Flight Instructor Course Handbook

Volume 1: The FI Course

A Study Guide by Steve Pells **Optimised for iPad** Version 4.9 19Oct24

Flight Instructor Course Handbook

The following volumes are available:

Volume 1: FI Course
Volume 2: Single Engine CRI Course
Volume 3: Multi Engine CRI Course
Volume 4: Instrument Instructor & IRI Course
Volume 5: Night Instructor Course
Volume 6: FIC Preparation Course
Volume 7: MCCI Course
Volume 8: Aerobatics Instructor Course
Volume 9: CPL Instructor Guidance

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Please contact for details.

Contents

Abbreviations

(A)	Aeroplane	**IFR**	Instrument flight rules	**SE**	Single-engine or Senior Examiner
ACA	Asymmetric committal altitude	**IMCR**	UK IMC Rating	**SEP**	Single-engine piston
ACH	Asymmetric committal height	**IMC**	Instrument meteorological conditions	**SFI**	Synthetic flight instructor
AFM	Aeroplane flight manual	**IR**	Instrument rating	**STI**	Synthetic training instructor
AoC	Assessment of competence	**IRE**	Instrument rating examiner	**SPA**	Single pilot aeroplane
ATO	Approved training organisation	**IRI**	Instrument rating instructor	**SPIC**	Student pilot in command
CCC	Course completion certificate	**IRR**	IR renewal & revalidation examiner	**SSEA**	Simple single-engine aeroplane
CFI	Chief flying instructor	**IR(R)**	Instrument rating (Restricted)	**SSR**	Standard stall recovery
CPL	Commercial pilot's licence	**LAPL**	Light aircraft pilot's licence	**TEM**	Threat & error management
CRE	Class rating examiner	**MCCI**	Multi crew co-operation instructor	**TK**	Theoretical knowledge
CRI	Class rating instructor	**ME**	Multi-engine	**TMG**	Touring motor glider
CRM	Crew resource management	**MEP**	Multi-engine piston	**TOC**	Top of climb
CSU	Constant speed unit	**MI**	Mountain rating instructor	**TOD**	Top of descent
DTO	Designated training organisation	**MP**	Multi-pilot or Manifold pressure	**TRI**	Type rating instructor
EASA	European Union Aviation Safety Agency	**MPL**	Multi pilot licence	**Ts & Ps**	Temperatures and pressures
EFATO	Engine failure after take-off	**Nm**	Nautical mile	**VAT**	Threshold speed
FCL	Flight crew licencing	**NPPL**	UK national private pilot's licence	**VFR**	Visual flight rules
FE	Flight examiner	**OEI**	One engine inoperative	**VMC**	Visual meteorological conditions
FFS	Full flight simulator	**P1**	Pilot in command	**Vmc**	Minimum control speed
FI	Flight instructor	**P1/s**	Pilot in command under supervision	**Vmca**	Minimum control speed in the air
FI (R)	Restricted Flight instructor	**PIC**	Pilot in command	**VP**	Variable pitch
FIC	Flight instructor course	**PICUS**	Pilot in command under supervision	**Vr**	Rotate Speed
FICI	Flight instructor course instructor	**PoH**	Pilot's operating handbook	**VREF**	Final approach reference speed
FIE	Flight instructor examiner	**PPL**	Private pilot's licence	**VS**	Vertical speed
FNPT	Flight navigation procedures trainer	**PuT**	Pilot under training	**Vs1**	Stall speed in a specific configuration
FT	Follow through	**QXC**	Qualifying cross country (defunct)	**Vs0**	Stall speed in landing configuration
FTI	Flight test instructor	**ROC**	Rate of climb	**Vtoss**	Take of safety speed
G/A	Go-around	**ROD**	Rate of descent	**Vx**	Best angle of climb speed
(H)	Helicopter	**RTO**	Rejected take-off	**Vxse**	Best angle of climb speed single engine
HDG	Heading	**RW R/W**	Runway	**Vy**	Best rate of climb speed
HoT	Head of Training	**S&L**	Straight and level	**Vyse**	Best rate of climb speed single engine

Introduction

This document is designed to assist the trainee Instructor through his/her journey from qualified and proficient pilot, to an instructor (FI, CRI or IRI). It is also a useful study document for the FI(A) studying to become an FIC instructor.

It contains lots of background information and suggested briefs and Air Exercises. It is by no means the only way of achieving the qualification.

In this document, for ease of writing, the generic student is referred to as 'he'. This is not meant to imply that women cannot be taught to fly! It is just a recognition that by far the majority of flying students are male. In this document, the word 'he' should be taken to mean any student pilot (or instructor or examiner) of any gender, or no gender, or gender-fluid.

Overview

The path from pilot to instructor is a journey. Long, and at times arduous, but worth the effort. Usually, before embarking on a journey, it is customary to know a bit about the destination.

In our case, the destination is an instructor certificate FI(A) (initially restricted). Before getting there it is worth knowing a bit about what it is we are aiming for.

What follows is a discussion about the various types of instructor certificate and the courses to which they relate.

Since the UK left EASA on 31 December 2020, things have changed. Initially much remains the same other than terminology. However, over time, it is expected that the information in this guide will become out of date. It is hoped to keep it revised as much as possible.

Part 1: Instructor Certificates

Instructor Certificates

There are several different types of instructor certificate available. Subject to successful completion of an assessment of competence with a suitably qualified examiner, the CAA will issue an appropriate Flight Instructor Certificate. The various types are listed below:

FI: **Flight Instructor** - Required for ab-initio training to LAPL or PPL standard and beyond.

The following will not be covered in this document.

CRI: **Class Rating Instructor** – Allows the holder to train pilots who already hold a licence, but does not permit ab-initio flight training.

It Allows the holder to conduct training towards the issue of a class rating, refresher training, checkouts and differences/familiarisation training. It also allows the holder to train a LAPL holder for upgrade to a PPL.

Most of the different instructional privileges can be added to the CRI certificate except Instrument privileges (for which he can obtain a standalone IRI) or FIC privileges (the ability to teach flight instructor courses). The CRI cannot train towards the issue of a night rating.

IRI: **Instrument rating Instructor** – Allows the holder to instruct towards the issue of an EIR, IR or IR(R) in single engined aeroplanes unless the holder also has privileges to instruct for MEP. An IRI cannot instruct ab-initio students unless he also holds an FI certificate.

MCCI: **Multi Crew Co-Operation Instructor** – Allows the instructor to teach for multi crew operation in airliners, simulators etc

SFI: **Synthetic Flight Instructor:** Allows the holder to instruct in flight simulators for Single and Multi-Pilot aeroplanes.

STI: **Synthetic Training Instructor** - Allows the holder to instruct in flight simulators for the issue of a licence and for Single-Pilot aeroplanes.

TRI: **Type Rating Instructor** - Allows the holder to instruct towards the issue of a type rating for those aircraft which require one.

MI: **Mountain Rating Instructor** - Allows the holder to instruct towards the issue of a Mountain Rating

FTI: **Flight Test Instructor**

The Flight Instructor FI(A) Certificate

Initially, once qualified, the instructor will be considered a ‘restricted instructor’ which means that they can only instruct under the supervision of an unrestricted instructor if training towards LAPL/PPL, Class Rating or Night/Aerobatic Ratings. This means an unrestricted instructor needs to be available at the airfield (or very close to) to support and mentor the restricted instructor at all times while teaching the above courses. Further, a restricted instructor may not send a student on his first solo or first cross-country solo flights. FCL.910.FI explains and not 905 as stated on the licence.

The restriction may be removed once the instructor has logged at least 100 hours of instruction and has, under supervision by an unrestricted FI(A), supervised 25 student solo flights (other than first solo or first cross-country solo). These flights should be recorded on CAA form **SRG 1133R** and sent as part of the application to remove restrictions.

After removal of restrictions, the instructor may instruct unsupervised, and supervise first solo and first solo cross-country flights.

