UK Civil Aviation Authority

General Aviation Pilot Licensing Review

AMC and GM to the UK Aircrew Regulation

A consultation

CAP 3094

Contents

Published by the Civil Aviation Authority, 2025

Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

First published March 2025

Please reply to this consultation via our website: https://consultations.caa.co.uk by **6th May 2025**.

Please direct enquiries regarding the content of this publication to: ga.consultations@caa.co.uk

The latest version of this document is available in electronic format at: www.caa.co.uk

Contents

Introduction

Using this document

1. This document contains proposed changes and additions to the Acceptable Means of Compliance (AMC) and Guidance Material (GM) associated with UK Regulation (EU) No 1178/2011 (the UK Aircrew Regulation).

2. Changes are indicated by:

   - New text – underlined in red
   - Removed text – ~~strikethrough~~
   - Unchanged text omitted for brevity – (…)

3. Draft changes to the regulations are included for context where appropriate, however these have not yet been finalised and may be subject to change.

4. Links to the existing text of the UK Aircrew Regulation within the Aviation Regulatory Library are included were appropriate.

5. Questions to obtain feedback on the changes are included throughout the document, please answer via the online response tool.

About you

Consultation Question 1

Please indicate if you participate in aviation and in what capacity (select all that apply):

- GA aeroplane flight crew licence holder or student: PPL(A), NPPL(A), LAPL(A)
- GA aeroplane instructor or examiner
- Other GA aircraft flight crew licence holder or student eg PPL(BA), PPL(H), BPL, SPL etc
- Other aviation flight crew licence holder including eg CPL(A), ATPL, military
- Other aviation licence holder or professional, eg other aircrew, air traffic controller, aircraft maintenance etc
- Aircraft operator or training organisation management
- GA-related industry, eg insurance, manufacturer, distributor, aerodrome etc
  Please specify: _____
- Position within a government, regulatory or related body
- Position within an aviation representative or professional body
- Frequent passenger in GA aircraft
- None of the above, but I consider myself affected by GA licensing; eg local resident, etc
- None of the above: I do not participate aviation, but have an interest in these issues

Consultation Question 2

Is your response the formal submission of an organisation?

- No
- Yes: organisation: _____

We would normally expect only one submission per organisation.

Chapter 1

Private Pilot Licence

Introduction

1.1 To support the changes to the Private Pilot Licence (Aeroplanes) and Private Pilot Licence (Helicopters), AMC and GM to the following provisions of Part-FCL are proposed to be added or amended:

- FCL.210 – Training course
- FCL.215 – Theoretical knowledge examination
- FCL.235 – Skill test
- FCL.210.A – Experience requirements and crediting (aeroplanes only)

FCL.210 – Training course

1.2 FCL.210 – Training course contains the PPL(A) and PPL(H) training course requirements. The applicable AMC update is proposed to include reference to partial power failure scenarios for aeroplane training, and the use of VFR moving map devices for both aeroplane and helicopter training.

AMC1 FCL.210 PPL(A) Training course

FLIGHT INSTRUCTION FOR THE PPL(A)

(…)

(b) Flight instruction

(1) The PPL(A) flight instruction syllabus takes into account the principles of threat and error management and also covers:

(…)

(viii) light by reference solely to instruments, including the completion of a level 180 ° turn;

(ix) cross-country flying using visual reference, dead reckoning, moving map displays (if available) and radio navigation aids;

(x) emergency operations, including simulated aeroplane equipment malfunctions;

(…)

(xvii) Exercise 12/13: Emergencies:

(A) abandoned take-off and reasons for doing so;

(B) engine failure after take-off, including partial loss of power;

(C) mislanding and go-around;

(D) missed approach.

Note: If partial loss of power is not taught prior to first solo, it should be addressed during circuit consolidation flying.

(…)

(xx) Exercise 16: Forced landing without power:

(A) forced landing procedure;

(B) choice of landing area, provision for change of plan;

(C) gliding distance;

(D) descent plan;

(E) key positions;

(F) engine cooling;

(G) engine failure checks;

(H) use of radio;

(I) base leg;

(J) final approach;

(K) landing;

(L) actions after landing.

(M) after completing the forced landing without power items, the FI should discuss and practice enroute partial power loss scenarios with the applicant.

(…)

(xxii) Exercise 18a: Navigation:

(…)

(C) arrival and aerodrome joining procedure:

(a) ATC liaison in controlled or regulated airspace;

(b) altimeter setting;

(c) entering the traffic pattern;

(d) circuit procedures;

(e) parking;

(f) security of aeroplane;

(g) refuelling;

(h) closing of flight plan, if appropriate;

(i) post-flight administrative procedures.

Note: The applicant should initially conduct the navigation exercises using a chart, manually completed flight log and maintain the flight log during the exercises. Once the applicant has reached a sufficient level of competence determined by the FI, flight planning applications and moving map devices should be integrated into the navigation exercises and supervised solo cross-country flights.

(xxiii) Exercise 18b: Navigation problems at lower levels and in reduced visibility:(A) actions before descending;

(B) hazards (for example obstacles and terrain);

(C) difficulties of map reading or when using moving map devices;

(D) effects of wind and turbulence;

(E) vertical situational awareness (avoidance of controlled flight into terrain);

(F) avoidance of noise sensitive areas;

(G) joining the circuit;

(H) bad weather circuit and landing.

(xxiv) Exercise 18c: Radio navigation:

(A) use of GNSS (including the use of moving map if available):

(a) selection of waypoints;

(b) to or from indications and orientation;

(c) error messages.

(…)

AMC2 FCL.210 PPL(H) Training course

FLIGHT INSTRUCTION FOR THE PPL(H)

(…)

(c) Flight Instruction

(…)

(xiii) cross-country flying by using visual reference, ~~DR, GNNS~~ dead reckoning, moving map displays (if available) and where available radio navigation aids including GNSS; simulation of deteriorating weather conditions and actions to divert or conduct precautionary landing;

(…)

(d) Syllabus of flight instruction

(…)

(2) Each of the exercises involves the need for the applicant to be aware of the needs of good airmanship and look-out, which should be emphasised at all times.

(…)

(xxx) Exercise 25a: Navigation:

(…)

(C) arrival and aerodrome joining procedure:

(a) ATC liaison in controlled or regulated airspace;

(b) altimeter setting;

(c) entering the traffic pattern;

(d) circuit procedures.

(e) parking;

(f) security of helicopter;

(g) refuelling;

(h) closing of flight plan (if appropriate);

(i) post-flight administrative procedures.

(D) The applicant should initially conduct the navigation exercises using a chart, manually completed flight log and maintain the flight log during the exercises. Once the applicant has reached a sufficient level of competence determined by the FI, flight planning applications and moving map devices should be integrated into the navigation exercises and supervised solo cross-country flights.

(xxxi) Exercise 25b: Navigation problems at low heights and in reduced visibility:

(A) actions before descending;

(B) hazards (for example obstacles and other aircraft);

(C) difficulties of map reading or when using moving map devices;

(D) effects of wind and turbulence;

(E) avoidance of noise sensitive areas;

(F) actions in the event of encountering DVE;

(G) decision to divert or conduct precautionary landing;

(H) bad weather circuit and landing;

(I) appropriate procedures and choice of landing area;

(J) precautionary landing.

(xxxii) Exercise 25c: Radio navigation:

(A) use of GNSS (including the use of moving map if available):

(a) selection of waypoints;

(b) to or from indications and orientation;

(c) error messages;

(d) hazards of over-reliance on the use of GNSS and moving map devices in the continuation of flight in DVE.

Consultation Question 3

Do you agree with our proposed changes to the PPL(A) syllabus regarding partial loss of engine power?

Yes No No view/don't know

Please enter any comments you may have.

Consultation Question 4

Do you agree with our proposed changes to the PPL (A) and (H) syllabi regarding the use of moving map devices?

Yes No No view/don't know

Please enter any comments you may have.

FCL.215 – Theoretical knowledge examination

1.3 FCL.215 sets out the theoretical knowledge requirements for the PPL(A) and (H). Amendments to Part-FCL Appendix 1 – crediting of theoretical knowledge will allow applicants for a PPL(A), who hold a National Private Pilot's Licence (Aeroplanes), but have not previously passed the PPL(A) theoretical knowledge exams, to complete a reduced 'bridging' suite of exams.

1.4 The NPPL(A) to PPL(A) bridging exams will cover:

- Principles of flight;
- Operational procedures;
- Flight performance and planning; and
- Aircraft general knowledge.

If the applicant has not previously obtained a flight radio telephony operator's licence, they must also pass the radio communications exam.

1.5 The applicability of individual subjects to the bridging exams will be identified in a revised AMC1 to FCL.215. An additional column to the table will be added to address the NPPL(A) to PPL(A) scenario. Due to the size, the revised AMC table is included in Annex A on p.49 – please refer to this when making comments.

Consultation Question 5

Please enter any comments you may have on the NPPL(A) to PPL(A) theoretical knowledge bridging requirements.

FCL.235 – Skill test

1.6 The optional use of moving map displays will be added to the applicable AMC for the PPL(A) and (H) skill tests.

AMC1 FCL.235 Skill Test

CONTENTS OF THE SKILL TEST FOR THE ISSUE OF A PPL(A)

(…)

(e) The skill test contents and sections set out in this AMC should be used for the skill test for the issue of a PPL(A) on SE or ME aeroplanes or on TMGs.

SECTION 3 EN-ROUTE PROCEDURES	
a	Flight plan, dead reckoning, ~~and~~ map reading and use of moving map displays (optional)
b	Maintenance of altitude, heading and speed
c	Orientation, timing and revision of ETAs and log keeping using a manual flight log
d	Diversion to alternate aerodrome (planning and implementation) including the use of moving map displays (optional)
e	Use of radio navigation aids including the use of GNSS and moving map displays (optional)
f	Basic instrument flying check (180° turn in simulated IMC)
g	Flight management (checks, fuel systems and carburettor icing, etc.)
h	ATC compliance and R/T procedures

(…)

AMC2 FCL.235 Skill Test

CONTENTS OF THE SKILL TEST FOR THE ISSUE OF A PPL(H)

(…)

(e) The skill test contents and sections set out in this AMC should be used for the skill test for the issue of a PPL(H) on SE or ME helicopters.

SECTION 3 NAVIGATION - EN ROUTE PROCEDURES	
a	Navigation and orientation at various altitudes or heights, ~~and~~ map reading and use of a moving map display (optional)
b	Altitude or height, speed, heading control, observation of airspace and altimeter setting
c	Monitoring of flight progress, using a manual flight log, fuel usage, endurance, ETA, assessment of track error and re-establishment of correct track and instrument monitoring
d	Observation of weather conditions and diversion planning, for the diversion using a moving map display (optional)
e	Use of navigation aids (where available) including the use of GNSS and moving map displays (optional)
f	ATC liaison with due observance of regulations, etc.

(…)

Consultation Question 6

Do you agree with our proposed changes to the PPL (A) and (H) skill test schedules regarding the use of moving map devices?

Yes No No view/don't know

Please enter any comments you may have.

FCL.210.A PPL(A) – Experience requirements and crediting

1.7 We have recommended a change to FCL.210.A – Experience requirements and crediting in our Opinion and Instruction Document (OID) to the Secretary of State. This change is to increase flexibility of crediting and more closely align with ICAO Annex 1 (Personnel Licensing):

FCL.210.A PPL(A) — Experience requirements and crediting

(a) Applicants for a PPL(A) shall have completed at least ~~45~~ 40 hours of flight time as a pilot of aeroplanes or TMGs, appropriate to the class rating sought, 5 of which may have been completed in an FSTD, including at least:

(1) ~~25 hours of~~ appropriate dual flight instruction; and

(2) 10 hours of supervised solo flight time, including at least 5 hours of solo cross-country flight time with at least 1 cross-country flight of at least 270 km (150 NM), during which full stop landings at 2 aerodromes different from the aerodrome of departure shall be made.

(b) The requirement for 40 hours flight time specified in (a) may be reduced to 35 hours, if following a course at an ATO.

~~(b) Specific requirements for applicants holding an LAPL(A). Applicants for a PPL(A) holding an LAPL(A) shall have completed at least 15 hours of flight time on aeroplanes after the issue of the LAPL(A), of which at least 10 shall be flight instruction completed in a training course at a DTO or at an ATO. That training course shall include at least four hours of supervised solo flight time, including at least two hours of solo cross-country flight time with at least one cross-country flight of at least 270 km (150 NM), during which full stop landings at two aerodromes different from the aerodrome of departure shall be made.~~

(…)

1.8 A new AMC and GM is therefore proposed to give guidance on applying the more flexible requirements:

[new] AMC1 FCL.210.A PPL(A) – Experience requirements and crediting

Applicants with no previous experience

(1) Applicants with no previous flying experience should receive at least 40 hours of flight instruction, to include 25 hours dual flight training. Applicants with previous flying experience in other aircraft categories may have the amount of dual instruction reduced in proportion to the credit described in FCL.210.A (d).

Applicants with previous aeroplane or TMG experience

(2) Applicants holding either a UK National Private Pilot's Licence (Aeroplanes) issued under the Air Navigation Order 2016, or a LAPL(A) issued under the UK Aircrew Regulation, should receive dual training as required to cover those exercises of AMC1 to FCL.210 PPL(A) Training course not previously covered.

(3) For applicants with previous flight experience in aircraft classified as an aeroplane or TMG, the amount of dual flight training required should be based on a pre-course assessment to establish training needs, considering the nature of the experience and how recently it was obtained. This should include an assessment flight with the applicant to establish the existing level of competence, and a review of any available training or flying logbook records:

a) Any previous flight experience to be credited is appropriately logged in a pilot logbook(s) in paper or electronic format;

b) Based on the performance of the applicant and the demonstrated level of competence during the pre-course assessment flight, the training organisation should determine which of the exercises identified in the syllabus defined in AMC1 FCL.210 PPL(A) Training course need to be delivered in full, or elements of specific exercises in need of revision.

c) The training organisation should pay particular attention to all exercises in emergency, slow flight, stalling and forced landing and partial loss of power exercises to ensure that the applicant demonstrates the necessary standards and appropriate level of competence.

Applicants with previous microlight aeroplane experience

(4) For applicants with previous flight time in microlight aeroplanes, this may be credited towards the overall 40 hours of flight time, provided that:

a) The supervised solo requirement in FCL.210.A (a)(2) is completed in an aircraft of the appropriate class that is not a microlight aeroplane; and

b) The hours to be credited were completed in microlight aeroplanes with a conventional three axis control system.

(5) The amount of dual flight training required should be based on a pre-course assessment to establish training needs, considering the nature of the experience and how recently it was obtained. This should include an assessment flight with the applicant to establish the existing level of competence, and a review of any available training or flying logbook records.

