-	1	2
5.4	Data Buses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.	1	2	2
5.5	Logic Circuits			
	a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.	-	2	2
	b) Interpretation of logic diagrams.	-	-	2

		Level		
		A	B1	B2
5.6	Basic Computer Structure			
	a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).	1	2	2
	b) Computer related terminology; Operation, layout and interface of the major components in a micro computer including their associated bus systems; Information contained in single and multiaddress instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.	-	-	2
5.7	Microprocessors	-	-	2
	Functions performed and overall operation of a microprocessor; Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.			
5.8	Integrated Circuits	-	-	2
	Operation and use of encoders and decoders; Function of encoder types; Uses of medium, large and very large scale integration.			

		Level		
		A	B1	B2
5.9	Multiplexing Operation, application and identification in logic diagrams of multiplexers and demultiplexers.	-	-	2
5.10	Fibre Optics Advantages and disadvantages of fibre optic data transmission over electrical wire propagation; Fibre optic data bus; Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems.	-	1	2
5.11	Electronic Displays Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.	-	2	2
5.12	Electrostatic Sensitive Devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.	1	2	2
5.13	Software Management Control Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	-	2	2

		Level		
		A	B1	B2
5.14	Electromagnetic Environment	-	2	2
Influence of the following phenomena on maintenance practices for electronic system:				
EMC - Electromagnetic Compatibility				
EMI - Electromagnetic Interference				
HIRF - High Intensity Radiated Field				
Lightning / lightning protection				
5.15	Typical Electronic / Digital Aircraft Systems	-	2	2
General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) testing such as:				
ACARS - ARINC Communication Addressing and Reporting System				
ECAM - Electronic Centralised Aircraft Monitoring				
EFIS - Electronic Flight Instrument System				
EICAS - Engine Indication and Crew Alerting System				
FBW - Fly by Wire				
FMS - Flight Management System				
GPS - Global Positioning System				
IRS - Inertial Reference System				
TCAS - Traffic Alert Collision Avoidance System				

Note: Different manufacturers may use different terminology for similar systems.

MODULE 6. MATERIALS AND HARDWARE

		A	Level B1/3	B2
6.1	Aircraft Materials - Ferrous			
	a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloys steels.	1	2/2	1
	b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	-	1/-	1
6.2	Aircraft Materials - Non-Ferrous			
	a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials.	1	2/2	1
	b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	-	1/-	1
6.3	Aircraft Materials - Composite and Non-Metallic			
	a) Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealants and bonding agents.	1	2/2	2
	b) The detection of defects in composite material. Repair of composite material.	1	2/2	-

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	A	Level B1/3	B2
6.4 Corrosion			
a) Chemical fundamentals; Formation by: galvanic action process, microbiological, stress;	1	1/1	1
b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.	2	3/3	2
6.5 Fasteners			
6.5.1 Screw threads	2	2/2	2
Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads.			
6.5.2 Bolts, studs and screws	2	2/2	2
Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.			
6.5.3 Locking devices	2	2/2	2
Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.			

	A	Level B1/3	B2
6.5.4 Aircraft rivets	1	2/2	1
Types of solid and blind rivets: specifications and identification, heat treatment.			
6.6 Pipes and Unions			
a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft.	2	2/2	2
b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2	2/2	1
6.7 Springs	1	2/2	1
Types of springs, materials, characteristics and applications.			
6.8 Bearings	1	2/2	2
Purpose of bearings, loads, material, construction; Types of bearings and their application.			
6.9 Transmissions	1	2/2	2
Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.			

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	A	Level B1/3	B2
6.10 Control Cables	1	2/2	1
Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.			
6.11 Electrical Cables and Connectors	1	2/2	2
Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.			

MODULE 7. MAINTENANCE PRACTICES

		Level		
		A	B1/3	B2
7.1	Safety Precautions-Aircraft and Workshop	3	3/3	3
	Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards.			
7.2	Workshop Practices	3	3/3	3
	Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.			
7.3	Tools	3	3/3	3
	Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods; Operation, function and use of electrical general test equipment.			
7.4	Avionic General Test Equipment	-	2/2	3
	Operation, function and use of avionic general test equipment.			

		A	Level B1/3	B2
7.5	Engineering Drawings, Diagrams and Standards	1	2/2	2
	Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.			
7.6	Fits and Clearances	1	2/2	1
	Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.			
7.7	Electrical Cables and Connectors	1	2/2	2
	Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding.			

		A	Level B1/3	B2
7.8	<p>Riveting</p> <p>Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.</p>	1	2/2	-
7.9	<p>Pipes and Hoses</p> <p>Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.</p>	1	2/2	-
7.10	<p>Springs</p> <p>Inspection and testing of springs.</p>	1	2/2	-
7.11	<p>Bearings</p> <p>Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.</p>	1	2/2	-
7.12	<p>Transmissions</p> <p>Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.</p>	1	2/2	-
7.13	<p>Control Cables</p> <p>Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.</p>	1	2/2	-

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		A	Level B1/3	B2
7.14	Material handling			
7.14.1	Sheet Metal	-	2/2	-
	Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.			
7.14.2	Composite and non-metallic	-	2/2	-
	Bonding practices; Environmental conditions Inspection methods			
7.15	Welding, Brazing, Soldering and Bonding			
	a) Soldering methods; inspection of soldered joints.	-	2/2	2
	b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	-	2/2	-
7.16	Aircraft Weight and Balance			
	a) Centre of Gravity / Balance limits calculation: use of relevant documents;	-	2/2	2
	b) Preparation of aircraft for weighing; Aircraft weighing.	-	2/2	-
7.17	Aircraft Handling and Storage	2	2/2	2

		Level		
		A	B1/3	B2
	Aircraft taxiing / towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling / defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies; Effects of environmental conditions on aircraft handling and operation.			
7.18	Disassembly, Inspection, Repair and Assembly Techniques			
	a) Types of defects and visual inspection techniques; Corrosion removal, assessment and re-protection.	2	3/3	2
	b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes.	-	2/2	-
	c) Non-destructive inspection techniques including: penetrant, radiographic, eddy current, ultrasonic and boroscope methods.	-	2/2	1
	d) Disassembly and re-assembly techniques.	2	2/2	2
	e) Trouble shooting techniques.	-	2/2	2
7.19	Abnormal Events			
	a) Inspections following lightning strikes and HIRF penetration.	2	2/2	2

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		Level		
		A	B1/3	B2
	b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2	2/2	-
7.20	Maintenance Procedures	1	2/2	2
	Maintenance planning;			
	Modification procedures;			
	Stores procedures;			
	Certification / release procedures;			
	Interface with aircraft operation;			
	Maintenance Inspection / Quality Control / Quality Assurance;			
	Additional maintenance procedures;			
	Control of life limited components.			

MODULE 8. BASIC AERODYNAMICS

	A	Level B1/3	B2
8.1 Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics.	1	2/2	2
8.2 Aerodynamics Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash; vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	1	2/2	2
8.3 Theory of Flight Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor : stall, flight envelope and structural limitations; Lift augmentation.	1	2/2	2
8.4 Flight Stability and Dynamics Longitudinal, lateral and directional stability (active and passive).	1	2/2	2

MODULE 9. HUMAN FACTORS

		Level		
		A	B1/3	B2
9.1	<p>General</p> <p>The need to take human factors into account; Incidents attributable to human factors / human error; 'Murphy's' law.</p>	1	2/2	2
9.2	<p>Human Performance and Limitations</p> <p>Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.</p>	1	2/2	2
9.3	<p>Social Psychology</p> <p>Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership.</p>	1	1/1	1
9.4	<p>Factors Affecting Performance</p> <p>Fitness / health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.</p>	2	2/2	2
9.5	<p>Physical Environment</p>	1	1/1	1

		A	Level B1/3	B2
	Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.			
9.6	Tasks	1	1/1	1
	Physical work; Repetitive tasks; Visual inspection; Complex systems.			
9.7	Communication	2	2/2	2
	Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.			
9.8	Human Error	1	2/2	2
	Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors.			
9.9	Hazards in the Workplace	1	2/2	2
	Recognising and avoiding hazards; Dealing with emergencies.			

