

PRIVATE PILOTS LICENCE (A) MICROLIGHT COURSE TRAINING SYLLABUS

Introduction

After many years experience and consultation with experienced microlight instructors and examiners, this syllabus has been formulated by the Microlight Panel of Examiners on behalf of the British Microlight Aircraft Association (BMAA), and approved by the Civil Aviation Authority (CAA).

All microlight instruction must be conducted in accordance to this, and no other syllabus - unless any alternative syllabus has been submitted to and approved by the CAA.

The syllabus is in two main parts - 1 Flying, 2 Ground - subjects.

The flying syllabus is broken down into **phases** and **exercises**. Individual exercises are further sub-divided into different **elements**, each of which must be fully understood by the student. Within each phase, each exercise has a specific stated aim. To ensure that these aims are achieved, each phase has a specific stated standard of skill which must be achieved.

Elements pertinent to both weight-shift and 3-axis types of aircraft are included in the syllabus. Where an aspect is not relevant to a type it should be ignored. For example, in exercise 6 - "Use of yaw control to maintain balanced flight" is not pertinent to a weightshift aircraft, as no primary control for yaw is provided in current designs.

Use of the syllabus

Every student should be in possession of a copy of the syllabus, as an aid to ensuring that no element is omitted, each element can be ticked off as it is completed. An exercise or group of exercises of the flying syllabus is taken as a session, and the pattern of each flying session should be run as follows:-

- (1) Pre-flight briefing
- (2) Flight training session
- (3) Post flight briefing

The flight exercises as listed reflect a progression through the basic handling skills to more complex manoeuvring and procedural flying. It is not however mandatory for a student to complete the exercises in strict number order if an instructor feels that the student would benefit from an earlier introduction to a later exercise. All flight exercises should be completed to a satisfactory standard prior to course completion. There is no laid down format for the ground subjects training, but it should be closely aligned to the knowledge required for the flight training exercises in order to produce an integrated course of training. Every school is required to keep an up to date progress report for each student pilot on a student record sheet.

SUMMARY OF THE SYLLABUS FOR THE MICROLIGHT P.P.L. COURSE FLIGHT TRAINING

Phase Minimum Ex No. Exercise Description

Times per Phase PART 1

1.... 2 Hrs	1. Aircraft familiarisation 2. Preparation for flight and action after 3. Air experience 4. Effects of controls 5. Taxying 6. Straight & Level 7. Climbing 8. Descending 9a. Medium Level-turns (up to 30* bank angle) 9b. Climbing and descending turns
2.... 1 Hr....	10a. Slow flight 10b. Stalling 11 Spin Awareness
3.... 3 Hrs....	12. Takeoff and climb to down wind 13. The circuit, approach, and landing/overshoot
4.... 1 Hr....	14. Advanced turning (up to 60* bank angle) 15. Unusual and dangerous attitudes/conditions
5.... 1 Hr....	16a. Forced landings, with/without power 16b. Operation at minimum level
6.... 7 Hrs....	17a. First solo 17b. Solo circuit, local area, and general flying consolidation to GFT for microlight PPL - local flying not further than 8nm from take-off site - hours as required to complete minimum of 15 hrs total flying experience (excluding GFT) and including minimum of 7 hrs solo. 17c. Dual revision for GFT

PART 2

7.... 5 Hrs	18. Pilot navigation
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Navigation training (at least **3 hrs** of which **MUST** be solo). To include **two 40nm** total distance each, solo cross-country flights, during each of which, the student landed at least at **one** other site. One site must be at least **15nm** away from the take-off site at which the flight began. The two solo cross-country flights must be flown over different routes and to different sites

Note:- Before full licence can be issued, or removal of limitations from 'restricted' licence, **25 hrs** total flying experience must be gained (Excluding GFT).

MICROLIGHT P.P.L. COURSE FLIGHT TRAINING SYLLABUS

PART 1

PHASE 1

Ex 1. Aircraft Familiarisation

Aim: To become familiar with the component parts, controls, and systems of the aircraft.

X Explanation of the aircraft:

- Component parts of the aircraft
- Main flight controls
- Engine controls

X Explanation of the cockpit layout and systems:

- Operation of flying controls
- Operation of engine controls
- Flight instruments/Engine instruments
- Electrical system
- Fuel system
- Operation of safety equipment

X Check lists and drills:

- Use of check lists and drills suitable for aircraft type
- Instinctive knowledge of position of controls

X Emergency drills:

- Action in the event of fire; in the air and on the ground
- Failure of equipment or systems
- Escape drills

Ex 2. Preparation for flight and Action after flight

Aim: To understand how to prepare the aircraft and pilot for flight, and to leave the aircraft after flight.

X Airfield Rules/Procedure/Safety:

- Standing orders
- Booking out/in
- Windsock
- Signals square
- Fuel storage
- Fire extinguisher/s
- Smoking

X Student Comfort:

- Seating position
- Suitable clothing for conditions expected

X Flight Authorisation and aircraft acceptance:

- Pre-flight planning
- Aircraft documentation
- Air traffic control information
- Personal equipment

X Pre-flight checks:

- Use of manufacturer's check list or mnemonic
- Explanation of extra items to check if aircraft just rigged

X External checks:

- Position of aircraft suitable for starting
- Fire extinguisher is available
- Taxi path is unobstructed

X Starting and warming up engine:

- Pre-start checks
- Stages and controls involved
- Signals that may be used

X Pre-Takeoff checks:

- Use of manufacturer's checklist or suitable mnemonic
- Importance of this check (vital actions)

X Running down and switching off:

- stages and controls involved

X Leaving the aircraft:

- Suitably parked/picketed
- Controls locked or restrained
- Brief external check

X Completion of post-flight documentation:

- Booking in
- Reporting of defects
- Entries in personal flight log
- Entries in Airframe/Engine log

Ex 3. Air experience

Aim: To introduce and become accustomed to the aircraft, the sensation of flying and to sample the aspect of the ground from the air.