(6) Based on the performance of the applicant and the demonstrated level of competence during the pre-course assessment flight, the training organisation should determine which of the exercises identified in the syllabus defined in AMC1 FCL.210 PPL(A) Training course need to be delivered in full, or elements of specific exercises in need of revision.

The head of training should ensure the following exercises are covered:

a) Ex 10a Slow flight,

b) Ex 10b Stalling,

c) Ex 11 Spin avoidance,

d) Ex 12/13 Emergencies

e) Ex 16 Forced landing without power and partial power loss,

f) Ex 17 Precautionary landings,

g) Ex 18b Navigation problems at lower level and in reduced visibility,

h) and any exercise not conducted for example radio navigation or basic instrument flight.

in most cases this will mean the applicant should complete around 10 hours of flight training in an aeroplane or TMG, that is not a microlight aeroplane.

Responsibilities of training organisations

(7) The training organisation should verify that the applicant has achieved the required standard and level of competence in all areas of the syllabus prior to recommending the applicant for the Skill Test.

(8) The training organisation will need to maintain records of any pre-course assessments conducted, estimated training needs and any credits offered to an applicant. The training organisation may be called upon by the CAA to supply this information on application for licence issue.

Consultation Question 7

Do you agree with our proposed AMC1 to the revised FCL.210.A regarding crediting previous aeroplane experience towards the PPL(A)?

Yes No No view/don't know

Please enter any comments you may have.

[new] GM1 FCL.210.A PPL(A) – Experience requirements and crediting

The following table is designed to assist training organisations when crediting previous flight experience, training or qualifications towards the UK Part-FCL PPL(A).

- When populating the course completion certificate for the application, please indicate what previous experience is being credited towards FCL.210.A requirements.
- All initial UK Part-FCL PPL(A) applications require a UK issued class 2 medical and English language proficiency must be assessed if not already held.
- For applicants holding a PPL or higher licence that was issued by another state in accordance with ICAO Annex 1, refer to UK Regulation (EU) No 2020/723 (Acceptance of Third Country Certification of Pilots).

Qualification held	Credit available	Requirements	Action by training organisation
UK issued Part-FCL licence in another category of aircraft (except balloons)	As per FCL.210.A (d), applicants holding a pilot licence for another category of aircraft, with the exception of balloons, shall be credited with 10% of their total flight time as PIC on such aircraft, up to a maximum of 10 hours. Note this cannot include time towards the supervised solo requirements of FCL.210.A (a)(2). Previous flight time as a pilot of single engine aeroplanes, including TMGs or three axis microlight aeroplanes, may be credited towards the FCL.210.A requirement for 40 hours flight time.	Pass the aeroplane category theoretical knowledge examinations for the PPL(A). Have completed sufficient flight time in three axis single engine aeroplanes to meet the flight time requirements of FCL.210.A(a). Have completed in a single engine aeroplane that is not a microlight: • Dual as required by the training organisation, as set out in the training needs assessment report;	Retain a record of the flight experience credits offered to pilot. When satisfied as to the competence of the applicant, recommend for PPL(A) Skill Test.

	Previous supervised solo time on single engine aeroplanes, except for microlight aeroplanes, may be counted towards FCL.210.A (a)(2). The common theoretical knowledge exams, as set out in FCL.215. The Flight Radio Telephony Operators Licence (FRTOL) practical test, if the FRTOL is already held.	• The 10 hours supervised solo required by FCL.210.A (a)(2), including at least 5 hours of solo cross-country, with at least 1 flight of at least 270km (150nm) during which full stop landings at 2 aerodromes different from the aerodrome of departure; and • The PPL(A) skill test.	
UK issued LAPL(A)	Previous flight time as a pilot of single engine aeroplanes, including TMGs or three axis microlight aeroplanes, may be credited towards the FCL.210.A requirement for 40 hours flight time. Previous supervised solo time on single engine aeroplanes, except for microlight aeroplanes, may be counted towards FCL.210.A (a)(2). All theoretical knowledge examinations for the PPL(A). The Flight Radio Telephony Operators Licence (FRTOL) practical test, if the FRTOL is already held.	Have completed sufficient flight time in three axis single engine aeroplanes to meet the flight time requirements of FCL.210.A(a). Have completed in a single engine aeroplane that is not a microlight: • Dual as required by the training organisation, as set out in the training needs assessment report; • The 10 hours supervised solo required by FCL.210.A (a)(2), including at least 5 hours of solo cross-country, with at least 1 flight of at least 270km (150nm) during which full stop landings at 2 aerodromes different from the aerodrome of departure; and	Conduct a pre-course assessment flight to establish how much flight training the applicant will require. Set out the estimated flight training required in a training need assessment report for the applicant. Retain a record of this report with the applicant's training records. When satisfied as to the competence of the applicant, recommend for PPL(A) Skill Test.

		• The PPL(A) skill test.	
UK NPPL(A)	Previous flight time as a pilot of single engine aeroplanes, including TMGs or three axis microlight aeroplanes, may be credited towards the FCL.210.A requirement for 40 hours flight time. Previous supervised solo or PIC time on single engine aeroplanes, except for microlight aeroplanes, may be counted towards FCL.210.A (a)(2). If previously passed, all theoretical knowledge examinations for the PPL(A). The Flight Radio Telephony Operators Licence (FRTOL) practical test and written Communications exam, if the FRTOL is already held.	Theoretical knowledge training as set out in the training need assessment report as required to pass the bridging theoretical knowledge examinations for the PPL(A) (including Communications if the FRTOL is not already held). Have completed sufficient flight time in three axis single engine aeroplanes to meet the flight time requirements of FCL.210.A(a). Have completed in a single engine aeroplane that is not a microlight: • Dual as required by the training organisation, as set out in the training needs assessment report; • The 10 hours supervised solo* as required by FCL.210.A (a)(2), including at least 5 hours of solo cross-country, with at least 1 flight of at least 270km (150nm) during which full stop landings at 2 aerodromes different from the aerodrome of departure; and • The PPL(A) skill test.	Conduct a pre-course assessment flight to establish how much theoretical and flight training the applicant will require. Set out the estimated theoretical and flight training required in a training need assessment report for the applicant. Retain a record of this report with the applicant's training records. When satisfied as to the competence of the applicant, recommend for PPL(A) Skill Test.

		*PIC time under the privileges of the NPPL(A) with SEP or SSEA ratings may be counted towards this.	
Flight experience as supervised solo or Pilot under Training (PUT or Dual) but no pilot's licence issued*.	Recorded flight time as a pilot of single engine aeroplanes, including TMGs or three axis microlight aeroplanes, may be credited towards the FCL.210.A requirement for 40 hours flight time. Previous supervised solo time on single engine aeroplanes, except for microlight aeroplanes, may be counted towards FCL.210.A (a)(2).	Pass the PPL(A) theoretical knowledge exams. Have completed sufficient flight time in three axis single engine aeroplanes to meet the flight time requirements of FCL.210.A(a). Have completed in a single engine aeroplane that is not a microlight: • Dual as required by the training organisation, as set out in the training needs assessment report; • The 10 hours supervised solo required by FCL.210.A (a)(2), including at least 5 hours of solo cross-country, with at least 1 flight of at least 270km (150nm) during which full stop landings at 2 aerodromes different from the aerodrome of departure; and • The PPL(A) skill test.	If possible, request a copy of the applicants training records from the previous training organisation(s). Conduct a pre-course assessment flight to establish how much flight training the applicant will require. Set out the estimated training required in a training need assessment report for the applicant. Retain a record of this report with the applicant's training records. When satisfied as to the competence of the applicant, recommend for PPL(A) Skill Test.

	Pass the FRTOL practical examination for issue of the Flight Radio Telephony Operators Licence (FRTOL). Possess English Language Proficiency to at least Operational Level.

*This could include flight time obtained in a third country registered aircraft where the applicant either does not hold a licence or does not meet the experience requirements (100 hours on aeroplanes) for licence conversion under UK Regulation (EU) No 2020/723 (Acceptance of Third Country Certification of Pilots).

Consultation Question 8

Do you agree with our proposed GM to the revised FCL.210.A regarding crediting previous aeroplane experience towards the PPL(A)?

Yes No No view/don't know

Please enter any comments you may have

[new] AMC2 FCL.210.A PPL(A)(b) – Experience requirements and crediting

Where an Approved Training Organisation (ATO) wishes to offer a PPL(A) course with a minimum flight experience of at least 35 hours, they should discuss the requirements with their allocated inspector.

The training organisation, will need to consider the following points:

- The ATO will need to apply for the additional approval.
- The course will need to be approved and detailed in the ATOs training manual.
- The training course shall include a continuous evaluation process of the training syllabus and a continuous assessment of the applicant following the syllabus. Evaluation shall ensure that:
    - the competencies and related assessment are relevant to a PPL(A);
    - the applicant acquires the necessary competencies in a progressive and satisfactory manner.
    - the applicant must cover all exercises of the PPL(A) syllabus as set out in AMC 1 FCL.210 and FCL.215.
    - where the applicant is not meeting the necessary standards and competencies, the training organisation should set out a recovery programme that will bring the applicant back in line with the standards and competencies.
- The training course should include a breakdown of flight and theoretical knowledge instruction, presented in a week-by-week or phase layout, a list of standard exercises and a syllabus summary.
- The training organisation must comply with FCL.030(b).

Consultation Question 9

Do you agree with our proposed AMC to facilitate a 35-hour PPL(A) course?

Yes No No view/don’t know

Please enter any comments you may have.

Chapter 2

Differences training

FCL.710 Class and type ratings – variants

2.1 We have recommended a change to FCL.705 in our OID that provides for holders of a Single Engine Piston (SEP) rating to fly an electric aircraft, subject to appropriate differences training under FCL.710. To give guidance on this training, additional GM to FCL.710 is proposed.

2.2 We also proposed to include additional GM to FCL.710, based on training guidance previously published in CAP 804. This will provide more guidance to instructors on a variety of aircraft features and equipment.

GM1 FCL.710 Class and type ratings – variants

DIFFERENCES TRAINING AND FAMILIARISATION ~~TRAINING~~

Reference should be made to the Type Rating and Endorsement lists for establishing variants that require either differences training or familiarisation.

(a) Differences training requires the acquisition of additional knowledge and training on an appropriate training device or the aircraft.

(b) Familiarisation training requires the acquisition of additional knowledge.

[New] GM2 FCL.710 Class and type ratings – variants

Variable Pitch (VP) Propellers

Instruction in this GM is applicable to pilots converting from SEP aeroplanes with fixed pitch propellers to SEP or MEP aeroplanes with VP propellers and constant speed units (CSU). The system on some older types may not include a CSU and instructors must ensure that all system differences and handling techniques, introduced by the new type, are properly covered in the training given. Differences Training completed, for this section, on an SEP aeroplane, does not provide equivalent qualification on MEP aeroplanes.

Theoretical knowledge training should include:

- Principle of operation and effect on performance;
- System construction and function;
- Propeller system limitations;
- Engine limitations and instrumentation.

Practical training should include operation of throttle, mixture and propeller controls, including pre-flight checks and normal handling during:

- Start up and taxi
- Take-off and climb;
- Cruise at various power settings and speeds;
- Low speed handling and stall/spin recovery;
- Approach and go-around;
- Landing and shut down.

In-flight failures, within the propeller system, including:

- Loss of oil pressure;
- Loss of governor control;
- Overspeed;
- Underspeed.

Emergency handling, during:

- Engine failure after take-off/go-around;
- Engine failure during other phases of flight, including approach and landing;
- Effect of engine failure on glide performance.

Emergency Handling Considerations for Multi-Engine Aeroplanes:

- Engine failures after take-off including propeller feathering and effect of wind-mill drag;
- Circuit and approach with one or more engines inoperative;
- Go-around with one or more engines inoperative;
- Landing with one or more engines inoperative.

Retractable Undercarriage

Differences Training completed, for this section, on an SEP aeroplane, does not provide equivalent qualification on MEP aeroplanes:

- Principle and effect on performance;
- System construction and function; • Limitations – raising, lowering and extended. Operation including pre-flight checks and normal handling:
- After take-off;
- On approach/go-around and landing.

In-flight system failures and emergency lowering. Operation of undercarriage during:

- Engine failure after take-off/go-around (Emergency raising – as applicable to type);
- Engine failure during other phases of flight, including approach and landing.
- Effect on glide performance. Considerations for MEP Aeroplanes:
- Effect on performance – one or more engines inoperative.
- Handling during approach and landing/go-around with one or more engines inoperative.
- Effect on engine out allowance and landing committal height.

Turbo/Supercharged Engine(s)

Differences Training completed, for this section, on a SEP aeroplane, does not provide equivalent qualification on MEP Aeroplanes:

- Principle and effect on performance, including cruise altitude;
- System construction and function;
- Engine limitations and instrumentation. Engine handling including pre-flight checks and normal operation during:
- Start up and taxi
- Take-off and climb;
- Cruise at various power settings and speeds;
- Low speed handling and stall/spin recovery;
- Approach and go-around;
- Landing and shut down.
- In-flight failures and emergency handling;
- Single-Engine Stabilising Altitude (ME only).

Cabin Pressurisation and Oxygen Systems

Differences Training completed, for this section, on an SEP aeroplane, does not provide equivalent qualification on MEP aeroplanes:

- Principle and effect on performance;
- Construction;
- System function including associated environmental heating and air conditioning systems;
- Oxygen system - storage capacity, pre-flight checks, system function (passengers and crew);
- Systems Limitations;

- Human Limitations including hypoxia and period of useful consciousness.
- Operations at high altitude including:
- Airspace classification;
- Licence and rating privileges;
- Rules of the Air;
- Weather;
- Air Navigation (RNP).
- Normal operation including pre-flight checks, setting and monitoring during:
- Take-off and climb;
- Cruise;
- Descent;
- Approach and Landing.
- In-flight failures and emergency handling including:
- Use of oxygen;
- Emergency descent including terrain and ATC considerations;
- Single Engine Stabilising Altitude (ME only).

Tail Wheel

Differences Training completed, for this section, on an SEP aeroplane, does not provide equivalent qualification on MEP aeroplanes:

- Physical differences;
- Loading and Effect of CG Position.
- Dynamic differences and handling during:
- Ground handling;
- Starting and taxi
- Taking-off;
- Engine failure during take-off;
- Landings including 2-point “Wheelers” and 3-point landings (as applicable to type);
- Crosswind operations;
- Parking and mooring.
- Landing and ground handling with one or more engines inoperative (ME only).