XII	Ratings, certificates and privileges
Class/Type/IR	Remarks and Restrictions
Instrument	Nil
B747 400	LV
Night	Nil
SEP (land)	Nil
	No Further Entries
Instructors	Remarks and Restrictions
FI	Restricted/FCL.905.FI applies as in/(a)/(b)/FCL.945
	No Further Entries
Examiners	
No Entries	

SRG 1133R Issue 02

RECORD OF SUPERVISED SOLO FLIGHTS OR AIR EXERCISES FOR REMOVAL OF SUPERVISORY RESTRICTION FROM AN INSTRUCTOR CERTIFICATE IN ACCORDANCE WITH PART-FCL

Please complete this form online (preferred method) then print, sign and submit as instructed.
Alternatively, print, then complete in BLOCK CAPITALS using black or dark blue ink.

Unique No. (to be completed by CAA)

Civil Aviation Authority

FALSE REPRESENTATION STATEMENT
It is an offence under Article 256 of the Air Navigation Order 2016 to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine up to £5000, and on conviction on indictment with an unlimited fine or up to two years imprisonment or both.

1. RECORD OF SUPERVISED SOLO FLIGHTS/AIR EXERCISES TO REMOVE SUPERVISORY RESTRICTION FCL.910.FI — **To be completed by applicant**

	Date of flight	Students name	Students licence or reference number	Exercise Number of Air Exercise	Name of Supervising Flight Instructor	Signature of Supervising Flight Instructor	Licence Number of supervising Flight Instructor	Name of ATO Flight training conducted with and approving competent Authority
1	21/04/19	Mike Smith	456789A	Ex18	Jonathan Bloggs	J Bloggs	AT123456A	ABC Flying School
2								
3								
4								
5								
6								
7								
8								
9								
10								

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The only privileges that may be added to a restricted FI certificate are: Night & Aerobatics. All others must wait for the restriction to be removed.

NOTE:

An FI can do a 30 hour course and obtain an FI and a CRI(SE).
2 x **CAA 5018** forms will be required.
On **SRG 1169** write FI(A) & CRI(A).
Annotate the form FI or CRI for each exercise.

Notes:

Student solos with more than one leg (eg Landaways or Qualifying Cross Countries) count as multiple flights. Therefore a landaway should be 2 flights out of the required 25.

However, there are certain individuals, within the CAA, who say a QXC counts as only one flight (with stops at 2 intermediate airfields), and applications to unrestrict have been rejected (see letter below).

Dear Mr Pilot

Thank you for your recent application for the Flight Instructor Variation to remove restriction on the FI rating.

Your application has now been assessed and has found to fall short of the following:

As part of a PPL (A) course of training, candidates are expected to have completed at lease, "10 hours of supervised solo flight time, including at least 5 hours of solo cross[1]country flight time with at least 1 cross-country flight of at least 270 km (150 NM), during which full stop landings at 2 aerodromes different from the aerodrome of departure shall be made."

- ***As the requirements confirm that it's a <u>flight</u> of at least 270 km, in other words a single exercise, it would be fair to conclude that it counts as 1 flight and not 3 for the purposes of the SRG1133R. Based on the aforementioned, we have only been able to count 17 hours of supervised solo flight. Therefore, all the flights completed on 26 April, 20 May, 23 May, 06 June and 14 June 2023 are counted as 1 flight each. You will have to meet the missing 08 hours for us to remove the restrictions.***

Please ensure any outstanding documents are submitted to fclweb@caa.co.uk clearly marked for my attention.

You are required to comply with the above outstanding requirements within a period of 30 working days from the date of this email. Where no correspondence is received within this period your application will be cancelled, original documents returned and a fee for the initial assessment applied, which is currently at £128.00 as per the CAA Scheme of Charges.

FCL.945 Privileges

Most new FI & CRI (SE) holders will have FCL.945 privileges recoded on their licence as shown below.

Instructors	Remarks & Restrictions
FI	FCL.905.FI applies as in (a)/(b)/(d)/(e)(g)/(h)/FCL.945
IRI	FCL.905.IRI(a) applies
No Further Entries	

945 privileges allow an instructor to sign a pilot's SEP and/or TMG class rating in their **Part FCL** licence only, for a further 2 years, after they have conducted the refresher training flight with that instructor. Previously, this was required to be signed by an examiner. Pilots holding a national (non-Part FCL) licence will need to find a Ground Examiner (GR) to carry out a similar process.

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

(b) Revalidation of single-pilot single-engine class ratings:

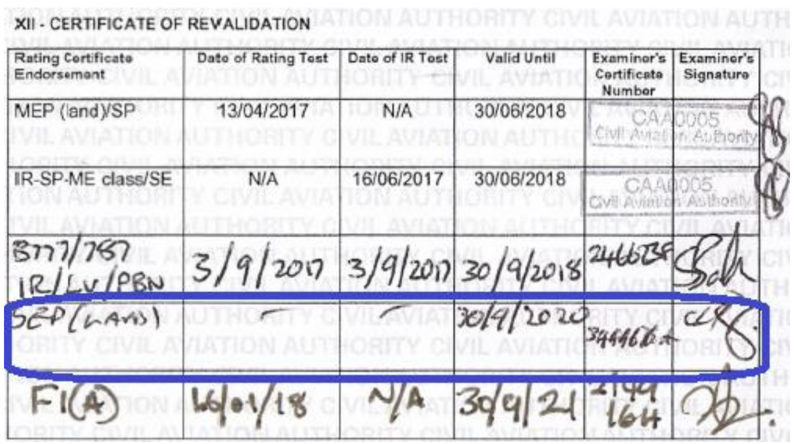
(1) Single-engine piston aeroplane class ratings and TMG ratings. For revalidation of single-pilot single-engine piston aeroplane class ratings or TMG class ratings the applicant shall:

- (i) within the 3 months preceding the expiry date of the rating, pass a proficiency check in the relevant class in accordance with Appendix 9 to this Part with an examiner; (note this proficiency test can be taken at ANY time, but doing so within the final 3 months of validity retains the original expiry date)
  OR
- (ii) within the 12 months preceding the expiry date of the rating complete 12 hours of flight time in the relevant class, including:
  - 6 hours as PIC,
  - 12 take-offs & 12 landings, and
  - **Refresher Training** of at least 1 hour of total flight time with a UK flight instructor (FI) or class rating instructor (CRI). Applicants shall be exempted from this refresher training if they have passed a class or type rating proficiency check, skill test or assessment of competence in any other class or type of aeroplane (excluding the IMC Rating test).

Upon completion of the training flight for the revalidation of an SEP or TMG class rating in accordance with FCL.740.A(b)(1) and only in the event of fulfilment of all the other revalidation criteria required by FCL.740.A(b)(1) the instructor shall endorse the applicant's licence with the new expiry date of the rating or certificate, if specifically authorised for that purpose by the competent authority responsible for the applicant's licence (ie if the instructor has FCL.945 on his licence). This is the **ONLY** time an instructor, rather than an examiner, may sign a pilot's licence.

So, the 945 qualified instructor must carry out a training refresher flight with the pilot within the last year of validity of the rating. It must last at least one hour and has no required content. Following completion, the instructor signs the rating for a further 2 years from the date of expiry of the original rating. **NOTE**, even if the pilot's performance leaves much to be desired, the instructor must still sign the logbook for the training given.

Note that as soon as the pilot has carried out all the required hours, take-offs & landings, and the refresher flight, then the licence may be signed giving the SEP rating a further 2 years beyond the original expiry. For example, referring to the above timeline, if a pilot carried out all the required flying by 03 June 2020, then his licence could be revalidated until 31 May 2023, almost 3 years hence.


XII - CERTIFICATE OF REVALIDATION

Rating Certificate Endorsement	Date of Rating Test	Date of IR Test	Valid Until	Examiner's Certificate Number	Examiner's Signature
MEP (land)/SP	13/04/2017	N/A	30/06/2018	CAA0005 Civil Aviation Authority	
IR-SP-ME class/SE	N/A	16/06/2017	30/06/2018	CAA0005 Civil Aviation Authority	
B777/787 IR/LV/PBN	3/9/2017	3/9/2017	30/9/2018	[illegible]	
SEP (LAND)	–	–	30/9/2020	[illegible]	
FI(A)	16/01/18	N/A	30/9/21	[illegible]	

What defines the Refresher Training Flight?

