

# The Honourable Company of Air Pilots



## EU Night Rating Training Programme

Validated by the UK CAA



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*EU PPL(A) Night Training Programme*

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## **Introduction**

This document provides Training Organisations with a basic programme of lessons to complete a syllabus of training for the issue of a Night Rating on an EU PPL (SEP) as required by FCL.810, which states:

(1) If the privileges of an LAPL, an SPL or a PPL for aeroplanes, TMGs or airships are to be exercised in VFR conditions at night, applicants shall have completed a training course at an ATO. The course shall comprise:

- (i) theoretical knowledge instruction;
- (ii) at least 5 hours of flight time in the appropriate aircraft category at night, including at least 3 hours of dual instruction, including at least 1 hour of cross-country navigation with at least one dual cross-country flight of at least 50 km (27 NM) and 5 solo take-offs and 5 solo full-stop landings.

Local procedures and individual training needs will affect the time and number of flights required to complete individual exercises. The variables of aircraft class and 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 engine 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 starts with the necessary theoretical knowledge lessons, and continues with the airborne lessons required to complete the course. The order of airborne lessons may be adjusted to accommodate local circumstances.

### **Progress Checks**

There are no formal tests or progress checks included in this training programme.

### **Pre-Entry Requirements:**

Before completing the training at night, LAPL holders shall have completed the basic instrument flight training required for the issue of the PPL. The necessary lessons are given in the AirPilots' LAPL Upgrade Programme.

### **Credits for Previous Experience**

The needs of students with previous night 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

AMC1.FCL810(b) refers to helicopters, but many of the listed topics are valid for aeroplanes. These are included in the ground lessons.

## 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 the training programme a list of potential relevant Threats, Errors and Mitigations/Undesired Aircraft States is given. 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 not 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.

<b>Threat</b>	<b>Consequence</b>	<b>Mitigation</b>	<b>Error</b>	<b>Consequence</b>	<b>Mitigation</b>	<b>Risk: 1 -5</b>	<b>Lesson input</b>
<b>Uncontrolled flight and operations.</b>	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 <b>1</b>	All
<b>Other aircraft</b>	Collision / loss of control while avoiding	<b>LOOKOUT:</b> Correct scanning techniques. Left/right and above/below. Weaving and clearing turns. <b>CLOCK CODE</b>	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 <b>2</b>	All
<b>Un-forecast winds, Weather/low cloud and poor visibility.</b>	CFIT, breach of CAS, Becoming lost. Fuel exhaustion.	<b>MAP READING</b> skills. Flight planning; <b>Safe altitude.</b> <b>Heading &amp; Time,</b> 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 <b>2</b>	EX 6 -10, EX 18
<b>Airframe Structure and component Overstress</b>	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 <b>1</b>	All
<b>Exceed engine limits</b>	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 <b>2</b>	All

**Continued..**

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

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	Meaning	Value
Frequent	Likely to occur many times	5
Occasional	Likely to occur sometimes	4
Remote	Unlikely to occur but possible	3
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 Likelihood	Risk Severity				
	Catastrophic 5	Hazardous 4	Major 3	Minor 2	Negligible 1
<b>Frequent 5</b>	Unacceptable	Unacceptable	Unacceptable	Review	Review
<b>Occasional 4</b>	Unacceptable	Unacceptable	Review	Review	Review
<b>Remote 3</b>	Unacceptable	Review	Review	Review	Acceptable
<b>Improbable 2</b>	Review	Review	Review	Acceptable	Acceptable
<b>Extremely Improbable 1</b>	Review	Acceptable	Acceptable	Acceptable	Acceptable







## **The Night Rating Course**

Before the first listed air lesson, the training in exercises 1, 2, and 3 of the extract from AMC1.FCL.810(b) should have been completed, either during a PPL course or independently. During the course, exercises 4, 5, and 6 should be completed and other exercises revised.

### **Theoretical Knowledge**

The course begins with ground lessons on the subjects suggested in AMC1.FCL.810(b). Briefings and debriefings should consolidate these lessons and expand the student's knowledge.

