The Honourable Company of Air Pilots



EU LAPL(A) TRAINING PROGRAMME Incorporating EU LAPL to PPL(A)

Upgrade Training Programme

AMC 1 FCL.110.A

Validated by the UK CAA

Nothing in this document supersedes any legislation, rules, regulations or procedures contained in any operational document issued by the UK Civil Aviation Authority (CAA), the European Union through or by the European Aviation Safety Agency (EASA), ICAO, the aircraft and/or equipment manufacturer or by the aircraft operator.

EU LAPL(A) Training Programme and LAPL(A) to PPL (A) Upgrade programme

Copyright 2019 © The Honourable Company of Air Pilots

All rights reserved. This complete document may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system by individual instructors, pilots and students for their own, private use. Training Organisations are encouraged to use this training programme but should credit The Honourable Company of Air Pilots within their document and inform The Honourable Company of Air Pilots of its use by email to the Company Office – contact details are available at the Company's website.

https://www.airpilots.org



This document provides Training Organisations with a basic programme to complete the airborne syllabus of training for an EU LAPL(A). The PPL Lesson Plans produced by the Honourable Company provide expanded guidance for those instructors using the programme.

The programme forms a coherent series of airborne lessons which fully meet the EU LAPL(A) syllabus requirements. However, local procedures and individual training needs will affect the time required to complete individual exercises, and although the total number of flying hours suggested in the programme add up to the minimum 30 hours required to complete the LAPL course, only in advantageous circumstances will the course be completed in that time.

The variables of aircraft type, student ability, local airspace considerations and weather will ultimately dictate the teaching methods, the construction of each flight lesson, the time taken and the exact order of events.

This training programme is based on the following assumptions:

- I. The student has good aptitude and natural ability and will be conducting the training on a regular basis.
- II. The aircraft is a simple single engined aeroplane, with a fixed pitch propeller, carburetted engine with manual mixture control, fixed undercarriage and basic avionics.
- III. The training aerodrome is outside controlled airspace with an Air Traffic Service available.
- IV. Controlled airspace and other suitable airfields with and without ATC/RADAR are located nearby for training purposes.

If the facilities of the training organisation differ from the above, adjustments to the lessons should be incorporated to provide effective training for the student.

Programme Structure

The programme is divided into three phases. The first phase provides all the fundamental flying and theoretical knowledge exercises required prior to teaching circuit procedures and landing. The second phase builds theoretical knowledge and includes the circuit training, first solo, and circuit consolidation exercises as well as refreshing stall avoidance techniques. The third phase includes navigation and the other more advanced TK, handling and safety exercises required before Skill Test. Normally, each phase of training should be completed, and the aims of each lesson in that phase achieved, before embarking on the next phase.

Progress Checks

There are no formal progress checks included in this training programme. Where the instruction is provided primarily by an FI (A) subject to the requirement to be supervised, it is recommended that the student flies with an FI with the supervisory restriction removed prior to that instructor authorising either a first solo flight or a first solo cross-country flight.

Pre-Entry Requirements:

There are no pre-entry requirements for a student to undertake the EU LAPL(A) training course. The following points should be noted and applied where applicable:

A student pilot shall not fly solo unless specifically authorised and supervised by a flight instructor. (Part FCL.020 refers).

Before first solo flight, a pilot shall be at least 16 years of age (Part FCL 020), and hold at least a LAPL medical certificate. (Part-MED.A.030 & AMC1 to Part-FCL 110.A)

Credits for Previous Experience

When a student already holds a flying licence, credit may be given towards the minimum hours needed for the issue of a LAPL (A). The precise nature of the credit is wholly dependent on the type of licence and the allowances as stated in Part-FCL110.A.

Where a course of flying training towards the LAPL (A) has been partially completed at another ATO or DTO the training records for that training must be obtained from the previous training organisation. An assessment should then be made to ascertain which of the syllabus requirements have been achieved and therefore which lessons within this programme have been completed.

The needs of students with previous experience should be assessed by a senior member of the instructional staff and any credit applied and/or lessons already completed should be annotated accordingly on their progress sheets.

Theoretical Knowledge Training

For issue of a LAPL (A) the student must pass the theoretical knowledge (TK) exams on the subjects listed in AMC1 to Part-FCL .210;215, which are also listed in the PPL TK syllabus at Alt MoC1FCL.210:215.

Unless the student has already completed a TK course, ground instruction should be integrated with the flying exercises as programmed. The TK lessons are grouped, but individual lessons should be given earlier as opportunity arises. Each lesson group should be completed before moving onto a later flight lesson. Weather and other considerations such as student background may change the order or timing of the lessons, but a satisfactory standard should be demonstrated in each listed ground subject before the student undertakes the solo exercises detailed as "check points".

During Phases 1 and 2 prior to first solo flight, ground instruction should be completed on Air Law and Communications, and the student should demonstrate a satisfactory level of knowledge of these subjects by passing either the LAPL/PPL Theoretical Knowledge examinations or an internal test to the same standard.

During Phase 3, all ground instruction should be completed. The student should demonstrate satisfactory knowledge of Operational Procedures, Meteorology, and Human Performance, before flying solo outside the circuit, a satisfactory knowledge of Navigation before solo navigation exercises, and knowledge of Flight Performance and Planning before the solo qualifying cross-country. Again an internal test may demonstrate that standard, but the student must have passed all TK examinations before being recommended for Skill Test.

Theoretical Knowledge lessons are programmed as formal classroom work, but some may be provided by interactive video, slide or tape presentation, computer based training, or other media distance learning courses. This instruction need not be provided by the same ATO who conducts the flight training programme.

Threat & Error Management

The philosophy of Threat & Error Management should be applied and taught throughout the course in conjunction with the DTO's basic Safety Management System (SMS). At the beginning of each phase of the training programme a list of potential Threats, Errors and Mitigations/Undesired Aircraft States is given relevant to that phase. Within each lesson plan, specific Threats and/or Errors particular to that lesson are specified for consideration & discussion.

The array below summarises the threats and human errors that are always present, note that this list should not to be taken as exhaustive. These threats & errors are assessed using the tables listed after the array; the Risk Severity table (3.5.1.2) and the Risk Likelihood table (3.5.2.2) and are summarised by reference to the Risk Tolerability Table (3.5.4). The scale used is ranged 1–5. The number entered into the 'Risk' column of the array below is the result following mitigation <u>not</u> the original value that may have been given to the threat or error. This methodology shows how TEM can effectively reduce the risk to an acceptable level by appropriate mitigation techniques and procedures. The "Lesson Input" column of the array suggests appropriate lessons where teaching of the particular TEM element from the array may be considered.

After each lesson TEM teaching & learning can be enhanced if both instructor and student take a few minutes to reconsider what threats, errors and/or undesired aircraft states were encountered during the lesson. Discussion may be useful to consider how well they were managed and what could have been done differently to improve the management of those threats and errors.

Where appropriate a safety report, as part of the SMS may be a useful method of sharing the experiences with others within the organisation.

In addition, instructors should, whenever possible during the course, use unplanned threats or errors (simulated if necessary), to allow the student to develop decision making skills.

Threat	Consequence	Mitigation	Error	Consequence	Mitigation	Risk:	Lesson
Uncontrolled flight and operations.	Taxiing collision. Deviation from flight profile: CAS bust & CFIT	Determine PIC: who has control and when.	Failure to establish the Pilot in Command; failure to recognise: control input confusion / no one has control	Conflicting control inputs leading to loss of controlled flight/taxi.	Ensure who is PIC and when: Control handover procedures: Verbalise: "I have control", "you have control	5 reduced 1	All
Other aircraft	Collision / loss of control while avoiding	LOOKOUT: Correct scanning techniques. Left/right and above/ below. Weaving and clearing turns. CLOCK CODE	Rushed & incomplete scan. Eye blind spots/visual field limits. Failure to recognise closing flight paths & speeds. Poor communications	Conflict aircraft unseen. Avoiding action too late.	Training to understand the limitations of sight & training in collision avoidance procedures & techniques. Skills in clear articulate communications.	5 reduced 2	All
Un-forecast winds, Weather/low cloud and poor visibility.	CFIT, breach of CAS, Becoming lost. Fuel exhaustion.	MAP READING skills. Flight planning; Safe altitude. Heading & Time, Positive fixes. Magnetic compass checks. Lost procedures. Radio aids and GPS skills. Minimum safe Operating Altitude	Poor flight planning. Incorrect reading of the map; Misidentification of features, Compass alignment & reading errors. Incorrect use of radio aids/GPS. Work rate overload	Entry into cloud. Disorientation; spatial/situational awareness lost - unsure of position. Degradation of confidence. Natural senses unreliable. Overload. CFIT	Continuous Lookout; situation/spatial awareness skills. Use of ATS. Priority of actions: aviate, navigate – communicate. Trust instruments.	5 reduced 2	EX 6 - 10, EX 18
Airframe Structure and component Overstress	Airframe/ Component failure.	Aircraft maintenance schedule. Flight time limits: Inspection, servicing and replacement. Vne, Vno Va & Vfe	No/ poor pre-flight inspection. Unrecognised flight Limits. Exceeding VNE. Operation of flap/gear outside limits.	Miss-diagnosis. Incorrect response causing further alarm & confusion	Understand PIC responsibilities. Check A. Documentation & checklist. Knowledge of aircraft limitations.	5 reduced 1	All
Exceed engine limits	Engine failure. Engine malfunction	FREDA, Engine management; Monitor; Power/Prop limits, mixture, Oil Ts & Ps	Failure to undertake, understand & monitor instruments & gauges. No routine checks.	Forced landing or unplanned diversion	FREDA, Climb/descent pre-entry checks	4 reduced 2	All

Continued..

Carburettor icing.	Engine failure/loss	FREDA checks.	Complacency: failure to	Engine failure/loss	Applying Carb. Ht: from		
U	of power	Identify ice/no ice.	ensure ice not present or	of power. Work	indications check to	4	
	1		eradicated. Icing	overload.	identify ice present.	reduced	All
			undetected. No routine		Allow Sufficient time	2	
			check.		for heat to purge ice.	_	
Engine	Reduced/total loss	Pre-flight and power	Rushed or skimped pre-	Unable to maintain	Know and follow		
malfunction/failure	of power	checks. FREDA	flight check. Oil dipstick	height. Forced	checks. Actually check		
		checks. Engine	unsecured. Power checks	landing: Loss of	– not just a routine.		
		instruments	rushed or not completed.	control, poor landing	Refer to engineer ANY	5	
		monitored, mixture	Failure to complete	site selection. Severe	faults found prior to	reduced	EX16/17
		settings and	FREDA. Miss-	damage, personal	flight. Report post flight.	3	
		temperatures	management of mixture or	injury/fatal	In-flight malfunction;		
		managed. Forced	temperatures. Forced		more likely to be action		
		landing drills.	landing procedures not		/ inaction by the pilot –		
			followed.		double check.		
The intended/	Potential for loss of	HASELL checks.	Loose items in cockpit:	Jammed controls.	HASELL, Pre-stall/stall		
unintentional	control. Impact	Recovery techniques.	incapacitate crew / restrict	Loss of control.	recognition signs.	5	Ex 10/11
Stall/spin	with the surface.	Weight & balance	ion of controls.	Loss of Spatial &	Identification. Terrain	reduced	
		Calculations.	Insufficient height to	situational	clearance. Power and	3	
			recover from stall.	awareness. Serious	speed maintenance. Stall		
				injury/fatal	avoidance /recovery		
Propellers	Serious injury/fatal	Propeller handling.	Failure to follow propeller	Serious injury/fatal.	Ensure area clear around		
		Stationary & rotating.	pre-handling procedures	Propeller damage.	aircraft pre-flight. Brief		
		Magnetos earthed	and poor/ no passenger	Engine shock	passengers regarding	5	
		(off). Mixture fully	safety brief given. Failure	loaded.	dangers and apron	reduced	EX 1-5
		lean. Electric master	to ensure area clear of		conduct. Ensure taxi	2	
		off. Brakes and	personnel and		path clear.		
		chocks.	obstructions.				
Surface	Collision with	Ensure area clear to	Failure to check brakes.	Collision. Departure	Ensure taxi path clear.		
obstructions /	other aircraft and	taxi. Brakes checked	Taxiing too fast. Not	from taxiways.	Brakes checked	4	
taxiing/parked	surface	immediately on	maintaining centre lines.	Ground loop/tip	immediately after	reduced	Ex 1- 5
aircraft	obstructions.	taxiing. Controlled	"Squeezing" between	onto propeller	commencement of taxi.	1	
		taxi speed. Maintain	aircraft. Poor	following heavy	Weaving turns. Good		
		centre line markings.	communications	braking.	communications.		

3.5.1.2	Risk severity should be defined in accordance with the
	following table.

SEVERITY OF CONSEQUENCES			
Definition	Meaning	Value	
Catastrophic	Results in an accident, death or equipment destroyed	5	
Hazardous	Serious injury or major equipment damage	4	
Major	Serious incident or injury	3	
Minor	Results in a minor incident	2	
Negligible	Nuisance of little consequence	1	

3.5.2.2	Risk likelihood should be defined in accordance with the
	following table:

LIKELIHOOD OF OCCURRENCE			
Definition	Value		
Frequent	Likely to occur many times	5	
Occasional	Likely to occur sometimes	4	
Remote	Remote Unlikely to occur but possible		
Improbable	Very unlikely to occur	2	
Extremely Improbable Almost inconceivable that the event will occur		1	

3.5.4 Risk Tolerability Matrix

The tolerability of an individual risk is determined by use of the following Risk Matrix:

	Risk Severity					
Risk Likelihood	Catastrophic 5	Hazardous 4	Major 3	Minor 2	Negligible 1	
Frequent 5	Unacceptable	Unacceptable	Unacceptable	Review	Review	
Occasional 4	Unacceptable	Unacceptable	Review	Review	Review	
Remote 3	Unacceptable	Review	Review	Review	Acceptable	
Improbable 2	Review	Review	Review	Acceptable	Acceptable	
Extremely Improbable 1	Review	Acceptable	Acceptable	Acceptable	Acceptable	

HCAP LAPL v1 March 2019



Lessons 1 to 9 (Syllabus Exercises 1 to 10b inclusive) should be completed to a competent standard before progressing to Phase 2.

Theoretical Knowledge

If the student has not completed the theoretical knowledge examinations before starting flying training, the pre-flight briefings during phase 1 should complement the TK lessons on Principles of Flight. Other briefings and debriefings should introduce elements of the other subjects, and reinforce the formal TK instruction on Air Law and Communications.

Threat and error management

In addition to those suggested as specific to individual lessons, the threats, errors and undesired aircraft states listed below may affect flight during most of the phase and suitable mitigations should be considered and applied.

THREATS

Other aircraft Cockpit blind spots Loss of bearings Unfamiliar surroundings System/Engine problems Weather conditions Controlled Airspace in the vicinity Carburettor ice

ERRORS

Use of flap at high speed Flap misuse Exceeding engine limits Descending too low Insufficient height to recover from stall/spin

UNDESIRED AIRCRAFT STATES

Engine overheating Loose items in cockpit during stalling The following items should also be covered in pre-flight briefings. Suggested lessons for their inclusion are given below, but the exact timing will depend on various factors. The dates the items are covered should be included in the student's records.