A flight during which a person is receiving flight instruction from a properly authorised instructor e.g., FI, CRI, etc.

Examples of training flights include:

- Flight on a training course eg, Night Rating, IR, IMC Rating, Class Rating, etc
- Formation flying training.
- Revision of stalling (or other exercise)
- Aerobatic flying training
- Differences training

Note, also, that in order to revalidate a pilot's rating and sign the licence, then the refresher training flight must have been conducted, or completed, by that same instructor. If the training flight was conducted entirely by a different instructor, then an examiner must check the experience and sign the licence.

In addition, the instructor and pilot complete sections 1 & 3 of **SRG 1107** or pages 1 and 2 of **SRG 1157** and send a copy to the CAA by mail or to **licenceapplications@caa.co.uk**. **SRG 1107** is shown below, and seems the better form:

Course Completion Certificate for issue, revalidation, renewal or variation of a Single or Multi-Pilot Type/Class Rating or the renewal of an Instrument Rating

This form is intended for use in the provision of evidence in support of an application made to the CAA using the CAA's online application service. Once completed the form should be scanned or photographed and uploaded by the applicant as part of an online application to the CAA.

FALSE REPRESENTATION STATEMENT
It is an offence under the UK Air Navigation Order to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, revalidation, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine and on conviction on indictment with an unlimited fine or imprisonment or both.

1 COURSE/TRAINING COMPLETION CERTIFICATE — **To be completed by the Training Organisation If a separate course completion certificate has not been provided**

I certify that (name).. CAA Personal reference number (if known): [ ][ ][ ][ ][ ][ ][ ]

Date of Birth.. has satisfactorily completed a course of training in accordance with Part-FCL for the following:

Type/Class Rating [ ] **and/or** Instrument Rating [ ]

Date Training commenced:		Date Training completed:	
Aircraft Type/Class name (including variants)			

3 NOTIFICATION OF REVALIDATION (if applicable) — **To be completed by the Applicant**

I am notifying the CAA of the Revalidation by Experience of: SEP (land) [ ] SEP (sea) [ ] TMG [ ]

I declare that the information provided on this form is correct and I have fully reviewed all guidance notes.

Applicants name: .... Signature: .... Date:..

3.1 NOTIFICATION OF REVALIDATION – CONFIRMATION OF FLIGHT EXPERIENCE — **To be completed by the UK FCL.945 Instructor/UK Examiner**

I certify that I have examined the applicant's logbook(s) and the entries in them meet in full the requirements to revalidation by experience.

Total Flight Time in preceding 12 months: .... Hours. Total Flight Time as PIC in preceding 12 months.........Hours.

Date(s) of Training Flight with Instructor: ....

I have endorsed the rating on the Certificate of Revalidation and the new expiry date is:..

Competent Authority issuing UK FCL.945 Instructor/UK Examiner's Certificate: ....

UK FCL.945 Instructor/UK Examiner's Name: ....

UK FCL.945 Instructor/UK Examiner's Number: ....

UK FCL.945 Instructor/UK Examiner's Signature: .... Date:..

PLEASE REFER TO FALSE REPRESENTATION STATEMENT ON PAGE 1

Alternatively, pages 1 and 2 of **SRG 1157** can be completed:

EXAMINERS REPORT - For Single Pilot Aeroplanes (SPA) Skill Test for Issue of Class and Type Ratings and Proficiency Checks for Revalidation and Renewal of Class, Type and Instrument Ratings, Revalidation by Experience of Class Ratings, excluding SP High Performance Complex Aeroplanes and Sea Class Ratings in accordance with Part-FCL. (European Commission Regulation (EU)No 1178/2011 as amended).

Civil Aviation Authority

Complete clearly in BLOCK CAPITALS using black or dark blue ink.

FALSE REPRESENTATION STATEMENT
It is an offence under the UK Air Navigation Order to make, with intent to deceive, any false representation for the purpose of procuringthe grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine, and on conviction on indictment with an unlimited fine or imprisonment or both.

1. APPLICANTS DETAILS — **To be completed by the Applicant**

CAA Personal Reference Number: 1 2 3 4 5 6 A

Forename(s): Peter Surname: Piper Date of Birth : 21/09/1999

Initial Issue ☐ Revalidation by Proficiency Check ☐ Revalidation by Experience ☑ or Renewal ☐

Type Rating ☐ includingvariants...................... including type specific IR ☐

Class Rating ☑ : SEP (land)

Expiry of previous or current type/class rating: 31/05/2022

Stand-alone Instrument Rating (IR/SPA): SE ☐ ME ☐ Revalidation ☐ Renewal ☐

Expiry of previous or current IR/SPA: ....

I confirm that I have requested the above Skill Test or Proficiency Check or Revalidation by Experience.

Applicant's signature: ......[signature]...... Date: 20/03/2022

2. EXAMINERS REPORT OF TEST OR CHECK — **To be completed by the Examiner**

Date of Skill Test or Proficiency Check: .... Location: ....

Start time (Chocks): .... Finish time(Chocks): .... Total duration: .... (HH:MM)

Aircraft Type/Class including variants used: .... Aircraft Registration: ....

Identification Number of FSTD used:.................. (to be in accordance with Commission Regulation (EU) 1178/2011 as retained (and amended in UK domestic law) under the European Union (Withdrawal) Act 2018

Competent Authority issuing qualification certificate for FSTD: ....

Result of Skill Test or Proficiency Check: Pass ☐ Partial Pass ☐ Fail ☐ (if fail or partial pass also complete SRG 2129)

Revalidation by Experience of aeroplane class or classes: SEP (land)

I confirm that the applicant has met the requirements of Part-FCL.740.A for Revalidation by experience:

Expiry of new Type/Class Rating: 31/05/2024 I have ☑ I have not ☐ endorsed the Certificate of Revalidation in the applicant's licence.(If not signed also complete SRG 1119).

Stand-alone Instrument Rating (IR/SPA): Pass ☐ Partial Pass ☐ Fail ☐ (if fail or partial pass also complete SRG 2129)

Expiry of new IR/SPA: .... SE ☐ ME ☐

I have ☐ I have not* ☐ endorsed the Certificate of Revalidation in the applicant's licence (*If not signed also complete SRG 1119).

If cross-crediting is claimed for revalidation of the IR/SPA, state the other type/class rating for which an LPC including IR was completed and the expiry date of that rating: .... Type or Class Rating: .... Expiry of Rating: ....

3. PBN — **To be completed by the Examiner**

I confirm that the applicant has been tested in PBN elements as relevant (Commission Regulation EU 1178/2011 as amended – Annex I, Appendix 7 and 9 Refers) ☐

I confirm that this skill test/proficiency check did not include an RNP APCH and that the applicant has been advised that: ☐
- the PBN privileges of their IR does not include an RNP APCH, and that
- this restriction can be lifted upon completing a proficiency check which includes an RNP APCH.

Form SRG1157 Issue11, April 2021 Page 1 of 3

4. CONFIRMATION — **To be completed by the Examiner**

I have found that the applicant's instruction and experience comply with Part FCL and confirm that all the required manoeuvres and exercises have been completed and that the applicant's theoretical knowledge has been confirmed by verbal examination (where applicable) in accordance with Appendix 9 to Part-FCL.

Examiner's Name: A PieLot Examiner's Number: 9 8 7 6 5 4 V

Authorising Competent Authority: UK CAA

Examiner's Signature: ......[signature]...... Date: 20/03/2022

Non-UK Examiners - I have reviewed and applied the relevant national procedures and requirements of the UK CAA.

UK CAA Examiner Designation Reference: ....

Declaration of applicant - I declare that the information provided on this form is correct and I have been informed of the result of the Skill Test or Proficiency Check or Revalidation of the Class Rating(s) by Experience.

