NOTICE OF PROPOSED AMENDMENT (NPA) NO 2012-15

DRAFT OPINION OF THE EUROPEAN AVIATION SAFETY AGENCY

for a Commission Regulation amending Commission Regulation (EC) No 2042/2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks

and

DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY

amending Decision No 2003/19/RM of the Executive Director on acceptable means of compliance and guidance material to Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks.

Adapt the current B2 licensing requirements for maintenance of avionic and electrical systems to the lower complexity of light aircraft.

and

Propose a simple and proportionate system for the licensing of certifying staff involved in the maintenance of aircraft other than aeroplanes and helicopters and in the maintenance of ELA1 aeroplanes.

EXECUTIVE SUMMARY

Feedback received from stakeholders and competent authorities has shown the following:

- On one hand, the difficulties faced by maintenance personnel intending to obtain a Part-66 avionic licence (B2) in order to maintain general aviation aircraft, due to the inclusion in the knowledge requirements of systems and technologies which are typical of large aircraft. This has created a decrease of the number of certifying staff available to maintain this category of aircraft, with the risk that in the future less staff will be available to maintain light aircraft;
- On the other hand, there is a need to standardise within the EU the licensing of certifying staff for sailplanes, balloons and airships, which currently is covered under national rules.

Furthermore, with the adoption of Commission Regulation (EU) No 1149/2011, the Article 7 of Regulation (EC) No 2042/2011 has been amended by adding a point 9 which calls for the issuance by the Agency of an opinion to include a proposal for a simple and proportionate system for the licensing of certifying staff involved in the maintenance of ELA1 aeroplanes as well as aircraft other than aeroplanes and helicopters, meaning sailplanes, balloons and airships.

These points are taken into consideration by this NPA through 2 different subjects which envisage to:

- Adapt the current B2 licensing requirements for maintenance of avionic and electrical systems to the lower complexity of light aircraft.
- Propose a simple and proportionate system for the licensing of certifying staff involved in the maintenance of ELA1 aeroplanes as well as aircraft other than aeroplanes and helicopters.

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A. Explanatory Note

I. General

1. In 2009, the Agency issued Opinion 04/2009[1], in which it proposed a B3 licence and an L licence (following Rulemaking Task 66.022):

   - The proposed B3 licence was similar to the B1.2 licence but with simplified requirements adapted to the lower complexity of light piston-engine aeroplanes. This B3 licence was adopted by Commission Regulation (EU) No 1149/2011[2].
   - On the other hand, the proposed L licence was a completely new concept, which was applicable to sailplanes, balloons and some airships. However, this proposal was rejected during the comitology process due to its perceived complexity (2 levels of licence and a significant number of ratings) and the Agency was tasked to re-submit a new Opinion with a simpler proposal. This new mandate was contained in Commission Regulation (EU) No 1149/2011, with the introduction in Regulation (EC) 2042/2003[3] of a new point (9) to Article 7, which states:

     'The Agency shall submit an opinion to the Commission including proposals for a simple and proportionate system for the licensing of certifying staff involved in the maintenance of ELA1 aeroplanes as well as aircraft other than aeroplanes and helicopters',

2. In the meanwhile, in 2010, the Rulemaking Directorate had launched another rulemaking activity by Term of Reference (ToR) 66.027[4], whose objective was to introduce in Part-66 an avionics licence adapted to the lower complexity of General Aviation aircraft. The Agency decided, therefore, to change the ToR for this task 66.027 and include also the additional work required for the new Opinion related to the L licence.

3. This Notice of Proposed Amendment (NPA) is the result of this work and envisages amending Commission Regulation (EC) No 2042/2003 Annexes II (Part-145), III (Part-66) and IV (Part-147) as well as Decision 2003/19/RM[5] of the Executive Director of 28 November 2003. The scope of this rulemaking activity is described in more detail below.

4. The European Aviation Safety Agency (hereinafter referred to as the 'Agency') is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic

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1 See the Opinion at http://easa.europa.eu/agency-measures/docs/opinions/2009/04/Amdt%20to%20Reg%202042-2003%20to%20Opinion%2004-2009.pdf.

2 Commission Regulation (EU) No 1149/2011 of 21 October 2011 amending Regulation (EC) No 2042/2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks. See at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:298:0001:0124:EN:PDF.

3 Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks (OJ L 315, 28.11.2003, p. 1). Regulation as last amended by Regulation (EU) No 593/2012 of 5 July 2012 (OJ L 176, 6/07/2012, p. 38).

4 See ToR for task 66.027 at: http://easa.europa.eu/rulemaking/terms-of-reference-and-group-composition.php#66

5 Decision No 2003/19/RM of the Executive Director of the Agency of 28 November 2003 on acceptable means of compliance and guidance material to Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks. Decision as last amended by Decision 2012/004/R of the Executive Director of the Agency of 19 April 2012.

Regulation[6] which are adopted as 'Opinions' (Article 19(1)). It also adopts Certification Specifications, Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 19(2)).

5. When developing rules, the Agency is bound to follow a structured process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as 'The Rulemaking Procedure'[7].

6. This rulemaking activity is included in the Agency's Rulemaking Programme for 2010-2013. It implements the rulemaking task RMT.0135 (66.027).

7. The text of this NPA has been developed by the Agency. It is submitted for consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

8. The proposed rules have taken into account the development of European Union and International law (ICAO), and the harmonisation with the rules of other authorities of the European Union main partners as set out in the objectives of article 2 of the Basic Regulation. The proposed rule:
   a. takes into account developments of relevant European Union law; and
   b. is more stringent than the ICAO Standards and Recommended Practices especially Annex I to the Convention.

II. Consultation

9. To achieve optimal consultation, the Agency is publishing the draft decision of the Executive Director on its internet site. Comments should be provided within 3 months in accordance with Article 6(4) of the Rulemaking Procedure. Comments on this proposal should be submitted by one of the following methods:

CRT: Send your comments using the Comment-Response Tool (CRT) available at **http://hub.easa.europa.eu/crt/**.

E-mail: Comments can be sent by e-mail only in case the use of CRT is prevented by technical problems. The(se) problem(s) should be reported to the CRT webmaster and comments sent by email to NPA@easa.europa.eu.

Correspondence: If you do not have access to the Internet or e-mail, you can send your comments by mail to:
Process Support
Rulemaking Directorate
EASA
Postfach 10 12 53
50452 Cologne
Germany

Comments should be submitted by **4 January 2013**. If received after this deadline, they might not be taken into account.

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[6] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.03.2008, p. 1). Regulation as last amended by Regulation 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

[7] Management Board Decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (Rulemaking Procedure), EASA MB Decision No 01-2012, 13.3.2012.

III. Comment response document

10. All comments received in time will be responded to and incorporated in a comment response document (CRD). The CRD will be available on the Agency's website and in the Comment-Response Tool (CRT).

IV. Content of the draft Opinion/Decision

11. The part of the NPA related to the subject 1 of the ToR proposes a B2L licence (the letter 'L' meaning 'Light Aircraft') for avionics engineers in general aviation.

12. This licence requires a lower level of knowledge, examination and experience, adapting these requirements to the lower complexity of light aircraft, which are not equipped (or partially equipped) with those complex avionics systems typical of large aircraft flying in IFR regime.

13. This proposal is based on a progressive system which allows the inclusion of different system ratings. This allows giving certifying staff and/or support staff privileges for those systems included in the licence and, eventually, the possibility to progress to a full B2 licence when all the applicable systems are covered.

14. The B2L licence is applicable to all aircraft other than those in Group 1 and is divided in the following 'system ratings':

- communication/navigation (com/nav)
- instruments
- autoflight
- surveillance
- airframe systems

15. A B2L licence, when issued, must contain at least one of the ratings above. Afterwards, the licence holder may progressively add, within the same licence, other system ratings.

16. The part of the NPA related to subject 2 of the ToR proposes an L licence. Its purpose is to cover ELA1 aeroplanes as well as aircraft other than aeroplanes and helicopters (as required by new point (9) to Article 7 of Commission Regulation (EC) No 2042/2003).

17. Compared to the L licence proposed in the Opinion 4/2009, this new L licence only contains one level and is divided in the following sub-categories:

- L1: sailplanes,
- L2: powered sailplanes and ELA1 aeroplanes,
- L3: balloons,
- L4: hot air airships and ELA2 gas airships,
- L5: gas airships above ELA2.

18. In this NPA, Annex II (Part-145) is modified to add the aforementioned new categories B2L and L to the licences held by certifying staff and support staff when Part-145 approved maintenance organisations carry out maintenance work on light aircraft. It has, on the contrary, not been necessary to modify Annex I (Part-M) to add similar requirements to the Subpart-F approved maintenance organisations as the rule states that the list of certifying staff required in the organisations must have Part-66 licences without specifying the categories.

19. Appendix I (Basic knowledge requirements), Appendix II (Basic examination standard) and Appendix IV (Experience requirements for extending an existing Part-66 Aircraft Maintenance Licence) to Part-66 have been modified in order to add the requirements corresponding to the B2L licence.

20. Appendix V (Application form- EASA Form 19) and Appendix VI (Aircraft Maintenance Licence referred to in Annex III (Part-66) – EASA Form 26) have been modified to add both categories B2L and L.

21. Regarding the L licence, the following appendixes have been added: Appendix VII (Basic Knowledge and Training Requirements for category L aircraft maintenance licence) and Appendix VIII (Basic examination standard for category L aircraft maintenance licence).

22. Annex IV (Part-147) to Regulation (EC) No 2042/2003 has been amended to adapt the privileges of a training organisation to sub-contract some modules of training to the modules of the licence category L.

23. Appendix I (Basic training course duration) to Annex IV (Part-147) has been modified to include training duration for both licences categories L and B2L.

24. Appendix II (Maintenance Training Organisation Approval referred to in Annex IV (Part-147) — EASA Form 11) has been amended to add the licence categories L and B2L.

V. Regulatory Impact Assessment

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Subject 1: Adapt the current B2 licensing requirements for maintenance of avionic and electrical systems to the lower complexity of light aircraft.

1. Process and consultation

Difficulties encountered by individuals engaged in avionics maintenance on light aircraft, where the number of maintenance certifying staff continuously decreases, have been reported to the Agency.

Extract from website of the ICAO NGAP & TRAINAIR PLUS Regional Conference:

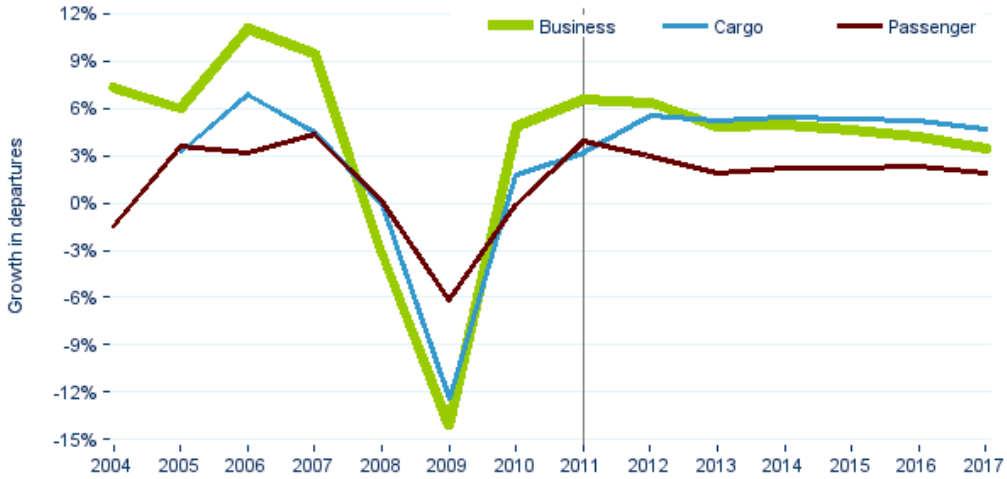
The aviation industry is challenged by a difficult economic context, changing demographics and new technologies with far-reaching potential. States are also facing similar situation with respect to human development and resource planning for the conduct of safety oversight activities. This is especially critical as large contingent of the current generation of aviation professionals will retire, access to affordable training and education is increasingly problematic, and aviation competes with other industry sectors for attracting highly skilled professionals. In this context, it becomes urgent to review existing regulations and propose a new regulatory environment for the recruitment, education, training and retention of the next generation of aviation professionals.

Part-66 B2 licence was developed by the Joint Aviation Authorities (JAA) primarily for transport category aircraft and with the expansion of the B2 licence into general aviation (GA) placed GA in direct competition with air carriers for the employment of B2 engineers.

Currently a majority of B2 licence holders are coming from the conversion of prior national qualifications. A high percentage of these B2 holders represent an ageing demographic and are nearing retirement.

In addition, airlines are expecting to grow annually putting additional pressure on a limited labour resource.

Medium-term forecast of air traffic



Source Eurocontrol
http://www.eurocontrol.int/statfor/gallery/content/public/documents/B143_Business_Aviation_2010_v1.0.pdf

Difficulties encountered by individuals engaged in avionics maintenance on light aircraft, where the number of maintenance certifying staff continuously decreases, have been reported to the Agency. Different reasons are leading to this situation, the most relevant being:

- the basic knowledge requirements and the relevant examinations imposed by the B2 licence cover the full scope of avionics systems for large aircraft operated in all weather conditions, while the majority of light aircraft are operated and equipped to fly in VFR; as a consequence students have real difficulties in passing the examinations by self-study for those systems typical of larger aircraft;
- the alternative to self-study is attending a training course in a Part-147 organisation, but this involves at least 2 years of training and in the field of maintenance organisations dealing with light aircraft, the majority are small organisations that can barely support the training costs for new personnel; and
- when new personnel obtain the licence, they frequently wish to be employed in the airline sector.

2. Issue analysis and risk assessment

2.1. Issue which the NPA is intended to address and sectors concerned

In order to address this situation, it is proposed to better adapt the level of knowledge, the examination and the experience requirements to the case where these aircraft are not equipped with these avionics systems or to situations where they are partially equipped.

A first proposal made by the working group was an avionics licence for light aircraft similar in nature to the B3. This option was evaluated by the working group but came to the conclusion that the avionics technology of light aircraft is not significantly different that the GA fleet, therefore a significant reduction in training could not be realised and an alternative approach was deemed as necessary. In addition, the limitations associated with a category B3 type of licence did not encourage the typical career progression from GA to transport aircraft and therefore had been rejected.

The final proposal that emerged after analysis showed that the greatest savings in time and costs, while retaining the same basic knowledge level, was in dividing the module 13 into avionics systems (autopilot, com/nav, instruments, surveillance, aircraft systems). The working group identified the individual systems contained in module 13 and developed a licensing scheme which allows the student to complete the individual systems independently.

Sectors concerned are: maintenance organisations dealing with general aviation, avionics engineers, training organisations.

2.2. What are the risks (probability and severity)?

The adoption of a B2L licence provides for the possibility of licensing young engineers in aviation who could be offered employment opportunities in general aviation at the beginning of their career. There is still the possibility that the industry of general aviation would not adopt such proposal of licensing and continue recruiting full B2 licences engineers, but when considering the preferences of such staff to be recruited by larger companies leading to better revenue opportunities, the Agency's opinion is that this reduces the risk that B2L licence engineers would not be recruited.

3. Objectives

The objective of this proposal is the establishment of a progressive system based avionics licence for GA avionics engineers which would enable an avionics licence based on the concept of system ratings, giving the privileges of certifying staff or support staff for the individual avionics systems, and allowing a progression to a full B2 licence, if desired.

4. The options identified

Option 1: 'do nothing'.

Option 2: develop regulatory material and guidance material in order to adapt the basic knowledge and examination requirements to general aviation aircraft.

5. Methodology and data requirements (only for full RIA)

Not applicable.

6. Analysis of the impacts

Option 1: 'do nothing'.

- **Safety impacts**

  None.

- **Social impacts**

  None

- **Economic impacts**

  None

- **Environmental impacts**

  None

- **Proportionality issues**

  None

- **Impact on regulatory coordination and harmonisation**

  None

Option 2: develop regulatory material and guidance material in order to adapt the current B2 licensing requirements for maintenance of avionic and electrical systems to groups 2, 3 and 4 aircraft.

- **Safety impacts**

  By retaining the level of knowledge of B2, the B2L licence retained the same safety level as previously realized by the B2.

  By adopting a system based licensing scheme, the general aviation community may have access to a higher number of licensed engineers, which should prevent the problem of under-staffing, avoiding a potential safety risk.

- **Social impacts**

  This should allow young people coming into the industry to gain access to an employment in a technology advanced industry and potentially reduce unemployment within this population.