Pre-flight

- 1. Administration (Ideally on Lesson2)
- 2. External checks (Lesson2)
- 3. Cockpit preparation (Lesson2)
- 4. Use of ventilation and heating controls (Lesson2)
- 5. Use of check list (Lesson2)
- 6. Starting procedures and warm up (Lesson2)
- 7. Taxy procedures
- 8. Use of radio
- 9. Power checks/pre take off checks (Lesson3)
- 10. Normal take off
- 11. Engine fire on the ground (Lesson4)
- 12. Steering failure (Lesson5)
- 13. Brake failure (Lesson5)
- 14. Passenger and pre take-off brief
- 15. Cabin fire (Lesson7)
- 16. Electrical fire (Lesson7)
- 17. Smoke in the cockpit

Inflight

- 1. Approach checks (Lesson4)
- 2. Arrival procedures (Lesson4)
- 3. Map orientation/reading (Lesson4)
- 4. Landing (Lesson6)
- 5. After landing checks (Lesson4)
- 6. Alternator failure
- 7. Loss of fuel pressure
- 8. Loss of oil pressure
- 9. High oil temperature
- 10. Engine fire in the air (Lesson6)

Post Flight

- 1. Shutting down (Lesson3)
- 2. Administration (Lesson3)

SYLLABUS CHECK LIST – Ref: AMC 1 FCL.110.A(c)2

AMC Ref.	Exercise
(i) Ex 1a Aircraft Familiarisation	 (A) characteristics of the aeroplane; (B) cockpit layout; (C) systems; (D) checklists, drills and controls.
(ii) Ex 1b Emergency drills	 (A) action if fire on the ground and in the air; (B) engine cabin and electrical system fire; (C) systems failure; (D) escape drills, location and use of emergency equipment and exits.
(iii) Ex 2 Preparation for and action after flight	 (A) flight authorisation and aeroplane acceptance; (B) serviceability documents; (C) equipment required, maps, etc.; (D) external checks; (E) internal checks; (F) harness, seat or rudder panel adjustments; (G) starting and warm-up checks; (H) power checks; (I) running down system checks and shutting down the engine; (J) parking, security and picketing (for example tie down); (K) completion of authorisation sheet and serviceability documents.
(iv) Ex 3 Air Experience	Air experience: flight exercise.
(v) Ex 4 Effects of controls	 (A) primary effects when laterally level and when banked; (B) further effects of aileron and rudder; (C) effects of: (a) air speed; (b) slipstream; (c) power; (d) trimming controls; (e) flaps; (f) other controls, as applicable. (D) operation of: (a) mixture control; (b) carburettor heat; (c) cabin heating or ventilation.
(vi) Ex 5a Taxiing	 (A) pre-taxi checks; (B) starting, control of speed and stopping; (C) engine handling; (D) control of direction and turning; (E) turning in confined spaces; (F) parking area procedure and precautions; (G) effects of wind and use of flying controls; (H) effects of ground surface; (I) freedom of rudder movement; (J) marshalling signals; (K) instrument checks; (L) air traffic control procedures.
(vii) Ex 5b Taxiing emergencies	Brake and steering failure

(viii) Ex 6 Straight and level	 (A) at normal cruising power, attaining and maintaining straight and level flight; (B) flight at critically high air speeds; (C) demonstration of inherent stability; (D) control in pitch, including use of trim; (E) lateral level, direction and balance and trim; (F) at selected air speeds (use of power); (G) during speed and configuration changes; (H) use of instruments for precision.
(ix) Ex 7 Climbing	 (A) entry, maintaining the normal and max rate climb and levelling off; (B) levelling off at selected altitudes; (C) en-route climb (cruise climb); (D) climbing with flap down; (E) recovery to normal climb; (F) maximum angle of climb; (G) use of instruments for precision.
(x) Ex 8 Descending	 (A) entry, maintaining and levelling off; (B) levelling off at selected altitudes; (C) glide, powered and cruise descent (including effect of power and air speed); (D) side slipping (on suitable types); (E) use of instruments for precision flight.
(xi) Ex 9 Turning	 (A) entry and maintaining medium level turns; (B) resuming straight flight; (C) faults in the turn (for example in correct pitch, bank and balance); (D) climbing turns; (E) descending turns; (F) faults in the turns (slipping and skidding on suitable types); (G) turns onto selected headings, use of gyro heading indicator and compass; (H) use of instruments for precision.
(xii) Ex 10a Slow flight	 (A) safety checks; (B) introduction to slow flight; (C) controlled flight down to critically slow air speed; (D) application of full power with correct attitude and balance to achieve normal climb speed.
(xiii) Ex 10b Stalling	 (A) safety checks; (B) symptoms; (C) recognition; (D) clean stall and recovery without power and with power; (E) recovery when a wing drops; (F) approach to stall in the approach and in the landing configurations, with and without power and recovery at the incipient stage.

Theoretical Knowledge Syllabus

AMC ref	AMC1 FCL.210; FCL 215	ALT MoC FCL.215
	(A) International law: conventions,	(A) International Aviation Law
	agreements and organisations	(1) International Civil Aviation
	(1) The Convention on international civil	Organisation (ICAO)
	aviation (Chicago) Doc. 7300/6	(2) European Aviation Safety
	(a) Part I Air Navigation relevant parts	Agency (EASA)
	(1) general principles and application of the	(3) National Aviation Authorities
	convention;	(NAA)
	(2) flight over territory of Contracting States;	(B) European Rules of the Air
	(3) nationality of aircraft;	(1) Applicability and compliance
	(4) measures to facilitate air navigation;	(2) Pilot in command
	(5) conditions to be fulfilled on aircraft;	responsibilities
	(6) international standards and recommended	(3) Pre flight actions
	practices;	(4) Avoidance of collisions & rights
	(7) validity of endorsed certificates and	of way
	licences;	(5) Operation in the vicinity of an
	(8) notification of differences.	aerodrome
	(b) Part II The International Civil Aviation	(C) Aerodromes
	(1CAU): objectives and composition	(1) Taxiway and runway signs and
	(2) Annex 6: Airworthiness of aircraft	markings
	(a) Foreword and deminitions (b) Cortificate of Airworthingss	(2) Preventing runway Incursion
	(3) Appex 7: Aircraft nationality and	(3) Other ground signals
	registration marks	(4) Marshalling signals
	(a) Foreword and definitions	(D) Visual Motoorological
	(b) Common and registration marks	(D) Visual Meleorological
	(c) Certificate of registration and aircraft	Elight Pulos (VEP)
	nationality	(1) Visual Meteorological
	(4) Annex 1: Personnel licensing	(1) VISUAL MELEOLOIOUGICAL Conditions (V/MC) minima
	(a) Definitions	(2) Visual Elight Pules (VEP)
1. Air Law and	(b) Relevant parts connected to Part-FCL and	(2) Minimum heights
ATC procedures	Part-Medical	(5) Minimum Heights (F) Airspace Classifications
	(5) Annex 2: Rules of the air	(1) Classification of airspace
	Essential definitions, applicability of the rules	(1) Controlled and notified airspace
	of the air, general rules (except water	(3) Uncontrolled airspace
	operations), visual flight rules, signals and	(4) Radio Mandatory Zones (RMZ)
	(6) Procedures for air pavigation, aircraft	(5) Transponder Mandatory Zones
	operations doc 8168-ons/611 volume 1	(TMZ)
	(a) Basic altimeter setting procedures	(F) Altimeter Setting Procedures
	applicable to operators and pilots (including	(1) Height altitude and flight level
	IACO doc. 7030 – regional supplementary	(2) VFR altimeter setting
	procedures)	procedures
	(b) Secondary surveillance radar transponder	(G) Air Traffic Services
	operating procedures (including ICAO Doc. 7030	(1) Air Traffic Control Service
	 regional supplementary procedures) 	(2) Flight Information Service
	(c) Transponder phraseology	(3) Alerting Service
	(7) Annex 11: Doc. 4444 air traffic	(H) Aeronautical Information
	management	Service (AIS)
	(a) Definitions	(1) Aeronautical Information Service
	(b) General provisions for air traffic services	(ÀÍS)
	(c) visual separation in the vicinity of	(2) Aeronautical Information
	(d) Presedures for peredrome control convises	Publication (AIP)
	(a) Padar services	(3) NOTAMs
	(f) Flight information service and alerting	(I) Urgency and Distress
	service	Procedures
	(g) Phraseologies	(1) Urgency situation
	(h) Procedures relating to emergencies.	(2) Distress situation
	communication failures & contingencies	(3) Interception of civil aircraft

(8) Annex 15: Aeronautical information	
service	
(a) Introduction, essential definitions (b) AIP, NOTAM, AIRAC and ATC	(J) Pilot Licensing
(9) Annex 14, volume 1 and 2: Aerodromes	(1) Medical certificates
(a) Definitions(b) Aerodrome data: conditions of the	(2) Private Pilot Licence (PPL) privileges
movement area & related facilities (c) Visual aids for navigation:	(3) Light Aircraft Pilot Licence (LAPL) privileges
(1) markings:	(4) Class Rating
(2) markings, (3) lights;	(5) Type Rating
(4) signs;	(C) Other Dating
(5) markers.	(6) Other Ratings and certificates
(d) Visual aids for denoting obstacles:	(K) National Procedures
Marking and lighting objects (e) Visual aids for denoting restricted use of	National rules and procedures
areas	
(f) Emergency and other services	
(1) rescue and fire fighting	
(2) apron management service	
(10) Annex 12: Search and rescue	
(a) Essential definitions (b) Operating procedures	
(1) procedures for PIC at the scene of an	
accident:	
(2) procedures for PIC intercepting a distress	
transmission;	
(3) search and rescue signals.	
(c) Search and rescue signals	
(1) signals with surface craft;	
ground or air visual signal code;	
(3) air or ground signals.	
(11) Annex 17: Security	
General: aims and objectives	
(12) Annex 13: Aircraft accident	
Investigation	
(P) National law	
(D) National law and differences to relevant ICAO	
Annexes and relevant EU regulations	

	(A) Human factors	
	(1) Human factors in aviation	
	Becoming a competent pilot	
2. Human Performance	 (2) Basic aviation physiology and health maintenance (a) The atmosphere (1) composition (2) gas laws (b) Respiratory & circulatory systems (1) oxygen requirement of tissues; (2) functional anatomy; (3) main forms of hypoxia (hypoxic and anaemic): (a) sources, effects and counter-measures of (carbon monoxide; (b) counter measures and hypoxia; (c) symptoms of hypoxia. (4) hyperventilation; (5) the effects of accelerations on the circulatory system; (6) hypertension and coronary heart disease. (3) Man and environment (a) Central, peripheral and autonomic nervous systems (b) Vision (1) functional anatomy; (2) visual field, foveal and peripheral vision; (3) binocular and monocular vision; (4) monocular vision cues; (5) night vision; (6) visual scanning and detection techniques and importance of 'look-out'; (7) defective vision. (c) Hearing: (1) descriptive and functional anatomy; (2) flight related hazards to hearing; (3) motion sickness. (e) Integration of sensory inputs (1) spatial disorientation: forms, recognition and avoidance; (2) illusions: forms, recognition and avoidance: (a) physical origin; (b) physiological origin, (c) psychological origin, (c) psy	 (A) Basic Aviation Physiology Hyperventilation Vision and visual illusions Lookout techniques Hearing and balance Spatial disorientation Sleep and fatigue Common ailments, medication, health Toxic hazards Intoxication (B) Basic Aviation Psychology Perception Memory Arousal and performance Stress and stress management Personality types Hazardous attitudes (C) Principles of Threat and Error Management Threats Errors Undesired aircraft states Decision making Developing sound judgement

(c) Problem areas for pilots	
(1) common minor ailments including cold,	
influenza and gastro-intestinal upset:	
(2) entranned cases and barotrauma (scuba	
diving):	
(2) abasity	
(3) ODESILY;	
(4) rood nyglene;	
(5) infectious diseases;	
(6) nutrition;	
(7) various toxic gases and materials.	
(d) Intoxication	
(1) prescribed medication	
(2) tobacco:	
(3) alcohol and drugs	
(4) caffeine	
(F) solf modication	
(5) Basic aviation psychology	
(a) Human information processing	
(1) Attention and vigilance	
(a) selectivity of attention;	
(b) divided attention.	
(2)Perception	
(a) perceptual illusions:	
(b) subjectivity of percention	
(c) processes of perception,	
(c) processes or perception.	
(3) Memory	
(a) sensory memory;	
(b) working or short term memory;	
(c) long term memory to include motor memory	
(skills).	
(b) Human error and reliability	
(1) Reliability of human behaviour	
(2) Error generation: social environment (group,	
organisation)	
(c) Decision making	
Decision making	
(1) structure	
(3) risk assessment;	
(4) practical application	
(d) Avoiding and managing errors, cockpit	
management	
(1) Safety awareness	
(a) risk area awareness;	
(b) situational awareness	
(2) Communication: verbal & non-verbal	
communication	
(e) Human behaviour	
(1) Personality and attitudes	
(1) development	
(b) any ironmontal influences	
(b) environmental innuences	
(1) Arousai	
(2) Stress	
(a) definition(s);	
(b) anxiety and stress;	
(c) effects of stress.	
(3) Fatigue and stress management	
(a) types, causes and symptoms of fatique:	
(b) effects of fatigue;	
(c) coping strategies:	
(d) management techniques:	
(a) health and fitness programmes	
(c) nearch and neness programmes,	

	(A) The Atmosphere	
	(A) The atmosphere	(1) Composition of the atmosphere
	(1) Composition extent and	(1) Composition of the atmosphere
	(1) Composition, extent and	(2) The troposphere (P) Tomporature, Processre and Donsity
		(1) Tomporature variation in the atmosphere
	(a) Structure of the atmosphere	(1) Temperature variation in the atmosphere
	(b) Troposphere	(2) Pressure variation in the atmosphere
	(2) Air temperature	(3) Density
	(a) Definition and units	(4) Humidity
	(b) Vertical distribution of	(5) The International Standard Atmosphere
	temperature	
	(c) Lapse rates, stability and	(C) Altimetry
	instability	(1) Altimeter and pressure settings
	(d) Development of inversions	(2) Altimeter temperature and pressure effects
	and types of inversions	(D) Wind
	(e) Temperature near the earth's	(1) Cause of wind
	surface surface effects diurnal	(2) Variation of wind velocity with altitude
	and seasonal variation effect of	(3) Local winds
	clouds and offect of wind	(E) Clouds and Precipitation
	clouds and effect of white	(1) Formation of cloud
	(3) Atmospheric pressure	(2) Principle cloud types
	(a) Barometric pressure and	(3) Precipitation
	isobars	(F) Visibility
	(b) Pressure variation with height	(1) Fog and mist
	(c) Reduction of pressure to mean	(2) Haze and smoke
	sea level	(3) Visibility in precipitation
	(d) Relationship between surface	(G) Air Masses
	pressure centres & pressure	Characteristics of air masses
	centres aloft	(H) Low Pressure Systems
	(A) Air deveiter	(1) The warm sector depression
	(4) AIF defisity	(2) The warm front
3. Meteorology	tomporature and density	(3) The cold front
,		(4) Occluded fronts
	(5) ICAO standard atmosphere	(5) Troughs and convergence
	(6) Altimatry	(1) High Pressure Systems
	(a) Terminology and definitions	(1) Anticyciones
	(b) Altimeter and altimeter	(2) Ridges
	settings	(3) COIS
	(c) Calculations	(1) Airframe ising
	(d) Effect of accelerated airflow	(1) Airridhe Ichig (2) Pain ico
	due to topography	(2) Frost
		(4) Piston engine icing
	(B) Wind	(K) Hazardous Weather Conditions:
	(1) Definition and	Thunderstorms
	measurement of wind	(1) Formation of thunderstorms
		(2) Hazards for aircraft
	(2) Primary cause of wind	(L) Other Hazardous Weather Conditions:
	(a) Primary cause of wind,	(1) Mountainous areas
	pressure gradient, coriolis force &	(2) Turbulence
	gradient wind	(3) Wind shear
	(D) variation of white in the	(4) Strong winds
	(c) Effects of convergence and	(M) Meteorological Information
	divergence	(1) Synoptic charts
		(2) Satellite imagery
		(3) Ground based weather radar
		(4) Area and significant weather forecasts
		(5) TAFs and METARs
		(6) Sources of meteorological information
		Forecast and observation parameters and
		tolerances
		(N) National Procedures
		National procedures

	(A) VFR communications	(A) VHE Padio Broadcast
	 (1) Definitions (a) Meanings and significance of associated terms (b) ATS abbreviations (c) Q-code groups commonly used in RTF air- ground communications (d) Categories of messages 	 (A) VHF Radio Broadcast Factors affecting VHF radio range (B) Transmission Technique (1) Transmission of letters (2) Transmission of numbers
	 (2) General operating procedures (a) Transmission of letters (b) Transmission of numbers (including level 	(3) Transmission of time(4) Call signs
4. Communications	 information) (c) Transmission of time (d) Transmission technique (e) Standard words and phrases (relevant RTF phraseology included) (f) R/T call signs for aeronautical stations including use of abbreviated call signs (g) R/T call signs for aircraft including use of abbreviated call signs (h) Transfer of communication (i) Test procedures including readability code (j) Read back and acknowledgement requirements 	 (C) VFR Communications Procedures (1) Test procedures (2) Standard phraseology (3) Items requiring read back (4) Transfer of communications (5) Transponder operating procedures
		(1) ATIS & VOLMET broadcasts, Flight Information Service (FIS)
	(3) Relevant weather information terms(VFR) (a) Aerodrome weather (b) Weather broadcast	(E) Communications Failure Actions in the event of communication failure
	(3) Action required to be taken in case of communication failure	(F) Distress and Urgency Procedures
	(a) Distress and urgency procedures (a) Distress (definition, frequencies, watch of distress frequencies, distress signal and distress message)	(1) Emergency frequencies and facilities
		(2) Urgency procedures (3)Distress procedures
	(b) Urgency (definition, frequencies, urgency signal and urgency message)	(G) National Procedures National rules and procedures
	(5) General principles of VHF propagation & allocation of frequencies	

	(A) Subsonic aerodynamics	(A) Basic Concepts
	(1) Basic concepts, laws and definitions	(1) Static and dynamic
	(a) Laws and definitions	pressure
	(1)conversion of units; (2) Newton's laws:	(2) Aerodynamic forces
	 (2) Remoull's equation and venture; (4) static processing dynamic processing and total 	(3) Aerofoils and wings
	(4) static pressure, dynamic pressure and total pressure:	(B) The Four Forces
	(5) density;	(1) Weight
	(6) IAS and TAS.	(2) Thrust
	(b) Basics about airflow	(3) Lift
	(1) streamine; (2) two-dimensional airflow:	(4) Drag
	(3) three-dimensional airflow.	(1) 2109
	(c) Aerodynamic forces on surfaces	(C) The Stall
	(1) resulting airforce;	(1) Stalling angle of attack
	(2) m; (3) drag:	(2) Factors affecting stall
	(4) angle of attack.	characteristics
	(d) Shape of an aerofoil section	(3) Factors affecting stalling
	(1) thickness to chord ratio;	speed
	(3) camber line:	(4) Stall warning
	(4) camber;	(5) Spin avoidance
	(5) angle of attack.	(6) Spinning characteristics
	(e) The wing shape (1) aspect ratio:	(D) Stability and Control
	(2) root chord;	(1) Stability and control in
	(3) tip chord;	vaw
5. Principles of	(4) tapered wings;	(2) Stability and control in roll
riigiit	(5) wing planform.	(3) Stability and control in
	(2) The two-dimensional flow about an aerofoil	pitch
	(a) Streamline pattern	(4) Trimming controls
	(b) Stagnation point	(5) High lift devices
	(c) Pressure distribution	(6) Air brakes and spoilers
	(d) Centre of pressure	(7) Other flying controls
	(e) Influence of angle of attack (f) Elow congration at high angles of attack	
	(a) The lift $-a$ graph	(E) Principles of Flight
	(3) The coefficients	(1) Straight and level flight
	(a) The lift coefficient C_{L} , lift formula	(2) Climbing
	(b) Drag coefficient C_D , drag formula	(3)Descending
	(4) The three-dimensional airflow round a	(4) Turning and manoeuvring
	(a) Streamline pattern	(E) Operating Limitations
	(1) span-wise flow and causes;	(1) Airspood and load
	(2) tip vortices and angle of attack;	limitations
	 (3) upwash and downwash due to tip vortices; (4) wake turbulence behind an aeroplane (causes) 	(2 The load diagram
	distribution and duration of the phenomenon).	(manoeuvring envelope)
	(b) Induced drag	(3) Other operating
	(1) influence of tip vortices on the angle of attack;(2) the induced least state	limitations
	 (2) the induced local 0; (3) influence of induced angle of attack on 	
	direction of the lift vector;	
	(4) induced drag and angle of attack.	