### **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**

- Unfamiliar surroundings
- System/Engine problems
- Weather conditions
- Controlled Airspace in the vicinity
- Carburettor ice
- Loss of bearings
- Engine failure
- Other aircraft including in the circuit and military low flying
- Unfamiliar runway shape/ size/ lighting at landaway bases
- Physiological sensations

#### **ERRORS**

- Errors in measuring / calculating navigation data
- Feature misidentification
- Inadequate terrain clearance
- Poor lookout whilst using radio aids
- Flap misuse
- Exceeding engine limits

#### **UNDESIRED AIRCRAFT STATES**

- Engine overheating

## NIGHT AIR SYLLABUS CHECK LIST – Ref: AMC1.FCL.810(b) (extracts)

Exercise	AMC1 810(b) Ref
Ex 1*	(A) Revise basic manoeuvres by sole reference to instruments; (B) Transition to instrument flight from visual flight; (C) Recovery from unusual attitudes by sole reference to instruments
Ex 2*	Use of radio navigation aids when flying by sole reference to instruments, to include position finding and tracking.
Ex 3*	Use of radar assistance.
Ex 4	(B) Night take-off techniques; (C) Night circuit technique; (D) Night approaches (constant angle) with or without visual approach aids (G) Night emergency procedures to include: (a) simulated engine failure; (c) simulated inadvertent entry to IMC; (e) internal and external lighting failure; (f) other malfunctions and emergency procedures as required by the aircraft flight manual.
Ex 5	Solo night circuits.
Ex 6	Night cross-country techniques.
* Exercises 1 to 3 may be completed during pre-course day flying training	

### AMC1 FCL.810(b) Theoretical Knowledge Syllabus for Night Rating

- (1) night VMC minima;
- (2) rules about airspace control at night and facilities available;
- (3) rules about aerodrome ground, runway, and obstruction lighting;
- (4) aircraft navigation lights and collision avoidance rules;
- (5) physiological aspects of night vision and orientation;
- (6) dangers of disorientation at night;
- (7) dangers of weather deterioration at night;
- (8) instrument systems or functions and errors;
- (9) instrument lighting and emergency cockpit lighting systems;
- (10) map marking for use under cockpit lighting;
- (11) practical navigation principles;
- (12) radio navigation principles;
- (13) planning and use of safety altitude;
- (14) danger from icing conditions, avoidance and escape manoeuvres.

**LESSON G1 – AIR LAW AND OPERATING PROCEDURES** (0.30)

- (1) VFR minima;
- (2) Airspace control at night, regulations, and facilities available;
- (3) Aerodrome ground, runway, and obstruction lighting;
- (4) Navigation lights and collision avoidance rules;

**LESSON G2 – HUMAN PERFORMANCE** (0.20)

- (1) Physiological aspects of night vision and orientation;
- (2) Dangers of disorientation at night;

**LESSON G3 – AIRCRAFT GENERAL** (0.20)

- (1) Instrument systems and errors;
- (2) Instrument and map lighting and emergency cockpit lighting systems;

**LESSON G4 – FLIGHT PLANNING AND NAVIGATION** (0.20)

- (1) Map marking for use under cockpit lighting;
- (2) Practical navigation principles;
- (3) Radio navigation principles;
- (4) Planning and use of safety altitude;

**LESSON G5 – METEOROLOGY** (0.20)

- (1) Danger from icing conditions, avoidance and escape manoeuvres.
- (2) Friction effect on gradient and surface wind during circuit and approach
- (3) Radiation cooling and resultant fog and stratus formation