Detailed instruction is not normally undertaken on this flight. It can, however, be a valuable lesson. It is an opportunity for the instructor to become acquainted with the student and decide upon the most suitable approach for subsequent instruction. During the flight all actions performed by the instructor should be accompanied by an explanation. Any sudden manoeuvring or expected turbulence should be discussed *before* it is encountered. The student should inform the instructor of any discomfort, in order to allow a rapid return to the airfield. During the latter part of the flight, the student should have the opportunity to handle the controls to provide a foundation for the next exercise. If the student has some previous flying experience, then this exercise can be combined with 'effects of controls'.

Ex 4. Effects of Controls

Aim: To understand how each control affects the aircraft in flight.

X Airmanship

- The importance of maintaining a good lookout

X Methods of assessing aircraft attitude:

- The horizon
- Hands-off trim
- 'Feel' of wind on face
- Primary effects of controls:
- Further effects of controls:
- Effects of airspeed, slipstream, and torque on control response:

- X Effects of trim:
- Hands-off trim
 - In flight adjustable trim (where applicable)

- X Effects of Flap; (where applicable):
- Effect at different positions
 - Change in pitch attitude with flap
 - Remaining within flap operational limiting speed

- X Use of other controls for increasing Rate of Descent (where applicable):
- Airbrakes
 - Spoilers
 - Tip draggers

- X Use of other controls as applicable to type:
- Mixture control
 - Carburettor heat
 - Cabin heat and ventilation

Ex 5. Taxying

Aim: To safety control the aircraft while manoeuvring on the ground, in different wind conditions, and on different surfaces.

- X Airmanship:
- Lookout
 - Suitable taxi speed
 - Serviceability checks of instruments (compass, ASI, etc)

- X Use of controls during taxying:
- Headwind Tailwind Crosswind
 - Tailwheel considerations, (where applicable):
 - Emergencies:

Ex 6. Straight & Level flight

Aim: To attain and maintain flight in a straight line, and at a constant attitude.

- X Airmanship:
- Lookout
 - Regular checks - Fuel state/consumption rate/engine instruments/etc

- X Straight flight:
- Visual reference point
 - Regaining and maintaining visual reference point
 - Use of yaw control to maintain balanced flight

- X Level flight, (Normal cruise power):
- Power required dependant on load carried
 - Attitude appreciation and control
 - Use of in-flight trim control (if applicable)
 - Hands-off trim
 - Inherent stability
 - Use of altimeter to check level

- X Level flight, (Varying power settings and IAS):
- Power provides height

- Angle of attack provides speed
- Power and angle of attack combine to give performance

- X Attitude control:
- Use of pitch control to maintain constant attitude to achieve constant I.A.S.

- X Difference between 3-axis aircraft, and weightshift aircraft:
- *Normal* input to the pitch control, will change the attitude on both 3-axis and weightshift aircraft. **But:**
 - With 3-axis aircraft, to change airspeed, aircraft nose must be raised or lowered, because wing is fixed to fuselage, **so nose attitude changes with deliberate airspeed change**
 - With weight-shift aircraft, to change airspeed, wing is moved independently of fuselage, **so nose attitude remains almost constant with deliberate airspeed change** (provided that Angle of Attack is changed slowly).

Ex 7. Climbing

Aim: To enter and maintain a steady full-power-climb, and then return to level flight at a predetermined altitude. Also to enter and maintain a steady cruise-climb.

- X Airmanship:
- Lookout
 - Altimeter setting procedure
 - Position of aircraft in relation to Airways etc
 - Awareness of any blind spots
 - Monitoring engine temperature

- X Entry to climb:
- Power first, then attitude adjustment (PAHT Power-Attitude-Hold-Trim)
 - Combining power and attitude for performance
 - Establishing and holding correct speed for climb

- X Levelling off:
- Attitude first, then power adjustment (AHPT Attitude-Hold-Power-Trim)
 - Maintenance of selected altitude
 - Effect of flaps on climb, (if applicable):

- X Maximum Angle of climb:
- Speed to achieve performance required
 - Practical uses

- X Maximum Rate of climb
- Speed to achieve performance required
 - Practical uses

- X Cruise climb
- Practical uses

Ex 8. Descending

Aim: To enter and maintain a steady glide-descent, then at a predetermined altitude, to return to level flight or climb. Also to enter and maintain a steady cruise-descent.

X Airmanship:

- Lookout
- Selection of clear airspace
- Altimeter setting procedure
- Regular application of power to ensure warm engine and clear plugs
- Awareness of blind spots

X Glide descent:

- Control of airspeed
- Speed for maximum glide range
- Speed for minimum sink
- Rate of descent/Angle of descent
- Use of flaps (if applicable)
- Use of airbrakes (if applicable)
- Use of spoilers (if applicable)
- Use of tip draggers (if applicable)

X Entry to the descent:

- Attitude first, then power reduction (AHPT Attitude-Hold-Power-Trim)

X Levelling off

- Power and attitude together

X Effect of flap (where applicable):

- Effect on attitude and airspeed
- Control of angle of descent with constant airspeed
- Descent-to-climb-on-full-flap procedure

X Powered descent:

- Relationship between power and airspeed
- Control of rate of descent
- Control of angle of descent using visual reference point (as on final approach)

X Cruise descent:

- Uses

X Sideslipping:

- Method of losing height

Ex 9a. Medium level-turns up to 30° bank angles,

Ex 9b. Climbing and descending turns.

Aim: To enter and maintain a medium (up to approx 30° bank) turn whilst maintaining level flight, then to return to straight and levelling on a new heading. Also to enter and maintain a climb or descent whilst turning, or to enter and maintain a turn from a straight climb or a descent.

