

Safety Regulation Group



CAP 468

British Civil Airworthiness Requirements

Section L Licensing - Aircraft Maintenance Engineers

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February 2003

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Amendment Record

Amendment Number	Amendment Date	Incorporated by	Incorporated on

Foreword

1 Purpose

British Civil Airworthiness Requirements of which Section L is a constituent part, are published by the Civil Aviation Authority (hereinafter referred to as the 'CAA'). Section L covers the grant, extension and renewal of Aircraft Maintenance Engineers' Licences and the approval and recognition of training applicable thereto.

2 International Standards

The requirements of this Section L recognise the Standards prescribed by the International Civil Aviation Organisation for the grant and extension of licences.

3 Interpretation

- 3.1 Where reference is made to a Statutory Instrument or document, e.g. the Air Navigation Order or other Sections of British Civil Airworthiness Requirements (BCAR), such reference shall be taken to refer to the current issue (with amendments) of the Statutory Instrument or document.
- 3.2 Where reference is made to Airworthiness Notices, such reference shall be taken as a reference to the current issue of the particular Notice.
- 3.3 Mandatory clauses are invariably denoted by the use of 'shall' or 'must' whereas 'should' or 'may' are used in the text to introduce permissive or recommended clauses.
- 3.4 It is implicit in requirements expressed qualitatively (e.g. 'acceptable') that the CAA will adjudicate in cases where doubt exists.

4 Editorial Presentation

- 4.1 It is the intention that Section L will serve as a comprehensive guide to licensing procedures as a whole, related information having been included. The Chapters and their subject matter are arranged in a progressive sequence, supplemented by a series of Appendices.
- 4.2 Related subject matter is highlighted by cross-referencing between Chapters and Appendices.
- 4.3 The examination syllabus in subject modules is one of the series of Appendices. The modules appropriate to the licence Categories are set out in tabular form.
- 4.4 A list of the subjects covered by the Chapters and of all Appendices is given in the CONTENTS.
- 4.5 A system of progressive paragraph numbering is used, but the number of digits is kept to a maximum of three by associating the system with the paragraph headings. A paragraph heading applies to all succeeding paragraphs until another titled paragraph with the same, or a smaller, number of digits occurs.

5 Issue and Amendment

- 5.1 The printed version of the Section, which is identified by an Issue No. and date (e.g. Issue 8, dated 1 March 1987) will be deemed to be amended by each BCAR Amendment which is issued subsequent to the date of Issue of the printed version.
- 5.2 The marginal lines in BCAR Amendments indicate material differences between them and the text in the previous version of the Section.

6 Effective Date

New requirements and amendments promulgated in BCAR Amendments are effective from the date printed on them. Thus for any application made on or after the date of issue of the printed version of the Section, the effective requirements will be made up of those in the printed version of the Section including any Amendments incorporated at the time the application is made.

7 Enquiries

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Chapter L1 Licences and Categories

1 General

- 1.1 Under Article 13 of the Air Navigation Order (ANO) the Civil Aviation Authority may grant an Aircraft Maintenance Engineer's Licence 'subject to such conditions as it thinks fit, upon its being satisfied that an applicant is a fit person to hold the Licence, and has furnished such evidence and passed such examinations and tests as the CAA may require for the purpose of establishing that the applicant has sufficient knowledge, experience, competence and skill in aeronautical engineering'.
- 1.2 Licences are granted and extended within the defined Categories given in Table 1. Generally, there are two parts to each Category:
- a) Licence Without Type Rating (LWTR).
 - b) Type Ratings.
- 1.3 JAR-66 Certifying Staff – Maintenance, A European harmonised licensing standard, became effective on 1 June 2001 for aeroplanes and helicopters above 5700 kgs Maximum Take Off Mass (MTOM). JAR-66 provides for 'protected rights' in respect of certification privileges held on that date including those of a BCAR Section L licence.
- 1.4 From 1 June 2001 applications in respect of aeroplanes and helicopters above 5700 kg MTOM should be made to the requirements in JAR-66 except as described in paragraphs 1.5 and 1.6.
- 1.5 The requirements of BCAR Section L for aeroplanes and helicopters below 5700 kgs and for airships of any weight will continue until JAR-66 includes them or until such time as the CAA otherwise directs.
- 1.6 BCAR Section L continues to prescribe the requirements for additional type ratings on existing BCAR Section L licences for aircraft greater than 5700 kgs MTOM until the Licence held by an individual is transferred to JAR-66. Thereafter the requirements of JAR-66 must be met.
- 1.7 The CAA intends to replace the previous and current licensing requirements of BCAR Section L in due course with JAR-66.

2 Licence Without Type Rating (LWTR) (see Table 1)

- 2.1
- a) This Licence does not in itself confer any certification responsibilities or privileges. It is, however, a prerequisite for the grant of the relevant Type Ratings which confer the privileges of certification appropriate to that Type Rating.
 - b) CAA Approval of Organisations under JAR-145 and UK national requirements are described in Airworthiness Notice No 14. In general these approvals require at least an appropriate LWTR to be held before authorisation for maintenance certification may be granted. For further information reference should be made to the latest issue of that Airworthiness Notice.

3 Type Ratings (See Table 2 and Airworthiness Notice No. 10)

- 3.1 **General.** Type Ratings confer on the holder of a Licence privileges and certification responsibilities in respect of certain aircraft registered in the United Kingdom. The certification responsibilities are described in Airworthiness Notice No. 3.
- 3.2 A Licence holder may not certify for work under a Type Rating or Group Type Rating unless he or she is familiar with the latest manufacturer's maintenance information and current airworthiness data. The licence holder may not certify beyond the privileges permitted by Airworthiness Notice No. 3 in respect of the Type ratings held.
- 3.3 Type Ratings granted in Category 'C' Engines – Aeroplanes cannot be used to certify engines in rotorcraft or airships.

4 Validity of Licences

- 4.1 Licences are issued for a period of 2 years and renewed for a period of 5 years.
- 4.2 Use of a Licence with a Type Rating to issue a certification requires that, during the 24 months preceding the date of the certification, the holder has been engaged for periods totalling at least 6 months on work affording experience comparable with that required for the grant of the Licence.
- 4.3 The Licence holder shall be satisfied that the Licence Ratings are correct.
- 4.4 The Licence is not valid until signed in ink by the holder.
- 4.5 Under Article 13 of the ANO, Licence holders may not exercise the privileges of a Licence whilst medically unfit or under the influence of drink or drugs. Advice on this subject is given in Airworthiness Notice No 47.

5 Obsolete Licence Ratings

- 5.1 Holders of Licences granted under issues 7 to 13 of BCAR Section L may continue to exercise the privileges of these ratings. However they may find that they are unable to apply for the full range of Type Ratings appropriate to the Category held and may first need to apply for the appropriate LWTRs of this issue of Section L, if appropriate, or to qualify to the full licence standard under JAR-66.
- 5.2 Holders of Licences issued under BCAR Section L may not add additional LWTRs to their Licences under Section L in respect of aeroplanes and helicopters above 5700 kgs MTOM. Where the basic scope of the licence is required to be extended it will be necessary to qualify under JAR-66. Additional Type ratings may be added as permitted by this issue of BCAR Section L until the privileges of the licence are transferred to JAR-66.
- 5.3 The holder of an LWTR sub division issued under BCAR Section L Issue 7 may upgrade that LWTR to the corresponding LWTR of the current Issue by passing a multi-choice examination on each full module where there is syllabus difference between the two. No additional experience is needed but due to the limited applicability of BCAR Section L from Issue 14, this conversion option is available only to those engaged in maintenance of aircraft below 5700 kg. The examinations required for those conversions available are shown in Table 2 of Appendix 1.

Table 1 Licence Categories, LWTRs and Type Ratings

Categories	Licence Without Type Rating Sub-divisions	Type Ratings As Defined In The Following Paragraphs Of Airworthiness Notice No. 10
'A' – Aeroplanes	Aeroplanes 1* ¹	Paras 5.7, 5.7.1, 5.8, 5.9, 5.9.1
	Aeroplanes 2* ²	Para 5.6
'B' – Aeroplanes ¹ – Rotorcraft ¹	Granted concurrently with a Category 'B' Type Rating only and requires a relevant Category 'A' Type Rating	Paras 5.7, 5.7.1 Paras 7.1, 7.3
'C' – Engines ¹	Piston Engines – Aeroplanes	Paras 6.0, 6.3
	Turbine Engines – Aeroplanes	Paras 6.4, 6.5, 6.6
'A' & 'C' – Rotorcraft ¹	Piston-engined Rotorcraft Turbine-engined Rotorcraft	Para 7.1 Paras 7.3, 7.4
'A' & 'C' – Airships	Piston-engined Airships Turbine-engined Airships	Not granted. See para 14 of Airworthiness Notice No. 10
'D' – Piston Engines	(Granted concurrently with a Type Rating only)	Paras 6.0, 6.3
'X' – Electrical ¹	Electrical	Paras 9.1, 9.2, 9.3 and 9.4
'X' – Instruments ¹	Instruments	Paras 8.1, 8.2, 8.3, 8.4 and 8.8
'X' – Automatic Pilots ¹	Automatic Pilots – Aeroplanes	Paras 13.1, 13.2 and 13.3
	Automatic Pilots – Rotorcraft	Paras 13.4 and 13.5
'X' – Combined Category ²	Combined Category Instruments/ Automatic Pilots	See para 10 of Airworthiness Notice No.10
'X' – Compass Compensation ¹	Compass Compensation and Adjustment	Para 15
'R' – Radio ¹	Communication and Navigation	Paras 12.2, 12.2.1
	Radar	Paras 12.3, 12.3.1

* Aeroplanes 1: Unpressurised types of any weight or pressurised types not exceeding 5700 kg
Aeroplanes 2: Pressurised types exceeding 5700 kg.

¹ Available only for aircraft below 5700 kg MTOM.

² No longer available.

Table 2 Type Ratings

Category	Paragraph of Notice No. 10	Types/Systems Covered
'A' – Aeroplanes 1	5.0+	Composite Material Aeroplanes (see NOTE below)
	5.1+	Wooden and Combined Wood and Metal Aeroplanes
	5.5.1 ²	Metal Aeroplanes not exceeding 2730 kg MTWA
	5.5 ²	Pressurised Metal Aeroplanes not exceeding 5700 kg MTWA and all Unpressurised Metal Aeroplanes
	5.7+	Unpressurised Metal aeroplanes not exceeding 5700 kg MTWA
	5.7.1+	Unpressurised Metal aeroplanes not exceeding 2730 kg MTWA
	5.8* ³	Unpressurised Metal aeroplanes exceeding 5700 kg MTWA
	5.9*	Pressurised Metal aeroplanes not exceeding 5700 kg MTWA
'B' – Aeroplanes	5.1+	Wooden and Combined Wood and Metal Aeroplanes.
	5.5.1 ²	Unpressurised Metal Aeroplanes not exceeding 2730 kg MTWA.
	5.5 ²	Unpressurised Metal Aeroplanes not exceeding 5700 kg MTWA.
	5.7+	Unpressurised Metal aeroplanes not exceeding 5700 kg MTWA
	5.7.1+	Unpressurised Metal aeroplanes not exceeding 2730 kg MTWA
'A' – Aeroplanes 2	5.6* ³	Pressurised Aeroplanes exceeding 5700kg MTWA.
'C' – Engines	6.0+	Diesel Engines in Aeroplanes.
	6.3+	Piston Engines in Aeroplanes, excluding Diesel Engines.
	6.4*	Jet-turbine engines not exceeding a power rating of 22.25 kN (5000 lbf) in aeroplanes including, where so endorsed, the associated APU.
	6.5*	Propeller-turbine engines in aeroplanes including, where so endorsed, the associated APU.
	6.6*	Jet-turbine engines exceeding a power rating of 22.25 kN (5000 lbf) in aeroplanes including where so endorsed, the associated APU.

Note (i) Aeroplanes of composite material are those in which the primary structure is of reinforced plastic/epoxy manufacture.

(ii) A Category B licence will not be granted for composite material aeroplanes in paragraph 5.0.

+ Available as a complete paragraph.

* Available as specific types only within the paragraph.

² No longer available.

³ Available only to holders of licences issued before 1 June 2001.

(Table Continued)

Table 2 (Continued)

Category	Paragraph of Notice No. 10	Types/Systems Covered
'D' – Engines	6.0+	Diesel Engines not exceeding 500KW(670bhp) in aeroplanes/ rotorcraft/airships
	6.3+	Piston engines, excluding Diesel engines, not exceeding 500KW (670bhp) in aeroplanes/rotorcraft/ airships.
'A' & 'C' – Rotorcraft	7.1+	Piston-engined rotorcraft.
	7.3+	Turbine-engined rotorcraft not exceeding 2730 kg MTWA.
	7.4* ⁴	Turbine-engined rotorcraft exceeding 2730 kg MTWA.
'B' – Rotorcraft	7.1+	Piston-engined rotorcraft.
	7.3+	Turbine-engined rotorcraft not exceeding 2730 kg MTWA.
'X' – Instruments	8.1	Aircraft having installed:– General aircraft instruments (excluding any aircraft which has installed a Flight Director)
	8.2	Smiths Flight Systems. Sperry Zero Reader ZL1, ZL2 Flight Director System.
	8.3	Flight Director Systems employing air-driven gyroscopes (attitude).
	8.4	Flight Director Systems employing electrically-driven gyroscopes (attitude) excluding those systems defined in paragraph 8.2.
	8.8	Compass compensation and adjustment.
'X' – Electrical	9.1	Aircraft in which the main generation system output is d.c. (including alternators having a self-contained rectifier system) and in which secondary alternators having an individual power rating not exceeding 1.5 kVA may be fitted.
	9.2	Aircraft in which the main generation system output is d.c. and which have installed 'frequency wild' alternators with an individual power rating exceeding 1.5 kVA for auxiliary services
	9.3	Aircraft in which the main generation system output is 'frequency wild' a.c. and d.c. power is supplied from transformer rectifier units.

+ Available as a complete paragraph.

* Available as specific types only within the paragraph.

⁴ Types of 5700kg MTOM and above available only to holders of licences issued before 1 June 2001.

(Table Continued)

Table 2 (Continued)

Category	Paragraph of Notice No. 10	Types/Systems Covered
'X' – Electrical (cont)	9.4	Aircraft in which the main generation system output is 'constant frequency' a.c. from alternators driven by constant speed drive units or variable speed constant frequency (VSCF) generator/converter systems, and d.c. power is supplied from transformer rectifier units.
'X' Combined Category (Instruments and Automatic Pilots)	10.1.4 10.1.5 10.1.6	Includes all the general instrumentation, flight director, automatic pilot, inertial navigation, compasses (excluding compensation) and ground proximity warning systems installed in aircraft listed in the relevant sub-paragraph of Notice No. 10.
'R' – Radio	12.2 12.2.1 12.3 12.3.1	Airborne Communication and Navigation Systems. Airborne Communication systems and Airborne Navigation systems installed in aircraft below 5700 kg MTOM, excluding HF communications systems, Passenger entertainment systems, Multiplex systems, CVR and Satellite communication systems. Airborne Radar Systems. Airborne radar systems installed in aircraft below 5700 kg MTOM, excluding weather radar and TCAS.
'X' –Automatic Pilots – Aeroplanes	13.1 13.2 13.3	Aeroplanes having installed: Non radio-coupled Automatic Pilots. Radio-coupled Automatic Pilots excluding ILS coupled (LOC and GS) Automatic pilots. ILS Coupled (LOC and GS) Automatic Pilots.
– Rotorcraft	13.4 13.5	Rotorcraft having installed: Non radio-coupled Automatic Pilots. Radio-coupled Automatic Pilots.
'X' –Compass Compensation and Adjustment	15	Compass compensation and adjustment.

NOTE: Applications in respect of type ratings in Categories 'X' and 'R' for aircraft above 5700kg MTOM will only be accepted from holders of licences issued prior to 1 June 2001.

Chapter L2 Application for the Grant or Extension of a Licence

1 General

- 1.1 This Chapter prescribes the minimum age and experience requirements, including any courses required or accepted as part of the process of determining whether a Licence be granted or extended.
- 1.2 The applicant's experience of maintenance of aircraft will be required to be of an extent and recency according to the application being made.
- 1.3 Military aircraft maintenance experience will be accepted only if gained whilst serving within the UK armed forces.
- 1.4 Satisfactory completion of a CAA-Approved ab-initio training course may vary these requirements (see Chapter L6).
- 1.5 The charges payable for the grant and extension of Licences are set out in the CAA Scheme of Charges and are summarised in Airworthiness Notice No. 25.
- 1.6 Some LWTRs are no longer available, having been superseded by JAR-66. Where this is the case an application for a licence will need to be made in accordance with the JAR-66 requirements.

2 Eligibility

- 2.1 Prior to the grant/extension of a Licence an applicant shall be not less than:
 - a) 20 years of age for a LWTR;
 - b) 21 years of age for a Type Rating.An application may be made no more than three months in advance of these ages.
- 2.2 An applicant for the grant/extension of a Licence shall:
 - a) submit an application which is acceptable in content and presentation;
 - b) provide evidence of acceptable experience and any training course requirements relevant to the application;
 - c) be able to read, write, interpret technical reports and carry out technical discussions in the English language;
 - d) reach a satisfactory standard in any examinations required;
 - e) pay the appropriate fee.

3 Application for a Licence Without Type Rating (LWTR)

- 3.1 Before applying for the grant or extension of a LWTR, an applicant must have passed all necessary written examinations as described in Chapter L3.
- 3.2 An application for the grant or extension of a Licence Without Type Rating should be made on Form SRG1005 (AD 300), an example of which is shown in Appendix 4. Applicants should ensure that they use forms of the current version. These are

available from the CAA, Personnel Licensing, Aviation House, Gatwick Airport South, West Sussex RH6 0YR, any CAA UK Regional Office (see Airworthiness Notice No. 29) or via the CAA website www.srg.caa.co.uk.

- 3.3 Form SRG1005 (AD 300) requires information on the nature of experience, the periods during which the experience has been gained and the signatures required in confirmation. Documents pertaining to service in the UK Armed Forces, completion of aeronautical engineering courses, foreign licences and professional qualifications should be submitted to the CAA in support of the application when relevant. If copy documents are submitted these shall be certified as a true copy by the person who confirms the experience on the Form SRG1005 (AD 300). The CAA is developing a logbook for engineers to record their experience in a structured way which will assist licence applicants to demonstrate their meeting the experience requirements for an LWTR or type rating.
- 3.4 LWTR Sub-Divisions may be applied for in any order with the exception of:
- Category 'A' Aeroplanes 1 which will be granted only in combination with either Category 'C' Piston Engines – Aeroplanes or Category 'C' Turbine Engines – Aeroplanes, as requested and according to experience.
 - Category 'C' Piston Engines – Aeroplanes or Turbine Engines – Aeroplanes which will be granted only in combination with Category 'A' Aeroplanes 1.
 - Category 'R' which requires that the LWTR Sub-Division Radio Communication and Navigation is held before the Licence can be extended to include Category 'R' Radio Radar.
 - Category 'X' – Compass Compensation and Adjustment which requires an applicant to hold LWTRs in both Categories 'A' and 'C'. The applicant is required to have a minimum of 6 months engineering experience relating to the maintenance of operating aircraft in the 2 years preceding the date of application.
- NOTE:** Category 'X' instruments LWTR includes the elements of the Category 'X' – Compass Compensation and Adjustment LWTR and so holders of Instruments LWTR do not need to apply for Compensation and Adjustment LWTR.
- Category 'B' (see paragraph 4.3.2).
 - Category 'D' (see paragraph 4.4.2).