## **LESSON A1 – NIGHT FAMILIARISATION**

**(DURATION 1:00)**

*Ref: AMC1 Ex 1, 2, 3, 4(B),(C),(D)*

**Aim:** To introduce the student to night flying.

### **Likely Threats, Errors and Undesired Aircraft States:**

Disorientation, loss of bearings, engine failure, lighting failure

#### **PRE FLIGHT:**

- Brief on local night procedures

#### **AIR EXERCISE:**

- Aircraft pre-flight checks including lighting (use of torch)
- Taxiing including lighting and speed control
- Take-off and climb, loss of horizon, use of instruments
- VFR flight integrating instrument scan
  - a. Straight & level at different power settings and speeds
  - b. Turns
  - c. Stall recognition and recovery
- Recovery from unintended attitudes including spiral dives
- Cloud identification
- Orientation and feature identification; use of map
- Use of radio navigation aids and GNSS for fixing
- Recovery to base for a standard (Overhead?) join
- Glide path demonstration using approach and runway lighting
- Go-around
- Circuit pattern
- Approach and landing

#### **STANDARD:**

The student demonstrates a clear understanding of the principles of:

- Integrating instrument indications with visual flight

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

- Carry out normal manoeuvres (S&L, turns, climbs descents) at night
- Perform a go round
- Recover to a safe climb at the incipient stage of a stall in simulated final approach
- Recover the aircraft safely from unintended attitudes including spiral dives

## **LESSON A2 - CIRCUITS & EMERGENCIES**

(1.00)

*Ref: Alt MoC1 Ex 4 (C),(D),(G)*

Aims:

1. To practise the night circuit.
2. To introduce circuit emergencies
3. To introduce glide approaches
4. To introduce approach without flap

### **Likely Threats, Errors and Undesired Aircraft States:**

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

### **PRE FLIGHT:**

- Pre-flight brief on circuit procedures [Ex 4(B),(C),(D)]
- Pre flight brief on emergency procedures [Ex 4(G)]
- Weather and NOTAM brief

### **AIR EXERCISE:**

#### **Revise night circuit procedures**

#### **Simulated engine failure after takeoff;**

- Speed achievement and maintenance
- Crash drill
- Go-around

#### **Approach without flap;**

- Approach aspect
- Effect on Landing Distance Performance.

#### **Glide approach;**

- Judgement of touchdown point (point of constant reference)
- Speed control
- Landing flare
- Circuit emergency(s) from overview [Ex 4(G)]

### **STANDARD:**

The student demonstrates a clear understanding of the principles of:

- Dealing with emergencies in the circuit
- Going around from an unstabilised approach

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

- Fly the standard circuit
- Fly a safe glide approach
- Make a safe landing
- Use standard RT

## **LESSON A3 –SOLO (CHECK POINT)**

**(1.30)**

*Ref: Alt MoC1 Ex 5*

### Pre-requisites:

- Valid medical certificate
- Satisfactory handling of circuit emergencies

Aim: To safely fly circuits at night for the first time unaccompanied.

### **Likely Threats, Errors and Undesired Aircraft States:**

Student bounce/balloon, engine failure, lighting failure

### **PRE FLIGHT:**

- Briefing on: Flight requirements  
Action in the event of an unsatisfactory approach or baulked landing

### **AIR EXERCISE:**

- Student fly normal circuits and full stop landings
- Student taxi for further take-offs, circuits and full stop landings

### **STANDARD:**

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

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

## LESSON A4 – DUAL NAVIGATION

(2.00)

*Ref: Alt MoC1 Ex 6*

- Aims:
1. To plan a night navigation exercise.
  2. To make an approach at an unfamiliar aerodrome (if available).

### **Likely Threats, Errors and Undesired Aircraft States:**

Deteriorating weather, Unfamiliar runway shape/size/surface, entering IMC

### **PRE FLIGHT:**

- **Pre-flight brief on:**
  - Map preparation
  - Pre-flight planning including flight plan filing, and destination information.

### **AIREX:**

- Feature identification
- Revise MDR techniques
- Joining, circuit & administrative procedures at unfamiliar airfield
- Simulate entering IMC
- Emergency procedures selected from Ex 4(G)

### **STANDARD:**

The student demonstrates a clear understanding of the principles of:

- Acceptable minimum weather conditions to continue VFR
- Sound in-flight decision making

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

- Use the correct R/T procedures
- Plan a navigation route for night cross-country use.
- Complete a night navigation route