(5) Drag	
(a) The parasite drag	
(1) pressure drag;	
(2) interference drag;	
(3) friction drag.	
(b) The parasite drag and speed	
(c) The induced drag and speed	
(d) The total drag	
(6) The ground effect	
Effect on takeoff and landing characteristics of an	
aeroplane	
(7) The stall	
(a) Flow separation at increasing angles of attack	
(1) the boundary layer:	
(d) Idmindr Idyer;	
(D) turbulent layer;	
(c) indistion. (2) constants	
(2) separation point, (3) influence of angle of attack:	
(4) influence on angle of attack,	
(a) pressure distribution	
(b) location of centre of pressure:	
$(c) \cap c$	
$(d) C_{\rm D}$:	
(e) nitch moments.	
(5) buffet:	
(6) use of controls.	
(b) The stall speed	
(1) in the lift formula;	
(2) 1g stall speed;	
(3) influence of:	
(a) the centre of gravity;	
(b) power setting;	
(c) altitude (IAS);	
(d) wing loading;	
(e) load factor n:	
(i) definition;	
(ii) turns;	
(iii) forces.	
(c) Initial stall in span-wise direction	
(1) influence of planform;	
(2) geometric twist (wash out);(2) was a failence	
(3) use of allerons.	
(a) Stall warning	
(1) importance of stall warning; (2) speed margin:	
(2) speed maryin; (3) buffet:	
(4) stall strip:	
(5) flanner switch	
(6) recovery from stall	
(e) Special phenomena of stall	
(1) the power-on stall:	
(2) climbing and descending turns:	
(3) t-tailed aeroplane;	
(4) avoidance of spins:	
(a) spin development;	
(b) spin recognition;	
(c) spin recovery.	
(5) ice (stagnation point & on surface):	
(a) absence of stall warning;	
(b) abnormal behaviour of the aircraft during	
stall.	

(8) C ₁ augmentation	
(a) Trailing edge flaps and the reasons for use in	
take-off and landing	
 influence on CL - a-graph; 	
(2) different types of flaps;	
(3) flap asymmetry; (4) influence on nitch movement	
(4) Initialities of pitch movement. (b) Leading edge devices and the reasons for use	
in take-off and landing	
(9) The boundary laver	
(a) Different types	
(1) laminar	
(2) turbulent	
(10) Special circumstances	
(a) Ice and other contamination	
(1) ice in stagnation point;	
(2) ice on the surface (frost, snow and clear ice);	
(3) rain; (4) contamination of the leading edge:	
(4) containination of the leading edge, (5) effects on stall:	
(6) effects on loss of controllability:	
(7) effects on control surface moment;	
(8) influence on high lift devices during take-off,	
landing and low speeds.	
(B) Stability	
(1) Condition of equilibrium in steady	
horizontal flight	
(a) Precondition for static stability	
(1) lift and weight	
(2) drag and thrust	
(2) Methods of achieving balance	
(a) Wing & empennage (tail & canard)	
(b) Control surfaces	
(c) Ballast or weight trim	
(3) Static and dynamic longitudinal stability	
(a) Basics and definitions	
(1) static stability, positive, neutral and negative;	
(2) precondition for dynamic stability;	
(3) uynamic stadility, positive, neutral and	
(b) Location of centre of gravity	
(1) aft limit and minimum stability margin;	
(2) forward position;	
(3) effects on static and dynamic stability.	
(4) Dynamic lateral or directional stability	
Spiral dive and corrective actions	
(C) Control	
(1) General	
(a) Basics, the three planes and three axes	
(D) Angle of attack change	
(2) Flowstor	
(d) Lievalui (h) Downwash effects	
(c) Location of centre of gravity	
(c) Execution of centre of gravity	
Pedal or rudder	

(4) Roll control	
(a) Ailerons: function in different phases of flight	
(b) Adverse yaw	
(c) Means to avoid adverse yaw:	
(1) trise allerons (2) differential allerons deflection	
(5) means to reduce control forces	
(a) Aerodynamic balance (1) balance tab and anti-balance tab	
(2) servo tab	
(6) Mass balance	
Reasons to balance: means	
(7) Trimming	
(a) Reasons to trim	
(b) Trim tabs	
(D) Limitations	
(1) Operating limitations	
(a) Flutter	
(b) V _{FE}	
(c) V _{NO} , V _{NE}	
(2) Manoeuvring envelope	
(a) Manoeuvring load diagram	
(1) load factor; (2) accelerated stall speed;	
(2) accelerated stall speed, (3) V_{A} :	
(4) manoeuvring limit load factor or certification	
category.	
(b) Contribution of mass	
(3) Gust envelope	
(a) Gust load diagram	
(b) Factors contributing to gust loads	
(E) Propellers	
(1) Conversion of engine torque to thrust	
(a) Meaning of pitch	
(b) Blade twist	
(c) Effects of ice on propeller	
(2) Engine failure or engine stop	
windmining drag	
(3) The section (3) Torque reaction	
(a) Torque reaction (b) Asymmetric slinstream effect	
(c) Asymmetric blade effect	
(c) Flight mechanics	
Forces acting on an aeronlane	
(a) Straight horizontal steady flight	
(b) Straight steady climb	
(c) Straight steady descent	
(d) Straight steady glide	
(e) Steady coordinated turn	
(1) bank angle;	
(2) load factor;	
(3) turn radius; (4) rate one turn	

	(A) General	(A) Application of Threat and Error Management
	<i>ICAO Annex 6 General requirements</i> (a) Definitions (b) Applicability	Application of Threat and Error Management (TEM) in relation to aircraft operation
	(B) Special operational procedures and bazards	(B) Operation of Aircraft
6. Operational procedures	 (1) Noise abatement (a) Noise abatement procedures (b) Influence of the flight procedure (departure, cruise and approach) (c) Runway incursion awareness (meaning of surface marks & signals) (2) Fire or smoke (a) Carburettor fire (b) Engine fire (c) Fire in cabin and cockpit (choice of extinguishing agents according to fire classification and use of the extinguishers) (d) Smoke in the cockpit and (effects and action to be taken) and smoke in the cockpit and cabin 	 (1) Applicability of EASA regulations (2) Responsibility and authority of Pilot in Command (PIC) (3) Documents to be carried (4) Dangerous goods (5) Fuel and oil, refuelling (6) Instruments and equipment (7) Safety equipment (7) Safety equipment (1) Avoiding hazardous situations (2) Avoidance of wake turbulence
	(3) Windshear and microburst (a) Effects and recognition during departure and approach (b) Actions to avoid and actions taken during encounter	 (D) Search and Rescue Procedures (1) Principles of search and rescue procedures (2) Search and rescue signals
	 (4) Wake turbulence (a) Cause (b) List of relevant parameters (c) Actions taken when crossing traffic, during take-off and landing (5) Emergency and precautionary landings (a) Definition (b) Cause (c) Passenger information (d) Evacuation (e) Action after landing 	 (E) Accidents and Incidents (1) Accident definitions and investigation (2) Safety reporting (3) Safety publications (F) Care of Passengers Passenger briefing and passenger procedures (G) National Procedures National rules and procedures
	 (6) Contaminated runways (a) Kinds of contamination (b) Estimated surface friction and friction coefficient. 	·

	7.1 MASS AND BALANCE	(A) Mass and Palance
	(A) Purpose of mass and balance	
	consideration	(1) Mass limitations
	(1) Mass limitations	(2) Calculation of aircraft
	(a) Importance in regard to structural	mass
	limitations	(3) Centre of gravity
	(b) Importance in regard to performance	limitations
	limitations	
	(2) CG limitations	(4) Calculation of centre of
	(a) Importance in regard to stability and	gravity
	controllability	(B) Performance - Take-Off
	(b) Importance in regard to performance	and Climb
	(B) Loading	(1) Factors affecting take-off
	(1) Terminology	and climb performance
	(a) Mass terms	(2) Calculation of talks off
	(b) Load terms (including fuel terms)	(2) Calculation of take-off
	(2) Mass limits	and climb performance
	(a) Structural limitations	(C) Performance - Cruise
	(b) Performance limitations	(1) Principles of endurance
	(c) Baggage compariment initiations	and range
	(a) Maximum masses for take-off and landing	(2) Factors affecting cruise
	(b) Use of standard masses for passengers	(2) lactors affecting cluise
	baggage and crew	
	(4) Fundamentals of CG calculations	(3) Calculation of cruise
	(a) Definition of centre of gravity	performance
	(b) Conditions of equilibrium (balance of forces	(D) Performance - Descent
	and balance of moments)	and Landing
	(c) Basic calculations of CG	(1) Factors affecting descent
7 Elight	(C) Mass and balance details of aircraft	and landing performance
performance	(1) Contents of mass and balance	(2) Calculation of descent and
and planning	documentation	(2) Calculation of descent and
	(a) Datum and moment arm	landing performance
	(b) CG position as distance from datum	
	(2) Extraction of basic mass and balance	
	(d) DEM (b) CC position or moment at REM	
	(c) Deviations from standard configuration	
	(3) Determination of CG position	
	(a) Methods	
	(1) Arithmetic method	
	(2) Graphic method	
	(4) Load and trim sheet	
	(a) General considerations	
	(b) Load sheet and CG envelope for light	
	aeroplanes and for helicopters	
	7.2 Aeroplane Performance	
	(1) Introduction	
	(a) Performance classes	
	(b) Stages of flight	
	(c) Effect of aeroplane mass, wind, altitude,	
	runway slope and runway conditions	
	(d) Gradients	
	(2) SE aeroplanes	
	Definition of terms and speeds	
	(3) Take-off and landing performance	
	use of aeroplane flight manual data	

 7.3 FLIGHT PLANNING AND FLIGHT MONITORING (A) Flight planning for VFR flights (1) VFR navigation plan (a) Routes, airfields, heights and altitudes from VFR charts (b) Courses and distances from VFR charts (c) Aerodrome charts and aerodrome directory (d) Communications and radio navigation planning data (e) Completion of navigation plan (2) Fuel planning General knowledge (3) Pre-flight calculation of fuel required (a) Calculation of extra fuel (b) Completion of the fuel section of the navigation plan (fuel log) and calculation of total fuel (B) Pre-flight preparation (1) AIP and NOTAM briefing (a) Ground facilities and services (b) Departure, destination and alternate aerodromes (c) Airway routings and airspace structure (2) Meteorological briefing Extraction and analysis of relevant data from meteorological documents 	 (E) VFR Flight Planning Route selection Communication and radio Completion of the Completion of the Completion of the Completion of the (3) Completion of the Ravigation plan The Aeronautical Information Publication (AIP) NOTAMS Obtaining meteorological Information International flight (F) Fuel Planning Fuel required calculation (G) ICAO (ATS) Flight Plan Requirement to File ICAO Flight plan Submission of the ICAO (ATS) Flight plan (H) National Procedures National rules and procedures
 (C) ICAO flight plan (ATS flight plan) (1) Individual flight plan (a) Format of flight plan (b) Completion of the flight plan (c) Submission of the flight plan (D) Flight monitoring & in-flight re-planning (1) Flight monitoring 	
 (a) Monitoring of track and time (b) In-flight fuel management (c) In-flight re-planning in case of deviation from planned data 	

	-	
8. Aircraft General Knowledge	 8.1 AIRFRAME AND SYSTEMS, ELECTRICS, POWERPLANT AND EMERGENCY EQUIPMENT (A) System design, loads, stresses, maintenance Loads and combination loadings applied to an aircraft's structure (B) Airframe (1) Wings, tail surfaces & control surfaces (a) Design and constructions (b) Structural components and materials (c) Stresses (d) Structural limitations (2) Fuselage, doors, floor, wind-screen and windows (a) Design and constructions (b) Structural components and materials (c) Stresses (d) Structural components and materials (c) Stresses and aero elastic vibrations (d) Structural limitations (e) Structural limitations (f) Hydraulics (f) Hydraulics (g) Hydraulics (g) Hydraulic systems (g) Hydraulic systems (g) Hydraulic fluids: types and characteristics, limitations (h) System components: design, operation, degraded modes of operation, indications and warnings (C) Landing gear, wheels, tyres and brakes (1) Landing gear Types and materials (2) Nose wheel steering: design and operation (j) System components: design, operation, indications and warnings (J) Wheels and tyres Types and operational limitations (h) System components: design, operation, indications and warnings (J) Wheels and tyres Types and operational limitations (j) System components: design, operation, indications and warnings, degraded modes of operation, and ipamining (j) Secondary flight controls Sys	 (A) The Airframe Airframe design and construction Serviceability checks (B) Flying Controls Flying Controls Flying control design and construction Serviceability checks (C) Undercarriage Undercarriage design and construction Tyres and brakes Serviceability checks (D) Piston Engines Principles of operation Piston engine design and components Serviceability checks (E) Piston Engine Systems Fuel system Induction system Other engine systems Principles of operation Propeller Principles of operation (2) Foropeller Propeller design and components Propeller handling Serviceability checks
	indications and warnings, degraded modes of operation and jamming (2) Secondary flight controls System components: design, operation, degraded modes of operation, indications and warnings (3) Anti-icing systems Types and operation (pitot and windshield)	

 (E) Fuel system - Piston engine System components: design, operation, degraded modes of operation, indications and warnings (F) Electrics (1) Electrics - general & definitions (a) Direct current: voltage, current, resistance, conductivity, Ohm's law, power and work (b) Alternating current: voltage, current, amplitude, phase, frequency and resistance (c) Circuits: series and parallel (d) Magnetic field: effects in an electrical circuit (2) Batteries (a) Types, characteristics and limitations (b) Battery chargers, characteristics, limitations (c) Protection against interference (d) Lightning effects (a) DC generation: production, distribution, use (a) DC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings (b) AC generation: types, design, operation, degraded modes of operation, indications and warnings	 (1) Instruments and Systems (1) The pitot static system (2) The altimeter (3) The vertical speed indicator (4) The air speed indicator (5) The suction system (6) Attitude indicator (7) Heading indicator (8) The turn indicator / turn coordinator (9) The compass (10) Other instrumentation (11) Integrated electronic displays (J) Avionics Systems (1) Communications Equipment (2) SSR (3) ADF (4) VOR (5) DME (6) GNSS (7) Integrated Electronic Displays (K) Cockpit Equipment and Systems (1) Doors, windows and exits
 (a) bus bar, common earth and priority; (b) AC and DC comparison. (G) Piston engines (1) General (a) Types of internal combustion engine: basic principles and definitions (b) Engine: design, operation, components and materials (2) Fuel (a) Types, grades, characteristics and limitations (b) Alternate fuel: characteristics and limitations (b) Alternate fuel: characteristics and limitations (a) Carburettor or injection system (a) Carburettor: design, operation, degraded modes of operation, indications and warnings (b) Injection: design, operation, degraded modes of operation, indications and warnings (c) Icing (d) Air cooling systems Design, operation, degraded modes of operation, indications and warnings (a) Lubricants: types, characteristics and limitations (b) Design, operation, degraded modes of operation, indications and warnings (b) Design, operation, degraded modes of operation, indications and warnings (b) Design, operation, degraded modes of operation, indications and warnings (b) Design, operation, degraded modes of operation, indications and warnings 	 (2) Seats (3) Seat belts and harnesses (4) Cockpit heating and ventilation systems (L) Emergency Equipment (1) First aid kit (2) Fire extinguishers (3) ELT/PLB (4) Lifejackets and life rafts (5) Other survival equipment (M) Aircraft Airworthiness (1) Aircraft registration (2) Airworthiness Certificate, Permit to Fly

(7) Mixture

Definition, characteristic mixtures, control instruments, associated control levers and indications

(8) Propellers

- (a) Definitions and general:
- (1) aerodynamic parameters;
- (2) types;
- (3) operating modes.