  The increase of youth employment may help to normalize the demographic employment curves for avionics engineers within the aviation industry.

This may lead also to the employment of staff in training organisations for the development and delivery of courses for the B2L licence.

- **Economic impacts**

  Allowing the use of a B2L licence, may allow the individual to earn earlier a licence as a certifying engineer thereby increasing their earning potential.

  For the organisation and or individual funding the training, this represents a lower initial investment to finance the training for a certifying engineer.

  For the GA maintenance organisations, the cost to employ a B2L should be lower than a full B2 and potentially may increase their activity.

  For the GA owners and operators, there is a potential to stabilise the maintenance costs.

  This may give also to Part-147 training organisations some better opportunities of training. This economic benefit may be partially reduced by the need for adapting their programmes of training and examinations.

  It might lead NAAs to modify the licensing and examination management system and impose additional costs. Some NAAs report that the introduction of the B3 licence has already represented a significant cost.

- **Environmental impacts**

  Any encouragement on the GA activities may have an impact on environments by modifying the number of flights hours and the emissions produced.

- **Proportionality issues**

  There proportionality issues since all sectors of general aviation should obtain a benefit from the new rules.

- **Impact on regulatory coordination and harmonisation**

  This may harmonise rules of licensing engineers not holding yet a B2 licence but already working in general aviation activities which, in case the B2L is not proposed, might remain under-controlled.

7. Conclusion and preferred option

The option n°2 may promote GA as a viable career path towards long term employment within the industry and may help attract young people into the GA industry thereby eliminating the potential understaffing of certifying staff.

After due consideration the Agency believes that option n°2 is to be preferred. Rulemaking in this area is probably the best option as it will be beneficial.

Subject 2: Propose a simple and proportionate system for the licensing of certifying staff involved in the maintenance of aircraft other than aeroplanes and helicopters and in the maintenance of ELA1 aeroplanes.

A Regulatory Impact Assessment for the L licence was already performed in NPA 2008-03, which eventually resulted in Opinion 04/2009 dated 11 December 2009, which showed:

- a positive safety impact;
- no environmental nor equity/fairness impact;
- a mix of positive/negative impacts in the economic and social aspects.

The current proposal has been further simplified and, in addition, considers the possibility of conversion of privileges for existing certifying staff national qualifications. This eliminates any negative impact in the economic and social aspects associated with the need for training and examination for existing licence holders (not needed anymore because of the conversion of privileges), leaving only the positive impact created by the free movement of licence holders and aircraft.

In addition, the current proposal does not create any negative impact linked to proportionality issues or regulatory coordination/harmonisation issues.

B. Draft Opinion:

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

1. deleted text is shown with a strike through: ~~deleted~~
2. changed or new text is highlighted with grey shading: new
3. … indicates that remaining text is unchanged in front of or following the reflected amendment.

I. Regulation EC2042/2003 (Cover Regulation) is amended as follows:

Article 2 is amended as follows:

Article 2 Definitions

Within the scope of the basic Regulation, the following definitions shall apply:

(a) 'aircraft' means any machine that can derive support in the atmosphere from the reactions of the air other than reactions of the air against the earth's surface;

(b) 'certifying staff' means personnel responsible for the release of an aircraft or a component after maintenance;

(c) 'component' means any engine, propeller, part or appliance;

(d) 'continuing airworthiness' means all of the processes ensuring that, at any time in its operating life, the aircraft complies with the airworthiness requirements in force and is in a condition for safe operation;

(e) 'JAA' means 'Joint Aviation Authorities';

(f) 'JAR' means 'Joint Aviation Requirements';

(g) 'large aircraft' means an aircraft, classified as an aeroplane with a maximum take-off mass of more than 5 700 kg, or a multi-engined helicopter;

(h) 'maintenance' means any one or combination of overhaul, repair, inspection, replacement, modification or defect rectification of an aircraft or component, with the exception of pre-flight inspection;

(i) 'organisation' means a natural person, a legal person or part of a legal person. Such an organisation may be established at more than one location whether or not within the territory of the Member States;

(j) 'pre-flight inspection' means the inspection carried out before flight to ensure that the aircraft is fit for the intended flight.

(k) 'ELA1 aircraft' means the following manned European Light Aircraft:

(i) an aeroplane with a Maximum Take-off Mass (MTOM) of 1 200 kg or less that is not classified as complex motor-powered aircraft;

(ii) a sailplane or powered sailplane of 1 200 kg MTOM or less;

(iii) a balloon with a maximum design lifting gas or hot air volume of not more than 3 400 m^3 for hot air balloons, 1 050 m^3 for gas balloons, 300 m^3 for tethered gas balloons;

(iv) an airship designed for not more than four occupants and a maximum design lifting gas or hot air volume of not more than 3 400 m^3 for hot air airships and 1000 m^3 for gas airships;

(l) 'ELA2 aircraft' means the following manned European Light Aircraft:

(i) an aeroplane with a Maximum Take-off Mass (MTOM) of 2 000 kg or less that is not classified as complex motor-powered aircraft;

(ii) a sailplane or powered sailplane of 2 000 kg MTOM or less;

(iii) a balloon;

(iv) a hot air ship;

(v) a gas airship meeting all of the following elements:

- 3% maximum static heaviness,
- Non-vectored thrust (except reverse thrust),
- Conventional and simple design of:
  - structure
  - control system
  - ballonet system
- Non-power assisted controls;

(vi) a Very Light Rotorcraft.

~~(l)~~ (m) 'LSA aircraft' means a light sport aeroplane which has all of the following characteristics:

(i) Maximum Take-off Mass (MTOM) of not more than 600 kg;

(ii) a maximum stalling speed in the landing configuration (VS0) of not more than 45 knots Calibrated Airspeed (CAS) at the aircraft's maximum certificated takeoff mass and most critical centre of gravity;

(iii) a maximum seating capacity of no more than two persons, including the pilot;

(iv) a single, non-turbine engine fitted with a propeller;

(v) a non-pressurised cabin;

~~(m)~~ (n) 'principal place of business' means the head office or the registered office of the undertaking within which the principal financial functions and operational control of the activities referred to in this Regulation are exercised.

II. Annex II (Part-145) to Regulation (EC) No 2042/2003 is amended as follows:

Point 145.A.30 is amended as follows:

145.A.30 Personnel requirements

…

(f) The organisation shall ensure that personnel who carry out and/or control a continued airworthiness non-destructive test of aircraft structures and/or components are appropriately qualified for the particular non-destructive test in accordance with the European or equivalent Standard recognised by the Agency.

Personnel who carry out any other specialised task shall be appropriately qualified in accordance with officially recognised Standards. By derogation to this paragraph those personnel specified in paragraphs (g) and (h)(1) and (h)(2), qualified in category B1, ~~or~~ B3 or L in accordance with Annex III (Part-66);

(g) Any organisation maintaining aircraft, except where stated otherwise in point (j), shall in the case of aircraft line maintenance, have appropriate aircraft rated certifying staff qualified as category B1, B2, B2L, B3, L, as appropriate, in accordance with Annex III (Part-66) and point 145.A.35.

In addition such organisations may also use appropriately task training certifying staff holding the privileges described in points 66.A.20(a)(1) and 66.A.20(a)(3)(ii) and qualified in accordance with Annex III (part-66) and point 145.A.35 to carry out minor scheduled line maintenance and simple defect rectification. The availability of such certifying staff shall not replace the need for category B1, B2, B2L, B3, L certifying staff, as appropriate.';

(h) Any organisation maintaining aircraft, except where stated otherwise in paragraph (j) shall:

1. …

2. in the case of base maintenance of aircraft other than large aircraft have either:

(i) appropriate aircraft rated certifying staff qualified as category B1, B2, B2L, B3, L, as appropriate, in accordance with Annex III (Part-66) and point 145.A.35 or,

(ii) ...

(i) …

(j) …

Point 145.A.35 is amended as follows:

145.A.35 Certifying staff and support staff

(a) ...

(i) 'Support staff' means those staff holding a Part-66 aircraft maintenance licence in category B1, B2, B2L, ~~and/or~~ B3, and/or L with the appropriate aircraft ratings, working in a base maintenance environment while not necessarily holding certification privileges.

(ii) …

(iii) …

…

III. Annex III (Part-66) to Regulation (EC) No 2042/2003 is amended as follows:

ANNEX III

(Part-66)

The Table of Contents is amended as follows:

Contents

SECTION A

TECHNICAL REQUIREMENTS

SUBPART A

AIRCRAFT MAINTENANCE LICENCE

Point 66.A.3 is replaced as follows:

66.A.3 Licence categories and subcategories

Aircraft maintenance licences include the following categories and, when applicable, subcategories and system ratings:

– Category A, divided in the following sub-categories:

  – A1 Aeroplanes Turbine

  – A2 Aeroplanes Piston

  – A3 Helicopters Turbine

  – A4 Helicopters Piston

– Category B1, divided in the following sub-categories:

  – B1.1 Aeroplanes Turbine

  – B1.2 Aeroplanes Piston

  – B1.3 Helicopters Turbine

  – B1.4 Helicopters Piston

– Category B2

The B2 licence is applicable to all aircraft.

– Category B2L

The B2L licence is applicable to all aircraft other than those in Group 1 and is divided in the following 'system ratings':

  – communication/navigation (com/nav)

  – instruments

  – autoflight

  – surveillance

  – airframe systems

A B2L licence shall contain, as a minimum, one system rating.

– Category B3

The B3 licence is applicable to piston-engine non-pressurized aeroplanes of 2 000 kg MTOM and below

– Category L, divided in the following sub-categories:

  – L1: sailplanes,

  – L2: powered sailplanes and ELA1 aeroplanes,

  – L3: balloons,

  – L4: hot air airships and ELA2 gas airships,

  – L5: gas airships above ELA2,

– Category C

The C licence is applicable to aeroplanes and helicopters.

Point 66.A.5 is amended as follows:

66.A.5 Aircraft groups

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, gas airships above ELA2 and other aircraft requiring an aircraft type rating when defined so by the Agency.
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.
4. Group 4: sailplanes, powered sailplanes, balloons and airships, other than those in Group 1.

Point 66.A.20 is amended as follows:

66.A.20 Privileges

(a) The following privileges shall apply:

…

4. A category B2L aircraft maintenance licence shall permit the holder to issue certificates of release to service and to act as B2L support staff for the following:
   – maintenance performed on electrical systems; and
   – maintenance performed on avionics systems within the limits of the system ratings specifically endorsed on the licence, and
   – when holding the 'airframe system' rating, performance of electrical and avionics tasks within powerplant and mechanical systems, requiring only simple tests to prove their serviceability.

5.4 A category B3 aircraft maintenance licence shall permit the holder to issue certificates of release to service for:
   – maintenance performed on aeroplane structure, powerplant and mechanical and electrical systems;
   – work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.

6. A category L aircraft maintenance licence shall permit the holder to issue certificates of release to service and to act as L support staff following:
   – maintenance performed on aircraft structure, powerplant and mechanical and electrical systems;

– work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.

Sub-category L2 includes sub-category L1. Any limitation to the sub-category L2 becomes applicable to the sub-category L1.

7.~~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.

Point 66.A.25 is amended as follows:

66.A.25 Basic knowledge requirements

(a) Except in the case of B2L and L licences, an ~~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 Annex III (Part-66). The examination shall be conducted either by a training organisation appropriately approved in accordance with Annex IV (Part-147) or by the competent authority.

(b) An applicant for an aircraft maintenance licence in the category L within a given subcategory or for the addition of a different subcategory, shall comply with the basic training requirements of Appendix VII to this Annex (Part-66) and demonstrate by examination a level of knowledge in the appropriate subject modules in accordance with the Appendix VIII to this Annex (Part-66).

The basic knowledge training courses shall be conducted by a training organisation appropriately approved in accordance with Annex IV (Part-147) or as approved by the competent authority.

The basic knowledge examinations shall be conducted by a training organisation appropriately approved in accordance with Annex IV (Part-147), by the competent authority or as approved by the competent authority.

The holder of an aircraft maintenance licence in the category/subcategory B1.2 or B3 is deemed to meet the basic knowledge training and examination requirements for a licence in the subcategories L1 and L2.

The basic knowledge requirements of subcategory L4 include the basic knowledge requirements of subcategory L3.

(c) By derogation to point (b), an applicant for an aircraft maintenance licence in the category L may replace the basic knowledge training requirement of paragraph (b) by the experience requirement described in 66.A.30(4)(ii).

(d) An applicant for an aircraft maintenance licence in the category B2L for a particular 'system rating', or for the addition of an additional 'system rating', shall demonstrate by examination a level of knowledge in the appropriate subject modules in accordance with the Appendix I to Annex III (Part-66). The examination shall be conducted either by a training organisation appropriately approved in accordance with Annex IV (Part-147) or by the competent authority.

(e)~~(b)~~ The training courses and examinations shall be passed within ten 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~~ f).

(f)~~(c)~~ The applicant may apply to the competent authority 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 (e)~~(b)~~ above, and

2 any other technical qualification considered by the competent authority to be equivalent to the knowledge standard of Annex III (Part-66).

Credits shall be granted in accordance with Subpart E of Section B of this Annex (Part-66).

(g)~~(d)~~ Credits expire ten years after they were granted to the applicant by the competent authority. The applicant may apply for new credits after expiration.

Point 66.A.30 is amended as follows:

66.A.30 Basic experience requirements

(a) An applicant for an aircraft maintenance licence shall have acquired:

1. ...

2 ...

3. for category B2L:

(i) three years of practical maintenance experience on operating aircraft, covering the corresponding system rating(s), if the applicant has no previous relevant technical training; or

(ii) two years of practical maintenance experience on operating aircraft, covering the corresponding system rating(s), and completion of training considered relevant by the competent authority as a skilled worker, in a technical trade; or

(iii) one year of practical maintenance experience on operating aircraft, covering the corresponding system rating(s), and completion of a Part - 147 approved basic training course.

For the addition of new system rating(s) to an existing B2L licence, 3 months of practical maintenance experience relevant to the new system rating(s) shall be required for each system rating added.

4. for category L:

(i) when qualified in accordance with 66.A.25(b), one year of practical maintenance experience on operating aircraft covering a representative cross-section of maintenance activities in the corresponding subcategory, except that for the inclusion of an additional subcategory it is only required the completion of the corresponding training and examination in accordance with Appendixes VII and VIII and six months of additional practical experience related to the additional subcategory.

(ii) when qualified in accordance with 66.A.25(c), two years of practical maintenance experience on operating aircraft covering a representative cross-section of maintenance activities in the corresponding subcategory, except that for the inclusion of an additional subcategory it is only required the completion of the corresponding examination in accordance with Appendix VIII and 12 months of additional practical experience related to the additional subcategory.

The holder of an aircraft maintenance licence in the category/subcategory B1.2 or B3 is deemed to meet the basic experience requirements for a licence in the subcategories L1 and L2.

5.~~3~~ for category C with respect to large aircraft:

...

6.~~4~~ for category C with respect to other than large aircraft: three 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;.

7.~~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 competent authority, three years of experience working in a civil aircraft maintenance environment on a representative selection of tasks directly associated with aircraft maintenance including six months of observation of base maintenance tasks.

(b) …

(c) …

(d) …

(e) …

(f) …

Point 66.A.45 is amended as follows:

66.A.45 Endorsement with aircraft ratings

(a) In order to be entitled to exercise certification privileges on a specific aircraft type, the holder of an aircraft maintenance licence needs to have his/her licence endorsed with the relevant aircraft ratings.

– For category B1, B2 or C the relevant aircraft rating are the following:

1. For group 1 aircraft the appropriate aircraft type rating.

2 For group 2 aircraft, the appropriate aircraft type rating, manufacturer sub-group rating or full sub-group rating.

3. For group 3 aircraft, the appropriate aircraft type rating or full group rating.

4. For group 4 aircraft, for the category B2 and C, the full group rating.

– For category B2L the relevant aircraft ratings are the following:

1. For group 2 aircraft, manufacturer sub-group rating or full sub-group rating.

2. For group 3 aircraft, full group rating.

3. For group 4 aircraft, the full group rating.

– For category B3, the relevant rating is piston-engine non-pressurized aeroplanes of 2000 kg MTOM and below'

– For category L the relevant aircraft ratings are the following:

– For subcategory L1, the rating 'sailplanes',

– For subcategory L2, the rating 'powered sailplanes and ELA1 aeroplanes',

– For subcategory L3, the rating 'balloons',

– For subcategory L4, the rating 'hot air airships and ELA2 gas airships'.

– For subcategory L5, the appropriate airship type rating.

– For category A, no rating is required, subject to compliance with the requirements of point 145.A.35 of Annex II (Part-145).