Applicants signature: ......[signature]...... Date: 20/03/2022

Copies of the report shall be submitted to (1) The Applicant, (2) The Applicant's Competent Authority, (3) The Examiner, (4) The Examiner's Competent Authority (if different), (5). The Examiner should also complete Form SRG2199 as required, (6)

English Language Proficiency assessments should be completed using Form SRG1199.

Form SRG1157 Issue11, April 2021 Page 2 of 3

See **Appendix 11** regarding the use of non-Part 21 aircraft for SEP renewal and revalidation.

*If the licence has not been endorsed by the examiner, the pilot will need to submit online application form **SRG 3108** and upload: a copy of examiner report form **SRG 1157** or form **SRG 1107**, a certified copy of their logbook, and a certified copy of their licence. There is a fee of £93 for this application.*

Note that validation by experience and 945 privileges are only for single engine (non-complex) aircraft types. MEP aircraft and those with type ratings (eg 747) can only be revalidated by a proficiency check with an examiner.

Those instructors who do not have 945 privileges on their licences can apply to the CAA to have it added, or next time the licence is re-issued by the CAA, it will be automatically added.

FIs restricted to teaching for the LAPL only (ie those that have not passed the CPL theoretical knowledge exams), will not get the 945 privilege because a LAPL uses recency to maintain validity. Such instructors could apply for a CRI certificate at the same time as applying for the FI, and this will give 945 privileges.

Validity of the FI Certificate

An FI(A) certificate is valid for 36 months plus the remainder of the month of test.

Revalidation & Renewal of the FI Certificate

Remember, revalidation is the process of extension of privileges **BEFORE** expiry has occurred. If it occurs after the rating or certificate has already expired, it is known as renewal. If a rating or certificate expires, it remains on the licence until the next time re-issued by the CAA (say to add a new rating), at which time it transfers to the reverse of the licence.

Revalidation of the FI Certificate

Within the 3 year validity period of the certificate, 2 out of the following 3 must be completed:

- Complete 50 hours flight instruction. **Note:** If privileges for IR are included, then 10 hours instrument instruction must be completed in the final 12 months of validity. If only IR(R) instructional privileges are needed, then these 10 hours are not required. Hours flown as an examiner on flight tests counts as instructional hours for this purpose.
- Complete Instructor Refresher Training any time within the 3 year validity. This used to be called an in instructor seminar and is essentially the same – a 2 day course with multiple attendees collaborating on lectures and briefings as well as presentations and study groups.
- Complete an assessment of competence with an FIE in the final 12 months of validity. In this case, following a successful outcome, the FIE will sign the licence for another 3 years.
    - **Note:** An assessment of competence with an FIE is required at least every other revalidation.
    - **Note:** The CAA state that for a new instructor's first revalidation, an AoC rather than Refresher Training/Seminar is required, although no reference can be found for this.

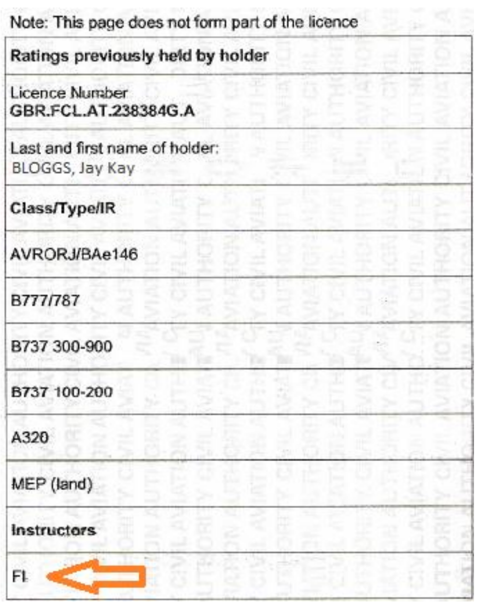
In some parts of the CAA literature it is stated that the Refresher Training is to be carried out before the AOC. However in other parts it says that the 2 can be completed in any order. In practice, the order seems not to matter.

Renewal of the FI Certificate

If expired, both of the following must be completed to renew:

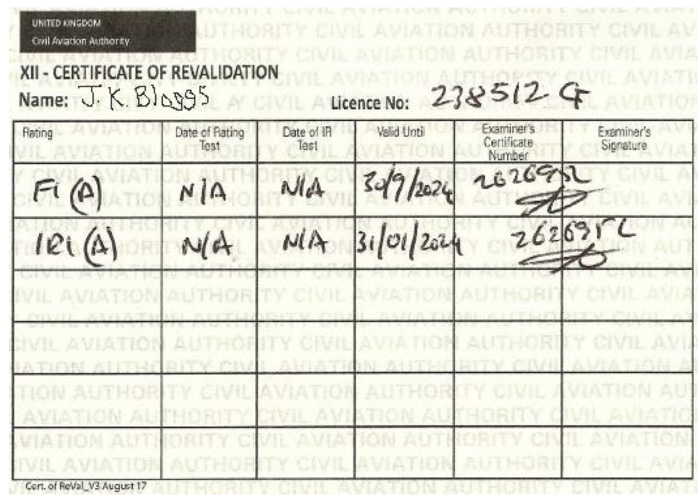
- Complete Instructor Refresher Training at an ATO. This used to be referred to an in instructor seminar and is essentially the same – a 2 day course with multiple attendees collaborating on lectures and briefings as well as presentations and study groups.
- Complete an assessment of competence with an FIE. If the FI certificate is on the front of the licence, the examiner will sign for another 3 years. If the certificate is on the reverse of the licence, then the licence must be re-issued from the CAA which will attract a fee.

Then the on-line form **SRG 2159** should be completed.


Note: This page does not form part of the licence

Ratings previously held by holder
Licence Number GBR.FCL.AT.238384G.A
Last and first name of holder: BLOGGS, Jay Kay
Class/Type/IR
AVRORJ/BAe146
B777/787
B737 300-900
B737 100-200
A320
MEP (land)
Instructors
FI

The reverse of a licence showing previously held ratings.


UNITED KINGDOM
Civil Aviation Authority

XII - CERTIFICATE OF REVALIDATION

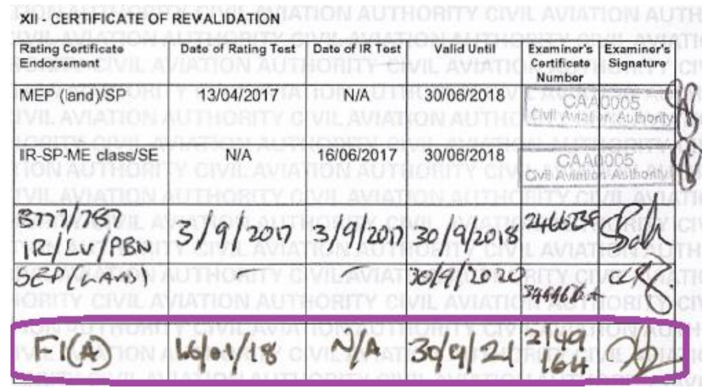
Name: J.K. Bloggs Licence No: 238512 G

Rating	Date of Rating Test	Date of IR Test	Valid Until	Examiner's Certificate Number	Examiner's Signature
FI (A)	N/A	N/A	30/9/2024	262695L	
IRI (A)	N/A	N/A	31/01/2024	262695L	

Cert. of ReVal_V3 August 17

If the pages in the licence become full, revalidations and renewals may be signed on an extra page as shown above. Make sure the examiner writes the name and licence number of the holder.

After completion of these items, on-line form **SRG 2159** should be completed.