(b) Constant speed propeller: design, operation and system components

(c) Propeller handling: associated control levers, degraded modes of operation, indications and warnings

(9) Performance and engine handling

(a) Performance: influence of engine parameters, influence of atmospheric conditions, limitations and power augmentation systems

(b) Engine handling: power and mixture settings during various flight phases and operational limitations

8.2 INSTRUMENTATION

(A) Instrument and indication systems

(1) Pressure gauge

Different types, design, operation, characteristics and accuracy

(2) Temperature sensing

Different types, design, operation, characteristics and accuracy

(3) Fuel gauge

Different types, design, operation, characteristics and accuracy

(4) Flow meter Different types, design, operation, characteristics

and accuracy

(5) Position transmitter

Different types, design, operation, characteristics and accuracy

(6) Tachometer Design, operation, characteristics and accuracy

(B) Measurement of aerodynamic parameters

(1) Pressure measurement

(a) Static pressure, dynamic pressure, density and definitions

(b) Design, operation, errors and accuracy

(2) Temperature measurement

- (a) Design, operation, errors and accuracy(b) Displays
- (3) Altimeter
- (a) Standard atmosphere
- (b) The different barometric references (QNH,
- QFE and 1013.25)
- (c) Height, indicated altitude, true altitude, pressure altitude and density altitude
- (d) Design, operation, errors and accuracy
- (e) Displays
- (4) Vertical speed indicator
- (a) Design, operation, errors and accuracy
- (b) Displays

(N) Aeroplane Flight Manual/Pilot Operating Handbook

(1) Aircraft maintenance and serviceability

(2) Maintenance and serviceability documentation

(O) Converting Onto a Another Aircraft Type

Practical considerations when converting onto a different aircraft and/or variants

(P) National Procedures

National rules and procedures

 (5) Air speed indicator (a) The different speeds IAS, CAS, TAS: definition, usage and relationships (b) Design, operation, errors and accuracy (c) Displays 	
(C) Magnetism: direct reading compass	
(1) Earth magnetic field	
 (2) Direct reading compass (a) Design, operation, data processing, accuracy and deviation (b) Turning and acceleration errors (D) Gyroscopic instruments 	
 (1) Gyroscope: basic principles (a) Definitions and design (b) Fundamental properties (c) Drifts 	
(2) Turn and bank indicator	
(3) Attitude indicator Design, operation, errors and accuracy (4) Directional gyroscope	
(E) Communication sustants	
(1) Transmission modes: VHF, HF, SATCOM Principles, bandwidth, operational limitations and use (2) Voice communication Definitions, general and applications	
(F) Alerting systems and proximity systems	
(1) Flight warning systems Design, operation, indications and alarms (2) Stall warning	
Design, operation, indications and alarms	
(G) Integrated instruments: electronic displays	
(1) Display units Design, different technologies and limitations	

	9.1 GENERAL NAVIGATION	(A) Form of the Farth
	(A) Basics of navigation	(1) Latitude and Longitude
	(1) The solar system	
	Seasonal and apparent movements of the sun	(B) Measurement of
	(2) The earth	(1) True direction
	(a) Great Circle, Small Circle and multipline (b) Latitude and difference of Latitude	(1) Magnetic direction
	(c) Longitude and difference of longitude	(2) Company direction
	(d) Use of latitude and longitude co-ordinates to	(3) Compass direction
	locate any specific position	(C) Measurement of Distance
	(3) Time and time conversions	(1) Units of distance
	(a) Apparent time	(2) Conversion of units
	(b) UTC	(D) Measurement of
	(c) LMI	Airspeed
	(a) Datalina	(1) Calculation of true airspeed
	(f) Definition of suprise supset and civil twilight	(E) Triangle of Velocities
	(i) Directions	(1) Calculating heading and
	(a) True north, magnetic north & compass north	groundspeed
	(b) Compass deviation	(E) In-flight VEP Navigation
	(c) Magnetic poles, isogonals, relationship	Dead Reckoning and Map
	between true and magnetic	Reading
	(5) Distance	(1) Principles of dead reckoning
	(a) Units of distance and height used in navigation: nautical miles, statute miles	(2) Time and distance
	kilometres, metres and ft	(3) Map reading
	(b) Conversion from one unit to another	(G) In-flight VFR Navigation:
9. Navigation	(c) Relationship between nautical miles and	Off-track and Diversion
-	minutes of latitude and minutes of longitude	(1) Off track correction
	(B) Magnetism and compasses	(2) ETA revision
	(1) General principles	(3) Diversion
	(d) refrestrial magnetism (b) Resolution of the earth's total magnetic force	(4) Alternate airfields
	into vertical and horizontal components	(H) In-flight VFR Navigation:
	(c) Variation-annual change	Vertical Navigation
	(2) Aircraft magnetism	(1) Safety altitudes
	(a) The resulting magnetic fields	(2) Vertical navigation
	(b) Keeping magnetic materials clear of the	(3) Altimeter settings
		(I) In-flight VER Navigation:
	(C) Charts	Controlled and Notified
	(1) General properties of miscellaneous types of projections	Airspace
	(a) Direct Mercator	(1) Procedures in the vicinity of
	(b) Lambert conformal conic	controlled and notified
	(2) The representation of meridians,	airspace
	parallels, great circles and rhumb lines	(2) Procedures within controlled
	(a) Direct Mercator	and notified airspace
	(D) Lambert conformal conic	(3) Airspace infringement
	(1) Plotting positions	(J) Time
	(2) Methods of indicating scale and relief (ICAO	(1) UTC
	topographical chart)	(2) Time Zones
	(3) Conventional signs	(3) Sunrise and sunset
	(4) Measuring tracks and distances (5) Plotting bearings and distances	information

(D) DR navigation (1) Basis of DR (a) Track	(K) VFR Radio Navigation (1) Integrating radio navigation
(b) Heading (compass, magnetic and true)(c) Wind velocity(d) Air speed (IAS, CAS and TAS)	(2) VDF – Operation and interpretation, limitations and accuracy
 (e) Groundspeed (f) ETA (g) Drift and wind correction angle (b) DB position fix 	(3) ATC Radar – Operation and interpretation, limitations and accuracy
 (e) Groundspeed (f) ETA (g) Drift and wind correction angle (h) DR position fix (2) Use of the navigational computer (a) Speed (b) Time (c) Distance (d) Fuel consumption (e) Conversions (f) Air speed (g) Wind velocity (h) True altitude (3) The triangle of velocities (a) Heading (b) Ground speed (c) Wind velocity (d) Track and drift angle (4) measurement of DR elements (a) Calculation of altitude (b) Determination of appropriate speed (E) In-flight navigation (1) Use of visual observations and application to in-flight navigation (2) Navigation in cruising flight, use of fixes to revise navigation data (a) Ground speed revision (b) Off-track corrections (c) Calculation of wind speed and direction (d) ETA revisions (3) Flight log 9.2 RADIO NAVIGATION (A) Basic radio propagation theory (1) Antennas 	 (3) ATC Radar - Operation and interpretation, limitations and accuracy (4) ADF - Operation and interpretation, limitations and accuracy (5) VOR - Operation and interpretation, limitations and accuracy (6) DME - Operation and interpretation, limitations and accuracy (7) GNSS - operation and interpretation, limitations and accuracy
 (1) Antennas Characteristics (2) Wave propagation Propagation with the frequency bands (B) Radio aids (1) Ground DF (a) Principles (b) Presentation and interpretation (c) Coverage (d) Range (e) Errors and accuracy (f) Factors affecting range and accuracy 	

(2) NDB/ADF	
(a) Principles	
(b) Presentation and interpretation	
(c) Coverage	
(d) Range	
(e) Errors and accuracy	
(f) Factors affecting range and accuracy	
(3) VOR	
(a) Principles	
(b) Presentation and interpretation	
(c) Coverage	
(d) Range	
(e) Errors and accuracy	
(f) Factors affecting range and accuracy	
(4) DME	
(a) Principles	
(b) Presentation and interpretation	
(c) Coverage	
(d) Range	
(e) Errors and accuracy	
(f) Factors affecting range and accuracy	
(C) Radar	
(1) Ground radar	
(a) Principles	
(b) Presentation and interpretation	
(c) Coverage	
(d) Range	
(e) Errors and accuracy	
(f) Factors affecting range and accuracy	
(2) Secondary surveillance radar and	
transponder	
(a) Principles	
(b) Presentation and interpretation	
(c) Modes and codes	
(D) GNSS	
(1) GPS, GLONASS or GALILEO	
(a) Principles	
(b) Operation	
(c) Errors and accuracy	
(d) Factors affecting accuracy	

LESSON A1 – EXERCISE 3 AIR EXPERIENCE

Ref: AMC1 FCL.110.A (c) 2 (ii) (iv) Ex 1b (D), 3

Aim: To introduce the student to single engine piston flying.

Likely Threats, Errors and Undesired Aircraft States: Not knowing who has control

PRE FLIGHT:

- · Introduction to safety in and around the aircraft
- Emergency and evacuation brief (Keep simple)
- Preparation for flight (Introduction to the basics only)
- Handover/ Takeover/Follow Through/Relax procedures

AIR EXERCISE:

- Aircraft familiarisation
- Demonstration of aircraft stability
- · Introduction to attitude flying

LESSON A2 – EXERCISE 4.1 EFFECTS OF CONTROLS 1

Ref: AMC1 FCL.110.A (c) 2 (i) (v), (vi) Ex 1a, 4, 5a

Aims:

- 1. To learn the effects of the primary controls.
- 2. To select, hold and trim to an attitude.

Likely Threats, Errors and Undesired Aircraft States:

Unfamiliar surroundings, Busy airspace

PRE FLIGHT:

- Pre-flight brief on Effects of Controls Part 1 (Ex 4.1)
- Pre-flight brief on Taxying (Ex 5)

AIR EXERCISE:

- Datum attitude
- Primary effect of the:
 - Elevators
 - Ailerons
 - Rudder
- Effect and use of trim
- Effect of speed on the primary controls
- Effect of slipstream on the primary controls
- Further effect of the:
 - Elevators
 - Ailerons
 - Rudder
- Demo of adverse yaw and the need for co-ordinated use of controls when rolling

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Control the aircraft in all 3 axes
- □ Select and trim to an attitude
- □ Taxi the aircraft with guidance

(0.45)
LESSON A3 – EXERCISE 4.2 EFFECTS OF CONTROLS 2

Ref: AMC1 FCL.110.A (c) 2 (v) Ex 4, 5a, 5b

Aim: To set an engine RPM and operate flaps and supplementary controls whilst maintaining the datum attitude in trim.

Likely Threats, Errors and Undesired Aircraft States:

Exceeding flap limit, Exceeding engine limits, Brake/steering failure

PRE FLIGHT:

- Pre-flight brief on Effects of Controls Part 2 (Ex 4.2)
- Introduction to weather interpretation and NOTAM decoding

AIR EXERCISE:

- Revision of effects of controls part 1
- Use of throttle and the engine gauges
- Effect of power, speed and flap on the trimmed state
- Effect and use of flap
- Supplementary controls: Use of mixture and carb heat
- Set an engine RPM

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Select & trim to any pitch attitude
- □ Maintain attitude & direction whilst changing power
- □ Maintain attitude & direction whilst operating flaps
- □ Retrim following changes to power and flaps
- □ Operate the ancillary controls

(0.45)

LESSON G1 – PRINCIPLES OF FLIGHT 1 Ref: AMC1 FCL.210; FCL 215 & Alt MoC1 TK 05.(A)	(1.00)
 Basic Concepts (1) Static and dynamic pressure (2) Aerodynamic forces (3) Aerofoils and wings 	
LESSON G2 – PRINCIPLES OF FLIGHT 2 Ref: Alt MoC1 TK 05.(B)	(2.00)
The Four Forces (1) Weight (2) Thrust (3) Lift (4) Drag	
LESSON G3 – PRINCIPLES OF FLIGHT 3 Ref: Alt MoC1 TK 05.(E)	(2.00)
Principles of Flight (1) Straight and level flight (2) Climbing (3) Descending (4) Turning and manoeuvring	
LESSON G4 – COMMS 1 Ref: Alt MoC1 TK 02.(A)	(1.00)
VHF Radio Broadcast Factors affecting VHF radio range	
Transmission Technique (1) Transmission of letters (2) Transmission of numbers (3) Transmission of time (4) Call signs	
LESSON G5 – COMMS 2 Ref: Alt MoC1 TK 02.(C)	(1.30)
VFR Communications Procedures (1) Test procedures (2) Standard phraseology (3) Items requiring read back (4) Transfer of communications (5) Transponder operating procedures	
LESSON G6 – OPERATIONAL PROCEDURES 1 Ref: Alt MoC1 TK 06.(A)	(0.30)

Application of Threat and Error Management

Application of Threat and Error Management (TEM) in relation to aircraft operation

LESSON A4 – EXERCISE 6.1 STRAIGHT AND LEVEL 1

(0.45)

Ref: AMC1 FCL.110.A (c) 2 (viii) Ex 6

Aim: To learn to fly straight and level, in balance and in trim, at a constant power setting

Likely Threats, Errors and Undesired Aircraft States:

System/Engine problems, Blind spots

PRE FLIGHT:

- Pre-flight brief on Straight & Level Part 1 (Ex 6.1)
- Weather and NOTAM brief

AIR EXERCISE:

- Revision of effects of controls
- Achieve straight flight
- Achieve level flight
- Achieve straight and level flight
- Demo gross and slight imbalance
- Lookout (scan technique)
- Maintenance of S & L Cruise checks
- Correct to datums

STANDARD:

The student demonstrates a clear understanding of the principles of:

- □ Routine checks
- □ The need for a lookout scan technique

- □ Recover to and maintain balanced, S&L from attitude excursions
- □ Trim the aircraft
- □ Make small corrections to recover & maintain heading & altitude datum
- □ Carry out a lookout scan

LESSON A5 – EXERCISE 6.2 STRAIGHT AND LEVEL 2

Ref: AMC1 FCL.110.A (c) 2 (viii), (xii) & (xv) Ex 6, 10a & 12

Aim: To fly straight and level at different power settings and speeds and with flap.

Likely Threats, Errors and Undesired Aircraft States:

Exceeding limiting speeds, Flying too slowly

PRE FLIGHT:

- Pre-flight brief on Straight & Level Part 2 (Ex 6.2)
- Weather and NOTAM brief

AIR EXERCISE:

- · Revision of straight and level 1
- Deceleration & acceleration
- · Straight & level at different power settings and speeds
- · Relate to best endurance and best range speeds
- Speed instability (slow flight)
- Straight & level with flaps
- Slow safe cruise

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Maintain S&L when adjusting power
- □ Maintain S&L when changing speed
- □ Maintain S&L when changing configuration
- □ Retrim following changes
- Adopt slow safe cruise & return to normal cruise

(1.00)

LESSON A6 – EXERCISE 7.1 & 8.1 CLIMBING & DESCENDING 1 AND EXERCISE 9.1, MEDIUM LEVEL TURNS

(1.15)

Ref: AMC1 FCL.110.A (c) 2 (ix) & (x) Ex7 & 8 and (xi) Ex9

Aims: 1. To climb at best rate and level off at specified altitudes.

- 2. To glide at best range speed
- 3. To execute a level turn at 30° AOB and roll out on specific headings.

Likely Threats, Errors and Undesired Aircraft States:

Weather conditions, Incorrect pressure setting, Flap misuse, Engine overheating and excessive engine cooling

PRE FLIGHT:

- Pre-flight brief on Climbing & Descending Part 1 (Ex 7.1 & 8.1)
- Pre-flight brief on Medium Level Turns (Ex 9.1)
- Weather and NOTAM brief

AIR EXERCISE:

- Revision of straight and level 2 Achieve S & L at different IAS.
- Climb
 - a. Maintain the climb (inc. control of IAS and engine management)
 - b. Entry into the climb
 - c. Level off at specified altitudes
- Turns:
 - a. Maintain a medium level turn
 - b. Entry into a medium level turn
 - c. Roll out of a medium level turn
 - d. Roll out onto specific features/headings
- Descent:
 - a. Maintain the glide (inc. control of IAS and engine management)
 - b. Entry to the glide
 - c. Transition from glide to climb

STANDARD:

- Enter a climb and recover to S&L
- Enter the glide
- □ Maintain balance and heading in climb/descent
- Make transition from glide to climb
- □ Make a level turn, recovering by ref to landmarks
- Make a level turn, recovering onto specified headings

LESSON A7 – EXERCISE 7.2 & 8.2 CLIMBING & DESCENDING 2 (1.15)

Ref: AMC1 FCL.110.A (c) 2 (ix) & (x) Ex7 & 8

Aims: 1. To learn the climb and descent techniques used in the circuit 2. To fly a go-around.

