

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	



Brunei Department of Civil Aviation
Negara Brunei Darussalam
www.mtic.gov.bn/dca

Brunei Aviation Requirements

BAR 1 – Part-66 Aircraft Maintenance Licence

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Table of Contents

Table of Contents	2
Control of this Document	4
Part 66 Aircraft Maintenance Licence	5
66.1 Competent Authority	5
Section A – Technical Requirements	6
Subpart A – Aircraft Maintenance Licence	6
66.A.1 Scope	6
66.A.3 Licence Categories	6
66.A.5 Aircraft groups	6
66.A.10 Application	7
66.A.15 Eligibility	7
66.A.20 Privileges	7
66.A.25 Basic Knowledge Requirements	8
66.A.30 Basic Experience Requirements	9
66.A.40 Continued Validity of the Aircraft Maintenance Licence	10
66.A.45 Endorsement with aircraft ratings for aircraft registered in Brunei Darussalam	10
66.A.50 Limitations	12
66.A.55 Evidence of qualification	12
66.A.70 Conversion Provisions	12
Section B – Procedures for the Brunei DCA	14
Subpart B – General	14
66.B.1 Scope	14
66.B.10 Brunei DCA	14
66.B.20 Record-keeping	14
66.B.25 Mutual exchange of information	15
66.B.30 Exemptions	15
Subpart B – Issue of an Aircraft Maintenance Licence	16
66.B.100 Procedure for the issue of an Aircraft Maintenance Licence by the Brunei DCA ...	16
66.B.105 Procedure for the issue of an Aircraft Maintenance licence via a Maintenance Organisation Approved in accordance with BAR 8 Part 145	16
66.B.110 Procedure for the change of an Aircraft Maintenance Licence to include an Additional Basic Category or Subcategory	16
66.B.115 Procedure for the change of an Aircraft Maintenance Licence to include an Aircraft Rating or to Remove Limitations	16
66.B.120 Procedure for the Renewal of an Aircraft Maintenance Licence Validity	17
66.B.125 Procedure for the Conversion of Licences including Group Ratings	18

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

66.B.130 Procedure for the direct approval of aircraft type training	19
Subpart C - Examinations	20
66.B.200 Examination by the Brunei DCA	20
Subpart D - Conversion of Certifying Staff Qualifications	21
66.B.300 General	21
66.B.305 Conversion Report for National Qualifications	21
66.B.310 Conversion report for Approved Maintenance Organisations Approvals	21
Subpart E – Examination Credits	23
66.B.400 General	23
66.B.405 Examination credit report.....	23
66.B.410 Examination credit validity	23
Subpart F – Continuing Oversight.....	24
66.B.500 Revocation, suspension or limitation of the aircraft maintenance licence	24
Appendix I - Basic Knowledge Requirements	25
Appendix II - Basic Examination Standard	86
Appendix III - Type Training and Examination Standard - On the Job Training	92
Appendix IV - Experience Requirements for extending a BAR 1 Part 66 Aircraft Maintenance Licence	110
Appendix V - Application Form and Example of Licence Format.....	111
Appendix VI - BAR 1 Part 66 Aircraft Maintenance Licence	114

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Control of this Document

DC.1 Introduction

DC.1.1 Pursuant to Civil Aviation Order 2006 and the Civil Aviation Regulations 2006 and their subsequent amendments, the following requirements are hereby established for compliance by all persons concerned, the Director of Civil Aviation is empowered to adopt and amend Brunei Aviation Requirements. In accordance herewith, the following requirement is hereby established for compliance by all persons concerned. This requirement shall be known as BAR 1 – Part-66 Aircraft Maintenance Licence and any reference to this title shall mean referring to the requirements to be met for civil aviation in Brunei Darussalam.

DC.2 Authority for this Regulation

DC.2.1 This BAR 1 – Part-66 Aircraft Maintenance Licence is issued on the authority of the Director of Civil Aviation.

DC.3 Applicability

DC.3.1 This BAR 1 – Part-66 Aircraft Maintenance Licence is applicable to the aviation industry of Brunei Darussalam.

DC.4 Scope

DC.4.1 BAR 1 Part- 66 contains the personnel licensing requirements of the Brunei Darussalam, and shows compliance with ICAO Annex 1. The requirements in BAR 1 are separated into the following parts with cross references between parts where applicable.

Part ARA Authority Requirements for Aircrew

Part ORA Organisational Requirements for Aircrew

Part FCL Flight Crew Licensing

Part CC Cabin Crew

Part FOO/FD Flight Operation Officer and Flight Dispatcher

Part MED Medical

Part 66 Aircraft Maintenance Licence

Part 147 Approved Training Organisations

Part ATCO (Air Traffic Control Officer) Licensing and Medical

DC.5 Definitions

DC.5.1 Terms not defined shall have the meaning given to them in the relevant legal instruments or international legal instruments in which they appear, especially as they appear in the Convention and its Annexes.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Part 66 Aircraft Maintenance Licence

66.1 Competent Authority

- (a) For the purpose of this BAR 1 Part- 66, the competent authority shall be:
- (1) Brunei Darussalam to whom a person first applies for the issuance of an aircraft maintenance licence.
- (b) The Brunei DCA shall be responsible for defining:
- (1) the list of aircraft types; and
 - (2) what airframe/engine combinations are included in each particular aircraft type rating.

BRUNEI DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Section A – Technical Requirements

Subpart A – Aircraft Maintenance Licence

66.A.1 Scope

This section defines the aircraft maintenance licence and establishes the requirements for application, issue and continuation of its validity.

66.A.3 Licence Categories

- (a) Aircraft maintenance licences include the following categories:
- Category A
 - Category B1
 - Category B2
 - Category B3
 - Category C
- (b) Categories A and B1 are subdivided into subcategories relative to combinations of aeroplanes, helicopters, turbine and piston engines. These subcategories are:
- A1 and B1.1 Aeroplanes Turbine
 - A2 and B1.2 Aeroplanes Piston
 - A3 and B1.3 Helicopters Turbine
 - A4 and B1.4 Helicopters Piston
- (c) Category B3 is applicable to piston-engine non-pressurised aeroplanes of 2,000kg MTOM and below

66.A.5 Aircraft groups

- (a) For the purpose of ratings on aircraft maintenance licences, aircraft shall be classified in the following groups:
- (1) Group 1: complex motor-powered aircraft as well as multiple engine helicopters, aeroplanes with maximum certified operating altitude exceeding FL290, aircraft equipped with fly-by-wire systems and other aircraft requiring an aircraft type rating when defined so by the Brunei DCA.
 - (2) Group 2: aircraft other than those in Group 1 belonging to the following subgroups:
 - sub-group 2a: single turbo-propeller engine aeroplanes
 - sub-group 2b: single turbine engine helicopters
 - sub-group 2c: single piston engine helicopters.
 - (3) Group 3: piston engine aeroplanes other than those in Group 1.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

66.A.10 Application

- (a) An application for an aircraft maintenance licence or amendment to such licence shall be made on Form 19 (see Appendix V) in a manner established by the Brunei DCA and submitted thereto.
- (b) An application for the change to an aircraft maintenance licence shall be made to the Brunei DCA that issued the aircraft maintenance licence.
- (c) In addition to the documents required in points 66.A.10 (a), 66.A.10 (b) and 66.B.105, as appropriate, the applicant for additional basic categories or subcategories to an aircraft maintenance licence shall submit his/her current original aircraft maintenance licence to the Brunei DCA together with the Form 19.
- (d) Reserved
- (e) Reserved
- (f) Each application shall be supported by documentation to demonstrate compliance with the applicable theoretical knowledge, practical training and experience requirements at the time of application.

66.A.15 Eligibility

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

66.A.20 Privileges

- (a) The following privileges shall apply:
 - (1) A category A aircraft maintenance licence permits the holder to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation referred to in point 145.A.35 of BAR 8 Part 145. The certification privileges shall be restricted to work that the licence holder has personally performed in the maintenance organisation that issued the certification authorisation.
 - (2) A category B1 aircraft maintenance licence shall permit the holder to issue certificates of release to service and to act as B1 support staff following:
 - (i) maintenance performed on aircraft structure, power plant and mechanical and electrical systems,
 - (A) work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.
 - (B) category B1 includes the corresponding A subcategory.
 - (3) A category B2 aircraft maintenance licence shall permit the holder:
 - (i) to issue certificates of release to service and to act as B2 support staff for following:
 - (A) maintenance performed on avionic and electrical systems, and
 - (B) electrical and avionics tasks within power plant and mechanical systems, requiring only simple tests to prove their serviceability; and

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (C) to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation referred to in point 145.A.35 of BAR 8 - Part 145. This certification privilege shall be restricted to work that the licence holder has personally performed in the maintenance organisation which issued the certification authorisation and limited to the ratings already endorsed in the B2 licence.

The category B2 licence does not include any A subcategory.

- (4) Reserved
- (5) A category C aircraft maintenance licence shall permit the holder to issue certificates of release to service following base maintenance on aircraft. The privileges apply to the aircraft in its entirety.
- (b) The holder of an aircraft maintenance licence may not exercise its privileges unless:
- (1) In compliance with the applicable requirements of BAR 8 Part M and BAR 8 Part 145; and
 - (2) In the preceding 2-year period he/she has, either had 6 months of maintenance experience in accordance with the privileges granted by the aircraft maintenance licence or, met the provision for the issue of the appropriate privileges; and
 - (3) He/she has the adequate competence to certify maintenance on the corresponding aircraft; and
 - (4) He/she is able to read, write and communicate to an understandable level in the language(s) in which the technical documentation and procedures necessary to support the issue of the certificate of release to service are written.

66.A.25 Basic Knowledge Requirements

- (a) An applicant for an aircraft maintenance licence, or the addition of a category or subcategory to such a licence, shall demonstrate by examination a level of knowledge in the appropriate subject modules in accordance with the Appendix I to BAR 1 Part 66. The examination shall be conducted either by a training organisation appropriately approved in accordance with BAR 1 Part 147 or by the Brunei DCA.
- (b) The training courses and examinations shall be passed within 10 years prior to the application for an aircraft maintenance licence or the addition of a category or subcategory to such aircraft maintenance licence. Should this not be the case, examination credits may however be obtained in accordance with point (c).
- (c) The applicant may apply to the Brunei DCA for full or partial examination credit to the basic knowledge requirements for:
 - (1) Basic knowledge examinations that do not meet the requirement described in point (b) above; and
 - (2) Any other technical qualification considered by the Brunei DCA to be equivalent to the knowledge standard of BAR 1 Part- 66.

Credits shall be granted in accordance with Subpart E of Section B of this BAR 1 Part-66.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (d) Credits expire 10 years after they were granted to the applicant by the Brunei DCA. The applicant may apply for new credits after expiration.

66.A.30 Basic Experience Requirements

- (a) An applicant for an aircraft maintenance licence shall have acquired:
- (1) For category A, subcategories B1.2 and B1.4:
 - (i) 3 years of practical maintenance experience on operating aircraft, if the applicant has no previous relevant technical training; or
 - (ii) 2 years of practical maintenance experience on operating aircraft and completion of training considered relevant by the Brunei DCA as a skilled worker, in a technical trade; or
 - (iii) 1 year of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with BAR 1 Part 147;
 - (2) For category B2 and subcategories B1.1 and B1.3:
 - (i) 5 years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or
 - (ii) 3 years of practical maintenance experience on operating aircraft and completion of training considered relevant by the Brunei DCA as a skilled worker, in a technical trade; or
 - (iii) 2 years of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with BAR 1 Part 147;
 - (3) For category C with respect to large aircraft:
 - (i) 3 years of experience exercising category B1.1, B1.3 or B2 privileges on large aircraft or as support staff according to point 145.A.35, or, a combination of both; or
 - (ii) 5 years of experience exercising category B1.2 or B1.4 privileges on large aircraft or as support staff according to point 145.A.35, or a combination of both;
 - (4) For category C with respect to other than large aircraft: 3 years of experience exercising category B1 or B2 privileges on other than large aircraft or as support staff according to point 145.A.35(a), or a combination of both;
 - (5) For category C obtained through the academic route: an applicant holding an academic degree in a technical discipline, from a university or other higher educational institution recognised by the Brunei DCA, 3 years of experience working in a civil aircraft maintenance environment on a representative selection of tasks directly associated with aircraft maintenance including 6 months of observation of base maintenance tasks.
- (b) An applicant for an extension to an aircraft maintenance licence shall have a minimum civil aircraft maintenance experience requirement appropriate to the additional category or subcategory of licence applied for as defined in Appendix IV to this BAR 1 Part- 66.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (c) The experience shall be practical and involve a representative cross section of maintenance tasks on aircraft.
- (d) At least 1 year of the required experience shall be recent maintenance experience on aircraft of the category/ subcategory for which the initial aircraft maintenance licence is sought. For subsequent category/subcategory additions to an existing aircraft maintenance licence, the additional recent maintenance experience required may be less than 1 year but shall be at least 3 months.

The required experience shall be dependent upon the difference between the licence category/subcategory held and applied for. Such additional experience shall be typical of the new licence category/subcategory sought.

- (e) Notwithstanding paragraph (a), aircraft maintenance experience gained outside a civil aircraft maintenance environment shall be accepted when such maintenance is equivalent to that required by this BAR 1 Part- 66 as established by the Brunei DCA.

Additional experience of civil aircraft maintenance shall, however, be required to ensure adequate understanding of the civil aircraft maintenance environment.

- (f) Experience shall have been acquired within the 10 years preceding the application for an aircraft maintenance licence or for the addition of a category or subcategory to such a licence.

66.A.40 Continued Validity of the Aircraft Maintenance Licence

- (a) The aircraft maintenance licence becomes invalid 5 years after its last issue or change, unless the holder submits his/her aircraft maintenance licence to the Brunei DCA that issued it, in order to verify that the information contained in the licence is the same as that contained in the Brunei DCA records, pursuant to point 66.B.120.
- (b) The holder of an aircraft maintenance licence shall complete the relevant parts of Form 19 (see Appendix V) and submit it with the holder's copy of the licence to the Brunei DCA, unless the holder works in a maintenance organisation approved in accordance with BAR 8 Part 145 that has a procedure in its exposition whereby such organisation may submit the necessary documentation on behalf of the aircraft maintenance licence holder.
- (c) Any certification privilege based upon an aircraft maintenance licence becomes invalid as soon as the aircraft maintenance licence is invalid.
- (d) The aircraft maintenance licence is only valid (i) when issued and/or changed by the Brunei DCA and (ii) when the holder has signed the document.

66.A.45 Endorsement with aircraft ratings for aircraft registered in Brunei Darussalam

- (a) In order to be entitled to exercise certification privileges on a specific aircraft type, the holder of an aircraft maintenance licence need to have his/her licence endorsed with the relevant aircraft ratings.
 - (1) For category B1, B2 or C the relevant aircraft ratings are the following:
 - (i) For group 1 aircraft, the appropriate aircraft type rating.
 - (ii) For group 2 aircraft, the appropriate aircraft type rating, manufacturer sub-group rating or full sub-group rating.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (iii) For group 3 aircraft, the appropriate aircraft type rating or full group rating.
- (2) For category B3, the relevant rating is 'piston-engine non-pressurised aeroplanes of 2,000kg and below.
- (3) For category A, no rating is required, subject to compliance with the requirements of point 145.A.35 of BAR 8 - Part 145.
- (b) The endorsement of aircraft type ratings requires the satisfactory completion of the relevant category B1, B2 or C aircraft type training.
- (c) In addition to the requirement of point (b), the endorsement of the first aircraft type rating within a given category/sub-category requires satisfactory completion of the corresponding On the Job Training, as described in Appendix III to BAR 1 Part-66.
- (d) By derogation from points (b) and (c), for group 2 and 3 aircraft, aircraft type ratings may also be granted after:
 - (1) Satisfactory completion of the relevant category B1, B2 or C aircraft type examination described in Appendix III to this BAR 1 Part-66, and
 - (2) In the case of B1 and B2 category, demonstration of practical experience on the aircraft type. In that case, the practical experience shall include a representative cross section of maintenance activities relevant to the licence category.