X Airmanship:

- Instinctive lookout before turns

- Allowance for wind and maintaining knowledge of position

X Use of controls:

- Co-ordination and interaction during turns
- Accurate speed control

X Use of power

- To control height
- Slipstream and torque effect relative to direction of turn

X Maintenance of attitude and balance:

- Co-ordination and balance through the turn
- Using structure of aircraft to provide datum during the turn
- Awareness of heading during the turn
- Use of visual reference points to ensure accurate rolling out of turns
- Use of low bank angles during climbing turns, to maintain rate of climb

Standard required at end of Phase 1.

A reasonable level of competence in all general-flying skills

PHASE 2

Ex 10a. Slow flight. (Vs + 2mph and Vs + 5mph)

Aim: To become familiar with the ‘feel’ of the aircraft in slow flight just above the stallspeed, and to recognise the symptoms of the incipient stall, and to restore aircraft to safe flight before the stall occurs

X Airmanship

- Lookout
- Checks to ensure safe operation through exercise i.e.: height/location etc

X Characteristics of slow speed flight:

- Control response
- Effect of slipstream and torque (where applicable)
- Angle of attack (high nose attitude for 3-Axis aircraft)
- Angle of attack (control bar well forward of hands-off position for weight-shift aircraft)
- Wing dropping tendencies and difficulty in maintaining wings level
- Extra emphasis on need to keep 3-axis aircraft in balance with use of rudder
- Extra emphasis on need for careful use of roll control
- Need for extra care when turning ie: shallow angles of bank

Ex 10b. Stalling

Aim: To recognise and enter a fully-developed stall from various modes of flight both straight and turning, and then to recover with minimum height-loss to a safe flight mode. Also to recover to a safe flight mode at the incipient stall stage.

X Airmanship:

- Special attention to lookout - clearing turn to check rear
- Checks to ensure safe operation through exercise i.e.: height/location etc

X Principles and characteristics at the stall:

- Effectiveness of controls
- Inherent stability of aircraft at stall eg. Washout
- Buffet and other indications eg. Severe rearward bar pressure on weight-shift aircraft
- Wing dropping tendencies and correct handling of controls i.e. dangers of using roll control to level wings at the point of stall.

X Factors affecting the stalling speed:

- Flaps (if applicable)
- Power
- Weight
- Load factor i.e. centrifugal force in steep turns

X Full Stall and recovery; (from straight flight - level, climbing and descending)

- Use of controls
- Use of power (Recovery with and without the use of power)

Full Stall and recovery; (from turning flight - 30* angle of bank - level,

climbing and descending)

- Use of controls
- Use of power (recovery with and without the use of power)

X Stall and recovery at the incipient stage:

- Recovery during various attitudes and configurations
- Recovery during changing configurations

X Stalling at higher speed:

- Secondary stall
- ‘g’ stall

Ex 11. Spin awareness (if applicable)

Aim: To understand and recognise the onset of situations which may lead to an inadvertent spin, and to learn how to instinctively take the necessary control actions to effect a recovery back to normal flight condition before a spin occurs, ie: to recover the incipient stage

X Airmanship:

- Special attention to lookout - clearing turn to check rear
 - Checks to ensure safe operation through exercise i.e.: height/location etc
- Causes of spin:
Recognition of Incipient spin:

X Recovery from the incipient spin:

- Use of controls
- Danger of using ailerons at the incipient stage
- Effect of power and flap (flap restriction as applicable to type)
- Effect of centre of gravity on spin
- Recovery at the incipient stage from various attitudes and configurations

Standard required at end of phase 2.

Prior to circuit training, ability to control aircraft safely in slow flight just above the stall (Vs + 2mph) and able to recover to normal flight at incipient stall stage. Prior to solo flight, a very high standard of competence at recovering safely from fully developed stall and demonstrable ability to prevent aircraft getting into dangerous attitudes from all stall/spin-and-recovery manoeuvres.

PHASE 3

Ex 12. Takeoff and climb to downwind position

Aim: To safely take off and climb the aircraft to position on the downwind leg at circuit height. Also to land safely in the event of an engine failure after take off or at any time in the circuit, and to decide against and take appropriate action, if for some reason, continuation of the take off would be unsafe.

X Airmanship

- Pre take-off checks
- Planning for power failure on **every** take off
- Planning takeoff with regard to wake turbulence from other aircraft
- Planning takeoff with regard to areas of low level rotor/turbulence
- Drills during and after take off ie: constant planning for an aborted takeoff, or a forced landing due to power failure on take off or in the circuit, and monitoring engine temperature during the climb.

X Factors affecting the length of the takeoff roll and the initial climb:

- Use of power
- Correct lift-off speed
- Use of flight controls and techniques
- Wind: Nil-wind, Head-wind, Cross-wind
- Ground surface: Concrete, Grass (long/short/soft/hard/dry/wet)
- Ground gradient
- Weight - Altitude - Temperature - Humidity
- Maximum **Angle** of climb:
- Maximum **Rate** of climb:

X Undulating (rough field)

- Premature lift-off and subsequent control
- Short and soft field considerations:
- Tailwheel considerations (if applicable):

X Effect of flaps (if applicable):

- Decision to use
- Effects of use

X Emergencies:

- **Abandoned takeoff**
- **Engine failure after takeoff**
- **Engine failure in the circuit**

Ex 13. The circuit, final approach and landing

Aim: To fly an accurate circuit and carry out a safe approach and landing.