Likely Threats, Errors and Undesired Aircraft States:

Weather conditions, Incorrect pressure setting, Flap misuse, Excessive engine cooling

PRE FLIGHT:

- Pre-flight brief on Climbing & Descending Part 2 (Ex 7.2 & 8.2)
- Weather and NOTAM brief

AIR EXERCISE:

- Revision of climbing and descending Part 1
- Climbing turns and lookout technique
- Effect of flaps in the climb
- Effect of flaps in the glide
- Effect of power in the descent
- Descending turns
- Approach & landing configurations control of descent
- Go around
- Demonstration stall and recovery

STANDARD:

- Carry out climbing turns
- □ Carry out descending turns
- □ Level off at pre-determined altitudes
- $\hfill\square$ Descend in approach configuration
- Descend in landing configuration
- D Perform a go round

LESSON G7 – PRINCIPLES OF FLIGHT 4	(2.00)
Ref: Alt MoC1 TK 05.(C)	
The Stall	
(1) Stalling angle of attack	
(2) Factors affecting stall characteristics	
(3) Factors affecting stalling speed	
(4) Stall warning	
(5) Spin avoidance	
(6) Spinning characteristics	
LESSON G8 – LAW 1	(1.30)
Ref: Alt MoC1 TK 01.(A) and (G)	
International Aviation Law	
(1) International Civil Aviation Organisation (ICAO)	
(2) European Aviation Safety Agency (EASA)	
(3) National Aviation Authorities (NAA)	
Air Traffic Services	
(1) Air Traffic Control Service	
(2) Flight Information Service	
(3) Alerting Service	
LESSON G9 – LAW 2	(2.00)
Ref: Alt MoC1 TK 01.(B)	()
European Rules of the Air	
(1) Applicability and compliance	
(2) Pilot in command responsibilities	
(3) Pre flight actions	
(4) Avoidance of collisions & rights of way	
(5) Operation in the vicinity of an aerodrome	
LESSON G10 – LAW 3	(1.00)
Ref: Alt MoC1 TK 01.(C)	
Aerodromes	
(1) Taxiway and runway signs and markings	
(2) Preventing runway Incursion	
(3) Other ground signals	
(4) Marshalling signals	
(5) Light signals	

LESSON G11 – OPERATIONAL PROCEDURES 2 Ref: Alt MoC1 TK 06.(C)

(0.30)

Avoidance of Hazards

(1) Avoiding hazardous situations(2) Avoidance of wake turbulence

LESSON A8 – EXERCISE 10A/B(1) STALLING PART 1

Ref: AMC1 FCL.110.A (c) 2 (xiii) Ex10b

Aim: To learn to recognise and recover from the full and approaching stall.

Likely Threats, Errors and Undesired Aircraft States:

Unrecognised stall, Other aircraft, Incorrect configuration, Harness insecure, Loose objects, Engine failure

PRE FLIGHT:

- Pre-flight brief on Stalling Part 1 (Ex10B1)
- Weather and NOTAM brief

AIR EXERCISE:

- Introduction to the stall:
 - a. Demo / guide of HASELL and entry
 - **b.** Demo of full stall & recovery if not previously done.
- Recognition of the stall:
 - a. Signs of the approaching stall
 - **b.** Confirming buffet identification
 - c. Full stall features
- Recovery from the stall:
 - a. Recovery at incipient stage
 - **b.** Recovery without power
 - c. Standard Stall Recovery (SSR)
 - d. Cruise checks after stalling

STANDARD:

The student demonstrates a clear understanding of the principles of:

- □ Checks before stalling (HASELL)
- □ Standard Stall Recovery

The student recognises:

- □ Symptoms of the full stall
- □ Signs of the incipient stall

The student demonstrates the correct use of the requisite techniques to:

- □ Recover at the incipient stage (SSR)
- □ Recover from a full stall (SSR)
- □ Recover without power

(1.00)

LESSON A9 – EXERCISE 10A/B(2) STALLING PART 2

(1.00)

Ref: AMC1 FCL.110.A (c) 2 (xiii) Ex10b

Aims: 1. To learn how flaps & power affect stalling characteristics.2. To avoid stalling in the circuit.

2. TO avoid stalling in the circuit.

Likely Threats, Errors and Undesired Aircraft States:

Unrecognised stall *When practising recoveries:* Other aircraft, Incorrect configuration, Harness insecure, Loose objects, Engine fails

PRE FLIGHT:

- Pre-flight brief on Stalling Part 2 (Ex10B2)
- Weather and NOTAM brief

AIR EXERCISE:

- Revise clean, power off stall recovering at incipient stage.
- Stalling with power/flap/landing configuration:
 - **a.** Effect of power on the stall
 - b. Effect of flap
 - c. Full stall in landing configuration
- Recovery from the stall at the incipient stage:
 - **a.** Recovery at the incipient stage in landing configuration (simulated final approach)
 - **b.** Recovery at the incipient stage in the turn with approach configuration (simulated base to final turn)
 - **c.** Recovery at the incipient stage in the departure turn with and without take-off flap setting (simulated turn after take off)
 - d. Cruise checks after stalling

STANDARD:

The student demonstrates a clear understanding of the principles of:

• The effect of power & flap on the stall

- □ Recover to a safe climb at the incipient stage of a stall in simulated final approach
- □ Recover to a safe climb at the incipient stage of a stall in simulated base to final turn
- □ Recover to a safe climb at the incipient stage of a stall in a simulated climbing turn after take off

	LESSON	G12 –	LAW 4
--	--------	-------	-------

Ref: Alt MoC1 TK 01.(D)

Visual Meteorological Conditions (VMC) and Visual Flight Rules (VFR)

- (1) Visual Meteorological Conditions (VMC) minima
- (2) Visual Flight Rules (VFR)
- (3) Minimum heights

LESSON G13 - LAW 5

Ref: Alt MoC1 TK 01.(E) & (I)

Airspace Classifications

- (1) Classification of airspace
- (2) Controlled and notified airspace
- (3) Uncontrolled airspace
- (4) Radio Mandatory Zones (RMZ)
- (5) Transponder Mandatory Zones (TMZ)

Urgency and Distress Procedures

- (1) Urgency situation
- (2) Distress situation
- (3) Interception of civil aircraft

LESSON G14 - MET 1

Ref: Alt MoC1 TK 03.(A) & (B)

The Atmosphere

- (1) Composition of the atmosphere
- (2) The troposphere

Temperature, Pressure and Density

- (1) Temperature variation in the atmosphere
- (2) Pressure variation in the atmosphere
- (3) Density
- (4) Humidity
- (5) The International Standard Atmosphere (ISA)

LESSON G15 – COMMS 3

Ref: Alt MoC1 TK 01.(D) & (E)

Weather Information

ATIS & VOLMET broadcasts, Flight Information Service (FIS)

Communications Failure

Actions in the event of communication failure

LESSON G16 – COMMS 4

Ref: Alt MoC1 TK 01.(F) & (G)

Distress and Urgency Procedures

(1) Emergency frequencies and facilities

(2) Urgency procedures

(3) Distress procedures

National Procedures

National rules and procedures

(1.00)

(1.00)

(2.00)

(1.30)

(2.00)



This programme details only four "circuit sessions" to include EASA exercises 12 and 13 but the actual number of flights to achieve competence will vary.

Flapless and glide approaches and cross wind techniques are introduced prior to first solo but are covered in more detail later as part of circuit consolidation. Cross wind techniques should be covered whenever conditions are suitable. All solo circuit practices should include practice of normal circuits when possible.

Theoretical Knowledge

The pre-flight briefings and debriefings during Phase 2 should introduce the student to basic Operating Procedures. A satisfactory knowledge of Aviation Law and if appropriate Communications Procedures, must be demonstrated before solo flight.

Threat and Error Management

In addition to those suggested in individual lessons, the threats and errors below may affect flight in the circuit. Suitable mitigations should be considered and applied.

THREATS

Concentration of aircraft in the circuit System/Engine problems Insufficient runway performance

ERRORS

Unstable approach Use of flap at high speed Premature flap retraction Repeatedly flying over populated areas Lack of theoretical knowledge Lack of medical fitness to fly solo

UNDESIRED AIRCRAFT STATES

Engine overheating

CIRCUIT EMERGENCIES

The student should be able to deal with all of the following prior to first solo.

- 1. Abandoned take-off
- 2. Engine failure after take-off
- 3. Partial engine failure after take-off
- 4. Missed landing and Go-around (bounce/balloon)
- 5. Missed approach
- 6. Radio failure

SYLLABUS CHECK LIST – EASA Ref: AMC 1 FCL.110.A (c) 2

AMC Ref.	Exercise
(xiii) Ex 10b Stalling	 (A) safety checks; (B) symptoms; (C) recognition; (D) clean stall and recovery without power and with power; (E) recovery when a wing drops; (F) approach to stall in the approach and in the landing configurations, with and without power and recovery at the incipient stage.
(xv) Ex 12 Take-off and climb to downwind position	 (A) pre-take-off checks; (B) into wind take-off; (C) safeguarding the nose wheel; (D) crosswind take-off; (E) drills during and after take-off; (F) short take-off and soft field procedure/techniques including performance calculations; (G) noise abatement procedures.
(xvi) Ex 13 Circuit, approach and landing	 (A) circuit procedures, downwind and base leg; (B) powered approach and landing; (C) safeguarding the nose wheel; (D) effect of wind on approach and touchdown speeds and use of flaps; (E) crosswind approach and landing; (F) glide approach and landing; (G) short landing and soft field procedures or techniques; (H) flapless approach and landing; (I) wheel landing (tail wheel aeroplanes); (J) missed approach and go-around; (K) noise abatement procedures.
(xvii) Ex12/13 Emergencies	 (A) abandoned take-off; (B) engine failure after take-off; (C) mislanding and go-around; (D) missed approach.
(xviii) Ex 14 First solo	 (A) instructor's briefing including limitations, (B) use of required equipment (C) observation of flight and de-briefing; Note: during flights immediately following the solo circuit consolidation the following should be revised: (a) procedures for leaving and rejoining the circuit; (b) the local area, restrictions, map reading; (c) use of radio aids for homing; (d) turns using magnetic compass, compass errors.

LESSON A10 - EXERCISE 12 & 13 – CIRCUITS

Ref: AMC1 FCL.110.A (c) 2 (xv) & (xvi) Ex 12 & 13

Aim: To learn to fly a standard circuit pattern and make a normal landing

Likely Threats, Errors and Undesired Aircraft States:

Concentration of aircraft, Unstable approach

PRE FLIGHT:

- Pre-flight brief on the standard circuit and normal landing (Ex 12 & 13)
- Weather and NOTAM brief

AIR EXERCISE:

- Revise normal take-off, after take-off checks; drift correction, climb.
- Turn to downwind and downwind leg Spacing from runway / other aircraft / drift correction Reference points / RT Call **Pre-landing checks**
- Base leg Configuring the aircraft Drift correction Assessing rate of descent / flight path Anticipation and technique for turn onto Final Approach
- Final Approach if not stable by 300'agl go around Control of approach path / Landing Configuration / Correct IAS Clearance received (if appropriate)
 - o Runway correct and clear
- Landing flare Technique
 - Throttle/attitude control
- Ground roll Use of flying controls and brakes
- Touch and Go procedures

STANDARD:

- □ Pre-take-off and runway checks
- □ Normal take-off
- Climb upwind and crosswind
- Downwind legBase leg
- □ Final Approach
- □ Stabilised Approach
- □ Landing flare
- □ Ground roll
- □ Touch and go □ Use of standard RT

LESSON A11 - EXERCISE 12 & 13 – CIRCUITS & EMERGENCIES (1.00)

Ref: AMC1 FCL.110.A (c) 2 (xv), (xvi) & (xvii) Ex 12, 13, 12E & 13E

Aims:

- 1. To continue practising the circuit.
- 2. To introduce circuit emergencies
- 3. To introduce flapless and glide approaches

Likely Threats, Errors and Undesired Aircraft States:

Flap failure, Engine malfunctions, Malfunction during T/O, Crosswind

PRE FLIGHT:

- Pre-flight brief on continuing practise of Ex12 and 13
- Pre flight brief on emergency procedures Ex 12E & 13E
- Weather and NOTAM brief

AIR EXERCISE:

Revise general circuit procedures

Engine failure after takeoff;

- · Speed achievement and maintenance
- Field selection
- Crash drill

Flapless approach;

- Higher stall speed = higher approach speed
- Difficulty in slowing down
- Extension of final approach
- Change to Approach Attitude
- Different flare
 Effect on Landing Distance Performance

Academic glide approach;

- Judgement of touchdown point (point of constant reference)
- Undershoot/overshoot corrections Flap/Turns/sideslip
- Speed control
- Landing flare
- Circuit emergency(s) from overview (EX 12E & 13E)

STANDARD:

The student demonstrates a clear understanding of the principles of:

- □ A flapless circuit & approach
- □ A glide circuit & approach
- Dealing with emergencies in the circuit

- □ Fly the standard circuit
- □ Make a safe landing
- Use standard RT

LESSON A12 – EXERCISE 10A/B(3) STALLING PART 3

Ref: AMC1 FCL.110.A (c) 2 (xiii) (xv) & (xvi) Ex 10b, 12 & 13

- Aims: 1. To revise stall avoidance
 - 2. To practise circuit joining
 - 3. To continue practising circuits and landing

Likely Threats, Errors and Undesired Aircraft States:

As stalling 2 (lesson 9) and

Bounce on landing, Wake vortices, Aircraft joining the circuit, Insufficient spacing, Runway occupied

PRE FLIGHT:

- Pre-flight brief on Stalling Part 3 (Ex10B3)
- Weather and NOTAM brief

AIR EXERCISE:

- · Climb to a suitable area for stalling.
- Revision of incipient recoveries:
 - a. In the approach configuration (simulated turn from base to final)
 - b. In the landing configuration (simulated final approach)
 - c. In the departure turn (simulated turn after take off)
 - d. Cruise checks after stalling

Recovery to base:

- Suitable circuit join with standard RT calls
- Practise normal circuits
- Practise selected circuit emergency from overview

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Carry out all relevant checks and drills
- □ Recognise and recover from an incipient stall on a simulated final turn
- □ Recognise and recover from an incipient stall on a simulated final approach
- □ Recognise and recover from an incipient stall on a simulated departure turn
- □ Fly a standard circuit
- □ Use standard RT procedures

(1.15)

LESSON G17 – METEOROLOGY 2	(1.30)
Ref: Alt MoC1 TK 03.(D)	(1107)
Wind	
(1) Cause of wind	
(2) Variation of wind velocity with altitude	
(3) Local winds	
LESSON G18 – METEOROLOGY 3	(1.30)
Ref: Alt MoC1 TK 03.(E)	
Clouds and Precipitation	
(1) Formation of cloud	
(2) Principle cloud types	
(3) Precipitation	
	(4.00)
$\frac{\text{LESSON GIS - LAW 6}}{\text{Pof: Alt MoC1 TK 01 (E) 8 (H)}}$	(1.30)
Altimeter Setting Procedures	
(1) Height, altitude and flight level	
(2) VFR altimeter setting procedures	
Aeronautical Information Service (AIS)	
(1) Aeronautical Information Service (AIS)	
(2) Aeronautical Information Publication (AIP)	
(3) NOTAMs	
$\frac{\text{LESSON G20} - \text{LAW }}{\text{Det All M-OLTK OD (1) B (10)}}$	(2.00)
Ref: Alt MOC1 TK 03.(J) & (K)	
Pilot Licensing	
(1) Medical certificates	
(2) Private Pilot Licence (PPL) privileges	
(3) Light Aircraft Pilot Licence (LAPL) privileges	
(4) Class Rating	
(5) Type Rating	
(6) Other Ratings and certificates	
National Procedures	
National rules and procedures	
LESSON G21 – PRINCIPLES OF FLIGHT 5	(2.00)
Ref. All MOCT TR 03.(D)	
Stability and Control	
(1) Stability and control in YaW (2) Stability and control in roll	
(2) Stability and control in nitch	
(4) Trimming controls	
(5) High lift devices	
(6) Air brakes and spoilers	
(7) Other flying controls	

LESSON A13 - EXERCISE 14 FIRST SOLO

Ref: AMC1 FCL.110.A (c) 2 (xviii) Ex14

Aim: To safely fly a circuit of the airfield for the first time unaccompanied.

Pre-requisites:

- Valid medical certificate
- Satisfactory handling of circuit emergencies
- Satisfactory knowledge of Air Law and Communications

Likely Threats, Errors and Undesired Aircraft States:

Student bounce/balloon, Pilot unfit to fly

PRE FLIGHT:

Instructor to be satisfied that weather and traffic levels are suitable for a First Solo Briefing:

Requirements for the flight

Action in the event of an unsatisfactory approach or baulked landing

Ensure cockpit secured for solo flight

AIR EXERCISE:

- Student fly a circuit and normal landing
- Go-around if unsafe

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Fly the circuit
- □ Make a safe landing
- □ Use standard RT

(0.15)

LESSON A14 - EXERCISE 13 FLAPLESS APPROACH

Ref: AMC1 FCL.110.A (c) 2 (xvi) Ex 13

- Aims: 1. To consolidate circuit and landing proficiency
 - 2. To revise and practise flapless circuits and landings dual and solo.