MODULE 10. AVIATION LEGISLATION

		Level		
		A	B1/3	B2
10.1	Aircraft Maintenance Licences	2	2/2	2
	Air Navigation (Hong Kong) Order 1995 requirements;			
	Responsibilities: by statutory law and by the need to fly aircraft in a satisfactory condition, i.e. common / civil / constitutional law;			
	Penalties - under statutory law and resulting from civil law suits;			
	HKAR-66: Licensing of Maintenance Personnel (Certifying Staff - Maintenance);			
	Categories - applicability;			
	Area and extent of limitations and privileges within Categories;			
	Overlap of Category applicability;			
	Relevant Airworthiness Notices.			
10.2	Certifications	1	2/2	2
	Air Navigation (Hong Kong) Order 1995 requirements; HKAR-1 Airworthiness Procedures;			
	Certificates of : Release to Service; Maintenance Review; Fitness for Flight;			
	Duplicate inspections;			
	Contributory certifications and reliance on other documentation and persons;			
	Certification - acceptance investigation and judgment procedures.			
10.3	Aircraft, Engine and VP Propeller Log Books	1	2/2	2
	Air Navigation (Hong Kong) Order 1995 requirements; HKAR-1 Airworthiness Procedures;			
	CAD Approval: light aircraft, large aircraft;			

	Level	
A	B1/3	B2

Worksheets;
 Data to be entered in log books;
 Condition reports - e.g. heavy landing checks, defect investigations, NDT and other inspections, mandatory and non-mandatory;
 Maintenance records;
 Cross-reference to other files / records;
 Preservation of documents: AN(HK)O 1995.

10.4	Technical Log	2	2/2	2
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Air Navigation (Hong Kong) Order 1995 requirements; HKAR-1 Airworthiness Procedures;
 Technical Log - Air Operator's Certificates Requirements Document.

10.5	Aircraft Documentation and Requirements	1	2/2	2
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Type Certification; Supplementary Type Certification;
 Weight schedule;
 External, and internal markings and signs, e.g. nationality and registration, no smoking and fasten seat belt, placards and requirements, doors and exits;
 Certificate of Airworthiness Categories, purposes of flight;
 Certificate of Registration;
 Noise Certificate;
 Air Operator's Certificate;
 Schedule 5 requirements for equipment;
 Radio station licence and approval;
 Change of ownership;
 Maintenance checks and inspections;

		Level		
		A	B1/3	B2
	Maintenance records; Maintenance documentation; Continuing airworthiness; Master Minimum Equipment Lists, Minimum Equipment Lists, Dispatch Deviation Lists; Service Bulletins, manufacturers service information; Modifications and repairs; Test flights; ETOPS: maintenance and dispatch requirements; All Weather Operation (AWO): CAT 2/3 operations and minimum equipment requirements; Reduced Vertical Separation Minima (RVSM) requirements;			
10.6	Approvals	1	2/2	2
	Design/Production Organisations; Maintenance Organisations; AOC interface; Maintenance Schedules and Programmes; Stores: systems; release of parts.			
10.7	Defect Reporting	2	2/2	2
	Air Navigation (Hong Kong) Order 1995 requirements; CAD382 The Mandatory Occurrence Reporting Scheme; Defects which are to be reported; Reportable accidents.			
10.8	Hong Kong Aviation Requirements	1	2/2	2
	HKAR-1: Airworthiness Procedures; Airworthiness Notices; Airworthiness Directives;			

A	Level	
	B1/3	B2

Mandatory Modifications and Inspections:-

- HK CAD
- UK CAA
- FAA
- Authorities other than above: aircraft, engines, equipment;

HKAR-21: Certification of Aircraft and Related Products, Parts and Appliances, and of Design and Production Organisations

HKAR-145: Approved Maintenance Organisations.

HKAR-147: Approved Maintenance Training/Examinations

Air Operator’s Certificates (AOC) Requirements Document.

10.9	EASA Requirements	1	1/1	1
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Certification rules: such as EASA CS 23/25/27/29

10.10	Hong Kong Aviation Legislations	1	2/2	2
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Influence of psychoactive substances on physical or mental condition of the holder of the AML;

Safety management system.

**MODULE 11. AEROPLANE AERODYNAMICS,
STRUCTURES AND SYSTEMS**

***Note: Subjects in italics NOT applicable to B3**

	A	Level B1/3	B2
11.1 Theory of Flight			
11.1.1 Aeroplane Aerodynamics and Flight Controls	1	2/1*	-
<p>Operation and effect of:</p> <ul style="list-style-type: none"> - roll control: ailerons <i>and spoilers</i>; - pitch control: elevators, stabilators, <i>variable incidence stabilisers and canards</i>; - yaw control, rudder limiters; <p>Control using elevons, ruddervators;</p> <p>High lift devices, slots, slats, flaps, flaperons;</p> <p><i>Drag inducing devices, spoilers, lift dumpers, speed brakes</i>;</p> <p>Effects of wing fences, saw tooth leading edges;</p> <p>Boundary layer control using, vortex generators, stall wedges or leading edge devices;</p> <p>Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;</p>			
11.1.2 High Speed Flight	1	2/-	-
<p>Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule;</p> <p>Factors affecting airflow in engine intakes of high speed aircraft;</p> <p>Effects of sweepback on critical Mach number.</p>			

		A	Level B1/3	B2
11.2	Airframe Structures - General Concepts			
a)	Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision; Aircraft bonding.	2	2/2	-
b)	Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	1	2/2	-
11.3	Airframe Structures - Aeroplanes			
11.3.1	Fuselage (ATA 52/53/56)	1	2/2*	-
	Construction and <i>pressurisation sealing</i> ; Wing, stabiliser, pylon and undercarriage			

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		A	Level B1/3	B2
	<p>attachments; Seat installation <i>and cargo loading system</i>; Doors: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.</p>			
11.3.2	<p>Wings (ATA 57)</p> <p>Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.</p>	1	2/2	-
11.3.3	<p>Stabilisers (ATA 55)</p> <p>Construction; Control surface attachment.</p>	1	2/2	-
11.3.4	<p>Flight Control Surfaces (ATA 55/57)</p> <p>Construction and attachment; Balancing - mass and aerodynamic.</p>	1	2/2	-
11.3.5	<p>Nacelles/Pylons (ATA 54)</p> <p>Construction; Firewalls; Engine mounts.</p>	1	2/2	-
11.4	<p>Air Conditioning and Cabin Pressurisation (ATA 21)</p>			
11.4.1	<p>Air supply</p> <p>Sources of air supply including engine bleed,</p>	1	2/-	-

		A	Level B1/3	B2
	APU and ground cart.			
11.4.2	Air Conditioning	1	3/-	-
	Air conditioning systems; Air cycle and vapour cycle machines; Distribution systems; Flow, temperature and humidity control system.			
11.4.3	Pressurisation	1	3/-	-
	Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers.			
11.4.4	Safety and warning devices	1	3/-	-
	Protection and warning devices.			
11.5	Instruments/Avionic Systems			
11.5.1	Instrument Systems (ATA 31)	1	2/2	-
	Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Compass compensation and adjustment; Angle of attack indication, stall warning systems; Other aircraft system indication.			