X Airmanship

- Importance of constant lookout during circuit, and prior to turning to leg
- Pre-landing checks (Downwind checks)
- Planning approach and landing with regard to wake turbulence from aircraft landing ahead
- The downwind leg, base leg, final approach positioning and drills:

X Factors affecting the final approach (and landing run):

- Nil-wind, Head-wind, Cross-wind
- Correct approach speed
- Use of power
- Weight
- Flaps/spoilers (if applicable)

X Types of approach (and landing):

- Powered approach and landing
- Glide approach and landing
- Crosswind approach and landing
- Short field approach and landing
- Soft field approach and landing
- Flapless approach and landing (if applicable)
- Use of airbrakes and spoilers (if applicable)

X Missed approach and go-around:

- Correct positioning
- Missed landing and go-around:
- Effect of ground surface and gradient on the landing run:
- Tailwheel considerations (if applicable):

X Use of elevators:

- Safeguarding the nosewheel
- Use of brakes (if applicable):
- The Complete Take-off, Circuit and Landing:
- Circuit joining and leaving procedures

X The Hold-off period, and Touchdown:

- Ability to control **height** with *pitch control*, and **airspeed** with *power*
- Ability to control **direction**
- Ability to control and correct **ballooning**
- Ability to cope with **crosswind**
- Ground manoeuvring after landing

Standard required at end of phase 3

Ability to take off safely and maintain the climbout safely given a variety of different circumstances. Ability to cope with emergencies at any point in the take-off, circuit, or landing phases of flight. Ability to approach and land safely given a variety of different circumstances. Demonstration of a high degree of airmanship and knowledge of airfield and circuit procedures and disciplines.

PHASE 4

Ex 14. Advanced turning (up to 60° bank angles)

Aim: To carry out a coordinated level turn at steep angles of bank and to recognise and recover from a spiral dive. Also entry and recovery from, and uses of a sideslipping turn.

X Airmanship:

- Importance of lookout
- Importance of maintaining orientation
- Cockpit checks

X 360° turns: (up to 45° bank angle)

- Level: Climbing: Descending
- Wake turbulence

X Steep level-turns (up to 60° bank angle):

- Co-ordination
- Use of power
- Weight-shift aircraft - 270° turns only, to avoid own wake turbulence and possible student disorientation due to being forced into an unusual or dangerous attitude

X The spiral dive:

- If power applied - reduce
- Recovery by use of roll and *then* pitch

X The sideslipping turn:

- Uses of

X Ex 15. Unusual and dangerous attitudes/conditions

Aim: To recognise potentially dangerous conditions of flight, and to recover safely from unusual attitudes.

- From inadvertent mishandling of controls at high speeds
- From inadvertent mishandling of controls in stall recovery in various configurations
- From inadvertent mishandling of controls in a steep turn
- From inadvertent mishandling controls following hitting own wake turbulence in a 360° steep turn at 45° to 60° bank angles

Note: This exercise must not be practised solo by the student

Standard required at end of phase 4.

Ability to control aircraft safely in steeper than normal angles of bank, with correctly coordinated roll, pitch, and power, also ability to avoid the spiral dive and wake turbulence. Ability to use sideslipping usefully and safely. Also, a very high degree of understanding the reasons why, and of ability to recognise the onset of dangerous attitudes, together with instinctive and immediate prevention of the aircraft from continuing into potentially dangerous conditions of flight.

PHASE 5

Ex 16a. Forced landings - with/without power

Aim: To carry out a safe descent, approach, and landing, in the event of the engine failing during flight, and to carry out a safe unplanned precautionary landing in an unfamiliar field.

X Airmanship:

- Use of correct drills
- Correct handling and highly accurate speed control
- Forced landing procedure:
- Choice of landing area:
- Provision for change of plan
- Gliding distance considerations:

X The descent plan:

- Key position
- Engine failure checks
- The base leg:

X The final approach:

- Methods of controlling glide angle
- S turns
- Precautionary landing with power:
- Inspection procedures

X Actions after landing:

- Aircraft security

Ex 16b. Operation at minimum level.

Aim: To safely operate the aircraft at heights lower than those normally used.

X Airmanship:

- Assessment of weather conditions/turbulence
- Assessment of height above terrain
- compliance with low flying rules
- High level of awareness
- Low level of military aircraft

X Low level familiarisation:

- Actions prior to descending
- Visual impressions and height control at low altitudes
- Effects of wind, speed, and inertia during turns
- Effects of wind and turbulence

X Low level operation:

- Weather considerations
- Avoidance of precipitation
- Obstacle considerations

X Effects of precipitation:

- As applicable to type
- Joining circuit in poor weather, and bad-weather circuit:

Standard required at end of phase 5.

Ability to choose a suitable safe area, and to set up a good approach to land following any unexpected power loss simulation. Ability to choose a suitable safe landing area, and to carry out a low pass to check suitability of surface prior to a simulated precautionary landing. Ability to fly safely just above ground level, demonstrating a high degree of understanding of low-level turbulence and awareness of obstacles, together with ability to coordinate turns correctly with regard to wind direction. Acute awareness of dangers and rules associated with low flying, and consideration for noise, animals, etc

PHASE 6

Ex 17a. First solo.

Aim: To carry out a safe and accurate solo circuit, approach, and landing.

X Airmanship:

- Constant look out
- Faultless checks
- Ability to deal with all emergency drills

X First solo, short briefing required:

- Pilot should not hesitate to overshoot if in any doubt
- Differences in handling and performance when flown solo
- Use of ballast

Ex 17b. Solo circuit, local area, general flying consolidation.

Aim: To practise and refine all the skills learned during the dual training, and to prepare for the General Flying Test.

X Airmanship:

- Review and application of all different aspects of airmanship

X General flying consolidation:

- Review and application of all different aspects of the general handling skills

X Circuit consolidation:

- Review and application of all different aspects of the take-off, circuit, approach, and landing

X Local area consolidation:

- Airfield departure procedure
- Map reading and identification of local features
- Turning onto and maintaining heading by use of compass
- Circuit rejoining procedure

Ex 17c. Dual revision for GFT.

Aim: To correct any errors or bad habits which may have developed during 17b and to check that no aspect of the training has been overlooked.

X Review of:

- All aspects of required standards of airmanship, general flying skills,

knowledge of and practical application of ground subjects/procedures etc prior to application for General Flying Test

Standard required at end of phase 6.

All general flying skills and airmanship to be up to GFT standard. Also an adequate knowledge of aviation law, general meteorology, local weather, and ability to predict if conditions will remain suitable for continued flight. Also reasonable standard of map reading ability.

PART 2

PHASE 7

Ex 18. Pilot navigation.

Aim: To fly accurately and safely in VMC and under VFR, a predetermined route, without infringing the rules governing regulated airspace.

X Airmanship:

- Pre-flight planning
- Planned cockpit management
- Adequate security of loose items

X Flight planning:

- Notams
- Weather forecast and actual(s) for planned route
- Map selection and preparation
- Choice of route
- Tie-down equipment

X Calculations:

- Magnetic heading and times on route
- Fuel consumption
- Weight, balance and performance

X Airfield procedure on departure:

- Organisation of cockpit
- Altimeter setting
- Setting of heading
- Setting of time and noting of ETAs

X En-Route:

- Maintenance of altitudes and headings
- Revisions to ETA and heading
- Minimum weather conditions for flight to continue at any point
- 'In-flight' decisions
- Navigation at minimum level
- Uncertain of position procedure
- Lost procedure

X Arrival at Destination procedure:

- Altimeter setting (QNH to airfield QFE)
- Airfield circuit and circuit joining procedure
- Parking procedure
- Security of aircraft:

Note:

*The above navigational exercises would typically be spread over the following sessions, though it is **not** mandatory for any **dual** tuition for this part of the syllabus:*

- 1) Dual cross country. (inc away landing)
- 2) Dual cross country. (inc navigation at min. level, and lost procedure)
- 3) Solo cross country. (1st qualifying cross country)
- 4) Solo cross country. (2nd qualifying cross country)

Standard required at end of phase 7.

Good navigational ability. Good ability to predict weather. High standard of airmanship.

SUMMARY OF THE SYLLABUS FOR THE MICROLIGHT PPL COURSE GROUND-SCHOOL TRAINING

Principles of Flight

Aviation Law

Aviation Navigation

Aviation Meteorology

Airframes and Engines

Aircraft Instruments

Fire, First Aid, and Safety Equipment

Human Performance Limitations

MICROLIGHT PPL COURSE GROUND-SCHOOL TRAINING SYLLABUS PRINCIPLES OF FLIGHT

X PHYSICS AND MECHANICS

Speed, Velocity, Force

Pressure - Bernoulli's Principle

Motion of a body along a curved path

X AEROFOILS, LIFT AND DRAG

Air Resistance and Air Density

Aerofoil shapes

Lift and Drag - Angle of Attack and Airspeed

Distribution of Lift, Centre of pressure

Drag - Induced, Parasite - Form, Skin, Interference

Lift/Drag Ratio and Aspect Ratio

X FLYING CONTROLS

The Three Axes - Vertical, Lateral, Longitudinal

Yaw, Pitch, Roll

Operation and Function of Elevators, Ailerons, Rudder

Principles and Purpose of Mass, and Aerodynamic Balance

Operation and Function of Trimming Controls

Operation and Function of Flaps

Operation and Function of Spoilers, Spoilerons, Tip Rudders

Principles and Function of Canard configuration

Principles and operation weight-shift control systems

Operation and function of billow shift

X EQUILIBRIUM

The Four Forces - Lift, Weight, Thrust, Drag

Moments and Couples

The Balance of the Four Forces - Straight and Level

- Climbing

- Descending

X STABILITY

Positive, Neutral, Negative

Lateral and Directional Stability - 3Axis/Weight-shift

Longitudinal Stability - 3Axis/Weight-shift

Relationship of C of G to Control in Pitch - 3Axis/Weight-shift

Luff Lines on Weight-shift aircraft

Washout

X THE STALL

Airflow Separation

Stalling Angle - Relationship to Airspeed

Wing Loading

Wing Loading increase with bank angle increase

High Speed Stall

X THE SPIN

Causes of a spin

Autorotation

Effect of the C of G on spinning characteristics

X TURNING FLIGHT

The Forces in the Turn

X LOAD FACTOR AND MANOEUVRES

Definition of Load Factor - VN envelope

Effect on Stalling Speed

In-Flight Precautions

X AIRCRAFT PERFORMANCE

Power Curves

Effect of Temperature and Density

Range and Endurance

Climbing Performance

Rate of Climb

Angle of Climb

Take-off and Landing Performance

Take-off Run Available

Take-off Distance Available

Landing Distance Available

The Take-Off and Initial Climb - Performance

Effect of:

Wind

Wind Gradient

Wind Shear

Weight

Pressure, Altitude, Temperature and Density

Ground Surface and Gradient

Use of Flaps

The Approach and Landing - Performance

Effect of:

Wind

Wind Gradient

Wind Shear

Use of Flaps

Ground Effect

X WEIGHT AND BALANCE

Limitations on Aircraft Weight

Limitations in Relation to Aircraft Balance

Weight and Centre of Gravity Calculations

X THE PROPELLER

Construction and Shape

Maintenance and checks

Balancing

AVIATION LAW

X THE AIR NAVIGATION ORDER

- Classification of Aircraft

X AIRCRAFT DOCUMENTATION

- Certificate of Registration

- Permit to Fly/Exemption Certificate

- Noise Certificate

- Flight Manual/Maintenance Schedules/Pilot's Operating Handbook
- Airframe and Engine Logbook and Pilot's responsibility to maintain and record: Aircraft hours, inspections, defects, repairs, maintenance, and modifications (mandatory and otherwise)

X PERMITS TO FLY AND EXEMPTIONS

- BMAA 'Guide to Airworthiness' Document
- Non-expiring Permit to Fly and Certificate of Validity
- Non-expiring Exemption and Certificate of Validity
- Limitations applying to Permit to Fly and Exemption Certificate Aircraft
- Failure to Comply with the Requirements or Conditions of the Permit to Fly or Exemption Certificate
- Application of Flight/Owner's Manual and Pilot's Operating Handbooks to the Permit to Fly
- Requirements for Maintenance and Inspections
- Overhaul, Repair, Replacement and Modifications to Aircraft or Equipment

X AIRCRAFT EQUIPMENT

- ANO Schedule 4
- Equipment Required in Relation to the Circumstances of Flight

X AIRCRAFT RADIO EQUIPMENT

- ANO Schedule 5
- Certificate of Approval of Aircraft Radio Installation
- Flight Radio Operators Licence

X AIRCRAFT WEIGHT SCHEDULE

- Legal Requirements in Relation to the Permit to Fly/Exemption

X GRANT AND RENEWAL OF LICENCES TO MEMBERS OF FLIGHT CREW

- Conditions of issue

X PRIVILEGES OF THE PRIVATE PILOT'S LICENCE

- Student Pilot Privileges
- Medical Certificates
- The Private Pilot's Licence
- Ground Examinations and Flight Test
- Medical Certificate - Renewal
- Private Pilot Privileges ('Restricted and 'Unrestricted')
- Specified Minimum Weather Provisions

X RATINGS - CONDITIONS OF ISSUE

- Privileges of the Aircraft Rating
- Additional Ratings

X LICENCES AND RATINGS - RENEWAL

- Certificate of Test
- Certificate of Experience
- Period of Validity
- Flying Hour Requirements

X PERSONAL FLYING LOG BOOK

- Requirements to Maintain
- Personal Details
- Particulars of Flight
- Recording of Dual, Solo, Cross Country Flight Times
- Recording of Flight Tests
- Instructor's Endorsements of Flight Times

X INSTRUCTION IN FLYING

- Definition of Flying Instruction
- Requirement for Flying Instruction to be given

PRE-FLIGHT ACTION BY COMMANDER OF AIRCRAFT

DROPPING OF PERSONS OR ARTICLES

CARRIAGE OF MUNITIONS

CARRIAGE OF DANGEROUS GOODS

ENDANGERING SAFETY OF AIRCRAFT

X ENDANGERING SAFETY OF PERSONS OR PROPERTY

- By intent
- By Neglect

X DRUNKENNESS IN AIRCRAFT

- Application to Passengers

- Application to Flight Crew

X SMOKING IN AIRCRAFT

- Authority of Commander

- Notices in Aircraft

X AUTHORITY OF COMMANDER OF AIRCRAFT

- Legal requirements to Obey all Lawful Commands

X EXHIBITIONS OF FLYING

- Public Displays

- BMAA Events

X DOCUMENTS TO BE CARRIED

- On Domestic Flights

- On International Flights

X PRODUCTION OF DOCUMENTS AND RECORDS

- Requirements of Commander

- Requirements of Operator

- Requirements of Flight Crew

- Personal Flying Log Books

X REVOCATION, SUSPENSION OR VARIATION OF CERTIFICATES, LICENCES, OR OTHER DOCUMENTS

- Whilst Pending Enquiry or After Enquiry

- Surrender of Documents

- Invalidation of Documents Due to Breach of Conditions

X OFFENCES IN RELATION TO DOCUMENTS AND RECORDS

- Unauthorised use of Documents

- Alteration, Mutilation, or Destruction of Documents or Records

- Entries in Log Books or Records

- Incorrect Entries - Wilfully or Negligently

- Unauthorised Issue of Certificates

X AERODROMES - INSTRUCTION IN FLYING

- The Requirement for Basic minima as laid down by BMAA

- Permission and Purpose of Use

POWER TO PREVENT AIRCRAFT FLYING

AIR TRAFFIC RULES AND SERVICES

X DIVISION OF AIRSPACE IN THE UK

- Controlled Airspace

Control Zones

Control Areas

Terminal Control Areas

Airways

- Advisory Airspace

- Military Aerodrome Traffic Zones

- Civil Aerodrome Traffic Zones

X CLASSIFICATION OF AIRSPACE

- The seven classes of airspace

X VMC, IMC AND NOTIFICATION

- Conditions for VFR Flight (VMC)

- Conditions for IFR Flight (IMC)

Quadrant Rule

Semi-Circular Rule

- Special VFR Flight

X TYPES OF AIR TRAFFIC SERVICE UNITS

- Notams
- The UK Air Pilot
- Air Traffic Centres
- Zone Control Units
- Aerodrome Control Units
- Radar Facilities

X ALTIMETER SETTING PROCEDURES

- Terrain Clearance
- Flight Separation
- Flight Levels
- Transition Level
- Transition Layer
- Transition Altitude

X FLIGHT AT AERODROMES

- Aerodrome Traffic Zone
- Lights and Pyrotechnic Signals
- Ground Signals Used at Civil Aerodromes
- Marshalling Signals

FLIGHT PLANS

FLIGHT INFORMATION REGIONS AND SERVICES

FLIGHT IN CONTROL ZONES, CONTROL AREAS AND TERMINAL CONTROL AREAS

FLIGHT ON AIRWAYS

FLIGHT ON ADVISORY ROUTES/SERVICE AREAS

AIRMISS REPORTING PROCEDURES

X AIRSPACE RESTRICTIONS AND HAZARDS

- Danger Areas
- Prohibited and Restricted Areas
- Military Flight Training Areas
- Bird Sanctuaries
- High Intensity Radio Transmission Areas
- Additional Hazards to Aircraft in Flight
- Gliding Sites/Hang Gliding Sites
- Free Fall Parachute Areas
- Military Air Exercises
- Flying Displays, Air Races, Etc
- Navigational Obstructions

ROYAL FLIGHTS

X AERODROMES, AGA SECTION OF THE AIR PILOT

- Civil Aerodromes
- Military Aerodromes
- Aerodrome Ground Lights
- Identification Beacons
- Aerodrome Beacons

ROYAL FLIGHTS

X METEOROLOGY

- Source of Information
- Requests for Route Forecasts

X FACILITATION - CUSTOMS AND PUBLIC HEALTH

- Arrival, Departure, and Transit of Civil Aircraft on International Flights
- Customs Aerodromes
- Private Flights - Documentary Requirements
- Customs Requirements
- Public Health Requirements

X SEARCH AND RESCUE

- Responsibility and Organisation
- Aircraft not Equipped with Radio

- Visual Distress and Urgency Signals
- Procedures and Signals Employed by Rescue Aircraft
- Search and Rescue Regions and Facilities

WARNING SIGNALS TO AIRCRAFT IN FLIGHT

X EXTRACTS FROM THE RULES OF THE AIR TRAFFIC CONTROL REGULATIONS

- Interpretation
- Application of Rules to Aircraft
- Reporting Hazardous Conditions
- Low Flying
- Simulated Instrument Flight
- Practise Instrument Approaches
- Lights or Other Signals to be shown or made by Aircraft
- Display of Lights by Aircraft
- Flying Machines in Flight
- Flying Machines on the Ground
- Failure of Navigation Lights

Gliders

Free Balloons

Captive Balloons and Kites

Airships

X GENERAL FLIGHT RULES

- Weather Reports and Forecasts
- Rules for Avoiding Aerial Collisions
- Aerobatic Manoeuvres
- Right Hand Traffic Rule
- Notification of Arrival
- Flight in Notified Airspace
- Choice of VFR or IFR

X AERODROME TRAFFIC RULES

- Application
- Visual Signals
- Access to and Movement on the Manoeuvring Area
- Right of Way on the Ground
- Dropping of Tow Ropes
- Aerodromes not having ATC Units
- Special Rules for Certain Aerodromes
- Wake Turbulence Separation

X FLIGHT SAFETY AND ACCIDENT/INCIDENT REPORTING

Extracts from:

THE CIVIL AVIATION (INVESTIGATION OF AIR ACCIDENTS) REGULATIONS 1989

THE CIVIL NAVIGATION (INVESTIGATION OF AIR ACCIDENTS INVOLVING CIVIL AND MILITARY OR

INSTALLATIONS)

REGULATIONS 1986

- Authorities requiring immediate notification by telephone
- Confirmation in writing and use of correct written form only
- BMAA Safety and Accident Investigation Handbook
- Flight Safety Bulletin Issued Quarterly by the General Aviation Safety Committee (GASCO)
- Accidents to Aircraft on the British Register (Published Annually by the CAA)
- A.I.B. Bulletins
- Pink Aeronautical Information Circulars

AIR NAVIGATION

X FORM OF THE EARTH

- Meridians of Longitude
- Parallels of Latitude
- Rhumb Lines

MAGNETIC VARIATION

COMPASS DEVIATION

X PRINCIPLES OF NAVIGATION

- IAS, Wind, Heading, Groundspeed
- The Triangle of Velocities

X MAPS AND CHARTS

- Practical Use of 1:500,000 and 1:250,000 Series
- Importance of using Current Charts
- Chart Scale
- Measurement of Distance and Heights

Units of Distance

Units of Height

- Measurement of Angles, Tracks and Bearings
- Relationship to True, Magnetic and Compass North

X MAP REFERENCE INFORMATION

- Latitude and Longitude
- Isogonals
- Topography

Relief

Hydrographic Features

Cultural Features

- Aeronautical Symbols
- Aeronautical Information
- Conversion of Units (Distance and Height)

X MAP READING

- Map Analysis
- Permanent Features

Relief

Line Features

Spot Features

Unique or Special Features

- Features Subject to Change

Water

Other

- Effects of Seasons

X PREPARATION

- Checkpoint Features and Selection
- Folding the Map for use

X METHODS OF MAP READING

- Map Orientation
- Anticipation of Checkpoints
- With Continuous Visual Contact
- With Restricted Visual Contact
- When Uncertain of Position

X FLIGHT PLANNING

- Selection of Charts
- Plotting the Route
- Selection of Altitude/s and Safety Altitude
- Use of the Chart of UK Airspace Restrictions

Danger Areas

Prohibited/Restricted Areas

Military Flight Training Areas

Bird Sanctuaries

High Intensity Radio Transmission Areas

- Additional Hazards to Aircraft in Flight
- Notams and Aeronautical Information Bulletins
- Civil Aeronautical information circulars

- Local Time and Greenwich Mean time

X WEATHER FORECASTS AND REPORTS

- Minimum Weather Conditions Acceptable to Safety
- General Aviation Visual Flight Forecast Service
- Aerodrome Forecasts and Reports
- Local Telephone General Weather Forecast
- Local Radio/TV General Weather Forecast

X PRACTICAL NAVIGATION

- Compilation of the Flight Log
- Measurement of Tracks
- Determining Safety Altitude
- Calculating Heading, True and Magnetic, Groundspeed, Distance, Time, Fuel Consumption, Fuel Required

- Departure Procedures

Booking Out

Estimated Time of Arrival

Setting heading Procedures

Altimeter Setting Procedures

- Maintenance of Altitude and Heading

- Establishing Position

- Revisions to Heading

The “1:60” and “Closing Angle” Methods of Heading Correction

The use of Drift Lines

En Route Checks

- Uncertainty of Position Procedure

- Lost Procedures

- Arrival Procedures

Altimeter Setting Procedures

Booking in

AVIATION METEOROLOGY

X THE ATMOSPHERE

- Composition and Structure

- The Troposphere

- Air density

X PRESSURE

- Air has weight

- Effect of altitude

- Effect on density

- Measurement

- Barometer

- Aneroid

- Mercurial

- Mean Sea Level (MSL)-Conversion for height

- Isobars

- Pressure systems - Depression - Trough - Col - Anticyclone - Ridge

X THE ALTIMETER

- Principle

- Pressure settings (QNH, QFE, Regional QNH, Standard)

X WIND

- Horizontal motion of the atmosphere

- Effect of Earth's rotation

- Relation of wind to isobars

- Surface friction

- Geostrophic

- Local winds

- Sea breeze effect

- Thermal winds
- Katabatic/Anabatic
- Effect of terrain
- Surface geography
- Surface objects
- Rotor
- Standing waves
- Wind gradient
- Wind shear

X TEMPERATURE

- Source of Earth's heat
- Effect on density
- Adiabatic cooling/heating
- Lapse rates
- Environmental
- Adiabatic - dry and wet (saturated)
- Effect of height on saturated adiabatic lapse rate

X HUMIDITY

- Water vapour
- Moisture content
- Relative Humidity
- Effect of temperature
- Dew point temperature
- Effect on density

X AIR MASSES

- Source and types
- Transformation
- Fronts
- Warm
- Cold

- Occlusion

X CLOUDS

- Classification of Clouds
- High/Medium/Low
- Types of Clouds
- Stratiform
- Cumuliform
- Names of Clouds

X FORMATION OF CLOUD

- Air cooling to Dew Point
- Mixing - vertical motion of atmosphere
- Convection - stability and instability
- Orographic
- Frontal

X PRECIPITATION

- Rain/drizzle/hail/sleet/snow

X DEPRESSIONS

- Origin
- Development
- Frontal depression

X VISIBILITY

- Measurement
- Haze
- Mist
- Fog - Radiation/Advection

X ICE ACCRETION ON AIRCRAFT

- Conditions required for ice formation

- Types of airframe icing

- Hoar frost

- Rime ice

- Clear ice

- Effects of icing on aircraft performance

- Carburettor icing

X EFFECTS OF WEATHER ON FLIGHT

- Effect on an altimeter en route in proximity to a depression

- Effect of turbulence - low level - under cumulus

- Hazards of flight through depressions and fronts

- Hazards of flight in reduced visibility - haze - precipitation

- Effect on visibility related to the sun's position ahead or behind

- Flight in proximity of large Cu and Cb Cloud - line squalls

- Effect on surface wind direction of large Cu and Cb cloud

- Potential hazard of a snow/ice coating on a parked aeroplane

- Potential hazard of a clear evening sky in autumn/winter - fog, frost

AIRFRAMES AND ENGINES

X AIRCRAFT STRUCTURE

- Airframe

- Wing

- The Controls

- The Trimming System

- Tuning

- Aircraft Tyres

- Wear, Bulges, Cuts, Scores

- Aircraft Seats

- Baggage

- Stowage Position

- Maximum Weights allowed

X ENGINE

- Principles of two stroke cycle

- Principles of four stroke cycle

X ENGINE IGNITION SYSTEM

- Principles

- The Ignition Switch/es

- Use of Correct Plugs

- Spark Gap

- Replacement Intervals

- Plug Security

X CARBURATION

- Principles

- Setting for the Correct Mixture

- Recognising the Wrong Mixture

X EXHAUST SYSTEMS

- Difference between Two-stroke and Four-stroke systems

- Checks for security, cracks, and internal integrity

X DECOKING

- Intervals

X OIL SYSTEM

- Correct mixing of Two-stroke Oil/Petrol

- Four stroke oil system

X FUEL SYSTEM

- Fuel Pump

- Fuel Filters

- Fuel Grade

- Water in Fuel

X ELECTRICAL SYSTEM

- Generators
- Batteries
- X PROPELLER**
- Defects
- Balancing
- X REDUCTION DRIVE**
- Belt Tension
- Alignment
- Defects
- Maintenance procedures
- AIRCRAFT INSTRUMENTS**
- X AIRSPEED INDICATOR**
- Position Errors
- ALTIMETER**
- X MAGNETIC COMPASS**
- Precautions when carrying Ferrous Objects
- Turning, acceleration, Deceleration errors
- X ENGINE INSTRUMENTS**
- Temperature Gauges - CHT - EGT - Water
- RPM Counter
- FIRE, FIRST AID, AND SAFETY EQUIPMENT**
- X FIRE, DANGERS AND PRECAUTIONS**
- Fire Extinguishers
- Fire in Flight
- Fire on the Ground
- Fuel Storage, Fuel Mixing, Refuelling
- Smoking
- X FIRST AID**
- Procedures following an accident
- Fractured or Broken Limbs
- Severe Bleeding
- Head Injuries
- Severe Shock
- Burns
- First Aid Kits - Stowage
- HUMAN PERFORMANCE LIMITATIONS**
- X INTRODUCTION**
- Reasons for Knowledge of HPL
- X OXYGEN**
- Relation - to the atmosphere
- to height
- effect
- X HYPOXIA**
- Location
- Timing
- Effects and acceleration of same
- X HYPERVENTILATION**
- Causes and effects
- Avoidance
- X BAROTRAUMA**
- Causes and effects
- Avoidance
- X COMMON AILMENTS**
- Effects
- Medication
- X DECOMPRESSION**
- Underwater effects

- Relationship to flying
- X AIR SICKNESS**
- Causes
- Medication
- Environment
- X HEARING**
- Noise limits
- Effects
- Precautions
- X SIGHT**
- Correction of defects
- X TOXIC HAZARDS**
- Sources
- Effects
- Smoking
- X BLOOD PRESSURE**
- Control
- X EPILEPSY**
- Why a bar to flying
- X ALCOHOL/DRUGS**
- Problems
- Effects
- Control
- X KNOWLEDGE AND THE SENSES**
- Knowledge
- Perception
- Action
- Environment
- X DISORIENTATION**
- Causes
- Effect
- Result
- X AVOIDING THE AIRMISS**
- Assessment
- Relative speeds
- 'Look-out'
- Actions
- Problems
- X STRESS**
- Forms
- The individual
- Outside influences
- X MANAGEMENT OF STRESS**
- Danger of drugs
- Mutual discussion
- Experience
- X SOCIAL PSYCHOLOGY**
- The Ego factor
- Potential reactions
- Control