Single Lever Power Control (SLPC) Aeroplanes

Differences training, for this section, on a single-engine aeroplane does not provide equivalent qualification on multi-engine aeroplanes. Engine and Ancillaries

- Principles, construction and function
- Engine and ancillaries
    - Gearbox
    - Turbo/super chargers
    - Lubrication, oil type, checking and topping up
    - Cooling – coolant type, checking and topping up Propeller
    - Propeller principles
    - Constant Speed Unit (CSU) and governor
    - Care of prop. and ground handling System monitoring and control
- Fuel system
    - Use of ground power units Fuel System
    - Fuel quantity distribution and selections
    - Fuel consumption
    - Fuel Labelling
    - Re-fuelling supervision Loading and Performance
    - Fuel consumption and endurance
- Electrical and monitoring systems
    - FADEC / Engine Control Unit (ECU)
    - Standby/manual over-ride power control (if applicable)
    - Engine information displays
    - Power control lever, FADEC and ECU integration
    - Auxiliary system displays
    - Annunciator panels, caution and warning systems Electrical System
    - Electrical system layout, voltage and limitations
    - Alternator system
    - Battery capacity
    - Circuit breakers
    - Distribution, bus bars and switching.
- Normal and abnormal operations
    - Aircraft loading differences. Mass and balance

  - Take off and Climb Performance
  - Cruise performance
  - Landing performance
  - Starting and shutting down
  - Fire and Emergency handling
  - Use of standby / manual over-ride power controls (if applicable)
- Review of Pilots' Operating Handbook or Flight Manual.

Converting from SLPC Aeroplanes;

Differences training, for this section, on a single-engine aeroplane does not provide equivalent qualification on multi-engine aeroplanes.

- Principles, construction and function
- Engine and ancillaries
  - Fuel system
  - Theory and need for manual mixture control
  - Theory of magneto ignition – where applicable
  - Engine cooling Operation and Engine Handling
- Engine controls and instrumentation
  - Power control indications
  - Carburettor heat/alternate air control – where applicable
  - Theory of carburettor icing
  - Mixture control
  - Ignition system
  - Fixed pitch propeller theory
- Normal and abnormal operations
  - Mass and balance
  - Performance
  - Range and endurance
  - Pre-flight inspection
  - Starting and taxi
  - Power and function checks
  - Take-off and climb
  - Cruise, including fuel system handling and fuel consumption

- Use of carburettor heat control
- Mixture leaning using mixture control
- Engine handling during descent, approach and landing
- Shutdown Limitations
- System limitations for despatch
- Operating limitations during flight
- Considerations for shutdown In-Flight Failures and Emergency Handling
- Engine failures including memory and checklist items
- Engine overspeed in descent
- Engine fire on the ground / in the air
- Other emergency checklist procedures.

Electronic Flight Instruments System (EFIS)

Airborne training in the use of Integrated EFIS demands considerable attention of both instructor and pilot, often at the expense of lookout and flight safety. It is recommended, therefore, that this training be carried out with an appropriate Part Task Trainer, FNPT or other STD. In any event, maximum use should be made of any available videos, manufacturers' or agents' computer based training aids and programmes. More guidance is in GM 3 FCL.710.

System overview

- System components and sub-systems
- Sub-systems arrangement and inputs – including (but not limited to;
- Pitot/Static and Air Data Computer (ADC)
- Compass and magnetometer
- Attitude and Heading Reference System (AHRS)
- Avionics computer(s)
- Power supply
- Sub-system principles, construction and limitations System Function
- Instruments
- Main and alternative power supplies
- System electrical demands
- Communication radios and audio panel
- Transponder
- VHF navigation Radios

- GPS and RNAV functionality and approval status
- ADF and DME installations
- Autopilot and flight director
- Traffic information systems
- Terrain data systems
- Weather radar and data-link systems

Normal and abnormal operations

- Switching on, system initialisation and alignment
- Test modes and function
- Cautions and warnings system and display
- Display brightness and control
- Display modes, layout and available information
- Flight instruments display
- Engine Instruments
- Use of communications radios,
- Use of transponder system, altitude encoding and traffic information system, aircraft identification (Mode S) and mode of use.
- Use of VHF navigation systems,
- Use of ADF and DME,
- Use of GPS and RNAV functions
- Navigation displays
- Instrument approach operations (for RNAV instrument approach operations see CAP 773)
- Autopilot and Flight Director selection and control functions, Abnormal Operations
- Sub system / system input malfunction
- Screen failure
- Composite, backup or reversionary display function
- Radio failure and emergency operation
- Electrical failures, fire and shut-down
- Flight by reference to standby instruments
- Aircraft system cautions and warnings
- EFIS message advisories.

SE or ME aeroplanes with autopilot and/or electric trim systems

- Normal and abnormal operations of autopilot as per Pilot's Operating Handbook (PH) or Flight Manual (FM) including:
    - Identifying the failure of the autopilot.
    - Maintaining control of the aircraft.
    - Reestablishing situational awareness.
- Normal and abnormal operations of the electric trim as per Pilot's Operating Handbook (PH) or Flight Manual (FM) including:
    - Identifying the failure of the electric trim.
    - Maintaining control of the aircraft.
    - Identifying the means to disconnecting the electric trim in the case of a trim runaway.
    - For more information see CAP 1774 Handling a Trim Runaway.

SEP Class Rating to fly a single centric propulsion unit of electric power or combination of electric and internal combustion power

Theoretical knowledge

This can be delivered through classroom-based briefing or using an online training package.

The training should cover –

- Battery basics, including high voltage batteries.
- Cooling system
- Electric motor/engine
- System monitoring health and state of charge.
- Pre-flight inspection
- Pre-flight planning including mass and balance and endurance calculations.
- Limitations, including airspeed and operational limits.
- Emergencies on the ground and in the flight and use of emergency checklist.
    - Engine over temperature,
    - Battery overtemperature,
    - Loss of direction control,
    - Battery fire.

- Battery disconnection from motor/engine,
- Engine coolant pump failure,
- Battery coolant pump failure,
- Full power loss,
- Loss system monitoring display.

- Charging and storage.

Flight training

This should be based on the normal and emergency operations as per the Pilot's Operating Handbook or Flight Manual or equivalent document.

The flight training should cover –

- Principle of operation and effect on performance.
- System construction and function.
- Battery system limitations.
- Motor/Engine limitations and instrumentation.
- Pre-flight checks.
- Start up and taxi.
- Take-off and climb.
- Cruise at various power settings and speeds.
- Inflight energy management (both State of Charge and Battery Health)
- Enroute decision making and point of no return (PNR).
- Low speed handling and stall/spin recovery.
- Approach and go-around.
- Landing and shut down.
- Parking, securing and recharging.
- Emergencies on the ground and in the flight and use of emergency checklist which should cover:
  - Engine over temperature,
  - Battery overtemperature,
  - Loss of directional control,
  - Battery fire.

- Battery disconnection from motor/engine,
- Engine coolant pump failure,
- Battery coolant pump failure,
- Full power loss,
- Loss of display for battery and motor monitoring system.
- Low state of battery charge.
- Low state of battery health.
- Understanding of all notification, warning and alerting messages on monitoring system.
- Any other abnormal operation as specified by the Flight Manual or Pilots Operating Handbook.

Aircraft described in para (e) of the Basic Regulation (microlight aeroplanes)

Article 150 of the UK Air Navigation Order 2016 ("the Order") permits the holder of a Part-FCL licence with a valid Single Engine Piston (SEP) to fly a microlight aeroplane, subject to appropriate differences training. Schedule 8 of the Order contains the applicable requirements.

Variants within a type or class rating

- Weight and loading – normal, utility and aerobatic load categories;
- Take-off and climb performance;
- Cruise performance; • Landing performance;
- Speeds for normal operation; • Speeds for emergency operation;
- Airframe limitations;
- Manoeuvre imitations and aerobatics;
- Spinning;
- Stall/Spin warning for protection systems;
- Fuel system;
- Engine systems and instrumentation;
- Undercarriage system;
- Electrical system (DC and AC);
- Cabin and environmental system (including pressurisation);
- Cockpit and cabin oxygen systems;

- Caution and warning annunciator system;
- Flight instrumentation;
- EFIS and navigation systems;
- Autopilot and trim system including pre-flight checks;
- Other systems including pneumatic, vacuum and hydraulic;
- Aerodynamic controls and handling characteristics;
- Engine handling;
- Flaps and lift/drag augmentation;
- Other systems particular to type;
- Emergency procedures.

New GM3 FCL.710 Class and type ratings – variants

Differences training in Single Pilot aeroplanes with Electronic flight instrumentations systems (EFIS)

Increasingly, single-pilot aircraft are being fitted with digital Electronic Flight Instrumentation Systems (EFIS) consisting of electronic 'glass instruments' and integrated digital avionics displays of widely varying complexity and capability. These systems present a significant change from conventional, mechanical flight instruments in the way the information is presented and the interpretation of these systems requires a thorough understanding by the pilot.

For the purposes of this requirement, an EFIS display requiring differences training is an electronic presentation of the primary flight instruments that presents gyroscopic instrument, pressure instrument and navigation information that is used by the pilot as a primary reference for control of the aircraft in flight.

Differences training requires both theoretical knowledge and training on an appropriate training device or an aeroplane. The instructors and training providers who may give the training are detailed in subsequent paragraphs.

Pilots converting to an EFIS equipped aeroplane for the first time, within the Single Engine Piston Class Rating, are required to complete differences training to the satisfaction of an appropriately qualified Class or Instrument Rating Instructor or Flight Instructor.

Pilots converting to another EFIS equipped aeroplane within the privileges of other type or class ratings are strongly advised to complete similar differences training. When converting either to or from EFIS within a single-pilot type rating, pilots should attend a Training Organisation approved to conduct type-rating training courses on the particular aircraft type and variant.

Converting between different EFIS installations

Pilots converting to another Integrated EFIS display should obtain further differences training, whether or not the same manufacturer produces the new system. Familiarisation training should be sufficient for FIs or CRI/TRIs who are fully qualified to teach all applied instrument flying and who are already trained on another Integrated EFIS system.

Converting from EFIS to Mechanical Instruments

Pilots trained in using Integrated EFIS displays but not trained on mechanical flight instruments, are likely to have established a scan pattern quite different from the techniques required by a conventional, mechanical instrument layout. These pilots are strongly advised to obtain differences training on conventional instruments, including selective radial scan techniques, before flying an aircraft with conventional mechanical instrumentation. EFIS can provide very precise information, which requires little interpretation, as opposed to conventional instrument displays, which require considerable interpretation and different scan techniques. A key element in this type of training, on whatever system, is ensuring the pilot fully understands what information is available, what is being displayed and how to interpret the display correctly.

Consultation Question 10

Please enter any comments you may have on the proposed GM for differences training.

Chapter 3

Revalidation of single engine class ratings

FCL.740.A Revalidation of class and type ratings – aeroplanes

3.1 FCL.740.A applies the requirements for the revalidation of single engine class ratings, including the flight experience requirements for the Single Engine Piston (SEP) and Touring Motor Glider (TMG) ratings.

3.2 Our OID proposes to amend FCL.740.A such that:

- Six hours of flight time may be flown the first year of rating validity; and
- The hour of refresher training may be completed at any point during the validity period of the rating.

3.3 We propose to expand the guidance in AMC and GM to instructors on how to conduct the hour of refresher training towards the revalidation of the SEP or TMG rating.

AMC1 FCL.740.A(b)(1)(ii) Revalidation of class and type ratings[1]

(a) ~~Training flight items should be based on the exercise items of the proficiency check, as deemed relevant by the instructor, and depending on the experience of the candidate.~~ Before the training takes place, ~~The briefing~~ the instructor should hold a briefing with the candidate. That briefing should include a discussion on the following:

(1) TEM with special emphasis on decision-making when encountering adverse meteorological conditions or unintentional IMC~~,~~;

(2) ~~as well as on~~ navigation flight techniques ~~capabilities.~~;

(3) recovery strategies for different stall scenarios.

(b) Flight training items should be based on the exercise items of the proficiency check, as deemed relevant by the instructor, and depending on the experience of the candidate. In any case, the flight training items should include exercises related to the recognition of and the recovery from the following scenarios:

(1) simulated loss or partial loss of engine power during different phases of flight;

(2) selection of different stall scenarios (as specified in Exercise 2.3 of the table in point (5) of Section B of Appendix 9).

[1] Based on EASA text from Opinion No 05/2023 - Cruise relief co-pilots | Regular update of flight crew licensing and medical requirements | Better flight crew licensing requirements for general aviation | EASA (europa.eu)

[new] GM1 FCL.740.A Revalidation of class and type ratings – aeroplanes

It is recommended that during the pre-flight briefing before refresher training or a proficiency check in accordance with point FCL.740.A with the pilot, the instructor or examiner, as applicable, includes elements to raise the pilot's safety awareness.

This part of the briefing (safety awareness briefing) should have a duration of at least 15 minutes to allow discussions on several safety issues, referring to accidents and incidents in general or risks specifically related to the type of flights usually undertaken by the pilot.

Threat and error management (TEM) should be promoted as an effective mitigation, including the illustration of the practical application of TEM using real-life examples. There is no restriction on the subjects that could be covered. It may range from weather-related issues to personal or passenger induced pressure. The material that can be used to support this briefing could come from accident & incident reports, mandatory or voluntary safety reporting, safety campaigns of different sources as well as from personal experience.

The following is a suggested list of topics which could be included in refresher training.

An effective teaching aid is to set up scenarios that will help the pilot relate to real flying world issues, including emergencies and how to handle them successfully.

Ground and pre-flight briefing

- Check the pilot's licence, medical certificate or declaration, identification and personnel log (book)(s).
- Talk through the revalidation requirements and the purpose for the flight and the necessary standards expected of the pilot.
- Selection of flight exercises, considering previous revalidation flights and the experience of the pilot.
- Discuss pilot health before the flight, highlighting the I AM SAFE checklist.
- Check the pilot knows where to find relevant information such as aerodrome information, NOTAM's, weather and airworthiness state of the aircraft.
- The pilot should use an approved checklist when conducting the pre-flight inspection.
- Ensure that pilot has conducted a mass, balance and performance calculation for the intended flight.
- Discuss the use of threat and error management and how it can help when managing the flight. For example, ask them about any potential threats to their safety during their flight with you and how they can be mitigated.
- Discuss the enroute planning for the flight and what measures the pilot uses to reduce the likelihood of airspace infringements, for example the 'Take 2 initiative'.

- Discuss the pilot's flight log, which can be on paper or on a mobile device with a flight planning application. Discuss the limitations of both systems.
- Has the pilot identified all appropriate radio frequencies and frequency monitoring codes which may be needed for the intended flight.
- The pilot can also use mnemonics to help with planning the flight such as:
- PAVE checklist:
    - Pilot – relevant experience, fitness to fly (I'm safe).
    - Aircraft – airworthiness, defects and limitations.
    - Environment – weather, aerodrome and terrain.
    - External pressures – time pressure, delays, weather, passengers
- WANT checklist:
    - Weather,
    - Aircraft,
    - NOTAM's
    - Threats.
- I'M SAFE checklist:
    - Illness,
    - Medication,
    - Stress,
    - Alcohol,
    - Fatigue
    - Eating.