Likely Threats, Errors and Undesired Aircraft States:

Insufficient performance, Confliction with other aircraft

PRE FLIGHT:

- · Pre-flight revision on flapless approach and landing
- Weather and NOTAM brief

AIR EXERCISE:

- Revise general circuit procedures
- Revise Flapless circuit procedures
- Solo consolidation of normal and flapless circuits and landings under supervision

STANDARD:

- □ Fly a normal circuit and landing
- □ Fly a flapless circuit
- □ Fly a flapless final approach
- □ Make a safe flapless landing
- □ Use standard RT procedures

LESSON A15 - EXERCISE 13 GLIDE APPROACH

Ref: AMC1 FCL.110.A (c) 2 (xvi) Ex 13

- Aims: 1. To revise circuit flying
 - 2. To fly a glide approach and landing
 - 3. To consolidate solo circuit practice

Likely Threats, Errors and Undesired Aircraft States:

Landing too far up runway, Wind exceeds limits

PRE FLIGHT:

Pre-flight brief on glide approach and landing Weather and NOTAM brief

AIR EXERCISE:

- Revise normal and glide circuit procedures
- Revise Glide approach;
- Carry out solo consolidation of normal, flapless and glide circuits and landings under supervision

STANDARD:

The student demonstrates a clear understanding of the principles of:

• Adjusting the approach path by altering bank angle

- □ Fly a normal circuit and landing
- □ Fly a safe glide approach and go-around
- □ Fly a safe glide landing
- □ Use standard RT procedures

LESSON A16 - EXERCISE 12 & 13 CROSSWIND TAKE-OFF & LANDING

Carried out when conditions dictate

(Dual 0.30 Solo 0.20)

Ref: AMC1 FCL.110.A (c) 2 xv & xvi Ex 12 & 13

Aim: To safely handle the aircraft during take-off and landing in crosswind conditions.

Likely Threats, Errors and Undesired Aircraft States:

Excessive gust, Balloon during Flare, Bounced Landing.

PRE FLIGHT:

Pre-flight brief on Crosswind Take-off and Landing (Ex12&13)
 Weather and NOTAM brief

AIR EXERCISE:

- Calculation of crosswind component
- Use of elevator/aileron to counter wind effects taxying
- Take-off and initial climb Anticipation and prevention of weathercocking and wing lifting Drift allowance when airborne on all circuit legs
- The approach
 Aircraft configuration
 Drift allowance
- The landing Wing down or crab technique to offset for drift Aligning aeroplane with landing path just prior to touchdown Control after landing
- Revise mislanding and go-around (bounce/balloon)

STANDARD:

The student demonstrates a clear understanding of the principles of:

• Crosswind operations and personal limits

- □ Fly a safe circuit in a crosswind
- □ Allow for drift on approach
- □ Make a safe landing in a crosswind
- □ Cope with a mislanding
- Use standard RT procedures

LESSON A17 - EXERCISE 12 & 13 SHORT & SOFT FIELD TAKE-OFF AND LANDING

Ref: AMC1 FCL.110.A (c) 2 (xv) & (xvi) Ex 12 & 13

Aim: To take off and land in minimum distance.

Likely Threats, Errors and Undesired Aircraft States:

Short runway, Recent heavy rain

PRE FLIGHT:

- Pre-flight brief on Short & Soft Field Take-off and Landing (Ex12&13)
- Weather and NOTAM brief

AIR EXERCISE:

- Runway conditions, short field technique
- Short field take-off
 Aircraft configuration
 Control of lift off
 Best angle climb out to clear obstacle convert to best rate
- Short field landing Aircraft configuration Approach picture Speed control Landing flare Control after landing/maximum effective braking
- Repeat take-off and landing sequences using soft field techniques

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Carry out a short field take-off
- □ Carry out a soft field take-off
- □ Achieve and maintain best angle of climb and recover to best rate
- □ Make a safe short field landing
- □ Make a safe soft field landing
- □ Use standard RT procedures

(Dual 0.30)

LESSON G22 – METEOROLOGY 4	(2.00)
Ref: Alt MoC1 TK 03.(F)	
Visibility	
(1) Fog and mist	
(2) Haze and smoke	
(3) Visibility in precipitation	
LESSON G23 – METEOROLOGY 5 Ref: Alt MoC1 TK 03.(C)	(1.00)
Altimetry	
(1) Altimeter and pressure settings	
(2) Altimeter temperature and pressure effects	
LESSON G24 – METEOROLOGY 6 Ref: Alt MoC1 TK 03.(G) & (I)	(1.30)
Air Masses Characteristics of air masses	
High Pressure Systems	
(1) Anticyclones	
(2) Ridges (3) Cols	
LESSON G25 – METEOROLOGY 7	(2.00)
Ref: Alt MoC1 TK 03.(H)	
Low Pressure Systems (1) The warm sector depression (2) The warm front (3) The cold front (4) Occluded fronts (5) Troughs and convergence	
LESSON G26 – OPERATIONAL PROCEDURES 3	(1.30)
Ref: Alt MoC1 TK 06.(B)	
 Operation of Aircraft (1) Applicability of EASA regulations (2) Responsibility and authority of Pilot in Command (PIC) (3) Documents to be carried (4) Dangerous goods (5) Evel and oil refuelling 	
(6) Instruments and equipment	
(7) Safety equipment	
LESSON G27 – FLIGHT PERFORMANCE AND PLANNING 1	(2.00)
Ref: Alt MoC1 TK 07.(A)	
Mass and Balance	
 (1) Mass limitations (2) Calculation of aircraft mass 	

- (2) Calculation of aircraft mass(3) Centre of gravity limitations(4) Calculation of centre of gravity



During Phase 3 Exercises 15 to 18 should be completed and previous exercises revised.

Theoretical Knowledge

Briefings and debriefings should introduce or confirm elements of most of the subjects as the course progresses. The student should demonstrate satisfactory knowledge of Operational Procedures, Meteorology and Human Performance, before flying solo outside the circuit. A satisfactory knowledge of Navigation must be demonstrated before solo navigation exercises, and knowledge of Flight Performance and Planning before the solo qualifying cross-country. Before applying for Skill Test, the student must have passed all the required Theoretical Knowledge examinations, and most of these should be normally be attempted well before the final flying exercises.

Threat and Error Management

In addition to those suggested in individual lessons, the threats and errors below may affect flight during this phase. Suitable mitigations should be considered and applied.

THREATS

Loss of bearings Engine failure Blind spots Confined airspace due weather Poor landing area Other aircraft including in the circuit and military low flying Unfamiliar runway shape/ size/surface at landaway bases Illusion of speed/sideslip at low altitude Physiological sensations in poor visibility

ERRORS

Breach of low flying regulations Errors in measuring / calculating navigation data Feature misidentification Inadequate terrain clearance Poor lookout whilst using satnav

SYLLABUS CHECK LIST – EASA Ref: AMC 1 FCL.210.A (c) 2

AMC Ref.	Exercise
(xix) Ex 15 Advanced turning	 (A) steep turns (45 °), level and descending; (B) stalling in the turn and recovery; (C) recoveries from unusual attitudes, including spiral dives.
(xiv) Ex 11 Spin avoidance	 (A) Stalling and recovery at the incipient spin stage (stall with excessive wing drop > 45°). a. From academic spin entry. b. From stall in a climbing turn with full power. c. From stall in a steep, level turn. d. From Instructor induced distractions during the stall. (B) Recovery from extreme undesired aircraft states. (C) Instructor demo full spin and recovery
(xx) Ex 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.
(xxi) Ex 17 Precautionary landing	 (A) full procedure away from aerodrome to break-off height; (B) occasions necessitating; (C) in-flight conditions; (D) landing area selection: (a) normal aerodrome; (b) disused aerodrome; (c) ordinary field. (E) circuit and approach; (F) actions after landing.

(xxii) Ex 18a Navigation	 (A) flight planning: (a) weather forecast and actuals; (b) map selection and preparation: (1) choice of route; (2) airspace structure (3) safety altitudes. (c) calculations: (1) magnetic heading(s) and time(s) en-route; (2) fuel consumption; (3) mass and balance; (4) mass and performance. (d) flight information: (1) NOTAMs etc.; (2) radio frequencies; (3) selection of alternate aerodromes. (e) aeroplane documentation; (f) notification of the flight: (l) pre-flight administrative procedures; (2) flight plan form. (B) departure: (a) organisation of cockpit workload; (b) departure procedures: (1) altimeter setting; (2) ATC liaison in controlled or regulated airspace; (3) setting heading procedure; (4) noting of ETAs. (c) maintenance of altitude and heading; (d) revisions of ETA and heading; (e) log keeping; (f) use of radio; (g) minimum weather conditions for continuation of flight; (h) in-flight decisions; (i) diversion procedures; (k) uncertainty of position procedure; (k) uncertainty of position procedure; (c) arival and aerodrome joining procedure: (a) Arial and aerodrome joining procedure: (a) circuit procedures; (b) altimeter setting; (c) entering the traffic pattern; (d) circuit procedures; (e) parking; (f) security of aeroplane; (f) security of aeroplane; (g) refuelling; (h) closing of flight plan, if appropriate; (i) post-flight administrative procedures.
(xxiii) Ex 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; (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) Ex 18c Radio navigation	 (A) use of GNSS or VOR/ADF: (a) selection of waypoints or stations; (b) to or from indications and orientation; (c) error messages. (B) use of VHF/DF: (a) availability, AIP and frequencies; (b) R/T procedures and ATC liaison; (c) obtaining a QDM and homing. (C) use of en-route or terminal radar: (a) availability and AIP; (b) procedures and ATC liaison; (c) pilot's responsibilities; (d) secondary surveillance radar: (1) transponders; (2) code selection; (3) interrogation and reply.
-----------------------------------	--

LESSON A18 – EXERCISE 15 ADVANCED TURNING

Ref: AMC1 FCL.110.A (c) 2 (xix) Ex 15

Aim: To learn to fly level & descending 45° AOB Turns

Likely Threats, Errors and Undesired Aircraft States:

Aircraft on collision course, Spiral dive, Stall in turn

PRE FLIGHT:

- Pre-flight brief on Advanced Turning (Ex 15)
- Weather and NOTAM brief

AIREX:

- Revise short field takeoff, climbing (Vx Vy) and climbing turns on to headings
- Student revise 30° AOB turns

Advanced Turning;

- Level 45° AOB Turns
- Use of magnetic compass (simulated DI Failure)
- Steep descending turns 45 ° AOB
- Stalling in the turn and recovery
- Recoveries from undesired aircraft states, including spiral dives
- Revise overhead join

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Fly level and descending turns at cruise speed using 45°- 50° AOB
- □ Recover the aircraft from a stall in the turn
- □ Recover the aircraft safely from Unintended Attitudes including Spiral Dives

(1.00)

LESSON A19 – EXERCISE 11A SPIN AVOIDANCE

(0.45)

Ref: AMC1 FCL.210.A (c) 2 xiv & xxiv Exercise 11 & 18c

Aim: To learn to recognise and recover the aircraft safely from the spin at the incipient stage with minimum height loss

Likely Threats, Errors and Undesired Aircraft States:

Controls mishandled, Other aircraft, Incorrect configuration, Harness insecure, Loose objects, Engine fails, Diving towards excessive airspeed

PRE FLIGHT:

- Pre-flight brief on Spin avoidance (Ex11A) & VHF DF (Ex 18c)
- Weather and NOTAM brief
- Note control central position

AIREX:

Incipient spin recognition and recoveries:

- From stall in a climbing turn with full power
- From stall in a steep, level turn.
- Instructor induced distractions during the stall
- Recovery from extreme undesired aircraft states

Demonstrations;

- Full spin and recovery
- Use of VHF DF to assist recovery to base

STANDARD:

The student demonstrates a clear understanding of the principles of:

- □ Using the Flight Manual or POH to identify correct spin recovery technique
- □ Use of VHF D/F

The student recognises:

□ The incipient stage of the spin

- □ Recover the aircraft safely from the Incipient Spin Stage
- Recover the aircraft safely from extreme undesired aircraft states

LESSON G28 – OPERATIONAL PROCEDURES 4	(1.30)
Ref: Alt MoC1 TK 06.(D) (E), (F) & (G)	
Search and Rescue Procedures	
(1) Principles of search and rescue procedures	
(2) Search and rescue signals	
Accidents and Incidents	
(1) Accident definitions and investigation	
(2) Safety reporting	
(3) Safety publications	
Care of Bassengers	
Passenger briefing and passenger procedures	
National rules and procedures	
LESSON G29 – METEOROLOGY 8	(2.00)
Ref: Alt MoC1 TK 03.(J)	
Hazardous Weather Conditions: Icing	
(1) Airframe icing	
(2) Rain ice	
(3) Frost	
(4) Piston engine icing	
	(1.00)
$\frac{12330N}{230} = \frac{1}{M} \frac{1}{2000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{1000} \frac{1}{10000} \frac{1}{10000} \frac{1}{10000} \frac{1}{100000} \frac{1}{10000000000000000000000000000000000$	(1.00)
Rei. All 1000 1 TR 03.(3)	
Hazardous Weather Conditions: Thunderstorms	
(1) Formation of thunderstorms	
(2) Hazards for aircraft	
LESSON G29 – METEOROLOGY 10	(2.00)
Ref: Alt MoC1 TK 03.(J)	(2.00)
Other Hazardous Weather Conditions:	
(1) Mountainous areas	
(2) Turbulence	
(3) Wind shear	
(4) Strong winds	
LESSON G29 – METEOROLOGY 11	(2.00)
Ref: Alt MoC1 TK 03.(J)	
Meteorological Information	
(1) Synoptic charts	
(2) Satellite imagery	
(3) Ground based weather radar	
(4) Area and significant weather forecasts	
(5) TAFs and METARs	
(6) Sources of meteorological information	
Forecast and observation parameters and tolerances	
National Procedures	
National procedures	

LESSON A20 - EX 16 FORCED LANDINGS WITHOUT POWER

(1.00)

Ref: AMC1 FCL.110.A (c) 2 (xx) Ex16

Aim: To plan, fly an approach and to land safely in the event of a complete engine failure.

Likely Threats, Errors and Undesired Aircraft States:

Engine failure, Too high in pattern, Low flying military aircraft

PRE FLIGHT:

- Pre-flight brief with Forced Landings Without Power (Ex16) as main exercise
- Weather and NOTAM brief

AIREX:

- Short field take-off over 50ft obstacle
- Field selection
- · Ideal FLWOP procedure
- Revise climbing at best angle
- Practise emergency
- Further practise of full procedure.
- Practise use of VHF DF to assist recovery

STANDARD:

- □ Execute a planned approach
- □ Perform relevant checklist drills
- □ Use DF to assist recovery

LESSON G30 – HUMAN PERFORMANCE 1	(2.00)
Ref: Alt MoC1 TK 02.(A)	•
Basic Aviation Physiology (1) Hypoxia (2) Hyperventilation (3) Vision and visual illusions (4) Lookout techniques (5) Hearing and balance (6) Spatial disorientation (7) Sleep and fatigue (8) Common ailments, medication, health (9) Toxic hazards	
(10) Intoxication	
LESSON G31 – HUMAN PERFORMANCE 2 Ref: Alt MoC1 TK 02.(B)	(2.00)
Basic Aviation Psychology(1) Perception(2) Memory(3) Arousal and performance(4) Stress and stress management(5) Personality types(6) Hazardous attitudes	
LESSON G32 – HUMAN PERFORMANCE 3 Ref: Alt MoC1 TK 02.(C)	(2.00)
Principles of Threat and Error Management (1) Threats (2) Errors (3) Undesired aircraft states (4) Countermeasures (5) Situational awareness (6) Decision making (7) Developing sound judgement	
LESSON G33 – NAVIGATION 1 Ref: Alt MoC1 TK 09.(A), (B), (C), & (D)	(2.00)
Form of the Earth (1) Latitude and Longitude Measurement of Direction (1) True direction (2) Magnetic direction (3) Compass direction Measurement of Distance	
(1) Units of distance(2) Conversion of units	

Measurement of Airspeed

(1) Calculation of true airspeed

LESSON A21 - EX 16 FORCED LANDINGS WITHOUT POWER PART 2 (0.45)

Ref: AMC1 FCL.110.A (c) 2 (xx) Ex16

Aim: To plan, fly an approach and to land safely in the event of a complete or partial engine failure.

Likely Threats, Errors and Undesired Aircraft States:

Carburettor icing, Real engine failure, Low flying military aircraft

PRE FLIGHT:

- Pre-flight brief with Forced Landing Without Power and partial engine failure (Ex16) as main exercise.
- Weather and NOTAM brief

AIREX:

FLWOP:

- Practise procedure from altitude .
- Adjusted procedure for failure at lower altitude
- Adjusted procedure for failure at 1000' AGL
- Practise from different starting altitudes and locations.
- Actions in the event of partial engine failure.