4 Experience Requirements – LWTR

4.1 Categories – A, C, X and R

Applications for the grant or extension of a Licence in any of these Categories (except Category 'X' – Compass Compensation and Adjustment, for which see paragraph 3.4) must show confirmed minimum specific periods of aviation maintenance engineering experience totalling 3 years.

- 4.1.1 Applications must also show the following minimum experience, which must have been gained whilst maintaining operating aircraft and not in component workshops or on static or non-flying aircraft:
- for a Category 'A' and/or 'C' LWTR, 24 months relating to Airframe and/or Engine maintenance, 12 months of which must be in the 2 years immediately preceding the date of application.

- b) for any Category 'R' and/or 'X' LWTR (excluding Category 'X' – Compass Compensation and Adjustment), 24 months related to avionic systems, 12 months of which must be in the 2 years immediately preceding the date of application.
- c) 6 months, within the 12 months referred to in (a) and (b), relevant to the specific LWTR for which application is being made.

4.1.2 Where an applicant for Category 'X' Electrical holds a valid Licence which includes both Category 'A' and Category 'C' LWTR sub divisions, the experience in paragraph 4.1.1(b) above need not be complied with and the applicant need show only the 6 months experience relevant to the LWTR required in paragraph (c).

4.1.3 Any of the periods specified in this paragraph may be concurrent.

4.2 Where in a particular case, the LWTR or Sub-Division syllabus covers systems or subjects which may not be encountered necessarily by an applicant, specific practical experience on that subject or system will not be required, provided that the general area of the LWTR/Sub-Division is supported by experience; for example in the case of:

- a) LWTR Turbine Engines-Aeroplanes, experience of propellers may not have been gained;
- b) LWTR Instruments, experience of INS may not have been gained;
- c) LWTR Electrical, experience of a.c. power may not have been gained.

However lack of experience in these subjects will not exclude them from the examination.

4.3 **Category 'B'**

4.3.1 Applications for Category 'B' Aeroplanes or Rotorcraft must show confirmed minimum specific periods of 12 months, within the 2 years immediately preceding the date of application, major maintenance/major repair/overhaul activity on aeroplanes or rotorcraft, as applicable, below 5700 kg. This experience is additional to, but may have been obtained concurrently with, the experience required for the prerequisite Category 'A' Licence. Notwithstanding this minimum period of experience, an applicant must show an appropriate breadth and depth of experience on specific aircraft to support the application.

4.3.2 An applicant for the grant or extension of a Licence to include Category 'B' must hold the equivalent LWTR in Category 'A' Aeroplanes or Category 'A/C' Rotorcraft, together with the equivalent Type Rating(s).

4.3.3 Category 'B' LWTR is only granted concurrently with an appropriate Type Rating.

4.4 **Category 'D'**

4.4.1 Applications for grant/extension of a Licence in Category 'D' must show confirmed minimum periods of 2 years use of a Category 'C' Type Rated Licence on piston engines in aircraft and 12 months, within the 2 years immediately preceding the date of application, overhaul of aircraft piston engines.

4.4.2 An applicant for the grant or extension of a Licence to include Category 'D' must hold the equivalent LWTR in Category 'C' – Piston Engines (Aeroplanes) or 'A/C' – Piston Engined Rotorcraft as appropriate together with the equivalent type ratings.

4.4.3 Category 'D' LWTR is only granted concurrently with an appropriate Type Rating.

5 Application for a Type Rating

- 5.1 Type Ratings are designated within paragraphs of Airworthiness Notice No. 10 and the paragraphs relate to the various Licence Categories. For the purpose of this Chapter, the Types/Systems covered by the Type Ratings are summarised in Table 2 (Chapter L1).
- 5.2 An application for a Type Rating in respect of the type of aircraft, engine or system will be considered provided that:
- the appropriate LWTR is held or is being applied for simultaneously (see Table 1 Chapter L1). In the latter case the Type Rating will not be granted until the appropriate LWTR is held;
 - the aircraft is of a type, or the engine or system is installed in a type that is registered in the United Kingdom and in respect of which a United Kingdom Certificate of Airworthiness is in force or has been applied for;
 - the application is **not**:
 - for an aircraft type, engine or system described in, or considered by the Authority to fall within the description of paragraph 14 of Airworthiness Notice No. 10;
 - in Category 'B', for
 - a pressurised Aeroplane, or
 - an Aeroplane in which the primary structure is of reinforced plastic/epoxy manufacture, or
 - an Aeroplane having a MTWA exceeding 5700 kg (12,500 lb), or
 - a Rotorcraft having a MTWA exceeding 2730 kg (6,000 lb);
 - in Category 'D', for Piston Engines with a power rating exceeding 670 BHP (500 kW) or for any jet or propeller turbine engine.
 - notwithstanding any exclusion by paragraph (b) or c(i) above, the application may be considered where a JAR-145 approved organisation in the UK can show a requirement for a type rating to permit certification authorisation under JAR-145.
- 5.3 For Type Ratings indicated '+' in Table 2 Chapter L1, an application may be made for the complete paragraph or for specific types of Aeroplanes, Rotorcraft or Engines within the paragraph.
- 5.4 The Type Ratings within paragraphs 5.6, 5.8, 5.9, 6.4, 6.5, 6.6 and 7.4 of Airworthiness Notice No. 10 are available only as specific types of Aeroplane, Rotorcraft or Engine and therefore are not available as a complete paragraph.
- 5.5 The assessment procedure for the grant of a Type Rating varies according to the particular Type Rating required and may take the form of an oral examination, completion of Approved Type Training or assessment of experience alone. Where satisfactory completion of Approved Type Training is required normally, the CAA may decide in a particular circumstance that an oral examination should be carried out either in lieu of the course or in addition to it.
- 5.5.1 The CAA will consider accepting a type training course approved in accordance with Chapter L5 instead of an oral examination which would otherwise be required for a particular type rating. Agreement from Personnel Licensing must be obtained before the type course is undertaken.

- 5.6 The application procedure to extend a licence to include a Type Rating is similar to that described in paragraph 3, except that the application Form SRG1005 (AD 300) must be accompanied by Forms SRG1007 (AD 301) Type Rating Record of Experience (see Appendix 6).
- 5.6.1 The certification required on Form SRG1005 (AD 300) shall be made by an engineer, acceptable to the CAA, who shall normally have had regular professional contact with the applicant and who has held a United Kingdom Licence, in the discipline for which application is made, for a minimum period of 24 months. The Licence must be valid. The signatory may be an experienced person other than an appropriately licensed engineer with the prior agreement of the CAA Personnel Licensing Department.
- 5.6.2 Where the applicant is required to undergo Approved Type Training, the applicant must give details on the Form SRG1005 (AD 300) and submit a copy of the appropriate Certificate.

6 Experience Requirements – Type Ratings

- 6.1 Subject to paragraph 6.2, extension of a Licence to include a Type Rating does not normally require a period of general experience additional to that required for the relevant LWTR, which must be held before a Type Rating will be granted (see Table 1 Chapter L1). However a satisfactory Record of Experience appropriate to the Type applied for must be submitted as part of the application for a Type Rating (see paragraph 5.6 and Appendix 6). The experience shown on it must have been gained within the three years before the application.
- 6.2 An application for a Type Rating from a holder of an LWTR which was gained following successful completion of an Approved Ab-initio Course must show confirmed evidence that he or she has obtained at least 12 months relevant aircraft engineering experience with an organisation engaged upon the maintenance of operational aircraft in addition to that gained during the Course.

6.3 Category 'A', 'B', 'C' and 'D' Type Ratings

6.3.1 For:

Category 'A' – Aeroplanes in paragraphs 5.0, 5.1, 5.7, 5.7.1, 5.9 and 5.9.1 of Airworthiness Notice No. 10;

Category 'B' – Aeroplanes in paragraphs 5.1, 5.7 or 5.7.1 of Airworthiness Notice No. 10;

Category 'B' – Rotorcraft in paragraphs 7.1 or 7.3 of Airworthiness Notice No. 10;

Category 'C' – Engines in paragraphs 6.0 or 6.3 of Airworthiness Notice No. 10;

Category 'D' – Engines not more than 500 kW (670 BHP) in paragraph 6.3 of Airworthiness Notice No. 10;

Categories 'A/C' – Rotorcraft in paragraph 7.1 of Airworthiness Notice No. 10.

- a) A Type Rating will normally be granted subject to a satisfactory oral examination on those items in the modular syllabus applicable to the Category/Type Rating.
- b) Where application is made for the paragraph itself, the Record of Experience referred to in paragraph 6.1 must provide satisfactory evidence of relevant experience of at least 1 year on a minimum of three types of aeroplanes, rotorcraft and/or engines, as appropriate, of different manufacturers within that paragraph. The types must be representative of those within the paragraphs and one type must satisfy the following criteria:

For paragraph 5.7.1: Aeroplanes having retractable landing gear.

For paragraph 5.7: Aeroplanes over 2730 kg and having retractable landing gear.

For paragraph 5.9.1: Aeroplanes below 2730 kg having retractable landing gear and are pressurised.

For paragraphs 6.0 or 6.3: Engines that are supercharged/turbocharged and of the type (Petrol or Diesel) covered by the paragraph.

Where application is made for a specific type only, the Record of Experience (see Appendix 6) need only cover that specific type.

6.3.2 For:

Category 'A' – Aeroplanes in paragraph 5.6 and 5.8 of Airworthiness Notice No. 10.

Category 'C' – Engines in paragraphs 6.4, 6.5 and 6.6 of Airworthiness Notice No. 10.

Category 'A' and 'C' – Rotorcraft in paragraphs 7.3 and 7.4 of Airworthiness Notice No. 10.

- a) A Type Rating will normally be granted subject to evidence of satisfactory completion either of a CAA Approved Course (See Chapter L5) covering the Type Rating or of a type training course to ATA 104 level 3 covering the Type Rating and carried out by a suitably approved JAR-147 Approved Maintenance Training Organisation approved by a JAA full member Authority. In either case the course should have been completed within the 3 years immediately preceding the date of application.
- b) Application may be made only for specific types of Aeroplanes, Rotorcraft and/or Engines listed in paragraphs 5.6, 5.8, 5.9, 6.4, 6.5, 6.6 and 7.4 and not for the complete paragraph.
- c) Applications will be considered for paragraph 7.3 or for specific types of Rotorcraft covered by the paragraph. Where application is made for the paragraph, the Record of Experience must provide satisfactory evidence of relevant experience of at least 1 year on a minimum of three types of Engines and/or Rotorcraft by two different manufacturers within that paragraph. The types must be representative of the paragraph. Where application is made for a specific type only, the Record of Experience need only cover that specific type.

6.3.3 Application for one of the complete paragraphs 5.0 (Category A only), 5.1, 5.7, 5.7.1, 5.9.1, 6.0, 6.3, 7.1 or 7.3, may be accepted without examination for the complete paragraph, or without a training course for the complete paragraph, provided that:

- a) The applicant has obtained three Type Ratings of aircraft and/or engines of different manufacturers, representative of types within the paragraph, and
 - i) For paragraphs 5.7, 5.7.1, 6.0 and 6.3, one of the Type Ratings must satisfy requirement (c) below.
 - ii) For paragraph 7.3, engine types by two different manufacturers is required.
- b) The applicant must show confirmed experience of 2 years maintenance of aircraft and/or engines within the paragraph. For paragraphs 5.7, 5.7.1, 6.0 and 6.3, 1 year must be on types satisfying requirement (c).
- c) For paragraph 5.7.1: Aeroplanes having retractable landing gear but not necessarily pressurised.

For paragraph 5.7: Aeroplanes over 2730 kg, and having retractable landing gear, but not necessarily pressurised.

For paragraph 5.9.1: Aeroplanes below 2730 kg having retractable landing gear and are pressurised.

For paragraphs 6.0 or 6.3: Engines that are supercharged/turbocharged and of a type (Petrol or Diesel) covered by the paragraph.

6.4 **Category 'X' Type Ratings**

Note: 1) Applications for Licence Without Type Ratings in Category 'X' sub-categories after 1 June 2001 may only be made for and, when issued, will only be valid for aircraft below 5700 kg and will be endorsed to that effect. Type Ratings may be added to these licences in accordance with the provisions of this paragraph but will be limited to certification on aircraft below 5700 kg only. This may limit the availability of some group ratings listed in Airworthiness Notice No. 10. For privileges on aircraft above this weight, application must be made in accordance with JAR-66.

2) Licences Without Type Ratings issued in Category 'X' sub-categories prior to 1 June 2001 may be extended by adding Type Ratings in accordance with this paragraph until the licence is transferred to the JAR-66 licensing system.

6.4.1 Category 'X' – Instruments. A Type Rating for any of the paragraphs 8.1, 8.2, 8.3 or 8.4 of Airworthiness Notice No. 10 will be granted subject to a satisfactory oral examination on those items in the modular syllabus applicable to the Category and to the Type Ratings.

6.4.2 Category 'X' – Electrical

a) A Type Rating for any of the paragraphs 9.1, 9.2 or 9.3 of Airworthiness Notice No. 10 will normally be granted subject to a satisfactory oral examination on those items in the modular syllabus applicable to the Category and to the Type Ratings.

b) A Type Rating in paragraph 9.4 of Airworthiness Notice No. 10 will normally be granted subject to evidence of satisfactory completion either of a CAA Approved Course (See Chapter L5) covering the Type Rating or of a type training course to ATA 104 level 3 covering the Type Rating and carried out by a suitably approved JAR-147 Approved Maintenance Training Organisation approved by a JAA full member Authority. In either case the course should have been completed within the 3 years immediately preceding the date of application.

6.4.3 Category 'X' – Automatic Pilots – Aeroplanes or Rotorcraft. A Type Rating for any of the paragraphs 13.1, 13.2, 13.3, 13.4 and 13.5 of Airworthiness Notice No.10 will normally be granted subject to a satisfactory oral examination on those items in the modular syllabus applicable to the Category and to the Type Ratings.

6.4.4 Category 'X' – Combined Category Instruments/Automatic Pilots. 'X' Combined Category LWTR is a prerequisite for the grant of any of the Combined Category Type Ratings listed in paragraph 10 of Airworthiness Notice No. 10. Such a Type Rating will normally be granted subject to evidence of satisfactory completion either of a CAA Approved Course (See Chapter L5) covering the Type Rating or of a type training course to ATA 104 level 3 covering the Type Rating and carried out by a suitably approved JAR-147 Approved Maintenance Training Organisation approved by a JAA full member Authority. In either case the course should have been completed within the 3 years immediately preceding the date of application.

6.4.5 Category 'X' – Compass Compensation and Adjustment. For holders of Category 'X' – instruments LWTR a Type Rating for paragraph 8.8 of Airworthiness Notice No. 10 will be granted. For holders of Category 'X' – Compass Compensation and Adjustment LWTR a Type Rating for paragraph 15 of Airworthiness Notice No. 10 will

be granted. These Type Ratings will normally be granted subject to the provision of evidence of compass swings, which have included the compensation and adjustment of compasses, on four aircraft within the preceding 12 months.

6.5 **Category 'R' Type Ratings** A Type Rating for paragraph 12.2, 12.2.1, 12.3 or 12.3.1 of Airworthiness Notice No. 10, will normally be granted subject to assessment by the CAA of the Record of Experience required in paragraph 6.1.

- Note:**
- 1) Applications for Licence Without Type Ratings in Category 'R' sub-categories after 1 June 2001 may only be made for and when issued will only be valid for aircraft below 5700 kg and will be endorsed to that effect. Type Ratings may be added to these licences in accordance with the provisions of this paragraph but will be limited to certification only on aircraft below 5700 kg. This may limit the availability of some group ratings as listed in Airworthiness Notice No. 10. For licences to cover aircraft above this weight, application should be made in accordance with the relevant requirements of JAR-66.
 - 2) Licences Without Type Ratings issued in Category 'R' sub-categories prior to 1 June 2001 may be extended by adding Type Ratings in accordance with this paragraph until the licence is transferred to the JAR-66 licensing system.

Chapter L3 Examinations

1 General

This Chapter provides information on the examinations appropriate to the grant or extension of a Licence. The information in relation to LWTRs in particular may not apply to candidates who have completed successfully an Approved Ab-initio Course. Such candidates should consult Chapter L6. Examinations under BCAR Section L and JAR-66 are not interchangeable and cannot be credited between the two requirements.

2 Licence Without Type Rating

- 2.1 Examinations will comprise those modules of the syllabus in Appendix 1 which are applicable to the Category/Sub-Division, less those modules previously satisfied by an existing LWTR held on a valid Licence.
- 2.2 The examination for the initial grant of a Licence will normally be in three parts:
- i) a written examination, comprising individual multiple choice question papers,
 - ii) an essay question paper, and
 - iii) a basic licence oral examination.
- 2.3 The examination for licence extension to include a LWTR requires the applicant to sit and pass only the additional multiple choice modular exams applicable to the licence category/sub-division being sought. In the case of extensions to include categories 'B' or 'D' or 'X' Compass Compensation, an additional essay paper is taken instead of a multiple choice paper.

3 Type Ratings

- 3.1 The assessment procedure for Type Ratings is set out in paragraphs 5 and 6 of Chapter L2. Where an oral examination is required it will cover those items of the modular syllabus appropriate to the Type Rating.
- 3.2 Concurrent applications for an LWTR and an associated Type Rating where both require an oral examination will result in one oral examination covering both aspects once all written examination passes have been achieved for the LWTR.

4 The Examinations

- 4.1 **General.** Information on examination format is given below. Candidates should expect to be examined according to the syllabus in Appendix 1 appropriate to the rating regardless of whether or not they have experience on particular systems. (See Chapter L2, paragraph 4.2.)
- 4.2 Candidates must show proof of identity, such as a passport or a recognised identity document, when attending for examination.
- 4.3 Applications to take written examinations are made independently of the application for the issue or extension of a licence and may be made at any time irrespective of the level of maintenance experience gained. Application to take a written examination

must be made to the CAA on form SRG1006 (AD300A) and may cover one or more papers relevant to the LWTR sought. Written papers may be applied for and taken in any order. Dates and venues of written examinations are listed in Airworthiness Notice No. 46 and on the CAA website www.srg.caa.co.uk. Any change to an examination booking will incur a charge. No charges will be made to a booking within two weeks of the examination date booked.

4.4 An application for licence issue also covers the oral examination and candidates should be ready to take that examination when submitting the application.

4.5 **Written Examination.** The time allowed for each examination paper is shown on the answer sheet which the candidate must sign. All questions in a paper are worth equal marks. The pass mark for each modular multiple choice paper is 75%. The pass mark for the essay paper is 70%. Copies of past papers are not published but sample questions are shown in Appendix 3. Technical Manuals or other similar documentation are not used for reference purposes during the examination. Calculators or similar devices may not be used during examinations.