In the case of a category C rating for a person qualified by holding an academic degree as specified in point 66.A.30(a)(5), the first relevant aircraft type examination shall be at the category B1 or B2 level.

- (e) For group 2 aircraft:
 - (1) The endorsement of manufacturer sub-group ratings for category B1 and C licence holders requires complying with the aircraft type rating requirements of at least two aircraft types from the same manufacturer which combined are representative of the applicable manufacturer sub-group;
 - (2) The endorsement of full sub-group ratings for category B1 and C licence holders requires complying with the aircraft type rating requirements of at least three aircraft types from different manufacturers which combined are representative of the applicable sub-group;
 - (3) The endorsement of manufacturer sub-groups and full sub-group ratings for category B2 licence holders requires demonstration of practical experience which shall include a representative cross section of maintenance activities relevant to the licence category and to the applicable aircraft sub-group.
- (f) For group 3 aircraft:
 - (1) The endorsement of the full group 3 rating for category B1, B2 and C licence holders requires demonstration of practical experience, which shall include a representative cross section of maintenance activities relevant to the licence category and to the group 3.
 - (2) For category B1, unless the applicant provides evidence of appropriate experience, the group 3 rating shall be subject to the following limitations, which shall be endorsed on the licence:
 - (i) pressurised aeroplanes
 - (ii) metal structure aeroplanes

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (iii) composite structure aeroplanes
 - (iv) wooden structure aeroplanes
 - (v) aeroplanes with metal tubing structure covered with fabric.
- (g) For the B3 licence:
- (1) The endorsement of the rating 'piston-engine non-pressurised aeroplanes of 2000kg MTOM and below' requires demonstration of practical experience which shall include a representative cross-section of maintenance activities relevant to the licence category.
 - (2) Unless the applicant provides evidence of appropriate experience, the rating referred to in point 1 shall be subject to the following limitations, which shall be endorsed on the licence:
 - (i) wooden structure aeroplanes.
 - (ii) aeroplanes with metal tubing structure covered with fabric.
 - (iii) metal structure aeroplanes
 - (iv) composite structure aeroplanes

66.A.50 Limitations

- (a) Limitations introduced on an aircraft maintenance licence are exclusions from the certification privileges and affect the aircraft in its entirety.
- (b) For limitations referred to in point 66.A.45, limitations shall be removed upon:
 - (1) Demonstration of appropriate experience; or
 - (2) After a satisfactory practical assessment performed by the Brunei DCA.
- (c) For limitations referred to in point 66.A.70, limitations shall be removed upon satisfactory completion of examination on those modules/subjects defined in the applicable conversion report referred to in point 66.B.300.

66.A.55 Evidence of qualification

Personnel exercising certification privileges as well as support staff shall produce their licence, as evidence of qualification, within 24 hours upon request by an authorised person.

66.A.70 Conversion Provisions

- (a) The holder of a certifying staff qualification valid in Brunei Darussalam, prior to the date of entry into force of BAR 1 Part- 66 shall be issued an aircraft maintenance licence by the Brunei DCA without further examination subject to the conditions specified in Section B Subpart D.
- (b) A person undergoing a certifying staff qualification process valid in an ICAO Member State accepted by the Brunei DCA may continue to be qualified. The holder of a certifying staff qualification gained following such process shall be issued an aircraft maintenance licence by the Brunei DCA without further examination subject to the conditions specified in Section B Subpart D.
- (c) Where necessary, the aircraft maintenance licence shall contain limitations in accordance with point 66.A.50 to reflect the differences between (i) the scope of the

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

certifying staff qualification valid in the accepted ICAO Member State before the entry into force of this Regulation and (ii) the basic knowledge requirements and the basic examination standards laid down in Appendix I and II to this BAR 1 Part- 66.

- (d) By derogation to paragraph (c) for aircraft not involved in commercial air transport other than large aircraft, the aircraft maintenance licence shall contain limitations in accordance with point 66.A.50 to ensure that the certifying staff privileges valid in Brunei Darussalam before the entry into force of this Regulation and the privileges of the converted BAR 1 Part- 66 aircraft maintenance licence remain the same.

BRUNEI DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Section B – Procedures for the Brunei DCA

Subpart B – General

66.B.1 Scope

This section establishes the procedures including the administrative requirements to be followed by the Brunei DCA in charge of the implementation and the enforcement of Section A of this BAR 1 Part- 66.

66.B.10 Brunei DCA

(a) General

Brunei Darussalam shall designate the Brunei DCA with allocated responsibilities for the issuance, continuation, change, suspension or revocation of aircraft maintenance licences.

This Brunei DCA shall establish an adequate organisational structure to ensure compliance with this BAR 1 Part- 66.

(b) Resources

The Brunei DCA shall be appropriately staffed to ensure the implementation of the requirements of this BAR 1 Part- 66.

(c) Procedures

The Brunei DCA shall establish documented procedures detailing how compliance with this BAR 1 Part- 66 is accomplished. These procedures shall be reviewed and amended to ensure continued compliance.

66.B.20 Record-keeping

(a) The Brunei DCA shall establish a system of record-keeping that allows adequate traceability of the process to issue, revalidate, change, suspend or revoke each aircraft maintenance licence.

(b) These records shall include for each licence:

- (1) The application for an aircraft maintenance licence or change to that licence, including all supporting documentation;
- (2) A copy of the aircraft maintenance licence including any changes;
- (3) Copies of all relevant correspondence;
- (4) Details of any exemption and enforcement actions;
- (5) Any report from other competent authorities relating to the aircraft maintenance licence holder;
- (6) The records of examinations conducted by the Brunei DCA;
- (7) The applicable conversion report used for conversion;
- (8) The applicable credit report used for crediting.

(c) Records referred to in points (1) to (5) of 66.B.20 (b) shall be kept at least 5 years after the end of the licence validity.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (d) Records referred to in points (6), (7) and (8) of 66.B.20 (b) shall be kept for an unlimited period.

66.B.25 Mutual exchange of information

- (a) Reserved
- (b) Reserved

66.B.30 Exemptions

Not applicable.

BRUNEL DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Subpart B – Issue of an Aircraft Maintenance Licence

This Subpart provides the procedures to be followed by the Brunei DCA to issue, change or continue an aircraft maintenance licence.

66.B.100 Procedure for the issue of an Aircraft Maintenance Licence by the Brunei DCA

- (a) On receipt of Form 19 and any supporting documentation, the Brunei DCA shall verify the Form 19 for completeness and ensure that the experience claimed meets the requirement of this BAR 1 Part-66.
- (b) The Brunei DCA shall verify an applicant's examination status and/or confirm the validity of any credits to ensure that all required modules of Appendix I have been met as required by this BAR 1 Part-66.
- (c) When having verified the identity and date of birth of the applicant and being satisfied that the applicant meets the standards of knowledge and experience required by this BAR 1 Part-66, the Brunei DCA shall issue the relevant aircraft maintenance licence to the applicant. The same information shall be kept on the Brunei DCA's records.
- (d) In the case where aircraft types or groups are endorsed at the time of the issuance of the first aircraft maintenance licence, the Brunei DCA shall verify compliance with point 66.B.115.

66.B.105 Procedure for the issue of an Aircraft Maintenance licence via a Maintenance Organisation Approved in accordance with BAR 8 Part 145

- (a) A maintenance organisation approved in accordance with BAR 8 Part 145, when authorised to carry out this activity by the Brunei DCA, may make recommendations to the Brunei DCA regarding the application from an individual for an aircraft maintenance licence so that the Brunei DCA may prepare and issue such licence.
- (b) Maintenance organisations referred to in point (a) shall ensure compliance with points 66.B.100 (a) and (b).
- (c) In all cases, the aircraft maintenance licence can only be issued to the applicant by the Brunei DCA.

66.B.110 Procedure for the change of an Aircraft Maintenance Licence to include an Additional Basic Category or Subcategory

- (a) At the completion of the procedures specified in points 66.B.100 or 66.B.105, the Brunei DCA shall endorse the additional basic category or subcategory on the aircraft maintenance licence by stamp and signature and reissue the licence.
- (b) The Brunei DCA record system shall be changed accordingly.

66.B.115 Procedure for the change of an Aircraft Maintenance Licence to include an Aircraft Rating or to Remove Limitations

- (a) On receipt of a satisfactory Form 19 and any supporting documentation demonstrating compliance with the requirements of the applicable rating together with the accompanying aircraft maintenance licence, the Brunei DCA shall either:

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (1) Endorse the applicant's aircraft maintenance licence with the applicable aircraft rating; or
- (2) Reissue the said licence to include the applicable aircraft rating; or
- (3) Remove the applicable limitations in accordance with point 66.A.50.

The Brunei DCA record system shall be changed accordingly.

- (b) In the case where the complete type training is not conducted by maintenance training organisation appropriately approved in accordance with BAR 1 Part 147, the Brunei DCA shall be satisfied that all type training requirements are complied with in accordance with Part 66 appendix III before the type rating is issued.
- (c) In the case where the On the Job Training is not required, the aircraft type rating shall be endorsed based on a Certificate of Recognition issued by a maintenance training organisation approved in accordance with BAR 1 Part 147.
- (d) In the case where the aircraft type training is not covered by a single course, the Brunei DCA shall be satisfied prior to the type rating endorsement that the content and length of the courses fully satisfy the scope of the licence category and that the interface areas have been appropriately addressed.
- (e) In the case of differences training, the Brunei DCA shall be satisfied that (i) the applicant's previous qualification, supplemented by (ii) either a course approved in accordance with BAR 1 Part 147 or a course directly approved by the Brunei DCA, are acceptable for type rating endorsement.
- (f) Compliance with the practical elements shall be demonstrated (i) by the provision of detailed practical training records or a logbook provided by a maintenance organisation appropriately approved in accordance with BAR 8 Part 145 or, where available, (ii) by a training certificate covering the practical training element issued by a maintenance training organisation appropriately approved in accordance with BAR 1 Part 147.
- (g) Aircraft type endorsement shall use the aircraft type ratings specified by the Brunei DCA.

66.B.120 Procedure for the Renewal of an Aircraft Maintenance Licence Validity

- (a) The Brunei DCA shall compare the holder's aircraft maintenance licence with the Brunei DCA's records and verify any pending revocation, suspension or change action pursuant to point 66.B.500. If the documents are identical and no action is pending pursuant to point 66.B.500, the holder's copy shall be renewed for 5 years and the file endorsed accordingly.
- (b) If the Brunei DCA records are different from the aircraft maintenance licence held by the licence holder:
 - (1) The Brunei DCA shall investigate the reasons for such differences and may choose not to renew the aircraft maintenance licence.
 - (2) The Brunei DCA shall inform the licence holder and any known maintenance organisation approved in accordance with BAR 8 Part 145 that may be directly affected of such fact.
 - (3) The Brunei DCA shall, if necessary, take action in accordance with point 66.B.500 to revoke, suspend or change the licence in question.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

66.B.125 Procedure for the Conversion of Licences including Group Ratings

- (a) Individual aircraft type ratings already endorsed on the aircraft maintenance licence shall remain on the licence and shall not be converted to new ratings unless the licence holder fully meets the requirements for endorsement defined in point 66.A.45 of this BAR 1 Part- 66 for the corresponding group/sub-group ratings.
- (b) The conversion shall be performed in accordance with the following conversion table:

Table 1: Conversion of Licences

Category		Conversion
B1 b1 C	Helicopter piston engine, full group:	Converted to "full sub-group 2c" plus the aircraft type ratings for those single piston engine helicopters which are in group 1.
	Helicopter piston engine, manufacturer group:	Converted to the corresponding "manufacturer sub-group 2c" plus the aircraft type ratings for those single piston engine helicopters of that manufacturer which are in group 1.
	Helicopter turbine engine, full group:	Converted to "full sub-group 2b" plus the aircraft type ratings for those single turbine engine helicopters which are in group 1
	Helicopter turbine engine, manufacturer group:	Converted to the corresponding "manufacturer sub-group 2b" plus the aircraft type ratings for those single turbine engine helicopters of that manufacturer which are in group 1.
	Aeroplane single piston engine — metal structure, either full group or manufacturer group:	Converted to "full group 3". For the B1 licence the following limitations shall be included: composite structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes.
	Aeroplane multiple piston engines — metal structure, either full group or manufacturer group:	Converted to "full group 3". For the B1 licence the following limitations shall be included: composite structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes.
	Aeroplane single piston engine — wooden structure, either full group or manufacturer group:	Converted to "full group 3". For the B1 licence the following limitations shall be included: metal structure aeroplanes, composite structure aeroplanes and metal tubing and fabric aeroplanes.
	Aeroplane multiple piston engine — wooden structure, either full group or manufacturer group:	Converted to "full group 3". For the B1 licence the following limitations shall be included: metal structure aeroplanes, composite structure aeroplanes and metal tubing and fabric aeroplanes.
	Aeroplane single piston engine — composite structure, either full group or manufacturer group:	Converted to "full group 3". For the B1 licence the following limitations shall be included: metal structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes.
	Aeroplane multiple piston engine — composite structure, either full group or manufacturer group:	Converted to "full group 3". For the B1 licence the following limitations shall be included: metal structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes.
	Aeroplane turbine — single engine, full group:	Converted to "full sub-group 2a" plus the aircraft type ratings for those single turboprop aeroplanes which did not require an aircraft type rating in the previous system and are in group 1.
	Aeroplane turbine — single engine, manufacturer group:	Converted to the corresponding "manufacturer sub- group 2a" plus the aircraft type ratings for those single turboprop aeroplanes of that manufacturer which did not require an aircraft type rating in the

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Category		Conversion
		previous system and are in group 1.
	Aeroplane turbine — multiple engine, full group:	Converted to the aircraft type ratings for those multiple turboprop aeroplanes which did not require an aircraft type rating in the previous system.
B2	Aeroplane:	Converted to "full sub-group 2a" and "full group 3", plus the aircraft type ratings for those aeroplanes which did not require an aircraft type rating in the previous system and are in group 1.
	Helicopter	Converted to "full sub-groups 2b and 2c", plus the aircraft type ratings for those helicopters which did not require an aircraft type rating in the previous system and are in group 1.
C	Aeroplane:	Converted to "full sub-group 2a" and "full group 3", plus the aircraft type ratings for those aeroplanes which did not require an aircraft type rating in the previous system and are in group 1,
	Helicopter:	Converted to "full sub-groups 2b and 2c", plus the aircraft type ratings for those helicopters which did not require an aircraft type rating in the previous system and are in group 1.

- (c) If the licence was subject to limitations following the conversion process referred to in point 66.A.70, these limitations shall remain on the licence, unless they are removed under the conditions defined in the relevant conversion report referred to in point 66.B.300.

66.B.130 Procedure for the direct approval of aircraft type training

The Brunei DCA may approve aircraft type training not conducted by a maintenance training organisation approved in accordance with BAR 1 Part 147, pursuant to point 1 of Appendix III to this BAR 1 Part- 66. In such case the Brunei DCA shall have a procedure to ensure the aircraft type training complies with Appendix III of this BAR 1 Part- 66.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Subpart C - Examinations

This Subpart provides the procedures to be followed for the examinations conducted by the Brunei DCA.

66.B.200 Examination by the Brunei DCA

- (a) All examination questions shall be kept in a secure manner prior to an examination, to ensure that candidates will not know which particular questions will form the basis of the examination.
- (b) The Brunei DCA shall nominate:
 - (1) Persons who control the questions to be used for each examination;
 - (2) Examiners who shall be present during all examinations to ensure the integrity of the examination.
- (c) Basic examinations shall follow the standard specified in Appendix I and II to this BAR 1 Part- 66.
- (d) Type training examinations and type examinations shall follow the standard specified in Appendix III to this BAR 1 Part- 66.
- (e) New essay questions shall be raised at least every 6 months and questions already used withdrawn or rested from use. A record of the questions used shall be retained in the records for reference.
- (f) All examination papers shall be handed out at the start of the examination to the candidate and handed back to the examiner at the end of the allotted examination time period. No examination paper may be removed from the examination room during the allotted examination time period.
- (g) Apart from specific documentation needed for type examinations, only the examination paper may be available to the candidate during the examination.
- (h) Examination candidates shall be separated from each other so that they cannot read each other's examination papers. They may not speak to any person other than the examiner.
- (i) Candidates who are proven to be cheating shall be banned from taking any further examination within 12 months of the date of the examination in which they were found cheating.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Subpart D - Conversion of Certifying Staff Qualifications

This Subpart provides the procedures for the conversion of certifying staff qualifications referred to in point 66.A.70 to aircraft maintenance licences.