Recovery to base:

Overhead join and PFL from overhead if traffic permits or glide approach & landing

STANDARD:

The student demonstrates a clear understanding of the principles of:

- □ Maximising use of available power
- □ Maintaining a safe airspeed

- □ Execute a planned approach
- Perform relevant checklist drills
- □ Make a Distress R/T call
- □ Brief passengers in the event of an emergency

LESSON G34 – AIRCRAFT GENERAL KNOWLEDGE 1	(1.00)
The Airframe	
(1) Airframe design and construction	
(2) Serviceability checks	
(1) Elving control docign and construction	
(1) Flying control design and construction (2) Serviceshility checks	
(1) Undercarriage	
(1) Undercarriage design and construction (2) Tyres and brakes	
(2) Services and Diakes	
(5) Serviceability checks	
LESSON G35 – AIRCRAFT GENERAL KNOWLEDGE 2	(2.00)
Ref: Alt MoC1 TK 08.(D) & (E)	(, , , , , , , , , , , , , , , , , , ,
Piston Engines	
(1) Principles of operation	
(2) Piston engine design and components	
(3) Serviceability checks	
Piston Engine Systems	
(1) Fuel system	
(2) Induction system	
(3) Ignition system	
(4) Oil system	
(5) Cooling system	
(6) Other engine systems	
Ref: Alt MoC1 TK 08 (I)	(2.00)
Instruments and Systems	
(1) The nitot static system	
(2) The altimeter	
(3) The vertical speed indicator	
(4) The air speed indicator	
(5) The suction system	
(6) Attitude indicator	
(7) Heading indicator	
(8) The turn indicator / turn co-ordinator	
(9) The compass	
(10) Other instrumentation	
(11) Integrated electronic displays	
LESSUN G31 - NAVIGATION 2 Pot Alt MoC1 TK (00/E)	(2.00)
Triangle of Velocities	
Calculating neading and groundspeed	

LESSON A22 – EXERCISE 17 PRECAUTIONARY LANDING

(0:45)

Ref: AMC1 FCL.110.A (c) 2(xii), (xxi), & (xxiii) Ex 10a & 17 & 18b

Aims: 1. To learn when a precautionary landing is appropriate and how to execute a safe approach to a selected landing area

2. To combine visual and instrument inputs in minimum visibility.

Likely Threats, Errors and Undesired Aircraft States:

Lack of visual horizon, Poor in-flight visibility, Physiological sensations, Surrounding weather, Dusk, Poor landing area

PRE FLIGHT:

- Pre-flight brief on Precautionary Landing (Ex17) as main ex
- Pre-flight brief on the Integrated Attitude Scan technique
- Weather and NOTAM brief
- Student plan: short field takeoff and landing performance calculations, route to suitable area

AIREX:

Set up poor visibility configuration

Integrated Technique (using foggles or flying at night);

- Advice to avoid flight in poor visibility
- Integrate AI & performance instruments into normal visual S&L scan •
- Standard rate turns using integrated technique
- Interpreting radar information for avoiding action

Precautionary landing

- Selecting suitable field
 - Wind / surface / size / slope / stock / surroundings
- Precautionary circuit procedure
- Practises at different locations with different simulated scenarios
- Recovery to base for short field landing practice from precautionary pattern

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- Achieve and maintain safe slow flight
- □ Execute a planned approach
- Perform relevant checklist drills



- Control the aircraft and recover to base in minimum visibility:
- □ Interpret external traffic information

LESSON G38 – NAVIGATION 3 Ref: Alt MoC1 TK 09.(F)	(2.00)
 In-flight VFR Navigation: Dead Reckoning and Map Reading (1) Principles of dead reckoning (2) Time and distance (3) Map reading 	
LESSON G39 – NAVIGATION 4 Ref: Alt MoC1 TK 09.(G)	(1.00)
 In-flight VFR Navigation: Off-track and Diversion (1) Off track correction (2) ETA revision (3) Diversion (4) Alternate airfields 	
LESSON G40 – NAVIGATION 5 Ref: Alt MoC1 TK 09.(H)	(1.00)
 In-flight VFR Navigation: Vertical Navigation (1) Safety altitudes (2) Vertical navigation (3) Altimeter settings 	
LESSON G41 – NAVIGATION 6 Ref: Alt MoC1 TK 09.(I)	(1.00)
 In-flight VFR Navigation: Controlled and Notified Airspace (1) Procedures in the vicinity of controlled and notified airspace (2) Procedures within controlled and notified airspace (3) Airspace infringement 	
LESSON G42 – NAVIGATION 7 Ref: Alt MoC1 TK 09.(G)	(1.00)
Time (1) UTC (2) Time Zones (3) Sunrise and sunset information	
LESSON G43 – PRE FLIGHT PLANNING 2	(2.00)
VFR Flight Planning	
 (1) Route selection (2) Communication and radio navigation selection (3) Completion of the navigation plan (4) The Aeronautical Information Publication (AIP) (5) NOTAMs (6) Obtaining meteorological information (7) International flight 	
Fuel Planning Fuel required calculation	

LESSON A23 – EXERCISE 18A DUAL NAVIGATION 1

Ref: AMC1 FCL.110.A (c) 2 (xxii) Ex 18a

Aim: To plan and fly a navigation route, using suitable visual navigation techniques

Likely Threats, Errors and Undesired Aircraft States:

Errors in measuring / calculating navigation data, Feature misidentification, Poor choice of fixes

PRE FLIGHT:

- Pre-flight brief on Visual Navigation (Ex18a)
- Planning a triangular route (Flight time approx 0.8 hour)
- Weather and NOTAM brief

AIREX:

- Cruise climb to start point.
- Start point actions
- · Revise maintenance of S & L.
- Fix identification
- Regaining track & adjusting HDG
- Adjusting ETA
- Routine checks
- Turning point actions
- · Alternate methods of regaining track as opportunity allows.

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Prepare a Map for a navigation route
- □ Make navigation planning calculations and complete a plog
- □ Use a basic visual navigation technique and work cycle
- □ Obtain weather information and extract data relevant to nav planning
- □ Obtain and interpret NOTAMS
- Depart the airfield using previously taught techniques and procedures

(1.15)
LESSON G44 – PREFLIGHT PLANNING 3 Ref: Alt MoC1 TK 07 (B) & (D)	(2.00)
Berformance - Take-Off and Climb	
(1) Factors affecting take-off and climb performance	
(2) Calculation of take-off and climb performance	
Performance - Descent and Landing	
(1) Factors affecting descent and landing performance	
(2) Calculation of descent and landing performance	
	(2.00)
Ref: Alt MoC1 TK 07.(C)	(2.00)
Performance - Cruise	
(1) Principles of endurance and range	
(2) Factors affecting cruise performance	
(3) Calculation of cruise performance	
I ESSON G46 – PRINCIPI ES OF FLIGHT 6	(1.00)
Ref: Alt MoC1 TK 05.(F)	(1100)
Operating Limitations	
(1) Airspeed and load limitations	
(2) The load diagram (manoeuvring envelope)	
(3) Other operating limitations	
LESSON G47 – PREFLIGHT PLANNING 5	(1.00)
Ref: Alt MoC1 TK 07.(G) & (H)	
ICAO (ATS) Flight Plan	
(1) Requirement to File ICAO (ATS) Flight plan	
(2) Submission of the ICAO (ATS) Flight plan	
National Procedures	
National rules and procedures	
LESSON G48 – AIRCRAFT GENERAL KNOWLEDGE 4	(2.00)
Ref: Alt MoC1 TK 08.(F) & (G)	(1.00)
The Propeller	
(1) Principles of operation	
(2) Propeller design and components	
(3) Propeller handling	
(4) Serviceability checks	
Engine Handling	
(1) Engine limitations	
(2) Engine handling	
LESSON G49 – AIRCRAFT GENERAL KNOWLEDGE 5	(1.00)
Ref: Alt MoC1 TK 08.(H)	
The Electrical System	
(1) Principles of operation	
(2)	

LESSON A24 – DUAL NAVIGATION 2

Ref: AMC1 FCL.110.A (c) 2 (xxii) Ex 18a

- Aims: 1. To land at another aerodrome.
 - 2. To learn procedures for Controlled Airspace.
 - 3. To learn en-route hazard avoidance and diversion techniques.
 - 4. To learn the Uncertain of Position and Lost Procedures

Likely Threats, Errors and Undesired Aircraft States:

Unfamiliar airfield procedure, Unfamiliar runway shape/size/surface, Hazard ahead on track, Uncertain of position

PRE FLIGHT:

- Pre-flight brief on:
 - Landaway planning
 - CAS/MATZ entry/crossing
 - En-route diversion (Ex18e)
 - Lost Procedure (Ex18e)
- · Weather and NOTAM brief
- **Pre-flight planning** including destination performance planning

AIREX:

- · Procedures for transit of CAS/regulated airspace
- · Joining procedure at landaway airfield
- Booking in/out procedures
- · "Dog-leg" hazard avoidance.
- · En-route diversion to new destination.
- Uncertain of position & lost procedure
- "PRACTICE PAN" call / Training Fix if available

STANDARD:

- □ Make performance calculations using the Flight Manual
- □ Obtain and follow a clearance in CAS/regulated airspace
- □ Use the correct R/T procedures
- □ Apply lost procedures
- □ Complete a navigation route after planning
- □ Liaise with ATS and join the circuit at destination
- □ Follow ground procedures at destination
- Plan & execute a diversion

LESSON G50 - NAVIGATION 8	(2.00)
 VFR Radio Navigation Integrating radio navigation with VFR navigation VDF - Operation and interpretation, limitations and accuracy ATC Radar - Operation and interpretation, limitations and accuracy ADF - Operation and interpretation, limitations and accuracy VOR - Operation and interpretation, limitations and accuracy DME - Operation and interpretation, limitations and accuracy GNSS - operation and interpretation, limitations and accuracy 	
LESSON G51 – AIRCRAFT GENERAL KNOWLEDGE 6 Ref: Alt MoC1 TK 08.(J)	(2.00)
Avionics Systems (1) Communications Equipment (2) SSR (3) ADF (4) VOR (5) DME (6) GNSS (7) Integrated Electronic Displays	
LESSON G52 – AIRCRAFT GENERAL KNOWLEDGE 7 Ref: Alt MoC1 TK 08 (K) & (L)	(2.00)
Cockpit Equipment and Systems (1) Doors, windows and exits (2) Seats (3) Seat belts and harnesses (4) Cockpit heating and ventilation systems Emergency Equipment (1) First aid kit (2) Fire extinguishers (3) ELT/PLB	
(4) Lifejackets and life rafts(5) Other survival equipment	
LESSON G53 – AIRCRAFT GENERAL KNOWLEDGE 8 Ref: Alt MoC1 TK 08.(M) & (N)	(1.00)
Aircraft Airworthiness (1) Aircraft registration (2) Airworthiness Certificate, Permit to Fly Aeroplane Flight Manual/Pilot Operating Handbook (1) Aircraft maintenance and serviceability (2) Maintenance and serviceability documentation	
LESSON G54 – AIRCRAFT GENERAL KNOWLEDGE 9	(1.00)
Ref. All MOC F FR 08.(0) & (P) Converting Onto a Another Aircraft Type Practical considerations when converting onto a different aircraft and/or variants National Procedures National rules and procedures	

LESSON A25 – EXERCISE 18A SOLO NAVIGATION 1 (CHECK POINT) (1.15)

Ref: AMC1 FCL.110.A (c) 2 (xxii) Ex 18a

Pre-requisites:

- Satisfactory knowledge of VFR Navigation
- Satisfactory knowledge of Communications Theory
- Satisfactory knowledge of Operational Procedures
- Satisfactory knowledge of Meteorology
- Satisfactory knowledge of Human Performance

Aim: To plan and fly a solo VFR navigation route.

Likely Threats, Errors and Undesired Aircraft States:

Over-map-reading

PRE FLIGHT:

- Student to plan a triangular route under supervision
- Solo Navigation Briefing Certificate
- Weather and NOTAM brief

AIREX:

Student flies the route solo completing a log en-route

STANDARD:

- □ Obtain weather information and extract data relevant to nav planning
- Obtain and interpret NOTAMS
- Prepare the map for the route
- □ Make navigation planning calculations and complete a plog

LESSON A26 - EXERCISE 18B & C DUAL NAVIGATION 4

(1.00)

Ref: AMC1 FCL.110.A (c) 2 (xii), (xiii), (xxiii) & (xxiv) Ex 10a, 10b, 18b & 18c

Aims: 1. To learn how to navigate using GNSS in addition to visual navigation.
2. To learn how to navigate & operate at low-level (<1000' AGL).

Likely Threats, Errors and Undesired Aircraft States:

GNSS power failure, GNSS signal failure, Poor lookout whilst using GNSS Inadequate terrain clearance Illusion of speed/sideslip, High wind speed, Low engine failure

PRE FLIGHT:

- · Plan visual route
- Preflight brief on: GNSS use and limitations
- Preflight brief on low level navigation (Ex 18b)
- Weather and NOTAM brief.
- Pre-flight route planning
- · Load & activate route in GNSS unit pre-flight

AIREX:

- Use of pre-programmed GNSS route to cross-check track
- GNSS tracking towards a waypoint
- Use of "Direct" or "GO-TO" Function
- Reverting to solely visual navigation techniques.
- · Actions prior to descent to low-level.
- Cruise descent
- Low level navigation technique
- Wind effect on turning at low-level
- Practise en-route diversion at low-level
- Recovery to base: Low level bad weather join and circuit

STANDARD:

- □ Check the validity of the GPS database.
- □ Programme a route into the GPS Unit
- □ Track the route using headings to achieve desired track & cross refer to the visual navigation plan.
- □ Use the "Direct" or "Go-To" Function.
- □ Recognise GPS failures/error messages and revert to visual navigation

LESSON A27 – EXERCISE 18A SOLO NAVIGATION 2 (CHECK POINT) (2.00)

Ref: AMC1 FCL.110.A (c) 2 (xxii) Ex 18a

Pre-requisites:

• Satisfactory knowledge of Pre-flight Performance and Planning

Aims: 1. To consolidate VFR navigation techniques on a solo cross country flight.

2. To complete the Solo Qualifying Cross-country navigation exercise.

Likely Threats, Errors and Undesired Aircraft States:

Over-map-reading HSI/DI failure, Poor weather en-route, Unfamiliar airfield procedure, Unfamiliar runway shape/size/surface, Uncertain of position

PRE FLIGHT:

- Route planning for landaway at another aerodrome, a minimum of 80 nm total.
- Revise use of ATC radar service
- Weather and NOTAM brief.
- Preparation of authorisation certificate to be completed at landaway aerodrome.

AIREX:

• Student completes the flight solo, completing a log en-route ensuring the QCC form is completed at the landaway airfield.

STANDARD:

- □ Obtain weather information and extract data relevant to nav planning
- □ Obtain and interpret NOTAMS
- □ Prepare a map for the route
- □ Make navigation planning calculations and complete a plog
- Calculate Landing & Take-off performance using the Flight Manual/POH

LESSON A28 – INTRODUCTION TO LAPL(A) SKILL TEST (CHECK POINT)(1.50)

Pre-requisites:

- Passed all PPL Theoretical Knowledge examinations
- Aim: To experience the content and conduct of the EASA PPL(A) Skill Test (Single Engined Aircraft) and revise to the required LAPL(A) Skill Test standards.

The Honourable Company of Air Pilots



EU LAPL to PPL(A) Upgrade Training Programme

Nothing in this document supersedes any legislation, rules, regulations or procedures contained in any operational document issued by the UK Civil Aviation Authority (CAA), the European Union through or by the European Aviation Safety Agency (EASA), ICAO, the aircraft and/or equipment manufacturer or by the aircraft operator.

EU LAPL(A) to PPL(A) Upgrade Training Programme

Copyright 2019 © The Honourable Company of Air Pilots

All rights reserved. This complete document may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system by individual instructors, pilots and students for their own, private use. Training Organisations are encouraged to use this training programme but should credit The Honourable Company of Air Pilots within their document and inform The Honourable Company of Air Pilots of its use by email to the Company Office – contact details are available at the Company's website.

https://www.airpilots.org



This document provides training organisations with a programme to complete the airborne syllabus of training to upgrade a pilot holding an EU LAPL (Aeroplanes) to qualify for an EU PPL(A) with Single Engine Piston or Touring Motor Glider Rating. The Lesson Plans produced by the Honourable Company provide expanded guidance for those instructors using the programme.

The programme forms a coherent series of airborne lessons which fully meet the EU Upgrade syllabus requirements. It allocates 4 hours of supervised solo flight time, including more than 2 hours of solo cross-country flight time and a 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. However, local procedures and individual training needs will affect the time required to complete individual exercises

The variables of aircraft type, student ability, local airspace considerations and weather will ultimately dictate the teaching methods, the construction of each flight lesson, the time taken and the exact order of events. This principle is enshrined within Acceptable Means of Compliance and Guidance Material (AMC & GM) to Part FCL AMC1 FCL.210.A PPL(A) — Experience requirements and crediting:

"Syllabus of flight instruction

The numbering of exercises should be used primarily as an exercise reference list; therefore, the demonstrations and practices need not necessarily be given in the order listed. The actual order and content will depend upon the following interrelated factors:

- *I.* the applicant's progress and ability;
- *II.* the weather conditions affecting the flight;
- III. the flight time available;
- *IV.* instructional technique considerations;
- V. the local operating environment:
- VI. the applicability of the exercises to the aeroplane."

This training programme is based on the following assumptions:

- V. The student has completed 5 hours flying since achieving the LAPL, is in current flying practice, has good aptitude and natural ability and will be conducting the training on a regular basis.
- VI. The aircraft is a simple single engined aeroplane, with a fixed pitch propeller, carburetted engine with manual mixture control, fixed undercarriage and basic avionics.
- VII. The training aerodrome is outside controlled airspace with an Air Traffic Service available.
- VIII. Controlled airspace and other suitable airfields with and without ATC/RADAR are located nearby for training purposes.