Departure and leaving the circuit

- Ensure the pilot uses an appropriate checklist for all preflight, start up and pre-departure checks.
- Monitor the pilot's radiotelephony to ensure the correct terminology is being used.
- Make sure the pilot has an up to date aerodrome chart (if available) and aeronautical chart for the area of the intended flight.
- Make sure the pilot is aware of any potential runway incursion 'hot-spots' on the aerodrome.
- Make sure the pilot has received an appropriate clearance (if applicable) before entering the runway.
- Make sure the pilot has checked the approach is clear before entering the runway.
- Discuss the benefits of a pre-departure and eventualities briefing before commencing the take-off run.

- Discuss with the pilot, a potential rejected take-off point on the runway.
- Ensuring the pilot is aware of the appropriate speeds for take-off, maintains directional control of the aeroplane and monitors engine temperatures and pressures when full power is applied for the take-off run.
- Ensure the pilot maintains a good lookout during the take-off climb, to circuit height.
- Discuss with the pilot possible landing sites in the event of an engine failure after take-off or the possible actions for a partial engine failure after take-off.

Enroute and upper air work

- During the enroute navigation element, ensure the pilot maintains a good look out, even if they are using a system for electronic conspicuity.
- Discuss with the pilot the use of radio navigation aids and the reduction of VORs and NDBs.
- Discuss the actions necessary for a diversion due to worsening weather conditions, closed aerodrome or refused entry into controlled airspace.
- Discuss the actions necessary if the pilot becomes lost or if they lose the use of their mobile device.
- Discuss the use of frequency monitoring codes and other transponder codes.
- It may be useful to do some basic navigation and practice some map reading during the refresher flight. Consider conducting some of this navigation at lower altitudes than the pilot normally flies at.
- Consider practicing the following handling exercises:
    - Steep turns
    - Recovery from a spiral dive
    - Dive to VNE
    - Sideslipping the aeroplane
    - Stall recovery in different configurations and at different flight stages
    - Practice forced landing
    - Managing a partial loss of power
    - Managing a loss of electrical power or electrical fire
    - Managing a loss of the vacuum system (if applicable)
    - Managing an engine fire
    - Managing other scenarios
        - Fuel leak
        - Stuck throttle
        - Loss of carburettor heating
        - Bird strike
        - Aircraft door or panel opening in flight
        - Loss of autopilot (if applicable)
        - Electric trim runaway (if applicable)
        - Communications failure
        - Reduction in visibility and lowering cloud base and the need for the pilot to carry out a 180° turn while sole reference to instruments.
        - Precautionary landing.

Circuit rejoin, approaches and landings

- Returning to the aerodrome, in the circuit and approaches monitor the pilot's radiotelephony to ensure the correct terminology is being used.
- Monitor the pilot's situational awareness, are they rejoining the aerodrome circuit at the correct height and in the correct manner, does the aerodrome use the standard overhead join or an alternative. What is the published circuit height. Have they identified the likely direction of other traffic joining or in the circuit pattern. Is the pilot aware of any noise sensitive areas, near to or within the circuit.
- Does the pilot conduct the appropriate pre-landing checks.
- Have the pilot conduct a sample of the following approaches
    - Normal approach, with flap.
    - Have the pilot conduct a precision (short field) landing.
    - Have the pilot conduct a flapless approach.
    - Have the pilot conduct a glide approach.
    - Have the pilot conduct an approach with other system failures for example radio failure or loss of airspeed indication.
- Have the pilot conduct a go-around, Discuss the departure stall recovery, this can be a surprise for a pilot as the aircraft may have a high nose attitude, full power and low airspeed.
- Consider the options for an engine failure after take-off (EFATO).
- Consider the options for a partial loss of power during the take-off.
- Monitor the pilot's speed and height control, ensuring that the aircraft is appropriately trimmed.
- Monitor the pilot's use of approach path indicators (APAPI or PAPI).
- Taxiing back to the parking area and ensure shut down checks are completed.
- Ensure the aircraft is safely parked and secure.
- Ensure appropriate aircraft documentation is completed.
- It is appreciated that not all these handling exercises, discussion and consideration will be achieved in one hour. This information is to assist pilots and instructors to develop a series of refresher training flights to build up a pilot's competence.

Post flight debrief and administration

- Debriefing the outcome of the flight, it may be easier to address any questions while still in the aircraft.
- Before debriefing, the instructor should consult their notes, to ensure they cover all elements of the flight. Remember the refresher training flight is not a Skill Test or Proficiency Check, but if the instructor considers the pilots conduct, behaviours and handling are not to the necessary standard, they can recommend the pilot has further flight training.
- The instructor should conduct a fair and unbiased debriefing of the pilots flying based on identifiable factual items.
- A balance between friendliness and firmness should be maintained. It may be appropriate to use a facilitative style of questioning for the pilot to obtain maximum benefit from the debrief.
- For example:
    - Start with an introduction
    - Avoid dealing with issues chronologically
    - Ask at least two open questions per issue
    - Get the pilot to do the thinking and talking
    - Summarise at the end (it can be useful to get the pilot to summarise).
- The following points should be discussed with the pilot:
    - How to recognise, avoid, mitigate or correct typical errors;
    - Any other points of a less critical nature that were noted during the refresher training flight;
    - Any advice, guidance or further training that might improve the applicant's overall competence.
    - Positive feedback of items and exercises that were well handled and give examples of good resource management, TEM and decision making by the pilot.
- The pilot should enter the details of the flight in their flying log (book). The instructor should counter sign the entry.
- If the instructor considers that the pilot requires further flight training to achieve the necessary standard, then the instructor does not need to complete the revalidation of the pilot's class rating endorsed on the Certificate of Revalidation within the licence.
- If the pilot meets all the revalidation requirements and the instructor considers the pilot has achieved the necessary standard, the instructor should then complete the revalidation of the pilot's class rating by endorsing the Certificate of Revalidation within the licence with the new validity period.
- The instructor should also complete the appropriate form to notify the CAA of the revalidation of the pilot's class rating.

Consultation Question 11

Do you agree with our proposed AMC1 and GM1 to the revised FCL.740.A?

Yes No No view/don't know

Please enter any comments you may have.

[new] AMC2 FCL.740.A(b)(1)(ii) Revalidation of class and type ratings

- The refresher training flight should normally be conducted as a single flight of at least one hour, for the purpose of refreshing knowledge and skills applicable to the privileges of the rating.
- If due to aircraft or weather-related limitations, it is not practical to conduct a single flight of an hour, the requirements may be satisfied by receiving instruction totalling at least 1 hour over the course of several flights. In this case, the instructor may only certify the training in accordance with FCL.945 after the required flight time has been completed.

Consultation Question 12

Do you agree with our proposed AMC2 to the revised FCL.740.A?

Yes No No view/don't know

Please enter any comments you may have.

[new] AMC3 FCL.740.A(b)(1)(ii) Revalidation of class and type ratings

When combining a proficiency check flight towards revalidating or renewing an Instrument Rating (restricted) or Instrument Metrological Conditions (IMC) rating issued in accordance Article 4 of this regulation with the refresher training applicable to the revalidation by experience of single-pilot single engine class ratings, the examiner should ensure:

- The preflight briefing includes appropriate elements of AMC1 and GM1;
- Some training excises from AMC1 and GM1 are included; and
- The examiner should verify the licence holder's experience complies with FCL.740.(b).

Alternatively, the flight may be combined with a proficiency check to revalidate or renew the applicable class rating.

Consultation Question 13

Do you agree with our proposed AMC3 to the revised FCL.740.A?

Yes No No view/don't know

Please enter any comments you may have.

Chapter 4

Using non-Part 21 aircraft for Part-FCL training

ORA.ATO.135 and DTO.GEN.240

4.1 We are proposing changes in our OID to ORA.ATO.135 and DTO.GEN.240 that would make the requirements for using non-Part 21 aircraft for training towards a Part-FCL licence more proportionate. The change would be the same for both regulations, save that the former applies to Approved Training Organisations (ATO) and the latter to Declared Training Organisations (DTO).

4.2 The draft changes remove the requirement for an individual CAA authorisation and place the emphasis on the relevant Head of Training determining that the aircraft is suitable.

4.3 Please note aircraft flying in accordance with a national permit to fly issued under the Air Navigation Order will still require either an individual or general permission to be used for any commercial purpose, including training when the flight meets the definition of 'commercial operation'.

4.4 Intended replacement to ORA.ATO.135 and DTO.GEN.240:

ORA.ATO.135 / DTO.GEN.240 Training aircraft and FSTDs

(a) Subject to (aa), ~~A~~an ATO [or DTO] ~~shall~~ must use an adequate fleet of training aircraft or FSTDs appropriately equipped for the training course provided. The fleet of aircraft ~~shall~~ must be composed of aircraft that comply with ~~all~~ the requirements defined in Regulation (EU) 2018/1139. ~~Aircraft that fall under points (a), (b), (c) or (d) of Annex I to Regulation (EU) 2018/1139, may be used for training if all of the following conditions are met:~~

~~(1) during an evaluation process the competent authority has confirmed a level of safety comparable to the one defined by all essential requirements laid down in Annex II to Regulation (EU) 2018/1139;~~

~~(2) the competent authority has authorised the use of the aircraft for training in the ATO [or DTO].~~

(aa) An ATO [or DTO] may provide training in an aircraft falling within point 1. (a), (b), (c), (d) or (g) of Annex I to Regulation (EU) 2018/1139, provided that the aircraft has been assessed by the head of training at the ATO [or DTO] as being suitable for the intended instruction, and:

(1) hold a certificate of airworthiness issued in accordance with Annex 8 to the Chicago Convention;

(2) is subject to a permission issued by the CAA in accordance with Article 42(b) of the Air Navigation Order 2016; or

(3) is an aeroplane or TMG used solely for non-commercial flight training involving a registered owner or joint owner of the aircraft, a registered shareholder of a company that owns the aircraft, or the spouse or child of such a registered owner or joint owner.

(…)

4.5 To provide more guidance to training organisations on assessing the safety and suitability of non-Part 21 aircraft, new AMC and GM is proposed to accompany these changes:

AMC2 ORA.ATO.135 / DTO.GEN.240 Training aircraft and FSTDs

When determining suitability of aircraft for the intended training, the Head of Training may rely on available information, personal experience or advice from other qualified instructors familiar with the aircraft type. An assessment flight may be required to verify the type's handling characteristics.

The following criteria should be considered in the suitability assessment:

(i) the aircraft should be safely controllable and manoeuvrable under all anticipated operating conditions, including after failure of one or more propulsion systems;

(ii) the aircraft should allow for a smooth transition from one flight phase to another without requiring exceptional piloting skills, alertness, strength, or workload under any probable operating conditions;

(iii) the aircraft should have sufficient stability to ensure that the demands made on the pilot are not excessive, considering the phase and duration of flight; and

(iv) control forces, flight deck environment, pilot workload, and other human factors (HF) considerations, depending on the phase and duration of flight.

(v) for dual flight training, the aircraft should have dual controls.

The Head of Training should document the suitability assessment.

~~**EVALUATION PROCESS**~~

~~Two cases for the evaluation process of Annex-I aircraft are distinguished:~~

~~(a) Annex-I aircraft that hold an ICAO-level certificate of airworthiness (CoA)~~

(1) To support the evaluation process performed by the competent authority and provide the competent authority with sufficient data related to the aircraft in question, an instructor who is qualified in accordance with Annex I (Part-FCL) to UK Regulation (EU) No 1178/2011 and nominated by the head of training (HT) of the DTO should assess that the aircraft is appropriately equipped and suitable for the training courses provided. The result of this assessment should be submitted to the competent authority and may be included already in the application for the authorisation.

(2) During the evaluation process, the competent authority should consider aircraft that hold a CoA issued in accordance with Annex 8 to the Chicago Convention to provide a level of safety comparable to that required by Annex II to the UK Basic Regulation, unless the competent authority determines that the airworthiness requirements used for certification of the aircraft, or the service experience, or the safety system of the State of design, do not provide for a comparable level of safety.

(b) Annex-I aircraft that do not hold an ICAO-level CoA

Before the inclusion of these aircraft in the fleet of an DTO and their use in training to obtain Part-FCL licences and ratings, the DTO should apply for the authorisation to the competent authority that should perform the evaluation process in the following order:

(1) Initial assessment by the competent authority and criteria taken into consideration

The CAA should take into account the following criteria (non-exhaustive list):

(i) national airworthiness requirements based on which the aircraft CoA was issued;

(ii) aircraft similarities to a certified variant;

(iii) aircraft with a satisfactory in-service experience as training aircraft;

(iv) simple and conventional aircraft design;

(v) aircraft that does not have hazardous design features or details, judging by experience; and

(vi) operable aircraft systems, equipment, and appliances that do not require exceptional skills or strength.

(2) Additional assessment by a qualified instructor

To support the evaluation process performed by the competent authority and provide the competent authority with sufficient data related to the aircraft in question, after the positive initial assessment by the competent authority as per point (1), an instructor who is qualified in accordance with Part-FCL and nominated by the HT of the DTO should show through an evaluation report that the aircraft is appropriately equipped and suitable for the training courses provided. That evaluation report should consider all of the following criteria:

~~(i) the aircraft should be safely controllable and manoeuvrable under all anticipated operating conditions, including after failure of one or more propulsion systems;~~

~~(ii) the aircraft should allow for a smooth transition from one flight phase to another without requiring exceptional piloting skills, alertness, strength, or workload under any probable operating conditions;~~

~~(iii) the aircraft should have sufficient stability to ensure that the demands made on the pilot are not excessive, considering the phase and duration of flight; and~~

~~(iv) the assessment should take into account control forces, flight deck environment, pilot workload, and other human factors (HF) considerations, depending on the phase and duration of flight.~~

~~Subject to a positive evaluation report as per point (2), the CAA should issue the authorisation.~~

[new] GM1 ORA.ATO.135 / GM 2 DTO.GEN.240 Training aircraft and FSTDs

The Head of Training should also consider the following:

(i) Access to all flying and braking controls. (as applicable).
(ii) Access to the engine controls such as throttle, mixture, propeller and carburettor heat controls (as applicable).
(iii) Access to other systems, such as ignition, master switch, other switches, circuit breakers, radio communications and avionics.
(iv) Serviceability of any safety equipment such as seats and seat belts, ballistic recovery parachute, CO monitor, portable location beacon and stall warning device (as applicable).
(v) General condition and airworthiness of the aeroplane or TMG, including ensuring that there is a good external view.
(vi) Ensure the validity of the applicable aircraft documentation such as a valid Certificate of Validity for an aircraft holding a Permit to Fly or Airworthiness Review Certificate for an aircraft with a Certificate of Airworthiness.

The Head of Training should ensure that any instructor(s) providing the flight training on the accepted aeroplane within the SEP or TMG class should have received appropriate standardisation to familiarise themselves with aircraft handling, systems and manufactures Pilots Notes, Pilots Operating Handbook or Flight Manual.