66.B.300 General

- (a) The Brunei DCA may only convert qualifications (i) obtained in the Brunei Darussalam for which it is competent, without prejudice to bilateral agreements and (ii) valid prior to the entry into force of the applicable requirements of this BAR 1 Part-66.
- (b) The Brunei DCA may only perform the conversion in accordance with a conversion report established pursuant to points 66.B.305 or 66.B.310, as applicable.
- (c) Conversion reports shall be either (i) developed by the Brunei DCA or (ii) approved by the Brunei DCA to ensure compliance with this BAR 1 Part-66.
- (d) Conversion reports together with any change of these shall be kept on record by the Brunei DCA in accordance with point 66.B.20.

66.B.305 Conversion Report for National Qualifications

- (a) The conversion report for certifying staff qualifications shall describe the scope of each type of qualification, including the associated national licence, if any, the associated privileges and include a copy of the relevant Brunei Darussalam requirements defining these.
- (b) The conversion report shall show for each type of qualification referred to in point (a):
 - (1) To which aircraft maintenance licence it will be converted; and
 - (2) Which limitations shall be added in accordance with points 66.A.70(c) or (d), as applicable; and
 - (3) The conditions to remove the limitations, specifying the module/subjects on which examination is needed to remove the limitations and obtain a full aircraft maintenance licence, or to include an additional (sub-) category. This shall include the modules defined in Appendix III to this BAR 1 Part-66 not covered by the national qualification.

66.B.310 Conversion report for Approved Maintenance Organisations

Approvals

- (a) For each approved maintenance organisation concerned, the conversion report shall describe the scope of each type of authorisation issued by the maintenance organisation and include a copy of the relevant approved maintenance organisation's procedures for the qualification and the authorisation of certifying staff on which the conversion process is based.
- (b) The conversion report shall show for each type of authorisation referred to in point (a):
 - (1) To which aircraft maintenance licence it will be converted, and
 - (2) Which limitations shall be added in accordance with points 66.A.70(c) or (d), as applicable, and

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (3) The conditions to remove the limitations, specifying the module/subjects on which examination is needed to remove the limitations and obtain a full aircraft maintenance licence, or to include an additional (sub-) category. This shall include the modules defined in Appendix III to this BAR 1 Part- 66 not covered by the national qualification.

BRUNEL DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Subpart E – Examination Credits

This Subpart provides the procedures for granting examination credits referred to in point 66.A.25(c).

66.B.400 General

- (a) The Brunei DCA may only grant credit on the basis of a credit report prepared in accordance with point 66.B.405.
- (b) The credit report shall be either (i) developed by the Brunei DCA or (ii) approved by the Brunei DCA to ensure compliance with this Annex (Part-66).
- (c) Credit reports together with any change of these shall be dated and kept on record by the Brunei DCA in accordance with point 66.B.20.

66.B.405 Examination credit report

- (a) The credit report shall include a comparison between: (i) the modules, sub-modules, subjects and knowledge levels contained in Appendix I to this Annex (Part-66), as applicable; and (ii) the syllabus of the technical qualification concerned relevant to the particular category being sought. This comparison shall state if compliance is demonstrated and contain the justifications for each statement.
- (b) Credit for examinations, other than basic knowledge examinations carried out in maintenance training organisations approved in accordance with Annex IV (Part-147), can only be granted by the Brunei DCA..
- (c) No credit can be granted unless there is a statement of compliance against each module and sub-module, stating where, in the technical qualification, the equivalent standard can be found.
- (d) The Brunei DCA shall check on a regular basis whether (i) the national qualification standard or (ii) Appendix I to this BAR (Part-66) have changed and assess if changes to the credit report are consequently required. Such changes shall be documented, dated and recorded.

66.B.410 Examination credit validity

- (a) The Brunei DCA shall notify to the applicant in writing any credits granted together with the reference to the credit report used.
- (b) Credits shall expire 10 years after they are granted.
- (c) Upon expiration of the credits, the applicant may apply for new credits. The Brunei DCA shall continue the validity of the credits for an additional period of 10 years without further consideration if basic knowledge requirements defined in Appendix I to this Annex (Part-66) have not been changed.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Subpart F – Continuing Oversight

This Subpart describes the procedures for the continuing oversight of the aircraft maintenance licence and in particular for the revocation, suspension or limitation of the aircraft maintenance licence.

66.B.500 Revocation, suspension or limitation of the aircraft maintenance licence

- (a) The Brunei DCA shall suspend, limit or revoke the aircraft maintenance licence where it has identified a safety issue or if it has clear evidence that the person has carried out or been involved in one or more of the following activities:
- (1) Obtaining the aircraft maintenance licence and/or the certification privileges by falsification of documentary evidence;
 - (2) Failing to carry out requested maintenance combined with failure to report such fact to the organisation or person who requested the maintenance;
 - (3) Failing to carry out required maintenance resulting from own inspection combined with failure to report such fact to the organisation or person for whom the maintenance was intended to be carried out;
 - (4) Negligent maintenance;
 - (5) Falsification of the maintenance record;
 - (6) Issuing a certificate of release to service knowing that the maintenance specified on the certificate of release to service has not been carried out or without verifying that such maintenance has been carried out;
 - (7) Carrying out maintenance or issuing a certificate of release to service when adversely affected by alcohol or drugs;
 - (8) Issuing certificate of release to service while not in compliance with BAR 8 Part M, BAR 8 Part 145 or BAR 1 Part- 66.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Appendix I - Basic Knowledge Requirements

1. Knowledge levels for Category A, B1, B2 and C Aircraft Maintenance Licence

Basic knowledge for categories A, B1, and B2 are indicated by knowledge levels (1, 2 or 3) against each applicable subject. Category C applicants shall meet either the category B1 or the category B2 basic knowledge levels.

The knowledge level indicators are defined on 3 levels as follows:

— LEVEL 1: A familiarisation with the principal elements of the subject.

Objectives:

- (a) The applicant should be familiar with the basic elements of the subject.
- (b) The applicant should be able to give a simple description of the whole subject, using common words and examples.
- (c) The applicant should be able to use typical terms.

— LEVEL 2: A general knowledge of the theoretical and practical aspects of the subject and an ability to apply that knowledge.

Objectives:

- (a) The applicant should be able to understand the theoretical fundamentals of the subject.
- (b) The applicant should be able to give a general description of the subject using, as appropriate, typical examples.
- (c) The applicant should be able to use mathematical formulae in conjunction with physical laws describing the subject.
- (d) The applicant should be able to read and understand sketches, drawings and schematics describing the subject.

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

Objectives:

- (a) The applicant should know the theory of the subject and interrelationships with other subjects.
- (b) The applicant should be able to give a detailed description of the subject using theoretical fundamentals and specific examples.
- (c) The applicant should understand and be able to use mathematical formulae related to the subject.
- (d) The applicant should be able to read, understand and prepare sketches, simple drawings and schematics describing the subject.
- (e) The applicant should be able to apply his knowledge in a practical manner using manufacturer's instructions.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- (f) The applicant should be able to interpret results from various sources and measurements and apply corrective action where appropriate.

2. Modularisation

Qualification on basic subjects for each BAR 1 Part- 66 aircraft maintenance licence category or subcategory should be in accordance with the following matrix. Applicable subjects are indicated by an 'X':

Subject modules	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	Piston-engine non-pressurised aeroplanes 2000kg MTOM
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	X
5	X	X	X	X	X	X
6	X	X	X	X	X	X
7A	X	X	X	X	X	
7B						X
8	X	X	X	X	X	X
9A	X	X	X	X	X	
9B						X
10	X	X	X	X	X	X
11A	X					
11B		X				
11C						X
12			X	X		
13					X	
14					X	
15	X		X			
16		X		X		X
17A	X	X				
17B						X

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 1 – Mathematics

	LEVEL			
	A	B1	B2	B3
1.1 Arithmetic Arithmetical terms and signs, methods of multiplication and division, fractions and decimals, factors and multiples, weights, measures and conversion factors, ratio and proportion, averages and percentages, areas and volumes, squares, cubes, square and cube roots.	1	2	2	2
1.2 Algebra (a) Evaluating simple algebraic expressions, addition, subtraction, multiplication and division, use of brackets, simple algebraic fractions;	1	2	2	2
(b) Linear equations and their solutions; Indices and powers, negative and fractional indices; Binary and other applicable numbering systems; Simultaneous equations and second-degree equations with one unknown; Logarithms;	—	1	1	1
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 coordinates;	—	2	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 2 - Physics

	LEVEL			
	A	B1	B2	B3
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	1	1
2.2.2 Kinetics Linear movements: 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	1	1
2.2.3 Dynamics (a) Mass Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency; (b) Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).	1	2	1	1
2.2.4 Fluid dynamics (a) Specific gravity and density; (b) Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure; Bernoulli's Theorem, Venturi	2	2	2	2
	1	2	1	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
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 gasses laws; specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.	—	2	2	1
2.4 Optics (Light)	—	2	2	—
Nature of light; speed of light; Laws of reflection and refraction; reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics.				
2.5 Wave Motion and Sound	—	2	2	—
Wave motion; mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 3 - Electrical Fundamentals

	LEVEL			
	A	B1	B2	B3
3.1 Electron Theory Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators. Conduction of electricity in solids, liquids, gases and a vacuum.	1	1	1	1
3.2 Static Electricity and Conduction Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law;	1	2	2	1
3.3 Electrical Terminology The following terms, their units and factors affecting them; potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	1	2	2	1
3.4 Generation of Electricity Production of electricity by the following methods; light, heat, friction, pressure, chemical action, magnetism and motion.	1	1	1	1
3.5 DC Sources of Electricity Construction and basic chemical action of; primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.	1	2	2	2
3.6 DC Circuits Ohms Law, Kirchhoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.	—	2	2	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
3.7 Resistance/Resistor				
(a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.	—	2	2	1
(b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermostats, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;	—	1	1	—
3.8 Power	—	2	2	1
Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy				
3.9 Capacitance/Capacitor	—	2	2	1
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.				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
3.10 Magnetism				
(a) Theory of magnetism; Properties of a magnet; Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetization; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.	—	2	2	1
(b) Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentively, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.	—	2	2	1
3.11 Inductance/Inductor	—	2	2	1
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 conductors 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 electromotive force (emf), self-induction; Saturation point; Principle uses of inductors;				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
3.12 DC Motor /Generator Theory Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction;	—	2	2	1
3.13 AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power. Triangular/Square waves; Single/3 phase principles.	1	2	2	1
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits Phase relationship of voltage and current in L, C and R circuits, parallel, series, and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations. True power, apparent power and reactive power calculations.	—	2	2	1
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; Calculation of line and phase voltage and currents; Calculation of power in a three phase system; Primary and secondary current, voltage, turns ratio, power, efficiency; Auto transformers;	—	2	2	1
3.16 Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	—	1	1	—

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
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; Permanent Magnet Generators	—	2	2	1
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	2	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 4 - Electronic Fundamentals

	LEVEL			
	A	B1	B2	B3
4.1. Semiconductors				
4.1.1. Diodes				
(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	1
(b) Materials, electron configuration, electrical properties; P and N type materials: effects of impurities on conduction, majority and minority characters; 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 (thyristors), light emitting diode, Schottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.	—	—	2	—
4.1.2 Transistors				
(a) Transistor symbols; Component description and orientation; Transistor characteristics and properties;	—	1	2	1
(b) Construction and operation of PNP and NPN transistors; Base, collector and emitter configurations; Testing of transistors Basic appreciation of other transistor types and their uses. Application of transistors; classes of amplifier (A,B,C): Simple circuits including: bias, decoupling, feedback and stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multi-vibrators, flip-flop circuits.	—	—	2	—

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
4.1.3 Integrated Circuits				
(a) Description and operation of logic circuits and linear circuits/operational amplifiers.	—	1	—	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	—
4.2 Printed Circuit Boards Description and use of printed circuit boards.	—	1	2	—
4.3 Servomechanisms				
(a) Understanding of the following terms; 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	—

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 5 - Digital Techniques Electronic Instrument Systems

	LEVEL				
	A	B1-1 B1-3	B1-2 B1-4	B2	B3
5.1 Electronic Instrument Systems Typical systems arrangements and cockpit layout of electronic instrument systems.	1	2	2	3	1
5.2 Numbering Systems Numbering systems; binary. Octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.	—	1	—	2	—
5.3 Data Conversion Analogue data, Digital data; Operational and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	—	1	—	2	—
5.4 Data Buses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications. Aircraft Network/Ethernet	—	2	—	2	—
5.5 Logic Circuits (a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams, (b) interpretation of logic diagrams	—	2	—	2	1
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) (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 multi address instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.	1	2	—	—	—
	—	—	—	2	—

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL				
	A	B1-1 B1-3	B1-2 B1-4	B2	B3
5.7 Microprocessors 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.	—	—	—	2	—
5.8 Integrated Circuits Operation and use of encoders and decoders. Function of encoder types; Uses of medium, large and very large scale integration.	—	—	—	2	—
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	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	1	2	1
5.12 Electrostatic Sensitive Devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel and anti-static protection devices.	1	2	2	2	1
5.13 Software Management Control Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	—	2	1	2	1
5.14 Electromagnetic Environment Influence of the following phenomena on maintenance practices for electronic system; EMC-Electromagnetic Compatibility EMI-High Intensity Radiated Field HIRF-High Intensity Radiated Field Lightning/lightning protection	—	2	2	2	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL				
	A	B1-1 B1-3	B1-2 B1-4	B2	B3
<p>5.15 Typical Electronic/Digital Aircraft System</p> <p>General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) testing such as;</p> <p>(a) For B1 and B2 only:</p> <p>ACARS-ARINC Communication and Addressing and Reporting System</p> <p>EICAS-Engine Indication and Crew Alerting System</p> <p>FBW-Fly-by-Wire</p> <p>FMS-Flight Management System</p> <p>IRS-Inertial Reference System;</p> <p>(b) For B1, B2 and B3:</p> <p>ECAM-Electronic Centralised Aircraft Monitoring</p> <p>EFIS-Electronic Flight Instrument System</p> <p>GPS-Global Positioning System</p> <p>TCAS-Traffic Alert Collision Avoidance System</p> <p>Integrated Modular Avionics</p> <p>Cabin Systems</p> <p>Information Systems.</p>	—	2	2	2	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 6 - Materials and Hardware

	LEVEL			
	A	B1	B2	B3
6.1 Aircraft Materials – Ferrous				
(a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;	1	2	1	2
(b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	—	1	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	1	2
(b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	—	1	1	1
6.3 Aircraft Materials – Compact and Non-Metallic				
6.3.1 Composite and non-metallic other than wood and fabric				
(a) Characteristic, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents.	1	2	2	2
(b) The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material.	1	2	—	2
6.3.2 Wooden structures	1	2	—	2
Construction methods of wooden airframe structures; Characteristic, 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.				
6.3.3 Fabric Covering	1	2	—	2
Characteristic, properties and types of fabrics used in aeroplanes Inspection methods for fabric; Types of defects in fabric: Repair of fabric covering.				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
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	2	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.				
6.5.4 Aircraft rivets	1	2	1	2
Types of solid and blind rivets: specifications and identification, heat treatment.				
6.6 Pipes and Unions	2	2	2	2
(a) identification of, and types of rigid and flexible pipes and their connectors used in aircraft.				
(b) standard unions for aircraft hydraulic, fuel, oil pneumatic and air system pipes.	2	2	1	2
6.7 Springs	—	2	1	1
Types of springs, materials, characteristics and applications.				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
6.8 Bearings Purpose of bearings, loads, material, construction; Types of bearings and their application.	1	2	2	1
6.9 Transmissions 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.	1	2	2	1
6.10 Control Cables Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.	1	2	1	2
6.11 Electrical Cables and Connectors 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.	1	2	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 7A &B - Maintenance Practices

