

Hong Kong Aviation Requirements

HKAR-66

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

**1 December 2000
Issue 1**

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

HKAR-66

Applications for further copies of the Hong Kong Aviation Requirements should be addressed to the Civil Aviation Department, Flight Standards and Airworthiness Division, General Office, 10/F Commercial Building, Airport Freight Forwarding Centre, 2 Chun Wan Road, Chek Lap Kok, Hong Kong.

FAX: (852) 2362 4250
TEL: (852) 2769 7641-4
TELEX: 39524 CFSHK

CONTENTS (Layout)

HKAR-66

LICENSING OF MAINTENANCE PERSONNEL

(CERTIFYING STAFF - MAINTENANCE)

FOREWORD

CHECK LIST OF PAGES

PREAMBLES

SECTION 1 - REQUIREMENTS

SECTION 2 - ACCEPTABLE MEANS OF COMPLIANCE AND INTERPRETATIVE /
EXPLANATORY MATERIAL (AMC AND IEM)

APPENDICES: 1, 2, 3, 4

HKAR-66

INTENTIONALLY LEFT BLANK

CONTENTS (Details)

HKAR-66

LICENSING OF MAINTENANCE PERSONNEL

(CERTIFYING STAFF - MAINTENANCE)

Paragraph	Page
FOREWORD	F-1
CHECK LIST OF PAGES	CL-1
PREAMBLES	P-1
SECTION 1 - REQUIREMENTS	
General and Presentation	1-0-1
HKAR 66.1 General	1-1
HKAR 66.3 Effectivity	1-2
HKAR 66.5 Definitions	1-2
HKAR 66.10 Applicability	1-3
HKAR 66.13 Application and issue	1-3
HKAR 66.15 Eligibility	1-4
HKAR 66.20 Categories and certification privileges	1-4
HKAR 66.25 Basic knowledge requirements	1-5
HKAR 66.30 Experience requirements	1-6
HKAR 66.40 Continuity of the aircraft maintenance licence	1-7
HKAR 66.45 Type/task training and ratings	1-7
HKAR 66.50 Medical fitness	1-9
HKAR 66.55 Evidence of qualification	1-9
HKAR 66.60 Equivalent safety cases	1-9
HKAR 66.65 Revocation, suspension or limitation of the HKAR-66 aircraft maintenance licence	1-9

HKAR-66

Paragraph **Page**

SECTION 2 - ACCEPTABLE MEANS OF COMPLIANCE AND INTERPRETATIVE / EXPLANATORY MATERIAL (AMC & IEM)

General and Presentation		2-0-1
AMC 66.1	General	2-1
IEM 66.15(b)	Eligibility	2-3
AMC 66.20(b)	Categories and certification privileges	2-4
IEM 66.25(a)	Basic knowledge requirements	2-6
AMC 66.25(c)	Basic knowledge requirements	2-6
AMC 66.30(a), (b), (c)	Experience requirements	2-6
AMC 66.30(d)	Experience requirements	2-9
AMC 66.30(e)	Experience requirements	2-9
AMC 66.40	Continuity of the aircraft maintenance licence	2-9
IEM 66.40	Continuity of the aircraft maintenance licence	2-10
AMC 66.45(a)	Type/task training and ratings	2-11
AMC 66.45(b)	Type/task training and ratings	2-11
IEM 66.45(b)	Type/task training and ratings	2-12
AMC 66.45(c)	Type/task training and ratings	2-12
AMC 66.45(d)	Type/task training and ratings	2-13
AMC 66.45(e)	Type/task training and ratings	2-14
IEM 66.45(f)	Type/task training and ratings	2-14
AMC 66.50	Medical fitness	2-14
IEM 66.55	Evidence of qualification	2-15
AMC 66.60	Equivalent safety cases	2-15
IEM 66.65	Revocation, suspension or limitation of the HKAR-66 aircraft maintenance licence	2-15

APPENDICES

1	AMC 66.25 Basic Knowledge - Introduction	2-APP 1-1
2	Specimen Examination Questions	2-APP 2-1
3	Suggested Study Material	2-APP 3-1
4	Record of Experience	2-APP 4-1

FOREWORD

- 1 Hong Kong Civil Aviation Department has published comprehensive and detailed aviation requirements, referred to as the Hong Kong Aviation Requirements (HKARs) with a view to setting up standards and minimising type certification problems, to facilitate the export and import of aviation products, to make it easier for maintenance carried out in Hong Kong. In addition, maintenance personnel should be trained and qualified to an international standard to assist Industry in obtaining suitable staff.
- 2 Article 12 of the Air Navigation (Hong Kong) Order 1995 as amended gives the Chief Executive of the Hong Kong Special Administrative Region authority of granting aircraft maintenance licences, subject to such conditions as he thinks fit, upon his being satisfied that the applicant is a fit person to hold the licence and furnished such evidence and passed such examinations and test as the Chief Executive may require of him for the purpose of establishing that he has sufficient knowledge, experience, competence and skill in aeronautical engineering.
- 3 HKAR-66 is to provide a standard for future maintenance certifying staff in Hong Kong. It should therefore be understood that when existing maintenance certifying staff are converted to HKAR-66, limitations may be applied to such staff if they do not meet the full HKAR-66 standard. Despite the limitations existing certifying staff will retain their existing authority to release to service, subject of course, to continued satisfactory performance.
- 4 The requirements of this HKAR-66 recognise the Standards prescribed by the International Civil Aviation Organisation Annex 1 for the grant and extension of licences.
- 5 HKAR-66 will become effective on 1 January 2002 and be fully implemented by 1 January 2004. Applications for a HKAR-66 licence will be accepted from 1 January 2002. Licences will be renewed with HKAR-66 format during the 2 year transition period between 1 January 2002 and 31 December 2003.
- 6 Amendments are incorporated into the text by means of a 'Revision' or a complete 'Re-issue'.

CHECK LIST OF PAGES

ISSUE 1, dated 1 December 2000
 ISSUE 1 Revision 1, dated 1 April 2002
 ISSUE 1 Revision 2, dated 30 September 2002
 | ISSUE 1 Revision 3, dated 16 September 2008

The following pages of HKAR-66 are now current:

<i>Page No</i>	<i>Legend</i>
Title Page	1.12.2000
ii	1.12.2000
C-1 to C-4	30.9.2002
F-1	1.12.2000
CL-1	16.9.2008
P-1	16.9.2008
1-0-1	1.12.2000
1-1	1.12.2000
1-2	1.4.2002
1-3 to 1-10	1.12.2000
2-0-1	1.12.2000
2-1 to 2-15	1.12.2000
2-APP 1-1 to 2-APP 1-74	1.12.2000
2-APP 2-1 to 2-APP 2-2	1.12.2000
2-APP 3-1 to 2-APP 3-6	16.9.2008
2-APP 4-1 to 2-APP 4-8	30.9.2002

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.

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**

(See AMC 66.1)

- (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 satisfied that all required maintenance has been completed.
- (b) Except where stated otherwise in HKAR-145 and sub-paragraphs (c), (d), (e) and (f), certifying staff responsible for issuing the certificate of release to service must be qualified in accordance with the appropriate requirements of this HKAR-66.
- (c) This HKAR-66 is limited to those certifying staff responsible for issuing the certificate of release to service for aeroplanes and helicopters.

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.

- (d) 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 these privileges.
- (e) Personnel undergoing a qualification process before the HKAR 66.3(b) compliance date in accordance with Hong Kong aviation regulations valid before the effective date of HKAR-66, may complete such qualification process in accordance with the Hong Kong aviation regulations. The qualifications gained will be recognised for the purposes of certification privileges in accordance with HKAR 66.1(d) only to the extent that such qualification is considered equivalent to the appropriate HKAR-66 requirements.
- (f) Personnel qualified in accordance with paragraph (d) or (e) remain eligible to exercise the certification privileges except in the case of adding other basic categories/sub-categories of qualification when the appropriate additional requirements of HKAR-66 will apply to such extension. Personnel qualified in accordance with paragraph (d) or (e) 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.
- (g) Notwithstanding that paragraph (d), (e) and (f) personnel remain eligible to exercise such privileges, such personnel must be issued a HKAR-66 aircraft maintenance licence based upon the Hong Kong qualification without further examination. The HKAR-66 aircraft maintenance licence may contain technical limitations in relation to HKAR-66 where not appropriately

qualified but does not change any existing right to certification privileges. Technical limitations will be deleted, as appropriate, when the person satisfactorily sits the relevant conversion examination.

HKAR 66.3**Effectivity**

- (a) This HKAR-66 was first issued on 1 December 2000 and becomes effective on 1 April 2002.
- (b) Any person required to be qualified in accordance with HKAR 66.1 (b) or (f) must be in compliance with this HKAR-66 after 1 April 2004.
- (c) A HKAR-66 aircraft maintenance licence may be issued by the Director during the sub-paragraph (b) transition period.

HKAR 66.5**Definitions**

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

'CAD' means Civil Aviation Department, Hong Kong Special Administrative Region, China.

'Director' 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 Hong Kong 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.

Note : The aircraft maintenance licence alone does not necessarily permit the holder to issue certificates of release to service in respect of aircraft. HKAR-145 contains additional requirements.

'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 66.10
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 in accordance with HKAR 145.50.

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 licences must be used in conjunction with a certification authorisation.

- (b) For the 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, but it should be remembered that an aircraft type rating is one of the prerequisites for a HKAR-145 certification authorisation.

- (c) For the 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 issue certificates of release to service by the type rated HKAR-66 aircraft maintenance licence.

Note: A type rated HKAR-66 aircraft maintenance licence may only be used to make certification(s) where the licence is endorsed to permit this.

HKAR 66.13
Application and Issue

- (a) An application for a HKAR 66.10(b) aircraft maintenance licence or renewal to such licence must be made on a form and in a manner prescribed by the Director and submitted to the Director.
- (b) An applicant who meets the appropriate requirements of HKAR 66.10(b) and has paid any charges prescribed by the Director is entitled to the HKAR-66 aircraft maintenance licence.

- (c) The HKAR-66 aircraft maintenance licence is issued by the Director.

Note : The issue of the HKAR-145 certification authorisation is carried out by the HKAR-145 approved maintenance organisation after establishing compliance with appropriate paragraphs of HKAR-66 and HKAR-145.

HKAR 66.15**Eligibility**

(See IEM 66.15)

- (a) Certifying staff must not be less than 21 years of age.
- (b) Certifying staff must be able to read, write and communicate to an understandable level in the language(s) in which the technical documentation and organisation procedures necessary to support the issue of the certificate of release to service are written.

HKAR 66.20**Categories and certification privileges**

(See AMC 66.20)

- (a) HKAR-145 certifications are made in accordance with the procedures of the HKAR-145 approved maintenance organisation and within the scope of the authorisation.
- (b) Certifying staff qualified in accordance with this HKAR-66 will be eligible to hold a HKAR-66 aircraft maintenance licence and, if appropriate, a HKAR-145 certification authorisation in one or more of the following categories:
- (1) A category A certifying staff authorisation permits the holder to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification, as specified in HKAR-145, within the limits of tasks specifically endorsed on the authorisation. The certification privileges are restricted to work that the authorisation holder has personally performed. Category A is sub-divided into sub-categories relative to combinations of aeroplanes, helicopters, turbine and piston engines.

Note : Category B1 certifying staff authorisation automatically permits certification in the appropriate A sub-categories. Category B2 certifying staff can qualify for any A sub-category as can any avionic mechanic subject to compliance with the appropriate A sub-category requirements.

- (2) A category B1 certifying staff authorisation permits the holder to issue certificates of release to service following line maintenance, including aircraft structure, power-plants, mechanical and electrical systems plus replacement of avionic line replaceable units, requiring

simple tests to prove serviceability. In addition, a category B1.2 aeroplanes piston certifying staff authorisation permits the holder to exercise the privileges of the category B3 subject to the category B3 wooden aeroplane limitation. Category B1 is sub-divided into sub-categories relative to combinations of aeroplanes, helicopters, turbine and piston engines.

- (3) A category B2 certifying staff authorisation permits the holder to issue certificates of release to service following line maintenance on avionic and electrical power systems.
- (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, including all systems.

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 covers all maintenance.

HKAR 66.25

Basic knowledge requirements

(See AMC 66.25 and IEM 66.25)

- (a) Certifying staff must demonstrate by examination a level of knowledge acceptable to the Director, in subject modules appropriate to the HKAR 66.20 category for which a HKAR-66 aircraft maintenance licence is issued or extended.
- (b) The levels of knowledge are directly related to the complexity of certifications appropriate to the particular HKAR 66.20 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.

Note : HKAR-66 Section 2 Appendix 1 contains detailed information on category A, B1, B2 and B3 levels of knowledge.

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

HKAR 66.30**Experience requirements**

(See AMC 66.30)

- (a) Certifying staff 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 when satisfied that either HKAR-147 approved training or other appropriate technical training has been received. For category A, B1, B2 or B3 the experience must be practical which means being involved with a representative cross section of maintenance tasks on aircraft.
- (b) The minimum civil aircraft maintenance experience before possible paragraph (a) reductions means, for category A or B3 three years and for category B1 or B2 five years except that a category B3 group type rating requires a minimum of five years.
- (c) The minimum civil aircraft maintenance experience for category C is three years qualified as a B1 or B2 certifying staff in line maintenance, or, in base maintenance supporting the category C certifying staff, or, a combination of both. Alternatively, the minimum civil aircraft experience for category C certifying staff qualified by holding an academic degree in a technical discipline from a university or other higher educational institute accepted by the Director is three years on a representative selection of tasks directly associated with aircraft maintenance including six months of observation of base maintenance tasks.
- (d) For all certifying staff, 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 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 AMC and IEM 66.40)

A licence may be renewed for a period of two years provided that the holder provides evidence of having been engaged on the maintenance of operating aircraft for periods totalling at least six months during the 12 months before application for renewal.

The HKAR-66 aircraft maintenance licence holder must ensure that his/her licence remains valid. Failure to carry out this action would invalidate any certification authorisation based upon such HKAR-66 aircraft maintenance licence and may require recent aircraft maintenance experience and/or the resit of some examinations before re-issue of the licence. The Director will decide for each particular case.

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

(See AMC and IEM 66.45)

- (a) Category A certifying staff are required to hold an appropriate HKAR-66 aircraft maintenance licence prior to the grant of a HKAR-145 certification authorisation on a specific aircraft type. HKAR-145 certification authorisations may only be granted following the satisfactory completion of the relevant category A aircraft task training carried out by an appropriately approved HKAR-145 or HKAR-147 organisation.
- (b) Category B1 and B2 certifying staff are required to hold an appropriate aircraft type rated HKAR-66 aircraft maintenance licence prior to the grant of a HKAR-145 certification authorisation. Except as stated otherwise in sub-paragraph (c) for all category B1 and sub-paragraph (d) for category B1.2 certifying staff, ratings will be granted following satisfactory completion of the relevant category B1 or B2 aircraft type training approved by the Director or by an appropriately approved HKAR-147 maintenance training organisation.
- (c) For aeroplanes less than 5700 Kg maximum take off mass and helicopters less than 2730 Kg maximum take off mass, category B1 certifying staff may hold a specific aircraft manufacturers group type or specific aircraft group type rating after the satisfactory completion of sufficient aircraft type examinations in the particular group.

Each aircraft manufacturers group type rating will be granted following the endorsement of two aircraft types from the same manufacturer. Each aircraft group type rating will be granted following the endorsement of three different aircraft manufacturers group type ratings. Aircraft groups are sub-divided by engines into single/twin and piston/pure jet-turbine/propeller jet-turbine.

- (d) Category B3 certifying staff are required to hold an appropriate aeroplane type or aeroplane manufacturers group type or aeroplane group type or wooden aeroplane group type rated HKAR-66 aircraft maintenance licence prior to the grant of a HKAR-145 certification authorisation on a specific aeroplane type or group type. Aeroplane type ratings will be granted following satisfactory completion of the relevant category B3 aeroplane type training approved by the Director or by an appropriately approved HKAR-147 maintenance training organisation; or following satisfactory completion of the relevant aeroplane type examination carried out by the Director or by an appropriately approved HKAR-147 maintenance training organisation.

The aeroplane manufacturers group type rating will be granted following the endorsement of two aeroplane types from the same manufacturer. The aeroplane group type rating will be granted following the endorsement of three different aeroplane manufacturers group type ratings. The wooden aeroplane group type rating will be granted following the endorsement of two wooden aeroplane types from different manufacturers. Aeroplane groups other than wooden aeroplanes are sub-divided by engines into single and twin piston.

Category B1.2 certifying staff who wish to include the category B3 simple light aeroplane type ratings must satisfy this sub-paragraph in respect of the simple light aeroplane type ratings.

- (e) Category C certifying staff are required to hold an appropriate aircraft type rated HKAR-66 aircraft maintenance licence prior to the grant of a HKAR-145 certification authorisation on a specific aircraft type. Ratings will be granted following satisfactory completion of the relevant category C aircraft type training approved by the Director or by an appropriately approved HKAR-147 maintenance training organisation except in the case of a category C person qualified by holding an academic degree as specified in HKAR 66.30 (c), where the first relevant aircraft type training must be at the category B1 or B2 level.
- (f) Completion of approved aircraft task or type training, as required by sub-paragraphs (a) to (d), must be satisfactorily demonstrated by an examination.

HKAR 66.50**Medical fitness**

(See AMC 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 IEM 66.55)

Certifying staff qualified in accordance with this HKAR-66 will be issued with an aircraft maintenance licence by the Director 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 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 considers necessary to ensure equivalent safety. Such exemption and supplementary condition(s) must be agreed by the Director to ensure continued recognition of the person.

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

(See IEM 66.65)

- (a) The Director 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 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 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 will consider those representations.

- (2) In the case where the Director has determined that the safe operation of the aircraft is adversely affected the Director 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 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.

**SECTION 2 - Acceptable Means of Compliance and Interpretative/
Explanatory Material (AMC & IEM)****1 GENERAL**

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

2 PRESENTATION

- 2.1 The Acceptable Means of Compliance and Interpretative / Explanatory Material are presented in full page width on loose pages, each page being identified by the date of issue or the 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 or Interpretative / Explanatory Material uses the same number as the HKAR paragraph to which it refers. The number is introduced by the letters AMC or IEM to distinguish the material from the HKAR itself.
- 2.3. The acronyms AMC and IEM also indicate the nature of the material and for this purpose the two types of material are defined as follows:

Acceptable Means of Compliance (AMC) illustrate a means, or several alternate means, but not necessarily the only possible means by which a requirement can be met.

Interpretative/Explanatory Material (IEM) helps to illustrate the meaning of a requirement.
- 2.4. Explanatory Notes not forming part of the AMC or IEM text appear in a smaller typeface.
- 2.5. New, amended or corrected text is indicated by a marginal line.

AMC 66.1**General**

See HKAR 66.1

- 1 Certification authorisations or qualifications held in accordance with HKAR 66.1 (d), (e) or (f) are recognised to allow the continuation of previously held rights to certification privileges that do not meet the full requirements of HKAR-66. Such previously held rights to certification privileges may continue to be used without any change in scope or limitation as permitted by the pre HKAR-66 Hong Kong aviation regulations.
- 2 HKAR 66.1(d) 'personnel qualified to exercise certification privileges' means:
 - a. Personnel currently holding a Hong Kong licence with or without certification privileges, or,
 - b. Personnel currently holding a Hong Kong licence with or without certification privileges and a current HKAR-145 certification authorisation, or,
 - c. Personnel do not hold a Hong Kong licence, but, currently hold a HKAR-145 certification authorisation in accordance with that HKAR-145 approved maintenance organisation's approved procedures.
- 3 HKAR 66.1(e) '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.
- 4 In the case of personnel qualified in accordance with HKAR 66.1(d) or (e) and who wish to add additional aircraft types and/or tasks as permitted by HKAR 66.1(f) within existing basic categories or sub-categories, the type and/or task qualification requirements of the pre HKAR-66 Hong Kong aviation regulations may continue to apply.
- 5 Personnel holding pre HKAR-66 qualifications in accordance with paragraphs HKAR 66.1(d) or (e) will be granted a HKAR-66 aircraft maintenance licence per HKAR 66.1(g) in the appropriate category or sub-category without further examination except that such licence will contain limitations in relation to any technical subject outside the established knowledge of the particular person. For example, a person may hold a pre

HKAR-66 Hong Kong licence or authorisation limited to the release of the airframe and engine but not the electrical systems because the person has not taken or passed the examination on electrical systems. This means that the person would be issued with a HKAR-66 aircraft maintenance licence in the B1 category with a limitation that it does not include electrical systems. The result is that the person retains all existing certification privileges but has a limitation in relation to the HKAR-66 subjects. It should be realised that such a limitation will not benefit the holder in the longer term, as more 'fully' qualified personnel become available.

- 6 Notwithstanding the fact that HKAR 66.1(d) and (e) provides for protection of existing personnel qualified to exercise certification privileges or undergoing a qualification process in accordance with Hong Kong aviation regulations valid prior to HKAR-66, there is a need to clarify the examinations that should be undertaken by such personnel who wish to convert to the full HKAR-66 licence standard rather than stay qualified to the limited HKAR-66 licence standard. In addition, HKAR 66.1(f) specifies the need to convert to the full HKAR-66 licence standard when there is a change of basic category/sub-category and again there is a need to clarify the examinations that should be undertaken for such conversions.
- 7 The policy of sub-paragraph 6 conversion examinations, with the exception of human factors, is to limit such examinations to those subjects that have not previously been examined and/or not covered by relevant experience.
 - a. With regard to those subjects not previously examined, this means those subjects which are contained in each relevant subject module of Appendix 1 to this Section 2 but were not, or are not, specified in the relevant Hong Kong licence standard. Where however the resultant conversion examination results in the need to set less than 15 multi-choice questions, then such conversion examination is not necessary due to the fact that in this case the standards are so close as to not warrant examination.
 - b. With regard to those subjects covered by relevant experience, this means those subjects which are contained in each relevant subject module of Appendix 1 to this Section 2 considered to be addressed by such 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 possible in relation to Appendix 1 of this Section 2 subject modules to partially exempt personnel from such subject modules, dependant upon their existing qualification, expertise and experience as specified in sub-paragraph 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 exception for human factors is due to the fact that human factors for existing qualified personnel is covered by an initial training and HKAR-145 continuity training and therefore no examination is required by HKAR-66. Therefore module M9 is not required for conversion purposes.
- 8 Sub-paragraph 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.

IEM 66.15(b)**Eligibility**

See HKAR 66.15(b)

- 1 Certifying staff should have a general knowledge of the language used within the HKAR-145 approved maintenance organisation including knowledge of common aeronautical terms in the language. The level of knowledge should be such that the applicant is able to:
 - a. read and understand the instructions and technical manuals in use within the organisation;
 - b. make written technical entries and any maintenance documentation entries, which can be understood by those with whom they are normally required to communicate;
 - c. read and understand the company procedures;

- d. communicate at such a level as to prevent any misunderstanding when exercising the privileges of their authorisation.
- 2 In all cases, the level of understanding needs to be compatible with the level of certification authorisation granted.

AMC 66.20(b)**Categories and certification privileges**

See HKAR 66.20(b)

- 1 Certifying staff may be granted a HKAR-145 certification authorisation in relation to the HKAR-66 basic categories or sub-categories held and any type ratings listed on the HKAR-66 aircraft maintenance licence subject to the document being valid at the time of authorisation issue and the continuing validity requirements of HKAR 66.40 being met. There may be special cases that certification is based upon the aircraft type rated HKAR-66 aircraft maintenance licence and does not require the issue of individual authorisation.
- 2 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: Line maintenance certifying engineer - mechanical.

Category B2: Line maintenance certifying engineer - avionic.

Category B3: Simple light aeroplane maintenance certifying engineer.

Category C: Base maintenance certifying engineer.

The titles adopted by the Director and the designators A, B1, B2, B3 and C are required by HKAR 66.20.
- 3 Individual certifying staff need not be restricted to a single category. Provided that each qualification requirement is satisfied, any combination of categories may be granted.
- 4 Tasks permitted by HKAR 66.20 (b) (1) to be certified under the category A authorisation as part of minor scheduled maintenance or simple defect rectification are as specified in HKAR-145 and agreed by the Director. HKAR-145 contains a typical example list of such tasks.

- 5 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.
- 6 The categories B1 and B2 authorisations permit rectification of unscheduled defect rectification and scheduled maintenance checks normally completed in a line maintenance environment. The rectification of defects arising from these scheduled maintenance checks may also be certified. The category B3, and B1.2 when making certifications under the B3 aircraft type/group ratings, permits all category B1 certifications specified in this sub-paragraph both in line and base maintenance.
- 7 The category B1 and B3 authorisation 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 that requires an element of decision making in its application - other than a simple go/no-go decision - should not be certified. 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.
- 8 The Category A and B1 sub-categories 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
 - A5 and B1.5 Reserved
- The category B3 is as stated in sub-paragraph 2 but note that as with category B1.2, wooden aeroplanes are not included unless specifically endorsed on the licence.
- 9 The category C 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 or B2 qualifications may perform both roles in base maintenance.

IEM 66.25(a)**Basic knowledge requirements**

See HKAR 66.25(a)

The basic knowledge examinations may be conducted by an appropriately approved HKAR-147 training organisation or by the Director except that the Director may direct that all such examinations be conducted by appropriately approved HKAR-147 training organisations.

AMC 66.25 (c)**Basic knowledge requirements**

See HKAR 66.25(c)

- 1 For an applicant being a person qualified by holding an academic degree in an aeronautical, mechanical, or electronic discipline from a recognised university or other higher educational institute the need for any examination will depend upon the course taken in relation to Appendix 1 of this Section 2. Any university or other higher educational institute accredited by the Hong Kong Council for Academic Accreditation is recognised by the Director.
- 2 Knowledge gained and examinations passed during previous experiences, for example, in military aviation and civilian apprenticeships will be credited where the Director is satisfied that such knowledge and examinations are equivalent to that required by Appendix 1 of this Section 2.

AMC 66.30 (a), (b), (c)**Experience requirements**

See HKAR 66.30 (a), (b), (c)

- 1 Regarding qualification as category A or B3 certifying staff the following experience options apply:
 - a. 1 year experience and completion of a HKAR-147 approved basic training course; or,
 - b. 2 years experience and completion of training considered relevant by the Director as a skilled worker, in a non-aviation technical trade; or,

- c. 3 years experience for an applicant having no previous relevant technical training.
 - d. 6 months experience for an applicant for sub-category addition to an existing category A basic licence; or,
 - e. 3 months experience for an applicant for sub-category addition to an existing category A basic licence and completion of a HKAR-147 approved basic training conversion course.
 - f. Notwithstanding any training it should be noted that as required by HKAR 66.30(b) an additional 2 years experience is needed for the first category B3 group type rating.
- 2 Regarding qualification as category B1 or B2 certifying staff the following experience options apply:
- a. 2 years experience and completion of a HKAR-147 approved basic training course; or,
 - b. 3 years experience and completion of training considered relevant by the Director as a skilled worker, in a non-aviation technical trade; or,
 - c. 5 years experience for an applicant having no previous relevant technical training.
 - d. 1 year experience for an applicant for category B1 or B2 addition to an existing category B2 or B1 basic licence respectively; or,
 - e. 6 months experience for an applicant for category B1 or B2 addition to an existing category B2 or B1 basic licence respectively and completion of a HKAR-147 approved basic training conversion course.
 - f. 2 years experience for an applicant for category B1 or B2 addition to an existing category A basic licence; or,
 - g. 1 year experience for an applicant for category B1 or B2 addition to an existing category A basic licence and completion of a HKAR-147 approved basic training conversion course.
 - h. 6 months experience for an applicant for sub-category addition to an existing category B1 basic licence; or,
 - i. 3 months experience for an applicant for sub-category addition to an

existing category B1 basic licence and completion of a HKAR-147 approved basic training conversion course.

- j. 2 years experience for an applicant for category B1 or B2 addition to an existing category B3 basic licence without group type rating; or,
- k. 1 year experience for an applicant for category B1 or B2 addition to an existing category B3 basic licence without group type rating and completion of a HKAR-147 approved basic training conversion course.

3 Regarding qualification as category C certifying staff:

- a. The 3 years experience qualified as a category B1 or B2 certifying staff means line maintenance certification experience as category B1 or B2 certifying staff, or, as a qualified category B1 or B2 supporting the category C certifying staff in base maintenance, or, a combination of both.
- b. The 3 years experience for an applicant holding an academic degree in a technical discipline, from a university or other higher educational institution accepted by the Director means working in a civil aircraft maintenance environment on a representative selection of tasks including the observation of hanger maintenance, maintenance planning, quality assurance, record keeping, approved spare parts control and engineering development.

4 Paragraphs 1 and 2 reference to 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. The point being to gain sufficient experience in the environment of 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. Relevant maintenance means relevant to the licence category or sub-category for which application has or will be made.

5 The time necessary for any additional classroom training may have to be added to the practical experience time.

6 A skilled worker is a person who has successfully completed a course of training, acceptable to the Director, involving the manufacture, repair, overhaul or inspection of mechanical, electrical or electronic equipment. The training would include the use of tools and measuring devices.

AMC 66.30(d)**Experience requirements**

See HKAR 66.30(d)

- 1 Where the applicant for a category/sub-category A, B1, B2 or B3 is already qualified in another HKAR-66 category/sub-category, then the required one year recent experience should be reduced where relevant not to exceed the total experience requirement of HKAR 66.30 (b) and (c) other than the need to meet HKAR 66.30 (d) minimum 3 months recent experience.
- 2 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 3-year period prior to application.
- 3 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**

See HKAR 66.30(e)

- 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 66.40**Continuity of the aircraft maintenance licence**

See HKAR 66-40

The HKAR-66 aircraft maintenance licence is only accepted if issued and/or amended by the Director and the holder has signed the document in ink after having checked the correctness of the information contained therein.

IEM 66.40**Continuity of the aircraft maintenance licence**

See HKAR 66.40

- 1 The Director will issue the HKAR-66 aircraft maintenance licence with a period of two years and the licence holder remains responsible for making application for renewal to the Director by completing the relevant sections of CAD Form 19. Licence will normally be renewed provided that during the 12 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. Applications for renewal will not be accepted more than 60 days before expiry of the licence.
- 2 Where a licence holder is unable to show the six-month experience but has been involved actively for the same minimum period in matters concerned with aircraft maintenance (e.g. as a quality engineer or quality manager, an aeronautical engineering instructor or as a flight engineer) consideration will be given to renewing the licence.
- 3 The HKAR-145 approved maintenance organisation issues the HKAR-145 certification authorisation when satisfied that compliance has been established with the appropriate paragraphs of HKAR-145 and HKAR-66. In granting the HKAR-145 certification authorisation the HKAR-145 approved maintenance organisation needs to be satisfied that the person holds a valid HKAR-66 aircraft maintenance licence and may need to confirm such fact with the Director. With regard to continued validity of the HKAR-145 certification authorisation due regard should be given to the currency of maintenance experience and training in accordance with HKAR-145.
- 4 Where the Director permits the use of the particular HKAR-66 type rated aircraft maintenance licence as the basis for the release of aircraft not required to be maintained by a HKAR-145 approved maintenance organisation, it will be necessary for the licence holder 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 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 was expired, which are based on the privileges or validity of the licence will also have an impact on the validity of the Certificate of Airworthiness of the aircraft being certified. In addition, any HKAR-145 certification authorisation granted on the basis of a current licence will be invalidated should that licence expire.

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

See HKAR 66.45(a)

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 (b)(1). 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(b)**Type/task training and ratings**

See HKAR 66.45(b)

- 1 Type training for categories B1 and B2 certifying staff, and equivalently qualified base maintenance staff, will be approved if the standards specified below are met. The training will normally be divided into a mechanical course (airframe and powerplant) for category B1 certifying staff and an avionic course for category B2 certifying staff. Limited avionics system training will be given to B1 certifying staff where it is intended that they are authorised to replace avionic line replaceable units. Electrical systems will be included in both categories. The type training will include training corresponding to at least level III in accordance with ATA specification 104, where applicable.
- 2 The training should give adequate detailed theoretical knowledge of the aircraft, its main parts, systems (all existing systems in accordance with ATA 100, where applicable), equipment, interior and applicable components. Relevant in-service problems, service bulletins and instructions should also be covered, including training in the systems in use for technical manuals, maintenance and trouble-shooting procedures.
- 3 Knowledge is also required of relevant inspections and limitations as applicable to the effects of environmental factors such as cold and hot climates, wind, moisture, etc.
- 4 Practical training should be performed to include hands on training in maintenance of the aircraft, rigging, adjustments, replacement of line replaceable units, trouble shooting, rectification of minor defects and functional tests of systems. The practical training should comprise a period of four months for certifying staff 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 certifying staff with such previous experience. A programme of structured on-job-training (OJT) may be prepared to satisfy this practical training requirement. Practical training may be carried out at any HKAR-145 approved maintenance organisation or at the aircraft manufacturer or a combination of both but such training will form part of the particular aircraft type training either approved directly by the Director or approved via the HKAR-147 requirement.

- 5 Before grant of the aircraft type the applicant should be able to:
- a. Demonstrate by knowledge examination a detailed understanding of applicable systems (in accordance with ATA 100), their operation and maintenance;
 - b. Ensure safe certification of line 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.

IEM 66.45(b)**Type/task training and ratings**

See HKAR 66.45(b)

Type ratings granted to certifying staff will normally reflect the listing of aircraft (including engine) types or series as they appear on the HKAR-145 approved maintenance organisation's ratings, and as covered by the type training courses.

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

See HKAR 66.45(c)

For aeroplanes less than 5700 Kg maximum take off mass, the following category B1.1 aeroplane group ratings are possible:

Manufacturers single jet-turbine engine aeroplanes
Manufacturers twin jet-turbine engine aeroplanes
Manufacturers single prop-turbine engine aeroplanes
Manufacturers twin prop-turbine engine aeroplanes
All single jet-turbine engine aeroplanes

All twin jet-turbine engine aeroplanes
All single prop-turbine engine aeroplanes
All twin prop-turbine engine aeroplanes.

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.

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.

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

See HKAR 66.45(d)

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, 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 Cessna, Socata, etc., will be quoted.

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

See HKAR 66.45(e)

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 to ATA specification 104 level III on an aircraft type of a similar technology. Practical training is not normally required. 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 qualifications and have passed type training according to ATA specification 104 level III.

IEM 66.45(f)**Type/task training and ratings**

See HKAR 66.45(f)

The examinations in respect of category B1, B2, B3 or C aircraft type ratings may be conducted by appropriately approved HKAR-147 training organisations or the Director except that the Director may direct that all such examinations be conducted by appropriately approved HKAR-147 training organisations.

AMC 66.50**Medical fitness**

See HKAR 66.50

- 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.

IEM 66.55**Evidence of qualification**

See HKAR 66.55

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.

AMC 66.60**Equivalent safety cases**

See HKAR 66.60

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

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

See HKAR 66.65

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.

APPENDIX 1

AMC 66.25 Basic Knowledge - Introduction

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)	PISTON ENGINE(S)	TURBINE ENGINE(S)	PISTON ENGINE(S)	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

APPENDIX 1

AMC 66.25 Basic Knowledge Levels

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	1	2/2	2
	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	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 Nature of matter : the chemical elements, structure of atoms, molecules; Chemical compounds; States: solid, liquid and gaseous; Changes between states.	1	1/1	1
2.2	Mechanics			
2.2.1	Statics 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).	1	2/2	1
2.2.2	Kinetics 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.	1	2/2	1

SECTION 2**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;	-	2/1	2

		A	Level B1/3	B2
	<p>Isothermal, adiabatic expansion and 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

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

	Level	
A	B1/3	B2

Cells connected in series and parallel;
 Internal resistance and its effect on a battery;
 Construction, materials and operation of thermocouples;
 Operation of photo-cells.

3.6 **DC Circuits** - 2/2 2

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.

3.7 **Resistance / Resistor**

a) Resistance and affecting factors; - 2/1 2
 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.

b) Positive and negative temperature coefficient conductance; - 1/1 1
 Fixed resistors, stability, tolerance and limitations, methods of construction;
 Variable resistors, thermistors, voltage dependent resistors;

SECTION 2

HKAR-66

		A	Level B1/3	B2
	Construction of potentiometers and rheostats; Construction of Wheatstone Bridge.			
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;	-	2/2	2

		A	Level B1/3	B2
	<p>Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.</p>	-	2/2	2
	<p>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.</p>	-	2/2	2
3.11	Inductance / Inductor	-	2/1	2
	<p>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.</p>			

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

		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 application 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

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

SECTION 2**HKAR-66**

	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.			

SECTION 2**HKAR-66**

	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	<p>Safety Precautions-Aircraft and Workshop</p> <p>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.</p>	3	3/3	3
7.2	<p>Workshop Practices</p> <p>Care of tools, control of tools, use of workshop materials;</p> <p>Dimensions, allowances and tolerances, standards of workmanship;</p> <p>Calibration of tools and equipment, calibration standards.</p>	3	3/3	3
7.3	<p>Tools</p> <p>Common hand tool types;</p> <p>Common power tool types;</p> <p>Operation and use of precision measuring tools;</p> <p>Lubrication equipment and methods;</p> <p>Operation, function and use of electrical general test equipment.</p>	3	3/3	3
7.4	<p>Avionic General Test Equipment</p> <p>Operation, function and use of avionic general test equipment.</p>	-	2/2	3

		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	-

SECTION 2

HKAR-66

		Level		
		A	B1/3	B2
7.14	Sheet Metal Work	-	2/2	-
	Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.			
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
	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;			

		A	Level B1/3	B2
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
	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;			

SECTION 2

HKAR-66

	Level		
	A	B1/3	B2
Interface with aircraft operation;	1	2/2	2
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	<p>Physics of the Atmosphere</p> <p>International Standard Atmosphere (ISA), application to aerodynamics.</p>	1	2/2	2
8.2	<p>Aerodynamics</p> <p>Airflow around a body;</p> <p>Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash; vortices, stagnation;</p> <p>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;</p> <p>Thrust, Weight, Aerodynamic Resultant;</p> <p>Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall;</p> <p>Aerofoil contamination including ice, snow, frost.</p>	1	2/2	2
8.3	<p>Theory of Flight</p> <p>Relationship between lift, weight, thrust and drag;</p> <p>Glide ratio;</p> <p>Steady state flights, performance;</p> <p>Theory of the turn;</p> <p>Influence of load factor : stall, flight envelope and structural limitations;</p> <p>Lift augmentation.</p>	1	2/2	2

SECTION 2

HKAR-66

	A	Level B1/3	B2
8.4 Flight Stability and Dynamics	1	2/2	2
Longitudinal, lateral and directional stability (active and passive).			

MODULE 9. HUMAN FACTORS

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

		A	Level B1/3	B2
	Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.			
9.5	Physical Environment	1	1/1	1
	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);			

		Level	
	A	B1/3	B2
	Avoiding and managing errors.		
9.9	Hazards in the Workplace	1	2/2
	Recognising and avoiding hazards; Dealing with emergencies.		2

MODULE 10. AVIATION LEGISLATION

		A	Level 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 judgement 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;			

	Level	
A	B1/3	B2

CAD Approval: light aircraft, large aircraft;
 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
------	----------------------	----------	------------	----------

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
------	--	----------	------------	----------

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;
 Maintenance records;

		Level		
		A	B1/3	B2
	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 Design Organisations; Maintenance Organisations; AOC interface; Maintenance Schedules and Programmes; Stores: systems; release of parts.	1	2/2	2
10.7	Defect Reporting Air Navigation (Hong Kong) Order 1995 requirements; CAD382 The Mandatory Occurrence Reporting Scheme; Defects which are to be reported; Reportable accidents.	2	2/2	2
10.8	Hong Kong Aviation Requirements HKAR-1: Airworthiness Procedures; Airworthiness Notices; Airworthiness Directives;	1	2/2	2

	Level	
A	B1/3	B2

Mandatory Modifications and Inspections:-

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

HKAR-145: Approved Maintenance Organisations.

HKAR-147: Approved Maintenance Training/Examinations

Air Operator's Certificates (AOC) Requirements Document.

10.9	Joint Aviation Authorities Requirements	1	1/1	1
-------------	--	----------	------------	----------

JAR-21; JAR-23; JAR-25; JAR-29

**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><i>Control using elevons, ruddervators</i>;</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.	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) Construction <i>and pressurisation sealing</i> ; Wing, stabiliser, pylon and undercarriage attachments;	1	2/2*	-

SECTION 2

HKAR-66

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

SECTION 2

HKAR-66

	A	Level B1/3	B2
11.5.2 Avionic Systems	1	1/1*	-
Fundamentals of system lay-outs and operation of: <i>Auto Flight</i> (ATA 22); 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, <i>spoiler;</i> Trim control; <i>Active load control;</i> High lift devices; <i>Lift dump, speed brakes;</i> System operation: manual, hydraulic, <i>pneumatic,</i> <i>electrical, fly-by-wire;</i> <i>Artificial feel, Yaw damper, Mach trim, rudder</i> <i>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; <i>Dumping, venting and draining;</i> <i>Cross-feed and transfer,</i> Indications and warnings; Refuelling and defuelling; <i>Longitudinal balance fuel systems.</i></p>	1	3/3*	-

SECTION 2

HKAR-66

		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.	1	3/3	-
11.13	Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, <i>antiskid and autobraking</i> ; Tyres; <i>Steering</i> .	2	3/3*	-

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

SECTION 2**HKAR-66**

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

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

		Level		
		A	B1	B2
12.1	Theory of Flight - Rotary Wing Aerodynamics 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.	1	2	-
12.2	Flight Control System 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.	2	3	-
12.3	Blade Tracking and Vibration Analysis	1	3	-

		Level		
		A	B1	B2
	Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.			
12.4	Transmissions	1	3	-
	Gear boxes, main and tail rotors; Clutches, free wheel units and rotor brake.			
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; Seat installation;	1	2	-

	Level		
A	B1		
		B2	

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	-
----------	----------	----------

Sources of air supply including engine bleed and ground cart.

12.6.2 Air Conditioning

1	3	-
----------	----------	----------

Air conditioning systems;
 Distribution systems;
 Flow and temperature control systems;
 Protection and warning devices.

	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)			

		A	Level 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	-

SECTION 2**HKAR-66**

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

	Level	
A	B1	B2

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

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

		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; Principles and methods used to minimise the effects of interference;			

	Level		
	A	B1	B2
<p>Standing wave ratio and its calculation; Working principles of following systems:</p> <ul style="list-style-type: none"> - 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); - Satellite Communication (SATCOM); - Doppler navigation; - Area navigation, RNAV 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). 			
<p>13.5 Electrical Power (ATA 24)</p> <p>Batteries Installation and Operation; DC power generation;</p>	-	-	3

		Level		
		A	B1	B2
	AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection; External / Ground power.			
13.6	Equipment and Furnishings (ATA 25)	-	-	3
	Electronic emergency equipment requirements; Cabin entertainment equipment.			
13.7	Flight Controls (ATA 27)			
	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;	-	-	1
	b) System operation: electrical, fly by wire.	-	-	2
13.8	Instrument Systems (ATA 31)	-	-	3
	Classification; Atmosphere; Terminology;			

		Level		
		A	B1	B2
	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, compensation and adjustment; 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.			
13.9	Lights (ATA 33)	-	-	3
	External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo;			

		Level		
		A	B1	B2
	Emergency.			
13.10	On board Maintenance Systems (ATA 45)	-	-	2
	Central maintenance computers;			
	Data loading system;			
	Electronic library system;			
	Printing;			
	Structure monitoring (damage tolerance monitoring).			

MODULE 14. PROPULSION

		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;			
	Propeller speed.			

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;	1	2	-

SECTION 2**HKAR-66**

		A	Level B1	B2
	Fan balancing; 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,	1	2	-

SECTION 2**HKAR-66**

	A	Level B1	B2
engine turbine discharge pressure or jet pipe 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
<p>15.19 Powerplant Installation</p> <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>	1	2	-
<p>15.20 Fire Protection Systems</p> <p>Operation of detection and extinguishing system.</p>	1	2	-
<p>15.21 Engine Monitoring and Ground Operation</p> <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>	1	3	-
<p>15.22 Engine Storage and Preservation</p> <p>Preservation and depreservation for the engine and accessories / systems.</p>	-	2	-

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;			

		A	Level B1/3	B2
16.4.2	Fuel injection systems Types, construction and principles of operation.	1	2/2	-
16.5	Starting and Ignition Systems Starting 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	-
16.8	Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2/2	-

SECTION 2

HKAR-66

		A	Level B1/3	B2
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 manufacturer.	1	3/3	-
16.13	Engine Storage and Preservation Preservation and depreservation for the engine and accessories / systems.	-	2/2	-

MODULE 17. PROPELLER

		A	Level B1/3	B2
17.1	Fundamentals 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.	1	2/2	-
17.2	Propeller Construction 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 speeding propeller; Propeller / spinner installation.	1	2/2	-
17.3	Propeller Pitch Control Speed control and pitch change methods; Feathering and reverse pitch; Overspeed protection.	1	2/2	-
17.4	Propeller Synchronising Synchronising and synchrophasing equipment.	-	2/2	-

SECTION 2

HKAR-66

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

MODULE 19. WOODEN AEROPLANES

		A	Level B1/3	B2
19.1	Wooden Structures 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.	-	2/2	-
19.2	Aeroplane Covering Characteristics, properties and types of fabrics and fibreglass used in aeroplanes; Types of defects in fabric and fibreglass; Repair of fabric and fibreglass covering.	-	2/2	-

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

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 serving.
- 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*	Civil Aviation Department 10/F, Commercial Building, Airport Freight Forwarding Centre, 2 Chun Wan Road Lantau Hong Kong
HKAR-2 - Administrative & Guidance Material*	
HKAR-66 - Licensing of Maintenance Personnel (Certifying Staff – Maintenance) *	
HKAR-145 - Approved Maintenance Organisations*	
CAD 455 - Airworthiness Notices*	

* *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

Book Title	Author	Publisher
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)
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

Book Title	Author	Publisher (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

Book Title	Author	Publisher
Fundamentals of Helicopter Maintenance	EA-HF-1	Aviation Maintenance Foundation Inc (USA)
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

Book Title	Author	Publisher
Automatic Flight Control	E Pallett	Blackwell Scientific Publications
Electrical Technology	E Hughes	Longmans
Electronics II, III	D C Green	Longman Group Publications
Microprocessors/Microcomputers: An Introduction	Givens/Roesser	McGraw-Hill
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

Book Title	Author	Publisher
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 Guidelines		Air Transport Association of 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 DCA35B 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 An example of a completed 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	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Air Conditioning and Pressurization, Safety & Warning Devices	21	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	–
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	–
Hydraulic Power	29	X	X	X	X	–
Ice & Rain Protection	30	X	X	X	X	–
Propeller Ice Protection	30	X	X	–	–	–

Applying for Category:		A1/ B1.1	A2/ B1.2	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	-
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	-
Water/Waste	38	X	X	-	-	-
On Board Maintenance. Systems	45	X	X	-	-	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	-	-	-
Wings, Flight Control Surfaces, Stabilizers	55 / 57	X	X	-	-	-
Propeller: Construction, Pitch Control, Synchronizing, Maintenance	61	X	X	-	-	-

Applying for Category:		A1/ B1.1	A2/ B1.2	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
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
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	–	–

Applying for Category:		A1/ B1.1	A2/ B1.2	A3/ B1.3	A4/ B1.4	B2
Topics	ATA*					
Turbine Engines: Turbo-prop Engines	72	X	-	-	-	-
Turbine Engines: Turbo-shaft Engines	72	X	-	X	-	-
Turbine Engines: Fuel Systems	73	X	-	X	-	-
Turbine Engines: Ignition Systems	74	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	-	-
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 with respect to the systems.

TABLE 2 (APPENDIX 4)
EXAMPLE OF COMPLETED DCA35B

HONG KONG CIVIL AVIATION DEPARTMENT
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, i.e. 30 days.
- (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 DCA35B.
- (5) A CAD approved log book can be used as a substitute of the form DCA35B.
- (6) Questions during any examinations/assessments may be based upon information contained in this Record of Experience.
- (7) 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: _____

Peter Chan

Date: _____

01 APR 2002

Name: <u>PETER CHAN</u> ATA Chapter No. <u>21</u> Page No. <u>1</u>				
Aircraft Registration & Type	Item	Details of Work Undertaken	Date(s) & Place Work Undertaken	Signature, Name & Status of Person in charge & Date(s)
B-HVY B747F	1	REPLACEMENT AND OPERATION/LEAK CHECK OF #1 A/C M CARRIED OUT IN ACCORDANCE WITH MM 21-XX-XX.	01/04/02 HONG KONG	<i>M. Lee.</i> M. C. LEE E. I. C. 01/04/02

(DCA 35B) Rev. 04/01/01

Name : <u>PETER CHAN</u> ATA Chapter No. <u>21</u> Page No. <u>2</u>				
Aircraft Registration & Type	Item	Details of Work Undertaken	Date(s) & Place Work Undertaken	Signature, Name & Status of Person in charge & Date(s)
B-HOU B747-400	2	DEFECT - CABIN 'C' ZONE TEMPERATURE HIGH. RECTIFICATION - ZONE TEMPERATURE CONTROLLER REPLACED AND ZONE TEMPERATURE CHECKED FOUND SERVICEABLE. REFERENCE MM 21-XX-XX.	02/04/02 HONG KONG	 JOHN CHEUNG ENGINEER- IN-CHARGE 02/04/02

If necessary add continuation sheets and number in sequence.

DC A 350 (Rev. Jan 01)