The instructor may also need to complete appropriate differences training on the accepted aeroplane if necessary.

[new] GM2 ORA.ATO.135 / GM3 DTO.GEN.240 Training aircraft and FSTDs

The ATO [or DTO] should verify that the aircraft is in an airworthy condition and complies with the applicable airworthiness requirements.

In the case of an aircraft issued with a national permit to fly in accordance with the Air Navigation Order 2016, the aircraft and intended training must be within the scope of a permission issued under Article 42(b) of the Order, which may be a general permission listed in www.caa.co.uk/ors4.

[new] AMC3 ORA.ATO.135 / DTO.GEN.240 Training aircraft and FSTDs

The aircraft should be equipped in accordance with NCO.IDE.A.145 (first aid kit) and NCO.IDE.170 (emergency locator transmitter or personal locator beacon).

Consultation Question 14

Do you agree with our proposed AMC and GM to the revised DTO.GEN.240 and ORA.ATO.135?

Yes No No view/don't know

Please enter any comments you may have.

Chapter 5

Deleted AMC and GM

Removal of LAPL AMC and GM

5.1 The NPPL(A) will supersede the LAPL(A) as the primary sub-ICAO licence issued by the UK. Existing LAPL(A) licences will remain valid, however from October 2026 they must be revalidated in accordance with FCL.740.A.

5.2 The LAPL(H) will continue to be issued, although the separate syllabus from the PPL(H) will be removed due to only small differences in contents.

5.3 Legacy AMC material relating to the LAPL(S) and LAPL(B), which has been superseded by content in the UK Sailplane Regulation and UK Balloon Regulation, will be removed.

5.4 The following AMC and GM will therefore be deleted:

- AMC1 FCL.115 LAPL(A) training course
- AMC1 FCL.115; FCL.120 training course and theoretical knowledge examination
- AMC1 FCL.125 LAPL – Skill test
- AMC1 FCL.125; FCL.235
- AMC1 FCL.125; FCL.235
- AMC1 FCL.105.A(b)(2) privileges and conditions;
- AMC1 FCL.140.A; FCL.740.A(b)(1)(ii) Recency and revalidation requirements
- AMC1 FCL.140.A(b)(1) LAPL(A) Recency requirements

Removal of sailplane towing rating

5.5 References to the sailplane towing rating are removed from AMC1 to FCL.805, since this rating is intended to be removed from the Aircrew Regulation.

Consultation Question 15

Please enter any comments you may have on the proposed removal of the AMC/GM listed above.

ANNEX A

NPPL(A) to PPL(A) conversion theoretical knowledge

AMC1 FCL.210; 215 Training course and theoretical knowledge examination

SYLLABUS OF THEORETICAL KNOWLEDGE FOR THE PPL(A) AND PPL(H)

The following tables contain the syllabi for the courses of theoretical knowledge, as well as for the theoretical knowledge examinations for the NPPL(A) to PPL(A), PPL(A) and PPL(H). The training and examination should cover aspects related to non-technical skills in an integrated manner, taking into account the particular risks associated to the licence and the activity.

The ~~DTO or the ATO~~ training organisation responsible for the training should check if all the appropriate elements of the training course of theoretical knowledge instruction have been completed to a satisfactory standard before recommending the applicant for the examination.

The applicable items for each licence are marked with 'x'. An 'x' on the main title of a subject means that all the sub-divisions are applicable. 'x*' in the NPPL to PPL means where the applicant has not already passed the Communications examination.

Subject		Aeroplanes			Helicopters	
		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
1	**Air Law and ATC Procedures**					
	International law: conventions, agreements and organisations					
	The Convention on international civil aviation (Chicago) Doc. 7300/6					

	Part I Air Navigation: relevant parts of the following chapters: (a) general principles and application of the convention; (b) flight over territory of Contracting States; (c) nationality of aircraft; (d) measures to facilitate air navigation; (e) conditions to be fulfilled on aircraft; (f) international standards and recommended practices; (g) validity of endorsed certificates and licences; (h) notification of differences.	X	X		X	
	Part II The International Civil Aviation Organisation (ICAO): objectives and composition	X	X		X	
	Annex 8 Airworthiness of aircraft					
	Foreword and definitions	X	X		X	
	Certificate of Airworthiness	X	X		X	
	Annex 7 Aircraft nationality and registration marks					
	Foreword and definitions	X	X		X	
	Common and registration marks	X	X		X	

	Certificate of registration and aircraft nationality	X	X		X	
	Annex 1 Personnel Licensing					
	Definitions	X	X		X	
	Relevant parts of Annex 1 connected to Part-FCL and Part MED	X	X		X	
	Annex 2 Rules of the Air					
	Essential definitions, applicability of the rules of the air, general rules (except water operations), visual flight rules, signals and interception of civil aircraft	X	X		X	
	Procedures for air navigation: aircraft operations doc. 8168-ops/611, volume 1					
	Altimeter setting procedures (including ICAO doc. 7030 – regional supplementary procedures)					
	Basic requirements (except tables), procedures applicable to operators and pilots (except tables)	X	X		X	
	Secondary surveillance radar transponder operating procedures (including ICAO Doc. 7030 – regional supplementary procedures)					
	Operation of transponders	X	X		X	
	Phraseology	X	X		X	

	Annex 11: Doc. 4444 air traffic management					
	Definitions	X	X		X	
	General provisions for air traffic services	X	X		X	
	Visual separation in the vicinity of aerodromes	X	X		X	
	Procedures for aerodrome control service	X	X		X	
	Radar services	X	X		X	
	Flight information service and alerting service	X	X		X	
	Procedures related to emergencies, communication failure and contingencies	X	X		X	
	Annex 15: Aeronautical information service					
	Introduction, essential definitions	X	X		X	
	AIP, NOTAM, AIRAC and AIC	X	X		X	
	Annex 14, volume 1 and 2: Aerodromes					
	Definitions	X	X		X	
	Aerodrome data: conditions of the movement area and related facilities	X	X		X	
	Visual aids for navigation: (a) indicators and signalling devices;	X	X		X	

	(b) markings; (c) lights; (d) signs; (e) markers					
	Visual aids for denoting obstacles: (a) marking of objects; (b) lighting of objects.	X	X		X	
	Visual aids for denoting restricted use of areas	X	X		X	
	Emergency and other services: (a) rescue and fire fighting; (b) apron management service.	X	X		X	
	Annex 12: Search and rescue					
	Essential definitions	X	X		X	
	Operating procedures: (a) procedures for PIC at the scene of an accident; (b) procedures for PIC intercepting a distress transmission; (c) search and rescue signals.	X	X		X	
	Search and rescue signals:	X	X		X	

	(a) signals with surface craft; (b) ground or air visual signal code; (c) air or ground signals.					
	Annex 17: Security					
	General: aims and objectives	X	X		X	
	Annex 13: Aircraft accident investigation					
	Essential definitions	X	X		X	
	Applicability	X	X		X	
	National law	X			X	
	National law and differences to relevant ICAO Annexes and relevant assimilated law.	X			X	

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
2	**HUMAN PERFORMANCE**					
	Human factors: basic concepts					
	Human factors in aviation					
	Becoming a competent pilot	X			X	

	Basic aviation physiology and health maintenance					
	The atmosphere: (a) composition; (b) gas laws.	X			X	
	Respiratory and circulatory systems: (a) oxygen requirement of tissues; (b) functional anatomy; (c) main forms of hypoxia (hypoxic and anaemic): (1) sources, effects and countermeasures of carbon monoxide; (2) counter measures and hypoxia; (3) symptoms of hypoxia. (d) hyperventilation; (e) the effects of accelerations on the circulatory system; (f) hypertension and coronary heart disease.	X			X	
	Man and environment					
	Central, peripheral and autonomic nervous systems	X			X	
	Vision: (a) functional anatomy;	X			X	

	(b) visual field, foveal and peripheral vision; (c) binocular and monocular vision; (d) monocular vision cues; (e) night vision; (f) visual scanning and detection techniques and importance of 'look-out'; (g) defective vision.					
	Hearing: (a) descriptive and functional anatomy; (b) flight related hazards to hearing; (c) hearing loss.	X			X	
	Equilibrium: (a) functional anatomy; (b) motion and acceleration; (c) motion sickness.	X			X	
	Integration of sensory inputs: (a) spatial disorientation: forms, recognition and avoidance; (b) illusions: forms, recognition and avoidance: (1) physical origin;	X			X	

	(2) physiological origin; (3) psychological origin. (c) approach and landing problems.					
	Health and hygiene					
	Personal hygiene: personal fitness	X			X	
	Body rhythm and sleep: (a) rhythm disturbances; (b) symptoms, effects and management.	X			X	
	Problem areas for pilots: (a) common minor ailments including cold, influenza and gastro-intestinal upset; (b) entrapped gases and barotrauma, (scuba diving); (c) obesity; (d) food hygiene; (e) infectious diseases; (f) nutrition; (g) various toxic gases and materials.	X			X	
	Intoxication:	X			X	
	(a) prescribed medication;	X			X	

	(b) tobacco; (c) alcohol and drugs; (d) caffeine; (e) self-medication.					
	Basic aviation psychology					
	Human information processing					
	Attention and vigilance: (a) selectivity of attention; (b) divided attention.	X			X	
	Perception: (a) perceptual illusions; (b) subjectivity of perception; (c) processes of perception.	X			X	
	Memory: (a) sensory memory; (b) working or short term memory; (c) long term memory to include motor memory (skills).	X			X	
	Human error and reliability					

	Reliability of human behaviour	X			X	
	Error generation: social environment (group, organisation)					
	Decision making					
	Decision-making concepts: (a) structure (phases); (b) limits; (c) risk assessment; (d) practical application.	X			X	
	Avoiding and managing errors: cockpit management					
	Safety awareness: (a) risk area awareness; (b) situational awareness.	X			X	
	Communication: verbal and non-verbal communication	X			X	
	Human behaviour					
	Personality and attitudes: (a) development; (b) environmental influences.	X			X	
	Identification of hazardous attitudes (error proneness)	X			X	

	Human overload and underload					
	Arousal	X			X	
	Stress: (a) definition(s); (b) anxiety and stress; (c) effects of stress.	X			X	
	Fatigue and stress management: (a) types, causes and symptoms of fatigue; (b) effects of fatigue; (c) coping strategies; (d) management techniques; (e) health and fitness programmes;	X			X	

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
3	**METEOROLOGY**					
	The atmosphere					

	Composition, extent and vertical division					
	Structure of the atmosphere Troposphere	X			X	
	Air temperature					
	Definition and units Vertical distribution of temperature Transfer of heat Lapse rates, stability and instability Development of inversions and types of inversions	X			X	
	Temperature near the earth's surface, surface effects, diurnal and seasonal variation, effect of clouds and effect of wind	X			X	
	Atmospheric pressure					
	Barometric pressure and isobars	X			X	
	Pressure variation with height Reduction of pressure to mean sea level Relationship between surface pressure centres and pressure centres aloft	X			X	
	Air density					

	Relationship between pressure, temperature and density	X			X	
	ISA	X			X	
	ICAO standard atmosphere					
	Altimetry					
	Terminology and definitions	X			X	
	Altimeter and altimeter settings	X			X	
	Calculations	X			X	
	Effect of accelerated airflow due to topography	X			X	
	Wind					
	Definition and measurement of wind					
	Definition and measurement	X			X	
	Primary cause of wind					
	Primary cause of wind, pressure gradient, Coriolis force and gradient wind	X			X	
	Variation of wind in the friction layer	X			X	
	Effects of convergence and divergence	X			X	
	General global circulation					

	General circulation around the globe	X			X	
	Local winds					
	Anabatic and katabatic winds, mountain and valley winds, Venturi effects, land and sea breezes	X			X	
	Mountain waves (standing waves, lee waves)					
	Origin and characteristics	X			X	
	Turbulence					
	Description and types of turbulence	X			X	
	Formation and location of turbulence	X			X	
	THERMODYNAMICS					
	Humidity					
	Water vapour in the atmosphere	X			X	
	Mixing ratio	X			X	
	Temperature/dew point, relative humidity	X				
	Change of state of aggregation					
	Condensation, evaporation, sublimation, freezing and melting, latent heat	X			X	

	Adiabatic processes					
	Adiabatic processes, stability of the atmosphere	X			X	
	CLOUDS AND FOG					
	Cloud formation and description					
	Cooling by adiabatic expansion and by advection	X			X	
	Cloud types and cloud classification	X			X	
	Influence of inversions on cloud development	X			X	
	Fog, mist, haze					
	General aspects	X			X	
	Radiation fog	X			X	
	Advection fog	X			X	
	Steaming fog	X			X	
	Frontal fog	X			X	
	Orographic fog (hill fog)	X			X	
	PRECIPITATION					
	Development of precipitation					

	Processes of development of precipitation	X			X	
	Types of precipitation					
	Types of precipitation, relationship with cloud types	X			X	
	AIR MASSES AND FRONTS					
	Air masses					
	Description, classification and source regions of air masses	X			X	
	Modifications of air masses	X			X	
	Fronts					
	General aspects	X			X	
	Warm front, associated clouds, and weather	X			X	
	Cold front, associated clouds, and weather	X			X	
	Warm sector, associated clouds, and weather	X			X	
	Weather behind the cold front	X			X	
	Occlusions, associated clouds, and weather	X			X	
	Stationary front, associated clouds, and weather	X			X	
	Movement of fronts and pressure systems, life cycle	X			X	

	Changes of meteorological elements at a frontal wave	X			X	
	PRESSURE SYSTEMS					
	Anticyclone					
	Anticyclones, types, general properties, cold and warm anticyclones, ridges and wedges, subsidence	X			X	
	Non-frontal depressions					
	Thermal, orographic and polar depressions, troughs	X			X	
	CLIMATOLOGY					
	Climatic zones					
	General seasonal circulation in the troposphere	X			X	
	Typical weather situations in the mid-latitudes					
	Westerly situation	X			X	
	High-pressure area	X			X	
	Flat-pressure pattern	X			X	
	Local winds and associated weather					
	e.g. Foehn	X			X	
	FLIGHT HAZARDS					

	Icing					
	Conditions for ice accretion	X			X	
	Types of ice accretion	X			X	
	Hazards of ice accretion, avoidance	X			X	
	Turbulence					
	Effects on flight, avoidance	X			X	
	Wind shear					
	Definition of wind shear	X			X	
	Weather conditions for wind shear	X			X	
	Effects on flight, avoidance	X			X	
	Thunderstorms					
	Conditions for, and process of, development, forecast, location, type specification	X			X	
	Structure of thunderstorms, life cycle, squall lines, electricity in the atmosphere, static charges	X			X	
	Electrical discharges	X			X	
	Development and effects of downbursts	X			X	