(b) The endorsement of aircraft type ratings requires the satisfactory completion of:

- the relevant category B1, B2, or C aircraft type training described in Appendix III to Annex III (Part-66); or
- in the case of gas airship type ratings on a B2 or L5 licence, a type training approved by the competent authority.

(c) ...

(d) ...

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~~7), the first relevant aircraft type examination shall be at the category B1 or B2 level.

(e) For group 2 aircraft:

1. ...
2. ...
3. the endorsement of manufacturer sub-groups and full sub-group ratings for category B2 and B2L 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.
4. By derogation from paragraph (e)3, the holder of a B2L licence, endorsed with a full sub-group 2b is entitled to be endorsed with a full sub-group 2c.

(f) For group 3 and 4 aircraft:

1. the endorsement of the full group 3 rating for category B1, B2, B2L and C licence holders and the endorsement of the full group 4 rating for B2 and B2L licence holders require demonstration of practical experience, which shall include a representative cross section of maintenance activities relevant to the licence category and to the group 3 or 4 as applicable.
2. ...
3. By derogation from paragraph (f)1, the holder of a B2L licence, endorsed with a full sub-group 2a or 2b is entitled to be endorsed with groups 3 and 4.

(g) ...

(h) For the L licence, subcategories L1, L2, L3 and L4:

1. the endorsement of ratings requires demonstration of practical experience which shall include a representative cross-section of maintenance activities relevant to the licence subcategory;
2. unless the applicant provides evidence of appropriate experience, the ratings shall be subject to the following limitations, which shall be endorsed on the licence:

(i) for the rating 'sailplanes' and the rating 'powered sailplanes and ELA1 aeroplanes':

– wooden structure aircraft,

– aircraft with metal tubing structure covered with fabric,

– metal structure aircraft,

– composite structure aircraft.

(ii) for the rating 'balloons':

– hot air,

– ELA1 gas balloons, and/or

– ELA2 gas balloons.

(iii) for the rating 'hot air airships and ELA2 gas airships':

– hot air, and/or

– gas.

The holder of an aircraft maintenance licence in the subcategory B1.2 endorsed with the group 3 rating or in the category B3 endorsed with the rating 'piston-engine non-pressurized aeroplanes of 2 000 kg MTOM and below', is deemed to meet the requirements for the issuance of a fully rated licence in the subcategories L1 and L2, and with the same limitations as the B1.2/B3 licence held.

SECTION B

PROCEDURES FOR COMPETENT AUTHORITIES

SUBPART B

ISSUE OF AN AIRCRAFT MAINTENANCE LICENCE

Point 66.B.100 is amended as follows:

66.B.100 Procedure for the issue of an aircraft maintenance licence by the competent authority

(a) ...

(b) The competent authority shall verify an applicant's examination status and/or confirm the validity of any credits to ensure that all required modules of Appendix I or Appendix VIII, as applicable, have been met with as required by this Annex (Part-66).

…

Point 66.B.110 is amended as follows:

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 competent authority shall endorse the additional basic category, subcategory or, for category B2L, the system rating on the aircraft maintenance licence by stamp and signature or reissue the licence.

(b) The competent authority record system shall be changed accordingly.

(c) Upon request by the applicant, the competent authority shall replace a licence in the category B2L with a licence in the category B2 endorsed with the same aircraft rating(s) when the holder has:

- demonstrated the basic knowledge of all system ratings and of the additional sub-modules for category B2 shown in Appendix I and;

- satisfied the practical experience required in Appendix IV.

(d) In the case of a holder of an aircraft maintenance licence in the subcategory B1.2 endorsed with the group 3 rating or in the category B3 endorsed with the rating 'piston-engine non-pressurised aeroplanes of 2 000 kg MTOM and below', the competent authority shall issue, upon application, a fully rated licence in the subcategories L1 and L2, with the same limitations as the B1.2/B3 licence held.

A new Point 66.B.111 is added as follows:

66.B.111 Procedure for the change of an aircraft maintenance licence in the category B2L to include an additional system rating

(a) When satisfied by the demonstration of knowledge required by 66.A.25(d) and of the experience required for the addition of a system rating specified in 66.A.30(a)3, the competent authority shall endorse the additional system rating on the aircraft maintenance licence for the relevant aircraft rating by stamp and signature or reissue the licence.

(b) The competent authority record system shall be changed accordingly.

Point 66.B.115 is amended as follows:

66.B.115 Procedure for the change of an aircraft maintenance licence to include an aircraft rating or to remove limitations

…

(f) Compliance with the practical elements shall be demonstrated:

(i) by the provision of detailed practical training records or a log-book provided by a maintenance organisation approved in accordance with Annex II (Part-145) or Annex I (Part-M) Subpart F, as appropriate, or by certifying staff appropriately rated in accordance with this Annex, or, where available,

(ii) by a training certificate covering the practical training element issued by a maintenance training organisation appropriately approved in accordance with Annex IV (part-147),

…

SUBPART C

EXAMINATIONS

Point 66.B.200 is amended as follows:

66.B.200 Examination by the competent authority

(a) ...

(b) ...

(c) Basic examinations shall follow the standard specified in Appendix I and II or Appendix VII and VIII, as applicable, to this Annex (Part-66).

…

SUBPART E

EXAMINATION CREDITS

Point 66.B.405 is amended as follows:

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 or VII to this Annex (Part-66), as applicable, and,

...

…

(d) The competent authority shall check on a regular basis whether (i) the national qualification standard or (ii) Appendix I or Appendix VII as applicable, to this Annex (Part-66) have changed and assess if changes to the credit report are consequently required. Such changes shall be documented, dated and recorded.

Point 66.B.410 is amended as follows:

66.B.410 Examination credit validity

…

(c) Upon expiration of the credits, the applicant may apply for new credits. The competent authority shall continue the validity of the credits for an additional period of ten year without further consideration if basic knowledge requirements defined in Appendix I or Appendix VII, as applicable, to this Annex (Part-66) have not been changed.

Appendix I is amended as follows:

Appendix I

Basic Knowledge Requirements

(except for category L licence)

1 Knowledge levels for Category A, B1, B2, B2L, B3 and C Aircraft Maintenance Licence

Basic knowledge for categories A, B1, B2, B2L, and B3 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.

...

2 Modularisation

Qualification on basic subjects for each aircraft maintenance licence category or subcategory should be in accordance with the following matrix, where applicable subjects are indicated by an 'X':

For categories A, B1 and B3:

Subject module	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 2 000 kg MTOM and below
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

For categories B2 and B2L:

Subject module/sub-modules	B2	B2L
1	X	X
2	X	X
3	X	X
4	X	X
5	X	X
6	X	X
7A	X	X
7B		
8	X	X
9A	X	X
9B		
10	X	X
11A		
11B		
11C		
12		
13.1 and 13.2	X	X
13.3(a)	X	For system rating 'Autoflight'
13.3(b)	X	
13.4(a)	X	For system rating 'Com/Nav'
13.4(b)	X	For system rating 'Surveillance'
13.4(c)	X	
13.5	X	X
13.6	X	
13.7	X	For system rating 'Autoflight'

13.8	X	For system rating 'Instruments'
13.9	X	X
13.10	X	
13.11 through 13.18	X	For system rating 'Airframe systems'
13.19 through 13.22	X	
14	X	For system rating 'Instruments' and For system rating 'Airframe systems'
15		
16		
17A		
17B		

MODULE 1. MATHEMATICS

	LEVEL			
	A	B1	B2 B2L	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)	2	2	2	2

	LEVEL			
	A	B1	B2 B2L	B3
Graphical representation; nature and uses of graphs, graphs of equations/functions; (c) Simple trigonometry; trigonometrical relationships, use of tables and rectangular and polar coordinates.	-	2	2	2

MODULE 2. PHYSICS

	LEVEL			
	A	B1	B2 B2L	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 movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal/ centripetal forces); Periodic motion: pendular movement; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency.	1	2	1	1
2.2.3 Dynamics (a) Mass Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;	1	2	1	1
(b) Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).	1	2	2	1
2.2.4 Fluid dynamics				

	LEVEL			
	A	B1	B2 B2L	B3
(a) Specific gravity and density;	2	2	2	2
(b) Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.	1	2	1	1
2.3 Thermodynamics				
(a) Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition.	2	2	2	2
(b) Heat capacity, specific heat; Heat transfer: convection, radiation and conduction; Volumetric expansion; First and second law of thermodynamics; Gases: ideal gases laws; specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and 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) Nature of light; speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics.	-	2	2	-
2.5 Wave Motion and Sound Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.	-	2	2	-

MODULE 3. ELECTRICAL FUNDAMENTALS

	LEVEL			
	A	B1	B2 B2L	B3
3.1 Electron Theory Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.	1	1	1	1
3.2 Static Electricity and Conduction	1	2	2	1

	LEVEL			
	A	B1	B2 B2L	B3
Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.				
3.3 Electrical Terminology	1	2	2	1
The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.				
3.4 Generation of Electricity	1	1	1	1
Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.				
3.5 DC Sources of Electricity	1	2	2	2
Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.				
3.6 DC Circuits	-	2	2	1
Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.				
3.7 Resistance/Resistor				
(a) Resistance and affecting factors; 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, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;	-	1	1	-
3.8 Power Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula;	-	2	2	1

	LEVEL			
	A	B1	B2 B2L	B3
Calculations involving power, work and energy.				
3.9 Capacitance/Capacitor Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric; Constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.	-	2	2	1
3.10 Magnetism				
(a) Theory of magnetism; Properties of a magnet; Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.	-	2	2	1
(b) Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.	-	2	2	1
3.11 Inductance/Inductor Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self induction; Saturation point; Principle uses of inductors.	-	2	2	1
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;	-	2	2	1

	LEVEL			
	A	B1	B2 B2L	B3
Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.				
3.13 AC Theory 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 voltages 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	-
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

MODULE 4. ELECTRONIC FUNDAMENTALS

LEVEL

	A	B1	B2 B2L	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 (thyristor), light emitting diode, Shottky 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, multivibrators, flip-flop circuits.	-	-	2	-
4.1.3 Integrated Circuits				
(a) Description and operation of logic circuits and linear circuits/operational amplifiers.	-	1	-	1
(b)	-	-	2	-

	LEVEL			
	A	B1	B2 B2L	B3
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.				
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	-

MODULE 5. DIGITAL TECHNIQUES / ELECTRONIC INSTRUMENT SYSTEMS

	LEVEL				
	A	B1-1 B1-3	B1-2 B1-4	B2 B2L	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; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	-	1	-	2	-
5.4 Data Buses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications. Aircraft Network / Ethernet	-	2	-	2	-

	LEVEL				
	A	B1-1 B1-3	B1-2 B1-4	B2 B2L	B3
5.5 Logic Circuits					
(a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.	-	2	-	2	1
(b) Interpretation of logic diagrams.	-	-	-	2	-
5.6 Basic Computer Structure					
(a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).	1	2	-	-	-
(b) Computer related terminology; Operation, layout and interface of the major components in a micro computer including their associated bus systems; Information contained in single and multiaddress instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.	-	-	-	2	-
5.7 Microprocessors 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

	LEVEL				
	A	B1-1 B1-3	B1-2 B1-4	B2 B2L	B3
5.12 Electrostatic Sensitive Devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.	1	2	2	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-Electromagnetic Interference HIRF-High Intensity Radiated Field Lightning/lightning protection	-	2	2	2	1
5.15 Typical Electronic/Digital Aircraft Systems General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) such as: *(a) For B1 and B2 only:* (ACARS-ARINC Communication and Addressing and Reporting System EICAS-Engine Indication and Crew Alerting System FBW-Fly by Wire FMS-Flight Management System IRS-Inertial Reference System *(b) For B1, B2 and B3:* ECAM-Electronic Centralised Aircraft Monitoring EFIS-Electronic Flight Instrument System GPS-Global Positioning System TCAS-Traffic Alert Collision Avoidance System Integrated Modular Avionics Cabin Systems Information Systems	-	2	2	2	1

MODULE 6. MATERIALS AND HARDWARE

	LEVEL			
	A	B1	B2 B2L	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

	LEVEL			
	A	B1	B2 B2L	B3
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 — Composite and Non-Metallic				
6.3.1 Composite and non-metallic other than wood and fabric				
(a) Characteristics, 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 Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aeroplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.	1	2	-	2
6.3.3 Fabric covering Characteristics, properties and types of fabrics used in aeroplanes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	1	2	-	2
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

	LEVEL			
	A	B1	B2 B2L	B3
Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads.				
6.5.2 Bolts, studs and screws 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.	2	2	2	2
6.5.3 Locking devices Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.	2	2	2	2
6.5.4 Aircraft rivets Types of solid and blind rivets: specifications and identification, heat treatment.	1	2	1	2
6.6 Pipes and Unions				
(a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;	2	2	2	2
(b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2	2	1	2
6.7 Springs Types of springs, materials, characteristics and applications.	-	2	1	1
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	1	2	2	2

	LEVEL			
	A	B1	B2 B2L	B3
Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.				

MODULE 7A. MAINTENANCE PRACTICES

Note: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 7B.

	LEVEL		
	A	B1	B2 B2L
7.1 Safety Precautions-Aircraft and Workshop Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	3	3	3
7.2 Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	3	3	3
7.3 Tools Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;	3	3	3
7.4 Avionic General Test Equipment Operation, function and use of avionic general test equipment.	-	2	3
7.5 Engineering Drawings, Diagrams and Standards Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.	1	2	2
7.6 Fits and Clearances Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.	1	2	1

	LEVEL		
	A	B1	B2 B2L
7.7 Electrical Wiring Interconnection System (EWIS) 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
7.8 Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	1	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	-
7.10 Springs Inspection and testing of springs.	1	2	-
7.11 Bearings Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	1	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	-
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	1	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	-
7.14.2 Composite and non-metallic Bonding practices; Environmental conditions; Inspection methods.	-	2	-
7.15 Welding, Brazing, Soldering and Bonding			
(a)	-	2	2

	LEVEL		
	A	B1	B2 B2L
Soldering methods; inspection of soldered joints.			
(b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	-	2	-
7.16 Aircraft Weight and Balance			
(a) Centre of Gravity/Balance limits calculation: use of relevant documents;	-	2	2
(b) Preparation of aircraft for weighing; Aircraft weighing	-	2	-
7.17 Aircraft Handling and Storage Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	2	2	2
7.18 Disassembly, Inspection, Repair and Assembly Techniques			
(a) Types of defects and visual inspection techniques. Corrosion removal, assessment and reprotection.	2	3	3
(b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes;	-	2	-
(c) Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.	-	2	1
(d) Disassembly and re-assembly techniques.	2	2	2
(e) Trouble shooting techniques	-	2	2
7.19 Abnormal Events			
(a) Inspections following lightning strikes and HIRF penetration.	2	2	2
(b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2	2	-

	LEVEL		
	A	B1	B2 B2L
7.20 Maintenance Procedures 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	1	2	2

MODULE 7B. MAINTENANCE PRACTICES

Note: The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.

	LEVEL
	B3
7.1 Safety Precautions-Aircraft and Workshop Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	3
7.2 Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	3
7.3 Tools Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;	3
7.4 Avionic General Test Equipment Operation, function and use of avionic general test equipment.	-
7.5 Engineering Drawings, Diagrams and Standards Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.	2
7.6 Fits and Clearances	2

	LEVEL B3
Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.	
7.7 Electrical Cables and Connectors Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding.	2
7.8 Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	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.	2
7.10 Springs Inspection and testing of springs.	1
7.11 Bearings Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	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.	2
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	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
7.14.2 Composite and non-metallic Bonding practices; Environmental conditions; Inspection methods.	2
7.15 Welding, Brazing, Soldering and Bonding	

	LEVEL
	B3
(a) Soldering methods; inspection of soldered joints.	2
(b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	2
7.16 Aircraft Weight and Balance	
(a) Centre of Gravity/Balance limits calculation: use of relevant documents;	2
(b) Preparation of aircraft for weighing; Aircraft weighing	2
7.17 Aircraft Handling and Storage Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	2
7.18 Disassembly, Inspection, Repair and Assembly Techniques	
(a) Types of defects and visual inspection techniques. Corrosion removal, assessment and reprotection.	3
(b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes;	2
(c) Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.	2
(d) Disassembly and re-assembly techniques.	2
(e) Trouble shooting techniques	2
7.19 Abnormal Events	
(a) Inspections following lightning strikes and HIRF penetration.	2
(b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2

	LEVEL
	B3
7.20 Maintenance Procedures 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	2

MODULE 8. BASIC AERODYNAMICS

	LEVEL			
	A	B1	B2 B2L	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

MODULE 9A. HUMAN FACTORS

Note: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 9B.

	LEVEL		
	A	B1	B2 B2L

	LEVEL		
	A	B1	B2 B2L
9.1 General The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law.	1	2	2
9.2 Human Performance and Limitations Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	1	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
9.4 Factors Affecting Performance Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.	2	2	2
9.5 Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	1	1	1
9.6 Tasks Physical work; Repetitive tasks; Visual inspection; Complex systems.	1	1	1
9.7 Communication Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	2	2	2
9.8 Human Error Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e accidents); Avoiding and managing errors.	1	2	2

	LEVEL		
	A	B1	B2 B2L
9.9 Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.	1	2	2

MODULE 9B. HUMAN FACTORS

Note: The scope of this module shall reflect the less demanding environment of maintenance for B3 licence holders.

	LEVEL
	B3
9.1 General The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law.	2
9.2 Human Performance and Limitations Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	2
9.3 Social Psychology Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership.	1
9.4 Factors Affecting Performance Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.	2
9.5 Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	1
9.6 Tasks Physical work; Repetitive tasks; Visual inspection;	1

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

MODULE 10. AVIATION LEGISLATION

	LEVEL			
	A	B1	B2 B2L	B3
10.1 Regulatory Framework Role of the International Civil Aviation Organisation; Role of the European Commission; Role of EASA; Role of the Member States and National Aviation Authorities; Regulation (EC) No 216/2008 and its implementing rules Regulations (EC) 1702/2003 and 2042/2003 Relationship between the various Annexes (Parts) such as Part-21, Part-M, Part-145, Part-66, Part-147 and EU-OPS	1	1	1	1
10.2 Certifying Staff — Maintenance Detailed understanding of Part-66.	2	2	2	2
10.3 Approved Maintenance Organisations Detailed understanding of Part-145 and Part-M Subpart F.	2	2	2	2
10.4 Air operations General understanding of EU-OPS. 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				

	LEVEL			
	A	B1	B2 B2L	B3
(a) General General understanding of Part-21 and EASA certification specifications CS-23, 25, 27, 29.	-	1	1	1
(b) Documents Certificate of Airworthiness; restricted certificates of airworthiness and 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 Part-21 provisions related to continuing airworthiness. Detailed understanding of Part-M.	2	2	2	2
10.7 Applicable National and International Requirements for (if not superseded by EU requirements).				
(a) Maintenance Programmes, Maintenance checks and inspections; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; *Only for A to B2 licences:* Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists;	1	2	2	2
(b) Continuing airworthiness; Minimum equipment requirements - Test flights; *Only for B1 and B2 licences:* ETOPS, maintenance and dispatch requirements; All Weather Operations, Category 2/3 operations. .	-	1	1	1

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

	LEVEL	
	A1	B1.1
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* 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.	1	2
11.2 Airframe Structures — General Concepts		
(a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision; Aircraft bonding.	2	2
(b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	1	2
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, stabiliser, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety	1	2

	LEVEL	
	A1	B1.1
devices; Windows and windscreen construction and mechanisms.		
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	1	2
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	1	2
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	1	2
11.3.5 Nacelles/Pylons (ATA 54) Nacelles/Pylons: — Construction; — Firewalls; — Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (ATA 21)		
11.4.1 Air supply Sources of air supply including engine bleed, APU and ground cart;	1	2
11.4.2 Air Conditioning Air conditioning systems; Air cycle and vapour cycle machines; Distribution systems; Flow, temperature and humidity control system.	1	3
11.4.3 Pressurisation Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers.	1	3
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

	LEVEL	
	A1	B1.1
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: — 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
11.8 Fire Protection (ATA 26)	1	3
(a) Fire and smoke detection and warning systems; Fire estinguishing systems; System tests.		
(b) Portable fire extinguisher.	1	1
11.9 Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, spped brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust lock systems; Balancing and rigging;	1	3

	LEVEL	
	A1	B1.1
Stall protection / warning system.		
11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defueling; Longitudinal balance fuel systems.	1	3
11.11 Hydraulic Power (ATA 29) 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.	1	3
11.12 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, 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)	1	3

	LEVEL	
	A1	B1.1
System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;		
11.16 Pneumatic/Vacuum (ATA 36)	1	3
System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.		
11.17 Water/ Waste (ATA 38)	2	3
Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.		
11.18 On Board Maintenance Systems (ATA 45)	1	2
Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).		
11.19 Integrated Modular Avionics (ATA42)	1	2
Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc. Core System; Network Components;		
11.20 Cabin Systems (ATA44)	1	2
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. The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels. The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:		

	LEVEL	
	A1	B1.1
• Data/Radio Communication, In-Flight Entertainment System. • The Cabin Network Service may host functions such as: • Access to pre-departure/departure reports, • E-mail/intranet/internet access, • Passenger database, Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System;		
11.21 Information Systems (ATA46) 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. Typical examples include Air Traffic and Information Management Systems and Network Server Systems Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System;	1	2

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Note 1: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 11C.

Note 2: The scope of this Module shall 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* 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;	1	2
11.1.2. *High Speed Flight – N/A*	-	-
11.2 Airframe Structures — General Concepts		
(a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision; Aircraft bonding.	2	2
(b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	1	2
11.3 Airframe Structures — Aeroplanes		
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; Windows and windscreen attachment.	1	2
11.3.2 Wings (ATA 57)	1	2

	LEVEL	
	A2	B1.2
Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.		
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	1	2
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	1	2
11.3.5 Nacelles/Pylons (ATA 54) Nacelles/Pylons: — Construction; — Firewalls; — Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (ATA 21) Pressurisation and air conditioning systems; Cabin pressure controllers, protection and warning devices; Heating systems.	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: — 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)	1	1

	LEVEL	
	A2	B1.2
Cabin lay-out; Equipment lay-out; Cabin Furnishing installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.		
11.8 Fire Protection (ATA 26)		
(a)	1	3
Fire and smoke detection and warning systems; Fire estinguishing systems; System tests.		
(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 system.	1	3
11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defueling.	1	3
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;	1	3
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.	1	3
11.13 Landing Gear (ATA 32)	2	3

	LEVEL	
	A2	B1.2
Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering; Air-ground sensing.		
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

MODULE 11C. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

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

	LEVEL
	B3
11.1 Theory of Flight	
Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons; — 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, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges;	1

	LEVEL B3
Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and anti-balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	
11.2 Airframe Structures — General Concepts	
(a)	2
Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision; Aircraft bonding.	
(b)	2
Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	
11.3 Airframe Structures — Aeroplanes	
11.3.1 Fuselage (ATA 52/53/56) Construction; Wing, tail-plane, pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.	1
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	1
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	1
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	1
11.3.5 Nacelles/Pylons (ATA 54)	

	LEVEL B3
Nacelles/Pylons: — Construction; — Firewalls; — Engine mounts.	1
11.4 Air Conditioning (ATA 21) Heating and ventilation systems	1
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
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22); — Communications (ATA 23); — Navigation Systems (ATA 34).	1
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.	2
11.7 Equipment and Furnishings (ATA 25) Emergency equipment requirements; Seats, harnesses and belts.	2
11.8 Fire Protection (ATA 26) Portable fire extinguisher.	2
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 system.	3
11.10 Fuel Systems (ATA 28)	2

	LEVEL B3
System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	
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.	2
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.	1
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.	2
11.14 Lights (ATA 33) External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2
11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	2
11.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure and vacuum pumps Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	2

	LEVEL	
	A3 A4	B1.3 B1.4
12.1 Theory of Flight – Rotary Wing Aerodynamics Terminology; Effects of gyroscopic precession; Torque reaction and directional control; Dissymmetry of lift, Blade tip stall; Translating tendency and its correction; Coriolis effect and compensation; Vortex ring state, power settling, overpitching; Auto-rotation; Ground effect.	1	2
12.2 Flight Control Systems Cyclic control; Collective control; Swashplate; Yaw control: Anti-Torque Control, Tail rotor, bleed air; Main Rotor Head: Design and Operation features; Blade Dampers: Function and construction; Rotor Blades: Main and tail rotor blade construction and attachment; Trim control, fixed and adjustable stabilisers; System operation: manual, hydraulic, electrical and fly-by-wire; Artificial feel; Balancing and rigging.	2	3
12.3 Blade Tracking and Vibration Analysis Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	1	3
12.4 Transmission 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.	1	3
12.5 Airframe Structures (a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision.	2	2

	LEVEL	
	A3 A4	B1.3 B1.4
(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, air speed indicator, vertical speed indicator; Gyroscopic:artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn co-ordinator; Compasses: direct reading, remote reading; Vibration indicating systems - HUMS; Glass cockpit; Other aircraft system indication.	1	2
12.7.2 Avionic Systems Fundamentals of system layouts and operation of: Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	1	1
12.8 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation, AC power generation;	1	3

	LEVEL	
	A3 A4	B1.3 B1.4
Emergency power generation; Voltage regulation, Circuit protection. Power distribution; Inverters, transformers, rectifiers; External/Ground power.		
12.9 Equipment and Furnishings (ATA 25)		
(a)	2	2
Emergency equipment requirements; Seats, harnesses and belts; Lifting systems.		
(b)	1	1
Emergency flotation systems; Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation;		
12.10 Fire Protection (ATA 26) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
12.11 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	1	3
12.12 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3
12.13 Ice and Rain Protection (ATA 30)	1	3

	LEVEL	
	A3 A4	B1.3 B1.4
Ice formation, classification and detection; Anti-icing and De-icing systems: electrical, hot air and chemical; Rain repellant and removal; Probe and drain heating; Wiper system.		
12.14 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, Tyres, brakes; Steering; Air-ground sensing; Skids, floats.	2	3
12.15 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	3
12.16 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
12.17 Integrated Modular Avionics (ATA42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc. Core System; Network Components;	1	2
12.18 On Board Maintenance Systems (ATA45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	1	2
12.19 Information Systems (ATA46)	1	2

	LEVEL	
	A3 A4	B1.3 B1.4
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. Typical examples include Air Traffic and Information Management Systems and Network Server Systems Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System;		

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS

	LEVEL
	B2 B2L
13.1 Theory of Flight *(a) Aeroplane Aerodynamics and Flight Controls*	1
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.	
(b) High Speed Flight	1
Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number.	
(c) Rotary Wing Aerodynamics	1
Terminology; Operation and effect of cyclic, collective and anti-torque controls.	
13.2 Structures – General Concepts (a)	1
Fundamentals of structural systems.	
(b)	2

	LEVEL B2 B2L
Zonal and station identification systems; Electrical bonding; Lightning strike protection provision.	
13.3 Autoflight (ATA 22)	
(a) 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;	3
(b) 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)	3
(a) 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; - Emergency Locator Transmitters; - Cockpit Voice Recorder; - Very High Frequency omnidirectional range (VOR); - Automatic Direction Finding (ADF); - Instrument Landing System (ILS); - Flight Director systems; Distance Measuring Equipment (DME); - Area navigation, RNAV systems; - Flight Management Systems; - Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS) ;	
(b) - Air Traffic Control transponder, secondary surveillance radar; - Traffic Alert and Collision Avoidance System (TCAS); - Weather avoidance radar; - Radio altimeter;	
(c) - Microwave Landing System (MLS); - Very Low Frequency and hyperbolic navigation (VLF/Omega); - Doppler navigation;	

	LEVEL B2 B2L
- Inertial Navigation System; - ARINC communication and reporting;	
13.5 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.	3
13.6 Equipment and Furnishings (ATA 25) Electronic emergency equipment requirements. Cabin entertainment equipment.	3
13.7 Flight Controls (ATA 27)	
(a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks. Stall protection systems.	2
(b) System operation: electrical, fly-by-wire.	3
13.8 Instruments (ATA 31) Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pitot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machmeters; Altitude reporting / alerting systems; Air data computers; Instrument pneumatic systems; Direct reading pressure and temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons;	3

	LEVEL B2 B2L
Slip indicators; Directional gyros; Ground Proximity Warning Systems; Compass systems; Flight Data Recording systems; Electronic Flight Instrument Systems; Instrument warning systems including master warning systems and centralised warning panels; Stall warning systems and angle of attack indicating systems; Vibration measurement and indication; Glass cockpit.	
13.9 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	3
13.10 On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	3
13.11 Air Conditioning and Cabin Pressurisation (ATA21)	
13.11.1. *Air supply* Sources of air supply including engine bleed, APU and ground cart;	2
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)	3

	LEVEL B2 B2L
Fire and smoke detection and warning systems; 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
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

	LEVEL B2 B2L
Steering;	3
Air-ground sensing.	3
13.17 Oxygen (ATA 35)	
System lay-out: cockpit, cabin;	3
Sources, storage, charging and distribution;	3
Supply regulation;	3
Indications and warnings;	3
13.18 Pneumatic/Vacuum (ATA 36)	
System lay-out;	2
Sources: engine/APU, compressors, reservoirs, ground supply	2
Pressure control;	3
Distribution;	1
Indications and warnings;	3
Interfaces with other systems;	3
13.19 Water/Waste (ATA 38)	2
Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing;	
13.20 Integrated Modular Avionics (ATA42)	3
Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc. Core System; Network Components;	
13.21 Cabin Systems (ATA44)	3
The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions. The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels. The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: Data/Radio Communication, In-Flight Entertainment System.	

	LEVEL B2 B2L
The Cabin Network Service may host functions such as: Access to pre-departure/departure reports, E-mail/intranet/internet access, Passenger database, Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System;	
13.22 Information Systems (ATA46) 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. Typical examples include Air Traffic and Information Management Systems and Network Server Systems Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System;	3

MODULE 14. PROPULSION

	LEVEL B2 B2L
14.1 Turbine Engines (a) Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines;	1
(b) Electronic Engine control and fuel metering systems (FADEC)	2
14.2 Engine Indicating Systems Exhaust gas temperature / Interstage turbine temperature systems; Engine speed; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure, temperature and flow; Manifold pressure; Engine torque;	2

	LEVEL
	B2 B2L
Propeller speed.	
14.3 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements;	2

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	2	2

	LEVEL	
	A	B1
Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.		
15.7 Exhaust 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
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	1	2

	LEVEL	
	A	B1
Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices.		
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 boroscope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.	1	3
15.22 Engine Storage and Preservation Preservation and depreservation for the engine and accessories / systems.	-	2

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	1	2	2

	LEVEL		
	A	B1	B3
Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.			
16.4 Engine Fuel Systems			
16.4.1 Carburettors 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
16.7 Supercharging/Turbocharging Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/turbocharging systems; System terminology; Control systems; System protection.	1	2	2
16.8 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2	2
16.9 Lubrication Systems System operation/lay-out and components.	1	2	2
16.10 Engine Indication Systems Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	1	2	2
16.11 Powerplant Installation	1	2	2

	LEVEL		
	A	B1	B3
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 Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.	1	3	2
16.13 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/systems.	-	2	1

MODULE 17A. PROPELLER

Note: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 17B.

	LEVEL	
	A	B1
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
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 speeding propeller; Propeller/spinner installation.	1	2
17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	1	2
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	-	2
17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	1	2
17.6 Propeller Maintenance	1	3

	LEVEL	
	A	B1
Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.		
17.7 Propeller Storage and Preservation Propeller preservation and depreservation.	1	2

MODULE 17B. PROPELLER

Note: The scope of this Module shall reflect the propeller technology of aeroplanes pertinent to the B3 category.

	LEVEL
	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.	2
17.2 Propeller Construction Construction methods and material used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.	2
17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	2
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	2
17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	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.	2
17.7 Propeller Storage and Preservation Propeller preservation and depreservation.	2

Appendix II is amended as follows:

Appendix II

Basic Examination Standard

(except for category L licence)

…

2. Number of questions per module

2.1. 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 and B2L: 32 multi-choice and 0 essay questions. Time allowed 40 minutes.

Category B3: 28 multi-choice and 0 essay questions. Time allowed 35 minutes.

2.2. 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 and B2L: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.

Category B3: 28 multi-choice and 0 essay questions. Time allowed 35 minutes.

2.3. 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 and B2L: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.

Category B3: 24 multi-choice and 0 essay questions. Time allowed 30 minutes.

2.4. MODULE 4 - ELECTRONIC FUNDAMENTALS

Category B1: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.

Category B2 and B2L: 40 multi-choice and 0 essay questions. Time allowed 50 minutes.

Category B3: 8 multi-choice and 0 essay questions. Time allowed 10 minutes.

2.5. 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 and B2L: 72 multi-choice and 0 essay questions. Time allowed 90 minutes.

Category B3: 16 multi-choice and 0 essay questions. Time allowed 20 minutes.

2.6. 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 and B2L: 60 multi-choice and 0 essay questions. Time allowed 75 minutes.

Category B3: 60 multi-choice and 0 essay questions. Time allowed 75 minutes.

2.7. MODULE 7A - 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 and B2L: 60 multi-choice and 2 essay questions. Time allowed 75 minutes plus 40 minutes.

MODULE 7B - MAINTENANCE PRACTICES

Category B3: 60 multi-choice and 2 essay questions. Time allowed 75 minutes plus 40 minutes.

2.8 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 and B2L: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.

Category B3: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.

2.9. MODULE 9A - 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 and B2L: 20 multi-choice and 1 essay question. Time allowed 25 minutes plus 20 minutes.

MODULE 9B - HUMAN FACTORS

Category B3: 16 multi-choice and 1 essay questions. Time allowed 20 minutes plus 20 minutes.

2.10. 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 and B2L: 40 multi-choice and 1 essay question. Time allowed 50 minutes plus 20 minutes.

Category B3: 32 multi-choice and 1 essay questions. Time allowed 40 minutes plus 20 minutes.

2.11. 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.

MODULE 11B - PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Category A: 72 multi-choice and 0 essay questions. Time allowed 90 minutes.

Category B1: 100 multi-choice and 0 essay questions. Time allowed 125 minutes.

MODULE 11C - PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Category B3: 60 multi-choice and 0 essay questions. Time allowed 75 minutes.

2.12. 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. 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.

Category B2L:

System rating	Number of multi-choice questions	Time allowed (minutes)
Basic requirements (Sub-modules 13.1, 13.2, 13.5 and 13.9)	28	35
COM/NAV (Sub-module 13.4(a))	24	30

INSTRUMENTS (Sub-module 13.8)	20	25
AUTOFLIGHT (Sub-modules 13.3(a) and 13.7)	28	35
SURVEILLANCE (Sub-module 13.4(b))	8	10
AIRFRAME SYSTEMS (Sub-modules 13.11 throung 13.18)	32	40

2.14. MODULE 14 - PROPULSION

Category B2 and B2L: 24 multi-choice and 0 essay questions. Time allowed 30 minutes.

NOTE: The B2L examination for Module 14 is only applicable to the 'Instruments' and 'Airframe Systems' ratings.

2.15. 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. 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 B3: 68 multi-choice and 0 essay questions. Time allowed 85 minutes.

2.17. MODULE 17A - 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.

MODULE 17B - PROPELLER

Category B3: 28 multi-choice and 0 essay questions. Time allowed 35 minutes.

Appendix IV is amended as follows:

Appendix IV

Experience requirements for extending a Part-66 Aircraft Maintenance Licence

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

The experience shall 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 Part-147 course relevant to the subcategory.

To From	A1	A2	A3	A4	B1.1	B1.2	B1.3	B1.4	B2	B2L	B3
A1	–	6 months	6 months	6 months	2 years	6 months	2 years	1 year	2 years	1 year	6 months
A2	6 months	–	6 months	6 months	2 years	6 months	2 years	1 year	2 years	1 year	6 months
A3	6 months	6 months	–	6 months	2 years	1 year	2 years	6 months	2 years	1 year	1 year
A4	6 months	6 months	6 months	–	2 years	1 year	2 years	6 months	2 years	1 year	1 year
B1.1	None	6 months	6 months	6 months	–	6 months	6 months	6 months	1 year	1 year	6 months
B1.2	6 months	None	6 months	6 months	2 years	–	2 years	6 months	2 years	1 year	None
B1.3	6 months	6 months	None	6 months	6 months	6 months	–	6 months	1 year	1 year	6 months
B1.4	6 months	6 months	6 months	None	2 years	6 months	2 years	–	2 years	1 year	6 months
B2	6 months	6 months	6 months	6 months	1 year	1 year	1 year	1 year	–	-	1 year
B2L	6 months	6 months	6 months	6 months	1 year	1 year	1 year	1 year	1 year	–	1 year
B3	6 months	None	6 months	6 months	2 years	6 months	2 years	1 year	2 years	1 year	–

Appendix V is amended as follows:

Appendix V

Application Form – EASA Form 19

1. This appendix contains an example of the form used for application for the aircraft maintenance licence referred to in Annex III (Part-66).

2. The competent authority of the Member State may modify the EASA Form 19 only to include additional information necessary to support the case where the National requirements permit or require the aircraft maintenance licence issued in accordance with Annex III (Part-66) to be used outside the requirement of Annex I (Part-M) and Annex II (Part-145).

APPLICATION FOR INITIAL / AMENDMENT / RENEWAL OF PART-66 AIRCRAFT MAINTENANCE LICENCE (AML)	EASA FORM 19
APPLICANTS DETAILS: Name:..... Address:..... ..... Nationality: . . . . Date and Place of Birth:.	
PART-66 AML DETAILS (if applicable): Licence No: . . . . Date of Issue:	
EMPLOYERS DETAILS: Name: ..... Address: .... Maintenance Organisation Approval Reference:..... Tel: . . . . . Fax:.	
APPLICATION FOR: (Tick relevant boxes)	

Initial AML ☐ Amendment of AML ☐ Renewal of AML ☐

(Sub)categories ~~**Rating**~~	**A**	**B1**	**B2**	**B2L**	**B3**	**C**	**L (see below)**
Aeroplane Turbine	☐	☐					
Aeroplane Piston	☐	☐					
Helicopter Turbine	☐	☐					
Helicopter Piston	☐	☐					
Avionics			☐	☐ See system ratings below			
Piston engine non-pressurised aeroplanes of MTOM of 2t and below					☐		
Large aircraft						☐	
Aircraft other than large aircraft						☐	

System ratings for licence B2L:

autoflight, ☐
instruments ☐
com/nav ☐
surveillance ☐
airframe systems ☐

L-licence sub-categories:

L1: Sailplanes ☐
L2: Powered sailplanes and ELA1 aeroplanes ☐
L3: Balloons ☐
L4: Hot air airships and ELA2 gas airships ☐
L5: Gas airships above ELA2 ☐

Type endorsement / Rating endorsement / Limitation removal (if applicable):

. . . . . .

. . .

....
I wish to apply for initial / amendment / renewal of 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 Part-66 AML issued in another Member State, 2. I have not applied for any Part-66 AML in another Member State and 3. I never had a Part-66 AML issued in another Member State which was revoked or suspended in any other Member State. I also understand that any incorrect information could disqualify me from holding a Part-66 AML. Signed: .... Name: .... Date: ....
I wish to claim the following credits (if applicable): ....

Experience credit for Part-147 training

. . . . . .

. . . . . .

. . . . . .

Examination credit for equivalent exam certificates

. . . . . .

. . . . . .

. . . . . .

Please enclose all relevant certificates

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

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

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

EASA FORM 19 Issue ~~3~~4

Appendix VI is amended as follows:

Appendix VI

Aircraft Maintenance Licence referred to in Annex III (Part-66) – EASA Form 26

…

13. With regard to the ~~aircraft type~~ rating page the competent authority of the Member State shall indicate the licence sub-category, when applicable, even in the case of basic licences with no aircraft ratings. If no sub-category is applicable, the competent authority 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.

…

I.
EUROPEAN UNION*
[STATE]
[AUTHORITY NAME & LOGO]

II.
Part-66
AIRCRAFT MAINTENANCE LICENCE

III.

Licence No [MEMBER STATE CODE].66.[XXXX]

.

EASA FORM 26 Issue 3

IVa. Full name of holder:
IVb. Date and place of birth:
V. Address of holder:
VI. Nationality of holder:
VII. Signature of holder:

III. Licence No:

VIII. CONDITIONS:

This licence shall be signed by the holder and be accompanied by an identity document containing a photograph of the licence holder.

Endorsement of any categories on the page(s) entitled Part-66 CATEGORIES only, does not permit the holder to issue a certificate of release to service for an aircraft.

This licence when endorsed with an aircraft rating meets the intent of ICAO annex 1.

The privileges of the holder of this licence are prescribed by Regulation (EC) No 2042/2003 and in particular its Annex III (Part-66).

This licence remains valid until the date specified on the limitation page unless previously suspended or revoked.

The privileges of this licence may not be exercised unless in the preceding two year period the holder has had either six months of maintenance experience in accordance with the privileges granted by the licence, or met the provision for the issue of the appropriate privileges.

III. Licence No:

IX. Part-66 CATEGORIES

VALIDITY	A	B1	B2	B2L	B3	L	C
Aeroplanes Turbine			n/a		n/a	n/a	n/a
Aeroplanes Piston			n/a		n/a	n/a	n/a
Helicopters Turbine			n/a		n/a	n/a	n/a
Helicopters Piston			n/a		n/a	n/a	n/a
Avionics	n/a	n/a			n/a	n/a	n/a
Large Aircraft	n/a	n/a	n/a		n/a	n/a	
Aircraft other than large	n/a	n/a	n/a		n/a	n/a	
Sailplanes, powered sailplanes, ELA1 aeroplanes, balloons and airships	n/a	n/a	n/a		n/a		n/a
Piston-engine non pressurized aeroplanes of 2 000 ~~k~~kg MTOM and below	n/a	n/a	n/a			n/a	n/a

X. Signature of issuing officer & date:

XI. Seal or stamp of issuing Authority:

III. Licence No:

XII. PART-66 ~~AIRCRAFT~~ RATINGS

Aircraft rating/ System Ratings	Category/Sub-category	Stamp & Date

III. Licence No:

XIII. PART-66 LIMITATIONS

Valid until:

III. Licence No:

Annex to EASA FORM 26

XIV. NATIONAL PRIVILEGES outside the scope of Part-66, in accordance with [National Legislation] (Valid only in [Member State])

Official Stamp & Date

III. Licence No:

INTENTIONALLY LEFT BLANK

EASA Form 26 Issue 34

A new Appendix VII is added as follows:

Appendix VII

Basic Knowledge and Training Requirements for category L aircraft maintenance licence

The definition of the different levels of knowledge required in this Appendix is described in Appendix I to this Part.

Sub-categories	Modules required for each sub-category (from the syllabus table below)
L1: Sailplanes	1 to 7, 9 and 13
L2: Powered sailplanes and ELA1 aeroplanes	1 to 7, 8, 9 and 13
L3: Balloons	1, 2, 3, 9, 10, 11 and 13
L4: Hot air airships and ELA 2 gas airships	1, 2, 3, 8, 9, 10, 11,12 and 13
L5: Gas airships above ELA2	Basic Knowledge requirements of any B1 sub-category plus 8 (for B1.1 and B1.3) and 11, 12 and 13

DURATION OF TRAINING:

Module Designation	Duration (hours)
1 'Basic knowledge'	10
2 'Human factors'	7
3 'Legislation'	19
4 'Airframe-Wooden / Metal tube and fabric'	30
5 'Airframe-Composite'	30
6 'Airframe-Metal'	30
7 'Airframe-General'	54
8 'Powerplant'	45
9 'Procedures of Physical Inspection'	10
10 'Balloon/Airship–Hot air'	32
11 'Balloon/Airship-Gas (free/tethered)'	32
12 'Airships-Hot air/Gas'	30
13 'Radio-Comm/Transponder'	15

MODULE 1. BASIC KNOWLEDGE

	Level
1.1 Mathematics Arithmetic Algebra Geometry **1.2 Physics** Matter Mechanics Temperature: thermometers and temperature scales **1.3.Electrics** DC Circuits Resistance/Resistor **1.4 Physics of the Atmosphere** Aerodynamics Theory of Flight Flight Stability and Dynamics	1

MODULE 2. HUMAN FACTORS

	Level
2.1 General **2.2.Human Performance and Limitations** **2.3 Social Psychology** **2.4 Factors Affecting Performance** **2.5 Physical Environment** **2.6 Tasks** **2.7 Communication** **2.8 Human Error** **2.9 Safety in the Workplace**	1

MODULE 3. AVIATION LEGISLATION

	Level
3.1 Part-M, Section A, Subpart B to F Part-66, Section A	2
3.2 Part M, Section A, Subpart G + I (additional to 3.1)	2
3.3 Part 21, Section A, Subparts D, E, M	2
3.4 Certification Specifications and Industry standards: Applicable topics	1
3.5 Execution of repair measures Assessment Work organisation Execution of repairs (→ DOA, Agency → approved repairs) Checks during and after repairs	3
3.6 Maintenance data Equipment specifications, airworthiness directives (AD), Instructions for Continuing Airworthiness (ICA)(AMM, IPC etc) Flight Manual Other maintenance records, trade literature Aircraft inspection and repair FAA AC 43.13-1A (for reference)	3
3.7 Subpart F Organisation The maintenance organisation manual Legal status and organization Scope of approval Content of responsibilities Responsibilities and tasks of technical personnel Content and nature of maintenance programs Organisation management	3
3.8 Safety in the workplace General requirements Electrical installations and operating materials Hoisting and support devices Inflation of tires Structural safety of stationary and mobile docking systems Maintenance work on non purged non ventilated tanks and containers	2

	Level
Labeling of work areas Lighting features Safekeeping of substances hazardous to health First-aid material Fire extinguishers Personal protective gear, work clothes; skin protection, skin care and skin cleaning agents Flammable, poisonous and health hazardous gases, vapors or suspended matter Maintenance work on tanks for flammable liquids Work involving flammable processes Hygienie measures Measures for the prevention of explosions and fire precautions Handling of fire extinguishers First-aid Parking picketing and chocking aircraft Oxygen system precautions Foreign object damage	
3.9 Environmental protection Hazardous materials and hazard designation Dangerous Materials and Substances Environmental hazards Substance-related safety information (chemical physical, toxicological and hydrological properties. Personal protective equipment, medical first aid after accidents) Labeling and storage of hazardous materials Protective measures and precautions Correct disposal of hazardous materials	1

MODULE 4. AIRFRAME – WOODEN / METAL TUBE AND FABRIC

	Level
4.1 Airframe - Wooden/Combination metal tube and fabric Timber, plywood, adhesives, preservation, power line, properties, machining Covering (covering materials, adhesives and finishes, natural and synthetic	2

covering materials and adhesives) Paint assembly and repair processes Recognition of damages from overstressing of wooden / metal tube and fabric structures Deterioration of wood components and coverings Crack test (optical procedure, e.g., magnifying glass) of metal components. Corrosion and preventive methods Health and fire safety protections	
4.2 Material science (material capability specification sheets LN, DIN) Types of wood, stability, and machining properties Steel and light alloy tubes and fittings, fracture inspections, of welded seams Plastics (overview, understanding of the properties) Colors and paints, paint removal Glues, adhesives Covering materials and technologies (natural and synthetic polymers)	2
4.3 Identifying damage Overstress of wood / metal tubing and fabric structures Load transfers Fatigue strength and crack testing	3
4.4 Occupational safety and fire protection Handing of flammable and health hazardous materials Shop regulations Precautionary measures Handing of solvents, fuels and lubricants Face masks and respiratory protective devices, skin protection	2
4.5 Performance of practical activities Locking of pin, screws, castellated nuts, turnbuckles Thimble splice Nicopress and Talurit cable splice Canopy and transparencies repairs Repair of coverings Performance of 100-hours / annual inspections on a wood or combination metal tube and fabric airframe Execution of skin repair; splicing of plywood/stringers	3
4.6 Performance of practical activities Repair exercises (plywood, stringer, handrails, skins) Thimble splice Clamp repairs (Nicopress, Talurit)	3

Transparency repairs Coverings components Weight and balance Aircraft Rigging. Calculation of control surface mass balance and range of movement of the control surfaces, measurement of operating forces	

MODULE 5. AIRFRAME – COMPOSITE

	Level
5.1 Airframe - Fiber-reinforced plastic (FRP) Basic principles of FRP construction Resins (EP, polyester, phenolic resins, vinyl ester resins) Reinforcement materials glass, aramide and carbon fibers, features Fillers Supporting cores (balsa, honeycombs, foamed plastics) Constructions, load transfers (solid FRP shell, sandwiches) Identification of damage during overstressing of components Procedure for FRP projects (according to MOM) including storage conditions for material Health and fire protection	2
5.2 Material Thermosetting plastics, thermoplastic polymers, catalysts Understanding, properties, machining technologies, detaching, bonding, welding Resins for FRP: epoxy resins, polyester resins, vinyl ester resins, phenolic resins Reinforcement materials From elementary fiber to filaments (release agent, finish), , patterns of weaving Properties of individual reinforcement materials (E-glass fiber, aramide-fibre, carbon-fibre) Problem with multiple-material systems, matrix Adhesion/cohesion various behaviors of fibre materials Filling materials and pigments Technical requirements for filling materials Property change of the resin composition through the use of E-glass, micro balloon, aerosols, cotton, minerals, metal powder, organic substances	2