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		A	Level B1/3	B2
11.5.2	Avionic Systems	1	1/1*	-
	Fundamentals of system lay-outs and operation of: <i>Auto Flight (ATA 22);</i> Communications (ATA 23); Navigation Systems (ATA 34).			
11.6	Electrical Power (ATA 24)	1	3/2*	-
	Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; <i>Inverters, transformers, rectifiers;</i> Circuit protection; External / Ground power.			
11.7	Equipment and Furnishings (ATA 25)			
	a) Emergency equipment requirements; Seats, harnesses and belts.	2	2/2	-
	b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	1	2/-	-

		A	Level B1/3	B2
11.8	<p>Fire Protection (ATA 26)</p> <p><i>Fire and smoke detection and warning systems;</i> Fire extinguishing systems; System tests.</p>	1	3/2*	-
11.9	<p>Flight Controls (ATA 27)</p> <p>Primary controls: aileron, elevator, rudder, spoiler; Trim control; <i>Active load control;</i> High lift devices; <i>Lift dump, speed brakes;</i> System operation: manual, hydraulic, <i>pneumatic, electrical, fly-by-wire;</i> <i>Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks;</i> Balancing and rigging; Stall protection system.</p>	1	3/3*	-
11.10	<p>Fuel Systems (ATA 28)</p> <p>System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer, Indications and warnings; Refuelling and defuelling; <i>Longitudinal balance fuel systems.</i></p>	1	3/3*	-

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		A	Level B1/3	B2
11.11	Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3/3	-
11.12	Ice and Rain Protection (ATA 30) Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, pneumatic and chemical; Rain repellent and removal; Probe and drain heating; Wiper systems.	1	3/3	-
11.13	Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; <i>Wheels, brakes, antiskid and autobraking;</i> <i>Tyres;</i>	2	3/3*	-

		A	Level B1/3	B2
<i>Steering.</i>				
11.14	Lights (ATA 33)	2	3/3*	-
External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.				
11.15	Oxygen (ATA 35)	1	3/-	-
System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings.				
11.16	Pneumatic/Vacuum (ATA 36)	1	3/-	-
System lay-out; Sources: engine / APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.				
11.17	Water/Waste (ATA 38)	2	3/-	-
Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.				

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		A	Level B1/3	B2
11.18	On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	1	2/-	-

**MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES
AND SYSTEMS**

		Level		
		A	B1	B2
12.1	Theory of Flight - Rotary Wing Aerodynamics	1	2	-
	Terminology;			
	Effects of gyroscopic precession;			
	Torque reaction and directional control;			
	Dissymmetry of lift, Blade tip stall;			
	Translating tendency and its correction;			
	Coriolis effect and compensation;			
	Vortex ring state, power setting, overpitching;			
	Auto-rotation;			
	Ground effect.			
12.2	Flight Control System	2	3	-
	Cyclic control;			
	Collective control;			
	Swashplate;			
	Yaw control: Anti-Torque Control, Tail rotor, bleed air;			
	Main Rotor Head: Design and Operation features;			
	Blade Dampers: Function and construction;			
	Rotor Blades: Main and tail rotor blade construction and attachment;			
	Trim control, fixed and adjustable stabilisers;			
	System operation: manual, hydraulic, electrical and fly-by-wire;			
	Artificial feel;			
	Balancing and Rigging.			

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		Level		
		A	B1	B2
12.3	Blade Tracking and Vibration Analysis Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	1	3	-
12.4	Transmissions Gear boxes, main and tail rotors; Clutches, free wheel units and rotor brake.	1	3	-
12.5	Airframe Structures			
	a) Airworthiness requirements for structural strength; Structural classification: primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision.	2	2	-
	b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection; Pylon, stabiliser and undercarriage attachments;	1	2	-

A	Level	
	B1	B2

Seat installation;
 Doors: construction, mechanisms, operation and safety devices;
 Windows and windscreen construction;
 Fuel storage;
 Firewalls;
 Engine mounts;
 Structure assembly techniques: riveting, bolting, bonding;
 Methods of surface protection, such as chromating, anodising, painting;
 Surface cleaning;
 Airframe symmetry: methods of alignment and symmetry checks.

12.6 Air Conditioning (ATA 21)

12.6.1 Air supply	1	2	-
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Sources of air supply including engine bleed and ground cart.

12.6.2 Air Conditioning	1	3	-
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Air conditioning systems;
 Distribution systems;
 Flow and temperature control systems;
 Protection and warning devices.

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	A	Level B1	B2
12.7 Instruments / Avionic Systems			
12.7.1 Instrument Systems (ATA 31)	1	2	-
Pitot static: altimeter, air speed indicator, vertical speed indicator;			
Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator;			
Compasses: direct reading, remote reading;			
Compass compensation and adjustment;			
Vibration indicating systems - HUMS;			
Other aircraft system indication.			
12.7.2 Avionic Systems	1	1	-
Fundamentals of system layouts and operation of:			
Auto Flight (ATA 22);			
Communications (ATA 23);			
Navigation Systems (ATA 34).			
12.8 Electrical Power (ATA 24)	1	3	-
Batteries Installation and Operation;			
DC power generation, AC power generation;			
Emergency power generation;			
Voltage regulation, Circuit protection;			
Power distribution;			
Inverters, transformers, rectifiers;			
External/Ground power.			
12.9 Equipment and Furnishings (ATA 25)			

		Level		
		A	B1	B2
a)	Emergency equipment requirements; Seats, harnesses and belts; Lifting systems.	2	2	-
b)	Emergency flotation systems; Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation.	1	1	-
12.10	Fire Protection (ATA 26) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3	-
12.11	Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	1	3	-
12.12	Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Pressure Control; Power distribution;	1	3	-

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		Level		
		A	B1	B2
	Indication and warning systems; Interface with other systems.			
12.13	Ice and Rain Protection (ATA 30) Ice formation, classification and detection; Anti-icing and De-icing systems: electrical, hot air and chemical; Rain repellent and removal; Probe and drain heating.	1	3	-
12.14	Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, Tyres, brakes; Steering; Skids, floats.	2	3	-
12.15	Lights (ATA 33) External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	3	-
12.16	Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine, compressors, reservoirs, ground supply;	1	3	-

Level		
A	B1	B2

Pressure control;
Distribution;
Indications and warnings;
Interfaces with other systems.

**MOEULE 13. AIRCRAFT AERODYNAMICS,
STRUCTURES AND SYSTEMS**

***Note: Subjects from Module 13.11 to Module 13.22 are effective from 1 August 2013**

		Level		
		A	B1	B2
13.1	Theory of Flight			
13.1.1	Aeroplane Aerodynamics and Flight Controls	-	-	1
	<p>Operation and effect of:</p> <ul style="list-style-type: none"> - roll control: ailerons and spoilers; - pitch control: elevators, stabilators, variable incidence stabilisers an canards; - yaw control, rudder limiters; <p>Control using elevons, ruddervators;</p> <p>High lift devices: slots, slats, flaps;</p> <p>Drag inducing devices: spoilers, lift dumpers, speed brakes;</p> <p>Operation and effect of trim tabs, servo tabs, control surface bias.</p>			
13.1.2	High Speed Flight	-	-	1
	<p>Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number.</p>			
13.1.3	Rotary Wing Aerodynamics	-	-	1
	<p>Terminology;</p> <p>Operation and effect of cyclic, collective and anti-torque controls.</p>			

		Level		
		A	B1	B2
13.2	Structures - General Concepts			
	a) Fundamentals of structural systems.	-	-	1
	b) Zonal and station identification systems; Electrical bonding; Lightning strike protection provision.	-	-	2
13.3	Autoflight (ATA 22)	-	-	3
	Fundamentals of automatic flight control including working principles and current terminology; Command signal processing; Modes of operation: roll, pitch and yaw channels; Yaw dampers; Stability Augmentation System in helicopters; Automatic trim control; Autopilot navigation aids interface; Flight Management System (FMS); navigation database; Autothrottle systems; Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions, downgrade and upgrade procedures.			
13.4	Communication / Navigation (ATA 23 / 34)	-	-	3
	Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter;			

Level		
A	B1	B2

Principles and methods used to minimise the effects of interference;

Standing wave ratio and its calculation;

Working principles of following systems:

- Very High Frequency (VHF) communication;
- High Frequency (HF) communication;
- Audio Systems;
- Emergency Locator Transmitters;
- Cockpit Voice Recorder;
- Very High Frequency Omni-directional Range (VOR);
- Automatic Direction Finding (ADF);
- Instrument Landing System (ILS);
- Microwave Landing System (MLS);
- Flight Director systems;
- Distance Measuring Equipment (DME);
- Very Low Frequency and hyperbolic navigation (VLF/Omega);
- Satellite Communication (SATCOM);
- Doppler navigation;
- Area navigation, RNAV systems;
- Flight Management Systems;
- Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS);
- Inertial Navigation/Reference System;
- Air Traffic Control (ATC) transponder, secondary surveillance radar;
- Traffic Alert and Collision Avoidance System (TCAS);
- Weather avoidance radar;
- Radio altimeter;
- ARINC Communication Addressing and Reporting System (ACARS).