	Thunderstorm avoidance	X			X	
	Inversions					
	Influence on aircraft performance	X			X	
	Hazards in mountainous areas					
	Influence of terrain on clouds and precipitation, frontal passage	X			X	
	Vertical movements, mountain waves, wind shear, turbulence, ice accretion	X			X	
	Development and effect of valley inversions	X			X	
	Visibility-reducing phenomena					
	Reduction of visibility caused by precipitation and obscuration	X			X	
	Reduction of visibility caused by other phenomena	X			X	
	METEOROLOGICAL INFORMATION					
	Observation					
	Surface observations	X			X	
	Radiosonde observations	X			X	
	Satellite observations	X			X	
	Weather radar observations	X			X	

	Aircraft observations and reporting	X			X	
	Weather charts					
	Significant weather charts	X			X	
	Surface charts	X			X	
	Information for flight planning					
	Aviation weather messages	X			X	
	Meteorological broadcasts for aviation	X			X	
	Use of meteorological documents	X			X	
	Meteorological warnings	X			X	
	Meteorological services					
	World area forecast system (WAFS) and meteorological offices	X			X	

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
4	**COMMUNICATIONS**					
	VFR COMMUNICATIONS					
	Definitions					

	Meanings and significance of associated terms	X	X*		X	
	ATS abbreviations	X	X*		X	
	Q-code groups commonly used in RTF airground communications	X	X*		X	
	Categories of messages	X	X*		X	
	General operating procedures					
	Transmission of letters	X	X*		X	
	Transmission of numbers (including level information)	X	X*		X	
	Transmission of time	X	X*		X	
	Transmission technique	X	X*		X	
	Standard words and phrases (relevant RTF phraseology included)	X	X*		X	
	R/T call signs for aeronautical stations including use of abbreviated call signs	X	X*		X	
	R/T call signs for aircraft including use of abbreviated call signs	X	X*		X	
	Transfer of communication	X	X*		X	
	Test procedures including readability scale	X	X*		X	
	Read back and acknowledgement requirements	X	X*		X	

	Relevant weather information terms (VFR)	X	X*		X	
	Aerodrome weather	X	X*		X	
	Weather broadcast	X	X*		X	
	Action required to be taken in case of communication failure	X	X*		X	
	Distress and urgency procedures	X	X*		X	
	Distress (definition, frequencies, watch of distress frequencies, distress signal and distress message)	X	X*		X	
	Urgency (definition, frequencies, urgency signal and urgency message)	X	X*		X	
	General principles of VHF propagation and allocation of frequencies	X	X*		X	

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
5	**PRINCIPLES OF FLIGHT**					
	PRINCIPLES OF FLIGHT: AEROPLANE					
	Subsonic aerodynamics					
	Basics concepts, laws and definitions					
	Laws and definitions:	X	X	X		

	(a) conversion of units; (b) Newton´s laws; (c) Bernoulli's equation and venture; (d) static pressure, dynamic pressure and total pressure; (e) density; (f) IAS and TAS.					
	Basics about airflow: (a) streamline; (b) two-dimensional airflow; (c) three-dimensional airflow.	X	X	X		
	Aerodynamic forces on surfaces: (a) resulting airforce; (b) lift; (c) drag; (d) angle of attack.	X	X	X		
	Shape of an aerofoil section: (a) thickness to chord ratio; (b) chord line; (c) camber line;	X	X	X		

	(d) camber; (e) angle of attack.					
	The wing shape: (a) aspect ratio; (b) root chord; (c) tip chord; (d) tapered wings; (e) wing planform.	X	X	X		
	The two-dimensional airflow about an aerofoil					
	Streamline pattern	X	X	X		
	Stagnation point	X	X	X		
	Pressure distribution	X	X	X		
	Centre of pressure	X	X	X		
	Influence of angle of attack	X	X	X		
	Flow separation at high angles of attack	X	X	X		
	The lift – α graph	X	X	X		
	The coefficients					
	The lift coefficient C_l: the lift formula	X	X	X		

	The drag coefficient $C_{d:}$ the drag formula	X	X	X		
	The three-dimensional airflow round a wing and a fuselage					
	Streamline pattern: (a) span-wise flow and causes; (b) tip vortices and angle of attack; (c) upwash and downwash due to tip vortices; (d) wake turbulence behind an aeroplane (causes, distribution and duration of the phenomenon).	X	X	X		
	Induced drag: (a) influence of tip vortices on the angle of attack; (b) the induced local α; (c) influence of induced angle of attack on the direction of the lift vector; (d) induced drag and angle of attack.	X	X	X		
	Drag					
	The parasite drag: (a) pressure drag; (b) interference drag; (c) friction drag.	X	X	X		
	The parasite drag and speed	X	X	X		

	The induced drag and speed	X	X	X		
	The total drag	X	X	X		
	The ground effect					
	Effect on take off and landing characteristics of an aeroplane	X	X	X		
	The stall					
	Flow separation at increasing angles of attack: (a) the boundary layer: (1) laminar layer; (2) turbulent layer; (3) transition. (b) separation point; (c) influence of angle of attack; (d) influence on: (1) pressure distribution; (2) location of centre of pressure; (3) C_L; (4) C_D; (5) pitch moments. (e) buffet;	X	X	X		

	(f) use of controls.					
	The stall speed: (a) in the lift formula; (b) 1g stall speed; (c) influence of: (1) the centre of gravity; (2) power setting; (3) altitude (IAS); (4) wing loading; (5) load factor n: (i) definition; (ii) turns; (iii) forces.	X	X	X		
	The initial stall in span-wise direction: (a) influence of planform; (b) geometric twist (wash out); (c) use of ailerons.	X	X	X		
	Stall warning: (a) importance of stall warning; (b) speed margin;	X	X	X		

	(c) buffet; (d) stall strip; (e) flapper switch; (f) recovery from stall.					
	Special phenomena of stall: (a) the power-on stall; (b) climbing and descending turns; (c) t-tailed aeroplane; (d) avoidance of spins: (1) spin development; (2) spin recognition; (3) spin recovery. (e) ice (in stagnation point and on surface): (1) absence of stall warning; (2) abnormal behaviour of the aircraft during stall.	X	X	X		
	CL augmentation	X	X	X		
	Trailing edge flaps and the reasons for use in take-off and landing: (a) influence on C_L - α-graph; (b) different types of flaps;	X	X	X		

	(c) flap asymmetry; (d) influence on pitch movement.					
	Leading edge devices and the reasons for use in take-off and landing	X	X	X		
	The boundary layer					
	Different types: (a) laminar; (b) turbulent.	X	X	X		
	Special circumstances					
	Ice and other contamination: (a) ice in stagnation point; (b) ice on the surface (frost, snow and clear ice); (c) rain; (d) contamination of the leading edge; (e) effects on stall; (f) effects on loss of controllability; (g) effects on control surface moment; (h) influence on high lift devices during takeoff, landing and low speeds.	X	X	X		
	Stability					

	Condition of equilibrium in steady horizontal flight					
	Precondition for static stability	X	X	X		
	Equilibrium: (a) lift and weight; (b) drag and thrust.	X	X	X		
	Methods of achieving balance					
	Wing and empennage (tail and canard)	X	X	X		
	Control surfaces	X	X	X		
	Ballast or weight trim	X	X	X		
	Static and dynamic longitudinal stability					
	Basics and definitions: (a) static stability, positive, neutral and negative; (b) precondition for dynamic stability; (c) dynamic stability, positive, neutral and negative.	X	X	X		
	Location of centre of gravity: (a) aft limit and minimum stability margin; (b) forward position; (c) effects on static and dynamic stability.	X	X	X		

	Dynamic lateral or directional stability					
	Spiral dive and corrective actions	X	X	X		
	Control					
	General					
	Basics, the three planes and three axis	X	X	X		
	Angle of attack change	X	X	X		
	Pitch control					
	Elevator	X	X	X		
	Downwash effects	X	X	X		
	Location of centre of gravity	X	X	X		
	Yaw control					
	Pedal or rudder	X	X	X		
	Roll control					
	Ailerons: function in different phases of flight	X	X	X		
	Adverse yaw	X	X	X		
	Means to avoid adverse yaw: (a) frise ailerons;	X	X	X		

	(b) differential ailerons deflection.					
	Means to reduce control forces					
	Aerodynamic balance: (a) balance tab and anti-balance tab; (b) servo tab.	X	X	X		
	Mass balance					
	Reasons to balance: means	X	X	X		
	Trimming					
	Reasons to trim	X	X	X		
	Trim tabs	X	X	X		
	Limitations					
	Operating limitations					
	Flutter	X	X	X		
	vfe	X	X	X		
	vno, vne	X	X	X		
	Manoeuvring envelope					
	Manoeuvring load diagram:	X	X	X		

	(a) load factor; (b) accelerated stall speed; (c) v_a; (d) manoeuvring limit load factor or certification category.					
	Contribution of mass	X	X	X		
	Gust envelope					
	Gust load diagram	X	X	X		
	Factors contributing to gust loads	X	X	X		
	Propellers					
	Conversion of engine torque to thrust					
	Meaning of pitch	X	X	X		
	Blade twist	X	X	X		
	Effects of ice on propeller	X	X	X		
	Engine failure or engine stop					
	Windmilling drag	X	X	X		
	Moments due to propeller operation					
	Torque reaction	X	X	X		

	Asymmetric slipstream effect	X	X	X		
	Asymmetric blade effect	X	X	X		
	Flight mechanics					
	Forces acting on an aeroplane					
	Straight horizontal steady flight	X	X	X		
	Straight steady climb	X	X	X		
	Straight steady descent	X	X	X		
	Straight steady glide	X	X	X		
	Steady coordinated turn: (a) bank angle; (b) load factor; (c) turn radius; (d) rate one turn.	X	X	X		
	PRINCIPLES OF FLIGHT: HELICOPTER					
	Subsonic aerodynamics					
	Basic concepts, laws and definitions				X	X
	Conversion of units				X	X

	Definitions and basic concepts about air: (a) the atmosphere and International Standard Atmosphere; (b) density; (c) influence of pressure and temperature on density.				X	X
	Newton's laws: (a) Newton's second law: Momentum equation; (b) Newton's third law: action and reaction.				X	X
	Basic concepts about airflow: (a) steady airflow and unsteady airflow; (b) Bernoulli's equation; (c) static pressure, dynamic pressure, total pressure and stagnation point; (d) TAS and IAS; (e) two-dimensional airflow and three-dimensional airflow; (f) viscosity and boundary layer.				X	X
	Two-dimensional airflow				X	X
	Aerofoil section geometry: (a) aerofoil section; (b) chord line, thickness and thickness to chord ratio of a section;				X	X

	(c) camber line and camber; (d) symmetrical and asymmetrical aerofoils sections.					
	Aerodynamic forces on aerofoil elements: (a) angle of attack; (b) pressure distribution; (c) lift and lift coefficient (d) relation lift coefficient: angle of attack; (e) profile drag and drag coefficient; (f) relation drag coefficient: angle of attack; (g) resulting force, centre of pressure and pitching moment.				X	X
	Stall: (a) boundary layer and reasons for stalling; (b) variation of lift and drag as a function of angle of attack; (c) displacement of the centre of pressure and pitching moment.				X	X
	Disturbances due to profile contamination: (a) ice contamination; (b) ice on the surface (frost, snow and clear ice).				X	X
	The three-dimensional airflow round a wing and a fuselage				X	X

	The wing: (a) planform, rectangular and tapered wings; (b) wing twist.				X	X
	Airflow pattern and influence on lift: (a) span-wise flow on upper and lower surface; (b) tip vortices; (c) span-wise lift distribution.				X	X
	Induced drag: causes and vortices				X	X
	The airflow round a fuselage: (a) components of a fuselage; (b) parasite drag; (c) variation with speed.				X	X
	Transonic aerodynamics and compressibility effects					
	Airflow velocities				X	X
	Airflow speeds: (a) speed of sound; (b) subsonic, high subsonic and supersonic flows.				X	X
	Shock waves: (a) compressibility and shock waves;				X	X

	(b) the reasons for their formation at upstream high subsonic airflow; (c) their effect on lift and drag.					
	Influence of wing planform: sweep-angle				X	X
	Rotorcraft types					
	Rotorcraft				X	X
	Rotorcraft types: (a) autogyro; (b) helicopter.				X	X
	Helicopters				X	X
	Helicopters configurations: the single main rotor helicopter				X	X
	The helicopter, characteristics and associated terminology: (a) general lay-out, fuselage, engine and gearbox; (b) tail rotor, fenestron and NOTAR; (c) engines (reciprocating and turbo shaft engines); (d) power transmission; (e) rotor shaft axis, rotor hub and rotor blades; (f) rotor disc and rotor disc area; (g) teetering rotor (two blades) and rotors with more than two blades;				X	X

	(h) skids and wheels; (i) helicopter axes and fuselage centre line; (j) roll axis, pitch axis and normal or yaw axis; (k) gross mass, gross weight and disc loading.					
	Main rotor aerodynamics					
	Hover flight outside ground effect				X	X
	Airflow through the rotor discs and round the blades: (a) circumferential velocity of the blade sections; (b) induced airflow, through the disc and downstream; (c) downward fuselage drag; (d) equilibrium of rotor thrust, weight and fuselage drag; (e) rotor disc induced power; (f) relative airflow to the blade; (g) pitch angle and angle of attack of a blade section; (h) lift and profile drag on the blade element; (i) resulting lift and thrust on the blade and rotor thrust; (j) collective pitch angle changes and necessity of blade feathering; (k) required total main rotor-torque and rotor-power; (l) influence of the air density.				X	X

	Anti-torque force and tail rotor: (a) force of tail rotor as a function of main rotor-torque; (b) anti-torque rotor power; (c) necessity of blade feathering of tail rotor blades and yaw pedals.				X	X
	Maximum hover altitude OGE: (a) total power required and power available; (b) maximum hover altitude as a function of pressure altitude and OAT.				X	X
	Vertical climb				X	X
	Relative airflow and angles of attack:				X	X
	(a) climb velocity V_C, induced and relative velocity and angle of attack; (b) collective pitch angle and blade feathering.				X	X
	Power and vertical speed: (a) induced power, climb power and profile power; (b) total main rotor power and main rotor torque; (c) tail rotor power; (d) total power requirement in vertical flight.				X	X
	Forward flight				X	X
	Airflow and forces in uniform inflow distribution:				X	X

	(a) assumption of uniform inflow distribution on rotor disc; (b) advancing blade (90°) and retreating blade (270°); (c) airflow velocity relative to the blade sections, area of reverse flow; (d) lift on the advancing and retreating blades at constant pitch angles; (e) necessity of cyclic pitch changes; (f) compressibility effects on the advancing blade tip and speed limitations; (g) high angle of attack on the retreating blade, blade stall and speed limitations; (h) thrust on rotor disc and tilt of thrust vector; (i) vertical component of the thrust vector and gross weight equilibrium; (j) horizontal component of the thrust vector and drag equilibrium.					
	The flare (power flight): (a) thrust reversal and increase in rotor thrust; (b) increase of rotor RPM on non governed rotor.				X	X
	Power and maximum speed: (a) induced power as a function of helicopter speed; (b) rotor profile power as a function of helicopter speed;				X	X