	Level
Paint assembly and repair technologies Support materials Honeycombs (paper, FRP, metal), balsa wood, Divinycell (Contizell), development trends	
5.3 Assembly of airframes in Fibre reinforced composite structure (FRP) Solid shell Sandwiches Assembly of airfoils, fuselages, control surfaces	2
5.4 Identifying damage Behavior of FRP components in the event of overstressing Identifying of delaminations, loose bonds Bending vibration frequency in airfoils Load transfer Frictional connection and positive locking Fatigue strength and corrosion of metal parts Metal bonding, surface finishing of steel and aluminum components during bonding with FRP	3
5.5 Mold making Plaster molds, mold ceramics GFK molds, Gel-coat, reinforcement materials, rigidity problems Metal molds Male and female molds	3
5.6 Health protection and work safety Handling of various resins/temper types Handing of solvents Utilities, auxiliary materials Face guard and respiratory protective device, skin protection	2
5.7 Performance of practical activities Safeguarding of pin, screws, castellated nuts, turnbuckles Thimble splice Nicopress and Talurit clamping joint Repair of transparency Repair of coverings Performance of 100-hours / annual inspections on an FRP airframe	3

	Level
Performance of a repair on a sandwich shell (minor repair less than 20 cm)	
5.8 Performance of practical activities Repair of solid FRP shells Mold fabrication/moulding of a component (e.g. fuselage nose, landing gear fairing, wing tip and winglet) Repair of sandwich shell where interior and exterior layer are damaged Repair of sandwich shell by pressing with a vacuum bag Centre of gravity calculations Aircraft Rigging. Calculation of control surface mass balance and range of movement of the control surfaces, measurement of operating forces Transparency repair (PMMA) with one- and two-component adhesive Bonding of transparency with the canopy frame Tempering of transparencys and other components	3

MODULE 6. AIRFRAME – METAL

	Level
6.1 Airframe – Pure Metal Metallic materials and semi-finished products, machining methods Fatigue strength and crack test Assembly of components of metal construction, riveted joints, adhesive joints Identification of damage in overstressed components, effects of corrosion Health and fire protection	2
6.2 Material science (material capability specification sheets LN, DIN) Steel and its alloys Light metals and their light alloys Rivet materials Plastics (overview) Colours and paints Metal adhesives Types of corrosion Covering materials and technologies (natural and synthetic)	2
6.3 Identifying damage Overstressed metal airframes, leveling, measurement of symmetry Load transfers	3

	Level
Fatigue strength and crack test Identifying loose riveted joints	
6.4 Assembly of airframes in metal and composite construction Skins Frames Stringers and longerons Frame construction Problems in multiple-material systems	2
6.5 Fasteners Classifications of fits and clearances Metric and imperial measuring systems Oversize bolt	2
6.6 Work safety Fuels and lubricants Handling of magnesium alloys Handling of solvents, colours and paints Handling of metal adhesives Machining tools	2
6.7 Performance of practical activities Wirelocking and split pinning of screws, castellated nuts, turnbuckles Thimble splice Nicopress and Talurit clamping joint Transparency (windows canopies) repair Repair of coverings, surface damage, stop drilling cracks Performance of 100-hours / annual inspections on a metal airframe Riveting procedures (small repair according to manufacturer instructions)	3
6.8 Performance of practical activities Cutting out sheet metals (aluminums and light alloys, steel and alloys) Folding bending, edging, welding, beating, smoothening, beading Repair riveting of metal airframes according to repair instruction or drawings Evaluation of rivet errors Thimble splice Clamp repairs (Nicopress, Talurit) Transparency repairs	3

	Level
Weight & Balance Aircraft Rigging. Calculation of control surface mass balance and range of movement of the control surfaces, measurement of operating forces	

MODULE 7. AIRFRAME GENERAL

	Level
7.1 Flight control system **Cockpit controls** – controls in cockpit, color markings, knob shapes **Flight controls surfaces, flaps, airbrakes** – surfaces, controls, hinges, bearings, brackets, push-pull rods, bellcrancks, horns, pulleys, cables, chains, tubes, rollers, tracks, screwjacks, surfaces, movements, lubrication, stabilizers, balancing of controls Combination of controls – flap airlerons, flap airbrakes. Trim systems	3
7.2 Airframe **Landing gear** - Characteristics of landing gears and shock absorber strut, extension, brakes, drum, disks, wheel, tyre, retraction mechanism, electrical retraction, emergency. **Wing and stabilizer to fuselage connections** - Wing flap ailerons to fuselage interconnection, stabilzer and elevator to fuselage installation Permissible maintenance measures **Towing** - Towing/lifting equipment - mechanism **Cabin -** Seats and safety harness, cabin arrangement, windshields, windows, placards, baggage compartment, cockpit controls, cabin air system, blower. **Water ballast** - Water reservoirs, lines, valves, drains, vents, tests **Fuel system** - tanks, lines, filters, vents, drains, filling, selector valve, pumps, indication, tests, bonding **Hydraulics** – System lay-out, accumulators, pressure and power distribution, indication **Liquid and gas –** hydraulic, other fluid, levels, reservoir, lines, valves, filter. **Protections** – Firewalls, fire protection, lightning strike bonding, trunbuckles, locking devices, dischargers	3
7.3 Fasteners Reliability of pins, rivets, screws Control cables, turnbuckles Quick-release couplings (L'Hotellier, SZD - Poland)	3

	Level
7.4 Locking equipment Admissibility of locking methods, locking pins, spring steel pins, locking wire, stop nuts, paint Quick-release couplings	3
7.5 Weight and Balance leveling	3
7.6 Rescue Systems	3
7.7 On-board modules **Static and pressure system, vacuum** - dynamic system. hydrostatic test **Flight instruments** - airspeed indicator, altimeter, vertical speed indicator, connection and functioning, markings, Arrangement and display, panel, electrical wires, Gyroscopes, filters, flux detectors, indicating instruments; testing of function Magnetic compass: installation and compass swing Sailplanes: acoustic vertical speed indicator, flight recorders, aid to anti-collision Oxygen system	3
7.8 On-board modules installation and connections Flight instruments, mounting requirements (emergency landing conditions as per CS 22) Electric wiring, power sources, types of storage batteries, electrical parameters, electric generator, circuit breaker, energy balance, earth / ground, connectors, terminals, warnings, fuses, lamps, lightings, switches, voltmeters, ampere-meters, electrical gauges;	2
7.9 Piston engine propulsion Design, modules, interplay of components and modules (to be developed)	2
7.10 Propeller Replacement Balancing	2
7.11 Retraction system Propeller position control Engine folding system	2

MODULES 8 – POWERPLANT

	Level
8.1 Noise limits Explanation of the concept of 'noise level' Noise certificate Enhanced sound-proofing Possible reduction of sound emissions	1
8.2 Piston engines Four-stroke spark ignition engine, air-cooled, fluid cooling Two-stroke engine Rotary piston engine Efficiency and influencing factors (pressure-volume diagram, power curve) Noise control devices	2
8.3 Propeller Blade, spinner, backplate, accumulator dome pressure, hub Operation of propellers Variable pitch propellers, ground and in-flight adjustable propellers, mechanically, electrically and hydraulically Balancing (static, dynamic) Noise problems	2
8.4 Engine control devices Mechanical control devices Electrical control devices Tank displays Functions, characteristics, typical errors and error indications	2
8.5 Hose pipes Material and machining of fuel and oil hoses Control of life limit	2
8.6 Accessories Operation of magneto ignition Control of maintenance limits Operation of carburetors Maintenance instructions on characteristic features	2

	Level
Electric fuel pumps Operation of propeller controls Electrically operated propeller control Hydraulically operated propeller control	
8.7 Ignition system Constructions: coil ignition, magneto ignition, and thyristor ignition Efficiency of the ignition and pre-heat system Modules of the ignition and pre-heat system Inspection and testing of a spark plug	2
8.8 Induction and Exhaust systems Operation and assembly Silencers and heater installations Nacelles and cowlings Inspection and test CO emission test	2
8.9 Fuels and lubricants Fuel characteristics Labeling, environmentally friendly storage Lubricating oils mineral, synthetic and their parameters: labeling and characteristics, application Environmentally friendly storage and proper disposal of used oil	2
8.10 Documentation Manufacturer documents for the engine and propeller, Instructions for continuing airworthiness Maintenance manuals TBO Airworthiness Directives, technical notes and service bulletins	2
8.11 Health protection Handling of fuels and lubricants Startup of engines, features of ignition system Handling of cleansing agents and solvents	2
8.12 Illustrative material Cylinder unit with valve Carburetor	2

	Level
High-tension magneto Differential compression tester for cylinders Overheated/damaged pistons Spark plugs of engines that were operated differently	
8.13 Practical experience Work safety/accident prevention (handing of fuels and lubricants, startup of engines) Rigging engine control rods and Bowden cables Setting of no-load speed Checking and setting the ignition point Operational test of magnetos Checking the ignition system Testing and cleaning of spark plugs Performance of the engine tasks contained in an aeroplane 100 hours / annual inspection. Carryout a cylinder compression test Carry out a static test and evaluation of the engine run Documentation of maintenance work including replacement of components	3
8.14 Gas exchange in internal-combustion engines 4-stroke reciprocating engine and control units Energy losses Ignition timing Direct flow behavior of control units Wankel engine and control units 2-stroke engine and control units Scavenging Energy losses Scavenging blower Idle range and power range	2

	Level
8.15 Ignition, combustion and carburation Ignition Spark plug Ignition system Combustion process Normal combustion Efficiency and medium pressure Engine knock and octane rating Combustion chamber shapes Fuel/air mix in the carburetor Carburetor principle, carburetor equation The simple carburetor Problems of the simple carburetor and their solutions Carburetor models Fuel/air mix during injection Mechanically controlled injection Electronically controlled injection Continuous injection Carburettor-injection comparison	2
8.16 Super Charging Super Charging process Gradation of the super charging process Embodiments Increase of output through super charging Air application and output Medium pressure and cylinder reloading Mechanical super charging and controllers Actual super charge Operating behavior of the mechanically super charged engine Exhaust gas turbo charging Exhaust gas turbo charger Interplay with engine (accumulation mode) Use of exhaust gas energy Impulse charging Performance limits and overboost protection	2

	Level
Charging with a dynamic pressure machine (Comprex charging)	
8.17 Flight instruments in aircraft with injection engines Special instruments of flight instruments (injection engine) Interpretation of indications in a static test Interpretation of indications in flight on various flight levels	2
8.18 Flight instruments in aircraft with supercharged engines Special instruments of flight instruments (supercharged engine) Interpretation of indications in a static test Interpretation of indications in flight on various flight levels	2
8.19 Maintenance of aircraft engines with injection system Documentation, manufacturer's documents, etc. General maintenance instructions (hourly inspections) Functional tests Ground test run Test flight Troubleshooting in the event of faults in the injection system and their correction	2
8.20 Maintenance of aircraft engines with charger systems Documentation, manufacturer's documents, etc. General maintenance instructions (hourly inspections) Functional tests Ground test run Test flight Troubleshooting in the event of faults in the charger system and their correction	2
8.21 Work safety and safety provisions Work safety and safety provisions for work on injection systems Work safety and safety provisions for work on charger systems	2
8.22 Visual aids: Carburetor Components of injection system Components of charger system Airplane with injection engine Airplane with supercharged engine Tool for work on injection systems	2

	Level
Tool for work on charger systems	
8.23 Electrical propulsion Energy system, accumulators, installation Electrical motor Heat, noise and vibration checks Testing windings. Propulsion interface,	2
8.24 Jet propulsion Fuel system Propulsion interface Turbine	2
8.25 FADEC	2

MODULES 9 – PROCEDURES OF PYSICAL INSPECTION

	Level
Cleaning, use of lighting and mirrors Measurement tools Measure of controls deflection Screw torque Wear of slide bearings etc. Procedures for testing of flight instruments Test flight: programme and evaluation Types of NDT inspections and tests	3

MODULES 10 – BALLOON / AIRSHIP – HOT AIR

	Level
10.1 Basic principles and assembly of hot-air balloons/airships Assembly and individual parts Cladding material, belts, cables Envelopes, ripping panel, valve (parachute), turning vent, scoop/skirt	3

	Level
Burner, burner frame and burner frame stanchions Compressed-gas tanks and compressed-gas hoses Basket and alternative devices (seats) Rigging accessories Maintenance and servicing jobs Annual inspection Flight papers Flight- and Maintenance Manuals Rigging and launch preparation Launch	
10.2 Practical training Operating controls, maintenance and servicing jobs (according to flight manual)	3
10.3 Envelope Fabrics Load tapes, rip stoppers Load cables Parachute Ripping panel Turning valve Rollers, pulleys Control and shroud lines Temperature control strip, envelope thermometer Flying wires	3
10.4 Burner and fuel system Burner coils Blast-, liquid- and pilot-valves Burners/nozzles Pilot burners/nozzles Burner frame Fuel lines/hoses Fuel cylinders or tanks and valves and fittings	3
10.5 Basket and basket suspension (incl. alternative devices) Kinds of baskets (incl. alternative devices) Basket cables	3

	Level
Carabineer, shackle and pins Burner support rods Fuel cylinder straps Accessories and packing diagrams	
10.6 Equipment Fire extinguisher, fire blanket Instruments (single or combined)	3
10.7 Minor repairs Stitching Bonding	3

MODULES 11 – BALLOON / AIRSHIP – GAS (FREE / TETHERED)

	Level
11.1 Basic principles and assembly of gas balloons/airships Assembly of individual parts Envelope and netting material Envelope, ripping panel, emergency opening, cords and belts Rigid gas valve Flexible gas valve (parachute) Netting Load ring Basket and accessories (incl. and alternative devices) Electrostatic discharge paths Mooring line and drag rope Maintenance and servicing Annual inspection Flight papers Flight- and Maintenance Manuals Rigging and launch preparation Launch	3
11.2 Practical training Operating controls, maintenance and servicing jobs (according to flight	3

	Level
manual), safety rules when using hydrogen as lifting gas	
11.3 Envelope Fabrics Poles and reinforcement of pole Ripping panel and cord Parachute and shroud lines Valves and cords Filler neck, Paschal-ring and cords Electrostatic discharge paths	3
11.4 Valve Springs Gaskets Screwed joints Control lines Electrostatic discharge paths	3
11.5 Netting or rigging (netless) Kinds of net and other lines Mesh sizes and angles Net ring Knotting methods Electrostatic discharge paths	3
11.6 Load ring	3
11.7 Basket (incl. alternative devices) Kinds of baskets (incl. alternative devices) Strops and toggles Ballast system (bags and supports) Electrostatic discharge paths	3
11.8 Ripping cord and valve cords	3
11.9 Mooring line and drag rope	3
11.10 Minor repairs Bonding Splicing hemp ropes	3
11.11 Equipment	3

	Level
Instruments (single or combined)	
11.12 Tether cable (TGB only) Kinds of cables Acceptable damage of cable Cable swivel Cable clamps	3
11.13 Winch (TGB only) Kinds of winches Mechanical system Electrical system Emergency system Grounding/ballasting of winch	3

MODULES 12 – AIRSHIPS – HOT AIR / GAS

12 AIRSHIPS-Hot Air/Gas	Level
12.1 Basic principles and assembly of small airships Envelope, ballonets Valves, openings Gondola Propulsion Flight- and Maintenance Manuals Rigging and launch preparation	3
12.2 Practical training Operating controls, maintenance and servicing jobs (according to flight manual)	3
12.3 Envelope Fabrics Ripping panel and cords Valves Catenary system	3
12.4 Gondola (incl. alternative devices) Kinds of gondolas (incl. alternative devices) Airframe according to 4.1-3., 5.1-4 or 6.1-3	3

12.5 Electrical system Basics about on-board electrical circuits Electrical sources (accumulators, fixation, ventilation, corrosion) Lead-, NiCd- or other accumulators, dry batteries Generators Wiring, electrical connections Fuses External power source Energy balance	3
12.6 Propulsion Fuel system - tanks, lines, filters, vents, drains, filling, selector valve, pumps, indication, tests, bonding **Propulsion instruments** Basics about measuring and instruments Revolution measuring Pressure measuring Temperature measuring Available fuel/power measuring	3
12.7 Equipment Fire extinguisher, fire blanket Instruments (single or combined)	3

MODULES 13 – RADIO-COM / TRANSPONDER

	Level
13.1 Radio/ELT Channel spacing Length of antenna required – counterweight Coax cable Radio shielding – interference with ignition system	3
13.2 Transponder **Basic operation** Typical installation Installation requirements power, inputs, antennas Explanation of Mode A, C, S.	3

	Level
Practical Testing Safety precautions Self test Test equipment Use of test equipment Typical test. Typical defects.	

A new Appendix VIII is added as follows:

Appendix VIII

Basic examination standard for category L aircraft maintenance licence

1. *Standardisation Basis for Examinations related to the Appendix VII basic knowledge requirements*

1.1. All examinations must be carried out using the multi-choice question format as specified below. The incorrect alternatives must seem equally plausible to anyone ignorant of the subject. All of the alternatives should be clearly related to the question and of similar vocabulary, grammatical construction and length. In numerical questions, the incorrect answers should correspond to procedural errors such as corrections applied in the wrong sense or incorrect unit conversions: they must not be mere random numbers.

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

1.3. The pass mark for each module is 75 %.

1.4. Penalty marking (negative points for failed questions) is not to be used.

1.5 The level of knowledge required in the questions must be proportionate to the level of technology of this category of aircraft.

2. *Number of questions per module:*

2.1 Module 1 'Basic Knowledge': 12 multi-choice questions. Time allowed 15 minutes

2.2 Module 2 'Human Factors': 8 questions. Time allowed 10 minutes

2.3 Module 3 'Legislation': 24 questions. Time allowed 30 minutes

2.4 Module 4 'Airframe-Wooden': 32 questions. Time allowed 40 minutes

2.5 Module 5 'Airframe-Composite': 32 questions. Time allowed 40 minutes

2.6 Module 6 'Airframe-Metal': 32 questions. Time allowed 40 minutes

2.7 Module 7 'Airframe-General': 60 questions. Time allowed 75 minutes

2.8 Module 8 'Powerplant-Advanced': 48 questions. Time allowed 60 minutes

2.9 Module 9 'Procedures for physical inspection': 8 questions. Time allowed 10 minutes

2.10 Module 10 'Balloon/Airship-Hot air': 36 questions. Time allowed 45 minutes

2.11 Module 11 'Balloon/Airship-Gas (free/tethered)': 36 questions. Time allowed 45 minutes

2.12 Module 12 'Airships-Hot air/Gas' : 32 questions. Time allowed 40 minutes

2.13 Module 13 'Radio-Comm/Transponder': 16 questions. Time allowed 20 minutes

IV. Annex IV (Part-147) to Regulation (EC) No 2042/2003 is amended as follows:

Point 147.A.145 is amended as follows:

147.A.145 Privileges of the maintenance training organisation

…

(d)

1. The maintenance training organisation may subcontract the conduct of basic theoretical training, type training and related examinations to a non-maintenance training organisation only when under the control of the maintenance training organisation quality system.
2. The subcontracting of basic theoretical training and examination is limited to Part-66, Appendix I, Modules 1, 2, 3, 4, 5, 6, 8, 9 and 10 and to Part-66, Appendix VII, Modules 1, 2 and 3.

…

Appendix I is amended as follows:

Appendix I

Basic Training Course Duration

The minimum duration of a complete basic training course shall be as follows:

Basic Course	Duration (in hours)	Theoretical training ratio (in %)
A1	800	30 to 35
A2	650	30 to 35
A3	800	30 to 35
A4	800	30 to 35
L	According to Appendix VII	50 to 60
B1.1	2400	50 to 60
B1.2	2000	50 to 60
B1.3	2400	50 to 60
B1.4	2400	50 to 60
B2	2400	50 to 60
B2L	1500*	50 to 60
B3	1000	50 to 60

* This number of hours shall be increased as follows, depending on the additional system ratings selected:

System rating	Duration (in hours)	Theoretical training ratio (in %)

COM/NAV	90	50 to 60
INSTRUMENTS	55	
AUTOFLIGHT	80	
SURVEILLANCE	40	
AIRFRAME SYSTEMS	100	

Appendix II is amended as follows:

Appendix II

Maintenance Training Organisation Approval referred to in Annex IV (Part-147) — EASA Form 11

Page 1 of …

[MEMBER STATE*]

A Member of the European Union **

MAINTENANCE TRAINING AND EXAMINATION ORGANISATION APPROVAL CERTIFICATE

Reference: [MEMBER STATE CODE*].147.[XXXX]

Pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council and to Commission Regulation (EC) No 2042/2003 for the time being in force and subject to the condition specified below, the [COMPETENT AUTHORITY OF THE MEMBER STATE*] hereby certifies:

[COMPANY NAME AND ADDRESS]

as a maintenance training organisation in compliance with Section A of Annex IV (Part-147) of Regulation (EC) No 2042/2003, approved to provide training and conduct examinations listed in the attached approval schedule and issue related certificates of recognition to students using the above references.

CONDITIONS:

1 This approval is limited to that specified in the scope of work section of the approved maintenance training organisation exposition as referred to in Section A of Annex IV (Part-147), and

2 This approval requires compliance with the procedures specified in the approved maintenance training organisation exposition, and

3 This approval is valid whilst the approved maintenance training organisation remains in compliance with Annex IV (Part-147) of Regulation (EC) No 2042/2003.

4 Subject to compliance with the foregoing conditions, this approval shall remain valid for an unlimited duration unless the approval has previously been surrendered, superseded, suspended or revoked.

Date of original issue: .....

Date of this revision: .....

Revision No: ……

Signed: .....

For the competent authority: [COMPETENT AUTHORITY OF THE MEMBER STATE*]

EASA Form 11 Issue 3

* or EASA if EASA is the competent authority

** Delete for non-EU Member States or EASA

Page 2 of …

MAINTENANCE TRAINING AND EXAMINATION ORGANISATION APPROVAL SCHEDULE

Reference: [MEMBER STATE CODE*].147.[XXXX]

Organisation: [COMPANY NAME AND ADDRESS]

CLASS	LICENCE CATEGORY	LIMITATION	
BASIC **	B1 **	TB1.1** TB1.2** TB1.3** TB1.4**	AEROPLANES TURBINE ** AEROPLANES PISTON ** HELICOPTERS TURBINE ** HELICOPTERS PISTON **
	B2 **	TB2 **	AVIONICS **
	B3 **	TB3 **	PISTON-ENGINE NON-PRESSURISED AEROPLANES 2000 KG MTOM AND BELOW **
	A **	TA.1 ** TA.2 ** TA.3 ** TA.4 **	AEROPLANES TURBINE ** AEROPLANES PISTON ** HELICOPTERS TURBINE ** HELICOPTERS PISTON **
	L **	TL **	QUOTE THE SPECIFIC LICENCE SUB-CATEGORY **
TYPE/TASK **	C **	T4 **	[QUOTE AIRCRAFT TYPE] ***
	B1 **	T1 **	[QUOTE AIRCRAFT TYPE] ***
	B2 **	T2 **	[QUOTE AIRCRAFT TYPE] ***
	A **	T3 **	[QUOTE AIRCRAFT TYPE] ***

This approval schedule is limited to those trainings and examinations specified in the scope of work section of the approved maintenance training organisation exposition,

Maintenance Training Organisation Exposition reference: .....

Date of original issue: .....

Date of last revision approved : ..... Revision No: ……

Signed: .....

For the competent authority:[COMPETENT AUTHORITY OF THE MEMBER STATE*]

EASA Form 11 Issue ~~3~~4

C. Draft Decision:

AMC M.A.707(a) is amended as follows:

AMC M.A.707(a) Airworthiness review staff

…

4. An appropriate licence in compliance with Annex III (Part-66) is any one of the following:

   - a category B1 licence in the sub-category of the aircraft reviewed, or
   - a category B2 or C licence, or
   - in the case of piston-engine non-pressurized aeroplanes of 2000 kg MTOM and below, a category B3 licence,
   - in the case of sailplanes, powered sailplanes, ELA1 aeroplanes, balloons and airships, a category L licence.

   It is not necessary to satisfy the experience requirements of Part-66 at the time of the review.

…

AMC 145.A.30(g) is amended as follows:

AMC 145.A.30(g) Personnel requirements

…

3. The requirement of having appropriate aircraft rated certifying staff qualified as category B1, B2, B2L, B3, L, as appropriate, in the case of aircraft line maintenance does not imply that the organisation must have B1, B2 and B3 personnel at every line station. The MOE should have a procedure on how to deal with defects requiring B1, B2 or B3 certifying staff.
4. The competent authority may accept that in the case of aircraft line maintenance an organisation has only B1, B2, B2L, B3, or L certifying staff, as appropriate, provided the competent authority is satisfied that the scope of work, as defined in the Maintenance Organisation Exposition, does not need the availability of all B1, B2 and B3 certifying staff. Special attention should be taken to clearly limit the scope of scheduled and non-scheduled line maintenance (defect rectification) to only those tasks that can be certified by the available certifying staff category.

GM 66.A.3 is replaced as follows:

GM 66.A.3 Licence categories and subcategories

ELA1 aeroplanes means those aeroplanes which meet the definition of "ELA1 aircraft"

ELA2 gas airships means those gas airships which meet the definition of "ELA2 aircraft"

Gas airships above ELA2 means those gas airships outside the definition of "ELA2 aircraft".

For the B2L licence, a "system rating" is a rating which gives privileges to release maintenance on the aircraft systems covered by the "system rating".

The sentence 'shall contain, as a minimum, one system rating' means that the application for a B2L licence should be made for any of the system ratings or any combination of the system ratings specified in 66.A.3.

There is no specific order in which the system ratings should be applied for. Any combination of system ratings is possible.

The description of systems covered by the different system ratings is provided in Appendix I "Basic Knowledge Requirements" under paragraph "2. Modularisation", sub-paragraph related to "Categories B2 and B2L".

A new GM 66.A.5 is added as follows:

GM 66.A.5 Aircraft groups

The following table summarises the applicability of categories/subcategories of Part-66 licences versus the groups/sub-groups of aircraft:

Category/subcategory	A, B1 and C	B2	B2L	B3	L				
		Avionics electrics			Mechanics				
					L1	L2	L3	L4	L5
Groups									
1 - complex motor-powered aircraft - multi-engine helicopters - aeroplanes above FL290 - aircraft with fly-by-wire systems - any other defined by the Agency	X	X							
+ gas airships above ELA2		X							X
2 2a: Single turbine aeroplanes 2b: Piston-engine helicopter 2c: Turbine- eng helicopters	X	X	X						
3 Non-pressurised piston engine aeroplanes < 2T MTOM	X	X	X	X					
4 Sailplanes, powered sailplanes, ELA 1 aeroplanes, balloons and airships other than those in Group 1	X (B1.2 for ELA1 aero-planes)	X	X		Sailplanes X	powered sailplanes + ELA 1 aeroplanes X	Balloons X	Airships not in Group 1 X	

A new GM 66.A.10(a) is added as follows:

GM to 66.A.10(a) Application

When an application is made for a licence in the category B2L, the applicant should specify on the EASA Form 19:

- the system rating or the combination of system ratings applied for; and
- the aircraft rating,

considering that according to 66.A.45(e), a B2L licence endorsed with full sub-group 2b is entitled to be endorsed also with full sub-group 2c.

When applying for the addition of a system rating on a B2L licence, the applicant should provide together with the application, the demonstration of experience related to the system applied for.

When a B2L licence holder applies for the extension of a B2L licence to add a new system rating, he/she needs to demonstrate the practical experience required by 66.A.30(3) for the system rating but also the practical experience required by 66.A.45(e) and (f) in case the aircraft group is different.

When a B2L licence holder applies for the change of his B2L licence for a category B2, he/she needs only to:

- complete the basic knowledge of the B2 licence described in Appendix I as per GM 66.A.25(b); and
- demonstrate the additional experience described in Appendix IV.

These requirements can be found also for the competent authority in 66.B.110.

When an applicant applies for having a B2L licence to be extended to a B2 licence and he/she meets the requirements, the B2L licence is replaced by the B2 licence.

GM 66.A.20(a) is amended as follows:

GM 66.A.20(a) Privileges

...

1. The category B3 licence does not include any A subcategory. Nevertheless, this does not prevent the B3 licence holder from releasing maintenance tasks typical of the A1.2 subcategory for piston-engine non-pressurized aeroplanes of 2 000 Kg MTOM and below, within the limitations contained in the B3 licence.
2. The categories B1.2 and B3 do not include any L subcategory.
43. The category C licence permits certification of scheduled base maintenance by the issue of a single certificate of release to service for the complete aircraft after the completion of all such maintenance. The basis for this certification is that the maintenance has been carried out by competent mechanics and category B1, B2, B2L, L and B3 support staff, as appropriate, have signed for the maintenance tasks under their respective specialisation. The principal function of the category C certifying staff is to ensure that all required maintenance has been called up and signed off by the category B1, B2 and B3 support staff, as appropriate, before issue of the certificate of release to service. Only category C personnel who also hold category B1, B2, B2L, B3, or L qualifications may perform both roles in base maintenance.

A new AMC 66.A.20(a)4 is added as follows:

AMC 66.A.20(a)4 Privileges

'within the limits of the system ratings specifically endorsed on the licence' means that the privileges of the licence holder are limited:

- to the group/sub-group of aircraft endorsed on the licence, but also
- to the system rating(s) endorsed.

When an applicant wishes to get the privilege to issue certificates of release to service and to act as support staff for electrical and avionics tasks on all the parts of the aircraft, he/she should apply for the rating 'airframe system' on the licence B2L. The reason is that the rating 'airframe systems' is the only rating which covers completely the 'electrical' part of the mechanical systems of the aircraft.

AMC 66.A.20(b)2 is amended as follows:

AMC 66.A.20(b)2 Privileges

…

2. Nature of the experience:

…

For category, B1, B2, B2L ~~and~~ B3 and L, for every aircraft included in the authorization the experience should be on that particular aircraft or on a similar aircraft within the same licence subcategory. Two aircraft can be considered as similar when…

…

For licences endorsed with (sub)group ratings:

- In the case of a B1 licence endorsed with (sub-)group ratings (either manufacturer sub-group or full (sub-)group) as defined in 66.A.45 the holder should show experience on at least one aircraft type per (sub-)group and per aircraft structure (metal, composite, wood).
- In the case of a B2 licence endorsed with (sub-)group ratings (either manufacturer sub-group or full (sub-)group) as defined in 66.A.45 the holder should show experience on at least one aircraft type per (sub-)group.
- In the case of a B2L licence endorsed with systems and full groups or sub-group ratings as defined in 66.A.45, the holder should show experience on at least aircraft type per group/sub-group. It is not required that experience is also shown on all systems.
- In the case of a B3 licence endorsed with the rating '*piston-engine non-pressurized aeroplanes of 2 000 Kg MTOM and below*' as defined in 66.A.45, the holder should show experience on at least one aircraft type per aircraft structure (metal, composite, wood),
- In the case of an L licence endorsed with a rating (or a combination of ratings) as defined in 66.A.45, the holder should show experience on at least one aircraft type per rating endorsed on the licence and for the rating 'sailplanes' and the rating 'powered sailplanes and ELA1 aeroplanes': at least one aircraft type per aircraft structure (metal, composite, wood).

...

The experience should be documented in an individual log book or in any other recording system (which may be an automated one) containing the following data:

- Date;
- Aircraft type;
- Aircraft identification i.e. registration;
- ATA chapter (optional);

- Operation performed i.e. 100 FH check, MLG wheel change, engine oil check and complement, SB embodiment, trouble shooting, structural repair, STC embodiment…;
- Type of maintenance i.e. in Part-145 organisations: base, line;
- Type of activity i.e. perform, supervise, release;
- Category used: A, B1, B2, B2L, B3, L or C.
- Duration in days or partial-days.

GM 66.A.25(a) is amended as follows:

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

The levels of knowledge for each licence (sub)category are directly related to the complexity of the certifications related to the corresponding licence (sub)category, which means that category A and L should demonstrate a limited but adequate level of knowledge, whereas category B1, B2, B2L and B3 should demonstrate a complete level of knowledge in the appropriate subject modules.

A new AMC 66.A.25(b) is added as follows:

AMC 66.A.25(b) Basic knowledge requirements

'Or as approved by the competent authority' means that:

- the training is conducted by an organisation approved in accordance with Part-147 or by a Part-21 or a M/F or a M/G approved organisation, and
- the examination is conducted by an organisation approved in accordance with Part-147 or directly by the authority, or by an organisation which works on behalf of the competent authority and under its quality control.

A new GM 66.A.25(d) is added as follows:

GM to 66.A.25(d) Basic knowledge requirements

When a B2L licence holder applies for the change of his B2L licence for a category B2, the person needs to complete the basic knowledge for the B2 licence described in Appendix I. This includes the basic knowledge for all the system ratings.

A new AMC 66.A.30(c) is added as follows:

AMC 66.A.30(c) Basic experience requirements

The sentence 'For a category B2L, a representative cross section of maintenance tasks on aircraft' means that the person has carried out some maintenance tasks representative of the system defined in 66.A.25(b) for which he/she applies for the system rating. These tasks may include troubleshooting, modifications or repairs.