4.5.1 A pass in a multiple-choice or essay paper is valid for five years from the date of the examination. All parts of the required examinations (including any oral examination) must be passed within that period. Any passes falling outside that time limit will lapse. Any written examinations passed previously for an LWTR already held on a valid licence are not affected by this five year limit.

4.5.2 **Multi-Choice Paper.** For each module being taken, a question paper including instructions is provided together with an answer sheet. Each question comprises an introductory statement (question stem) and three alternative answers designated (A), (B) and (C) printed below. Only one of these answers is totally correct, the remaining two answers are incorrect or only partially correct, being incomplete in some definite aspect.

4.5.3 **Essay Paper.** An essay paper comprises a number of questions each with an allocated space in which the candidate is required to write the response. Some questions will cover basic principles and practical features appropriate to systems and/or components but in the main they will relate to maintenance and inspection aspects, condition assessment, functional checking, trouble-shooting procedures and maintenance certification. They may also include a need to consider legislative requirements and human factors implications in certain instances.

a) For examinations in respect of LWTR categories 'A', 'C', 'X' or 'R', the essay paper is required for initial licence issue only. This paper is intended to test the candidate's ability to read, write and express himself in technical English although some element of technical evaluation will occur.

b) In addition, for Categories 'B', 'D' and 'X' Compass Compensation an essay paper will have to be taken predominantly to examine the specific additional technical elements relating to these subjects.

4.6 **Oral Examination.** The basic oral examination is carried out only at licence issue and is the final stage in the process for the grant of a Licence. An application for LWTR oral examination and licence issue can be made only when the appropriate experience requirements for licence issue have been met and all written examinations required have been passed within the time limit allowed. The oral examination must be passed within five years of the first written examination pass. Oral examinations may also be carried out for the extension of a licence to include certain Type Ratings. The examinations are carried out by Surveyors at CAA Regional Offices at times mutually agreed. Applications for oral examinations are made on Form SRG1005 (AD300)

which also constitutes the application for licence issue subject to the applicant passing the oral examination.

- 4.6.1 The LWTR oral examination at licence issue is not intended to re-examine the basic knowledge of an individual. It is aimed primarily at assessing whether or not the individual possesses the expected ability to discharge the responsibilities of a licence holder. The oral examination will therefore be an assessment of the individual's fitness to hold the Licence by evaluating such issues as the determination of maintenance requirements, preparation and use of documents, supervision of tasks, management of complex tasks and the meeting of the various requirements to permit certification to be made. Whilst it is not intended that the oral examination deal with specific subjects from the syllabus, surveyors may include such questions if the candidate's answers to other questions suggest there is justification to do so. The oral examination must be passed within five years of passing the first written examination paper.
- 4.6.2 An oral examination for a Type Rating, where required, is based on those items of the syllabus applicable to the Category and Type Rating (see Appendix 1), emphasis being placed on the practical application of the knowledge. The candidate will be expected to demonstrate a knowledge of the aircraft, systems or components relevant to the Type Rating being sought, the manufacturer's maintenance documentation, relevant airworthiness data including Airworthiness Directives and modifications, typical defects and where applicable typical repair and inspection procedures for the Type. In addition, the candidate will be expected to show a familiarity with the checking and adjustment procedures for the various systems. Areas of work itemised by the candidate in the Type Rating Record of Experience will be included in the examination.

5 Failure and Partial Passes

- 5.1 **LWTR Written Examinations.** A candidate who wishes to reapply after any failure of an examination must complete and submit a Form SRG1006 (AD300A), no earlier than two months since the date of failure. Any modular passes are valid as described in paragraph 4.5.1.
- 5.2 **LWTR Oral Examinations.** A candidate who wishes to reapply after any failure of an oral examination must complete and submit a Form SRG1005 (AD300), no earlier than two months since the date of failure.
- 5.2.1 Subject to remaining within the five year time limit, a candidate is allowed two further attempts at an oral examination for the issue of an LWTR provided that the subsequent attempt takes place no earlier than two months and no later than six months after the previous failure. A candidate who fails all three attempts at the oral examination will be required to take or retake the appropriate written examinations before reapplying for licence issue and oral examination.
- 5.3 **Type Rating.** A candidate who has failed a Type Rating oral examination and wishes to be re-examined, should complete further Forms SRG1005 (AD300) and SRG1006 (AD 301) listing items of experience since the previous application. A minimum of three months of additional experience will be required for re-application.
- 5.4 **Failure Guidance** Candidates may request guidance following failure of an oral examination only. Requests must be made in writing to the CAA Personnel Licensing Department and guidance will be supplied only a writing. The CAA cannot offer any beneficial guidance on failure of written examinations beyond the marks shown on the failure notification.

Chapter L4 Licence Renewal

1 General

A Licence may be renewed as described below provided that the holder provides evidence of having been engaged on the maintenance of operating aircraft for periods totalling at least 6 months during the 24 months before application for renewal. Where a Licence holder is unable to show such experience but has been involved actively for the same minimum period in matters concerned with aircraft maintenance (e.g. as a quality engineer or quality manager, an aeronautical engineering instructor or as a flight engineer) consideration will be given to renewing the Licence.

2 Renewal

- 2.1 It is the responsibility of the Licence holder to ensure that his or her Licence remains valid. However, approximately two months before the expiry date of a Licence, a renewal form SRG1011 (AD 302) will be sent to the holder at the last address registered with the Personnel Licensing Department of the CAA. For this reason, and to be sure of receiving copies of amendments to Airworthiness Notices, it is important for Licence holders to notify changes of address promptly. On completion, the form should be returned with the appropriate fee to the address shown on it. Applications for renewal will not be accepted more than 60 days before expiry of the Licence. However, if the licence holder intends to apply for conversion to a JAR-66 licence instead of renewing the Section L licence (or as well as renewing it, if light aircraft privileges are also to be retained) applications involving conversion will be accepted before that time and in any event should be made no later than six weeks before the licence is due to expire to avoid any break in continuity.
- 2.2 A Licence cannot be back-dated and in order to ensure continuity of Licence coverage an acceptable application for renewal must be received by the CAA in good time before expiry of the Licence. Any lack of continuity in the validity of the Licence will be recorded on the renewed Licence. Any certifications issued after a Licence has lapsed could affect the validity of the Certificate of Airworthiness of the aircraft for which those certifications were issued.
- 2.2.1 If certification has been made under the authority of a Licence which has lapsed, the Licence will not be renewed until a statement has been made that all such certifications have been re certified by the holder of a valid Licence. This statement must be made by the owner of the aircraft or by the maintenance organisation(s) responsible for the maintenance of the aircraft since the invalid certification was made.
- 2.2.2 If certification has been made under the authority of a Company Authorisation based upon the certifier holding a valid Licence which had lapsed at the time the certification was made, the Licence will not be renewed until a statement has been made that all such certifications have been re certified by the holder of a valid Company Authorisation. This statement must be made by the Quality Manager of the approved maintenance organisation(s) responsible for the maintenance of the aircraft since the invalid certification was made.
- 2.3 The CAA can only renew a Licence upon being satisfied with the renewal submission and upon the receipt of the statutory fee. The charge payable will be shown on the application form. Licences are renewed for a period of five years.

3 Expired Licences

- 3.1 A Licence which has lapsed for less than 2 years will be considered for renewal without examination of the holder provided that the other requirements of this Chapter are met.
- 3.2 A Licence which has lapsed for more than 2 years will not be renewed without examination of the holder. The amount of recent experience required will depend on the length of time since the licence lapsed and the nature of employment. Application for the re-issue of the Licence should be made in accordance with the procedures in Chapter L2. Examination details appropriate to the circumstances will be notified by the CAA. The extent of the examination will generally be dependent on the nature of the holder's employment since the Licence was last renewed and on the degree to which such employment can be considered by the CAA as comparable to those privileges for which the Licence was valid. Where the applicant's recent experience is on aircraft of 5700 kg or above, the Section L licence will not be renewed and the examinations for a JAR-66 licence must be taken.

Chapter L5 Approved Type Training

1 General

- 1.1 For the grant of a type rating in paragraphs 5.6, 5.8, 6.4, 6.5, 6.6, 7.3, 7.4, 9.4 and 10 of Airworthiness Notice No 10, the applicant shall have satisfactorily completed approved type training. This Chapter sets out the requirements for the approval of such type training courses.
- 1.2 An applicant for a type rating which under Chapter L2 requires approved type training must have completed either a type course carried out by a JAR-147 maintenance training organisation approved for the particular aircraft type or a type course approved by the CAA. In either case, the training courses shall cover the scope of the appropriate LWTRs and be in accordance with ATA specification 104 level III.
- 1.3 Applications for approval of type training under this Chapter will also be considered for type ratings other than those listed in paragraph 1.1 above in cases where the CAA has agreed to accept approved type training in lieu of an oral examination.
- 1.4 The CAA will accept until June 2003 type rating applications based on the completion of any previously Recognised type training courses which have been notified to the Recognition holder as being valid until that date. No new applications will be accepted for Recognition or renewal of Recognition of type training courses.

2 JAR-147 Approved Type Training

- 2.1 A type course carried out to ATA 104 level III in JAR-66 Category B1 or B2 by a JAR-147 Approved Maintenance Training Organisation which is appropriately approved by a JAA full member Authority for that aircraft type may be accepted against the requirement for approved type training. Although such a course may cover the full JAR-66.45 Category B1 or B2 type training requirements, the scope of the type ratings for a licence granted under Section L will be restricted to that of the LWTRs held and covered fully by the course.
- 2.2 Although JAR-147, as currently published, applies to aircraft of 5700 kg and above, applications for type training approval under JAR-147 will also be accepted by the CAA for aircraft below this weight. Applicants for this approval for such aircraft will be required to satisfy the requirements of JAR-147 Part A and, where applicable, Part C. Approval will be granted only where the course covers fully the scope of the LWTR(s) for which type ratings will be sought although the course may also cover the existing JAR-66 syllabus equivalent where it is at a comparable or higher level. The Certificate of Approval granted by the CAA will show that the training is approved to JAR-147 but will specify that the course meets part of the requirement for a BCAR Section L licence type rating and certificates of training issued to students successfully completing the course must be endorsed to that effect. This training may not be recognised by other JAA Member States as meeting directly the requirements of JAR-66.
- 2.3 Where appropriate, a single course approval may be granted covering groups of aircraft by the same manufacturer; for example twin-engined Beech series.

3 Non-JAR-147 Type Course Approval

- 3.1 **General.** Although provision of type training under JAR-147 offers advantages both to user and provider, in view of the limited availability of JAR-147 approved type training in the short term particularly for GA aircraft and the provision to allow direct approval of a type course towards the granting of a type rating under JAR-66, the CAA will accept applications for direct type course approval under Section L by which the requirement for type training described in paragraph 1 can be met.
- 3.1.1 Application for approval of a type training course under this paragraph must be made by the course user, not the course provider. The organisation applying for approval must be a United Kingdom maintenance organisation. Approval is granted to - and specific to - the applicant and covers either a single, one-off course or a defined series of the same course within a specified time limit. The course user will be required to have carried out an assessment of the course against the criteria set out below which in general follow the standards required under JAR-147.
- 3.1.2 Approval must also be sought for Manufacturer's or other contracted out courses where they are not approved under JAR-147. It may be necessary in these circumstances to supply additional training on those areas of the Section L syllabus that are not covered.
- 3.2 **Requirements for Approval.** Organisations applying for approval of a course will be required to supply with the application a training needs analysis (examples of which are at Appendix 5), a sample of the course notes, details of the facilities at the location at which the course will be conducted, confirmation that the course will be conducted to Level III of ATA specification 104 commensurate with the LWTR in which the type rating is sought and information on end of course examination arrangements.
- 3.2.1 The course duration in days and hours must reflect the Training Needs Analysis which should state the duration, subjects instructed and that the levels of training meet the knowledge levels required by the syllabus modules. The analysis must encompass the full scope for the LWTR against which the type rating is required. The course must cover experience of the type including feedback from in-services difficulties, occurrence reporting and significant Airworthiness Directives and / or Service Bulletins.
- 3.2.2 The theoretical training must be supplemented by a review of the aircraft or systems hardware, ground simulator time, engine running and training aids such as aircraft system components and computer based training.
- 3.2.3 Where the training is conducted internally the organisation shall nominate a manager of training and ensure that an adequate number of suitably qualified instructors are available. Training personnel must be provided with appropriate information to keep them up to date. Appropriate administrative support must be provided.
- 3.2.4 The facility in which the operator intends the course to be conducted must:
- a) be fully enclosed and separate from other facilities for the instruction of theory and conduct of knowledge exams;
 - b) be maintained at a light, noise and temperature/humidity level such that the students are able to concentrate on their studies or examinations without undue distraction or discomfort;
 - c) have access to appropriate examples of the aircraft type. Synthetic training devices may also be used when the CAA is satisfied that the use of such devices is adequately supported to ensure acceptable training standards.

- In most cases the CAA will carry out an audit of the training facility as part of the approval process.
- 3.2.5 Where the approval covers more than a single, one-off course, the approval holder shall notify material changes in staff, syllabuses or facilities to the CAA. Approval shall become invalid if any of the information supplied in support of the application for approval is no longer correct. To ensure that these requirements are being met the CAA shall have reasonable access to the training organisation and its records.
- 3.2.6 Where, for example in the case of a helicopter airframe and engine, elements of training for an LWTR are conducted separately or the course is split between different providers, the elements will be subject to separate approval and charged accordingly but the applicant organisation must ensure that the training as a whole covers the full scope of the type rating sought.
- 3.3 **Course examinations.** Course examinations shall comprise multi choice questions and each question is to have three alternative answers with only one being correct. The time allowed for answering each question shall be 75 seconds for level III questions. The minimum number of questions shall be related to the course length with at least one question for each hour of instruction. The examination shall be of "closed book" style with a pass mark of 75% with no penalty marking. Phase examinations should comprise a minimum of four questions for each ATA chapter and the questions may not be used in the final examination.
- 3.3.1 Where the course includes the use of either fixed base or full motion simulators to carry out ground running techniques or troubleshooting scenarios the final examination should include practical assessments to demonstrate the appropriate competence.
- 3.3.2 On successful completion of the course, a course certificate will be issued for each student by the training provider clearly stating the scope of the training.
- 3.4 **Application for the grant of approval.** Application for approval of the course should be made before the training is conducted.
- 3.4.1 An organisation requiring approval of a type course must submit an application on form SRG 1012, copies of which are obtainable from the Personnel Licensing Department of the CAA or may be downloaded from its website www.srg.caa.co.uk. Following receipt of the application and the supporting documentation, the CAA will decide the level of investigation required for it to assess the training facilities and programmes in accordance with the requirements above.
- 3.4.2 A charge is payable for the approval application. Additional charges are payable according to the CAA Scheme of Charges for any work carried out outside the UK in connection with the approval application.
- 3.4.3 Approval is not renewable and a new application must be made if any extension to the agreed scope or number of courses covered by the approval is required.
- 3.5 **Applying for the type rating.** The student must apply within three years of successful completion of an approved type course for the grant of the relevant type rating in accordance with the procedures and requirements of Chapter L2, subject to any overriding transitional timescale which may apply as a result of any future amendment of JAR-66.

Chapter L6 Approved Ab-initio Training

1 Introduction

This Chapter details the requirements to be satisfied by Training Organisations seeking Approval of ab-initio courses giving basic aircraft engineering training and preparing students for CAA examinations for the grant of Categories 'A', 'C', 'X' or 'R' LWTRs. It also gives information on the application procedures and requirements for students completing such courses where they differ from those specified elsewhere in this document. With the advent of JAR-147, holders of existing training approval under this Chapter for Categories in respect of aircraft above 5700 kg will not be able to start new courses after 1 June 2001. No new approval applications will be accepted for such aircraft training. Existing approvals for aircraft training below 5700 kg will continue as herein until further notice.

2 Approval of Training Courses

2.1 Training courses may be approved within:

a) Mechanical Categories ('A', 'C' and may include 'X' Electrical);

and/or

b) Avionic Category 'X' (excluding Compass Compensation and Adjustment) and Category 'R'.

The Approval granted will be related to one or more LWTR Categories only. No approval will be granted in relation to any Type Rating.

2.2 Applications for Approval of a training course covering periods of training of not less than 24 months for any acceptable group either of mechanical category LWTRs or of avionic category LWTRs will be considered. Applications for variations from the basic courses will be assessed by the CAA which may require adjustment of course duration. The inclusion of additional LWTRs will require consideration of extra theoretical and practical training.

2.3 Application shall be made on Forms AD 458 and 681, copies of which are obtainable from the Personnel Licensing Department of the CAA. The information to be provided relates to the requirements set out in this Chapter. On completion, the forms and other relevant training documentation, including the proposed company exposition, should be sent for assessment to the Personnel Licensing Department with the appropriate fee.

3 Requirements for Approval

3.1 **Nominated personnel.** The applicant for approval shall nominate the following:

a) a responsible person and deputy whose functions will include co-ordination of all appropriate departments to ensure compliance with the Authority's requirements and that the training is carried out in a satisfactory manner. If the nominated person lacks an aircraft maintenance background or experience, the applicant must ensure that such person is supported by a member of the instructional staff appointed to advise on all technical aspects of training.

- b) departmental heads as appropriate to the training conducted.
- c) a sufficient number of instructional staff, whose experience and qualifications shall be acceptable to the CAA, to carry out the training adequately. Account shall be taken of the instructor/student ratio. It will normally be required that personnel experienced in civil aircraft maintenance procedures are employed to supervise the practical training. The organisation shall establish a programme to provide periodic update training for instructors which may include attendance at seminars, type training or observation of maintenance.
- d) examiners and signatories of course certificates.

3.2 **Company exposition.** The applicant shall provide an exposition of the organisation which shall include the following information:

- a) the structure of the organisation, the terms of reference of senior and nominated personnel and the associated lines of responsibility;
- b) a list of instructional staff;
- c) addresses of locations at which training is carried out and a general description of the facilities available at each site;
- d) a list of the courses approved by the CAA;
- e) the procedures for notification of changes to the organisation;
- f) the amendment procedure for the exposition and associated manuals;
- g) the procedures, including details of the management and control systems, which the organisation has instituted to ensure compliance with the requirements for the Approval(s) held.

The exposition may be supplemented by a separate procedures manual which gives detailed guidance on the various procedures.

3.3 **Facilities and equipment**

- 3.3.1 The accommodation provided for classrooms, workshops and/or demonstration areas and administrative offices shall be acceptable to the CAA.
- 3.3.2 The number of classrooms and workshops (and/or demonstration areas) shall be satisfactory when considered in relation to the intended maximum number of students. Heating, lighting and noise insulation shall be to acceptable standards. Suitable arrangements shall be made for cleaning and maintenance. Classroom furniture, wall boards and equipment shall be to an acceptable standard.
- 3.3.3 Appropriate teaching, demonstration and projection facilities shall be available and shall be maintained to a satisfactory standard. Storage facilities shall be provided for equipment not in use.
- 3.3.4 Workshops shall be provided with basic equipment and hand tools appropriate to the training being given. Instructional equipment, airframes, engines and components sufficient to support the practical training specified in the approved course syllabus shall be provided. Such equipment shall be representative of the technology in current use and appropriate to the licence category for which training is being given.
- 3.3.5 Unless agreed otherwise with the CAA, a library shall be provided for the use of staff and students. Sufficient technical material to support the training given shall be provided. This should include relevant CAA publications, typical type related maintenance documentation and other general publications and documents. A nominated person shall be responsible for keeping the material up to date and for ensuring that the facility is maintained to a satisfactory standard.

3.4 **Training**

- 3.4.1 An acceptable course entry standard, which shall include competence in written and spoken English, shall be specified.
- 3.4.2 Detailed course syllabuses shall be submitted to the CAA for approval. Syllabuses shall be compatible with the relevant examination requirements of Appendix 1.
- 3.4.3 Detailed lesson plans shall be produced showing all practical and theoretical training periods, their durations and the subjects covered.
- 3.4.4 Lecture notes, diagrams and other training material supplied shall be prepared in accordance with an agreed procedure and shall be accurate at the time they are given to the students. Where no provision is made for subsequent amendment, written warning must be given to this effect. Care should be taken to ensure that such material is clear and legible.
- 3.4.5 An adequate period of the course must be spent in experience of the maintenance of representative operational aircraft/engines/systems as appropriate to the course. For a course covering one or two LWTR sub divisions this must be a minimum of six months (26 weeks) duration. Where the course covers more than two sub divisions this period will be extended by two months for each additional sub division. It is essential that the student gains a representative mix of experience, to a reasonable depth and complexity, reflecting the sub divisions being taken. This experience must be managed and monitored by the training organisation in accordance with an agreed procedure and records must be maintained by the organisation. Students are expected to maintain a logbook, to be countersigned appropriately, showing the experience gained. With the agreement of the CAA, this experience may be obtained at a suitable maintenance organisation, subject to a written agreement between the two organisations and acceptable arrangements for liaison and supervision of the students being in place.
- 3.4.6 Daily attendance records shall be maintained and held available for CAA inspection.
- 3.4.7 The process of monitoring students' progress shall be defined and the required standards shall be specified by the training organisation. Such monitoring shall include periodic reviews and the identification of any action required to correct any shortfall in a student's performance. A record of all reviews shall be kept.

3.5 **Examinations**

- 3.5.1 The training organisation shall establish an examination and assessment system to check the progress of each student and to demonstrate that the student has achieved a satisfactory level of knowledge and skill. This system shall be managed and monitored in accordance with procedures agreed with the CAA. An assessment shall be held at the conclusion of each section or phase of training.
- 3.5.2 A final assessment, representative of all subjects undertaken, will be carried out. As a minimum this will be a written examination, of multiple choice questions and essay type papers, but may be supplemented by an oral examination. The examinations shall be set at a level equivalent to the CAA examinations. This final assessment shall determine whether the student has achieved a satisfactory understanding of the subjects within the LWTRs sufficient to enable an application for those LWTRs to be made to the CAA.
- 3.5.3 Examination papers shall be prepared by nominated individuals within the organisation. Papers may be prepared from a question data bank for each examination sitting or a sufficient stock of papers may be held. Examination papers shall cover the complete syllabus or section of the syllabus concerned. Examples of examination

papers shall be submitted to the CAA for assessment. Each paper shall be identified with a reference number, issue or revision number and serial number. Records of papers shall be maintained. The papers used in any particular examination shall be decided by a nominated examiner or supervisory staff other than the instructor of the subject. Completed examination papers shall be made available to the CAA on request.

- 3.5.4 A system for the management of the development, review and amendment of questions shall be established and records maintained. A regular programme of analysis of examination questions shall be arranged under the direct supervision of a senior member of staff. The questions shall be reviewed against students' answers and to ensure that they reflect adequately new systems and advances in technology. Records of such reviews shall be kept.
- 3.5.5 Examination data banks shall be kept secure and protected from unauthorised access by adequate computer security means. Examination papers and data bank printouts shall be kept in locked cabinets under the control of supervisory staff.
- 3.6 **Records.** Unless agreed otherwise with the CAA, examination papers shall be retained for a minimum of five years. Examination records shall not be destroyed without the written agreement of the CAA. Student records and other records required to be kept under the Approval shall be retained for such time as agreed with the CAA.

4 Requirements for Maintenance of the Approval

- 4.1 An Approval granted under this Chapter shall be valid for a year but may be renewed subject to the following conditions:
- a) the organisation continues to satisfy the requirements for the grant of Approval;
 - b) any changes to the nominated personnel are notified in writing to and have been accepted by the CAA;
 - c) the exposition and procedures required under this Chapter are reviewed periodically by the organisation and any necessary amendments promulgated;
 - d) payment of the appropriate charge.
- 4.2 The Approved Organisation shall adhere to the agreed procedures set out in its exposition. Any variation to these procedures shall have the prior agreement of the CAA.
- 4.3 The CAA will carry out periodic audits of the structure and procedures of the organisation. Any deficiencies noted during an audit will be notified to the management of the organisation. Deficiencies are classified as either Level 1 or Level 2 dependent upon their significance as follows:
- a) Level 1 – an item of a significant nature which is considered to lower the standard of training or which compromises the conditions or requirements of the Approval. This would warrant suspension of the Approval in whole or in part until corrective action has been taken. The organisation would be expected to take steps immediately to rectify any such item.
 - b) Level 2 – an item of a less significant nature but which still requires correction to restore compliance with the requirements of the Approval. A Level 2 deficiency would require the organisation to offer a proposal for corrective action within a timescale agreed with the CAA.

- 4.4 The organisation shall inform the CAA in writing of intended action and proposed timescales to rectify any deficiency noted under paragraph 4.3. Confirmation that such action has been completed shall also be given to the CAA. The adequacy of any changes or procedures will be reviewed at the following audit.

5 Application for Licence Without Type Rating

- 5.1 Subject to paragraph 6, a candidate who has completed successfully a course approved under this Chapter is not required to comply with the normal experience requirements set out in Chapter L2 for those LWTRs in which he or she has been recommended as described below.
- 5.2 Subject to a satisfactory standard by the student throughout the Approved Course and specifically in the final examinations, an application may be made for those LWTRs in which a satisfactory standard has been reached. The application must be made on a form SRG1005 (AD300) within 3 months of completion of the course and must include a recommendation by the training organisation. If the application is acceptable to the CAA, the candidate will be exempt from the written examination associated with the grant of those LWTRs.
- 5.3 Licence applicants who have completed an Approved Course are subject to the normal age requirement of 20 years for the acceptance of a licence application. Nevertheless students who are under 20 years of age at the completion of the training may take the Approved Course final examinations provided they satisfy all other course requirements and are not less than 18 years of age. Subject to a satisfactory standard being achieved, an application may be made, as described in paragraph 5.2, at 20 years of age. The application for grant of the Licence must be made and all examinations completed within 3 months immediately following the 20th birthday of the applicant. He or she must also have been engaged in employment providing relevant aircraft engineering experience for an acceptable period between completion of the training and the date of application for grant of the Licence. The date of completion of the Approved Course should be quoted in the application.
- 5.4 Applications to extend a Licence via the Ab-initio scheme will not be accepted except for a resit allowed in paragraph 6.1 which follows a partial pass resulting in the issue of a Licence.
- 5.5 A Licence issued as a result of an Approved ab-initio course will have the following condition included: 'The holder of this licence is required to show a minimum of 12 months experience, from the date of issue, of maintenance of operating aircraft before they may be granted any authorisation privileges under JAR-145 or BCAR Chapter A8-13 or A8-18.' This endorsement applies a requirement to the grant of authorisation to certify similar to that contained in Chapter L2 paragraph 6.2 for an application for a type rating. If, at the time of application for a licence, the applicant can show evidence of this 12 full months experience, in addition to that gained as part of the Ab-initio course, the Authority may grant the licence without the endorsement. The licence holder may apply for removal of the endorsement on a form SRG1005 (AD300) which must show evidence of the additional experience required. A charge for the variation of a licence will be payable in the latter case.

6 Failure of CAA LWTR Examination

- 6.1 A candidate, on completion of an Approved Course for an LWTR, who fails the first attempt at the CAA oral examination, may be accepted for re-examination following a further period of at least 2 months training managed by the ab-initio training organisation. This training shall consist of a combination of theoretical instruction and practical experience relevant to the areas in which the candidate failed to achieve a satisfactory standard in the oral examination. Details of the additional training undertaken shall be shown on the application form. The application for re-examination must be made on form SRG1005 (AD300) and must be supported by the Training Organisation. If these procedures are not followed the candidate must meet the experience requirements in paragraph 7.1 or 7.2 as appropriate and the normal examination requirements set out in Chapter L3.
- 6.2 If the second attempt at the CAA oral examination also results in failure, no further applications for that candidate via the ab-initio scheme will be accepted. If reapplication for the grant of a Licence is made, the candidate must show a minimum of a further 12 months experience in the relevant discipline, including at least 6 months experience relating to the LWTR sub division(s) being applied for. The candidate will be subject to the normal written and oral examination requirements set out in Chapter L3.

7 Applications from Former Ab-initio Students

- 7.1 An ab-initio candidate who has completed the full course of ab-initio training but has not been recommended by the training organisation for CAA oral examination will be required to satisfy the normal requirements. However, some credit will be granted in recognition of the candidate's having attended a structured course of ab-initio training. The candidate will be required to obtain an additional eighteen months relevant practical experience before applying for the grant of a Licence Without Type Rating.
- 7.2 A candidate who has gained a licence through the ab-initio scheme and who wishes to extend the licence subsequently will be required to show 12 months recent experience of the maintenance of operating aircraft, 6 months of which must be applicable to the WTR applied for.

Appendix 1 Examination Syllabus

- 1 The syllabus relevant to the examinations for all Licence Categories is presented in this Appendix as a series of subjects or combinations of subjects referred to as Modules, the content of each of the Modules is detailed in this Appendix.
- 2 The written and oral examinations for each Category of Licence, (and its Sub-Divisions where appropriate) are based on a number of the Modules, and the Module/Category relationship is set out overleaf. It will be noted that the modular arrangements recognise that major areas of the syllabus are common to more than one Licence Category and/or its Sub-Divisions. Thus, when an existing Licence is to be extended to include another Category or Sub-Division, those Modules which have been satisfied by previous examinations may be excluded.

Each module is numbered and contains a series of syllabus subject headings. Each subject is then further expanded in more detail against 'level numbers' corresponding to Licence Without Type Rating (LWTR) and Type Rating (TR). This expansion of detail provides an indication of the degree/level of knowledge, experience, competence and skill in aeronautical engineering required by the CAA.
- 3 There are three level numbers and they are defined as follows:

Level 1: General appreciation of principles and familiarisation of the subject.

Level 2: Comprehension of principles and salient features with a practical ability to assess operational condition.

Level 3: Detailed knowledge of all aspects of the subject.
- 3.1 In applying the above levels to the subjects which, in particular relate to aircraft, engines, systems and items of equipment, the following aspects should be taken into account:
 - a) theoretical principles;
 - b) constructional arrangements, functional and design features;
 - c) maintenance practices;
 - d) normal, deteriorated and failed conditions.

Table 1

Module	Category	- 'X' -														'R' - Radio		
		'A' - Aeroplanes 1		'C' - Engines		'A' & 'C' Rotorcraft		'A' & 'C' Airships		'B'	'D'	Electrical	Instruments	Automatic Pilots		Compass Compensation	Communication & Navigation	Radar
				Piston	Turbine	Piston	Turbine	Piston	Turbine	Aeroplanes or Rotorcraft	Engines					Aeroplanes	Rotorcraft	
- SUBJECT MODULE NUMBERS -																		
Regulations		1		1	1	1	1	1	1			1	1	1	1		1	
Basic Engineering Practices		2		2	2	2	2	2	2			2	2	2	2		2	
Common	Aircraft	3				3	3	3	3									
	Aeroplanes - 1	4																
Piston Engines				6		6		6										
Propellers				7	7			7	7									
Turbine Engines					8			8										
Rotorcraft						9	9											
Airships								10	10									
'B' Licence										11								
Engine Overhaul											12							
Human Performance		13		13	13	13	13	13	13			13	13	13	13		13	
Basic:	Electrical Equipment & Systems											21						
	Instruments												22					
	Electronics																	
	Gyroscopes																	
	Servo-mechanisms																	
Automatic Pilots	Aeroplanes														24			
	Common														25	25		
	Rotorcraft															26		
Compass Compensation																30		
Radio:	Communication & Navigation																31	
	Radar																	32

Table 2 Upgrade of BCAR Section L Issue 7 LWTR sub divisions

The multiple choice examinations required for those conversions of Issue 7 LWTRs available are shown in the following table:

Issue 7 LWTR	to Current LWTR	Section L Syllabus Module exam required
Wooden & Composite Aeroplanes	Aeroplanes 1	4
Unpressurised Metal Aeroplanes	Aeroplanes1	4
Unsupercharged Piston Engines	Piston Engines-Aeroplanes	6
Jet Turbine Engines	Turbine Engines-Aeroplanes	7
Electrical DC Power	Electrical	21
General Aircraft Instruments	Instruments	22 & 23
Non Radio-Coupled Automatic Pilots (Aeroplanes)	Automatic Pilots (Aeroplanes)	24 & 25
Non Radio-Coupled Automatic Pilots (Rotorcraft)	Automatic Pilots (Rotorcraft)	25 & 26
Radio Communication	Radio Communication/ Navigation	31

Application for examination should be made on form SRG 1006 (AD300A). Once the examination has been passed, it will be necessary to apply for the grant of the LWTR on a form SRG 1005 (AD300).

Module 1 Regulations

Syllabus Subject	Level		
	WTR	TR	
Maintenance Engineers' Licences	2	–	<p>Air Navigation Order requirements</p> <p>Responsibilities: by statutory law and by the need to fly aircraft in a satisfactory condition, i.e. common/civil/constitutional law</p> <p>Penalties – under statutory law and resulting from civil law suits</p> <p>Categories – applicability</p> <p>Area and extent of limitations and privileges within Categories</p> <p>Overlap of Category applicability</p> <p>Relevant Airworthiness Notices</p>
Certifications	1	2	<p>Air Navigation Order requirements; BCAR Sections A and B</p> <p>Certificates of: Release to Service; Maintenance Review; Fitness for Flight</p> <p>Duplicate inspections</p> <p>Contributory certifications and reliance on other documentation and persons</p> <p>Certification – acceptance investigation and judgement procedures</p>
Aircraft, Engine and VP Propeller Log Books	1	2	<p>Air Navigation Order requirements; BCAR Sections A and B</p> <p>CAA Approval: Light aircraft, large aircraft</p> <p>Worksheets; Technical Log</p> <p>Data to be entered in log books</p> <p>Condition reports – e.g. heavy landing checks, defect investigations, NDT and other inspections, mandatory and non-mandatory</p> <p>Maintenance checks and inspections</p> <p>Cross-reference to other files/records</p> <p>Preservation of documents; ANO</p>

Syllabus Subject	Level			
	WTR	TR		
Technical Log	1	2	Air Navigation Order requirements; BCAR Sections A and B	
			Technical Log – Air Operator’s Certificate requirements	
Aircraft Documentation and Requirements	1	2	Type Certification	
			Weight schedule	
			External, and internal markings and signs, e.g. nationality and registration	
			no smoking and fasten seat belt, placards and requirements, doors and exits	
			Certificate of Airworthiness Categories, purposes of flight	
			Certificate of Registration	
			Air Operator’s Certificate	
			Schedule 5 requirements for equipment	
			Radio station licence and approval	
			Change of ownership	
Approvals	–	1	Design Organisations	
		1	2	Inspection Organisations
			Maintenance Schedules	
			AOC interface	
			LAMS – star inspections, C of A recommendation	
Defect Reporting	1	2	Air Navigation Order requirements	
			Defects which are to be reported	
			Reportable accidents	

Syllabus Subject	Level		
	WTR	TR	
CAA Requirements	1	2	BCAR Sections A and B
	2	–	BCAR Section L
	1	2	Airworthiness Notices
			Mandatory Modifications and Inspections: British American Foreign Aircraft, engines, equipment
Joint Aviation Authorities Requirements	2	2	JAR-145
	1	1	JAR-21
			JAR-25
			JAR-23
			JAR-29
			JAR-66
			JAR-147
			JAR-OPS

Module 2 Basic Engineering Practices

Syllabus Subject	Level		
	WTR	TR	
Engineering Drawings and Technical Information	1	2	Drawing details – common practices: plan, elevations, isometric, sections, scale, dimensional and indicating presentation
	2	2	Use, validity control, interpretation
	1	2	Maintenance Manuals, Parts Catalogues, Overhaul Manuals Service bulletin and modification data Maintenance schedules: approved and otherwise
Mathematics	2	2	Wiring diagram manuals, Interconnection charts, Schematic diagrams, Symbols
	1	–	Simple calculations: measurements, angles, graphs, metric/imperial, volume, forces, moments, centre of gravity Transposition of formulae, Powers of numbers, Binary notation, Simple equations, Conversion of units Resolution of forces
Science	1	–	Pressure/volume/temperature of gases Density, Specific gravity, Pressure Hydraulics: basic principles, liquids in flow and static conditions The atmosphere – density/pressure/temperature/altitude/humidity Basic principles of motion, acceleration, centrifugal, centripetal forces, friction Basic electrical laws, Units, Power in circuits, Magnetism, circuit calculations

(continued over)

Syllabus Subject	Level			
	WTR	TR		
Hangar/Workshop Common Practices and Tools	1	–	Lubrication methods and application Hand tools, simple machine tools Go/No Go gauges, fits and clearances	
	2	2	Crimping tools, hand and hydraulic	
	1	–	Soldering and crimping	
	1	–	Precision measuring instruments, Electrical measuring instruments, Circuit testing methods	
	2	–	Torque loading	
	1	–	Assessment of in service condition of soldered, brazed and welded joints	
	1	–	Inhibiting and corrosion protection Painting and paint stripping	
	1	–	Metal contamination Fire protection and safety in and around the workshop/hangar/aircraft Storage and handling	
	Common Parts	1	2	Control cables and fittings Fastening devices – threaded, riveted and swaged V-band clamps and couplings Locking: parts and methods Washers Bearings Pipes: rigid and flexible Keys and key ways Worm drive and other types of band clips
		1	2	Air, nitrogen, carbon dioxide, oxygen, helium Acetylene Safety aspects Adhesives, oils, greases, sealing compounds, solvent

(continued over)

Syllabus Subject	Level		TR
	WTR	TR	
Basic Electrics	2	–	General principles and practices
	2		Simple circuits a.c. to d.c., d.c. to a.c., a.c. to a.c. conversion
	1	2	Ground services ac and dc
			Batteries, application and handling
			Insulators and Insulation, Conductors and conductivity
			Common items used in aircraft applications, e.g. resistors, potentiometers, solenoids
			Transformers, single phase and auto
			Semi-conductors, capacitors, relays
			Micro switches
			Proximity detectors
			Fuses, circuit breakers
			Motors/actuators
			Principles of frequency wild, constant frequency a.c. power
	1		Circuit wiring, connectors, crimping, clipping, cable sizes and types, cable looms, harnesses, terminations and disconnects
			Bonding, earthing of aircraft
	1		Static electricity; lightning; static charges; 'interference' effects on radio equipment, electrostatic damage protection
Environmental Aspects	1	2	Effects of snow, ice, lightning and turbulence

Module 3 Category 'A' Common – Aeroplanes, Rotorcraft and Airships

Syllabus Subject	Level		
	WTR	TR	
Basic Aerofoil Theory	1	2	Lift/thrust/drag/weight
			Stalling of an Aerofoil
			Induced and parasitic drag
			Boundary layer
			Aerofoil shapes
			Chord/span/aspect ratio
Sub-Structures	1	2	Folded metal, sheet metal, extrusions, tubing
			Effect of swaging, lightening holes
			Use of different metals
			Commonly used fasteners and joint methods
			Protective treatments and precautions
			Honeycomb
			Reinforced plastic/epoxy materials, applications
			Floors
			Seats – crew, passenger – 'crash' situation
			Aerials, Pitot probes, drain masts, air intakes and similar structural fitments
			Instrument panels and consoles
			Radio equipment racks and stowages
			Metals
Titanium			
–	Brass, bronze, copper, lead		
	2	Recognition and general characteristics of metals used	
	Application and use of metals		
	The purpose of heat treatments		
	Use of different heat treated materials		

Syllabus Subject	Level		
	WTR	TR	
Metals (continued)			Anodic treatments
			Corrosion treatments during manufacture
			Identification of corrosion
	2	2	Corrosion treatments during repair
			Fatigue
			Other protective treatments/finishes
Non-destructive Condition-Testing	1	–	Typical uses and display of defects using: X ray/gamma ray, ultrasonic, eddy current, magnetic particle
	2	–	Penetrant leaching
	1	2	Visual probes Eyeglass equipment: usefulness, effectiveness of various magnifications
	1	2	Glass, fibre and filament reinforcement Materials used Cold setting, hot setting systems Construction principles used, aircraft applications Failure characteristics Honeycomb, foam sandwich
Hydraulic	2	–	Simple systems, i.e. powered pump, reverse selection, pressure relief, pressure regulation LP and HP filters
	1	2	Types of pump Differing fluids – mineral/fire resistant Control and indication methods
	1	2	Wheels, tyres, shock absorbers, castering, steering methods
Landing Gear and Brakes	2	–	Simple hydraulic brakes, i.e. master cylinder to wheel-brake unit
	1	2	Brake discs and callipers
	1	–	Landing and braking energy conversion

Syllabus Subject	Level		
	WTR	TR	
Electrical	1	2	Simpler type systems
	1	2	Batteries, generators, relays, wiring, switch gear
			Voltage control
			Current limiting, circuit protection devices
			Paralleling
			a/c from inverters
			Crimping
			Soldered joints
			Control and indications, magnetic indicators and annunciators
	Instruments (other than Engine)	1	2
			Gyro instruments – vacuum/pressure/electrical
			Pressure and temperature indication
			Position indication
			Compasses
Radio	1	–	VHF communication systems
Safety Equipment	1	2	Fire extinguishers – hand
			Life jackets
			Life rafts
			Seat belts/harnesses – passenger/crew 3-point, 4-point, inertial, lapstraps
	–	3	Mandatory requirements for upper torso restraint
Ground Handling	1	1	Jacking, trestling, slinging, towing, tie down 'Servicing' activities
			Storage
			Painting – protective finish/external markings
	1	2	Weighing and centre of gravity determination – weighing report

Syllabus Subject	Level	
	WTR	TR
Ground Handling (continued)		BCARs Scale positions Basic Weight Unusable fuel Oil and other consumable liquids – quantities Role variations Hold/seat row/removable equipment Station identification C of G datum

Module 4 Category 'A' – Aeroplanes 1

Syllabus Subject	Level		
	WTR	TR	
Theory of Flight and Control	1	2	Stability and control Equilibrium Stalling of the aircraft Flaps and slats Aerodynamic balance Mass balance Aileron/elevator/rudder control Tabs – servo/anti-servo/balance/anti-balance/trim/spring Canard/foreplanes
Aircraft Structures	1	2	Main structures – fuselage/wing Stressed skin – diaphragms and longerons Tubular structures Skin, frames and stiffening Wing: spar and rib structures Integral fuel tanks Load paths Empennage Windows, doors and hatches
Materials – non Metal:			
(1) Wood	–	2	Types, application and uses Diseases – environmental effects Plywoods Glues – past and present Storage and condition control Damage – failure modes Painting/protective finishes

Syllabus Subject	Level		
	WTR	TR	
Materials – non Metal: (continued)			
(2) Fabrics	–	2	Natural and man-made materials – types, applications and uses
	–	1	Techniques used during covering
	–	2	Repairs
			Paint finishes and protective treatments
			Butrate and nitrate paints
			Ageing
			Tautening, heat shrinking
			Strength considerations
			Drainage and apertures
			Stitching, stringing, adhesives
			Testing
	Systems:		
(1) Flight Controls	1	2	Aileron, elevator rudder
			Operating systems and surfaces – manually operated
			Trim operating systems and surfaces – manual and electric
			Flap systems – electrical, hydraulic and manual
	–	2	Flap systems – pneumatic
	1	2	Simple asymmetric protection
			Slat systems – automatic, and manual
	–	2	Hydraulic
	1	2	Tab systems – trim, balance, servo, anti-servo, anti-balance, spring servo
			Stall sensing and warning – simple systems, . e.g. vane or reed types
		Basic auto pilots – simple systems	
		Inputs into main controls – function testing – attitude, heading and height sensing	

Syllabus Subject	Level		
	WTR	TR	
Systems: (Continued)			
(2) Ice and Rain Protection	1	2	Liquid, electric and boot systems
			Power source, control and indication
			Windscreen wipers
(3) Heating and Ventilation	1	2	Electrically-heated windscreens
			Combustion heaters, exhaust heat exchangers
(4) Oxygen	1	2	Ram air
			Ventilation fans
			Bottle storage, distribution, regulation
(5) Pressurisation	1	2	Masks
			Safety features and requirements
(6) Vacuum/Pressure	1	2	Simple systems – bleed air, turbo-charger bleed
			Passenger environmental requirements for the control of:
			oxygen, heating, ventilation, rate of change, humidity
			Mass flow control
(6) Vacuum/Pressure	1	2	Temperature control
			Differential pressure – maximum, negative
			Control and indication
(6) Vacuum/Pressure	1	2	Cabin structure, windows and doors for pressurised flight
			Dry and wet pump systems
			Oil separation
			Gyro supply
			Relief valve
			Filtering
(6) Vacuum/Pressure	1	2	Aerofoil anti-icing

Syllabus Subject	Level	
	WTR	TR
Systems: (Continued)		
(7) Pneumatic	–	2
		Landing gear/flaps/brakes
		Operating systems
		Basic theory and common practices

Module 6 Category 'C' – Piston Engines in Aeroplanes, Rotorcraft and Airships

Syllabus Subject	Level		
	WTR	TR	
Principles. Terminology. Definitions and Laws	1	2	Normally aspirated and supercharged operation
			Two and Four stroke cycles
			Ignition timing, mixture, fuel grade detonation.
			Power
			Overhaul periods/continuation in service beyond overhaul recommendation
			Ground running – principles and problems
			Effect of altitude, humidity, temperature, and icing
			Standard atmosphere, pressure altitude
			Fixed and variable pitch propeller effects
			Vibration characteristics and damping
Constructional Arrangements	1	1	Type certification
			General arrangement – internal
			General arrangement – external
			Crankcase breathing
			Propeller shaft sealing
			Materials
			Propeller attachment provision
			Power take-off provision
			Cooling
			Cylinders, pistons and valve gear
			Hydraulic tappets
			Camshaft
			Casings, mountings and accessories drive
			Vibration damping

Syllabus Subject	Level		
	WTR	TR	
Systems:			
(1) Carburation and Induction	1	2	Air intake – normal/alternate – filtering Manifolds Anti-icing provision Float type and injection systems Engine driven fuel pumps Priming systems Mixture/idle cut-off/throttle control
(2) Ignition	1	2	Magnetos Ignition harness Spark plugs – reach variations, operating temperatures – long life Switch control Timing (internal/external) Advancing and retarding mechanisms Screening Starting aids – impulse couplings and ignition boosting
(3) Starting	1	2	Starter motors – manual, Bendix, solenoid, pre-engaged – engagement methods Non-engagement indication and effects Starter relays Earth straps Cooling Effects on battery
(4) Fire Protection and Indication	1	2	Extinguishant, bottles, cartridges, 'life control' Detection systems and warnings Two shot provision
(5) Lubrication	1	2	Wet and dry sump systems System arrangement Pressure control

Syllabus Subject	Level		
	WTR	TR	
Systems: (continued)			
(5) Lubrication (continued)			Effects of hot and cold weather Filtering Straight, detergent, ash dispersant oils Engine condition assessment using oil system analysis Oil coolers – temperature control valves Hoses, rigid pipes, internal passages, splash – oil jet Cooling functions of the oil system
(6) Supercharging/Turbocharging	1	2	Directly driven and exhaust driven superchargers Manual and automatic control Lubrication and hydraulic power Controls and indication Automatic control systems
(7) Aircraft Fuel	1	2	Tanks, cells and integral systems Fuel tank heating and monitoring Venting Fuel pumps – electrical Fuel grades and quality MOGAS Water contamination – drains Filtering Controls and indication
(8) Engine Controls	1	2	Throttle Electronic controls Mixture Propeller Alternate air Manual controls for turbocharger

Syllabus Subject	Level		
	WTR	TR	
(9) Engine Instruments	1	2	Manifold pressure Rotational speed Pressure and temperature Cylinder head temperature Exhaust gas temperature Electronic Condition Monitoring
(10) Diagnostic Tools	1	2	Equipment Use and analysis

Module 7 Category C – Fixed and Variable Pitch Propellers

Syllabus Subject	Level				
	WTR	TR			
Principles, Terminology, Definitions and Laws	1	–	Constant Speeding		
			Pitch variation		
			Ground and flight functioning characteristics		
			Power conversion		
			Blade forces: aerodynamic and centrifugal		
			Aerofoil aerodynamic principles		
			Pitch coarse/fine, high/low, reverse		
			Feathering		
			Vibration characteristics		
			Turbine engine installation propeller systems		
Constructional Arrangement	1	2	Pitch change mechanism single/double acting		
			CSUs/governors		
			Spinners		
			Balance control		
			Materials		
			Diameter – minimum and maximum		
			Pitch stops – fixed, centrifugal, manual and electrical		
			Protective finishes – contour control		
			1	3	Damage acceptance areas
					Cropping
1	2	Attachment and assembly methods			
		Oil transfer – governor/propeller/sump			
		Safety visibility			

Syllabus Subject	Level		
	WTR	TR	
Automatic and Manual Pitch Control Systems	1	2	Pilot control and governor sensing Feathering
Ice Protection	1	2	Liquid and electrical systems
Turbine Engine Application	1	2	Auto-feathering Synchronising/ synchrophasing Braking Automatic and manually controlled pitch limiting systems Beta control Permitted balancing

Module 8 Category 'C' – Turbine Engines in Aeroplanes, Rotorcraft and Airships

Syllabus Subject	Level		
	WTR	TR	
Principles, Terminology Definitions and Laws	1	2	Gas flow path – temperature, velocity and pressure
			Compression
			Combustion
			Turbine power extraction
			Effects of atmospheric variations in temperature, density, pressure altitude on engine and on engine/aircraft combination
			Single shaft, two and three shaft engines
			Centrifugal and axial flow compressors
			Fan engines
			By-pass engines
			Water/water methanol injection
			Power turbines
			Surge/compressor stalling
			Propeller turbines
			Gas producers
			APU applications
			Thrust reversal
			Power assessment
Constructional Arrangement	1	2	Casings, shafts, bearings, accessories drive
			Air intakes and compressors
			Combustion section
			Turbines and exhaust
			Materials
			Modular construction
	1	3	Engine inspection capability and condition assessment provision

Syllabus Subject	Level		
	WTR	TR	
Constructional Arrangement (continued)	1	3	Principles of 'condition monitored' and 'on condition' maintenance programmes
	–	2	Supersonic flight air intake geometry control systems
Propeller and Shaft Power Provisions	1	2	Gas producers
			Reduction gearing
			Power and auxiliary drive
	1	1	Principles of torque/power/rotational speed in power transmission by rotating shafts
Systems:			
(1) Thrust Reversing	1	2	General arrangements
			Control/interlocks
			Safety features
			Operating systems – hydraulic/pneumatic mechanical
			Turbine and fan applications
(2) APUs	1	2	General arrangements
			Intake and exhausts systems – door operation
			Load control
			Electrical output control and management
			Speed control
			Fuel control
			Safety features
			Ground/flight/altitude-limiting factors
			Mounting
			Fire protection and indication
			Bay cooling
			Ground running

Syllabus Subject	Level		
	WTR	TR	
(3) Fuel Control	1	2	Principles – parameters Mechanical/electronic control Power speed – control and limiting Temperature and power factors Burners – primary and secondary provision
	–	2	Burners – shaft injection, torch ignition
	1	2	Governor speed sensing
(4) Fuel Systems	1	2	Tanks – cells and integral systems Refuelling/defuelling, crossfeed, jettison, venting, transfer Scavenging – jet pumps Boost pumps, backing pumps LP/HP valves and control Tank selection Internal/external pipes, hoses, connectors Fuel types Static electricity – effects and control Leak assessment and control Fuel quantity indication – ‘Level Sticks’ Water contamination – effects and control SG/Density/volume/weight Filtering and heating Fuel systems in pressurised cabin areas
(5) Water Injection	1	2	Water/water methanol applications Sensing, control and safety provision Power effects Tankage Replenishing /dumping Pumps Effects on fuel control Pipes and pipe lines

Syllabus Subject	Level		
	WTR	TR	
(6) Lubrication	1	2	<p>Tanks, storage, venting, contents indication</p> <p>Pressure/scavenge pumps</p> <p>Filters, screens and magnetic plugs/chip detectors</p> <p>Pressure/flow control</p> <p>Heat exchangers oil/fuel, oil/air</p> <p>Sealing – labyrinth seals, carbon seals, etc.</p> <p>Overboard drains – drains systems</p> <p>Lubrication of mains bearings, accessories and gear trains</p> <p>Supply to propeller systems</p> <p>Contamination by hydraulic fluid/fuel</p> <p>Types of oil</p> <p>Internal/external pipes, hoses and passages – effects of heat</p> <p>Use of oil for ice protection – intake and fuel control</p>
(7) Cooling, Sealing and Bleed Air Services	1	2	<p>Internal cooling, external cooling, sealing air</p> <p>Overboard dump – temperature monitoring</p> <p>Off-takes for other services – air conditioning, anti-icing, equipment drive, pressurising of hydraulic reservoirs, water systems, etc.</p> <p>Centrifugal filters</p>
(8) Surge Protection and Airflow Control	1	2	<p>Bleed valves – operating system</p> <p>Variable inlet guide vanes – scheduling, operating systems</p> <p>Surge sensing</p> <p>‘Surge margins’</p>
	–	2	<p>Supersonic flight air intake geometry control</p>

Syllabus Subject	Level		
	WTR	TR	
(9) Ice Protection	1	2	Hot air systems – struts and intakes Electrical systems – engine and intakes Use of oil and air bleeds Pressure sensor heating Control and indication
(10) Fire Protection	1	2	Fire detection Overheat warning Fire extinguishing Bay and zone isolation Fire walls, bulkheads, cladding Fire wires, detector units Single/dual detection Extinguishants First and second shot capability Warnings and indications – lights, aural warnings, fuse types, squib test 'Bottle gone' indicators Operating systems Over pressure Cartridges – life control Electric and electronic systems
(11) Ignition	1	2	High energy ignition systems
	–	2	Torch ignition Glow plug systems
	1	2	Igniter plugs and leads Operation inside and outside the starting cycle

Syllabus Subject	Level		
	WTR	TR	
(12) Starting	1	2	<p>Starting cycle</p> <p>Initiation – HP valves, termination, bleed valves, starter valves, power lever, self sustaining speeds</p> <p>Starter motors – electrical, pneumatic, starter/generators – HP air, impingement air</p> <p>Clutch provision, overspeed sensing</p> <p>Manual operation starter cooling/resting</p> <p>Ground power electrical/pneumatic provisions</p>
(13) Controls	1	2	<p>Power/throttle/thrust reverse</p> <p>HP/LP valve controls – manual and electric</p> <p>Condition control systems</p> <p>Propeller control</p> <p>Auto control of throttle</p> <p>Control runs</p>
	–	1	Electronic control systems
(14) Pods, Pylons, Cowlings and Mountings	1	2	<p>General arrangements</p> <p>Services and controls – input/exit</p> <p>Materials</p> <p>Venting</p> <p>Zone demarcation</p> <p>Mountings</p> <p>Pylon and pod structural features</p> <p>Torque, vibration, expansion provisions</p> <p>Bay venting</p> <p>Cooling air intakes</p>
(15) Electrical	1	2	<p>a.c. generators – CSDs/IDGs</p> <p>Starter/generators</p> <p>Starter motor high current circuits</p> <p>CSDs – principles of operation, disconnect/reconnect, lubrication/hydraulic operation, filters, coolers</p>

Syllabus Subject	Level		
	WTR	TR	
(16) Instruments	1	2	Rotational speed indication; a.c. generator and pulse probe systems Temperature and pressure systems Pressure ratio systems Turbine temperature systems Instrument system amplifier Fuel flow indication Torque indication Fuel contents/oil contents – electrical and electronic Vibration indication
Ground Handling	1	2	Storage and inhibiting Spare engine carriage Ground running – noise control – power checking Functional checks of engine associated services

Module 9 Category 'A'/'C' – Rotorcraft

Syllabus Subject	Level		
	WTR	TR	
Theory of Flight and Control	1	2	Rotor disc: forces acting, lift, drag centrifugal force, weight, rotor useful force, phase lag; advance angle non-constant speed drive (Hookes Joint) effect
			Articulated/semi-rigid/rigid rotors
			Flapping/dragging/feathering
			Climbing/losing height/horizontal flight
			Main and anti-torque rotors – control inputs – cyclic and collective
			Effects of aircraft speed on rotors
			Directional control
			Translational lift/inflow/ground effect
			Vortex ring effect
			Retreating blade stall
Constructional Arrangements	1	2	Twin rotors
			Rotorcraft structures, load paths, vibration effects
Constructional Arrangements	1	2	Landing gear configurations: skids/wheels/floats
			Fuselages, tail cones, pylons, engine mounts
			Gearbox and transmission mountings
			Doors and windows

Syllabus Subject	Level		
	WTR	TR	
Systems:			
(1) Flying Controls	1	2	Collective/cyclic/directional Hydraulic Rotor heads – main and tail rotor
	1	2	Articulated, rigid, semi-rigid, teetering Swash plate/spider control input methods Blades: construction and materials; balancing: static, dynamic, span wise, chord wise Tracking: flag and in-flight methods Tabs/trailing edge bending Vibration – effects and analysis BIM indicators Automatic Pilots/Autostabilisers – Control interface System components – component replacement and subsequent testing
(2) Ice and Rain Protection	1	2	Windscreen wipers Electrically-heated windscreens
(3) Heating and Ventilation	1	2	Exhaust heat exchangers Ram air Ventilation fans
Transmission Systems	1	2	Engines to rotors: shafts, clutches, free wheel units; reduction gearboxes; main transmission/ gearboxes, combining gearboxes Tail rotor drive: drive shafts, intermediate gearboxes, tail rotor gearboxes Lubrication systems: oils, coolers, cooling fans, filters, magnetic plugs, chip detectors, pumps, pressure control Universal drive provision Splined shafts, type of gears – tooth pattern Instrumentation Rotor brake systems

Syllabus Subject	Level		
	WTR	TR	
Equipment	1	2	Hoists and winches External load carrying Flotation Survival systems Specialised role equipments, aerial spraying, cameras
Instruments	1	1	ADI, HSI Flight Recorders
	1	2	HUMs

Module 10 Category 'A'/'C' – Airships

Syllabus Subject	Level		
	WTR	TR	
Principles of Lift	1	–	Bodies immersed in fluids Gases: free to expand/constant volume/ constant temperature/constant pressure Mixture of gases in a containing vessel
	2	–	Centre of gravity, centre of buoyancy, static heaviness, static lightness, static trim Ballonet ceiling, pressure height Superpressure, superheat Porosity Equilibrium Ballast-shot/water
Theory of Flight and Control	1	–	Aerodynamic lift, aerodynamic balance Stability and control Free ballooning Fins, rudders, elevators Tabs: balance/servo/trim/spring Powered flying controls
Envelope	2	–	Materials: fabrics, Kevlar
	1	–	Ultra-violet light effects Gas-tight membranes Ballonets, gases, load curtains, shear curtains, support cables, gas valves, air valves, entry ports, inspection domes, charge adaptors, load patches, handling lines, nose cone Charging, purging, porosity checks Lightning protection Airs systems: ram air scoops, ballonet fans, dampers, transfer fans

Syllabus Subject	Level		TR
	WTR		
Gondola	2	–	Main Structures Materials: Kevlar laminate, Fibrelam, sandwich panels, metal skin frames and stiffening
	1	–	Moulding/bonding techniques Support cables, support cable attachment, bulkheads, equipment attachment Furnishings Doors, windows and hatches Fire protection – skinning Lightning protection
Systems:			
(1) Flight control	1	–	Fins, rudders, elevators Operating systems and surfaces – manually/power operated Trim operating systems – manual and electric
(2) Ice and Rain Protection	1	–	Windscreen wipers
(3) Heating and Ventilation	1	–	Exhaust heat exchanges Ventilation system
(4) Vacuum/Pressure	1	–	Supply and associated system
(5) Landing Gear	1	–	Geometric arrangement Structural arrangements Castering/pivoting/locking Shock absorbers Weight sensing/measurement

Syllabus Subject	Level		
	WTR	TR	
Ducted Propellers	1	–	Principles of operation Propeller forces: aerodynamic/centrifugal Pitch variation/control Positive/negative vectoring Power conversion Control systems: electronic control, emergency forward coarse selection Balance Clutches Materials Protective finish: contour control, visibility Duct pivoting systems: drive and control, motors, limit control, gear boxes, inter-connection, emergency manual
Ground Handling	1	–	Attaching to/releasing from/mast Ground power Fuelling Ballasting Helium: charging, purifying, leak testing Pressure watch techniques Mooring – mobile/portable Engine running Hangaring Adverse weather

Module 11 Category 'B' – Aeroplanes/Rotorcraft

Syllabus Subject	Level		
	WTR	TR	
Regulations	1	2	<p>Registration process</p> <p>Issue of Certificates of Airworthiness – special conditions, mandatory requirements for modifications/ inspections, markings, equipment</p> <p>Flight Manual – provision of manuals and documents</p> <p>Prototypes, modified prototypes, series aircraft</p> <p>Acceptability of foreign type certification</p> <p>AANs for a type within particular C of A Categories</p> <p>Modification standard – recording</p> <p>Relevance of previous maintenance records</p> <p>Build standard</p> <p>Public transport – operator's responsibilities</p> <p>Loading</p> <p>Performance</p> <p>Categories of Flight</p> <p>Glider towing</p> <p>Parachuting</p> <p>Aerial application</p> <p>Exits and break-in markings</p> <p>Documents to be carried</p> <p>Records to be kept</p> <p>Production and preservation of records</p> <p>Offences in relation to documents and records</p>

Syllabus Subject	Level		
	WTR	TR	
Refurbish/'Overhaul' of Aircraft	1	2	<p>Preparation of the aircraft – cleaning, access dismantling, jacking and trestling, furnishing removal</p> <p>Preparation of inspection reports and establishment of work required</p> <p>Final inspection – preparation of final reports and records/log book entries</p> <p>Mandatory Modifications, Inspections, Service Bulletins, Airworthiness Directives applicable to the type rating sought</p>
Overhaul/Repair of Parts/Components	1	2	<p>Overhaul data – requirements, documentation, work sheets, inspection stages, testing</p> <p>Use and control of workshop inspection aids including non-destructive test equipment</p> <p>Factors and limitations affecting choice of equipment and methods used</p> <p>Overhaul and testing procedures for component parts of pneumatic, hydraulic, air conditions, oxygen, anti-icing, de-icing, fire extinguishing and rotorcraft transmission systems</p> <p>Assembly procedures and approved repair schemes applicable to major components</p> <p>Engine mounting structures</p> <p>Inspections necessary before, during and after repair, including checking of alignment and symmetry</p> <p>Repair, inspection and testing of tanks, heat exchangers, fuel and oil systems, and all types of control systems relevant to a Category 'B' Licence</p>
Facilities	1	2	<p>Preparation and layout of workshops</p> <p>Care, use and checking for accuracy of test equipment</p>

Syllabus Subject	Level		
	WTR	TR	
Welding	1	2	Use and application
			Approved welders – limitations, periodic testing
			Support – pre-heating – pressure relief
			Cleaning and preparation
			Fluxes and filler/welding rods
			Gas and specialist welding principles
			Materials
			Strength of welded joints
			Inspection before, during and after welding
			Pre- and post-treatments
Brazing/Hard Soldering	1	2	Use and application
			Support, pre-heating, pressure relief
			Cleaning and preparation
			Fluxes – fillers/spelter
			Equipment
Materials – non Metal			
(1) Wood	–	2	Types, applications and uses
			Diseases – environmental effects
			Plywoods
			Glues – Past and present
			Storage and condition control
			Damage – failure modes
			Painting/protective finishes

(continued over)

Syllabus Subject	Level	
	WTR	TR
Materials – non Metal (continued)		
(2) Fabrics	–	2 Natural and man-made materials – types, applications and uses 1 Techniques used during covering 2 Repairs Paint finishes and protective treatments Butrate and nitrate paints Ageing Tautening, heat shrinking Strength considerations Draining and apertures Stitching, stringing, adhesives Testing

Module 12 Category D – Engine Overhaul

Syllabus Subject	Level		
	WTR	TR	
Category 'D' Licences: General	2	–	<p>Overhaul as a condition control process – its advantages and disadvantages</p> <p>Familiarity with the operating environment of piston engines in aircraft</p> <p>Sudden stoppage – over-revving, over-boosting, over-heating</p> <p>Bogus parts</p> <p>Fatigue</p> <p>Mandatory reporting</p> <p>Fuels and oils – Mogas</p>
Overhaul Process Control	2	–	<p>Facilities: shop layout – stores; work environment; equipment for cleaning, inspection, rework and testing</p> <p>Control of precision measuring instruments and equipment</p> <p>Work package control and processing</p> <p>Acceptability of third party work/opinions/reports/recommendations e.g. manufacturers and their agents/other agencies</p> <p>Use of experts and expert opinion</p> <p>Use of unskilled labour</p>
Constructional Arrangement and Piston Engine General Considerations	1	2	<p>Crankshaft, balance weights, main bearings</p> <p>Auxiliary drives, internal lubrication provisions</p> <p>Seals and sealing materials</p> <p>Oil coolers and thermostatic valves</p> <p>Oil pumps, filtering, pressure control</p> <p>Fuel pumps – engine driven</p> <p>Ignition and valve timing provision</p> <p>Drive pulleys</p>

(continued over)

Syllabus Subject	Level		
	WTR	TR	
Constructional Arrangement and Piston Engine General Considerations (continued)	1	2	Hardness testing, fits and clearances Dowels and blind holes Sequential torque assembly – retorquing requirements Tooth patterns and backlash checks Contact area checking End float clearance, checking and setting Bonding and main earthing
Repairs and Rectification	1	1	Machining Heat treatments Anodic treatments Plating Corrosion treatments
	2	2	Protective treatments and finishes Surface finishes Fits and clearances Thread forms
Overhaul Activity	1	2	Cylinder and piston assemblies Cooling baffles – hottest cylinder Main casings Rear covers Gear trains Camshaft and valve operating mechanisms Crankshaft, connecting rods – bearings Lubrication systems – passages, jets, pumps, pressure relief valves, coolers, thermostatic valves, filters and strainers Sealing – slinger rings, and mechanical flow control Crank cases, rear covers, sumps Engine mounting provisions

(continued over)

Syllabus Subject	Level		
	WTR	TR	
Overhaul Activity (continued)	1	2	Governor drive provision Induction and exhaust manifolds Reduction gears, assemblies and housings Superchargers/turbochargers Carburettor/injection systems Hoses and pipes Electrical wiring Ignition harness
Non-Destructive Testing	2	–	Eddy current/ultrasonic/X-ray/gamma ray/ magnetic particle Techniques – status and approval Approved NDT organisations Interpretation of results Certification of inspection completion/ acceptability of the condition found
Welding/Brazing	2	–	Preparation – fluxes, welding/brazing rods Expansion/contraction effects and control Hollow parts – internal protection Welding methods: gas/arc/resistance welding Brazing/hard soldering methods Approval of welders Inspection of welded/brazed joints
Testing after Overhaul	2	–	Dynamometer testing Fan testing Endurance tests Final tests Testing in aircraft Run-in procedure Oil consumption run Turbocharger setting up after overhaul

Syllabus Subject	Level	
	WTR	TR
Release, Preservation, Storage and Transportation	2	– Log Books: certification, reports, references, recording of parts, limits, concessions, modifications, alternate parts, mandatory modifications and inspections Service information leaflets, etc. Lifed parts, salvage schemes/oversize parts Inhibiting: internal, external, injectors, carburettors, turbochargers

Module 13 Human Performance

Syllabus Subject	Level	
	WTR	TR
General	2	The need to take human factors into account Incidents attributable to human factors/ human error 'Murphy's' Law
Human Performance and Limitations	2	Vision Hearing Information processing Attention and perception Memory Claustrophobia and physical access
Social Psychology	1	Responsibility: individual and group Motivation and de-motivation Peer pressure 'Culture' issues Team working Management, supervision and leadership
Factors Affecting Performance	2	Fitness/health Stress: domestic and work related Time pressure and deadlines Workload: overload and underload Sleep and fatigue, shiftwork Alcohol, medication, drug abuse
Physical Environment	1	Noise and fumes Illumination Climate and temperature Motion and vibration Working environment

Syllabus Subject	Level	
	WTR	TR
Tasks	1	Physical work Repetitive tasks Visual inspection Complex systems
Communication	2	Within and between teams Work logging and recording Keeping up to date, currency Dissemination of information
Human Error	2	Error models and theories Types of error in maintenance tasks Implications of errors (i.e. accidents) Avoiding and managing errors
Hazards in the Workplace	2	Recognising and avoiding hazards Dealing with emergencies

Module 21 Basic: Electrical Equipment and Systems

Syllabus Subject	Level		
	WTR	TR	
Batteries	1	–	Principles of primary and secondary cells
	2	–	Lead-acid types Ni-Cad types
	2	3	Methods of charging batteries in aircraft
	2	–	Capacity testing, storage
	2	–	Basic laws and principles Types and characteristics Control
Direct Current Machines	2	–	Basic laws and principles Types and characteristics Control
Direct Current Generation	1	2	Voltage regulation Control Load sharing Paralleling System layouts Interlock circuits
	1	2	Static and rotary inverters Transformer rectifier units
	1	2	Detection systems Fire and overheat warning Smoke detectors – principles and applications Overheat sensors Extinguishing systems Warnings
	1	2	Motors and actuators – clutches and brakes Limit switches, micro switches and proximity detectors Power control units Flap motors protection and control Trim motors
	1	2	Motors and actuators – clutches and brakes Limit switches, micro switches and proximity detectors Power control units Flap motors protection and control Trim motors

Syllabus Subject	Level		
	WTR	TR	
Fuel Systems	1	2	Boost pumps control and indication Jettison systems Refuel/defuel systems Fuel heaters Crossfeed, supply and shut-off valves – normal and emergency
Hydraulic Systems	1	2	Pump control and isolation Pressure switches Overheat warnings Electrically-operated priority valves Fluid reservoir components Low level warnings
Landing Gear Systems	1	2	Actuation motors – selection and control Indication – proximity sensors micro switches Air/ground sensor systems Anti-skid systems – operation, control and override Automatic braking systems – inputs; control and override
Lighting Systems	1	2	External systems: landing, navigation, anti-collision and inspection, etc. Internal systems: normal and emergency, fluorescent tubes, reading and passenger information systems, multiplex function
Pneumatics	1	2	Control – indication and protection
Engine and Propeller Control	1	2	Fuel control valves Temperature and speed limiting systems Propeller feathering controls Electronic engine control
Starting and Ignition	1	2	System types Control Principles of operation of high energy ignition units

Syllabus Subject	Level		WTR	TR
	WTR	TR		
Starting and Ignition (continued)				Aircraft and engine applications and related systems, e.g. stall warning
Alternating Current Machines	2	–		Basic laws and principles Types and characteristics Control
Alternating Current Power Generation	1	2		Constant and variable frequency Constant speed drive units Paralleling Load sharing Load shedding Generator control unit Voltage regulation Load controller Differential protection Fault and test panels Voltage, frequency and excitation control and protection
Alternating Current Power Distribution Systems	1	2		Bus-bar layouts Split and parallel systems Transfer relay interlocks Emergency conditions APU and GPU interlocks Warnings Maintenance panels
Air Conditioning Systems	1	2		Control Indication Protection
Ice and Rain Protection Systems	1	2		Windscreen heating: control, indication and failure Engine/propeller and airframe anti-ice protection: thermal, electrical and pneumatic Warnings and indications

Syllabus Subject	Level		
	WTR	TR	
Ice and Rain Protection Systems (continued)			Overhead indications and protection
			Ground operations
			Windscreen wiper, washer and rain repellent systems
			Sensor protection – angle of airflow, pitot head, static plate and temperature probes
			Waste water heaters – thermal anti-icing protection
Auxiliary Power Units	1	2	Aerial heaters
			Starting, control, protection
			Power generation
Ground Power Supplies	–	2	Fire protection
			Interlocks and protection of aircraft supplies
Centralised Warning and Indication Systems	1	2	Control
			Inputs
			Output warnings
Galley/Toilet Services	1	–	Priority philosophy
			Power supply and protection
			Water heating
			Equipment

Module 22 Basic: Instruments Category 'X'

Syllabus Subject	Level		TR
	WTR	TR	
Pitot-Static Systems and Instruments	1	–	Atmospheric physics, temperature lapse rate, Mach number computation
	2	–	Airspeed indicator, altimeter, vertical speed indicator, and machmeter Servo altimeter
	1	2	Pitot probes, static plates and heaters
	2	2	Pipelines and flexible hoses
	1	2	Drain traps, associated equipment Altitude and airspeed switches
	1	2	Rotor speed; display
Vacuum Systems	1	–	Sources
	1	2	Control and adjustment Indication
Pressure Measurement	1	–	Sensing elements; capsules, bellows, Bourdon tubes, transmitters Displays
Temperature Measurement	1	2	Variable resistance Thermocouples; compensation; limits and values; servo indicators; control system inputs
Rotational Speed Measurement	1	2	Direct drive indicators; tacho-generator and indicator systems; pulse probe systems Displays
Position Measurement	1	2	d.c. and a.c. systems

Syllabus Subject	Level		
	WTR	TR	
Quantity Measurement	1	2	Direct reading
	2	2	Electrical and electronic systems
	1	2	Compensation Power supplies
Flow Measurement	1	2	Indicators Transmitters Power supplies
	1	2	Direct reading compass installation; safe distance Flux detectors and remote sensors remote system components Heading reference outputs
	2	–	Sensors and inputs Signal processors: mechanical, electrical and electronic Signal outputs and displays
Reduced Vertical Separation Minima	1	2	Signal sources and interface with other systems
	1	2	Maintenance practices
Flight Path Computation	2	2	Signal sources, radio inputs
	1	2	Modes, computation Displays
Electronic Display Systems	1	1	CRT; LED; LCD displays
	1	2	EADI; EHSI; symbol generators Control panels Comparators and monitors Engine indicating and crew alerting systems Electronic centralised aircraft monitors
	1	2	Requirements
	1	2	Sensors and inputs Cockpit Voice Recorder inputs Interface with aircraft systems

Syllabus Subject	Level		
	WTR	TR	
Flight Data Recorders (continued)	1	2	Signal processing Entry panels Computer principles Data recording methods Retrieval and verification
	1	1	Readout
	1	2	Failure monitors
	1	1	Basic principles Platform construction Computation
Inertial Navigation Systems and Inertial Reference Systems	1	2	Displays and interface with aircraft equipment Mode selector and CDU Failure/fault indicators Power supplies and cooling
	2	2	Modes Warnings
Ground Proximity Warning Systems	1	2	Inputs and interface with other aircraft systems
	1	1	Computation Monitors Failure indications
	1	2	Types of pick-up Signal conditioning Displays Alarm levels and warnings

Syllabus Subject	Level	
	WTR	TR
Compass Compensation	1	– Base survey techniques Compass swinging areas Aircraft magnetism Terrestrial magnetism – variation Methods and procedures for swinging compasses
	3	– Deviation: calculations and effects on a compass Compensation and adjustment procedures

Module 23 Basic Gyroscopes and Servomechanisms

Category 'X'

Syllabus Subject	Level		
	WTR	TR	
Gyroscopes	1	–	Basic principles
	1	2	Types and methods of operation – vacuum, electrical, or laser
	2	–	Handling care
Electronics	1	2	Transistors Biasing, Simple circuit arrangements
	1	2	Amplifiers Signal amplifiers, feedback
	1	2	Errors, correction Remote gyros, interconnection and transfers Limits
Direction sensing	1	2	Errors, compensation Remote gyros, interconnection and transfers
	1	2	Alignment Rotor speeds
Accelerometers	1	2	Basic principles
Synchros	1	2	CTs, Differential, Torque synchros and resolvers
Servomechanisms	1	2	Rate and position sensing and control Integrators Response and damping Power requirements Clutches Override and lockout protection Null and loop error sensing Synchronisation systems Force rebalance systems

Syllabus Subject	Level		
	WTR	TR	
Digital Techniques	2		Logics – basic gate functions and truth tables
	1		Microprocessors – block diagram Digital computing techniques Parallel and series operation Volatile/non-volatile data storage
		2	Multiplex systems
High Intensity Radiated Fields	1	1	Effect on sensitive systems, principles and methods used to minimise HIRF effects
Fly by Wire	1	1	General principles

Module 24 Automatic Pilots – Aeroplanes Category ‘X’