	(c) fuselage drag and parasite power as a function of forward speed; (d) tail rotor power and power ancillary equipment; (e) total power requirement as a function of forward speed; (f) influence of helicopter mass, air density and drag of additional external equipment; (g) translational lift and influence on power required.					
	Hover and forward flight in ground effect				X	X
	Airflow in ground effect and downwash: rotor power decrease as a function of rotor height above the ground at constant helicopter mass				X	X
	Vertical descent				X	X
	Vertical descent, power on: (a) airflow through the rotor, low and moderate descent speeds; (b) vortex ring state, settling with power and consequences.				X	X
	Autorotation: (a) collective lever position after failure; (b) up flow through the rotor, auto-rotation and anti-autorotation rings; (c) tail rotor thrust and yaw control; (d) control of rotor RPM with collective lever;				X	X

	(e) landing after increase of rotor thrust by pulling collective and reduction in vertical speed.					
	Forward flight: Autorotation				X	X
	Airflow through the rotor disc: (a) descent speed and up flow through the disc; (b) the flare, increase in rotor thrust, reduction of vertical speed and ground speed.				X	X
	Flight and landing: (a) turning; (b) flare; (c) autorotative landing; (d) height or velocity avoidance graph and dead man's curve.				X	X
	Main rotor mechanics					
	Flapping of the blade in hover				X	X
	Forces and stresses on the blade: (a) centrifugal force on the blade and attachments; (b) limits of rotor RPM; (c) lift on the blade and bending stresses on a rigid attachment; (d) the flapping hinge of the articulated rotor and flapping hinge offset;				X	X

	(e) the flapping of the hinge less rotor and flexible element.					
	Coning angle in hover: (a) lift and centrifugal force in hover and blade weight negligible (b) flapping, tip path plane and disc area.				X	X
	Flapping angles of the blade in forward flight				X	X
	Forces on the blade in forward flight without cyclic feathering: (a) aerodynamic forces on the advancing and retreating blades without cyclic feathering; (b) periodic forces and stresses, fatigue and flapping hinge; (c) phase lag between the force and the flapping angle (about 90°); (d) flapping motion of the hinged blades and tilting of the cone and flap back of rotor; (e) rotor disc attitude and thrust vector tilt.				X	X
	Cyclic pitch (feathering) in helicopter mode, forward flight: (a) necessity of forward rotor disc tilt and thrust vector tilt; (b) flapping and tip path plane, virtual rotation axis or no flapping axis and plane of rotation; (c) shaft axis and hub plane; (d) cyclic pitch change (feathering) and rotor thrust vector tilt;				X	X

	(e) collective pitch change, collective lever, swash plate, pitch link and pitch horn; (f) cyclic stick, rotating swash plate and pitch link movement and phase angle.					
	Blade lag motion				X	X
	Forces on the blade in the disc plane (tip path plane) in forward flight: (a) forces due to the Coriolis effect because of the flapping; (b) alternating stresses and the need of the drag or lag hinge.				X	X
	The drag or lag hinge: (a) the drag hinge in the fully articulated rotor; (b) the lag flexure in the hinge less rotor; (c) drag dampers.				X	X
	Ground resonance: (a) blade lag motion and movement of the centre of gravity of the blades and the rotor; (b) oscillating force on the fuselage; (c) fuselage, undercarriage and resonance.				X	X
	Rotor systems				X	X
	See-saw or teetering rotor				X	X
	Fully articulated rotor:				X	X

	(a) three hinges arrangement; (b) bearings and elastomeric hinges.					
	Hinge less rotor and bearing less rotor				X	X
	Blade sailing: (a) low rotor RPM and effect of adverse wind; (b) minimising the danger; (c) droop stops.				X	X
	Vibrations due to main rotor: (a) origins of the vibrations: in plane and vertical; (b) blade tracking and balancing.				X	X
	Tail rotors					
	Conventional tail rotor				X	X
	Rotor description: (a) two-blades tail rotors with teetering hinge; (b) rotors with more than two blades; (c) feathering bearings and flapping hinges; (d) dangers to people and to the tail rotor, rotor height and safety.				X	X
	Aerodynamics: (a) induced airflow and tail rotor thrust;				X	X

	(b) thrust control by feathering, tail rotor drift and roll; (c) effect of tail rotor failure and vortex ring.					
	The fenestron: technical lay-out				X	X
	The NOTAR: technical lay-out				X	X
	Vibrations: high frequency vibrations due to the tail rotors				X	X
	Equilibrium, stability and control				X	X
	Equilibrium and helicopter attitudes				X	X
	Hover: (a) forces and equilibrium conditions; (b) helicopter pitching moment and pitch angle; (c) helicopter rolling moment and roll angle.				X	X
	Forward flight: (a) forces and equilibrium conditions; (b) helicopter moments and angles; (c) effect of speed on fuselage attitude.				X	X
	Control				X	X
	Control power: (a) fully articulated rotor; (b) hinge less rotor;				X	X

	(c) teetering rotor.					
	Static and dynamic roll over				X	X
	Helicopter performances					
	Engine performances				X	X
	Piston engines: (a) power available; (b) effects of density altitude.				X	X
	Turbine engines: (a) power available; (b) effects of ambient pressure and temperature.				X	X
	Helicopter performances				X	X
	Hover and vertical flight: (a) power required and power available; (b) OGE and IGE maximum hover height; (c) influence of AUM, pressure, temperature and density.				X	X
	Forard flight: (a) maximum speed; (b) maximum rate of climb speed; (c) maximum angle of climb speed;				X	X

	(d) range and endurance; (e) influence of AUM, pressure, temperature and density.					
	Manoeuvring: (a) load factor; (b) bank angle and number of g's; (c) manoeuvring limit load factor.				X	X
	Special conditions: (a) operating with limited power; (b) over pitch and over torque.				X	X

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
6	**OPERATIONAL PROCEDURES**					
	General					
	Operation of aircraft: ICAO Annex 6, General requirements					
	Definitions	X	X	X	X	X
	Applicability	X	X	X	X	X
	Special operational procedures and hazards (general aspects)					

	Noise abatement					
	Noise abatement procedures	X	X	X	X	X
	Influence of the flight procedure (departure, cruise andapproach)	X	X	X	X	X
	Runway incursion awareness (meaning of surface markings andsignals)	X	X	X	X	X
	Fire or smoke					
	Carburettor fire	X	X	X	X	X
	Engine fire	X	X	X	X	X
	Fire in the cabin and cockpit, (choice of extinguishing agents according to fire classification and use of the extinguishers)	X	X	X	X	X
	Smoke in the cockpit and (effects and action to be taken) and smoke in the cockpit and cabin (effects and actions taken)	X	X	X	X	X
	Windshear and microburst					
	Effects and recognition during departure and approach	X	X	X	X	X
	Actions to avoid and actions taken during encounter	X	X	X	X	X
	Wake turbulence					
	Cause	X	X	X	X	X
	List of relevant parameters	X	X	X	X	X

	Actions taken when crossing traffic, during take-off and landing	X	X	X	X	X
	Emergency and precautionary landings					
	Definition	X	X	X	X	X
	Cause	X	X	X	X	X
	Passenger information	X	X	X	X	X
	Evacuation	X	X	X	X	X
	Action after landing	X	X	X	X	X
	Contaminated runways					
	Kinds of contamination	X	X	X		
	Estimated surface friction and friction coefficient	X	X	X		
	Rotor downwash					
	Operation influence by meteorological conditions (helicopter)					
	White out, sand or dust				X	X
	Strong winds				X	X
	Mountain environment				X	X
	Emergency procedures					

	Influence by technical problems					
	Engine failure				X	X
	Fire in cabin, cockpit or engine				X	X
	Tail, rotor or directional control failure				X	X
	Ground resonance				X	X
	Blade stall				X	X
	Settling with power (vortex ring)				X	X
	Overpitch				X	X
	Overspeed: rotor or engine				X	X
	Dynamic rollover				X	X
	Mast bumping				X	X

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
7	**FLIGHT PERFORMANCE AND PLANNING**					
	MASS AND BALANCE: AEROPLANES OR HELICOPTERS					
	Purpose of mass and balance considerations					

	Mass limitations					
	Importance in regard to structural limitations	X	X	X	X	X
	Importance in regard to performance limitations	X	X	X	X	X
	CG limitations					
	Importance in regard to stability and controllability	X	X	X	X	X
	Importance in regard to performance	X	X	X	X	X
	Loading					
	Terminology					
	Mass terms	X	X	X	X	X
	Load terms (including fuel terms)	X	X	X	X	X
	Mass limits					
	Structural limitations	X	X	X	X	X
	Performance limitations	X	X	X	X	X
	Baggage compartment limitations	X	X	X	X	X
	Mass calculations					
	Maximum masses for take-off and landing	X	X	X	X	X

	Use of standard masses for passengers, baggage and crew	X		X	X	X
	Fundamentals of CG calculations					
	Definition of centre of gravity	X	X	X	X	X
	Conditions of equilibrium (balance of forces and balance of moments)	X	X	X	X	X
	Basic calculations of CG	X		X	X	X
	Mass and balance details of aircraft					
	Contents of mass and balance documentation					
	Datum and moment arm	X	X	X	X	X
	CG position as distance from datum	X	X	X	X	X
	Extraction of basic mass and balance data from aircraft documentation					
	Basic Empty Mass (BEM)	X	X	X	X	X
	CG position or moment at BEM	X	X	X	X	X
	Deviations from standard configuration	X	X	X	X	X
	Determination of CG position					
	Methods					
	Arithmetic method	X	X	X	X	X

	Graphic method	X	X	X	X	X
	Load and trim sheet					
	General considerations	X	X	X	X	X
	Load sheet and CG envelope for light aeroplanes and for helicopters	X	X	X	X	X
	PERFORMANCE: AEROPLANES					
	Introduction					
	Performance classes	X	X	X		
	Stages of flight	X	X	X		
	Effect of aeroplane mass, wind, altitude, runway slope and runway conditions	X	X	X		
	Gradients	X	X	X		
	SE aeroplanes	X	X	X		
	Definitions of terms and speeds	X	X	X		
	Take-off and landing performance	X	X	X		
	Use of aeroplane flight manual data	X	X	X		
	Climb and cruise performance	X	X	X		
	Use of aeroplane flight data	X	X	X		

	Effect of density altitude and aeroplane mass	X	X	X		
	Endurance and the effects of the different recommended power or thrust settings	X	X	X		
	Still air range with various power or thrust settings	X	X	X		
	FLIGHT PLANNING AND FLIGHT MONITORING					
	Flight planning for VFR flights	X		X	X	X
	VFR navigation plan	X		X	X	X
	Routes, airfields, heights and altitudes from VFR charts	X		X	X	X
	Courses and distances from VFR charts	X		X	X	X
	Aerodrome charts and aerodrome directory	X		X	X	X
	Communications and radio navigation planning data	X		X	X	X
	Completion of navigation plan	X		X	X	X
	Use of moving map device to plan and monitor flight	X		X	X	X
	Fuel planning					
	General knowledge	X		X	X	X
	Pre-flight calculation of fuel required					
	Calculation of extra fuel	X		X	X	X

	Completion of the fuel section of the navigation plan (fuel log) and calculation of total fuel	X		X	X	X
	Pre-flight preparation					
	AIP and NOTAM briefing					
	Ground facilities and services	X		X	X	X
	Departure, destination and alternate aerodromes	X		X	X	X
	Airway routings and airspace structure	X		X	X	X
	Meteorological briefing					
	Extraction and analysis of relevant data from meteorological documents	X		X	X	X
	ICAO flight plan (ATS flight plan)					
	Individual flight plan					
	Format of flight plan	X	X	X	X	X
	Completion of the flight plan	X	X	X	X	X
	Submission of the flight plan	X	X	X	X	X
	Flight monitoring and in-flight replanning					
	Flight monitoring					
	Monitoring of track and time	X	X	X	X	X

	In-flight fuel management	X	X	X	X	X
	In-flight re-planning in case of deviation from planned data	X	X	X	X	X
	Use of moving map device to plan and monitor flight	X	X	X	X	X
	PERFORMANCE: HELICOPTERS					
	General					
	Introduction					
	Stages of flight				X	X
	Effect on performance of atmospheric, airport or heliport and helicopter conditions				X	X
	Applicability of airworthiness requirements					
	Definitions and terminology					
	Performance: SE helicopters					
	Definitions of terms (a) masses; (b) velocities: v_x, $v_{y;}$ (c) velocity of best range and of maximum endurance; (d) power limitations; (e) altitudes				X	X

	Take-off, cruise and landing performance **Use and interpretation of diagrams and tables:** (a) Take-off: (1) take-off run and distance available; (2) take-off and initial climb; (3) effects of mass, wind and density altitude; (4) effects of ground surface and gradient. (b) Landing: (1) effects of mass, wind, density altitude and approach speed; (2) effects of ground surface and gradient. (c) In-flight: (1) relationship between power required and power available; (2) performance diagram; (3) effects of configuration, mass, temperature and altitude; (4) rduction of performance during climbing turns; (5) autorotation; (6) adverse effects (icing, rain and condition of the airframe).				X	X

		PPL	NPPL – PPL	Bridge course	PPL	Bridge course
8	**AIRCRAFT GENERAL KNOWLEDGE**					
	AIRFRAME AND SYSTEMS, ELECTRICS, **POWERPLANT AND EMERGENCY EQUIPMENT**					
	System design, loads, stresses, maintenance					
	Loads and combination loadings applied to an aircraft's structure	X	X	X	X	X
	Airframe					
	Wings, tail surfaces and control surfaces					
	Design and constructions	X	X	X		
	Structural components and materials	X	X	X		
	Stresses	X	X	X		
	Structural limitations	X	X	X		
	Fuselage, doors, floor, wind-screen and windows					
	Design and constructions	X	X	X	X	X
	Structural components and materials	X	X	X	X	X
	Stresses	X	X	X	X	X

	Structural limitations	X	X	X	X	X
	Flight and control surfaces					
	Design and constructions				X	X
	Structural components and materials				X	X
	Stresses and aero elastic vibrations				X	X
	Structural limitations				X	X
	Hydraulics					
	Hydromechanics: basic principles					
	Hydraulic systems					
	Hydraulic fluids: types and characteristics, limitations	X	X	X	X	X
	System components: design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Landing gear, wheels, tyres and brakes					
	Landing gear					
	Types and materials	X	X	X	X	X
	Nose wheel steering: design and operation	X		X		
	Brakes					