AMC 66.A.30(e) is amended as follows:

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

1. For category A the additional experience of civil aircraft maintenance should be a minimum of 6 months. For category B1, B2, B2L or B3 the additional experience of civil aircraft maintenance should be a minimum of 12 months.

2. …

AMC 66.A.45(d), (e)3, (f)1 and (g)1 is amended as follows:

AMC 66.A.45(d), (e)3, (f)1, ~~and~~ (g)1 and (h) Endorsement with aircraft ratings

1. The *'practical experience'* should cover a representative cross section including at least:

   - for categories B1, B2, B2L and B3: 50% of tasks contained in Appendix II to AMC relevant to the licence category and to the applicable aircraft type ratings or aircraft (sub)group ratings being endorsed,
   - for category L:
     - in the sub-categories L1 and L2: 50% as in the paragraph related to B1, B2, B2L and B3,
     - in the sub-categories L3 'Balloons' and L4 and L5 for 'Airships', 80% of the tasks should be demonstrated, and should include the tasks identified with an (*) in the appendix;
     - and can be full time or part-time either as professional or on a voluntary basis.

   This experience should cover tasks from each paragraph of the Appendix II list. Other tasks than those in the Appendix II may be considered as a replacement when they are relevant. In the case of (sub)group ratings, this experience may be shown by covering one or several aircraft types of the applicable (sub)group and may include experience on aircraft classified in group 1, 2 and/or 3 as long as the experience is relevant. The practical experience should be obtained under the supervision of authorised certifying staff.

…

GM 66.A.45 is amended as follows:

GM 66.A.45 Endorsement with aircraft ratings

The following table shows a summary of the aircraft rating requirements contained in 66.A.45, 66.A.50 and Appendix III to Part-66.

The table contains the following:

- The different aircraft groups.
- For each licence (sub)category, which ratings are possible (at the choice of the applicant):
  - Individual type ratings.
  - Full and/or Manufacturer (sub)group ratings
- For each rating option, which are the qualification options.
- For the B1.2 licence (Group 3 aircraft) and for the B3 licence (piston-engine non-pressurized aeroplanes of 2000 Kg MTOM and below), which are the possible limitations to be included in the licence if not sufficient experience can be demonstrated in those areas.

Note: OJT means 'On the Job Training' (Appendix III to Part-66, Section 6) and is only required for the first aircraft rating in the licence (sub)category.

Aircraft rating requirements			
Aircraft Groups	**B1/B3/L licence**	**B2/B2L licence**	**C licence**
Group 1 (except airships above ELA2) • Complex motor-powered aircraft. • Multiple engine helicopters. • Aeroplanes certified above FL290. • Aircraft equipped with fly-by-wire. • Other aircraft when defined by the Agency.	**(For B1)** **Individual TYPE RATING** Type training: - Theory + examination - Practical + assessment **PLUS** OJT (for first aircraft in licence subcategory)	**(For B2)** **Individual TYPE RATING** Type training: - Theory + examination - Practical + assessment **PLUS** OJT (for first aircraft in licence category)	**Individual TYPE RATING** Type training: - Theory + examination
Group 1 airships above ELA2	**(For L5 licence)** **Individual TYPE RATING** Type training: - Theory + examination - Practical + assessment **PLUS** OJT (for first aircraft in licence subcategory)	**(For B2)** **Individual TYPE RATING** Type training: - Theory + examination - Practical + assessment **PLUS** OJT (for first aircraft in licence category)	**Individual TYPE RATING** Type training: - Theory + examination
Group 2: **Subgroups:** **2a: single turboprop aeroplanes** (*) **2b: single turbine engine helicopters** (*) **2c: single piston engine helicopters** (*) (*) Except those classified in Group 1.	**(For B1.1, B1.3, B1.4)** **Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **Full SUB-GROUP RATING** (type training + OJT) **or** (type examination + practical experience) on at least 3 aircraft representative of that subgroup **Manufacturer SUB-GROUP RATING** (type training + OJT) **or** (type examination + practical experience) on at least 2 aircraft representative of that manufacturer subgroup	**(For B2)** **Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **(For B2 and B2L)** **Full SUB-GROUP RATING** based on demonstration of practical experience **Manufacturer SUB-GROUP RATING** based on demonstration of practical experience	**Individual TYPE RATING** type training **or** type examination **Full SUB-GROUP RATING** type training **or** type examination on at least 3 aircraft representative of that subgroup **Manufacturer SUB-GROUP RATING** type training **or** type examination on at least 2 aircraft representative of that manufacturer subgroup
Group 3 **Piston engine aeroplanes** (except those classified in Group 1)	**(For B1.2)** **Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **Full GROUP 3 RATING** based on demonstration of practical experience **Limitations:** ▪ Pressurized aeroplanes ▪ Metal aeroplanes ▪ Composite aeroplanes ▪ Wooden aeroplanes ▪ Metal tubing & fabric aeroplanes	**(For B2)** **Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **(For B2 and B2L)** **Full GROUP 3 RATING** based on demonstration of practical experience	**Individual TYPE RATING** type training **or** type examination **Full GROUP 3 RATING** based on demonstration of practical experience

Piston-engine non-pressurized aeroplanes of 2 000 ~~K~~kg MTOM and below	**(For B3)** **FULL RATING 'Piston-engine non-pressurized aeroplanes of 2 000 ~~K~~kg MTOM and below'** based on demonstration of practical experience **Limitations:** ▪ Metal aeroplanes ▪ Composite aeroplanes ▪ Wooden aeroplanes ▪ Metal tubing & fabric aeroplanes	**This rating cannot be endorsed on a B2/B2L license. It is already covered by the endorsement of ratings for Group 3 aircraft (see box above).** **~~Not applicable~~**	**This rating cannot be endorsed on a C license. It is already covered by the endorsement of ratings for Group 3 aircraft (see box above).** **~~Not applicable~~**
Group 4 Sailplanes, powered sailplanes, balloons and airships other than those in Group 1	**(For L1, L2, L3 and L4)** – For L1, rating 'sailplanes', – For L2, rating 'powered sailplanes and ELA1 aeroplanes', – For L3, rating 'balloons', – For L4, rating 'hot air airships and ELA2 gas airships'. – For L5, airship type rating. all based on demonstration of practical experience **Limitations:** See 66.A.45(h)	**(For B2L)** **Full GROUP 4 RATING** based on demonstration of practical experience	**Full GROUP 4 RATING** based on demonstration of practical experience

A new GM 66.B.100 is added as follows:

GM to 66.B.100 Procedure for the issue of an AML by the CA:

At the issue or renewal of a B2L licence:

- one or several system ratings, and
- one or several group/sub-group ratings

should be endorsed on the Form 26.

AMC 66.B.110 is amended as follows:

AMC 66.B.110 Procedure for the change of an aircraft maintenance licence to include an additional basic category or subcategory

In the case of computer generated licences, the licence should be reissued.

When the conditions set in the rule for extending a B2L licence to include the B2 category are met, the B2L licence should be replaced by a B2 licence.

The B2L licence replaced by a B2 licence should be retained by the competent authority.

Appendix II to AMC to Part-66 is amended as follows:

Appendix II

Aircraft Type Practical Experience and On the Job Training
List of Tasks

Tasks are divided in categories of aircraft:

A) aeroplanes

B) sailplanes and powered sailplanes

C) balloons and airships

A. SPECIFIC TASKS FOR AEROPLANES

Time limits/Maintenance checks

100 hour check (general aviation aircraft).

"B" or "C" check (transport category aircraft).

...

B. SPECIFIC TASKS FOR SAILPLANES AND POWERED SAILPLANES

Structures	Wooden/metal tube and fabric/ composite/metallic
General Activities	
Placards check or replace	x
Weighing, Weight & Balance Sheet	X
Documentation of Annual Inspection, Repair,	x
Review records for compliance with airworthiness directives	x
Five Annual Inspections	x
Inspection after an occurrence	x
Dismantling/reinstallation of wings and empennages	x
Leveling and weighing	
Level the sailplane	x
Weighing, Weight & Balance Sheet	X
Prepare a weight and balance amendment	x
Check the list of equipment	x

Structures	Wooden/metal tube and fabric/ composite/metallic
Flight Controls and Flight Control Systems	
Aileron, Flaps – Removal – Balancing - Reinstallation	x
Elevator – Removal – Balancing - Reinstallation	x
Rudder – Removal – Balancing - Reinstallation	x
Rudder Cable - Fabrication and Installation	x
Elevator pushrod - Installation	x
Safeguarding of pins, screws, castellated nuts	x
Sealing of gaps	x
Electrical Systems	
Electrical components, wiring - Removal - Installation	x
Batteries - servicing	x
Avionics Systems	
COM - removal – installation	x
NAV - removal – installation	x
XPDR - removal – installation	x
Antenna/ Antenna cable - removal – installation	x
Cabin Equipment / Systems	
Belts – safety harness removal installation	x
Oxygen system removal installation – test	x
Canopy replacement or repair	x
Pitot/Static system – removal – installation - test	x
Flight instruments removal – installation	x
Installation of approved equipment	x
Compass - installation – compensation	x
Tow release - removal – installation	x
Water ballast system - removal – installation - test	x

Structures	Wooden/metal tube and fabric/ composite/metallic
Undercarriage - removal – installation	x
Brake system – replacement of components	x
Fuel – Engine – Propeller – Engine- Instruments Refer to the tasks related to the tasks for aeroplane propeller, piston engine, fuel and control, ignition, engine indications and exhaust.	x
Verification and adjustment of folding system of powered sailplanes	x
Wooden structures / Metal tubes and fabric	
Inspection / testing for damages	x
Rib structure repair	x
Plywood skin repair	x
Recover or repair structure with fabric	x
Protective coating and finishing	x
Install patch on fabric material	x
Repair of fairings	x
Welding of tubes	x
Composite Structures	
Laminate repair	x
Sandwich structure repair	x
Partial gel coat repair	x
Complete gel coating	x
Repair of fairings	x
Metal structures	
Crack testing	x
Repair of covering	x
Drilling cracks	x
Riveting jobs	x
Bonding of structures	x

Structures	Wooden/metal tube and fabric/ composite/metallic
Anti-corrosion treatment	x
Repair of fairings	x

C. SPECIFIC TASKS FOR BALLOONS AND AIRSHIPS

Tasks	Balloon			Airship	
	Hot Air	Gas	Tethered Gas	Hot Air	Gas
General activities:					
Functionality test of aircraft (*)	x	x	x	x	x
Placards check or replace	x	x	x	x	x
Documentation Annual Inspection, Repair, AD`s, equipment (*)	x	x	x	x	x
Classification Repair (*)	x	x	x	x	x
Weighing:					
Weighing and weighing report (*)	x	x	x	x	x
Servicing:					
Lubrication of controls when applicable			x	x	x
Cleaning Envelope, Basket, Burner	x	x	x	x	x
Inspections:					
Eight annual inspections of different types (*)	x				
Five annual inspections of different types (*)		x			
Three annual inspections of different types (*)			x	x	
Two annual inspections (*)					x
Strength test of envelope fabric (*)	x	x	x	x	x
Flight control systems – removal, inspection, reinstallation:					
Control surface cable					x
Trim system					x
Safeguarding of pins, screws, castellated nuts (*)			x	x	x
Stick and pedals					x

Hydro/Mech. control systems			x		x
Ballonet control systems (*)			x	x	x
Electrical control systems			x		x
Valves (gas valve, turning vent, parachute or rip panel) (*)	x	x	x	x	x
Control and shroud lines and pulleys	x	x	x	x	x
Elevator – stabilizer (incl. balancing if applicable)					x
Rudder (incl. balancing if applicable)					x
Drag rope		x			
Electrical system:					
Removal – installation of electrical wires			x	x	x
Removal – installation of electrical components			x	x	x
Servicing of batteries	x	x	x	x	x
Communication system – Transponder:					
Removal – installation of COM	x	x	x	x	x
Removal – installation of NAV					x
Removal – installation of XPDR	x	x	x	x	x
Installation of antenna	x	x	x	x	x
Replacement of antenna cable	x	x	x	x	x
Cabin – Equipments:					
Pitot / static systems – tubes removal - installation - replacement					x
Flight instruments removal - installation - replacement	x	x	x	x	x
Installation of an approved system	x	x	x	x	x
Magnetic compass installation - compensation					x
Fire extinguisher	x			x	x
Ballast - Replacement of:					
Water ballast (when applicable)					x
Sand/shot ballast (when applicable)		x	x		x
Valves - inspection and rigging of valves					x
Envelope:					
Inspection and repair of envelope panels/gores/seams	x	x	x	x	x

Inspection and repair of load tapes and attachment points	x	x	x	x	x
Inspection and repair of deflation system	x	x		x	
Inspection and repair of net		x	x		
Inspection and repair of mooring system			x		
Electrostatic conductivity test (if type is approved for hydrogen) (*)		x			x
Ballonet inspection and repair			x		x
Inspection and fabrication of a suspension cable or rope	x	x	x	x	x
Inspection and fabrication of a catena				x	x
Load ring/frame:					
Crack detection (welded and machined parts) (*)	x	x	x	x	
Heater system:					
Removal, inspection and re-installation	x			x	
Inspection and cleaning of vaporizer and filter (*)	x			x	
Inspection and replacement of hoses (*)	x			x	
Inspection and replacement of pilot flame ignition unit (*)	x			x	
Sealing of fittings (*)	x			x	
Pressure and leak test (*)	x			x	
Disassembly an assembly of fuel cell (*)	x			x	
10-year inspection of fuel cell	x			x	
Basket/gondola:					
Removal, inspection and re-installation (as applicable)	x	x	x	x	x
Inspection and fabrication of a suspension cable or rope (*)	x	x			
Removal – installation of padding	x	x			
Removal – installation of belts - safety harness				x	x
Removal – installation of essential elements of the cabin	x	x	x	x	x
Inspection and fabrication of a	x	x	x		

basket wire					
Inspection of operational equipment and its fixation points	x	x	x	x	x
Crack detection and repair (welded parts and frames)	x	x	x	x	x
Landing gear:					
Removal, inspection and re-installation of wheels			x	x	x
Removal, inspection and re-installation of brakes					x
Removal, inspection and re-installation of shock absorber					x
Fuel – Engine – Propeller – Engine instruments systems:					
Refer to tasks in blocks for aeroplanes				x	x
Wood structure:					
Structure repair	x	x	x		
Protective coating					
Composite structure:					
Laminate repair			x		x
Sandwich structure repair			x		x
Metal structures:					
Crack detection (welded and machined parts)	x	x	x	x	x
Riveting jobs				x	x
Bonding of structures		x	x	x	x
Anti-corrosion treatment			x	x	x
Repair of fairings			x		x
Engine:					
Tasks for aeroplanes of comparable certification level				x	x
Exhaust system:					
Tasks for aeroplanes of comparable certification level				x	x
Propeller:					
Tasks for aeroplanes of comparable certification level				x	x
Fuel system:					
Tasks for aeroplanes of comparable certification level				x	x

Hydraulic system:					
Tasks for aeroplanes of comparable certification level				x	x
Pneumatic system:					
Tasks for aeroplanes of comparable certification level				x	x
Winch system:					
Witness winch inspection			x		

GM 147.A.145(d) is amended as follows:

GM 147.A.145(d) Privileges of the maintenance training organisation

1. The pre audit procedure should focus on establishing compliance with the training and examination standards set out in Part-147 and Part-66.

2. The fundamental reason for allowing a maintenance training organisation approved under Part-147 to sub-contract certain basic theoretical training courses is to permit the approval of maintenance training organisations which may not have the capacity to conduct training courses on all Part-66 modules.

3. The reason for allowing the subcontracting of only training modules 1 to 6 and 8 to 10 of Appendix I and to modules 1, 2 and 3 of Appendix VII to Part-66 is that most of the related subjects can generally also be taught by training organisations not specialised in aircraft maintenance and the practical training element as specified in 147.A.200 does not apply to them. On the contrary, training modules 7 and 11 to 17 of Appendix I to Part-66 are specific to aircraft maintenance and include the practical training element as specified in 147.A.200. The intent of the 'limited subcontracting' option as specified in 147.A.145 is to grant Part-147 approvals only to those organisations having themselves at least the capacity to teach on aircraft maintenance specific matters.

AMC 147.A.200(g) is amended as follows:

AMC 147.A.200(g) The approved basic training course

Typical conversion durations are given below:

…

(d) ...

(e) The approved basic training course to qualify for conversion from holding a Part-66 aircraft maintenance licence in any subcategory A to:

- category L (any subcategory) should not be less than the hours specified in the Appendix VII of Part-66;

- category B2L (with any system rating), should not be less than 800 hours; and

In both cases it should include between 60% and 70% knowledge training.