Syllabus Subject	Level		
	WTR	TR	
Theory of Flight (Fixed Wing)	1	2	<p>Forces on the aircraft</p> <p>Stability – dihedral, sweepback, etc.</p> <p>Control axis</p> <p>Primary control surfaces – operation and effect on the aircraft</p> <p>Secondary controls</p> <p>Forces during turns</p> <p>Functions of trim tabs, balance tabs and servo tabs</p> <p>High speed buffet and stall conditions</p> <p>Auto-pilot control axis</p> <p>Auto-stabilisers – wing levellers</p> <p>Co-ordinated turns, aileron/rudder cross feed</p> <p>Versine generation and application</p> <p>Sideslip monitors – Slip and skid in a turn</p> <p>Turbulence penetration and the effect on autopilot control</p>
Yaw Dampers	1	2	<p>Dutch Roll phenomenon</p> <p>Yaw sensing</p> <p>Yaw signal processing</p> <p>Synchronisation</p> <p>Series and parallel systems</p> <p>Cockpit indication</p> <p>Aileron/rudder control interaction in turns</p> <p>Rudder PCU, LRUs</p> <p>Interlocks with autopilot systems</p>
Pitch Trim Systems	1	2	<p>Longitudinal axis stability</p> <p>High speed tuck</p> <p>Mach No. inputs</p>

Syllabus Subject	Level		
	WTR	TR	
Mach Trim	1	2	Mach trim actuators computation Connections with aircraft controls Warnings
Alpha Trim	1	2	Angle of attack sensing Computation Interface with other aircraft systems: e.g. N1 computers – stall warning systems Flight directors
Auto-Stabilisers	1	2	Trim actuators – control and safety interlocks Speed change systems for trim actuators Interlocks Elevator/stabiliser interaction
C of G Trimmers	1	2	Computation Indication
Demand Signals	1	2	Control wheel steering systems Touch wheel steering systems

Module 25 Automatic Pilots – Common – Category ‘X’

Syllabus Subject	Level		
	WTR	TR	
Error Signals	1	2	Rate system – errors and control Displacement system – errors and control Heading and course error inputs Radio beam deviation inputs Attitude inputs CADC/autopilot interface – e.g. q or % adaptation Sideslip sensors and monitors
Signal Processing	1	2	Typical channel signal flow path Buffer amps Input signal modulation Summing points Signal sensors and switching functions Integrators Limiters Gain programmers Dual channel monitors Voter systems
Demand Signals	1	2	Mode selectors Control display units Turn controllers Control column transducers Command override systems Mode compatibility Mode annunciators Failure and disconnect lights and aural warnings

(continued over)

Syllabus Subject	Level		
	WTR	TR	
Demand Signals (continued)	1	2	Interlocks – pre- and post-engage Pitch attitude trim Roll out/heading-hold, engage Synchronisation Trim monitors and indicators Altitude hold inputs Vertical speed control Mach/IAS hold Altitude acquire or change systems
Command Signal Ouputs	1	2	Power control units – line replaceable units Solenoid valves Transfer valves Position sensors Servomotors – construction, interconnection with control runs Clutches – torque settings Brakes Tachogenerators – feedback and damping Position feedback – indication Torque limiting Hardover sensing – disconnection Jam detection Runaway conditions – disconnection Pilot override – disconnection

Module 26 Automatic Pilots – Rotorcraft – Category ‘X’

Syllabus Subject	Level		
	WTR	TR	
Theory of Flight (Rotorcraft)	1	2	<p>Rotor disc: forces, lift, drag, centrifugal force, weight, phase lag</p> <p>Articulated/semi-rigid/rigid rotors flapping/dragging/feathering</p> <p>Vertical and translational flight</p> <p>Main and anti-torque rotors, control inputs cyclic, collective, rudder pedals</p> <p>Directional control</p> <p>Autorotation</p> <p>Forward speed effects</p>
Command Outputs	1	2	<p>Actuators</p> <p>Indicators</p>
Trim Systems	1	2	<p>Manual/Automatic</p> <p>Indication</p>
Stability Augmentation Systems	1	2	<p>Actuators</p> <p>Indicators</p> <p>Computation</p>

MODULES 27 TO 29 RESERVED

Module 30 Compass Compensation

Syllabus Subject	Level		
	WTR	TR	
Compass Compensation	2	–	Base survey techniques Compass swinging areas Aircraft magnetism Terrestrial magnetism – variation Methods and procedures for swinging compasses
	1	–	Flux valve operation
	3	–	Deviation: calculations and effects on a compass Compensation and adjustment procedures
	1	–	Various compass types

Module 31 Radio Communication and Navigation – Category 'R'

Syllabus Subject	Level		
	WTR	TR	
Radio Theory	1	–	Propagation of radio waves Polarisation Radiation patterns Transmitters and receivers RF Amps, IF Amps Oscillators, frequency synthesisers Frequency multipliers Mixers, detectors, BFO, AGC Noise limiters, muting circuits, audio amplifiers Modulators, RF power amplifiers matching units Filters and tuned circuits
Interference	2	–	Principles and methods used to minimise the effects of conducted and radiated interference Methods used to minimise the effects of lightning strikes and static on aerials
Aerials and Feeders	2	–	Diplexers, baluns and matching stubs Fixed and variable matching arrangements Locations and types of aerials – communication and navigation Bandwidth and effective height of an aerial
Communication	2	–	Calculation of standing wave ratio Control and monitoring circuits
Audio Systems	2	–	Intercommunication Audio mixing and distribution systems Public address and entertainment systems Headsets and microphones

Syllabus Subject	Level		
	WTR	TR	
Cockpit Voice Recorder	2	–	Signal sources Control circuitry; hot microphone Requirements
VHF/HF Communications	2	–	Airborne installations
VOR/ILS	1	–	Ground station signals
	2	–	Airborne installations Control Monitors Indicators Loading AFCS and instrument interface
Marker	1	–	Ground installations
	2	–	Airborne systems
Automatic Direction Finding	2	–	Receiver Loop and sense aerials and feeders Bearing errors and correction devices Loop swings
Satellite Communication and Navigation (GPS) Systems	1	–	Airborne installations Receiver, computer
	2	–	Displays Interface with other systems
Flight Compartment Electronic Display Systems	1	–	EADI; EHSI; symbol generators Control panels Comparators and monitors
Microwave Landing Systems (TRSB)	1	–	Receiver, computer Interface with other systems
RNAV	1	–	Computer Interface with other systems Indications

Module 32 Radar Systems – Category ‘R’

Syllabus Subject	Level		
	WTR	TR	
Pulse Techniques	1	–	Radar transmitter/receiver Pulse modulation Peak power, average power Duty cycle, pulse shape, pulse width Pulse rise time and repetition frequency Range accuracy and resolution Receiver bandwidth Noise
Primary Radar	2	–	Weather radar: Control and monitoring circuits Indicators; displays Scanners; waveguides
	1	–	Doppler: Aerials Indicators Interface with other equipment
	2	–	Radio altimeters: Pulse and FM.CW systems
Secondary Radar	2	–	DME: Indicators Control and monitor circuits Interface with other aircraft systems ATC Transponders: Instrument system interface Control and monitor circuits
	1	–	TCAS: Indicators Control and monitor circuits Interface with other aircraft systems

Appendix 2 Suggested Study Material

- 1 A study of the following official publications relevant to the subject of Regulations and Airworthiness Requirements is essential in respect of examinations associated with the various categories of licence. The publications may be purchased from Her Majesty's Stationery Office and Documedia Solutions UK Limited at the addresses below.

The Air Navigation Order

HMSO
49 High Holborn
London

Air Navigation (General) Regulations

Telephone 0171 873 0011

NOTE: The CAA also publishes a loose-leaf edition of the above Statutory Instruments. It is obtainable under reference 'CAP 393: Air Navigation – the Order and the Regulations' from the address below.

British Civil Airworthiness Requirements:

(CAP 553) Section A – Certification and Approval Procedures

(CAP 455) Airworthiness Notices

(CAP 468) Section L – Licensing – Aircraft Maintenance Engineers

Joint Aviation Requirements

(JAR-145) Approved Maintenance Organisations

(CAP 562) Civil Aircraft Airworthiness Information and Procedures

(CAP 396) Registration, certification and maintenance of aircraft

Documedia Solutions UK Limited
37 Windsor Street
Cheltenham
Glos. GL52 2DG
Telephone Cheltenham 01242 283100

- 2 The following publications provide useful information for study in connection with the Licence, and may be obtained direct from the publisher, or through bookshops. Books may also be available in libraries. The CAA cannot guarantee the availability of any of the publications listed.

Aircraft and Systems

Understanding Aircraft Structures	J Cutler	Blackwell Scientific Publications
The Aeroplane Structure	A C Kermode	} Longman Group Publications
Mechanics of Flight	A C Kermode	
Light Aircraft Inspection	J E Heywood	T & A D Poyser Blackwell Scientific Publications
Light Aircraft Maintenance	J E Heywood	
Into Thin Air	E W Still	Normalair-Garrett
Aircraft Maintenance and Repair	Bent & McKinley	} McGraw-Hill
Maintenance of Aeroplane Vehicles	Northrop Institute of Technology	
A & P Mechanics General Handbook	EA-AC65-9A	} Aviation Maintenance Foundation Inc (USA)
A & P Mechanics Airframe Handbook	EA-AC65-15A	
Aviation Maintenance Handbook and Standard Hardware Digest	EA-AHS-1	
Transport Category Aircraft Systems	EA-363	} Aviation Maintenance Foundation Inc (USA)
Aircraft Weight and Balance	EA-BAL	
Aircraft Corrosion Control	EA-CC-1	
Advanced Mathematics for the Aircraft Technician	EA-MAT	
Aircraft Air Conditioning Systems	EA-AAC-1	
Aircraft Fabric Covering	EA-ADF	
Aircraft Hydraulic Systems	EA-AH-1	
Aircraft Oxygen Systems	EA-AOS	
Aircraft Painting and Finishing	EA-AP-2	
Aircraft Tires and Tubes	EA-ATT	
Aircraft Wheels, Brakes and Anti-Skid Systems	EA-AWB	
Aircraft Bonded Structure	EA-NMR	
Aircraft Sheet Metal Construction and Repair	EA-SMF	
The Anatomy of the Aeroplane	Darrol Stinton	Blackwell Scientific Publications
The Helicopter – Its History and How It Flies	J Fay	David and Charles

Helicopter Flight Theory for Pilots and Mechanics	J R Montgomery	Sikorsky
Dynamics of Helicopter Flight	Saunders	John Wiley & Sons
Fundamentals of Helicopter Maintenance	EA-HF-1	Aviation Maintenance Foundation Inc (USA)

Powerplants

The Jet Engine	Rolls-Royce	
Aircraft Powerplants	Bent & McKinley	McGraw-Hill
Powerplants for Aerospace Vehicles	Northrop Institute of Technology	McGraw-Hill
The Aircraft Gas Turbine Engine	Pratt & Whitney	
Light Aircraft Inspection	J E Heywood	T & A D Poyser
A & P Mechanics Handbook	EA-AC65-12A	} Aviation Maintenance Foundation Inc (USA)
Aircraft Propellers and Controls	EA-APC	
Aircraft Reciprocating Engines	EA-ARE	
Aircraft Fuel and Metering Systems	EA-FMS	
Aircraft Ignition and Electrical Power Systems	EA-IGS	
Aircraft Gas Turbine Powerplants	EA-TEP-1	
Jet Aircraft Power Systems	Cassamassa & Bert	} McGraw-Hill
Aircraft Gas Turbine Engine Technology	Irwin E Tregar	

Avionics

Aircraft Flight Instruments and Integrated Systems	E Pallett	} Longman Group Publications
Aircraft Electrical Systems	E Pallett	
Aircraft Radio Systems	J Powell	
Automatic Flight Control	E Pallett	Blackwell Scientific Publications
Electrical Technology	E Hughes	Longmans
Electronics II } Electronics III }	D C Green	Longman Group Publications

Microprocessors/Microcomputers: An Introduction	Givens/Roesser	}	McGraw-Hill
Elements of Electronics	Hickey/Villines		
Handbook for Electronic Engineering Technicians	Kaufman/Siedman		
Aircraft Electricity and Electronics	Eisman/Bent/ McKinley		
Electronic Computers Made Simple	Jacobweitz		W H Allen
Aircraft Batteries	EA-AB-1	}	Aviation Maintenance Foundation Inc (USA)
Basic Electricity for A & P Mechanics	EA-BE-1		
Basic Electronics and Radio Installation	EA-BEM		
Aviation Electronics	EA-AEG-1		
D C Circuits	EA-DCC		
Manual of Avionics	Brian Kendal		PSP Professional Books
Digital Avionic Systems	GRS Spitzer		Prentice Hall
Modern Aviation Electronics	A Helfrich		
Avionic Fundamentals			IAP Inc Training Manual

Appendix 3 Specimen Examination Questions

1 Essay Questions

Regulations

Describe the responsibilities of either a company approved under JAR-145 or BCAR **A8-15** (M3).

Category A

Describe the inspections and procedures you would adopt to rectify the following reported fault. 'The trailing edge flaps fail to extend to the selected position.'

Category B

Describe the procedure associated with the supervision, and the eventual certification, of the repair of a severely damaged aileron hinge attachment.

Category C

Describe the inspections and procedures you would adopt to rectify the following reported fault. 'High vibration indicated on number one engine.'

Category D

Describe the inspections and their purposes, necessary before dismantling an engine for overhaul.

Category X – Electrical

Detail the checks on an anti-ice system following electrical engine inlet heater mat failure.

Category X – Instruments

Following a report that the engine speed indication system was intermittent, describe how you would carry out defect diagnosis on the system.

Category X – Autopilots

Following reports that the aircraft was flying off the radio beam, describe the checks to prove the defect.

Category X – Radio

The ADF is reported as unreliable. Detail checks and inspections required to ascertain serviceability of the system.

2 Multiple Choice Questions

Category 'A'

A hydraulic regulator (cut out):

- a) will control the maximum pressure automatically.
- b) will reduce the working pressure as selected.
- c) will regulate the amount of fluid in the reservoir.

Category 'A'

A balance tab is an auxiliary surface fitted to a main control surface:

- a) operating automatically to assist the pilot in moving the controls.
- b) operating automatically to provide 'feel' to the controls.
- c) operated independently by the pilot to remove excessive loads from the controls.

Category 'A'

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

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

Category 'A'

In an air supply system using a positive displacement type cabin supercharger, if the supply is not required it will:

- a) be prevented from leaving the supercharger outlet.
- b) be returned to the supercharger inlet.
- c) be spilled to atmosphere.

Category 'A'

Balance marks on an aircraft tyre and tube are normally:

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

Category 'C'

The Beta range (propeller turbine engines) is:

- a) where the throttle lever controls the blade angle of the propeller above the 'FLIGHT IDLE' position.
- b) where the throttle lever controls the blade angle of the propeller between 'GROUND IDLE' and 'MAX REVERSE' position.
- c) where the throttle lever controls the blade angle of the propeller below the 'FLIGHT IDLE' position.

Category 'C'

When inhibiting gas turbine engine fuel systems:

- a) the fuel must be drained from the engine fuel system before attaching the inhibiting rig.
- b) the inhibiting oil is drawn through the engine fuel system by suction from the inhibiting rig.
- c) the fuel should be forced out of the engine fuel system by inhibiting oil pressure.

Category 'C'

Piston engine inlet valve opening before exhaust valve closing is intended to permit:—

- a) an increase of pressure in the cylinder on completion of the induction stroke.
- b) the incoming mixture to mix with a certain proportion of exhaust gases.
- c) a greater amount of mixture to enter the cylinder.

Category 'C'

Gas turbine engine variable inlet guide vanes:

- a) ensure satisfactory starting is achieved at any ambient temperature.
- b) minimise stalling at the front stages of the compressor, with variation of engine conditions.
- c) prevent excessive exhaust gas temperatures during rapid accelerations of the compressor rotational speed.

Category 'A/C'

The advancing blade of a helicopter rotor:

- a) is the blade moving with the relative airflow.
- b) is the blade moving to the highest point during one revolution of the rotor.
- c) is the blade moving forward into the relative airflow.

Category 'A/C'

With increase in altitude, stalling of the main rotor retreating blade will occur:

- a) at a lower helicopter forward speed than that at a lower altitude.
- b) only at a higher helicopter forward speed than that at a lower altitude.
- c) only at a lower helicopter forward speed with a decrease in all-up weight.

Category 'X'

An auto-transformer incorporates:

- a) a tapped winding with a part that is common to primary and secondary circuits.
- b) three separate windings with three separate connections.
- c) two windings wound 180° apart and centre tapped.

Category 'X'

The secondaries of a linear variable differential transformer are connected in:

- a) series opposition.
- b) parallel.
- c) series additive.

Category 'X'

In an Integrated Flight Control System, signals from radio navigation systems can provide control in:

- a) the lateral aircraft axis only.
- b) the vertical aircraft axis only.
- c) both lateral and vertical axes.

Category 'X'

During descent, the pressure around the capsule in a rate of climb indicator will be:

- a) the same as the pressure in the capsule.
- b) lower than the pressure in the capsule.
- c) higher than the pressure in the capsule.

Category 'X'

A high inertia mass, restrained by springs, is usually the basic component in:

- a) a heading sensor.
- b) a liquid flow rate sensor.
- c) an acceleration sensor.

Category 'X'

In an Inertial Navigation System, 'Transport Rate' errors are due to:

- a) aircraft movement in any direction over the earth's surface.
- b) aircraft movement across parallels of longitude.
- c) aircraft movement across parallels of latitude.

Category 'X'

When function testing the autopilot on the ground, the first check would be:

- a) that rigging pins are fitted.
- b) that the control surfaces and systems are free and clear of obstruction.
- c) that the aircraft is on jacks and the undercarriage is retracted.


Category 'R'

A radar transmission pulse of very short duration:

- a) allows reception of returns from very short range.
- b) does not allow reception of returns from very short range.
- c) does not provide good range resolution.

Appendix 4 Example of a Completed Form SRG1005 (AD 300)

UK Civil Aviation Authority
Member of the Joint Aviation Authorities



AIRCRAFT MAINTENANCE ENGINEER'S LICENCE GRANT OR EXTENSION APPLICATION

Please complete the form in block capitals using black or dark blue ink after reading the attached guidance notes.

1. PERSONAL DETAILS

Personal reference number (if known) 123456A or Licence No. 21254

Surname SMITH Forename(s) JOHN

Title MR. Date of birth (dd/mm/yyyy) 20 July 1953

Nationality BRITISH Town BRISTOL and Country ENGLAND of birth

Permanent address 42 CORNELL ROAD
NIMBOURNE DORSET

Postcode BH21 1TR Telephone Number 01202 576142

Address for correspondence (if different from above) N/A.