Note: The scope of module 7B shall reflect the technology of aeroplanes relevant to the B3 category	LEVEL			
	A	B1	B2	B3
<p>7.1 Safety Precautions and Workshop</p> <p>Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals.</p> <p>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 including knowledge on extinguishing agents.</p>	3	3	3	3
<p>7.2 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
<p>7.3 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
<p>7.4 Avionic General Test Equipment</p> <p>Operation, function and use of avionic general test equipment.</p>	—	2	3	—
<p>7.5 Engineering Drawings, Diagrams and Standards</p> <p>Drawing types and diagrams their symbols, dimensions, tolerances and projections;</p> <p>Identifying title block information;</p> <p>Microfilm, microfiche and computerized presentations;</p> <p>Specification 100 of the Air Transport Association (ATA) of America;</p> <p>Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL;</p> <p>Wiring diagrams and Schematic Wiring diagrams</p>	1	2	2	2
<p>7.6 Fits and Clearances</p> <p>Drill sizes for bolt holes, classes of fits;</p> <p>Common system of fits and clearances;</p> <p>Schedule of fits and clearances for aircraft and engines;</p> <p>Limits for bow, twist and wear;</p> <p>Standard methods for checking shafts, bearings and other parts.</p>	1	2	1	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Note: The scope of module 7B shall reflect the technology of aeroplanes relevant to the B3 category	LEVEL			
	A	B1	B2	B3
7.7 Electrical Cables and Connectors 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; Identification of wire types, their inspection criteria and damage tolerance; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding; EWIS installations, inspection, repair, maintenance and cleanliness standards.	1	3	3	2
7.8 Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	1	2	—	2
7.9 Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	1	2	—	2
7.10 Springs Inspection and testing of springs.	1	2	—	1
7.11 Bearings Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	1	2	—	2
7.12 Transmissions Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	1	2	—	2
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	1	2	—	2
7.14 Material handling 7.14.1 Sheet Metal Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.	—	2	—	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Note: The scope of module 7B shall reflect the technology of aeroplanes relevant to the B3 category	LEVEL			
	A	B1	B2	B3
7.14.2 Composite and non-metallic Bonding practices; Environmental conditions Inspection methods.	—	2	—	2
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 taxing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defueling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.				
7.18 Disassembly, Inspection, Repair and Assembly Techniques				
(a) Types of defects and visual inspection techniques. Corrosion removal, assessment and protection.	2	3	3	3
(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 borescope methods.	—	2	1	2
(d) Disassembly and re-assembly techniques.	2	2	2	2
(e) Trouble shooting techniques	—	2	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Note: The scope of module 7B shall reflect the technology of aeroplanes relevant to the B3 category	LEVEL			
	A	B1	B2	B3
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;				
Interface with aircraft operation;				
Maintenance Inspection/Quality Control/Quality Assurance;				
Additional maintenance procedures. Control of life limited components.				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 8 - Basic Aerodynamics

	LEVEL			
	A	B1	B2	B3
8.1 Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics.	1	2	2	1
8.2 Aerodynamics Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	1	2	2	1
8.3 Theory of Flight Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.	1	2	2	1
8.4 Flight Stability and Dynamics Longitudinal, lateral and directional stability (active and passive).	1	2	2	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 9 - Human Factors

	LEVEL			
	A	B1	B2	B3
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; Workload: overload and underload; Sleep and fatigue shift work; Alcohol, medication, drug abuse.	2	2	2	2
9.5 Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	1	1	1	1
9.6 Tasks Physical work; Repetitive tasks; Visual inspection; Complex systems;	1	1	1	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
9.7 Communication Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	2	2	2	2
9.8 Human Error Error models and theories; Types of error in maintenance tasks; Implications of error (i.e. accidents) Avoiding and managing error	1	2	2	2
9.9 Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.	1	2	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 10 - Aviation Legislation

	LEVEL			
	A	B1	B2	B3
10.1 Regulatory Framework Role of International Civil Aviation Organization; Role of the Brunei DCA; Relationship between BAR 8 - Part 145, BAR 1 - Part 66, BAR 1 - Part 147, BAR 8 - Part M and BAR 8 - Part General Requirements for Airworthiness; Relationship with other Aviation Authorities.	1	1	1	1
10.2 BAR 1 - Part 66 – Certifying Staff – Maintenance Detailed understanding of BAR 1 - Part 66	2	2	2	2
10.3 BAR 8 Part 145–Approved Maintenance Organization Detailed understanding of BAR 8 - Part 145	2	2	2	2
10.4 Air Operations General understanding of BAR 6 Part Operation of Aircraft. Air Operators Certificates; Operator's responsibilities, in particular regarding continuing airworthiness and maintenance; Aircraft Maintenance Programme; MEL//CDL; Documents to be carried on board; Aircraft placarding (markings).	1	1	1	1
10.5 Certification of Aircraft, Parts and Appliances (a) General General Understanding of BAR 8 - Part 21 and EASA Cert' Specs CS-23, CS-25, CS27 and CS 29	—	1	1	1
(b) Documents Certificate of Airworthiness; Restricted CofA, Permit to Fly; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station Licence and Approval;	—	2	2	2
10.6 Continuing Airworthiness Detailed understanding of BAR 8 - Part 21 provisions related to continuing airworthiness. Detailed understanding of BAR 8 - Part M.	2	2	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL			
	A	B1	B2	B3
10.7 Applicable National and International Requirements				
(a) Maintenance Programmes, Maintenance checks and inspections Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.	1	2	2	2
(b) Continuing airworthiness; Minimum equipment requirements -Test flights - ETOPS, maintenance and dispatch requirements; All Weather Operations, Category 2/3 operations	—	1	1	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 11A - Turbine Aeroplane Aerodynamics, Structures and Systems

	LEVEL	
	A1	B1.1
11.1 Theory of Flight		
11.1.1 Aeroplane Aerodynamics and Flight Controls	1	2
Operation and effect of:	—	—
- roll control: ailerons and spoilers;		
- Pitch control: elevators, stabilators, variable Incidence stabilisers and canards;		
- yaw control, rudder limiters;		
Control using elevons, ruddervators;		
High lift devices, slots, slats, flaps, flaperons;		
Drag inducing devices, spoilers, lift dumpers, speed brakes;		
Effects of wing fences, saw tooth leading edges		
Boundary layer control using, vortex generators, stall wedges or leading edge devices;		
Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels.		
11.1.2 High Speed Flight	1	2
Speed of sound, subsonic flight, transonic flight, supersonic flight,		
Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule;		
Factors affecting airflow in engine intakes of high speed aircraft;		
Effects of sweepback on critical Mach number.		
11.2 Airframe Structures — General Concepts		
(a) Airworthiness requirements for structural strength;		
Structural classification, primary, secondary and tertiary;	2	2
Fail safe, safe life, damage tolerance concepts;		
Zonal and station identification systems;		
Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;		
Drains and ventilation provisions;		
System installation provisions;		
Lightning strike protection provision.		
Aircraft bonding		
(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;	1	2
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.		

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A1	B1.1
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56)	1	2
Construction and pressurization sealing;		
Wing, stabilizer, pylon and undercarriage attachments;		
Seat installation and cargo loading system;		
Doors and emergency exits: construction, mechanisms, operation and safety devices;		
Windows and windscreen construction and mechanisms.		
11.3.2 Wings (ATA 57)	1	2
Construction;		
Fuel storage;		
Landing gear, pylon, control surface and high lift/drag attachments.		
11.3.3 Stabilizers (ATA 55)	1	2
Construction;		
Control surface attachment.		
11.3.4 Flight Control Surfaces (ATA 55/57)	1	2
Construction and attachment;		
Balancing — mass and aerodynamic.		
11.3.5 Nacelles/Pylons (ATA 54)	1	2
Nacelles/Pylons:	—	—
- Construction;		
- Firewalls;		
- Engine mounts.		
11.4 Air Conditioning and Cabin Pressurisation (ATA21)		
11.4.1 Air supply	1	2
Sources of air supply including engine bleed, 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.		

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A1	B1.1
11.4.4 Safety and warning devices Protection and warning devices.	1	3
11.5 Instruments/Avionic Systems 11.5.1 Instrument Systems (ATA 31) 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; Angle of attack indication, stall warning systems; Glass cockpit Other aircraft system indication.	1	2
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of; <ul style="list-style-type: none"> - Auto Flight (ATA 22); - Communications (ATA 23); - Navigation Systems (ATA 34). 	1 —	1 —
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection. External/Ground power;	1	3
11.7 Equipment and Furnishings (ATA 25) (a) Emergency equipment requirements; Seats, harnesses and belts.	2	2
(b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	1	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A1	B1.1
11.8 Fire Protection (ATA 26)		
(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
(b) Portable fire extinguisher	1	1
11.9 Flight Controls (ATA 27)	1	3
Primary controls: aileron, elevator, rudder, spoiler; Trim control Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging; Stall protection/warning system.		
11.10 Fuel Systems (ATA 28)	1	3
System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling; Longitudinal balance fuel systems.		
11.11 Hydraulic Power (ATA 29)	1	3
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		

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A1	B1.1
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, hot air, pneumatic and chemical; Rain repellent; Probe and drain heating. Wiper systems	1	3
11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering. Air – Ground sensing	2	3
11.14 Lights (ATA 33) External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	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

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A1	B1.1
<p>11.18 On Board Maintenance Systems (ATA 45)</p> <p>Central maintenance computers;</p> <p>Data loading system;</p> <p>Electronic library system;</p> <p>Printing;</p> <p>Structure monitoring (damage tolerance monitoring).</p>	1	2
<p>11.19 Integrated Modular Avionics (ATA42)</p> <p>Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:</p> <p>Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.</p> <p>Core System; Network Components.</p>	1	2
<p>11.20 Cabin Systems (ATA44)</p> <p>The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions.</p> <p>The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.</p> <p>The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:</p> <p>— Data/Radio Communication, In-Flight Entertainment System.</p> <p>The Cabin Network Service may host functions such as:</p> <ul style="list-style-type: none"> - Access to pre-departure/departure reports, - E-mail/intranet/Internet access, - Passenger database; <p>Cabin Core System;</p> <p>In-flight Entertainment System;</p> <p>External Communication System;</p> <p>Cabin Mass Memory System;</p> <p>Cabin Monitoring System;</p> <p>Miscellaneous Cabin System.</p>	1	2
<p>11.21 Information Systems (ATA46)</p> <p>The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.</p>	1	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A1	B1.1
<p>Typical examples include Air Traffic and Information Management Systems and Network Server Systems</p> <p>Aircraft General Information System;</p> <p>Flight Deck Information System;</p> <p>Maintenance Information System;</p> <p>Passenger Cabin Information System;</p> <p>Miscellaneous Information System.</p>		

BRUNEL DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 11B - Piston Aeroplane Aerodynamics, Structures and Systems

Note. The scope of this module should reflect the technology of aeroplanes pertinent to the A2 and B1.2 subcategory.

	LEVEL	
	A2	B1.2
11.1 Theory of Flight		
11.1.1 Aeroplane Aerodynamics and Flight Controls	1	2
Operation and effect of:	—	—
- roll control: ailerons and spoilers;		
- pitch control: elevators, stabilators, variable incidence stabilisers and canards;		
- yaw control, rudder limiters;		
Control using elevons, ruddervators;		
High lift devices, slots, slats, flaps, flaperons;		
Drag inducing devices, spoilers, lift dumpers, speed brakes;		
Effects of wing fences saw tooth leading edges;		
Boundary layer control using, vortex generators, stall wedges or leading edge devices;		
Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;		
11.1.2 High Speed Flight — N/A	—	—
11.2 Airframe Structures — General Concepts		
(a) Airworthiness requirements for structural strength;	2	2
Structural classification, primary, secondary and tertiary;		
Fail safe, safe life, damage tolerance concepts;		
Zonal and station identification systems;		
Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;		
Drains and ventilation provisions;		
System installation provisions;		
Lightning strike protection provision.		
Aircraft bonding		
(b) Construction methods of: stressed skin fuselage,	1	2
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.		

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A2	B1.2
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56)	1	2
Construction and pressurisation sealing; Wing, tail-plane pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.		
11.3.2 Wings (ATA 57)	1	2
Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.		
11.3.3 Stabilisers (ATA 55)	1	2
Construction; Control surface attachment.		
11.3.4 Flight Control Surfaces (ATA 55/57)	1	2
Construction and attachment; Balancing — mass and aerodynamic.		
11.3.5 Nacelles/Pylons (ATA 54)	1	2
Nacelles/Pylons: - Construction; - Firewalls; - Engine mounts.		
11.4 Air Conditioning and Cabin Pressurization (ATA21)	1	3
Pressurisation and air conditioning systems; Cabin pressure controllers, protection and warning devices. Heating systems		
11.5 Instruments/Avionic Systems		
11.5.1 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; Angle of attack indication, stall warning systems. Glass Cockpit Other aircraft system indication.		

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A2	B1.2
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: <ul style="list-style-type: none"> - Auto Flight (ATA 22); - Communications (ATA 23); - Navigation Systems (ATA 34). 	1	1
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.	1	3
11.7 Equipment and Furnishings (ATA 25) (a) Emergency equipment requirements; Seats, harnesses and belts.	2	2
(b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	1	1
11.8 Fire Protection (ATA 26) (a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
(b) Portable fire extinguisher.	1	3
11.9 Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder; Trim tabs; High lift devices; System operation: manual; Gust locks; Balancing and rigging; Stall warning systems	1	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A2	B1.2
<p>11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.</p>	1	3
<p>11.11 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Filters Pressure Control; Power distribution; Indication and warning systems.</p>	1	3
<p>11.12 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems.</p>	1	3
<p>11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tyres; Steering; Air –ground sensing</p>	2	3
<p>11.14 Lights (ATA 33) External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.</p>	2	3
<p>11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;</p>	1	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A2	B1.2
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

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Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 11C - Piston Aeroplane Aerodynamics, Structures and Systems

Note. The scope of this module should reflect the technology of aeroplanes pertinent to the B3 category.

	LEVEL
	B3
<p>11.1 Theory of Flight</p> <p>Aeroplane Aerodynamics and Flight Controls</p> <p>Operation and effect of:</p> <ul style="list-style-type: none"> - roll control: ailerons; - pitch control: elevators, stabilators, variable incidence stabilisers and canards; - yaw control, rudder limiters; <p>Control using elevons, ruddervators;</p> <p>High lift devices, slots, slats, flaps, flaperons;</p> <p>Drag inducing devices, lift dumpers, speed brakes;</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> <p>11.2 Airframe Structures — General Concepts</p> <p>(a) Airworthiness requirements for structural strength;</p> <p>Structural classification, primary, secondary and tertiary;</p> <p>Fail safe, safe life, damage tolerance concepts;</p> <p>Zonal and station identification systems;</p> <p>Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;</p> <p>Drains and ventilation provisions;</p> <p>System installation provisions;</p> <p>Lightning strike protection provision.</p> <p>Aircraft bonding</p> <p>(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;</p> <p>Structure assembly techniques: riveting, bolting, bonding;</p> <p>Methods of surface protection, such as chromating, anodising, painting;</p> <p>Surface cleaning;</p> <p>Airframe symmetry: methods of Alignment and symmetry checks.</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">2</p>

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B3
<p>11.3 Airframe Structures — Aeroplanes</p> <p>11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, tail-plane pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.</p> <p>11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.</p> <p>11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.</p> <p>11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.</p> <p>11.3.5 Nacelles/Pylons (ATA 54) Nacelles/Pylons: - Construction; - Firewalls; - Engine mounts.</p> <p>11.4 Air Conditioning (ATA21) Heating and ventilation systems;</p> <p>11.5 Instruments/Avionic Systems</p> <p>11.5.1 Instrument Systems (ATA 31) 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; Angle of attack indication, stall warning systems. Glass cockpit Other aircraft system indication.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B3
<p>11.5.2 Avionic Systems</p> <p>Fundamentals of system lay-outs and operation of:</p> <ul style="list-style-type: none"> - Auto Flight (ATA 22); - Communications (ATA 23); - Navigation Systems (ATA 34). 	1
<p>11.6 Electrical Power (ATA 24)</p> <p>Batteries Installation and Operation;</p> <p>DC power generation;</p> <p>Voltage regulation;</p> <p>Power distribution;</p> <p>Circuit protection;</p> <p>Inverters, transformers.</p>	2
<p>11.7 Equipment and Furnishings (ATA 25)</p> <p>Emergency equipment requirements;</p> <p>Seats, harnesses and belts.</p>	2
<p>11.8 Fire Protection (ATA 26)</p> <p>Portable fire extinguisher.</p>	2
<p>11.9 Flight Controls (ATA 27)</p> <p>Primary controls: aileron, elevator, rudder;</p> <p>Trim tabs;</p> <p>High lift devices;</p> <p>System operation: manual;</p> <p>Gust locks;</p> <p>Balancing and rigging;</p> <p>Stall warning systems</p>	3
<p>11.10 Fuel Systems (ATA 28)</p> <p>System lay-out;</p> <p>Fuel tanks;</p> <p>Supply systems;</p> <p>Cross-feed and transfer;</p> <p>Indications and warnings;</p> <p>Refuelling and defuelling.</p>	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B3
<p>11.11 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Filters Pressure Control; Power distribution; Indication and warning systems.</p>	2
<p>11.12 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems.</p>	1
<p>11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tyres; Steering;</p>	2
<p>11.14 Lights (ATA 33) External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.</p>	2
<p>11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;</p>	2
<p>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.</p>	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 12 - Helicopter Aerodynamics, Structures and Systems

	LEVEL	
	A3 A4	B1.3 B1.4
<p>12.1 Theory of Flight—Rotary Wing Aerodynamics</p> <p>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 settling, overpitching; Auto-rotation; Ground effect.</p>	1	2
<p>12.2 Flight Control Systems</p> <p>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.</p>	2	3
<p>12.3 Blade Tracking and Vibration Analysis</p> <p>Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.</p>	1	3
<p>12.4 Transmission</p> <p>Gear boxes, main and tail rotors; Clutches, free wheel units and rotor brake. Tail rotor drive shafts, flexible couplings, bearings, vibration dampers and bearing hangers</p>	1	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A3 A4	B1.3 B1.4
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; 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.	1	2
12.6 Air Conditioning (ATA 21)		
12.6.1 Air supply Sources of air supply including engine bleed and ground cart;	1	2
12.6.2 Air Conditioning Air conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices.	1	3
12.7 Instruments/Avionic Systems		
12.7.1 Instrument Systems (ATA 31) Pitot static: altimeter, airspeed 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;	1	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A3 A4	B1.3 B1.4
Vibration indicating systems — HUMS; Glass cockpit; 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) 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
	1	3
12.10 Fire Protection (ATA 26)		
Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.		
12.11 Fuel Systems (ATA 28)	1	3
System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.		

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A3 A4	B1.3 B1.4
<p>12.12 Hydraulic Power (ATA 29)</p> <p>System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.</p>	1	3
<p>12.13 Ice and Rain Protection (ATA 30)</p> <p>Ice formation, classification and detection; Anti-icing and de-icing systems: electrical, hot air and chemical; Rain repellent and removal; Probe and drain heating. Wiper system</p>	1	3
<p>12.14 Landing Gear (ATA 32)</p> <p>Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, tyres, brakes; Steering; Air-Ground sensing Skids, floats.</p>	2	3
<p>12.15 Lights (ATA 33)</p> <p>External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.</p>	2	3
<p>12.16 Pneumatic/Vacuum (ATA 36)</p> <p>System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.</p>	1	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL	
	A3 A4	B1.3 B1.4
<p>12.17 Integrated Modular Avionics (ATA42)</p> <p>Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:</p> <p>Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.</p> <p>Core System;</p> <p>Network Components</p>	1	2
<p>12.18 On Board Maintenance Systems (ATA45)</p> <p>Central maintenance computers;</p> <p>Data loading system;</p> <p>Electronic library system;</p> <p>Printing;</p> <p>Structure monitoring (damage tolerance monitoring).</p>	1	2
<p>12.19 Information Systems (ATA46)</p> <p>The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.</p> <p>Typical examples include Air Traffic and Information Management Systems and Network Server Systems.</p> <p>Aircraft General Information System;</p> <p>Flight Deck Information System;</p> <p>Maintenance Information System;</p> <p>Passenger Cabin Information System;</p> <p>Miscellaneous Information System.</p>	1	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 13 - Aircraft Aerodynamics, Structures and Systems

	LEVEL
	B2
13.1 Theory of Flight	
(a) Aeroplane Aerodynamics and Flight Controls Operation and effect of: – roll control: ailerons and spoilers; – pitch control: elevators, stabilators, variable incidence stabilisers and canards; – yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices: slots, slats, flaps; Drag inducing devices: spoilers, lift dumpers, speed brakes; Operation and effect of trim tabs, servo tabs, control surface bias.	1
(b) High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number.	1
(c) Rotary Wing Aerodynamics Terminology; Operation and effect of cyclic, collective and anti- torque controls.	1
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) 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; Autothrottle systems. Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.	3
13.4 Communication/Navigation (ATA 23/34) Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter; Working principles of following systems: - Very High Frequency (VHF) communication; - High Frequency (HF) communication; - Audio;	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B2
<ul style="list-style-type: none"> - Cockpit Voice Recorder; - Very High Frequency Omnidirectional Range (VOR); - Automatic Direction Finding (ADF); - Instrument Landing System (ILS); - Microwave Landing System (MLS); - Flight Director systems; Distance Measuring Equipment (DME); - Very Low Frequency and hyperbolic navigation (VLF/ Omega); - Doppler navigation; - Area navigation, RNAV systems; - Flight Management Systems; - Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS); - Inertial Navigation System; - Air Traffic Control transponder, secondary surveillance radar; - Traffic Alert and Collision Avoidance System (TCAS); - Weather avoidance radar; - Radio altimeter; - ARINC communication and reporting; 	3
<p>13.5 Electrical Power (ATA 24)</p> <p>Batteries Installation and Operation;</p> <p>DC power generation;</p> <p>AC power generation;</p> <p>Emergency power generation;</p> <p>Voltage regulation;</p> <p>Power distribution;</p> <p>Inverters, transformers, rectifiers;</p> <p>Circuit protection;</p> <p>External/Ground power.</p>	3
<p>13.6 Equipment and Furnishings (ATA 25)</p> <p>Electronic emergency equipment requirements;</p> <p>Cabin entertainment equipment.</p>	3
<p>13.7 Flight Controls (ATA 27)</p> <p>(a) Primary controls: aileron, elevator, rudder, spoiler;</p> <p>Trim control;</p> <p>Active load control;</p> <p>High lift devices;</p> <p>Lift dump, speed brakes;</p> <p>System operation: manual, hydraulic, pneumatic;</p> <p>Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks.</p> <p>Stall protection systems.</p>	2
<p>(b) System operation: electrical, fly by wire.</p>	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B2
<p>13.8 Instruments (ATA 31)</p> <p>Classification;</p> <p>Atmosphere;</p> <p>Terminology;</p> <p>Pressure measuring devices and systems;</p> <p>Pitot static systems;</p> <p>Altimeters;</p> <p>Vertical speed indicators;</p> <p>Airspeed indicators;</p> <p>Machmeters;</p> <p>Altitude reporting/alerting systems;</p> <p>Air data computers;</p> <p>Instrument pneumatic systems;</p> <p>Direct reading pressure and temperature gauges;</p> <p>Temperature indicating systems;</p> <p>Fuel quantity indicating systems;</p> <p>Gyroscopic principles;</p> <p>Artificial horizons;</p> <p>Slip indicators;</p> <p>Directional gyros;</p> <p>Ground Proximity Warning Systems;</p> <p>Compass systems;</p> <p>Flight Data Recording systems;</p> <p>Electronic Flight Instrument Systems;</p> <p>Instrument warning systems including master warning systems and centralised warning panels;</p> <p>Stall warning systems and angle of attack indicating systems;</p> <p>Vibration measurement and indication;</p> <p>Glass cockpit</p>	3
<p>13.9 Lights (ATA 33)</p> <p>External: navigation, landing, taxiing, ice;</p> <p>Internal: cabin, cockpit, cargo;</p> <p>Emergency.</p>	3
<p>13.10 On board Maintenance Systems (ATA 45)</p> <p>Central maintenance computers;</p> <p>Data loading system;</p> <p>Electronic library system;</p> <p>Printing;</p> <p>Structure monitoring (damage tolerance monitoring).</p>	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B2
13.11 Air Conditioning and Cabin Pressurisation (ATA21)	
13.11.1. Air supply	2
Sources of air supply including engine bleed, APU and ground cart;	
13.11.2. Air Conditioning	
Air conditioning systems;	2
Air cycle and vapour cycle machines;	3
Distribution systems;	1
Flow, temperature and humidity control system.	3
13.11.3. Pressurisation	3
Pressurisation systems;	
Control and indication including control and safety valves;	
Cabin pressure controllers.	
13.11.4. Safety and warning devices	3
Protection and warning devices.	
13.12 Fire Protection (ATA 26)	
(a) Fire and smoke detection and warning systems;	3
Fire extinguishing systems;	
System tests;	
(b) Portable fire extinguisher.	1
13.13 Fuel Systems (ATA 28)	
System lay-out;	1
Fuel tanks;	1
Supply systems;	1
Dumping, venting and draining;	1
Cross-feed and transfer;	2
Indications and warnings;	3
Refuelling and defuelling;	2
Longitudinal balance fuel systems.	3
13.14 Hydraulic Power (ATA 29)	
System lay-out;	1
Hydraulic fluids;	1
Hydraulic reservoirs and accumulators;	1
Pressure generation: electrical, mechanical, pneumatic;	3
Emergency pressure generation;	3
Filters;	1
Pressure control;	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B2
Power distribution;	1
Indication and warning systems;	3
Interface with other systems.	3
13.15 Ice and Rain Protection (ATA 30)	
Ice formation, classification and detection;	2
Anti-icing systems: electrical, hot air and chemical;	2
De-icing systems: electrical, hot air, pneumatic, chemical;	3
Rain repellent;	1
Probe and drain heating;	3
Wiper Systems.	1
13.16 Landing Gear (ATA 32)	
Construction, shock absorbing;	1
Extension and retraction systems: normal and emergency;	3
Indications and warnings;	3
Wheels, brakes, antiskid and autobraking;	3
Tyres;	1
Steering;	3
Air-ground sensing.	3
13.17 Oxygen (ATA 35)	
System lay-out: cockpit, cabin;	3
Sources, storage, charging and distribution;	3
Supply regulation;	3
Indications and warnings.	3
13.18 Pneumatic/Vacuum (ATA 36)	
System lay-out;	2
Sources: engine/APU, compressors, reservoirs, ground supply;	2
Pressure control;	3
Distribution;	1
Indications and warnings;	3
Interfaces with other systems.	3
3.19 Water/Waste (ATA 38)	2
Water system lay-out, supply, distribution, servicing and draining;	
Toilet system lay-out, flushing	

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

	LEVEL
	B2
<p>13.20 Integrated Modular Avionics (ATA42)</p> <p>Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:</p> <p>Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.;</p> <p>Core System;</p> <p>Network Components.</p>	3
<p>13.21 Cabin Systems (ATA44)</p> <p>The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions.</p> <p>The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.</p> <p>The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:</p> <p>Data/Radio Communication, In-Flight Entertainment System.</p> <p>The Cabin Network Service may host functions such as:</p> <ul style="list-style-type: none"> - Access to pre-departure/departure reports, - E-mail/intranet/Internet access, - Passenger database; <p>Cabin Core System;</p> <p>In-flight Entertainment System;</p> <p>External Communication System;</p> <p>Cabin Mass Memory System;</p> <p>Cabin Monitoring System;</p> <p>Miscellaneous Cabin System.</p>	3
<p>13.22 Information Systems (ATA46)</p> <p>The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.</p> <p>Typical examples include Air Traffic and Information Management Systems and Network Server Systems.</p> <p>Aircraft General Information System;</p> <p>Flight Deck Information System;</p> <p>Maintenance Information System;</p> <p>Passenger Cabin Information System;</p> <p>Miscellaneous Information System.</p>	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 14 - Propulsion

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

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 15 - Gas Turbine Engine

	LEVEL	
	A	B1
15.1 Fundamentals Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop.	1	2
15.2 Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.	—	2
15.3 Inlet Compressor inlet ducts Effects of various inlet configurations; Ice protection.	2	2
15.4 Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; 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.	1	2
15.5 Combustion Section Constructional features and principles of operation.	1	2
15.6 Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.	2	2
15.7 Exhaust Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers.	1	2
15.8 Bearings and Seals Constructional features and principles of operation.	—	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

15.9 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2
15.10 Lubrication Systems System operation/lay-out and components.	1	2
15.11 Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2
15.12 Air Systems Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.	1	2
15.13 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	1	2
15.14 Engine Indication Systems Exhaust Gas Temperature/Interstage Turbine Temperature; Engine Thrust Indication: Engine Pressure Ratio, Engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed; Vibration measurement and indication; Torque; Power.	1	2
15.15 Power Augmentation Systems Operation and applications; Water injection, water methanol; Afterburner systems.	—	1
15.16 Turbo-prop Engines Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices	1	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

15.17 Turbo-shaft engines Arrangements, drive systems, reduction gearing, couplings, control systems.	1	2
15.18 Auxiliary Power Units (APUs) Purpose, operation, protective systems.	1	2
15.19 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
15.20 Fire Protection Systems Operation of detection and extinguishing systems.	1	2
15.21 Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and borescope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.	1 1	3
15.22 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/ systems.	—	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 16 - Piston Engine

	LEVEL		
	A	B1	B3
16.1 Fundamentals Mechanical, thermal and volumetric efficiencies; Operating principles — 2 stroke, 4 stroke, Otto and Diesel; Piston displacement and compression ratio; Engine configuration and firing order.	1	2	2
16.2 Engine Performance Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition.	1	2	2
16.3 Engine Construction Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.	1	2	2
16.4 Engine Fuel Systems			
16.4.1 Carburettors Types, construction and principles of operation; Icing and heating.	1	2	2
16.4.2 Fuel injection systems Types, construction and principles of operation.	1	2	2
16.4.3 Electronic engine control Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2	2
16.5 Starting and Ignition Systems Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems.	1	2	2
16.6 Induction, Exhaust and Cooling Systems Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid.	1	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

16.7 Supercharging/Turbocharging	1	2	2
Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/turbocharging systems; System terminology; Control systems; System protection.			
16.8 Lubricants and Fuels	1	2	2
Properties and specifications; Fuel additives; Safety precautions.			
16.9 Lubrication Systems	1	2	2
System operation/lay-out and components.			
16.10 Engine Indication Systems	1	2	2
Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.			
16.11 Powerplant Installation	1	2	2
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.			
16.12 Engine Monitoring and Ground Operation	1	3	2
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.			
16.13 Engine Storage and Preservation	—	2	1
Preservation and de-preservation for the engine and accessories/systems.			

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Module 17A &B - Propeller

	LEVEL		
	A	B1	B3
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 wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speed propeller; Propeller/spinner installation.	1	2	2
17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	1	2	2
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	—	2	2
17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	1	2	2
17.6 Propeller Maintenance Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.	1	3	2
17.7 Propeller Storage and Preservation Propeller preservation and depreservation	1	2	2

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Appendix II - Basic Examination Standard

1. Standardisation Basics for Examinations

1.1 All basic examinations must be carried out using the multi-choice question format and essay questions as specified below.

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

1.2 Each multi-choice question shall have three alternative answers of which only one must be the correct answer and the candidate shall be allowed a time per module which is based upon a nominal average of 75 seconds per question.

1.3 Each essay question requires the preparation of a written answer and the candidate shall be allowed 20 minutes to answer each such question.

1.4 Suitable essay questions shall be drafted and evaluated using the knowledge syllabus in BAR 1 Part- 66 Appendix I, Modules 7, 9 and 10.

1.5 Each question will have a model answer drafted for it, which will also include any known alternative answers that may be relevant for other subdivisions.

1.6 The model answer will also be broken down into a list of the important points known as Key Points.

1.7 The pass mark for each BAR 1 Part- 66 module and sub-module multi-choice part of the examination is 75%.

1.8 The pass mark for each essay question is 75% in that the candidates answer shall contain 75% of the required key points addressed by the question and no significant error related to any required key point.

1.9 If either the multi-choice part only or the essay part only is failed, then it is only necessary to retake the multiple choice or essay part, as appropriate.

1.10 Penalty marking systems shall not be used to determine whether a candidate has passed.

1.11 A failed module may not be retaken for at least 90 days following the date of the failed module examination, except in the case of a maintenance training organisation approved in accordance with BAR 1 Part 147 which conducts a course of retraining tailored to the failed subjects in the particular module when the failed module may be retaken after 30 days.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

1.12 The time periods required by point 66.A.25 apply to each individual module examination, with the exception of those module examinations which were passed as part of another category licence, where the licence has already been issued.

1.13 The maximum number of consecutive attempts for each module is three. Further sets of three attempts are allowed with a 1 year waiting period between sets.

The applicant shall confirm in writing to the approved maintenance training organisation or the Brunei DCA to which they apply for an examination, the number and dates of attempts during the last year and the organisation or the Brunei DCA where these attempts took place. The maintenance training organisation or the Brunei DCA is responsible for checking the number of attempts within the applicable timeframes.

2. Question Numbers for the BAR 1 Part-66 Appendix I Modules

2.1 Subject Module 1 Mathematics:

Category A:16 multi-choice and 0 essay questions.

Time allowed 20 minutes.

Category B1:32 multi-choice and 0 essay questions.

Time allowed 40 minutes.

Category B2:32 multi-choice and 0 essay questions.

Time allowed 40 minutes.

2.2 Subject Module 2 Physics:

Category A;32 multi-choice and 0 essay questions.

Time allowed 40 minutes.

Category B1:52 multi-choice and 0 essay questions.

Time allowed 65 minutes.

Category B2:52 multi-choice and 0 essay questions.

Time allowed 65 minutes.

2.3 Subject Module 3 Electrical Fundamentals:

Category A:20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

Category B1:52 multi-choice and 0 essay questions.

Time allowed 65 minutes.

Category B2:52 multi-choice and 0 essay questions.

Time allowed 65 minutes.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

2.4 Subject Module 4 Electronic Fundamentals:

Category B1:20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

Category B2:40 multi-choice and 0 essay questions.

Time allowed 50 minutes.

2.5 Subject Module 5 Digital Techniques/Electronic Instrument Systems:

Category A:16 multi-choice and 0 essay questions.

Time allowed 20 minutes.

Category B1.1 & B1.3: 40 multi-choice and 0 essay questions.

Time allowed 50 minutes.

Category B1.2 & B1.4: 20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

Category B2: 72 multi-choice and 0 essay questions.

Time allowed 90 minutes.

2.6 Subject Module 6 Materials and Hardware:

Category A: 52 multi-choice and 0 essay questions.

Time allowed 65 minutes.

Category B1: 72 multi-choice and 0 essay questions.

Time allowed 90 minutes.

Category B2: 60 multi-choice and 0 essay questions.

Time allowed 75 minutes.

2.7(A) Subject Module 7 Maintenance Practices:

Category A:72 multi-choice and 2 essay questions.

Time allowed 90 minutes plus 40 minutes.

Category B1:80 multi-choice and 2 essay questions.

Time allowed 100 minutes plus 40 minutes.

Category B2: 60 multi-choice and 2 essay questions.

Time allowed 75 minutes plus 40 minutes.

2.7(B) Subject Module 7B Maintenance Practices:

Category B3:60 multi-choice and 2 essay questions.

Time allowed 75 minutes plus 40 minutes.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

2.8 Subject Module 8 Basic Aerodynamics:

Category A: 20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

Category B1: 20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

Category B2: 20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

2.9 Subject Module 9 Human factors:

Category A: 20 multi-choice and 1 essay question.

Time allowed 25 minutes plus 20 minutes.

Category B1: 20 multi-choice and 1 essay question.

Time allowed 25 minutes plus 20 minutes.

Category B2: 20 multi-choice and 1 essay question.

Time allowed 25 minutes plus 20 minutes.

2.10 Subject Module 10 Aviation Legislation:

Category A: 32 multi-choice and 1 essay question.

Time allowed 40 minutes plus 20 minutes.

Category B1: 40 multi-choice and 1 essay question.

Time allowed 50 minutes plus 20 minutes.

Category B2: 40 multi-choice and 1 essay question.

Time allowed 50 minutes plus 20 minutes.

2.11(a) Subject Module 11a Turbine Aeroplane Aerodynamics, Structures and Systems:

Category A: 108 multi-choice and 0 essay questions.

Time allowed 135 minutes.

Category B1: 140 multi-choice and 0 essay questions.

Time allowed 175 minutes.

Category B2: None.

2.11(b) Subject Module 11b Piston Aeroplane Aerodynamics

Structures and Systems:

Category A: 72 multi-choice and 0 essay questions.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Time allowed 90 minutes.

Category B1:100 multi-choice and 0 essay questions.

Time allowed 125 minutes.

2.11(c) Subject Module 11C Piston Aeroplane Aerodynamics

Structures and Systems:

Category B3: 60 multi-choice and 0 essay questions.

Time allowed 75 minutes.

2.12 Subject Module 12 Helicopter Aerodynamics, Structures and Systems:

Category A:100 multi-choice and 0 essay questions.

Time allowed 125 minutes.

Category B1:128 multi-choice and 0 essay questions.

Time allowed 160 minutes.

2.13 Subject Module 13 Aircraft Aerodynamics, Structures and Systems:

Category B2:180 multi-choice and 0 essay questions.

Time allowed 225 minutes. Questions and time allowed may be split into two examinations as appropriate.

2.14 Subject Module 14 Propulsion:

Category B2: 24 multi-choice and 0 essay questions.

Time allowed 30 minutes.

2.15 Subject Module 15 Gas Turbine Engine:

Category A: 60 multi-choice and 0 essay questions.

Time allowed 75 minutes.

Category B1: 92 multi-choice and 0 essay questions.

Time allowed 115 minutes.

2.16 Subject Module 16 Piston Engine:

Category A: 52 multi-choice and 0 essay questions.

Time allowed 65 minutes.

Category B1: 72 multi-choice and 0 essay questions.

Time allowed 90 minutes.

Category B2 None.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

2.17(a) Subject Module 17 Propeller:

Category A:20 multi-choice and 0 essay questions.

Time allowed 25 minutes.

Category B1:32 multi-choice and 0 essay questions.

Time allowed 40 minutes.

2.17(b) Subject Module 17B Propeller:

Category B3:28 multi-choice and 0 essay questions.

Time allowed 35 minutes.

BRUNEL DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Appendix III - Type Training and Examination Standard - On the Job Training

1. General

Aircraft type training shall consist of theoretical training and examination, and, except for the category. C ratings, practical training and assessment.

- (a) Theoretical training and examination shall comply with the following requirements:
- (i) Shall be conducted by a maintenance training organisation appropriately approved in accordance with BAR 1 Part 147 or, when conducted by other organisations, as directly approved by the Brunei DCA.
 - (ii) Shall comply with the standard described in paragraph 3.1 and 4 of this Appendix III, except as permitted by the differences training described below.
 - (iii) In the case of a category C person qualified by holding an academic degree as specified in point 66.A.30(a)(5), the first relevant aircraft type theoretical training shall be at the category B1 or B2 level.
 - (iv) Shall have been started and completed within the 3 years preceding the application for a type rating endorsement. In the case where training and examination completion exceeds 3 years the training and examination must be retaken.
- (b) Practical training and assessment shall comply with the following requirements:
- (i) Shall be conducted by a maintenance training organisation appropriately approved in accordance with BAR 1 Part 147 or, when conducted by other organisations, as directly approved by the Brunei DCA.
 - (ii) Shall comply with the standard described in paragraph 3.2 and 4 of this Appendix III, except as permitted by the differences training described below.
 - (iii) Shall include a representative cross section of maintenance activities relevant to the aircraft type.
 - (iv) Shall include demonstrations using equipment, components, simulators, other training devices or aircraft.
 - (v) Shall have been started and completed within the 3 years preceding the application for a type rating endorsement.
- (c) Differences training
- (i) Differences training is the training required in order to cover the differences between two different aircraft type ratings of the same manufacturer as determined by the Brunei DCA.
 - (ii) Differences training has to be defined on a case-to-case basis taking into account the requirements contained in this Appendix III in respect of both theoretical and practical elements of type rating training.
 - (iii) A type rating shall only be endorsed on a licence after differences training when the applicant also complies with one of the following conditions:
 - having already endorsed on the licence the aircraft type rating from which the differences are being identified, or

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

- having completed the type training requirements for the aircraft from which the differences are being identified.

2. Aircraft type training levels

The three levels listed below define the objectives, the depth of training and the level of knowledge that the training is intended to achieve.

- Level 1: A brief overview of the airframe, systems and power plant as outlined in the Systems Description Section of the Aircraft Maintenance Manual/Instructions for Continued Airworthiness.

Course objectives: Upon completion of Level 1 training, the student will be able to:

- provide a simple description of the whole subject, using common words and examples, using typical terms and identify safety precautions related to the airframe, its systems and power plant;
- identify aircraft manuals, maintenance practices important to the airframe, its systems and power plant;
- define the general layout of the aircraft's major systems;
- define the general layout and characteristics of the power plant;
- identify special tooling and test equipment used with the aircraft.

- Level 2: Basic system overview of controls, indicators, principal components, including their location and purpose, servicing and minor troubleshooting. General knowledge of the theoretical and practical aspects of the subject.

Course objectives: In addition to the information contained in the Level 1 training, at the completion of Level 2 training, the student will be able to:

- understand the theoretical fundamentals; apply knowledge in a practical manner using detailed procedures;
- recall the safety precautions to be observed when working on or near the aircraft, power plant and systems;
- describe systems and aircraft handling particularly access, power availability and sources;
- identify the locations of the principal components;
- explain the normal functioning of each major system, including terminology and nomenclature;
- perform the procedures for servicing associated with the aircraft for the following systems: Fuel, Power Plants, Hydraulics, Landing Gear, Water/Waste, and Oxygen;
- demonstrate proficiency in use of crew reports and on-board reporting systems (minor troubleshooting) and determine aircraft airworthiness per the MEL/CDL;
- demonstrate the use, interpretation and application of appropriate documentation including instructions for continued airworthiness, maintenance manual, illustrated parts catalogue, etc.

- Level 3: Detailed description, operation, component location, removal/installation and bite and troubleshooting procedures to maintenance manual level.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Course objectives: In addition to the information contained in Level 1 and Level 2 training, at the completion of Level 3 training, the student will be able to:

- (a) demonstrate a theoretical knowledge of aircraft systems and structures and interrelationships with other systems, provide a detailed description of the subject using theoretical fundamentals and specific examples and to interpret results from various sources and measurements and apply corrective action where appropriate;
- (b) perform system, power plant, component and functional checks as specified in the aircraft maintenance manual;
- (c) demonstrate the use, interpret and apply appropriate documentation including structural repair manual, troubleshooting manual, etc.;
- (d) correlate information for the purpose of making decisions in respect of fault diagnosis and rectification to maintenance manual level;
- (e) describe procedures for replacement of components unique to aircraft type.

3. Aircraft type training standard

Although aircraft type training includes both theoretical and practical elements, courses can be approved for the theoretical element, the practical element or for a combination of both.

3.1 Theoretical element

- (a) Objective:

On completion of a theoretical training course the student shall be able to demonstrate, to the levels identified in the Appendix III syllabus, the detailed theoretical knowledge of the aircraft's applicable systems, structure, operations, maintenance, repair, and troubleshooting according to approved maintenance data. The student shall be able to demonstrate the use of manuals and approved procedures, including the knowledge of relevant inspections and limitations.

- (b) Level of training:

Training levels are those levels defined in point 2 above.

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

During a level 3 theoretical training, level 1 and 2 training material may be used to teach the full scope of the chapter if required. However, during the training the majority of the course material and training time shall be at the higher level.

- (c) Duration:

The theoretical training minimum tuition hours are contained in the following table:

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Category	Hours
Aeroplanes with a maximum take-off mass above 30000 kg:	
B1.1	150
B1.2	120
B2	100
C	30
Aeroplanes with a max take-off mass equal or less than 30 000 kg and above 5700 kg:	
B1.1	120
B1.2	100
B2	100
C	25
Aeroplanes with a maximum take-off mass of 5700 kg and below (*)	
B1.1	80
B1.2	60
B2	60
C	15
Helicopters(**)	
B1.3	120
B1.4	100
B2	100
C	25

(*) For non-pressurised piston engine aeroplanes below 2 000 kg MTOM the minimum duration can be reduced by 50 %.

(**) For helicopters in group 2 (as defined in point 66.A.42) the minimum duration can be reduced by 30 %.

For the purpose of the table above, a tuition hour means 60 minutes of teaching and excludes any breaks, examination, revision, preparation and aircraft visit.

These hours apply only to theoretical courses for complete aircraft/engine combinations according to the type rating as defined by the Brunei DCA.

(d) Justification of course duration:

Training courses carried out in a maintenance training organisation approved in accordance with BAR 1 Part 147 and courses directly approved by the Brunei DCA shall justify their hour duration and the coverage of the full syllabus by a training needs analysis based on:

- the design of the aircraft type, its maintenance needs and the types of operation,
- detailed analysis of applicable chapters — see contents table in point 3.1(e) below,
- detailed competency analysis showing that the objectives as stated in point 3.1(a) above are fully met.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Where the training needs analysis shows that more hours are needed, course lengths shall be longer than the minimum specified in the table.

Similarly, tuition hours of differences courses or other training course combinations (such as combined B1/B2 courses), and in cases of theoretical type training courses below the figures given in point 3.1(c) above, these shall be justified to the Brunei DCA by the training needs analysis as described above.

In addition, the course must describe and justify the following:

- The minimum attendance required to the trainee, in order to meet the objectives of the course.
- The maximum number of hours of training per day, taking into account pedagogical and human factors principles.

If the minimum attendance required is not met, the certificate of recognition shall not be issued. Additional training may be provided by the training organisation in order to meet the minimum attendance time.

(e) Content:

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

The training syllabus shall be focused on mechanical and electrical aspects for B1 personnel, and electrical and avionic aspects for B2.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapter/Level	Aeroplane turbine		Aeroplane piston		Helicopters turbine		Helicopter piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Introduction module:									
05 Time limits/maintenance checks	1	1	1	1	1	1	1	1	1
06 Dimensions/Areas (MTOM, etc.)	1	1	1	1	1	1	1	1	1
07 Lifting and Shoring	1	1	1	1	1	1	1	1	1
08 Levelling and Weighing	1	1	1	1	1	1	1	1	1
09 Towing and Taxiing	1	1	1	1	1	1	1	1	1
10 Parking/mooring, Storing and Return to Service	1	1	1	1	1	1	1	1	1
11 Placards and Markings	1	1	1	1	1	1	1	1	1
12 Servicing	1	1	1	1	1	1	1	1	1
20 Standard practices – only type particular	1	1	1	1	1	1	1	1	1
Helicopters									
18 Vibration and Noise Analysis (Blade tracking)	-	-	-	-	3	1	3	1	-
60 Standard Practices Rotor	-	-	-	-	3	1	3	1	-
62 Rotors					3	1	3	1	1
62A Rotors – Monitoring and indicating					3	1	3	1	3
63 Rotor Drives					3	1	3	1	1
63A Rotor Drives – Monitoring and indicating					3	1	3	1	3
64 Tail Rotor					3	1	3	1	1
64A Tail Rotor – Monitoring and indicating					3	1	3	1	3
65 Tail Rotor Drive					3	1	3	1	1
65A Tail Rotor Drive – Monitoring and indicating					3	1	3	1	3
66 Folding Blades/Pylon					3	1	3	1	-
67 Rotors Flight Control					3	1	3	1	-
53 Airframe Structure (Helicopter)					3	1	3	1	-
25 Emergency Flotation Equipment					3	1	3	1	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapter\Level	Aeroplane turbine		Aeroplane piston		Helicopters turbine		Helicopter piston		Avionics
	B1	C	B1	C	B1	C	B1	C	
Licence Category	B1	C	B1	C	B1	C	B1	C	B2
Airframe structures									
51 Standard practices and structures (damage classification, assessment and repair)	3	1	3	1	-	-	-	-	1
53 Fuselage	3	1	3	1	-	-	-	-	1
54 Nacelles/Pylon	3	1	3	1	-	-	-	-	1
55 Stabilisers	3	1	3	1	-	-	-	-	1
56 Windows	3	1	3	1	-	-	-	-	1
57 Wings	3	1	3	1	-	-	-	-	1
27A Flight Control Surfaces (All)	3	1	3	1	-	-	-	-	1
52 Doors	3	1	3	1	-	-	-	-	1
Zonal and Station Identification System	1	1	1	1	1	1	1	1	1
Airframe systems									
21 Air Conditioning	3	1	3	1	3	1	3	1	3
21A Air Supply	3	1	3	1	3	1	3	1	2
21B Pressurisation	3	1	3	1	3	1	3	1	3
21C Safety and Warning Devices	3	1	3	1	3	1	3	1	3
22 Autoflight	2	1	2	1	2	1	2	1	3
23 Communications	2	1	2	1	2	1	2	1	3
24 Electrical Power	3	1	3	1	3	1	3	1	3
25 Equipment and Furnishing	3	1	3	1	3	1	3	1	1
25A Electronic Equipment including emergency equipment	1	1	1	1	1	1	1	1	3
26 Fire Protection	3	1	3	1	3	1	3	1	3
27 Flight Controls	3	1	3	1	3	1	3	1	2
27A Sys Operation: Electrical/Fly-by-Wire	3	1	-	-	-	-	-	-	3
28 Fuel Systems	3	1	3	1	3	1	3	1	2
28A Fuel Systems – Monitoring and indicating	3	1	3	1	3	1	3	1	3
29 Hydraulic Power	3	1	3	1	3	1	3	1	2
29A Hydraulic Power – Monitoring and indicating	3	1	3	1	3	1	3	1	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapter/Level	Aeroplane turbine		Aeroplane piston		Helicopters turbine		Helicopter piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
30 Ice and Rain Protection	3	1	3	1	3	1	3	1	3
31 Indicating/Recording Systems	3	1	3	1	3	1	3	1	3
31A Instrument Systems	3	1	3	1	3	1	1	1	3
32 Landing Gear	3	1	3	1	3	1	3	1	2
32A Landing Gear — Monitoring and indicating	3	1	3	1	3	1	3	1	3
33 Lights	3	1	3	1	3	1	3	1	3
34 Navigation	2	1	2	1	2	1	2	1	3
35 Oxygen	3	1	3	1	-	-	-	-	2
36 Pneumatic	3	1	3	1	3	1	3	1	2
36 Pneumatic — Monitoring and indicating	3	1	3	1	3	1	3	1	3
37 Vacuum	3	1	3	1	3	1	3	1	2
38 Water/Waste	3	1	3	1	-	-	-	-	2
41 Water Ballast	3	1	3	1	-	-	-	-	1
42 Integrated Modular Avionics	2	1	2	1	2	1	2	1	3
44 Cabin Systems	2	1	2	1	2	1	2	1	3
45 On Board Maintenance System (or covered in 31)	3	1	3	1	3	1	-	-	3
46 Information Systems	2	1	2	1	2	1	2	1	3
50 Cargo and Accessory Compartments	3	1	3	1	3	1	3	1	1
Turbine Engine									
70 Standard Practices – Engines,	3	1	-	-	3	1	-	-	1
70A constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems)	3	1	-	-	3	1	-	-	1
70B Engine Performance	3	1	-	-	3	1	-	-	1
71 Powerplant	3	1	-	-	3	1	-	-	1
72 Engine Turbine/Turbo Prop/Ducted Fan/Unducted fan	3	1	-	-	3	1	-	-	1
73 Engine Fuel and Control	3	1	-	-	3	1	-	-	1
75 Air	3	1	-	-	3	1	-	-	1
76 Engine controls	3	1	-	-	3	1	-	-	1

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapter\Level	Aeroplane turbine		Aeroplane piston		Helicopters turbine		Helicopter piston		Avionics
	B1	C	B1	C	B1	C	B1	C	
Licence Category	B1	C	B1	C	B1	C	B1	C	B2
78 Exhaust	3	1	-	-	3	1	-	-	1
79 Oil	3	1	-	-	3	1	-	-	1
80 Starting	3	1	-	-	3	1	-	-	1
82 Water Injections	3	1	-	-	3	1	-	-	1
83 Accessory Gear Boxes	3	1	-	-	3	1	-	-	1
84 Propulsion Augmentation	3	1	-	-	3	1	-	-	1
73A FADEC	3	1	-	-	3	1	-	-	3
74 Ignition	3	1	-	-	3	1	-	-	3
77 Engine indicating systems	3	1	-	-	3	1	-	-	3
49 Auxiliary Power Units (APU)	3	1	-	-	-	-	-	-	2
Piston Engine									
70 Standard Practices – Engines	-	-	3	1	-	-	3	1	1
70A Constructional arrangement and operation (Installation, Carburettors, Fuel injection systems, Induction, Exhaust and Cooling Systems, Supercharging/Turbocharging , Lubrication Systems).	-	-	3	1	-	-	3	1	1
70B Engine Performance	-	-	3	1	-	-	3	1	1
71 Powerplant	-	-	3	1	-	-	3	1	1
73 Engine Fuel and Control	-	-	3	1	-	-	3	1	1
76 Engine Controls	-	-	3	1	-	-	3	1	1
79 Oil	-	-	3	1	-	-	3	1	1
80 Starting	-	-	3	1	-	-	3	1	1
81 Turbines	-	-	3	1	-	-	3	1	1
82 Water Injections	-	-	3	1	-	-	3	1	1
83 Accessory Gear Boxes	-	-	3	1	-	-	3	1	1
84 Propulsion Augmentation	-	-	3	1	-	-	3	1	1
73A FADEC	-	-	3	1	-	-	3	1	3
74 Ignition	-	-	3	1	-	-	3	1	3
77 Engine indication Systems	-	-	3	1	-	-	3	1	3

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapter\Level	Aeroplane turbine		Aeroplane piston		Helicopter s turbine		Helicopter piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Propellers									
60A Standard Practices – Propeller	3	1	3	1	-	-	-	-	1
61 Propellers/Propulsion	3	1	3	1	-	-	-	-	1
61A Propeller	3	1	3	1	-	-	-	-	-
61B Propeller	3	1	3	1	-	-	-	-	-
61C Propeller	3	1	3	1	-	-	-	-	1
61D Propeller	3	1	3	1	-	-	-	-	3
61E Propeller	3	1	3	1	-	-	-	-	-
61F Propeller	3	1	3	1	-	-	-	-	1

- (f) Multimedia Based Training (MBT) methods may be used to satisfy the theoretical training element either in the classroom or in a virtual controlled environment subject to the acceptance of the Brunei DCA approving the training course.

3.2 Practical element

- (a) Objective:

The objective of practical training is to gain the required competence in performing safe maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks. It includes the awareness of the use of all technical literature and documentation for the aircraft, the use of specialist/special tooling and test equipment for performing removal and replacement of components and modules unique to type, including any on-wing maintenance activity. The practical training is conducted under the control of a Part 147 approved organisation.

- (b) Content:

At least 50% of the crossed items in the table below, which are relevant to the particular aircraft type, shall be completed as part of the practical training.

Tasks crossed represent subjects that are important for practical training purposes to ensure that the operation, function, installation and safety significance of key maintenance tasks are adequately addressed; particularly where these cannot be fully explained by theoretical training alone. Although the list details the minimum practical training subjects, other items may be added where applicable to the particular aircraft type.

Tasks to be completed shall be representative of the aircraft and systems both in complexity and in the technical input required to complete that task. While relatively simple tasks may be included, other more complex tasks shall also be incorporated and undertaken as appropriate to the aircraft type.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Glossary of the table: LOC: Location; FOT: Functional/Operational Test; SGH: Service and Ground Handling; R/I: Removal/Installation; MEL: Minimum Equipment List; TS: Trouble Shooting.

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Introduction Module											
5 Time limits/maintenance checks	X/X	-	-	-	-	-	-	-	-	-	-
6 Dimensions/Areas (MTOM, etc.)	X/X	-	-	-	-	-	-	-	-	-	-
7 Lifting and Shoring	X/X	-	-	-	-	-	-	-	-	-	-
8 Levelling and weighing	X/X	-	X	-	-	-	-	X	-	-	-
9 Towing and Taxiing	X/X	-	X	-	-	-	-	X	-	-	-
10 Parking/mooring, Storing and Return to Service	X/X	-	X	-	-	-	-	X	-	-	-
11 Placards and Markings	X/X	-	-	-	-	-	-	-	-	-	-
12 Servicing	X/X	-	X	-	-	-	-	X	-	-	-
20 Standard Practices-only type particular	XX	-	X	-	-	-	-	X	-	-	-
Helicopters											
18 Vibration and Noise Analysis (Blade tracking)	X/-	-	-	-	-	X	-	-	-	-	-
60 Standard Practices Rotor — only type specific	X/X	-	X	-	-	-	-	X	-	-	-
62 Rotors	X/-	-	X	X	-	X	-	-	-	-	-
62A Rotors- Monitoring and Indicating	X/X	X	X	X	X	X	-	-	X	-	X
63 Rotor Drives	X/-	X	-	-	-	X	-	-	-	-	-
63A Rotor Drives- Monitoring and Indicating	X/X	X	-	X	X	X	-	-	X	-	X
64 Tail Rotor	X/-	-	X	-	-	X	-	-	-	-	-
64A Tail Rotor- Monitoring and Indicating	X/X	X	-	X	X	X	-	-	X	-	X
65 Tail Rotor Drive	X/-	X	-	-	-	X	-	-	-	-	-
65A Tail Rotor Drive- Monitoring and Indicating	X/X	X	-	X	X	X	-	-	X	-	X
66 Folding Blades/Pylon	X/-	X	X	-	-	X	-	-	-	-	-
67 Rotors Flight Control	X/-	X	X	-	X	X	-	-	-	-	-
53 Airframe Structure (Helicopter) Note: covered under Airframe structures											
25 Emergency Flotation Equipment	X/X	X	X	X	X	X	X	X	-	-	-

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Airframe Structures											
51 Standard Practices and Structures (damage classification, assessment and repair)											
53 Fuselage	X/-	-	-	-	-	X	-	-	-	-	-
54 Nacelles/Pylons	X/-	-	-	-	-	-	-	-	-	-	-
55 Stabilisers	X/-	-	-	-	-	-	-	-	-	-	-
56 Windows	X/-	-	-	-	-	X	-	-	-	-	-
57 Wings	X/-	-	-	-	-	-	-	-	-	-	-
27A Flight Control Surfaces	X/-	-	-	-	-	X	-	-	-	-	-
52 Doors	X/-	X	X	-	-	-	-	X	-	-	-

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Airframe Systems											
21 Air Conditioning	X/X	X	X	-	X	X	X	X	-	X	X
21A Air Supply	X/X	X	-	-	-	-	X	-	-	-	-
21B Pressurisation	X/X	X	-	-	X	X	X	-	-	X	X
21C Safety and Warning Devices	X/X	-	X	-	-	-	-	X	-	-	-
22 Autoflight	X/X	-	-	-	X	-	X	X	X	X	X
23 Communications	X/X	-	X	-	X	-	X	X	X	X	X
24 Electrical Power	X/X	X	X	X	X	X	X	X	X	X	X
25 Equipment and furnishings	X/X	X	X	X	-	-	X	X	X	-	-
25A Electronic Equipment including Emergency Equipment	X/X	X	X	X	-	-	X	X	X	-	-
26 Fire Protection	X/X	X	X	X	X	X	X	X	X	X	X
27 Flight Controls	X/X	X	X	X	X	X	X	-	-	-	-
27A Sys operation: Electrical/Fly by wire	X/X	X	X	X	X	-	X	-	X	-	X
28 Fuel Systems	X/X	X	X	X	X	X	X	X	X	X	X
28A Fuel Systems – Monitoring and Indicating	X/X	X	-	-	-	-	X	X	-	X	-
29 Hydraulic Power	X/X	X	X	X	X	X	X	-	X	-	X
29A Hydraulic Power– Monitoring and Indicating	X/X	X	-	X	X	X	X	-	X	X	X
30 Ice and Rain Protection	X/X	X	X	-	X	X	X	X	-	X	X
31 Indicating/Recording Systems	X/X	X	X	X	X	X	X	X	X	X	X
31A Instrument Systems	X/X	X	X	X	X	X	X	X	X	X	X
32 Landing Gear	X/X	X	X	X	X	X	X	X	X	X	-
32A Landing Gear- Monitoring and Indicating	X/X	X	-	X	X	X	X	-	X	X	X
33 Lights	X/X	X	X	-	X	-	X	X	X	X	-
34 Navigation	X/X	-	X	-	X	-	X	X	X	X	X
35 Oxygen	X/-	X	X	X	-	-	X	X	-	-	-
36 Pneumatic	X/-	X	-	X	X	X	X	-	X	X	X
36A Pneumatic- Monitoring and Indicating	X/X	X	X	X	X	X	X	X	X	X	X
37 Vacuum	X/-	X	-	X	X	X	-	-	-	-	-
38 Water /Waste	X/-	X	X	-	-	-	X	X	-	-	-
41 Water Ballast	X/-	-	-	-	-	-	-	-	-	-	-
42 Integrated Modular Avionics	X/X	-	-	-	-	-	X	X	X	X	X
44 Cabin Systems	X/X	-	-	-	-	-	X	X	X	X	X
45 On Board Maintenance System (or covered in 31)	X/X	X/X	X	X	X	X	X	X	X	X	X
46 Information Systems	X/X	-	-	-	-	-	X	-	X	X	X
50 Cargo and Accessory Compartments	X/X	-	X	-	-	-	-	-	-	-	-

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapters	B1/B2	B1	B2									
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS	
Turbine/Piston Engine Module												
70 Standard Practices — Engines — only type particular	-	-	X	-	-	-	-	X	-	-	-	-
70A Constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems)	X/X	-	-	-	-	-	-	-	-	-	-	-
Turbine Engines												
70B Engine performance	-	-	-	-	-	X	-	-	-	-	-	-
71 Power Plant	X/-	X	X	-	-	-	-	X	-	-	-	-
72 Engine Turbine/Turbo Prop/Ducted Fan/ Unducted fan	X/-	-	-	-	-	-	-	-	-	-	-	-
73 Engine Fuel and Control	X/X	X	-	-	-	-	-	-	-	-	-	-
73A FADEC System	X/X	X	-	X	X	X	X	-	X	X	X	X
74 Ignition	X/X	X	-	-	-	-	X	-	-	-	-	-
75 Air	X/-	-	-	X	-	X	-	-	-	-	-	-
76 Engine Controls	X/-	X	-	-	-	X	-	-	-	-	-	-
77 Engine Indicating	X/X	X	-	-	X	X	X	-	-	X	X	X
78 Exhaust	X/-	X	-	-	X	-	-	-	-	-	-	-
79 Oil	X/-	-	X	X	-	-	-	-	-	-	-	-
80 Starting	X/-	X	-	-	X	X	-	-	-	-	-	-
82 Water Injection	X/-	X	-	-	-	-	-	-	-	-	-	-
83 Accessory Gearboxes	X/-	-	X	-	-	-	-	-	-	-	-	-
84 Propulsion Augmentation	X/-	X	-	-	-	-	-	-	-	-	-	-
Auxiliary Power Units (APUs)												
49 Auxiliary Power Units (APUs)	X/-	X	X	-	-	X	-	-	-	-	-	-
Piston Engines												
70 Standard Practices — Engines — only type particular	-	-	X	-	-	-	-	X	-	-	-	-
70A Constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Sys	X/X	-	-	-	-	-	-	-	-	-	-	-

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
70B Engine Performance	-	-	-	-	-	X	-	-	-	-	-
71 Power Plant	X/-	X	X	-	-	-	-	X	-	-	-
73 Engine Fuel and Control	X/X	X	-	-	-	-	-	-	-	-	-
73A FADEC System	X/X	X	-	X	X	X	X	X	X	X	X
74 Ignition	X/X	X	-	-	-	-	X	-	-	-	-
76 Engine Controls	X/-	X	-	-	-	X	-	-	-	-	-
77 Engine Indicating	X/X	X	-	-	X	X	X	-	-	X	X
78 Exhaust	X/-	X	-	-	X	X	-	-	-	-	-
79 Oil	X/-	-	X	X	-	-	-	-	-	-	-
80 Starting	X/-	X	-	-	X	X	-	-	-	-	-
81 Turbines	X/-	X	X	X	-	X	-	-	-	-	-
82 Water Injection	X/-	X	-	-	-	-	-	-	-	-	-
83 Accessory Gearboxes	X/-	-	X	X	-	-	-	-	-	-	-
84 Propulsion Augmentation	X/-	X	-	-	-	-	-	-	-	-	-
Propellers											
60A Standard Practices – Propeller	-	-	-	X	-	-	-	-	-	-	-
61 Propellers/Propulsion	X/X	X	X	-	X	X	-	-	-	-	-
61A Propeller Construction	X/X	-	X	-	-	-	-	-	-	-	-
61B Propeller Pitch Control	X/-	X	-	X	X	X	-	-	-	-	-
61C Propeller Synch	X/-	X	-	-	-	X	-	-	-	X	-
61D Propeller Electronic Control	X/X	X	X	X	X	X	X	X	X	X	X
61E Propeller Ice Protection	X/-	X	-	X	X	X	-	-	-	-	-
61F Propeller Maintenance	X/X	X	X	X	X	X	X	X	X	X	X

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

4. Type training examination and assessment standard

4.1 Theoretical element examination standard

After the theoretical portion of the aircraft type training has been completed, a written examination shall be performed, which shall comply with the following:

- (a) Format of the examination is of the multi-choice type. Each multi-choice question shall have 3 alternative answers of which only one shall be the correct answer. The total time is based on the total number of questions and the time for answering is based upon a nominal average of 90 seconds per question.
- (b) The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction and length.
- (c) In numerical questions, the incorrect answers shall correspond to procedural errors such as the use of incorrect sense (+ versus -) or incorrect measurement units. They shall not be mere random numbers.
- (d) The level of examination for each chapter (*) shall be the one defined in point 2 "Aircraft type training levels". However, the use of a limited number of questions at a lower level is acceptable.
- (e) The examination shall be of the closed book type. No reference material is permitted. An exception will be made for the case of examining a B1 or B2 candidate's ability to interpret technical documents.
- (f) The number of questions shall be at least 1 question per hour of instruction. The number of questions for each chapter and level shall be proportionate to:
 - the effective training hours spent teaching at that chapter and level,
 - the learning objectives as given by the training needs analysis.

The Brunei DCA will assess the number and the level of the questions when approving the course.

- (g) The minimum examination pass mark is 75%. When the type training examination is split in several examinations, each examination shall be passed with at least a 75% mark. In order to be possible to achieve exactly a 75% pass mark, the number of questions in the examination shall be a multiple of 4.
- (h) Penalty marking (negative points for failed questions) is not to be used.
- (i) End of module phase examinations cannot be used as part of the final examination unless they contain the correct number and level of questions required.

() For the purpose of this point 4, a "chapter" means each one of the rows preceded by a number in the table contained in point 3.1(e).*

4.2 Practical element assessment standard

After the practical element of the aircraft type training has been completed, an assessment must be performed, which must comply with the following:

- (a) The assessment shall be performed by designated assessors appropriately qualified.
- (b) The assessment shall evaluate the knowledge and skills of the trainee.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

5. Type examination standard

Type examination shall be conducted by training organisations appropriately approved under BAR 1 Part 147 or by the Brunei DCA.

The examination shall be oral, written or practical assessment based, or a combination thereof and it shall comply with the following requirements:

- (a) Oral examination questions shall be open.
- (b) Written examination questions shall be essay type or multi-choice questions.
- (c) Practical assessment shall determine a person's competence to perform a task.
- (d) Examinations shall be on a sample of chapters (***) drawn from paragraph 3 type training/examination syllabus, at the indicated level.
- (e) The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All of the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction and length.
- (f) In numerical questions, the incorrect answers shall correspond to procedural errors such as corrections applied in the wrong sense or incorrect unit conversions: they shall not be mere random numbers.
- (g) The examination shall ensure that the following objectives are met:
 1. Properly discuss with confidence the aircraft and its systems.
 2. Ensure safe performance of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks such as engine run, etc., if required.
 3. Correctly use all technical literature and documentation for the aircraft.
 4. Correctly use specialist/special tooling and test equipment, perform removal and replacement of components and modules unique to type, including any on-wing maintenance activity
- (h) The following conditions apply to the examination:
 1. The maximum number of consecutive attempts is three. Further sets of three attempts are allowed with a 1 year waiting period between sets. A waiting period of 30 days is required after the first failed attempt within one set, and a waiting period of 60 days is required after the second failed attempt.

The applicant shall confirm in writing to the maintenance training organisation or the Brunei DCA to which they apply for an examination, the number and dates of attempts during the last year and the maintenance training organisation or the Brunei DCA where these attempts took place. The maintenance training organisation or the Brunei DCA is responsible for checking the number of attempts within the applicable timeframes.
 2. The type examination shall be passed, and the required practical experience shall be completed within the 3 years preceding the application for the rating endorsement on the aircraft maintenance licence. In the vase where the type examination and experience

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

completion exceed 3 years the examination and experience must be repeated.

3. Type examination shall be performed with at least one examiner present. The examiner(s) shall not have been involved in the applicant's training.
 - (i) A written and signed report shall be made by the examiner(s) to explain why the candidate has passed or failed.

6. On the Job Training

On the Job Training (OJT) shall be approved by the Brunei DCA who has issued the licence.

It shall be conducted at and under the control of maintenance organisation appropriately approved for the maintenance of the particular aircraft type and shall be assessed by designated assessors appropriately qualified.

It shall have been started and completed within the 3 years preceding the application for a type rating endorsement.

(a) Objective:

The objective of OJT is to gain the required competence and experience in performing safe maintenance.

(b) Content:

OJT shall cover a cross section of tasks acceptable to the Brunei DCA. The OJT tasks to be completed shall be representative of the aircraft and systems both in complexity and in the technical input required to complete that task. While relatively simple tasks may be included, other more complex maintenance tasks shall also be incorporated and undertaken as appropriate to the aircraft type.

Each task shall be signed off by the student and countersigned by a designated supervisor. The tasks listed shall refer to an actual job_card/work sheet, etc.

The final assessment of the completed OJT is mandatory and shall be performed by a designated assessor appropriately qualified.

The following data shall be addressed on the OJT worksheets/logbook:

- (1) Name of Trainee;
- (2) Date of Birth;
- (3) Approved Maintenance Organisation;
- (4) Location;
- (5) Name of supervisor(s) and assessor, (including licence number if applicable);
- (6) Date of task completion;
- (7) Description of task and job card/work order/tech log, etc.;
- (8) Aircraft type and aircraft registration;
- (9) Aircraft rating applied for.

In order to facilitate the verification by the Brunei DCA, demonstration of the OJT shall consist of (i) detailed worksheets/logbook and (ii) a compliance report demonstrating how the OJT meets the requirement of this Part.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Appendix IV - Experience Requirements for extending a BAR 1 Part- 66 Aircraft Maintenance Licence

The table below shows the experience requirements for adding a new category or subcategory to an existing BAR 1 Part- 66 licence.

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

The experience requirement will be reduced by 50% if the applicant has completed an approved BAR 1 Part 147 course relevant to the subcategory.

To: From:	A1	A2	A3	A4	B1.1	B1.2	B1.3	B1.4	B2	B3
A1	-	6 months	6 months	6 months	2 years	6 months	2 years	1 year	2 years	6 months
A2	6 months	-	6 months	6 months	2 years	6 months	2 years	1 year	2 years	6 months
A3	6 months	6months	-	6 months	2 years	1year	2 years	6 months	2 years	1 year
A4	6 months	6months	6months	-	2 years	1year	2 years	6 months	2 years	1 year
B1.1	None	6 months	6 months	6 months	-	6 months	6 months	6 months	1 year	6 months
B1.2	6 months	None	6 months	6 months	2 years	-	2 years	6 months	2 years	None
B1.3	6 months	6 months	None	6 months	6 months	6 months	-	6 months	1 year	6 months
B1.4	6 months	6 months	6 months	None	2 years	6 months	2 years	-	2 years	6 months
B2	6 months	6 months	6 months	6 months	1 year	1year	1 year	1 year	-	1 year
B3	6 months	None	6 months	6 months	2 years	6 months	2 years	1 year	2 years	-

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Appendix V - Application Form and Example of Licence Format

This appendix contains an example of the BAR 1 Part- 66 aircraft maintenance licence and the relevant application form for such licence.

Application for Initial/Amendment/Renewal of BAR 1 Part- 66 Aircraft Maintenance Licence(AML)				
Applicants Details: Name:..... Address:.....				
Nationality:..... Date and Place of Birth:.....				
BAR 1 Part- 66 AML Details (if applicable): Licence No:..... Date of issue:.....				
Employers Details: Name:..... Address:.....				
AMO Approval Reference:..... Tel:..... Fax:.....				
Application For: [Tick (√) relevant box(es)]				
Initial AML	<input type="checkbox"/>	Amendment of AML	<input type="checkbox"/>	Renewal of AML <input type="checkbox"/>
Rating:	A	B1	B2	C
Aeroplane Turbine	<input type="checkbox"/>	<input type="checkbox"/>	-	-
Aeroplane Piston	<input type="checkbox"/>	<input type="checkbox"/>	-	-
Helicopter Turbine	<input type="checkbox"/>	<input type="checkbox"/>	-	-
Helicopter Piston	<input type="checkbox"/>	<input type="checkbox"/>	-	-
Avionics	-	-	<input type="checkbox"/>	-
Large Aircraft	-	-	-	<input type="checkbox"/>
Aircraft other than large aircraft	-	-	-	<input type="checkbox"/>
Type endorsements/Rating endorsement/Limitation Removal (if applicable):				

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

I wish to apply for initial / amendment / renewal / of BAR 1 Part- 66 AML as indicated and confirm that the information contained in this form was correct at the time of application.

I herewith confirm that:

1. I am not holding any BAR 1 Part- 66 AML.
2. I have never held a BAR 1 Part- 66 AML in the Brunei Darussalam which was revoked or suspended.

I also understand that any incorrect information could disqualify me from holding a BAR 1 Part- 66 AML.

Signed:.....

Name:

Date:

Application for Initial/Amendment/Renewal of BAR 1 Part- 66 Aircraft Maintenance Licence (AML)

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

I wish to claim the following credits (if applicable) :

.....
 ..

 ..

 ..

Experience credit due BAR 1 Part 147 training

.....

 ...

 ...

Examination credit due equivalent exam certificates

.....

 ...

 ...

Please Enclose relevant certificates

Recommendation (if applicable): It is hereby certified that the applicant has met the relevant maintenance knowledge and experience requirements of BAR 1 Part- 66 and it is recommended that the Brunei DCA grants or endorses the BAR 1 Part- 66 AML.

Signed: Name:.....
 ...

Position:..... Date:.....

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

Appendix VI - BAR 1 Part- 66 Aircraft Maintenance Licence

1. An example of the BAR 1 Part- 66 aircraft maintenance licence can be found on the following pages.
2. The document must be printed in the standardised form shown but may be reduced in size to accommodate its computer generation if desired. When the size is reduced care should be exercised to ensure sufficient space is available in those places where official seals/stamps are required. Computer generated documents need not have all the boxes incorporated when any such box remains blank so long as the document can clearly be recognized as the BAR 1 Part- 66 aircraft maintenance licence.
3. The document must be printed in English.
4. Each licence holder must have a unique licence number based on an alpha- numeric designator.
5. The document may have the pages in any order and need not have some or any divider lines as long as the information contained is positioned such that each page layout can clearly be identified with the format of the example BAR 1 Part- 66 aircraft maintenance licence contained herein. The aircraft type rating page need not be issued until the first type endorsement is included.
6. The document may be prepared by the Brunei DCA or by any BAR 8 Part 145 approved maintenance organisation in accordance with a procedure approved by the Brunei DCA and contained in the BAR 8 Part 145 maintenance organisation exposition except that in all cases the Brunei DCA will issue the document.
7. The preparation of any variation to an existing BAR 1 Part- 66 aircraft maintenance licence may be carried out by the Brunei DCA or by any BAR 8 Part 145 approved maintenance organisation in accordance with a procedure approved by the Brunei DCA and contained in the BAR 8 Part 145 maintenance organisation exposition except that in all cases the Brunei DCA will issue the document with the variation.
8. The BAR 1 Part- 66 aircraft maintenance licence once issued is required to be kept by the person to whom it applies in good condition and who shall remain accountable for ensuring that no unauthorized entries are made.
9. Failure to comply with paragraph 8 may invalidate the document and could lead to the holder not being permitted to hold any BAR 8 Part 145 certification authorization and may result in prosecution under National law.
10. The BAR 1 Part- 66 aircraft maintenance licence is issued by the Brunei DCA.
11. An appendix IX to Form 26 is optional and may only be used to include National Privileges not covered by BAR 1 Part- 66, where such privileges were covered by the national regulation in force prior to the implementation of BAR 1 Part- 66.
12. With regard to the aircraft type rating page the Brunei DCA may choose not to issue this page until the first aircraft type rating needs to be endorsed and will need to issue more than one aircraft type rating page when there are a number to be listed.
13. Notwithstanding 12, each page issued will be in this format and contain the specified information for that page.
14. If there are no limitations applicable, the LIMITATIONS page will be issued stating 'No limitations.

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

15. Where a pre-printed format is used, any category, subcategory or type rating box which does not contain a rating entry shall be marked to show that the rating is not held.

BRUNEL DCA

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

BAR 1 Part- 66 – Aircraft Maintenance Licences

Brunei Darussalam

**BAR 1 Part-66
AIRCRAFT MAINTENANCE
LICENCE**

Department of Civil Aviation
Ministry of Transport and
Infocommunications

DCA Form 26

Conditions:

1. This licence shall be signed by the holder and be accompanied by an identity document containing a photograph of the licence holder.
2. Endorsement of any categories on the page(s) entitled BAR 1 Part- 66 CATEGORIES only, does not permit the holder to issue a certificate of release to service for an aircraft.
3. Endorsement of aircraft types on the page (s) entitled DCA-66 AIRCRAFT TYPE RATINGS means the holder qualified to issue certificates of release to service for such aircraft at the date of endorsement.
4. The privileges of the holder of this licence are prescribed by BAR 1 Part- 66 and the applicable requirements of BAR 8 Part-M and BAR 8 Part-145.
5. The licence remains valid until the date specified on the limitation page unless previously suspended or revoked.
6. This licence when endorsed with an aircraft type rating meets the intent of ICAO Annex I.

I) State of issue:
III) Licence No:
IV) Full name of holder:
IVa) Date and place of birth:
V) Address of holder:
VI) Nationality of holder:
VII) Signature of holder:
X) Signature of issuing officer & date:
XI) Seal or stamp of the DCA

XII) BAR Part-66 CATEGORIES				
Validity	A	B1	B2	C
Aeroplanes Turbine			X	X
Aeroplanes Piston			X	X
Helicopters Turbine			X	X
Helicopters Piston			X	X
Avionics	X	X		X
Aircraft	X	X	X	
Aircraft other than Large				
LIC NO:				

Page

*Issue. Rev. 0
Dec 2019*

Document	BAR 1 – Part-66 Aircraft Maintenance Licence	
Version	02	

BAR – Part 66 – Aircraft Maintenance Licences

XI) BAR 1 Part- 66 AIRCRAFT TYPE RATINGS		
A/C Type or Group	Category	Official Stamp & Date
LIC NO:		

XII) BAR 1 Part- 66 LIMITATIONS
Valid until:
LIC NO:

XIII) Annex to DCA Form 26 National Privileges outside the Scope of BAR 1 Part- 66
Official Stamp & date
LIC NO:

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