	Types and materials	X	X	X	X	X
	System components: design, operation, indications and warnings	X		X	X	X
	Wheels and tyres					
	Types and operational limitations	X	X	X	X	X
	Helicopter equipments				X	X
	Flight controls					
	Mechanical or powered	X	X	X	X	X
	Control systems and mechanical	X	X	X	X	X
	System components: design, operation, indications and warnings, degraded modes of operation and jamming	X	X	X	X	X
	Secondary flight controls					
	System components: design, operation, degraded modes of operation, indications and warnings	X	X			
	Anti-icing systems					
	Types and operation (pitot and windshield)	X	X	X	X	X
	Fuel system					
	Piston engine					

	System components: design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Turbine engine					
	System components: design, operation, degraded modes of operation, indications and warnings				X	X
	Electrics					
	Electrics: general and definitions					
	Direct current: voltage, current, resistance, conductivity, Ohm's law, power and work	X	X	X	X	X
	Alternating current: voltage, current, amplitude, phase, frequency and resistance	X	X	X	X	X
	Circuits: series and parallel	X	X	X	X	X
	Magnetic field: effects in an electrical circuit	X	X	X	X	X
	Batteries					
	Types, characteristics and limitations	X	X	X	X	X
	Battery chargers, characteristics and limitations	X	X	X	X	X
	Static electricity: general		X			
	Basic principles	X	X	X	X	X
	Static dischargers	X	X	X	X	X

	Protection against interference	X	X	X	X	X
	Lightning effects	X	X	X	X	X
	Generation: production, distribution and use					
	DC generation: types, design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	AC generation: types, design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Electric components					
	Basic elements: basic principles of switches, circuit-breakers and relays	X	X	X	X	X
	Distribution					
	General: (a) bus bar, common earth and priority; (b) AC and DC comparison.	X	X	X	X	X
	Piston engines					
	General					
	Types of internal combustion engine: basic principles and definitions	X	X	X	X	X
	Engine: design, operation, components and materials	X	X	X	X	X
	Fuel					

	Types, grades, characteristics and limitations	X	X	X	X	X
	Alternate fuel: characteristics and limitations	X	X	X	X	X
	Carburettor or injection system					
	Carburettor: design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Injection: design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Icing	X	X	X	X	X
	Air cooling systems					
	Design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Lubrication systems					
	Lubricants: types, characteristics and limitations	X	X	X	X	X
	Design, operation, degraded modes of operation, indications and warnings	X	X	X	X	X
	Ignition circuits					
	Design, operation, degraded modes of operation	X	X	X	X	X
	Mixture					
	Definition, characteristic mixtures, control instruments, associated control levers and indications	X	X	X	X	X

	Propellers					
	Definitions and general: (a) aerodynamic parameters; (b) types; (c) operating modes.	X	X	X		
	Constant speed propeller: design, operation and system components	X	X	X		
	Propeller handling: associated control levers, degraded modes of operation, indications and warnings	X	X	X		
	Performance and engine handling					
	Performance: influence of engine parameters, influence of atmospheric conditions, limitations and power augmentation systems	X	X	X	X	X
	Engine handling: power and mixture settings during various flight phases and operational limitations	X	X	X	X	X
	Turbine engines					
	Definitions					
	Coupled turbine engine: design, operation, components and materials				X	X
	Free turbine engine: design, operation, components and materials				X	X
	Fuel					

	Types, characteristics and limitations				X	X
	Main engine components					
	Compressor: (a) types, design, operation, components and materials; (b) stresses and limitations; (c) stall, surge and means of prevention.				X	X
	Comb (a) types, design, operation, components and materials; (b) stresses and limitations; (c) emission problems.				X	X
	Turbine: (a) types, design, operation, components and materials; (b) stresses, creep and limitations.				X	X
	Exhaust: (a) design, operation and materials; (b) noise reduction.				X	X
	Fuel control units: types, operation and sensors				X	X
	Helicopter air intake: different types, design, operation, materials and optional equipments				X	X
	Additional components and systems					

	Helicopter additional components and systems: lubrication system, ignition circuit, starter, accessory gearbox, free wheel units: design, operation and components				X	X
	Performance aspects					
	Torque, performance aspects, engine handling and limitations: (a) engine ratings; (b) engine performance and limitations; (c) engine handling.				X	X
	Protection and detection systems					
	Fire detection systems					
	Operation and indications				X	X
	Miscellaneous systems					
	Rotor design					
	Rotor heads					
	Main rotor					
	Types				X	X
	Structural components and materials, stresses and structural limitations				X	X
	Design and construction				X	X

	Adjustment				X	X
	Tail rotor					
	Types				X	X
	Structural components and materials, stresses and structural limitations				X	X
	Design and construction				X	X
	Adjustment				X	X
	Transmission					
	Main gear box					
	Different types, design, operation and limitations				X	X
	Rotor brake					
	Different types, design, operation and limitations				X	X
	Auxiliary systems					
	Drive shaft and associated installation					
	Intermediate and tail gear box					
	Different types, design, operation and limitations				X	X
	Blades					

	Main rotor blade					
	Design and construction				X	X
	Structural components and materials				X	X
	Stresses				X	X
	Structural limitations				X	X
	Adjustment				X	X
	Tip shape				X	X
	Tail rotor blade					
	Design and construction				X	X
	Structural components and materials				X	X
	Stresses				X	X
	Structural limitations				X	X
	Adjustment				X	X
	INSTRUMENTATION					
	Instrument and indication systems					
	Pressure gauge					

	Different types, design, operation, characteristics and accuracy	X	X	X	X	X
	Temperature sensing					
	Different types, design, operation, characteristics and accuracy	X	X	X	X	X
	Fuel gauge					
	Different types, design, operation, characteristics and accuracy	X	X	X	X	X
	Flow meter					
	Different types, design, operation, characteristics and accuracy	X	X	X	X	X
	Position transmitter					
	Different types, design, operation, characteristics and accuracy	X	X	X	X	X
	Torque meter					
	Design, operation, characteristics and accuracy		X		X	X
	Tachometer					
	Design, operation, characteristics and accuracy	X	X	X	X	X
	Measurement of aerodynamic parameters					
	Pressure measurement					
	Static pressure, dynamic pressure, density and definitions	X	X	X	X	X

	Design, operation, errors and accuracy	X	X	X	X	X
	Temperature measurement: aeroplane					
	Design, operation, errors and accuracy	X	X	X		
	Displays	X	X	X		
	Temperature measurement: helicopter					
	Design, operation, errors and accuracy				X	X
	Displays				X	X
	Altimeter					
	Standard atmosphere	X	X	X	X	X
	The different barometric references (QNH, QFE and 1013.25)	X	X	X	X	X
	Height, indicated altitude, true altitude, pressure altitude and density altitude	X	X	X	X	X
	Design, operation, errors and accuracy	X	X	X	X	X
	Displays	X	X	X	X	X
	Vertical speed indicator					
	Design, operation, errors and accuracy	X	X	X	X	X
	Displays	X	X	X	X	X

	Air speed indicator					
	The different speeds IAS, CAS, TAS: definition, usage and relationships	X	X	X	X	X
	Design, operation, errors and accuracy	X	X	X	X	X
	Displays	X	X	X	X	X
	Magnetism: direct reading compass					
	Earth magnetic field					
	Direct reading compass					
	Design, operation, data processing, accuracy and deviation	X	X	X	X	X
	Turning and acceleration errors	X	X	X	X	X
	Gyroscopic instruments					
	Gyroscope: basic principles					
	Definitions and design	X	X	X	X	X
	Fundamental properties	X	X	X	X	X
	Drifts	X	X	X	X	X
	Turn and bank indicator					
	Design, operation and errors	X	X	X	X	X

	Attitude indicator					
	Design, operation, errors and accuracy	X	X	X	X	X
	Directional gyroscope					
	Design, operation, errors and accuracy	X	X	X	X	X
	Communication systems					
	Transmission modes: VHF, HF and SATCOM					
	Principles, bandwidth, operational limitations and use	X	X	X	X	X
	Voice communication					
	Definitions, general and applications	X	X	X	X	X
	Alerting systems and proximity systems					
	Flight warning systems					
	Design, operation, indications and alarms	X	X	X	X	X
	Stall warning					
	Design, operation, indications and alarms	X	X	X		
	Radio-altimeter					
	Design, operation, errors, accuracy and indications				X	X

	Rotor or engine over speed alert system					
	Design, operation, displays and alarms				X	X
	Integrated instruments: electronic displays					
	Display units					
	Design, different technologies and limitations	X	X	X	X	X

		PPL	**NPPL – PPL**	**Bridge course**	**PPL**	**Bridge course**
9	**NAVIGATION**					
	GENERAL NAVIGATION					
	Basics of navigation					
	The solar system					
	Seasonal and apparent movements of the sun	X			X	
	The earth					
	Great circle, small circle and rhumb line	X			X	

	Latitude and difference of latitude	X			X	
	Longitude and difference of longitude	X			X	
	Use of latitude and longitude co-ordinates to locate any specific position	X			X	
	Time and time conversions					
	Apparent time	X			X	
	UTC	X			X	
	LMT	X			X	
	Standard times	X			X	
	Dateline	X			X	
	Definition of sunrise, sunset and civil twilight	X			X	
	Directions					
	True north, magnetic north and compass north	X			X	
	Compass deviation	X			X	
	Magnetic poles, isogonals, relationship between true and magnetic	X			X	
	Distance					
	Units of distance and height used in navigation: nautical miles, statute miles, kilometres, metres and ft	X			X	

	Conversion from one unit to another	X			X	
	Relationship between nautical miles and minutes of latitude and minutes of longitude	X			X	
	Magnetism and compasses					
	General principles					
	Terrestrial magnetism	X			X	
	Resolution of the earth's total magnetic force into vertical and horizontal components	X			X	
	Variation-annual change	X			X	
	Aircraft magnetism					
	The resulting magnetic fields	X			X	
	Keeping magnetic materials clear of the compass	X			X	
	Charts					
	General properties of miscellaneous types of projections					
	Direct Mercator	X			X	
	Lambert conformal conic	X			X	
	The representation of meridians, parallels, great circles and rhumb lines					
	Direct Mercator	X			X	

	Lambert conformal conic	X			X	
	The use of current aeronautical charts					
	Plotting positions	X			X	
	Methods of indicating scale and relief (ICAO topographical chart)	X			X	
	Conventional signs	X			X	
	Measuring tracks and distances	X			X	
	Plotting bearings and distances	X			X	
	DR navigation					
	Basis of DR					
	Track	X			X	
	Heading (compass, magnetic and true)	X			X	
	Wind velocity	X			X	
	Air speed (IAS, CAS and TAS)	X			X	
	Groundspeed	X			X	
	ETA	X			X	
	Drift and wind correction angle	X			X	

	DR position fix	X			X	
	Use of the navigational computer					
	Speed	X			X	
	Time	X			X	
	Distance	X			X	
	Fuel consumption	X			X	
	Conversions	X			X	
	Air speed	X			X	
	Wind velocity	X			X	
	True altitude	X			X	
	The triangle of velocities					
	Heading	X			X	
	Ground speed	X			X	
	Wind velocity	X			X	
	Track and drift angle	X			X	
	Measurement of DR elements					

	Calculation of altitude	X			X	
	Determination of appropriate speed	X			X	
	In-flight navigation					
	Use of visual observations and application to in-flight navigation					
	Navigation in cruising flight, use of fixes to revise navigation data	X			X	
	Ground speed revision	X			X	
	Off-track corrections	X			X	
	Calculation of wind speed and direction	X			X	
	ETA revisions	X			X	
	Flight log	X			X	
	Use of moving map devices to plan and monitor flights	X			X	
	RADIO NAVIGATION					
	Basic radio propagation theory					
	Antennas					
	Characteristics	X	X		X	

	Wave propagation					
	Propagation with the frequency bands	X	X		X	
	Radio aids					
	Ground DF					
	Principles	X	X		X	
	Presentation and interpretation	X	X		X	
	Coverage	X	X		X	
	Range	X	X		X	
	Errors and accuracy	X	X		X	
	Factors affecting range and accuracy	X	X		X	
	NDB/ADF					
	Principles	X	X		X	
	Presentation and interpretation	X	X		X	
	Coverage	X	X		X	
	Range	X	X		X	
	Errors and accuracy	X	X		X	

	Factors affecting range and accuracy	X	X		X	
	VOR					
	Principles	X	X		X	
	Presentation and interpretation	X	X		X	
	Coverage	X	X		X	
	Range	X	X		X	
	Errors and accuracy	X	X		X	
	Factors affecting range and accuracy	X	X		X	
	DME					
	Principles	X	X		X	
	Presentation and interpretation	X	X		X	
	Coverage	X	X		X	
	Range	X	X		X	
	Errors and accuracy	X	X		X	
	Factors affecting range and accuracy	X	X		X	
	Radar					

	Ground radar					
	Principles	X	X		X	
	Presentation and interpretation	X	X		X	
	Coverage	X	X		X	
	Range	X	X		X	
	Errors and accuracy	X	X		X	
	Factors affecting range and accuracy	X	X		X	
	Secondary surveillance radar and transponder					
	Principles	X	X		X	
	Presentation and interpretation	X	X		X	
	Modes and codes	X	X		X	
	GNSS					
	GPS, GLONASS OR GALILEO					
	Principles	X	X		X	
	Operation	X	X		X	
	Errors and accuracy	X	X		X	

	Factors affecting accuracy	X	X		X	
	Moving map systems	X	X		X	

ANNEX B

Abbreviations

AAIB	Air Accidents Investigation Branch
AMC	Acceptable Means of Compliance
ANO	Air Navigation Order
AOC	Air Operator's Certificate
AOPA	Aircraft Owners & Pilots Association
ATO	Approved Training Organisation
BGA	British Gliding Association
BIR	Basic Instrument Rating
CBIR(A)	Competency-Based modular Instrument Rating (Aeroplanes)
CRD	Comment Response Document
DTO	Declared Training Organisation
EASA	European Union Aviation Safety Agency
EIR	En-route Instrument Rating
FCL	Flight Crew Licensing
FRTOL	Flight Radio Telephony Operators Licence
GA	General Aviation
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IR	Instrument Rating
IR(R)	Instrument Rating (Restricted)
LAA	Light Aircraft Association
LAPL	Light Aircraft Pilot Licence
MEP	Multi-Engine Piston
MET	Multi-Engine Turboprop
NPA	Notice of Proposed Amendment
NPPL	National Private Pilot Licence
PBN	Performance-Based Navigation
PMD	Pilot Medical Declaration
PPL	Private Pilot Licence
RNP	Required Navigation Performance

SARPs	Standards & Recommended Practices (ICAO Annexes)
SE	Single-Engine
ME	Multi-Engine
SEP	Single-Engine Piston
SET	Single-Engine Turboprop
SLMG	Self-Launching Motor Glider
SPL	Sailplane Pilot Licence
SSEA	Simple Single-Engine Aeroplane
TMG	Touring Motor Glider
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions