

MICROLIGHT/ULTRALIGHT TRAINING SYLLABUS

INTRODUCTION

After many years experience and consultation with experienced microlight instructors and examiners , this syllabus has been formulated by the UK Microlight Panel of Examiners on behalf of the BMAA and approved by the CAA.

All microlight instructions 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 balance flight" is not pertinent to a weight-shift aircraft, as no primary control for yaw 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 is omitted, each 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:-

Pre-flight briefing
Flight training session
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 will 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 records sheet.

SUMMARY OF THE SYLLABUS FOR THE MICROLIGHT PPL COURSE FLIGHT TRAINING

PART 1 PHASE	MIN TIMES/PHASE	EX NO	EXERCISE DESCRIPTION
1	2 HRS	1	AIRCRAFT FAMILIARISATION
		2	PREPARATION FOR FLIGHT AND ACTION AFTER
		3	AIR EXPERIENCE
		4	EFFECTS OF CONTROL
		5	TAXYING
		6	STRAIGHT & LEVEL
		7	CLIMBING
		8	DESCENDING
		9a	MEDIUM LEVEL-TURNS (up to 30° bank)
		9b	CLIMBING AND DESCENDING TURNS
		2	1 HR
10b	STALLING		
11	SPIN AWARENESS		
3	3 HRS	12	TAKEOFF AND CLIMB TO DOWN WIND
4	1HR	13	THE CIRCUIT, APPROACH, AND LANDING/OVERSHOOT
		14	ADVANCED TURNING (up to 60° bank)
5	1HR	15	UNUSUAL AND DANGEROUS ATTITUDES/CONDITIONS
		16a	FORCED LANDINGS, WITH /WITHOUT POWER
6	7HRS	16b	OPERATION AT MINIMUM LEVEL
		17a	FIRST SOLO
		17b	SOLO CIRCUIT, LOCAL AREA, AND GENERAL FLYING CONSOLIDATION TO GFT FOR MICROLIGHT PPL. -LOCAL FLYING NOT FURTHER THAN 8 NM FROM TAKE-OFF SITE - HOURS AS REQUIRED TO COMPLETE MINIMUM OF 15 hrs TOTAL FLYING EXPERIENCE (EXCLUDING GFT) AND INCLUDING A MINIMUM OF 7 HRS SOLO.
		17c	DUAL REVISION FOR GFT
PART 2			
7	5 HRS	18	PILOT NAVIGATION Navigation training (at least 3 hrs of which MUST be solo). To include 2 x 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

² Before full licence can be issued, or remove of limitations 'restricted' licence, 25 hrs flying experience must be gained (Excluding GFT).

EX 1: AIRCRAFT FAMILIARISATION.

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

Explanation of the aircraft:

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

Explanation of the cockpit layout and systems:

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

Check lists and drills:

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

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 & ACTION AFTER

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

Airfield Rules/Procedures/Safety:

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

Student Comfort:

- Seating position
- Suitable clothing for conditions expected

Flight Authorisation and aircraft acceptance:

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

Pre-flight checks:

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

External checks:

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

Starting and warming up engine:

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

Pre-flight Takeoff checks:

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

Running down and switching off:

- Stages and controls involved

Leaving the aircraft

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

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 and controls.

EX 4: EFFECTS OF CONTROLS

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

Airmanship:

The importance of maintaining a good look out

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:

Effects of trim

Hands-off trim

In flight adjustable trim (where applicable)

Effects of Flap (where applicable)

Effect at different positions

Change in pitch attitude with flap

Remaining within flap operational limiting speed

Use of other controls for increasing Rate of Descent (where applicable)

Airbrakes

Spoilers

Tip draggers

Use of other controls as applicable to type

Mixture control

Carburettor heat

Cabin heat and ventilation

EX 5: TAXYING

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

Airmanship

- Lookout
- Suitable taxi speed
- Service ability checks of instruments (compass, ASI, etc.)

Use of controls during taxiing:

- Headwind
- Tailwind
- Crosswind

Tailwind considerations: (where applicable)

Emergencies

EX 6:STRAIGHT & LEVEL FLIGHT

Aim: *To attain and maintain flight in a straight line and constant altitude*

Airmanship:

- Lookout
- Regular checks - Fuel state/ consumption rate/engine instruments/etc.

Straight flight

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

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

Level Flight: (Varying power settings and IAS)

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

Attitude control:

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

Differences between 3-axis aircraft and weightshift aircraft:

- Normal input to the pitch control will change we the attitude on both 3-axis and weight-shift aircraft.
- But:- With 3-axis aircraft to change airspeed, aircraft nose must be raised or lowered, because wing is fixed to the fuselage so nose attitude change with deliberate airspeed change.
- With weight-shift aircraft to change airspeed wing is moved independently of fuselage so nose attitude remains almost with deliberate airspeed change (provided that the 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.*

Airmanship:

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

Entry to climb:

- Power first, then attitude adjustment (PAHT)
- Combining power and attitude for performance
- Establishing and holding correct speed for climb

Levelling off:

- Attitude first, then power adjustment (AHPT)
- Maintenance of selected altitude

Effect of flaps on climb: (if applicable)

Maximum Angle of climb:

- Speed to achieve performance required
- Practical uses

Maximum Rate of climb:

- Speed to achieve performance required
- Practical uses

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.*

Airmanship

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

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)

Entry to the descent

- Attitude first, then power reduction (AHPT)

Levelling off

- Power and attitude together

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

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)

Cruise descent

- Uses

Sideslipping

- Method of losing height

EX 9a: MEDIUM LEVEL TURNS UP TO 30° BANK ANGLE

EX 9b: CLIMBING & 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 level flight 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*

Airmanship

Instinctive lookout before turns
Allowance for wind and maintaining knowledge of position

Use of controls

Co-ordination and interaction during turns
Accurate speed control

Use of power:

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

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 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

EX 10a: SLOW FLIGHT (V_{s+2} mph and V_{s+5} mph)

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

Airmanship

Lookout

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

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 wing 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 i.e.: 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.*

Airmanship:

Special attention to lookout - clearing turn to check rear

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

Principles and characteristics at the stall:

Effectiveness of controls

Inherent stability of aircraft at stall e.g. Washout

Buffet and other indications e.g. Severe rearward bar pressure on weigh-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.

Factors affecting the stall speed:

Flaps (if applicable)

Power

Weight

Load factor i.e. centrifugal force in steep turns

Full Stall and recovery:(from straight flight-level climbing and descending)

Use of controls

Use of power

Full Stall and recovery:(from Turing flight-30(angle of bank -level, climbing and descending)

Use of controls

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

Stall and recovery at the incipient stage:

Recovery during various attitude and configurations

Recovery during changing configurations

Stalling at higher speed

Secondary stall

'g' stall

EX 11: SPIN AWARENESS (if applicable)

Aim: *To understanding 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 conditions before a spin occurs i.e.: to recover at the incipient stage*

Airmanship:

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

Causes of spin:**Recognition of Incipient spin:****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

**STANDARDS REQUIRED AT THE END OF STAGE 2.**

Prior to circuit training ability to control aircraft safely in slow flight just above the stall ($V_s + 2$ mph) 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.

EX 12: TAKE OFF & CLIMB TO DOWNWIND POSITION

Aim: *To safely take off and climb the air craft 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.*

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 i.e.: constant planning for an aborted takeoff or a forced landing due to power failure on take off in the circuit and monitoring engine temperature during the climb.

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

Undulating (rough field):

- Premature lift off and subsequent control

Short and soft field considerations:

Tailwind considerations (if applicable)

Effects of flap (if applicable)

- Decision to use
- Effects of use

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*

Airmanship

Importance of constant lookout during circuit and prior to turning to leg
Downwind checks

Planning approach and landing with regards to wake turbulence from aircraft landing ahead

The downwind leg, base leg, final approach positioning and drills:

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)

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
Flawless approach and landing (if applicable)
Use of airbrakes and spoilers (if applicable)

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)**

Use of elevators

Safeguarding the nosewheel
Use of brakes (if applicable)

The Complete Take-off circuit and Landing

Circuit joining and leaving procedures.

The Hold off period and Touchdown:

Ability to control height and pitch control, and airspeed with power
Ability to control direction
Ability to control and correct ballooning
Ability to control with crosswinds
Ground manoeuvring after landing



STANDARD REQUIRED AT THE 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 the 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.

EX 14: ADVANCED TURNING (up to 60° bank angles)

Aim: To carry out a co-ordinate level turn at steep angles of bank and to recognise and recover from a spiral dive. Also entry and recover from and uses of a side slipping turn.

Airmanship:

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

360° turns (up to 45° bank angle)

- Level climbing Descending
- Wake turbulence

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

The spiral dive

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

The side slipping turn

- Uses of

Ex 15: UNUSUAL & DANGEROUS ATTITUDE/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 of controls following hitting own wake turbulence in a 360° steep turn at 45° to 60° bank angles.



WARNING!

THIS EXERCISE MUST ON NO ACCOUNT BE PRACTISED BY
THE STUDENT



STANDARD REQUIRED AT THE END OF PHASE 4

Ability to control aircraft safely in steeper than normal angles of bank, with correctly co-ordinated roll, pitch and power, also has ability to avoid the spiral dive and wake turbulence. Ability to use sides slipping 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.

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*

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

- The descent plan
- Key position
- Engine failure check
- The base leg:

The final approach:

- Methods of controlling glide angle
- S turns

Precautionary landing with power:

- Inspection procedures

Actions after landing

- Aircraft security

EX16b: OPERATION AT MINIMUM LEVEL.

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

Airmanship:

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

Low level familiarisation

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

Low level operation:

- Weather considerations
- Avoidance of precipitation
- Obstacle considerations

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 co-ordinate turns correctly with regard to wind direction.

Acute awareness of dangers and rules associated with low flying, and consideration for noise, animals etc.

EX 17a: FIRST SOLO

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

Airmanship

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

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.*

Airmanship:

Review and application of all different aspect of airmanship.

General flying consolidation

Review and application of all different aspect of the general handling skills

Circuit consolidation

Review and application of all different aspect of the take off circuit approach and landing

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.*

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 THE 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.

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.

Airmanship

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

Flight planning

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

Calculations

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

Airfield procedure on departure:

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

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

Arrival at destination procedure:

- Altimeter setting (QNH to airfield QFE)
- Airfield circuit and circuit joining procedure

Parking procedure

Security of aircraft

Note

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

- Dual cross country. (Inc. Away landing)
- Dual cross country. (Inc. navigation at min. level and lost procedure)
- Solo cross country. (1st qualifying cross country)
- Solo cross country. (2nd qualifying cross country)



STANDARD REQUIRED AT THE END OF STAGE 7.

Good navigation ability to predict weather. High standards 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

**PRINCIPLES OF
FLIGHT**

PHYSICS AND MECHANICS

Speed, Velocity, Force
Pressure-Bernoulli's Principle
Motion of a body along a curved path

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

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 spoiler, spoilerons, tip rudder
Operation and function of canard configuration
Principles and operation weight-shift control systems
Operation and function of billow shift

EQUILIBRIUM

The Four Forces - Lift, Weight, Thrust, Drag
Moments and Couples
The balance of the Four Forces - Straight and Level
- Climbing
- Descending

STABILITY

Positive, Neutral, Negative
Lateral and Directional Stability -3 Axis/Weight-shift
Longitudinal Stability -3 Axis/Weight-shift
Relationship of C of G to Control in Pitch -3 Axis/Weight-shift
Luff lines on weight-shift aircraft
Washout

THE STALL

Airflow separation
Stalling Angle - Relationship to Airspeed
Wing Loading
Wing Loading increase with bank angle increase
High Speed Stall

THE SPIN

Causes of a spin
Autorotation
Effect of the C of G on spinning characteristics

TURNING FLIGHT

The Forces in the Turn

LOAD FACTORS AND MANOEUVRES

Definition of load factor - VN envelope
Effect on Stalling Speed
In-Flight Precautions

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

The Take-off and Initial Climb - Performance

Effect of:

Wind

Wind Gradient

Wind Shear

Weight

Pressure, Altitude, Temperature and Density

Ground Surface and Gradient

Uses of flaps

The Approach and Landing - Performance

Effect of:

Wind

Wind Gradient

Wind Shear

Use of Flaps

Ground Effect

WEIGHT AND BALANCE

Limitations on Aircraft Weight

Limitations in relation to aircraft balance

Weight and centre of gravity calculations

THE PROPELLER

Construction and shape

Maintenance and checks

Balancing

**AVIATION
LAW**

The AIR NAVIGATION ORDER

Classification of aircraft

AIRCRAFT DOCUMENTATION

Certificate of Registration

Permit to fly/exemption certificate

Noise Certificate

Flight manual/maintenance schedules/ pilots operating handbook

Airframe and Engine log book and pilots responsibility to maintain and record:

Aircraft hours, inspections, defects, repairs, maintenance, and modifications

(mandatory and otherwise)

PERMITS TO FLY AND EXEMPTIONS

BMAA, 'Guide to Airworthiness' Documentation

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

AIRCRAFT EQUIPMENT

ANO Schedule 4

Equipment Required in Relation to the Circumstances of Flight

AIRCRAFT RADIO EQUIPMENT

ANO Schedule 5

Certificate of Approval of Aircraft Radio Installation

Flight Radio Operators Licence

AIRCRAFT WEIGHT SCHEDULE

Legal Requirements in Relation to the Permit To Fly/ Exemption

GRANT AND RENEWAL OF LICENCES TO MEMBERS OF FLIGHT CREW

Conditions of issue

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 un restricted')
Specified Minimum Weather Provisions

RATINGS- CONDITIONS OF ISSUE

Privileges of the Aircraft Rating
Additional Ratings

LICENCES AND RATINGS-RENEWAL

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

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

INSTRUCTION IN FLYING

Definition of Flying Instruction
Requirements 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

ENDANGERING SAFETY OF PERSONS OR PROPERTY

By Intent
By neglect

DRUNKENNESS IN AIRCRAFT

Application to Passengers
Application to Flight Crew

SMOKING IN AIRCRAFT

Authority of Commander
Notices in aircraft

AUTHORITY OF COMMANDER OF AIRCRAFT

Legal Requirements to obey all Lawful Commands

EXHIBITION OF FLYING

Public Displays
BMAA Events

DOCUMENTS TO BE CARRIED

On Domestic Flights
On International Flights

PRODUCTION OF DOCUMENTATION AND RECORDS

Requirements of Commander
Requirements of Operator
Requirements of Flight Crew
Personal Flying Log Books

REVOCAION, SUSPENSION OR VARIATION OF CERTIFICATES, LICENCES, OR OTHER DOCUMENTS

Whilst pending enquiry or after enquiry
Surrender of Documents or Records
Invalidation of Documents due to Breach of Conditions

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

AERODROMES- INSTRUCTION IN FLYING

The Requirements for Basic minima as laid down by the BMAA
Permission and Purpose of Use

POWER TO PREVENT AIRCRAFT FLYING

**AIR TRAFFIC RULES
AND SERVICES**

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

CLASSIFICATION OF AIRSPACE

The seven classes of airspace

VMC,IMC AND NOTIFICATION

- Conditions for VFR flight (VMC)
- Conditions for IFR (IMC)
- Quadrant Rule
- Semi-Circular Rule
- Special VFR Flight

TYPES OF AIR TRAFFIC SERVICE UNITS

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

ALTIMETER SETTING PROCEDURES

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

FLIGHT AT AERODROMES

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

FLIGHT PLANS

FLIGHT INFORMATION

FLIGHT IN CONTROL ZONES, CONTROL AREAS AND TERMINAL CONTROL AREAS

FLIGHT ON ADVISORY ROUTES/SERVICE AREAS

AIRMISS REPORTING PROCEDURES

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.
Navigation Obstructions

ROYAL FLIGHTS

AERODROMES, AGA SECTION OF THE AIR PILOT

Civil Aerodromes
Military Aerodromes
Aerodrome Ground Lights
Identification Beacons
Aerodrome Beacons
Times of operation

METEOROLOGY

Sources of information
Requests for Route Forecasts

FACILITATION - CUSTOMS AND PUBLIC HEALTH

Arrival, departures and transit of Civil aircraft on International Flights
Customs Aerodromes
Private flights - Documentary Requirements
Customs Requirements
Public Health Requirements

SEARCH AND RESCUE

Responsibility and Organisation
Aircraft not equipped with radio
Visual Distress and Urgency Signals
Procedure and signals employed by rescue Aircraft
Search and rescue regions and facilities

WARNING SIGNALS TO AIRCRAFT IN FLIGHT

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

EXTRACTS FROM THE RULES OF THE AIR TRAFFIC CONTROL REGULATIONS (cont)

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

GENERAL FLIGHT RULES

Weather reports and forecasts
Rules for avoiding aerial collisions
Aerobatics Manoeuvres
Right Hand Traffic Rule
Notification of arrival

Flight in notified airspace
Choice of VFR or IFR

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

**AIR
NAVIGATION**

FORM OF THE EARTH

- Meridians of Longitude
- Parallels of Latitude
- Rhumb Lines

MAGNETIC VARIATION

COMPASS DEVIATION

PRINCIPLES OF NAVIGATION

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

MAPS AND CHARTS

- Practical use of 1:500,000 and 1:250,000 Series
- Importance of using Current Charts
- Chart Scale
- Measurements of distance and heights
- Units of distance
- Units of height
- Measurement of angles tracks and bearings
- Relationship to true magnetic and compass north

MAP REFERENCE INFORMATION

- Latitudes and Longitude
- Isogonals
- Topography
- Relief
- Hydrographic features
- Cultural features
- Aeronautical Symbols
- Aeronautical information
- Conversion of units (Distance and Height)

MAP READING

- Map Analysis
- Permanent Features
- Relief
- Line Features
- Spot Features
- Unique or special features
- Features subject to change
- Water
- Other
- Effects of season

PREPARATION

- Checkpoint features and selection
- Folding the map for use

METHOD OF MAP READING

- Map orientation
- Anticipation of checkpoints
- With continuous visual contact
- When uncertain of position

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
Addition hazards to aircraft in flight
Notams and Aeronautical information circulars
Local time and GMT

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

PRACTICAL NAVIGATION

Compilation of the flight log
Measurements of track
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 "close 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

THE ATMOSPHERE

- Composition and structure
- The troposphere
- Air density

PRESSURE

- Air has weight
- Effect of altitude
- Effect of density
- Measurement
 - Barometer
 - Aneroid
 - Mercurial
- Mean sea level (MSL)-Conversion for height
- Isobars
- Pressure systems - Depression - Trough-Col-Anticyclone-Ridge

THE ALTIMETER

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

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

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

HUMIDITY

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

AIR MASSES

- Sources and types
- Transformation

Fronts
-Warm
-Cold
-Occlusion

CLOUDS

Classification of clouds
High/Medium/Low
Types of clouds
Stratiform
Cumiliform
Name of clouds