		Level		
		A	B1	B2
13.5	<p>Electrical Power (ATA 24)</p> <p>Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection; External / Ground power.</p>	-	-	3
13.6	<p>Equipment and Furnishings (ATA 25)</p> <p>Electronic emergency equipment requirements; Cabin entertainment equipment.</p>	-	-	3
13.7	<p>Flight Controls (ATA 27)</p>			
	<p>a) Primary controls: aileron, elevator, rudder, spoiler, Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks; Stall protection systems;</p>	-	-	2
	<p>b) System operation: electrical, fly by wire.</p>	-	-	3

		Level		
		A	B1	B2
13.8	Instrument Systems (ATA 31) Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pitot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machmeters; Altitude reporting / alerting systems; Air data computers; Instrument pneumatic systems; Direct reading pressure and temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons; Slip indicators; Directional gyros; Ground Proximity Warning Systems; Compass systems Flight Data Recording systems; Electronic Flight Instrument Systems; Instrument warning systems including master warning systems and centralised warning panels; Stall warning systems and angle of attack indicating systems; Windshear Detection and Warning System; Vibration measurement and indication;	-	-	3

		Level		
		A	B1	B2
	Glass cockpit.			
13.9	Lights (ATA 33)	-	-	3
	External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.			
13.10	On board Maintenance Systems (ATA 45)	-	-	3
	Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).			
13.11	Air Conditioning and Cabin Pressurisation (ATA21)			
13.11.1	Air supply	-	-	2
	Sources of air supply including engine bleed, APU and ground cart;			
13.11.2	Air Conditioning			
	Air conditioning systems;	-	-	2
	Air cycle and vapour cycle machines;	-	-	3
	Distribution systems;	-	-	1

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		Level		
		A	B1	B2
	Flow, temperature and humidity control system.	-	-	3
13.11.3	Pressurisation	-	-	3
	Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers.			
13.11.4	Safety and warning devices	-	-	3
	Protection and warning devices.			
13.12	Fire Protection (ATA 26)			
	(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests;	-	-	3
	(b) Portable fire extinguisher.	-	-	1
13.13	Fuel Systems (ATA 28)			
	System lay-out	-	-	1
	Fuel tanks;	-	-	1
	Supply systems;	-	-	1
	Dumping, venting and draining;	-	-	1
	Cross-feed and transfer;	-	-	2
	Indications and warnings;	-	-	3

		Level		
		A	B1	B2
	Refuelling and defuelling;	-	-	2
	Longitudinal balance fuel systems.	-	-	3
13.14	Hydraulic Power (ATA 29)			
	System lay-out;	-	-	1
	Hydraulic fluids;	-	-	1
	Hydraulic reservoirs and accumulators;	-	-	1
	Pressure generation: electrical, mechanical, pneumatic;	-	-	3
	Emergency pressure generation;	-	-	3
	Filters;	-	-	1
	Pressure control;	-	-	3
	Power distribution;	-	-	1
	Indication and warning systems;	-	-	3
	Interface with other systems.	-	-	3
13.15	Ice and Rain Protection (ATA 30)			
	Ice formation, classification and detection;	-	-	2
	Anti-icing systems: electrical, hot air and chemical;	-	-	2
	De-icing systems: electrical, hot air pneumatic and chemical;	-	-	3
	Rain repellent;	-	-	1
	Probe and drain heating;	-	-	3
	Wiper systems.	-	-	1
13.16	Landing Gear (ATA 32)			

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		Level		
		A	B1	B2
	Construction, shock absorbing;	-	-	1
	Extension and retraction systems: normal and emergency;	-	-	3
	Indications and warning;	-	-	3
	Wheels, brakes, antiskid and autobraking;	-	-	3
	Tyres;	-	-	1
	Steering;	-	-	3
	Air-ground sensing.	-	-	3
13.17	Oxygen (ATA 35)			
	System lay-out: cockpit, cabin;	-	-	3
	Sources, storage, charging and distribution;	-	-	3
	Supply regulation;	-	-	3
	Indications and warnings.	-	-	3
13.18	Pneumatic/Vacuum (ATA 36)			
	System lay-out;	-	-	2
	Sources: engine / APU, compressors, reservoirs, ground supply;	-	-	2
	Pressure control;	-	-	3
	Distribution;	-	-	1
	Indications and warnings;	-	-	3
	Interfaces with other systems.	-	-	3
13.19	Water/Waste (ATA 38)	-	-	2
	Water system lay-out, supply, distribution, servicing and draining;			
	Toilet system lay-out, flushing and servicing;			

		Level		
		A	B1	B2
13.20	Integrated Modular Avionics (ATA42)	-	-	3

Functions that may be typically integrated in the Integrated Modular Avionics (IMA) modules are, among others:

- Bleed Management,
- Air Pressure Control,
- Air Ventilation and Control,
- Avionics and Cockpit Ventilation Control,
- Temperature Control,
- Air Traffic Communication,
- Avionics Communication Router,
- Electrical Load Management,
- Circuit Breaker Monitoring,
- Electrical System BITE,
- Fuel Management,
- Braking Control,
- Steering Control,
- Landing Gear Extension and Retraction,
- Tyre Pressure Indication,
- Oleo Pressure Indication, &
- Brake Temperature Monitoring, etc.;

Core System;

Network Components.

		Level		
		A	B1	B2
13.21	Cabin Systems (ATA44)	-	-	3

The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service) including voice, data, music and video transmissions.

The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.

The Cabin Network Service typically consists of a server, typically interfacing with, among others, the following systems:

- Data/Radio Communication,
- In-Flight Entertainment System.

The Cabin Network Service may host functions such as:

- Access to pre-departure/departure reports,
- E-mail/intranet/Internet access,
- Passenger database;

Cabin Core System;
 In-flight Entertainment System;
 External Communication System;
 Cabin Mass Memory System;
 Cabin Monitoring System;
 Miscellaneous Cabin System

	Level	
A	B1	B2

13.22	Information Systems (ATA46)	-	-	3
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The units and components that furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. This includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller, but does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.

Typical examples include:

- Air Traffic and Information Management Systems and Network Server Systems.
- Aircraft General Information System;
- Flight Deck Information System;
- Maintenance Information System;
- Passenger Cabin Information System;
- Miscellaneous Information System.

MODULE 14. PROPULSION

*Note: Module 14.3 is effective from 1 August 2013

		A	Level B1	B2
14.1	Turbine Engines			
a)	Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines;	-	-	1
b)	Electronic Engine control and fuel metering systems (FADEC).	-	-	2
14.2	Engine Indicating Systems	-	-	2
	Exhaust gas temperature / Interstage turbine temperature systems;			
	Engine speed;			
	Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems;			
	Oil pressure and temperature;			
	Fuel pressure, temperature and flow;			
	Manifold pressure;			
	Engine torque;			
14.3	Starting and Ignition Systems	-	-	2
	Operation of engine start systems and components;			
	Ignition systems and components;			
	Maintenance safety requirements.			

MODULE 15. GAS TURBINE ENGINE

		Level		
		A	B1	B2
15.1	Fundamentals Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop.	1	2	-
15.2	Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.	-	2	-
15.3	Inlet Compressor inlet ducts; Effects of various inlet configurations; Ice protection.	2	2	-
15.4	Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing;	1	2	-

SECTION 4**HKAR-66**

		Level		
		A	B1	B2
	Operation; Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.			
15.5	Combustion Section	1	2	-
	Constructional features and principles of operation.			
15.6	Turbine Section	2	2	-
	Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.			
15.7	Exhaust	1	2	-
	Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers.			
15.8	Bearings and Seals	-	2	-
	Constructional features and principles of operation.			

		Level		
		A	B1	B2
15.9	Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2	-
15.10	Lubrication Systems System operation/lay-out and components.	1	2	-
15.11	Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2	-
15.12	Air Systems Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.	1	2	-
15.13	Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	1	2	-
15.14	Engine Indication Systems Exhaust Gas Temperature/Interstage Turbine Temperature; Engine Thrust indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe	1	2	-

SECTION 4**HKAR-66**

	A	Level B1	B2
pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed; Vibration measurement and indication; Torque; Power.			
15.15 Power Augmentation Systems	-	1	-
Operation and applications; Water injection, water methanol; Afterburner systems.			
15.16 Turbo-prop Engines	1	2	-
Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices.			
15.17 Turbo-shaft engines	1	2	-
Arrangements, drive systems, reduction gearing, couplings, control systems.			
15.18 Auxiliary Power Units (APUs)	1	2	-
Purpose, operation, protective systems.			

	A	Level B1	B2
15.19 Powerplant Installation	1	2	-
<p>Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.</p>			
15.20 Fire Protection Systems	1	2	-
<p>Operation of detection and extinguishing system.</p>			
15.21 Engine Monitoring and Ground Operation	1	3	-
<p>Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and boroscope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing / cleaning; Foreign Object Damage.</p>			
15.22 Engine Storage and Preservation	-	2	-
<p>Preservation and depreservation for the engine and accessories / systems.</p>			

MODULE 16. PISTON ENGINE

		A	Level B1/3	B2
16.1	Fundamentals	1	2/2	-
	Mechanical, thermal and volumetric efficiencies; Operating cycles; Piston displacement and compression ratio; Engine configuration and firing order.			
16.2	Engine Performance	1	2/2	-
	Power calculation and measurement ; Factors affecting engine power; Mixtures / leaning, pre-ignition.			
16.3	Engine Construction	1	2/2	-
	Crank case, crank shaft, cam shaft, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.			
16.4	Engine Fuel Systems			
16.4.1	Carburettors	1	2/2	-
	Types, construction and principles of operation; Icing and heating;			

		Level		
		A	B1/3	B2
16.4.2	Fuel injection systems Types, construction and principles of operation.	1	2/2	-
16.4.3	Electronic engine control Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2/2	-
16.5	Starting and Ignition Systems Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems.	1	2/2	-
16.6	Induction, Exhaust and Cooling Systems Construction and operation of: induction systems including alternate air systems; Exhaust systems and engine cooling systems.	1	2/2	-
16.7	Supercharging / Turbocharging Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging / turbocharging system; System terminology; Control systems; System protection.	1	2/2	-

SECTION 4

HKAR-66

		A	Level B1/3	B2
16.8	Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2/2	-
16.9	Lubrication Systems System operation / lay-out and components.	1	2/2	-
16.10	Engine Indication Systems Engine speed; Cylinder head temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	1	2/2	-
16.11	Powerplant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	1	2/2	-
16.12	Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine	1	3/3	-

	Level		
A	B1/3	B2	

manufacturer.

16.13 Engine Storage and Preservation

- 2/2 -

Preservation and depreservation for the engine and accessories / systems.

MODULE 17. PROPELLER

		A	Level B1/3	B2
17.1	Fundamentals	1	2/2	-
	Blade element theory; High / low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.			
17.2	Propeller Construction	1	2/2	-
	Construction methods and materials used in composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speed propeller; Propeller / spinner installation.			
17.3	Propeller Pitch Control	1	2/2	-
	Speed control and pitch change methods; Feathering and reverse pitch; Overspeed protection.			
17.4	Propeller Synchronising	-	2/2	-
	Synchronising and synchronising equipment.			

		A	Level B1/3	B2
17.5	Propeller Ice Protection Fluid and electrical de-icing equipment.	1	2/2	-
17.6	Propeller Maintenance Static and dynamic balancing ; Blade tracking ; Assessment of blade damage, erosion, corrosion. impact damage, delamination; Propeller treatment / repair schemes; Propeller engine running.	1	3/3	-

MODULE 19. WOODEN AEROPLANES

		Level		
		A	B1/3	B2
19.1	Wooden Structures	-	2/2	-
	Construction methods of wooden airframe structures;			
	Characteristics, properties and types of wood and glue used in aeroplanes;			
	Preservation and maintenance of wooden structure;			
	Types of defects in wood material and wooden structures;			
	The detection of defects in wooden structure;			
	Repair of wooden structure.			
19.2	Aeroplane Covering	-	2/2	-
	Characteristics, properties and types of fabrics and fibreglass used in aeroplanes;			
	Types of defects in fabric and fibreglass;			
	Repair of fabric and fibreglass covering.			

Note: This module only required if the wooden aeroplane rating is to be endorsed in the HKAR-66 licence.

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APPENDIX 2

Specimen Examination Questions

1. Multiple Choice Questions**1.1 Level 1 questions**

1.1.1 A hydraulic regulator (cut out):-

- A) will control the maximum pressure automatically.
- B) will reduce the working pressure as selected.
- C) will regulate the amount of fluid in the reservoir.

1.1.2 The turbine in an air cycle machine/cold air unit:-

- A) increases the air pressure above that of the cabin.
- B) drives the compressor which provides pressurisation.
- C) drive the compressor in the unit and creates a temperature drop in the pressurising air.

1.1.3 Balance marks on an aircraft tyre and tube are normally:-

- A) a coloured line on tyre and tube.
- B) two parallel coloured lines 1 inch apart on the tyre, and two coloured dots on the tube.
- C) a coloured line on the tube and a coloured dot on the tyre.

1.2 Level 2 questions

1.2.1 Centrifugal turning (or twisting) moment (C.T.M.) assists the propeller pitch change mechanism when:-

- A) turning the blades to fine pitch.
- B) turning the blades to coarse pitch.
- C) unfeathering the blades.

1.2.2 Vibration from a propeller defect will generally be:-

- A) of a higher frequency than vibration from a turbine defect.
- B) of higher frequency than vibration from an auxiliary gearbox defect.
- C) of lower frequency than vibration from a turbine defect.

1.2.3 When a propeller is 'windmilling':-

- A) energy is extracted from the airflow to turn the propeller resulting in a large increase in drag.
- B) the propeller is caused to turn by the airflow thus giving a small residual thrust and little drag.
- C) the propeller normal direction of rotation is reversed giving rise to a large increase in drag.

1.3 Level 3 questions

1.3.1 The intent of a one-way restrictor valve in a hydraulic landing gear system is to restrict the flow of hydraulic fluid:-

- A) to the brakes when the gear is retracting.
- B) during gear extension.
- C) during gear retraction.

1.3.2 When fuel tanks are inhibited with Biobor JF biocide against the attack from biological growth it is:-

- A) applied to the tank dry and left.
- B) applied to tank wet and flushed out.
- C) poured into the tank, allowed to stand and burnt with fuel.

1.3.3 If the pressure in an oxygen system is allowed to drop lower than normal (500 lb/in²) and remain with a low supply of oxygen:-

- A) the diluter regulator will stick and require servicing.
- B) the oxygen will degenerate, allowing bacterial to grow and produce smell.
- C) condensation may occur which can cause corrosion.

APPENDIX 3

Suggested Study Material

A study of the following official publications relevant to the subject of Regulations and Airworthiness Requirements is essential in respect of examinations associated with the various categories of licence. The publications may be purchased from Government Publication Centre and/or the Civil Aviation Department.

The Air Navigation (Hong Kong) Order 1995* Government Publication
Centre

** The above publication can be accessed on Internet at <http://www.justice.gov.hk>.
(Please note that the Internet version is not to be relied on as an authentic version of
the law.)*

Hong Kong Aviation Requirements:

HKAR-1 - Airworthiness Procedures

HKAR-2 - Administrative & Guidance Material

HKAR-21 - Certification of Aircraft and Related
Products, Parts and Appliances, and of
Design and Production Organisations

HKAR-66 - Licensing of Maintenance Personnel
(Certifying Staff – Maintenance)

HKAR-145 - Approved Maintenance Organisations

CAD 455 - Airworthiness Notices

CAD 712 – Safety Management systems (SMS) For Air
Operators and Maintenance Organisations

Civil Aviation Department
1 Tung Fai Road
Hong Kong Int'l Airport
Lantau
Hong Kong

The above publications are available on the CAD website.

The following publications provide useful information for study in connection with the Licence, and may be obtained direct from the publisher, or through bookshops. Books may also be available in libraries.

Book Title	Author	Publisher
Basic Knowledge		
Open Tech Study Plans Learning Packages		Aviation Training Association
CAP 562 – Civil Aircraft Airworthiness Information and Procedures		U.K. Civil Aviation Authority
Aviation Dictionary		Jeppesen
Mechanical Testing of Materials	A J Fenner	Newnes
Physics for Today and Tomorrow	T Duncan	John Murray
Electronics for Today and Tomorrow	T Duncan	Hodder Murray
Mechanics of Flight	A C Kermode	Longman Group Publications
Advanced Mathematics for the Aircraft Technician	EA-MAT	Aviation Maintenance Foundation Inc (USA)
Into Thin Air	E W Still	Normalair-Garrett
Airframe and Mechanical		
Understanding Aircraft Structures	J Cutler	Blackwell Scientific Publications
The Aeroplane Structure	A C Kermode	Longman Group Publications
Light Aircraft Inspection	J E Heywood	T & A D Poyser
Light Aircraft Maintenance	J E Heywood	Blackwell Scientific Publications
Aircraft Maintenance and Repair	Bent & McKinley	McGraw-Hill
Maintenance of Aeroplane Vehicles	Northrop Institute of Technology	McGraw-Hill
A & P Mechanics General Handbook	EA-AC65-9A	Aviation Maintenance Foundation Inc (USA)
A & P Mechanics Airframe Handbook	EA-AC65-15A	Aviation Maintenance Foundation Inc (USA)

Book Title	Author	Publisher
Aviation Maintenance Handbook and Standard Hardware Digest	EA-AHS-1	Aviation Maintenance Foundation Inc (USA)
Transport Category Aircraft Systems	EA-363	Aviation Maintenance Foundation Inc (USA)
Aircraft Weight and Balance	EA-BAL	Aviation Maintenance Foundation Inc (USA)
Aircraft Corrosion Control	EA-CC-1	Aviation Maintenance Foundation Inc (USA)
Aircraft Air Conditioning Systems	EA-AAC-1	Aviation Maintenance Foundation Inc (USA)
Aircraft Fabric Covering	EA-ADF	Aviation Maintenance Foundation Inc (USA)
Aircraft Hydraulic Systems	EA-AH-1	Aviation Maintenance Foundation Inc (USA)
Aircraft Oxygen Systems	EA-AOS	Aviation Maintenance Foundation Inc (USA)
Aircraft Painting and Finishing	EA-AP-2	Aviation Maintenance Foundation Inc (USA)
Aircraft Tires and Tubes	EA-ATT	Aviation Maintenance Foundation Inc (USA)
Aircraft Wheels, Brakes and Anti-skid Systems	EA-AWB	Aviation Maintenance Foundation Inc (USA)
Aircraft Bonded Structure	EA-NMR	Aviation Maintenance Foundation Inc (USA)
Aircraft Sheet Metal Construction and Repair	EA-SMF	Aviation Maintenance Foundation Inc (USA)
The Anatomy of the Aeroplane	Darrol Stinton	Blackwell Scientific Publications
The Helicopter – Its History and How it Flies	J Fay	David and Charles
Helicopter Flight Theory for Pilots and Mechanics	J R Montgomery	Sikorsky
Dynamics of Helicopter Flight	Saunders	John Wiley & Sons
Fundamentals of Helicopter Maintenance	EA-HF-1	Aviation Maintenance Foundation Inc (USA)

Book Title	Author	Publisher
Powerplants		
The Jet Engine	Rolls-Royce	Rolls-Royce
Aircraft Powerplants	Bent & McKinley	McGraw-Hill
Powerplants for Aerospace Vehicles	Northrop Institute of Technology	McGraw-Hill
The Aircraft Gas Turbine Engine	Pratt & Whitney	Pratt & Whitney
Aircraft Propellers and Controls	EA-APC	Aviation Maintenance Foundation Inc (USA)
Aircraft Reciprocating Engines	EA-ARE	Aviation Maintenance Foundation Inc (USA)
Aircraft Fuel and Metering Systems	EA-FMS	Aviation Maintenance Foundation Inc (USA)
Aircraft Ignition and Electrical Power Systems	EA-IGS	Aviation Maintenance Foundation Inc (USA)
Aircraft Gas Turbine Powerplants	EA-TEP-1	Aviation Maintenance Foundation Inc (USA)
Jet Aircraft Power Systems	Cassamassa & Bert	McGraw-Hill
Aircraft Gas Turbine engine Technology	Irwin E Tregar	McGraw-Hill
Electrical / Electronic and Avionics		
Aircraft Flight Instruments and Integrated Systems	E Pallett	Longman Group Publications
Aircraft Electrical Systems	E Pallett	Longman Group Publications
Aircraft Radio Systems	J Powell	Longman Group Publications
Automatic Flight Control	E Pallett	Blackwell Scientific Publications
Electrical Technology	E Hughes	Longmans
Electronics II, III	D C Green	Longman Group Publications
Microprocessors/Microcomputers:	Givens/Roesser	McGraw-Hill

Book Title	Author	Publisher
An Introduction		
Elements of Electronics	Hickey/Villines	McGraw-Hill
Handbook for Electronic Engineering Technicians	Kaufman/Siedman	McGraw-Hill
Aircraft Electricity and Electronics	Eisman/Bent/McKinley	McGraw-Hill
Electronic Computers Made Simple	Jacobweitz	W H Allen
Aircraft Batteries	EA-AB-1	Aviation Maintenance Foundation Inc (USA)
Basic Electricity for A & P Mechanics	EA-BE-1	Aviation Maintenance Foundation Inc (USA)
Basic Electronics and Radio Installation	EA-BEM	Aviation Maintenance Foundation Inc (USA)
Aviation Electronics	EA-AEG-1	Aviation Maintenance Foundation Inc (USA)
D C Circuits	EA-DCC	Aviation Maintenance Foundation Inc (USA)
Manual of Avionics	Brian Kendal	PSP Professional Books
Digital Avionic Systems	GRS Spitzer	Prentice Hall
Modern Aviation Electronics	A Helfrich	
Avionic Fundamentals		IAP Inc TrainingManual
Avionics: Systems & Troubleshooting	T K Eismin	Avotek
Digital Techniques & Systems	D C Green	Longman
Principle of Avionics	A Hefrick	Airlines Avionics
Fibre Optics Communication and Other Applications	H Zanger	Prentice Hall
Design and Maintenance of Aircraft Electrical Systems	T K Eismin	
Principles of Avionics Systems	T K Eismin	
Human Factors		
ATA Specification 113 for Maintenance Human Factors Program		Air Transport Association of

Book Title	Author	Publisher
Guidelines		America
ICAO Doc 9683 – Human Factors Training Manual		ICAO
ICAO Circular 216 Human Factors Digest No.1 – Fundamental Human Factors Concepts		ICAO
ICAO Circular 253 Human Factors Digest No. 12 – Human Factors in Aircraft Maintenance and Inspection		ICAO
CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR 66		U.K. Civil Aviation Authority
CAP 716 - Aviation Maintenance Human Factors (EASA /JAR145 Approved Organisations) Guidance Material on the UK CAA Interpretation of Part-145 Human Factors and Error Management Requirements		U.K. Civil Aviation Authority

APPENDIX 4**Record of Experience****1 GENERAL**

HKAR 66.30 states that the licence applicant must fulfill the experience requirement. To fulfill this requirement, applicants should record their practical experience on form DCA 35B or CAD approved log book and submit to Personal Licensing Office as part of an application for an HKAR-66 licence. This appendix gives guidance to the completion of Record of Experience.

2 ITEMS TO BE RECORDED

- 2.1 The Record of Experience must be practical and involved with a representative cross section of maintenance tasks on aircraft appropriate to the licence category being applied. They should be grouped under suitable ATA chapters in order that the distribution and depth of coverage can be assessed. Table 1 of this Appendix provided guidance to the systems relevant for each licence category.
- 2.2 The amount of detail should be related to the construction and complexity of the category of aircraft concerned. Account should also be taken of maintenance procedures, defect rectification and the duties and responsibilities which devolve on the licence holder.
- 2.3 It is not sufficient to make simple statements such as, for example, "No.1 inverter replaced", "Hydraulic pump replaced", or "50-hour check carried out". The replacement of items requires subsequent specific functional checks to be carried out, and therefore evidence of such checks must also be given in the Record of Experience. In the case of time-cycled check, reference should also be made to the extent of work involved relevant to the systems and/or equipment covered by the check. Checking/inspection items are of limited worth, but the work items which follow from such check/inspection can provide greater experience.
- 2.4 A sample of form DCA 35B, Record of Experience, is given in Table 2 of this Appendix.

3 CONFIRMATION SIGNATORY

Items and dates entered in the Record of Experience should be countersigned by a person of supervisory status to whom the applicant is responsible in relation to the work experience recorded and who should confirm that the experience is reflected accurately in the document.

4 ASSESSMENT BY THE DIRECTOR-GENERAL

4.1 It should be assumed that the person assessing the Record of Experience is not acquainted either with the applicant or the company by whom he/she is employed. For this reason, emphasis is placed on the way in which work is recorded against specific registration and type of aircraft, on overall practical experience and on countersigned certifications.

4.2 The Director-General may request the applicant to produce copy of maintenance record to support the claimed experience for verification purpose. Failure to comply with the request would render the submitted Record of Experience invalid. For falsification of Record of Experience, Director-General may ban the applicant from future application of an HKAR-66 licence for a period deemed appropriate by the Director-General.

5 RETENTION OF RECORD OF EXPERIENCE

After assessment by the Director-General, the Record of Experience will be returned to the applicant for continuous recording of his/her maintenance experience that may be required for future licence application.

TABLE 1 (APPENDIX 4)

RELEVANT SYSTEMS FOR DIFFERENT LICENCE CATEGORIES

Applying for Category:		A1/ B1.1	A2/ B1.2/ B3	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Air Conditioning and Pressurization, Safety & Warning Devices	21	X	X	X	X	X
Avionics Systems – Autoflight, Communication, and Navigation: Fundamentals of system lay-outs and operation	22 /23 /34	X	X	X	X	–
Avionics Systems – Autoflight: Yaw Damper, Stability Augmentation, Auto trim, Autopilot, FMS, Autothrottle, Autoland.	22	–	–	–	–	X
Avionics Systems – Communication: VHF, HF, Audio, CVR, SATCOM, ACARS.	23	–	–	–	–	X
Electrical Power: Battery, AC/DC Power Generation, Emergency Power generation, Power distribution, Voltage regulation, Circuit protection, External / Ground Power Supply.	24	X	X	X	X	X
Equipment & Furnishing: Cabin Equipment and Layout, Galley, Cargo, Emergency Equipment, Entertainment Equipment	25	X	X	X	X	X
Fire Protection Systems	26	X	X	X	X	X
Flight Control Systems: Primary flying control (aileron, elevator, rudder, spoiler), Trim control, High lift devices, Electrical/ Fly-by-Wire	27	X	X	–	–	X
Fuel Systems	28	X	X	X	X	X
Hydraulic Power	29	X	X	X	X	X
Ice & Rain Protection	30	X	X	X	X	X
Propeller Ice Protection	30	X	X	–	–	–

Applying for Category:		A1/ B1.1	A2/ B1.2/ B3	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Instrument Systems: Pitot static, Gyroscopic, Compass, AOA, other aircraft systems.	31	X	X	X	X	-
Instrument Systems: Pressure measuring, Pitot static, Altitude reporting / alerting, ADC, Temperature and quantity indication, Gyroscopic instrument, GPWS, Compass and compass compensation, FDR, EFIS, Instrument warning, Stall warning, AOA, Windshear, Vibration measurement and indication.	31	-	-	-	-	X
Landing Gear	32	X	X	X	X	X
Lights	33	X	X	X	X	X
Avionics Systems – Navigation: VOR, ADF, ILS/MLS, Flight Director, DME, Doppler navigation, Area navigation, RNAV, GPS, GNSS, INS/IRS, ATC, TCAS, Weather avoidance radar, Radio altimeter.	34	-	-	-	-	X
Oxygen	35	X	X	-	-	X
Pneumatic/Vacuum	36	X	X	X	X	X
Water/Waste	38	X	X	-	-	X
Integrated Modular Avionics	42	-	-	-	-	X
Cabin Systems	44	-	-	-	-	X
On Board Maintenance. Systems	45	X	X	-	-	X
Information Systems	46	-	-	-	-	X
Auxiliary Power Units (APUs)	49	X	-	-	-	-
Airframe Structure	51	X	X	-	-	-
Fuselage: Doors, Fuselage, Windows	52 / 53 / 56	X	X	-	-	-
Nacelles/Pylons	54	X	X	-	-	-

Applying for Category:		A1/ B1.1	A2/ B1.2/ B3	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Wings, Flight Control Surfaces, Stabilizers	55 / 57	X	X	-	-	-
Propeller: Construction, Pitch Control, Synchronizing, Maintenance	61	X	X	-	-	-
Blade tracking and vibration analysis, Transmissions, Airframe structure, Main rotor, Tail rotor/rotor drive, Rotor flight control	62 /64/ 65/67	-	-	X	X	-
Piston Engines: Engine Performance, Powerplant Installation, Engine Monitoring and Ground Operation, Engine Storage and Preservation	71	-	X	-	X	-
Piston Engines: Engine Fuel Systems, Carburetors, Fuel injection systems	73	-	X	-	X	-
Piston Engines: Ignition Systems	74	-	X	-	X	-
Piston Engines: Engine Indication Systems	77	-	X	-	X	-
Piston Engines: Starting	80	-	X	-	X	-
Piston Engines: Supercharging/Turbocharging	81	-	X	-	X	-
Piston Engines: Engine Construction, Lubricants and Fuels, Lubricants Systems, Induction, Exhaust and Cooling	85	-	X	-	X	-
Turbine Engines: Constructional arrangement and operation, FADEC	71	-	-	-	-	X

Applying for Category:		A1/ B1.1	A2/ B1.2/ B3	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Turbine Engines: Engine Performance, Inlet, Powerplant Installation, Engine Monitoring and Ground Operation, Engine Storage and Preservation.	71	X	–	X	–	–
Turbine Engines: Compressors, Combustion Section, Turbine Section	72	X	–	X	–	–
Turbine Engines: Turbo-prop Engines	72	X	–	–	–	–
Turbine Engines: Turbo-shaft Engines	72	X	–	X	–	–
Turbine Engines: Fuel Systems	73	X	–	X	–	X
Turbine Engines: Ignition Systems	74	X	–	X	–	X
Turbine Engines: Air System	75	X	–	X	–	–
Engine Control	76	X	X	X	X	–
Turbine Engines: Engine Indicating Systems	77	X	–	X	–	X
Turbine Engines: Exhaust	78	X	–	X	–	–
Turbine Engines: Bearings and Seals, Lubricants, Lubrication Systems	79	X	–	X	–	–
Turbine Engines: Starting Systems	80	X	–	X	–	X

Applying for Category:		A1/ B1.1	A2/ B1.2/ B3	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Turbine Engines: Power Augmentation Systems	82	X	–	–	–	–
Zonal & Station Identification Systems	–	X	X	X	X	X
Defect Diagnosis and Rectification	–	X	X	X	X	X
Mandatory Inspection and Modification	–	X	X	X	X	X

* The ATA chapter number is for reference only. Please refer to manufacturer's publications for the exact classification of ATA chapter numbers.

**TABLE 2 (APPENDIX 4)
SAMPLE OF DCA 35B**



Civil Aviation Department
The Government of the Hong Kong Special Administrative Region

RECORD OF EXPERIENCE

- Notes:*
- (1) Record of Experience is used to record work experience in operating aircraft. It is intended being recorded and updated on a regular basis.
 - (2) Entries must be made, endorsed and certified within a reasonable time of task being carried out.
 - (3) The person in charge should endorse and certify each item when he is satisfied that the applicant has participated in, or satisfactorily carried out the work / inspection. The status of the person in charge must be in an authoritative position e.g. Quality Manager, Licensed Engineer in appropriate category, Instructor, etc. of the company.
 - (4) Applicants are encouraged to maintain a personal logbook in which to record details of work carried out. The personal log book may consist of this front page and continuation sheets of second page of DCA 35B.
 - (5) A CAD approved log book can be used as substitute of the form DCA 35B.
 - (6) The authenticity of entries is vital and therefore any false statements made in this Record of Experience may be liable for suspension of licence or licensing examination.

I hereby declare that the information given on this form is true in every aspect.

Signature : _____ Date : _____

Name : _____		ATA Chapter No. _____	Page No. _____	
Aircraft Registration & Type	item	Details of Work Undertaken	Date(s) & Place Work Undertaken	Signature, position & name of person in-charge, name of organisation & company stamp

Name : _____ ATA Chapter No. _____ Page No. _____				
Aircraft Registration & Type	item	Details of Work Undertaken	Date(s) & Place Work Undertaken	Signature, position & name of person in-charge, name of organisation & company stamp

If necessary add continuation sheets and number in sequence.

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APPENDIX 5

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.

1. Course objectives: Upon completion of the course, the student will be able to 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.

Course 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.
 - (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 and bite and troubleshooting procedures to maintenance manual level.

Course 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:

- (a) Perform system, engine, component and functional checks as specified in the maintenance manual.
- (b) Correlate information for the purpose of making decisions in respect of fault diagnosis and rectification to maintenance manual level.
- (c) 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.

Note: The training elements for B2 on ATA 21, 26, 28, 29, 30, 32, 35, 36, 38, 42, 44, 46, 74 and 80 are effective from 1 August 2013

Introduction Module Title	
General Aircraft(dimensions/weights MTOW etc) 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/B3 module-safety items/avionics interface	

	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics B2
	B1	C	B1/B3	C	B1	C	B1	C	
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	-	-	-	-	-

	Aeroplanes		Aeroplanes		Helicopters		Helicopters		Avionics
	turbine		piston		turbine		piston		
	B1	C	B1/B3	C	B1	C	B1	C	B2
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	2
Air Conditioning	3	1	3	1	3	1	3	1	2
Pressurisation	3	1	-	-	-	-	-	-	3
Safety & Warning Devices	3	1	-	-	-	-	-	-	3
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. Repair & Cabin Entertainment Equipment	-	1	-	-	-	-	-	-	3
Fire Protection	3	1	3	1	3	1	3	1	3
Flight Controls	3	1	3	1	3	1	3	1	2
System Operation: Electrical/Fly-by-Wire	3	1	-	-	-	-	-	-	3
Fuel Systems	3	1	3	1	3	1	3	1	3
Hydraulic Power	3	1	3	1	3	1	3	1	3
Ice & Rain Protection	3	1	3	1	3	1	3	1	2
Landing Gear	3	1	3	1	3	1	3	1	3
Lights	3	1	3	1	3	1	3	1	3
Oxygen	3	1	3	1	-	-	-	-	3
Pneumatic/Vacuum	3	1	3	1	3	1	3	1	3
Water/Waste	3	1	3	1	-	-	-	-	2
Integrated Modular Avionics	-	-	-	-	-	-	-	-	3
Cabin Systems	-	-	-	-	-	-	-	-	3
On-board Maintenance Systems	3	1	3	1	-	-	-	-	3
Information Systems	-	-	-	-	-	-	-	-	3
Turbine Engines:									
Constructional arrangement & 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	-	-	-

	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics B2
	B1	C	B1/B3	C	B1	C	B1	C	
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	-	-	2
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	-	-	-
<i>Piston Engines:</i>									
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	2
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	-

	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics B2
	B1	C	B1/B3	C	B1	C	B1	C	
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	-	-	-	-	-
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:

- (a) 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.
- (b) Correctly use all technical literature and documentation for the aircraft.
- (c) 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 comply with the following:

1. 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.
2. The examination must be of the closed book type. No reference material is permitted. An exception will be made for the case of examining a B1, B2 or B3 candidate's ability to interpret technical documents.
3. 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 Director-General will assess number and level of questions on a sampling basis when approving the course.
4. The examination pass mark is 75%
5. Penalty marking is not to be used to determine whether a candidate has passed.
6. 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.

A written report must be made by the examiner to explain why the candidate has passed or failed.

APPENDIX 6

Experience requirements for extending a HKAR-66 Aircraft Maintenance Licence

The table below shows the experience requirements for adding a new category or subcategory to an existing HKAR-66 licence.

The experience must be practical maintenance experience on operating aircraft in the subcategory relevant to the application.

The experience requirement will be reduced by 50% if the applicant has completed an approved HKAR-147 course relevant to the subcategory.

To: From:	A1	A2	A3	A4	B1.1	B1.2 / B3	B1.3	B1.4	B2
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/B3	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	

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Appendix 7

Aircraft Type Practical Experience 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 aircraft 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 tire 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 pressurization controller.	Clean outflow valves.
Check operation of air conditioning/heating system	Check operation of pressurization 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 flap 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 check 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 outbrake 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 HSI.	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 nav 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.
Integrated Modular Avionics	
Replace flight management control box	Replace air data / navigation control box
Replace flight control avionic box	Replace landing gear control box
Replace brake and steering control box	Replace air bleed system control box
Functional check avionic modules	Troubleshoot faulty modules
Cabin Systems	
Replace IFE control box	Replace CIDS
Replace Flight Attendant Panel	
Troubleshoot faulty IFE system	Troubleshoot faulty cabin intercommunication system
Functional check cabin system	
Central Maintenance System	
Retrieve data from CMU.	Replace CMU.
Perform Bite check.	Troubleshoot faulty system.
Information Systems	
Replace ATSU	Replace DCDU
Troubleshoot faulty system	Check ACMS
Functional check information 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 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 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/igniters.	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 check 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.	