UK Postcode

Name of Employer SOUTHERN AVIATION LTD Date of joining 1 JANUARY 2003

Employed at BOURNEMOUTH Telephone Number 01202 561726

2. RATING(S) APPLIED FOR (see Guidance Notes)

This section must be completed

Licence Without Type Rating(s) – please tick appropriate box(es)

Cat	LWTR	<input type="checkbox"/>	Cat	LWTR	<input type="checkbox"/>
A	Aeroplanes 1	<input type="checkbox"/>	D	Piston Engine (Overhaul)	<input type="checkbox"/>
C	Piston Engines – Aeroplanes	<input type="checkbox"/>	X	Compass Compensation & Adjustment	<input type="checkbox"/>
C	Turbine Engines – Aeroplanes	<input checked="" type="checkbox"/>	X	Electrical	<input type="checkbox"/>
AC	Piston-Engined Rotorcraft	<input type="checkbox"/>	X	Instruments	<input type="checkbox"/>
AC	Turbine-Engined Rotorcraft	<input type="checkbox"/>	X	Autopilots – Aeroplanes	<input type="checkbox"/>
AC	Piston-Engined Airships	<input type="checkbox"/>	X	Autopilots – Rotorcraft	<input type="checkbox"/>
B	Aeroplanes	<input type="checkbox"/>	R	Radio Communication/Navigation	<input type="checkbox"/>
B	Rotorcraft	<input type="checkbox"/>	R	Radio Radar	<input type="checkbox"/>

Type Rating(s) – if you are applying for any type ratings please enter Category and type(s) applied for:

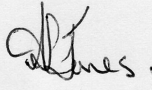
CATEGORY C - PRATT AND WHITNEY JT15D.

3. CAA USE ONLY

LWTR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TR	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Experience	<input type="checkbox"/>	<input type="checkbox"/>	Experience	<input type="checkbox"/>	<input type="checkbox"/>
Signature:			Course required	<input type="checkbox"/>	<input type="checkbox"/>
Exemption for modules			Course OK	<input type="checkbox"/>	<input type="checkbox"/>
Reason:					
Written passes OK for modules:					
Oral exam req'd	<input type="checkbox"/>	<input type="checkbox"/>	Oral exam req'd	<input type="checkbox"/>	<input type="checkbox"/>
Grant			Signature:		

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4. EXPERIENCE (see Guidance Notes)			
Column (4) shall be completed for each block of experience shown by a person in a managerial position (such as the quality manager, chief engineer or, in the case of a training organisation, the training manager) within the organisation in which the experience was gained and who is able to verify the experience.			
Types of Aircraft, Engine or Equipment, showing the particulars relevant to the application being made (1)	Precise Nature of work, and name of person and their managerial position State name of employer and place of employment (2)	DATES From To (3)	Signature of Referee and name in capitals. To be signed by person quoted in Column (2). (4)
CESSNA CITATION 500	SOUTHERN AVIATION LTD BOURNEMOUTH INT AIRPORT. ALL ASPECTS OF BASE AND LINE MAINTENANCE WHICH INCLUDES THE FOLLOWING: 1. PRE FLIGHT AND DAILY INSPECTIONS. 2. FAULT DIAGNOSIS AND RECTIFICATION 3. SCHEDULED MAINTENANCE. 4. EMBODIMENT OF SPS. 5. ENGINE CHANGES 6. ENGINE GROUND RUNS. SOUTHERN AVIATION LTD BOURNEMOUTH AIRPORT. SEE ATTACHED AD3015.	1996 To DATE.	 A.S. JONES. QUALITY MANAGER.

4. EXPERIENCE (continued)

Column (4) shall be completed for each block of experience shown by a person in a managerial position (such as the quality manager, chief engineer or, in the case of a training organisation, the training manager) within the organisation in which the experience was gained and who is able to verify the experience.

Types of Aircraft, Engine or Equipment, showing the particulars relevant to the application being made (1)	Precise Nature of work, and name of person and their managerial position State name of employer and place of employment (2)	DATES		Signature of Referee and name in capitals. To be signed by person quoted in Column (2). (4)
		From (3)	To	
<i>Not Read!</i>				

5. WRITTEN EXAMINATION EXEMPTIONS CLAIMED (see Guidance Notes)

List certificates (including licences not issued by the CAA) against which you are claiming exemptions from any part of the written examinations required for the LWTR being applied for.

.....

6. REFEREE (see Guidance Notes)

This section is to be completed in all cases by the Referee who confirms the current period of experience in Section 4, column (4). This certification shall normally be made by a person in a managerial position, such as the quality manager or chief engineer, within the organisation in which the experience was gained who is able to verify the experience and who has had regular professional contact with the applicant for at least 12 months.

I hereby declare that to the best of my knowledge the information given by the applicant is true. The attached documents are true copies of the originals. (Each document should have the following statement 'I certify this to be a true copy' followed by your signature and you must ensure that you see the original before making this statement.) You should ensure that the applicant cannot add statements to section 4 after you have signed the document.

If application is also being made for a type rating please complete statement (i) or (i) and (ii) as applicable.

- i) I hereby certify that I am not aware of any reason why should not be granted a Type Rating in respect of Category
- ii) This applicant being in the employment of has received type training required by BCAR Section L appropriate to his responsibilities as a Licensed Engineer.

Name of referee (block capitals) A.S. Jones Signature of referee [Signature]

Position or Status QUALITY MANAGER.

Licence No. 19624

It is an offence to make, with intent to deceive, any false representations for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. Persons doing so render themselves liable, on summary conviction, to a fine not exceeding the statutory maximum (currently £5000, or in Northern Ireland £2000) and on conviction on indictment to an unlimited fine or imprisonment for a term not exceeding two years or both.

7. PAYMENT METHODS

All fees must be paid in advance, failure to do so will delay your application.

The fees for licences, associated ratings and assessments are contained in the latest Scheme of Charges. This is available on our website - www.srg.caa.co.uk - under Personnel Licensing.

I am paying by (Please tick appropriate box).

MASTERCARD SWITCH VISA CHEQUE OTHER

Cheques MUST be made payable to CIVIL AVIATION AUTHORITY

If paying by credit or debit card please complete the following. (block letters)

Card holder's name (in full)

Amount £

Card Number

Expiry date / Card issue number (switch only)

Address of Card Holder if different from Applicant

8. DECLARATION OF APPLICANT

I declare that the information provided on this form is correct.

Signature [Signature] Date 14 JANUARY 2003.

It is an offence to make, with intent to deceive, any false representations for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. Persons doing so render themselves liable, on summary conviction, to a fine not exceeding the statutory maximum (currently £5000, or in Northern Ireland £2000) and on conviction on indictment to an unlimited fine or imprisonment for a term not exceeding two years or both.

9. SUBMISSION INSTRUCTIONS (see Guidance Notes)

Send your completed application form to:

Civil Aviation Authority, Personnel Licensing Department, Aviation House, Gatwick Airport South, West Sussex RH6 0YR.

Appendix 5 Type Training - Example Training Needs Analysis

1 Training Needs Analysis - Mechanical Type Training Syllabus to ATA 104 Level 111 For Airframe/Engine Combination

SUBJECT ATA Chapter	TRG LEVEL	HOURS			
		Classroom	CBT	CAT	Simulator/Practical
Introduction					
Manual					
Overview					
21 Air-conditioning	3				
22 Autoflight	2				
23 Communication	2				
24 Electrical Power	3				
25 Equip & Furnish	3				
26 Fire Protection	3				
27 Flight Controls	3				
28 Fuel	3				
29 Hydraulic	3				
30 Ice & Rain	3				
31 Instruments	3				
32 Landing Gear	3				
33 Lighting	3				
34 Navigation	2				
35 Oxygen	3				
36 Pneumatics	3				
38 Waste & Water	3				
45 BITE	3				
46 A.P.U.	3				
51 Structures	3				
52 Doors	3				
53 Fuselage	3				
54 Nacelles/Pylons	3				
55 Stabilisers	3				
56 Windows	3				
57 Wings	3				
61 Propellers	3				
62 Rotors	3				
63 Rotor Drives	3				
64 Tail Rotor	3				
65 Tail Rotor Drive	3				
66 Folding Blades/Pylon	3				
67 Rotor Flight Controls	3				
71 Powerplant	3				
72 Engine	3				
73 Fuel Control	3				
74 Ignition	3				
75 Air	3				
76 Engine Controls	3				
77 Indication	3				
78 Exhaust	3				
79 Oil	3				
80 Starting	3				
Total Hours					

2 Training Needs Analysis - Avionic Type Training Syllabus to ATA 104 Level 111 For Airframe/Engine combination _____

SUBJECT ATA Chapter	HOURS				
	TRG LEVEL	Classroom	CBT	CAT	Simulator /Practical
Introduction					
Manual					
0 to 12					
21 Air-conditioning					
22 Autoflight	3				
23 Comms	3				
24 Electrical Power	3				
25 Equip & Furnish	3				
26 Fire Protection					
27 Flight Controls	2				
28 Fuel					
29 Hydraulic					
30 Ice & Rain					
31 Instruments	3				
32 Landing Gear					
33 Lighting	3				
34 Navigation	3				
35 Oxygen					
36 Pneumatics					
38 Waste & Water					
45 BITE	3				
49 A.P.U.					
51 Structures					
52 Doors					
53 Fuselage					
54 Nacelles					
55 Stabilisers					
56 Windows					
57 Wings					
61 Propellers					
71 Powerplant					
72 Engine					
73 Fuel Control	2				
74 Ignition					
75 Air					
76 Engine Controls	2				
77 Indication	2				
78 Exhaust					
79 Oil					
80 Starting					
Total Hours					

Appendix 6 Type Rating Record of Experience — Form SRG1007 (AD 301)

1 General

As stated in Chapter L2, a satisfactory Record of Experience must be submitted as part of an application for a Type Rating. Details of this form, methods of completion, and confirming signatories required are given in this Appendix.

2 Items to be Recorded

- 2.1 The Record of Experience items should be grouped under suitable headings appropriate to the Licence Category (see Tables 1 and 2 of this Appendix) in order that distribution and depth of coverage can be assessed. The experience shown must have been gained within the three years prior to the application.
- 2.2 The amount of detail should be related to the construction and complexity of the type/group of aircraft, engine or equipment concerned. Account should also be taken of maintenance procedures, defect rectification and the duties and responsibilities which devolve on the holder of the Type Rated Licence.
- 2.3 It is not sufficient to make such simple statements as, for example, 'No. 1 inverter replaced', 'Hydraulic pump replaced' or, '50-hour check carried out'. The replacement of items requires subsequently that specific functional checks be carried out, and therefore evidence of such checks must also be given in the Type Rating Record of Experience. In the case of time-cycled checks, reference should also be made to the extent of work involved relevant to the systems and/or equipment covered by the checks. Checking/inspection items are of limited worth, but the work items which follow from such checks/inspections provide the greater experience.
- 2.4 If an oral examination is to be conducted for the Type Rating, the Record of Experience will be used as a basis for questions on the practical aspects of items included in it.
- 2.5 An example of a completed Type Rating Record of Experience is given in Table 3 of this Appendix.

3 Confirming Signatories

Items and dates entered in the Record of Experience should be countersigned by a person of supervisory status to whom the applicant is responsible in relation to the work experience recorded and who should confirm that the experience is reflected accurately in the document. See also Chapter L2, concerning the certification required on of Form SRG1005 (AD 300).

4 Assessment by the CAA

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

Table 1 Classification of Items of Work for Completion of Type Rating Record of Experience (Categories 'A' and 'C')

Sub-headings under which representative selection of items of work carried out or participated in	Licence Categories			ATA Chapter
	'A' - Aeroplanes	'C' - Engines	'A' & 'C' Rotorcraft	
Airframe Structure, including doors and windows	X		X	51
Flight Control Systems	X		X	27
Flaps and Lift Control Systems	X			27
Hydraulic Systems	X		X	29
Pneumatic Systems	X		X	36
Landing Gear Systems	X		X	32
Air Conditioning Systems	X		X	21
Pressurisation Systems	X			21
Ice and Rain Protection Systems	X		X	30
Oxygen Systems	X		X	35
Life-saving and Safety Equipment	X		X	25
Fire Detection and Extinguishing Systems	X	X	X	26
Electrical Systems	X*	X*	X*	24
Instrument Systems	X*	X*	X*	31
Automatic Pilot Systems	X*		X*	22
Airframe Fuel Systems		X	X	28
Main Engines and Power Plant		X	X	71
Engine Fuel Systems		X	X	73
Oil Systems		X	X	79
Ignition Systems		X	X	74
Propeller Systems		X		61
Air Intake Systems		X		72
Thrust Reverser and Exhaust Systems		X		78
Rotor Systems			X	65
Transmission Systems			X	65
Replacements of Systems Components	X	X	X	ALL
Replacement of Main Engines		X	X	71
Replacements of APUs		X		49
Ground Handling	X		X	9/10
Ground Running and Adjustments		X	X	76
Minor Repairs	X		X	51
Defect Diagnosis and Rectification	X	X	X	ALL
Current Mandatory Modifications and Inspections	X	X	X	ALL

*. In accordance with the responsibilities and privileges defined in Airworthiness Notice No. 3.

Table 2 Classification of Items of Work for Completion of Type Rating Record of Experience (Categories 'X' and 'R')

Sub-headings under which representative selection of items of work carried out or participated in	Licence Categories		ATA Chapter
	'X' – Electrical	'X' – Compass Compensation Chapter and Adjustment	
Main a.c. Power Generation Systems	X		24
Main d.c. Power Generation Systems	X		24
Power Distribution Systems	X		24
Batteries	X		24
Secondary Power Generation Systems	X		24
External Power Supply Systems	X		24
Auxiliary Power Units	X		49
Warning and Alerting Systems	X		All
Circuit Installation and Testing	X		All
Engine Starting Systems	X		74/80
Engine and Propeller Control Systems	X		61/76
Rotor Control Systems	X		22
Fuel Systems	X		28/73
Oil Systems	X		79
Fire Detection and Extinguishing Systems	X		26
Ice and Rain Protection Systems	X		30
Air Conditioning Systems	X		21
Pressurisation Systems	X		21
Flight Control Systems	X		27
Hydraulic and/or Pneumatic Systems	X		29/36
Landing Gear Systems	X		32
Lighting Systems	X		24
Passenger Service Systems	X		25
Multiplex Systems	X		31/All
Indicating Systems	X		31/All
Replacement of systems Components	X		All
BITE checks	X		All
Defect diagnosis and Rectification	X		All

Table 2 Classification of Items of Work for Completion of Type Rating Record of Experience (Categories 'X' and 'R')

Sub-headings under which representative selection of items of work carried out or participated in	Licence Categories		ATA Chapter
	'X' – Electrical	'X' – Compass Compensation Chapter and Adjustment	
Current Mandatory Modifications and Inspections	X		All
Warning and Alerting Systems	X	X	All
Circuit Installation and Testing	X	X	All
Direct and Remote-reading Compass swings		X	34
Sub-headings under which representative selection of items of work carried out or participated in	Licence Categories		ATA Chapter
	'X' – Instruments	'X' – Combined Category Instruments/Automatic Pilots	
Indicating Systems:			
Pressure	X	X	77
Temperature	X	X	77/79
Engine Speed	X	X	77
Quantity	X	X	28/29/79
Flow	X	X	73
Position	X	X	All
Vibration	X	X	77
Pitot-static Instrument Systems	X	X	34
Gyroscopic Flight Instrument Systems	X	X	34
Compasses Direct-reading and/or Remote-Reading	X	X	34
Flight Director Systems	X	X	34
Air Data Computer Systems	X	X	34
Inertial Navigation Systems	X	X	34
Ground Proximity Warning Systems	X	X	34
CRT Display System	X	X	31
Flight Director Systems	X	X	31
Replacement of System Components	X	X	All
BITE Checks	X	X	All
Defect Diagnosis and Rectification	X	X	All

Table 2 Classification of Items of Work for Completion of Type Rating Record of Experience (Categories 'X' and 'R')

Sub-headings under which representative selection of items of work carried out or participated in	Licence Categories		ATA Chapter
	'X' – Instruments	'X' – Combined Category Instruments/Automatic Pilots	
Current Mandatory Modifications and Inspection	X	X	All
Yaw Damper Systems		X	22
Pitch Trim Systems		X	22
Mach Trim Systems		X	22
Automatic Pilot Systems		X	22
Auto Throttle Systems	X	X	22
Autoland Systems		X	22
Flight Management Systems		X	34


Sub-headings under which representative selection of items of work carried out or participated in	'X' Automatic Pilots Aeroplanes	'X' Automatic Pilots Rotorcraft	R Radio Communication /Navigation	'R' Radio Radar	ATA Chapter
Yaw Damper Systems	X				22
Mach Trim Systems	X				22
Pitch Trim Systems	X	X			22
Automatic Pilot Systems	X	X			22
Yaw systems		X			22
Stability Augmentation Systems		X			22
Trim Systems		X			22
Warning And Alerting Systems	X	X	X	X	All
Circuit Installation and Testing	X	X	X	X	All
Replacement of System Components	X	X	X	X	All
Defect Diagnosis and Rectification	X	X	X	X	All
Current Mandatory Modifications and Inspections	X	X	X	X	All
BITE Checks	X	X	X	X	All
HF Communication Systems			X*		23
VHF Communication Systems			X		23

Sub-headings under which representative selection of items of work carried out or participated in	'X' Automatic Pilots Aeroplanes	'X' Automatic Pilots Rotorcraft	R Radio Communication /Navigation	'R' Radio Radar	ATA Chapter
Intercommunication			X		23
Service Interphone/Public Address Systems			X		23
Passenger Entertainment Systems			X*		23
Multiplex Systems			X*		31
Cockpit Voice Recorder			X*		31
VHF Navigation Systems			X		34
Marker Systems			X*		34
ADF Systems			X		34
Sat Comm			X*		34
GPS			X*		34
Weather Radar Systems				X ⁺	34
Radio Altimeter Systems				X	34
DME Systems				X	34
Transponder Systems				X	34
TCAS				X ⁺	34
Microwave Landing Systems				X ⁺	34

* Experience is not required in these areas for Paragraph 12.2.1.

+ Experience is not required in these areas for Paragraph 12.3.1.

UK Civil Aviation Authority



TYPE RATING RECORD OF EXPERIENCE

Please complete the form in block capitals using black or dark blue ink after reading the following.

- Information and guidance on completion of this form can be found in BCAR Section L Appendix 4.
- The Person in charge should certify each item when satisfied that the applicant has taken part in or carried out a task.

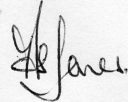
1. PERSONAL DETAILS

Personal reference number (if known) 1 2 3 4 5 6 A or Licence number 2 1 2 5 4

Surname SMITH Forename(s) JOHN

2. PARTICULARS OF EXPERIENCE

for Category C Rating FRATT AND WHITNEY JT150

Aircraft Type & registration	Details of work performed	Specific date work performed	Signature, name and status of person in charge and dates
<p>CSSNA CITATION 500 G-LITT</p>	<p><u>REPLACEMENT OF MAIN ENGINES</u></p> <p>LEASE ENGINES REMOVED AND CRATED IN READINESS FOR DISPATCH. TIME EXPIRES FRONT AND REAR ENGINE MOUNTS REPAIRED. 'C' EXHAUST NOZZLE REMOVED AND SIZE 'A' FITTED AS PER ENGINE DATA PLATE. OVERTHAULED ENGINES FITTED TO NO1 AND 2 POSITIONS. THROTTLE CONTROLS FITTED AND RECHECKED. DUPLICATE INSPECTIONS CARRIED OUT TO VITAL POINTS. FUEL, OIL AND AIR LEAK CHECKS CARRIED OUT. PERFORMANCE RUNS CARRIED OUT I.A.W. AMM C500-71-00.</p>	<p>23 SEPTEMBER 2002</p>	<p> A.S. JONES QUALITY MANAGER 4 JANUARY 2003</p>

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Table 3 Example of a Completed Form AD 301