FORMATION OF CLOUD

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

PRECIPITATION

Rain/drizzle/hail/sleet/snow

DEPRESSIONS

Origin
Development
Frontal Depression

VISIBILITY

Measurement
Haze
Mist
Fog - Radiation/Advection

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

EFFECTS OF WEATHER ON FLIGHT

Effect on altimeter en route in proximity to a depression
Effects of turbulence - low level - under cumulus
Hazards of flight through depressions and fronts
Hazards of flight in reduced visibility - haze - precipitation
Effects 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**

AIRCRAFT STRUCTURE

- Airframe
- Wing the controls
- The Trimming System
- Tuning
- Aircraft Tyres
 - Wear, bulges, cuts, scores
- Aircraft seats
- Baggage
 - Stowage position
 - Maximum weights allowed

ENGINE

- Principles of two stroke cycle
- Principles of four stroke cycle

ENGINE IGNITION SYSTEMS

- Principles
- The Ignition Switch/es
- Use of correct plugs
- Spark gap
- Replacement intervals
- Plug security

CARBURATOR

- Principles
- Setting for the correct mixture
- Recognising the wrong mixture

EXHAUST SYSTEMS

- Difference between Two-stroke and Four-stroke systems
- Check for security, cracks and internal integrity

DECOKING

- Intervals

OIL SYSTEM

- Correct mixing of Two-stroke oil/petrol
- Four stroke oil systems

FUEL SYSTEMS

- Fuel Pump
- Fuel filters
- Fuel grade
- Water in fuel

ELECTRICAL SYSTEMS

- Generators
- Batteries

PROPELLER

- Defects
- Balancing

REDUCTION DRIVE

- Belt tension
- Alignment
- Defects
- Maintenance procedures

AIRCRAFT INSTRUMENTS

AIRSPEED INDICATOR

Position errors

ALTIMETER

MAGNETIC COMPASS

Precautions when carrying Ferrous objects
Turning, acceleration, deceleration errors

ENGINE INSTRUMENTS

Temperature gauges -CHT-EGT-Water
RPM Counter

FIRE, FIRST AID AND SAFETY EQUIPMENT

FIRE DANGERS AND PRECAUTIONS

Fire Extinguishers
Fire in flight
Fire on the ground
Fuel storage, fuel mixing, refuelling
Smoking

FIRST AID

Procedures following an accident
Fractured or broken limbs
Severe bleeding
Head Injuries
Severe shock
Burns
First Aid Kits - Stowage

HUMAN PERFORMANCE LIMITATIONS

INTRODUCTION

Reasons for knowledge of HPL

OXYGEN

Relation - To the atmosphere
to height effect

HYPOXIA

Location
Timing
Effects and acceleration of same

HUMAN PERFORMANCE LIMITATIONS cont

HYPERVENTILATION

Causes and effects
Avoidance

BAROTRAUMA

Causes and effects
Avoidance

COMMON AILMENTS

Effects
Medication

DECOMPRESSION

Underwater effects
Relationship to flying

AIR SICKNESS

Causes
Medication
Environment

HEARING

Noise limits
Effects
Precautions

SIGHT

Correction of defects

TOXIC HAZARDS

Sources
Effects
Smoking

BLOOD PRESSURE

Control

EPILEPSY

Why a bar to fly

ALCOHOL/DRUGS

Problems
Effects
Control

KNOWLEDGE AND THE SENSES

Knowledge
Perception
Action
Environment

DISORIENTATION

Causes
Effect
Result

AVOIDING THE AIRMISS

Assessment
Relative speeds
'Look-out'
Actions
Problems

STRESS

Forms

The individual
Outside influences

MANAGEMENT OF STRESS

Danger of drugs
Mutual discussion
Experience

SOCIAL PSYCHOLOGY

The ego factor
Potential reactions
Control