If the facilities of the training organisation differ from the above, adjustments to the lessons should be incorporated to provide effective training for the student.

The programme includes instrument training, radio navigation and the other more advanced handling and safety exercises required before PPL Skill Test.

Pre-Entry Requirements:

A pilot holding a LAPL (Aeroplanes) may undertake the EU LAPL(A) to PPL(A) training course. The following points should be noted and applied where applicable:

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 an ATO or DTO.

A student pilot shall not fly solo unless specifically authorised and supervised by a flight instructor. (Part FCL.020 refers).

Before first solo flight, a pilot shall hold at least a Class 2 medical certificate. (Part-MED.A.030 & AMC1 to Part-FCL 210.a)

Credits for Previous Experience

Where a course of flying training towards the EU PPL (A) has been partially completed at another ATO or DTO the training records for that training must be obtained from the previous training organisation. An assessment should then be made to ascertain which of the syllabus requirements have been achieved and therefore which lessons within this programme have been completed.

The needs of students with previous experience should be assessed by a senior member of the instructional staff and any credit applied and/or lessons already completed should be annotated accordingly on their progress sheets.

Insufficient Previous Experience

If the student has not already completed 5 hours since LAPL issue, the additional training required should be assessed by a senior member of the instructional staff and appropriate lessons completed from the Pre-course Addition section of the course before commencing the main course.



During the course, Exercises 18 and 19 should be completed and previous exercises revised.

Theoretical Knowledge

The LAPL course should have included all theoretical knowledge subjects to the PPL level. However, not all of the syllabus may have been relevant at the time, so some items may have been forgotten in the interim. The course begins with ground lessons on flight instruments and radio navigation aids, and briefings and debriefings should refresh or confirm elements of most of the subjects as the course progresses.

Threat and Error Management

In addition to those suggested in individual lessons, the threats and errors below may affect flight during the course. Suitable mitigations should be considered and applied.

THREATS

Loss of bearings Engine failure Blind spots Confined airspace due weather Poor landing area Other aircraft including in the circuit and military low flying Unfamiliar runway shape/ size/surface at landaway bases Illusion of speed/sideslip at low altitude Physiological sensations in cloud/poor visibility Instrument limits

ERRORS

Breach of low flying regulations Errors in measuring / calculating navigation data Feature misidentification Inadequate terrain clearance Poor lookout whilst using radio aids

SYLLABUS CHECK LIST – Ref: AMC 1 FCL.210.A (c) 2

AMC Ref.	Exercise
(xxiv) Ex 18c Radio navigation	 (A) use of GNSS: (a) selection of waypoints; (b) to or from indications & orientation; (c) error messages. (B) use of VHF omni range: (a) availability, AIP and frequencies; (b) selection and identification; (c) OBS; (d) to or from indications & orientation; (e) CDI; (f) determination of radial; (g) intercepting & maintaining a radial; (h) VOR passage; (i) obtaining a fix from two VORs. (C) use of ADF equipment: NDBs: (a) availability, AIP and frequencies; (b) selection and identification; (c) orientation relative to the beacon; (d) homing. (D) use of VHF/DF: (a) availability, AIP, frequencies; (b) R/T procedures and ATC liaison; (c) obtaining a QDM and homing. (E) use of en-route or terminal radar: (a) availability and AIP; (b) procedures and ATC liaison; (c) pilot's responsibilities; (d) secondary surveillance radar: (1) transponders; (2) code selection; (3) interrogation and reply. (F) use of DME: (a) station selection & identification; (b) modes of operation: distance, groundspeed and time to run.
(xxv) Ex 19 Basic instrument flight	 (A) physiological sensations; (B) instrument appreciation; attitude instrument flight; (C) instrument limitations; (D) basic manoeuvres: (a) straight and level at various air speeds and configurations; (b) climbing and descending; (c) standard rate turns, climbing and descending, onto selected headings; (d) recoveries from climbing and descending turns.

LESSON G1 – AIRCRAFT GENERAL KNOWLEDGE

Ref: Alt MoC1 FCL.210:215 TK 08.(J)

Avionics Systems

- (1) Communications Equipment
- (2) SSR
- (3) ADF
- (4) VOR
- (5) DME
- (6) GNSS
- (7) Integrated Electronic Displays

LESSON G2 – NAVIGATION

Ref: Alt MoC1 FCL.210:215 TK 09.(K)

VFR Radio Navigation

- (1) Integrating radio navigation with VFR navigation
- (2) VDF Operation and interpretation, limitations and accuracy
- (3) ATC Radar Operation and interpretation, limitations and accuracy
- (4) ADF Operation and interpretation, limitations and accuracy
- (5) VOR Operation and interpretation, limitations and accuracy
- (6) DME Operation and interpretation, limitations and accuracy
- (7) GNSS operation and interpretation, limitations and accuracy

LESSON G3 – AIRCRAFT GENERAL KNOWLEDGE IF REQD (1.00)

Ref: Alt MoC1 FCL.210:215 TK 08.(0) & (P)

Converting Onto a Another Aircraft Type

Practical considerations when converting onto a different aircraft and/or variants

(2.00)

(2.00)

LESSON A1 – EXERCISE 18A, 18C DUAL NAVIGATION 1A

AMC1 FCL.210.A (c) 2 (xxii) Ex 18a

- Aims: 1. To revise basic navigation techniques
 - 2. To land at another aerodrome.
 - 3. To learn/revise procedures for Controlled Airspace.

Likely Threats, Errors and Undesired Aircraft States:

Unfamiliar airfield procedure, Unfamiliar runway shape/size/surface, Uncertain of position

PRE FLIGHT:

- Pre-flight brief on:
 - Landaway planning revision
 - CAS/MATZ entry/crossing
 - Loading and activating GNSS route
- Weather and NOTAM brief
- · Pre-flight planning including performance and diversion planning
- · Load and activate the route on the GNSS equipment

AIREX:

- · Procedures for transit of CAS/regulated airspace
- Joining procedure at landaway airfields
- · Revise practice forced landing without power
- · Land at unfamiliar aerodrome

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Make performance calculations using the Flight Manual
- □ Obtain and follow a clearance in CAS/regulated airspace
- □ Use the correct R/T procedures
- □ Complete a navigation route after planning
- □ Liaise with ATS and join the circuit at destination
- □ Follow ground procedures at destination

(1.00)

LESSON A2 – EXERCISE 18C DUAL NAVIGATION 1B (FROM LANDAWAY) (1.00)

AMC1 FCL.210.A (c) 2 (xxiv) Ex 18c

Aim: To learn how to navigate using radio navigation aids.

Likely Threats, Errors and Undesired Aircraft States:

Concentrating on radio aids, Wrong navaid selected

PRE FLIGHT:

- Pre-flight brief on Radio Navigation (Ex18c)
- Weather and NOTAM brief

AIREX:

- Correct tracking technique
- Indications overhead VOR
- Orientation relative to NDB
- "Homing" to NDB
- DME tuning, ident and functions
- DME combined with VOR for position fixing

STANDARD:

- □ Fix position using the VOR
- □ Intercept and track to/from a given radial
- □ Orientate position relative to an NDB
- □ Carry out a NDB homing
- □ Use a combination of VOR & DME for a position fix

LESSON A3 – EXERCISE 19 BASIC INSTRUMENT FLYING 1

Ref: AMC1 FCL.210.A (c) 2 (xxv) Ex 19

Aim: To learn to fly the aircraft by sole reference to instruments

Likely Threats, Errors and Undesired Aircraft States:

Physiological sensations, Inadvertent entry into cloud

PRE FLIGHT:

- Pre-flight brief on Basic Instrument Flying (Ex19A)
- Weather and NOTAM brief

AIREX:

Basic Instrument Flying;

- Physiological Sensations
- Attitude Instrument Flight, Instrument Appreciation
- Instrument Limitations
- Basic Manoeuvres (S+L / IAS / Configuration)
- Climbing and descending
- Standard rate turns (Climbing/descending/on to HDGs)
- Recoveries from gentle unusual positions on full panel
- Technique to recover to VFR flight from inadvertent entry into IMC (180° level turn in simulated IMC)

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

Control the aircraft and monitor its performance by sole reference to instruments

(1.00)

LESSON A4 – EXERCISE 19 BASIC INSTRUMENT FLYING 2

Ref: AMC1 FCL.210.A (c) 2 (xxv) Ex 19

Aim: To consolidate the techniques required to fly the aircraft by sole reference to instruments

Likely Threats, Errors and Undesired Aircraft States:

Exceed instrument limits, Physiological sensations, Flight above freezing level, Instrument faults

PRE FLIGHT:

- Pre-flight brief on Basic Instrument Flying (Ex19A)
- Weather and NOTAM brief

AIREX:

- Revise a selected climbing technique and climbing turns on to headings
- Revise recoveries from unusual positions on full panel.
- Selective Radial Scan
- Practice recovery to VFR flight from inadvertent entry into IMC (180° turn in simulated IMC)
- Use of radio aids to recover to base

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

Control the aircraft and monitor its performance on Instruments to a Skill Test standard

(1.00)

LESSON A5 – MINIMUM VISIBILITY FLYING [DEGRADED VISUAL ENVIRONMENT (DVE)]

Ref: AMC1 FCL.210.A (c) 2 (xiii) Ex10b & (xxv) Ex 19

Aim: To combine visual and instrument inputs in minimum visibility

Likely Threats, Errors and Undesired Aircraft States:

Poor/no visual horizon, Poor visibility, Physiological sensations

PRE FLIGHT:

- Pre-flight brief on the Integrated Attitude Scan technique
- Weather and NOTAM brief

AIREX:

- · Revise instrument flying during climb
- Set up poor visibility configuration on instruments
- Integrated Technique (using foggles or flying at night);
 - · Advice to avoid flight in poor visibility
 - Integrate AI into normal visual S&L scan
 - · Standard rate turns using integrated technique
 - Climbing and descending
 - Interpreting radar information for avoiding action

STANDARD:

The student demonstrates the correct use of the integrated technique to:

- Control the aircraft and recover to base in minimum visibility:
- □ Interpret external traffic information

(0.30)

LESSON A6 – EXERCISE 18A SOLO NAVIGATION 1 (1.00)

(1.30 if lesson A5 completed on LAPL course)

AMC1 FCL.210.A (c) 2 (xxii) Ex 18a

Aim: To consolidate VFR navigation techniques on a solo cross country flight.

Pre-requisites:

• Valid medical certificate

Likely Threats, Errors and Undesired Aircraft States: Over-map-reading, HSI/DI failure, Poor weather en-route

PRE FLIGHT:

- Student plan a triangular route under supervision
- Revise procedures to transit complex airspace
- Revise use of ATC radar service
- Completion of Solo Navigation Briefing Certificate.
- Weather and NOTAM brief.

AIREX:

Student completes the flight solo completing a log en-route Student practice visual circuits on recovery

STANDARD:

- □ Obtain weather information and extract data relevant to nav planning
- □ Obtain and interpret NOTAMS
- $\hfill\square$ Prepare the map for the route
- □ Make navigation planning calculations and complete a plog

LESSON A7 – EXERCISE 18A SOLO NAVIGATION 2

(2.30)

AMC1 FCL.210.A (c) 2 (xxii) Ex 18a

Aim: To complete the PPL Solo Qualifying Cross-country navigation exercise.

Likely Threats, Errors and Undesired Aircraft States:

Unfamiliar airfield procedure, Unfamiliar runway shape/size/surface, Uncertain of position

PRE FLIGHT:

- Route planning for landaway at two aerodromes other than the departure point, a minimum of 150 nm total.
- Weather and NOTAM brief.
- Preparation of authorisation certificate to be completed at landaway aerodromes.

AIREX:

 Student completes the flight solo, completing a log en-route ensuring the QCC form is completed at the landaway airfields

STANDARD:

The student demonstrates the correct use of the requisite techniques to:

- □ Obtain weather information and extract data relevant to nav planning
- □ Obtain and interpret NOTAMS
- □ Prepare a map for the route
- □ Make navigation planning calculations and comple a plog
- □ Calculate Landing & Take-off performance using the Flight Manual/POH

LESSON A8 – REVISION FOR EU PPL(A) SKILL TEST

(2.00)

Aim: To experience the content and conduct of the EU PPL(A) Skill Test (Single Engined Aircraft) and revise to the required standards.



These preliminary lessons are intended to give candidates with limited experience a refresher of basic aeroplane exercises to prepare them for the main course.

LESSON AA1 – STALLING REVISION

(1.00)

Ref: AMC1 FCL.210.A (c) 2 (xiii) (xv) & (xvi) Ex 10b, 12 & 13

Aims: 1. To revise stall avoidance

- 2. To revise circuit joining
- 3. To practise circuits and landing

Likely Threats, Errors and Undesired Aircraft States:

Unrecognised stall

When practising recoveries:

Other aircraft, Incorrect configuration, Harness insecure, Loose objects, Engine fails *In circuit*

Bounce on landing, Wake vortices, Aircraft joining the circuit, Insufficient spacing, Runway occupied

PRE FLIGHT:

- Pre-flight brief on Stalling Part 3 (Ex10b)
- Pre-flight brief on circuit procedures (Ex 12, 13)
- · Weather and NOTAM brief

AIR EXERCISE:

- · Climb to a suitable area for stalling.
- Revision of incipient recoveries:
 - a. In the approach configuration (simulated turn from base to final)
 - b. In the landing configuration (simulated final approach)
 - c. In the departure turn (simulated turn after take off)
 - d. Cruise checks after stalling

Recovery to base:

- · Suitable circuit join with standard RT calls
- Practise normal circuits
- Practise selected circuit emergency from overview

STANDARD:

- □ Carry out all relevant checks and drills
- □ Recognise and recover from an incipient stall on a simulated final turn
- □ Recognise and recover from an incipient stall on a simulated final approach
- □ Recognise and recover from an incipient stall on a simulated departure turn
- □ Fly a standard circuit
- □ Use standard RT procedures

LESSON AA2 – CIRCUIT CONSOLIDATION

Ref: AMC1 FCL.210.A (c) 2 xv & xvi Ex 12 & 13

Pre-requisites:

- Valid medical certificate
- Satisfactory handling of circuit emergencies

Aims: 1. To revise circuit flying

- 2. To fly a glide approach and landing
- 3. To fly a flapless approach and landing
- 4. To fly a crosswind approach and landing
- 5. To consolidate solo circuit practice

Likely Threats, Errors and Undesired Aircraft States:

Landing too far up runway, Wind exceeds limits

PRE FLIGHT:

Pre-flight brief on all approaches and landing [Ex 13] Weather and NOTAM brief

AIR EXERCISE:

- Revise circuit procedures
- Revise Normal, glide, flapless and crosswind approach;
- Carry out solo consolidation of normal, flapless and glide circuits and landings under supervision

STANDARD:

- □ Fly a normal circuit and landing
- □ Fly a safe glide approach and go-around
- □ Fly a safe glide landing
- □ Fly a safe flapless approach and landing
- □ Use standard RT procedures

LESSON AA3 - FORCED LANDINGS AND STEEP TURN REVISION (1.30)

Ref: AMC1 FCL.210.A (c) 2 (xix) Ex 15 & 16

Aims: 1. To fly level & descending 45° AOB Turns

2. To plan, fly an approach and to land safely in the event of a complete or partial engine failure.

Likely Threats, Errors and Undesired Aircraft States:

Carburettor icing, Real engine failure, Low flying military aircraft Aircraft on collision course, Spiral dive, Stall in turn

PRE FLIGHT:

- Pre-flight brief with Forced Landing Without Power and partial engine failure (Ex16) as main exercise.
- Pre-flight brief on Steep turns including recovery from spiral dive (Ex 15)
- Weather and NOTAM brief

AIREX:

- Revise short field takeoff, climbing (Vx Vy) and climbing turns on to headings
- Turns at 45° angle of bank
- Spiral dive recovery
- Steep descending turns

FLWOP:

- Practise procedure from altitude .
- Adjusted procedure for failure at lower altitude
- Adjusted procedure for failure at 1000' AGL
- Practise from different starting altitudes and locations.
- Actions in the event of partial engine failure.

Recovery to base:

Overhead join and PFL from overhead if traffic permits or glide approach & landing

STANDARD:

The student demonstrates a clear understanding of the principles of:

- □ Maximising use of available power
- □ Maintaining a safe airspeed

- □ Fly level and descending turns at cruise speed using 45°- 50° AOB
- □ Recover the aircraft safely from Unintended Attitudes including Spiral Dives
- □ Execute a planned forced landing approach
- Perform relevant checklist drills
- □ Make a Distress R/T call
- □ Brief passengers in the event of an emergency

LESSON AA4 - SOLO SECTOR RECCE (CHECK POINT) (1.00)

Ref: AMC1 FCL.210.A (c) 2 (xviii) Ex14

Aim: To safely fly a departure to the local area, practise general handling, then rejoin the circuit to land.

Likely Threats, Errors and Undesired Aircraft States:

Loss of bearings, System/Engine problems, Unsure of ATC clearance

AIREX:

Student to fly solo, leave the circuit and carry out general handling, return and land as authorised by the instructor

STANDARD:

- □ Fly the departure
- □ Rejoin the circuit
- □ Fly the circuit following the join
- Use standard RT procedures