XII - CERTIFICATE OF REVALIDATION

Rating Certificate Endorsement	Date of Rating Test	Date of IR Test	Valid Until	Examiner's Certificate Number	Examiner's Signature
MEP (land)/SP	13/04/2017	N/A	30/06/2018	CAA0005 Civil Aviation Authority	
IR-SP-ME class/SE	N/A	16/06/2017	30/06/2018	CAA0005 Civil Aviation Authority	
B777/787 IR/LV/PBN	3/9/2017	3/9/2017	30/9/2018	246635F	
SEP (LAND)	–	–	30/9/2020	344467A	
FI(A)	16/01/18	N/A	30/9/21	2149164	

The revalidation of an FI(A) certificate in a licence. →

Credit for Certificates Already Held

An instructor who holds any certificate, eg, FI, IRI, TRI etc (SP or MP) and wishes to add another certificate, is exempted the requirement of the 25 hours Teaching & Learning module in the ground school. For example if an FI(R) wishes to teach for MEP, then he must do the CRI(ME) course but need not do the 25 hrs groundschool element. Just 5 hours flight training & 10 hours groundschool. Likewise a TRI who wants an IRI. In general, an FI gives 5 hours flying credit and 25 hours groundschool credit. Adding IR instrument privileges to an FI requires 200 hrs IFR flight time, but a standalone IRI needs 800.

FCL 900c Instructor Certificates

The CAA will issue FI certificates to foreign pilots who have an instructor certificate/rating in another country (eg an FAA CFI). The foreign instructor needs to undergo a training course with an FIC instructor of at least 15 hours flying, and then must pass an assessment of competence with a UK FIE (the same assessment that a UK instructor would take).

On successful completion of this assessment, the CAA will issue an FCL 900c FI certificate. This allows the foreign instructor (who has no UK licence) to teach towards UK Part FCL courses, but **ONLY OUTSIDE THE UK**. This allows, for example, FAA CFIs to instruct British students in the USA.

An example of an FCL 900c FI is shown:

Certificate	Aircraft	Privileges and Conditions
FI(A)		Restricted FCL.900(c)(2) applies FCL.905.FI applies as in (a) (b) (f)

GBR.584584E 09/08/2024

I	State of Issue **United Kingdom**
III	Licensing Certificate Number **GBR.584584E**
IV	Last and first name of holder **Piltdown, James**
IVa/ XIV	Date and Place of Birth **02/02/1996, Washington DC, United States of America**
V	Address of holder **528 Red Lane Fort Lauderdale Florida 32792-4747 United States of America**
VI	Nationality **U S Citizen**
VII	Signature of holder ....
VIII	Issuing competent authority **UK Civil Aviation Authority.**
X	Signature and stamp of issuing officer CIVIL AVIATION AUTHORITY 0040 **09/08/2024**

GBR.584584E 09/08/2024

Civil Aviation Authority

United Kingdom

Civil Aviation Authority

UNITED KINGDOM

LICENSING CERTIFICATE

This is not a licence

GBR.584584E 09/08/2024

Flight Instructor (FI) Privileges

The basic privilege of an FI is to teach ab-initio students for the issue of a licence. Not all instructors are authorised to teach all subjects (eg CPL, Multi-engine). Flight instructor privileges are shown on the licence in Section XII and are explained in FCL.905. In essence, there is a letter in brackets after the FI designation, and each letter denotes a different privilege.

In November 2019, the designation of flight instructor privileges was amended. In order to determine the kinds of instruction an instructor may carry out requires reference to CAP 1854, which is summarised below.

Licences Issued Up to 10Nov19

a: **PPL, SPL, BPL and LAPL in the appropriate aircraft category.**
b: **Class and type ratings for single-pilot, single-engine aircraft, except for single-pilot high performance complex aeroplanes.**
c: Type ratings for single or multi-pilot airship.
d: CPL in the appropriate aircraft category.
e: The Night Rating
f: Aircraft Towing or Aerobatic Rating
g: IR or EIR in the appropriate aircraft category.
h: Single pilot, multi-engine class or type ratings except for single-pilot high performance complex aeroplanes.
i: Training for FI, IRI, CRI, STI or MI.
j: MPL.

Licences Issued After 11Nov19

a: **PPL, SPL, BPL and LAPL in the appropriate aircraft category**
b: **Class and type ratings for single-pilot, single-engine aircraft, except for single-pilot high performance complex aeroplanes**
c: Class and type ratings for single-pilot aeroplanes, except for single-pilot high-performance complex aeroplanes, in multi-pilot operations, provided that FIs meet certain conditions.
d: Type ratings for single or multi-pilot airship.
e: CPL in the appropriate aircraft category.
f: The Night Rating
g: Aircraft Towing or Aerobatic Rating
h: IR or EIR in the appropriate aircraft category.
i: Single pilot, multi-engine class or type ratings except for single-pilot high performance complex aeroplanes.
j: Training for FI, IRI, CRI, STI or MI.
k: Training for the MPL

Eventually, all licences will be updated to the new system, but until that time, it is important to check the date of licence issue.

Below is an example of a licence issued on 23Aug19:

XII	Ratings, certificates and privileges
Class/Type/IR	**Remarks & Restrictions**
Instrument	PBN
Night	Nil
SEP (Sea)	Nil
B777/787	Nil
MEP (Land)	SP
SEP (Land)	Nil
IR(Restricted)	Restricted to the privileges of the Instrument Meteorological Conditions Rating specified in the United Kingdom Air Navigation Order
No Further Entries	
Instructors	**Remarks & Restrictions**
FI	FCL.905.FI applies as in (a)/(b)/(d)/(e)(g)/(h)/FCL.945
IRI	FCL.905.IRI(a) applies
No Further Entries	
Examiners	
See Certificate Number GBR.238514G	

I	State of Issue **United Kingdom**
III	Licence Number **GBR.FCL.AT12345G.A**
IV	Last and first name of holder Bloggs, Jonathan
IVa	Date of Birth 01/04/1979
XIV	Place of Birth Gatwick, UK
V	Address of holder 1 Aeroplane Road Hangertown **United Kingdom**
VI	Nationality **British**
VII	Signature of holder J Bloggs
VIII	Issuing competent authority **UK Civil Aviation Authority**
X	Signature of issuing officer and date 23/08/2019
XI	Seal or stamp of issuing authority

So, looking at the first table, the instructor privileges can be worked out. (Note: the yellow arrows are not on the licence but provided for clarity)

As this licence was issued before 11 Nov 19, this instructor may instruct towards the issue of PPL & LAPL, SEP Class rating, CPL, Night Rating, IR/EIR & MEP Class rating.

Instructors	**Remarks & Restrictions**
FI	Restricted/FCL.905.FI applies as in/(a)/(b)/(f)/(g)A/FCL.945
No Further Entries	
Examiners	
No Entries	

An FI certificate with Aerobatic instructional privileges.
Note (g) can be for either Towing or Aerobatics. The A resolves the ambiguity.

Stand-alone & Add-on Privileges:

The privileges shown by the letters in brackets can also be used to add-on instructional privileges. For example an FI who wants to teach for the IR can either apply, study and be assessed for a standalone IRI certificate to be held in addition to his FI, or can apply, study and be assessed for the letter (h) as an add-on.

Part 2: Instructor Courses

The Flight Instructor FI(A) Course

Pre-Entry Requirements

There are pre-entry requirements for an FI(A) course. The applicant must have

- Minimum age 18 years and hold a Class 1 or Class 2 medical certificate.
- Completed at least 200 hours of flight time of which not less than 100 hours shall be PIC if holding an ATPL(A) or CPL(A); or 150 hours PIC if holding a PPL(A).
- If holding only a PPL(A), then the applicant must have passed the TK written tests for CPL unless only LAPL instruction is intended.
- Completed at least 30 hours on SEP aeroplanes of which at least 5 hours shall have been completed during the 6 months preceding the pre-entry flight test set out below.
- Received at least 10 hours of instrument flight instruction (of which not more than 5 hours may be instrument ground time in a flight simulator or FNPT II).
- Completed at least 20 hours cross country flight as PIC including a flight not less than 300 nm in which a full stop landing at two different aerodromes shall be made.
- Passed a specific pre-entry flight assessment with an FI qualified in accordance with FCL.905 (ie FIC instructor) for this purpose (based upon the SEP proficiency check) within the six months preceding the start of the course. The flight test will assess the ability of the applicant to undertake the course. As well as looking for good flying skills, the assessment is checking that the trainee has spare capacity available, a good bedside manner, and is self-critical. During the assessment, the instructor may try to distract the trainee or feign airsickness to see how the trainee deals with the situation. It need not be completed at the ATO where the training will take place. If this is the case, the ATO doing the training has no right to require a second assessment. This assessment is signed by the instructor at section 3 of **CAA 5018** – Instructor Course Completion Certificate.

3. Flight or Mountain Rating Instructor (FI/MI) Pre-Entry Flight Test	**To be completed by the Instructor**
I confirm the pilot has satisfactorily completed a pre-entry flight test on (date):	
I recommended the pilot for the specified course (select one): Flight Instructor (FI) ☐	Mountain Rating Instructor (MI) ☐
Name of FI/MI who conducted the flight test:	
Instructor reference number:	Competent authority issuing certificate: ....
Signature of Instructor:	Date ....

- Note, for various reasons, it is unusual for an applicant to fail this assessment.

FI COURSE PRE-ENTRY CHECKLIST		
Hold Relevant current SEP class rating?	Expiry:	
Hold current Medical Certificate?	Expiry:	
200 hours Total Time on aeroplanes?	TT(A):	
100 hours PIC with CPL/ATPL or 150 PIC (PPL)	PIC hrs:	
CPL TK Passed? Unless FI (LAPL)	CPL TK:	
30 hours SEP? 5 hrs in last 6 months? Excluding assessment	SEP hrs:	
20 hours X country? 300Nm 2 landings	X-Country Hrs:	
10 hours instrument instruction?	Instr Instruction	
Pre-Entry Assessment?	Pre-Assessment:	

Course Objective

The objective of the course is to train a qualified pilot to the level of proficiency necessary for the issue of an FI (A) certificate for single engine aeroplanes. The trainee will be guided to the required level of skill & technical knowledge (TK) and develop instructional techniques needed in order to instruct for typical single engine training aircraft on which the applicant is qualified.

A successful candidate must have good knowledge of the PPL course entry requirements, the training syllabus (ground and air), the skill test format and the SEP (land) rating privileges.

Course Details

Ground Training: There is a requirement for ground instruction which will comprise at least 25 hours 'teaching & learning', at least 100 hours of theoretical knowledge instruction including progress tests (when applying for an FI certificate in another category of aircraft, pilots holding or having held an FI(A), (H) or (As) shall be credited with 55 hours towards the required 100). This will include the FIC students practicing giving briefings and debriefing to other students and instructors. **NOTE:** A prospective instructor should already be familiar with the relevant Theoretical Knowledge (TK) for the course he is training to instruct for. The job of an FIC Instructor is NOT to teach such TK.

Flight Training: The FI(A) course consists of a minimum of 30 hours flight training (technically 5 hours of this may be completed in an approved simulator). All training must be carried out at an ATO (Approved Training Organisation) by suitably qualified instructors. Of these 30 hours, 25 hours dual instruction is required, the remaining 5 hours may be mutual flying (2 FI students flying together). To this end, the ideal flight instructor course consists of 2, or another even number of students. A single FIC student is harder to accommodate.

Assessment: After the course, the ATO shall complete an Instructor Course Completion Certificate **CAA 5018**.
An assessment of competence by an FIE will take place at the end, and a successful outcome will allow the applicant to apply for the FI(A) certificate. EASA has no requirement for spinning in this AoC, however the UK CAA insist on it, so one of the secondary exercises will always be teaching (not just demonstrating) full spinning and recovery.

From CAA Standards Document 10:
It is recognised that the vagaries of UK weather and limited access to spin-able aeroplanes can result in delays or cancelled flight tests when spinning is a required item. As a concession, the UK CAA permits the spinning element of the FI AoC to be flown by the applicant and assessed by an examiner prior to the overall completion of the FI course. Applicants and examiners are reminded that this is still an assessment of competence for the grant of an instructor certificate. Therefore, the flight must be conducted under test conditions. Where the spinning item is conducted prior to completion of the FI course, the FIE must complete an Examiner's Report Form (SRG 1169) indicating satisfactory completion of the spinning item in Section 3. The flight should be recorded in the applicant's logbook and annotated by the FIE. These documents must then be presented to the FIE who conducts the remainder of FI AoC upon completion of the course. This flight is not to be included with the FI course hours.

Delivery & Course Content

Stage 1: There is no point in the trainee instructor going flying if he has not already studied and practiced some of the Teaching & Learning techniques that will be required during a teaching exercise in the air. To this end, typically 3 days of ground training will start the course off. This will be instructor led, and introduce the trainee to many of the techniques needed. There will be lectures by the instructor, group discussions and briefing practice with a white board and visual aids.

Stage 2: The first flying exercise will follow, in the format - Pre flight Brief by the instructor to the trainee (who pretends to be a PPL student). Then, after discussion of the brief, highlighting teaching and learning techniques, the lesson will be flown with the instructor in the left hand seat and the trainee in the right hand seat. This is known as a 'give', as the instructor is giving the lesson.

For the purposes of getting the trainee used to flying from the right hand seat, he will fly the take-off and climbout to the local area, when the instructor will take control and deliver the lesson in real time. The first lesson that can sometimes be used is Lesson 9, turning. This is not in chronological order, but the use of this relatively simple lesson first allows the trainee to see the techniques in action. It only has three elements or 'building blocks': Entry – Maintaining – Rollout. This lesson also has no instruction until in the cruise, so gives the trainee longer to familiarise with the aircraft from an unfamiliar seat. After the conclusion of the turning lesson, control can be returned to the trainee for the return and landing.

There then follows a debrief. After a suitable break, the lesson can be repeated, but with the trainee delivering the pre-flight briefing and the flying exercise. This is known as a 'give back'.

Other FI courses break each lesson down into 'chunks' which are given by the FIC instructor, and then given back, before moving on to the next chunk. This is generally the easier way to manage the flying.

The purpose of the flying side of the course is to develop the 'patter' and synchronisation that is required. In the early lessons it can be quite hard to master, but after a little practice is becomes easier.

Stage 3: Once this format has been established, the remaining lessons can be flown, usually in chronological order, starting with Lesson 4.1: Effects of Control 1.

Stage 4: On bad weather days, more ground study can take place. Preparation for long lessons can take place. A trainee may be asked to prepare a lesson on a subject that interests them, rather than a flying topic. The principles of teaching are the same.

Theoretical Knowledge: There is a large amount of theoretical knowledge that must be known by the trainee instructor. He must be fully conversant with all of the theoretical knowledge for the PPL syllabus, and this will be tested orally in the assessment of competence at the end of the course. Many would-be instructors have forgotten much of this material, and a thorough study should be undertaken before starting the course. This material will not be taught during an FI course as it is expected to already be known. A good way to check your knowledge is to have a look at the questions at the back of **CAA Standards Document 10**. There are 250 questions which are quite taxing.

The trainee instructor should prepare and deliver lectures on topics that are selected by the course instructor from the PPL course and the generic topics listed further below:

Aircraft Take-off & landing performance	Thunderstorms	Using TEM to avoid Infringement
Aircraft Performance (specific a/c type)	Weather Fronts	Use of GPS in General Aviation
Pitot Static Instruments	Blackbushe Airport Operational Procedures	VOR Navigation
Stalling	Radiotelephony at UK airports	Mass & Balance
Spinning	Maintaining SEP validity & currency	

Part 3: Pilot Licences

The UK.Part FCL PPL
The Modular CPL
The Integrated CPL
The ATPL
The LAPL (A)
The MPL
The UK NPPL
The UK Non-Part.FCL PPL

The UK Part.FCL PPL

Pre-Entry Requirements

There are no pre-entry requirements for a PPL course.

Flight Training:

The EASA PPL course consists of a minimum of 45 hours flight training (technically 5 hours of this may be completed in an approved simulator). All training must be carried out at an ATO or DTO by suitably qualified instructors. The flight training must include at least:

- 25 hours of dual flight instruction,
- 10 hours of supervised solo flight time, including at least 5 hours of solo cross-country flight time with at least 1 cross country flight of at least 270 km (150 NM) that includes full stop landings at 2 aerodromes different from the departure aerodrome.

There may be a reduction in training requirement if a student has previous flying experience, such as a

- LAPL(A): See below.
- Other aircraft licence: see below.
- Foreign PPL: Rules have recently changed, but credit is available.

For further details see the relevant course in the next section.

Ground Training:

Sufficient ground school is required to allow the applicant to pass 9 multiple choice on-line exams. These must be passed with a pass mark of 75% on the following subjects:

Common Subjects: Air Law, Human Performance, Meteorology, Communications, Navigation.

Specific Class Subjects: Principles of Flight, Operational Procedures, Flight Performance & Planning, Aircraft General Knowledge.

The exams must all be passed within 18 months from the end of the month in which the applicant took the first exam (whether passed or failed). From the date of successful completion of these exams, the 'pass' remains valid for a further 24 months for application for the PPL.

3 attempts at each exam are allowed. Failure of all 3 require the 4th attempt to be booked via the CAA and taken at Gatwick. Failure of the 4th attempt means a 3 month ban on further exams, all previous passes being rendered null and void, and all further exams must be taken at the CAA in Gatwick after further training has been carried out.

A FRTOL (Flight radiotelephony Operator's Licence) Practical Test should be passed for which a minimum demonstrated language proficiency of 4 must be achieved. For further details see the relevant course in the next section. The FRTOL is not an absolute requirement before skill test (since the applicant may not wish to use an aircraft with a radio), but the Communications written exam is.

Assessment:

A skill test with an UK Flight Examiner (FE) must be passed once all these requirements have been met. The examiner must not have completed more than 25% of the applicant's required flight training, nor should they have been involved in the final part of the applicant's training. If the skill test is carried out at an unlicenced aerodrome, the aerodrome operator and the examiner must both be satisfied that the aerodrome has adequate facilities for the safe conduct of flight.

The examiner must either be notified to the CAA by the ATO/DTO by means of an approved list of examiners, or if it is conducted externally, the examiner must apply to the CAA for authorisation to conduct the test. This is done by sending an e-mail to **testnotifications@caa.co.uk**. The test may not be conducted until authorisation has been received. The content of the e-mail is very specific, and failure to adhere correctly to the format may result in no response.

The subject field of the e-mail MUST be as follows: ST (skill test) Examiner Family Name Examiner Licence/Certificate No, for example:

ST SMITH GBR.FCL.123456A.A

The body of the e-mail MUST be as follows: Details of Applicant (Surname, Forenames, Title, Licence/CAA Ref No), Examiner details (Surname, Forenames, Title, UK Licence No, Examiner privilege to be exercised during test), Test details (Type of test eg PPL ST, Class or type of a/c, Registration, Date of test, Venue of test, Time of test in 24 hour format) for example:

Details of Applicant: Johnson, Michael Peter, Mr, CAA Ref 456789Z.
Examiner Details: Smith, John Samuel, Mr, GBR.FCL.123456A.A, PPL skill test
Test Details: PPL ST, SEP(land)-PA28, G-ABCD, 14/02/2021, Blackbushe (EGLK), 1200.

For further information dee CAA Information Notice No 2016/0004.

Application:

This is now done using the **online application form**.

Validity:

The PPL(A) is a non-expiring 'lifetime' licence. Once issued the licence is held unless it is provisionally suspended, suspended or revoked by the issuing authority or is surrendered by the holder. However, for the licence to be valid for any particular flight the medical certificate and relevant aircraft ratings contained within it must be valid.

Privileges:

General:

(a) The privileges of the holder of a PPL(A) are to act without remuneration as PIC or co-pilot on aeroplanes or TMGs engaged in non-commercial operations.

(b) Notwithstanding the paragraph above, the holder of a PPL(A) with instructor or examiner privileges may receive remuneration for:

(i) the provision of flight instruction for the LAPL(A) or PPL(A).

(ii) the conduct of skill tests and proficiency checks for these licences.

(iii) the ratings and certificates attached to these licences.

(c) May fly an aeroplane for the purpose of aerial work which consists of:

(i) towing a glider in flight

(ii) a flight for the purpose of dropping of persons by parachute

In either case the PPL(A) holder, aeroplane and persons carried in the aeroplane or glider are members of a flying club.

Note: The EASA PPL contains no requirement for night flying, and the resulting PPL confers no night privileges. A separate Night Rating must be obtained.

Carriage of Passengers:

A pilot shall not operate an aircraft carrying passengers:

(a) as PIC or co-pilot unless he/she has carried out, in the preceding 90 days, at least 3 take-offs, approaches and landings in an aircraft of the same type or class or an FFS representing that type or class.

(b) as PIC at night unless he/she:

(i) has carried out in the preceding 90 days at least 1 take-off, approach and landing at night as a pilot flying in an aircraft of the same type or class or an FFS representing that type or class.

OR

(ii) holds an IR.

Weather Minima:

Holders of a PPL without IR or IMC Rating are restricted to flight under Visual Flight Rules (VFR) 1.5 km visibility outside controlled airspace or 5 km visibility in Class C, D and E airspace.

Upgrade LAPL to PPL

If you hold a LAPL (A) and are applying for a PPL (A) you must complete the following:

- At least 15 hours of flight time on aeroplanes after the issue of the LAPL (A), of which at least 10 hours should be flight instruction at an ATO. This flight instruction must include 4 hours of supervised solo flight, of which at least 2 hours must be solo cross country, with at least 1 cross country flight of 270km (150NM) or more, plus full stop landings at 2 aerodromes different from the departure aerodrome.
- Pass the PPL Skill test.

Upgrade to PPL from another licence

If you hold a pilot's licence for another type of aircraft, except balloons, you will be credited with 10% of your total flight time as PIC up to a maximum of 10 hours.

You will still need to complete 10 hours of supervised solo flight time, including at least 5 hours of solo cross country flight time with at least 1 cross-country flight of at least 270 km (150 NM) that includes 2 full stop landings at an aerodrome different from the departure aerodrome as the credited flight time cannot be counted towards this requirement.

United Kingdom Civil Aviation Authority

UNITED KINGDOM

FLIGHT CREW LICENCE

Issued in accordance with Part-FCL

This licence complies with ICAO standards, except for the LAPL and BIR privileges or when accompanied by a LAPL medical certificate

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The Modular CPL

Pre-Entry Requirements

- The minimum age to apply for a CPL is 18 and you must hold a Part MED Class 1 Medical Certificate.
- Must hold a PPL (A) issued in accordance with Annex 1 of the Chicago Convention. EASA PPL (A) licences are in accordance with this Annex.
- Before beginning the course, you must have completed 150 hours flight time. If you are taking your skill test on a multi-engine aircraft you must have completed the prerequisites for the issue of a class or type rating for multi-engine aeroplanes.

Flight Training:

- Training for a CPL is to the level required to fly commercially. The modular route does not include instrument rating training. The modular CPL flight training must be completed in one continuous course at an ATO.
- To apply for a CPL you must complete at least 25 hours of dual flight instruction, including 10 hours of instrument instruction and 15 hours of visual flight instruction. Five hours of the instrument instruction can be taken in a simulator (BITD, FNPT I or II, and FTD 2 or an FFS).
- At least five hours of the flight instruction must be completed in a 4-seat aeroplane with a variable pitch propeller and retractable landing gear.
- You will also need to complete at least 5 hours of night flight instruction, comprising 3 hours of dual instruction, which will include at least 1 hour of cross country navigation and 5 solo take-offs and 5 solo full stop landings.
- If you hold a valid IR (A) you will be fully credited up to 10 hours towards the instrument instruction time requirement. If you hold an IR (H) you will be credited with 5 hours. The remaining 5 hours must be completed in an aeroplane.
- If you have completed the basic instrument flight module you will be credited the 10 hours instrument instruction time requirement.
- If you already hold a night rating (aeroplane) you will not need to complete the additional night flight instruction.

Ground Training:

- You must hold current and valid theoretical knowledge examinations to at least CPL level (13 examinations).
- The Military Accreditation Scheme sets out the credits for UK Military Flight Crew, so the scheme is only open to serving Members of HM UK Forces or people discharged from HM UK Forces. You must provide proof of UK Military service. QMP(A)s do not need to complete a theoretical knowledge instruction course as set out in FCL.310 or FCL.515 and Appendix 3, before attempting the theoretical knowledge examinations for the CPL or ATPL(A).
- An applicant for a CPL holding a valid CPL in another category of aircraft must complete theoretical knowledge bridge instruction at an ATO according to the differences identified between the CPL syllabi for different aircraft categories. The applicant must pass the following PART FCL subjects in the appropriate aircraft category:
  - 021 - Aircraft General Knowledge: Airframe and Systems, Electrics, Powerplant, Emergency Equipment
  - 022 - Aircraft General Knowledge: Instrumentation
  - 032/034 - Performance Aeroplanes or Helicopters, as applicable
  - 070 - Operational Procedures

- 080 - Principles of Flight

The remainder of the CPL(A) examinations are credited.

Assessment:

The skill test must be taken after completing the course on either a single or multi-engine aeroplane. The aircraft must be certified for at least 4 people, have a variable pitch propeller and retractable landing gear.

You must have at least 200 hours of flight time before conducting the skill test. This must include the following:

- 100 hours as Pilot in Command (PIC), of which 20 hours of cross-country flight as PIC, which shall include a VFR cross-country flight of at least 540km (300 NM), in the course of which full stop landings at two aerodromes different from the aerodrome of departure must be made.
- 5 hours of flight time must be completed at night, comprising 3 hours of dual instruction which must include at least 1 hour of cross-country navigation and 5 solo take-offs and 5 solo full stop landings.
- 10 hours of instrument flight instruction, of which up to 5 hours may be instrument ground time in an FNPT I, or FNPT II, or FFS. If you hold a course completion certificate for the Basic Instrument Flight Module you will be credited with up to 10 hours towards the required instrument instruction time. Hours done in a BITD shall not be credited.
- If a multi-engine aeroplane is used for the skill test, 6 hours of flight time shall be completed in a multi-engine aeroplane.
- You may be able to count some other Pilot in Command flying hours towards the 200 hours of flight time required. These are detailed below:
    - 30 hours in helicopter, if you hold a PPL(H) or
    - 100 hours in helicopters, if you hold a CPL(H) or
    - 30 hours in TMGs or sailplanes or
    - 30 hours in airships, if you hold a PPL(As) or
    - 60 hours in airships, if you hold a CPL(As).

Application for the Licence

A new **Professional Issue Online Application form** for CPL,CPL IR and ATPL issue is now available to use for applicants who have not previously used the eLicensing system.

Please note that from 10th May 2021, all applications for professional licence issue must be made using eLicensing system or this online application form. The paper versions of SRG1183A/SRG1183H will no longer be accepted.

Guidance on how to apply for Professional licence issue is available on the CAA website.

Validity:

The CPL, however gained, is a non-expiring 'lifetime' licence. Once issued the licence is held unless it is provisionally suspended, suspended or revoked by the issuing authority or is surrendered by the holder. However, for the licence to be valid for any particular flight the medical certificate and relevant aircraft ratings contained within it must be valid.

Privileges:

If you hold a CPL (however gained) you can, on the appropriate aircraft category:

- exercise all the privileges of the holder of a LAPL and a PPL. (To exercise LAPL privileges you will need a LAPL licence)
- act as pilot in command (PIC) or co-pilot of any aircraft operations other than commercial air transport
- act as PIC in commercial air transport of any single-pilot aircraft, subject to some restrictions
- act as co-pilot in commercial air transport subject to some restrictions.

United Kingdom Civil Aviation Authority

Civil Aviation Authority

UNITED KINGDOM

FLIGHT CREW LICENCE

Issued in accordance with Part-FCL

This licence complies with ICAO standards, except for the LAPL and BIR privileges or when accompanied by a LAPL medical certificate

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The Integrated CPL

Pre-Entry Requirements

- The minimum age to apply for a CPL is 18 and you must hold a Part MED Class 1 Medical Certificate.
- No further pre-entry requirements for the integrated CPL course.

Flight Training:

The flight training for an integrated CPL course is as follows:

- At least 150 hours (not including type rating training) which includes all progress tests and up to 5 hours may be instrument ground time. If you hold an ICAO compliant PPL(A) or PPL(H), 50% of the hours flown can be credited, up to a maximum of 40 hours, (or 45 hours if you have an aeroplane night rating), of which up to 20 hours may count towards the requirement for dual instruction flight time.

The total flying training requirement (above) must include the following components:

- 80 hours Dual instruction, of which up to 5 hours may be instrument ground time.
- 70 hours Pilot in Command.
- 20 hours Cross-country flying as PIC, including a VFR cross-country flight of at least 540 km (300 NM), which should also include full stop landings at two aerodromes different from that of departure.
- 5 hours Night flying, comprising 3 hours of dual instruction and 1 hour of cross-country navigation and 5 solo take-offs and full stop landings.
- 10 hours Instrument time, of which up to 5 may be instrument ground time in a suitable simulator. If you hold a course completion certificate for the basic instrument flight module (BIFM), you will be credited with up to 10 hours towards the required instrument instruction time. Hours done on a BITD will not be credited.
- 5 hours in an aircraft certified for at least 4 persons, variable pitch propeller and retractable landing gear.

Ground Training:

You will need to complete at least 350 hours of theoretical knowledge training. This theoretical knowledge course will only be sufficient for attempting CPL (A) theoretical knowledge examinations. If you wish to take theoretical knowledge examinations at ATPL (A) level or for an IR (A), you will need to complete additional study. You will need to pass the 13 CPL (A) theoretical knowledge examinations:

- Principles of Flight
- Airframes/Systems/Powerplant
- Performance
- General Navigation
- Radio Navigation
- Instrumentation
- VFR Communications
- Air Law
- Operational Procedures
- Flight Planning & Monitoring
- Mass & Balance
- Human Performance
- Meteorology

Assessment:

The skill test must be taken after completing the course on either a single or multi-engine aeroplane. The aircraft must be certified for at least 4 people, have a variable pitch propeller and retractable landing gear.

Application for the Licence

A new **Professional Issue Online Application form** for CPL,CPL IR and ATPL issue is now available to use for applicants who have not previously used the eLicensing system.

Please note that from 10th May 2021, all applications for professional licence issue must be made using eLicensing system or this online application form. The paper versions of SRG1183A/SRG1183H will no longer be accepted.

Guidance on how to apply for Professional licence issue is available on the CAA website.

Validity:

The CPL, however gained, is a non-expiring 'lifetime' licence. Once issued the licence is held unless it is provisionally suspended, suspended or revoked by the issuing authority or is surrendered by the holder. However, for the licence to be valid for any particular flight the medical certificate and relevant aircraft ratings contained within it must be valid.

Privileges:

If you hold a CPL (however gained) you can, on the appropriate aircraft category:

- exercise all the privileges of the holder of a LAPL and a PPL. (To exercise LAPL privileges you will need a LAPL licence)
- act as pilot in command (PIC) or co-pilot of any aircraft operations other than commercial air transport
- act as PIC in commercial air transport of any single-pilot aircraft, subject to some restrictions
- act as co-pilot in commercial air transport subject to some restrictions.

The ATPL

Pre-Entry Requirements

- The minimum age to apply for a CPL is 21.
- you must hold a Part MED Class 1 Medical Certificate.
- Additionally, you must hold either:
    - A CPL (A) and a multi-engine IR for aeroplanes and have completed instruction in multi-crew co-operation (MCC) or
    - Hold an MPL. If you are upgrading to an ATPL from an MPL, and you do not hold any privileges on your MPL for a single pilot aircraft, then your ATPL will continue to be restricted to multi-crew operations only, as your MPL would have been.

Flight Training:

- There is no course of training as such. The applicant first must obtain a CPL with instrument rating and a pass in all 14 ATPL ground exams. This is known as a 'Frozen ATPL'.
- The ATPL will remain frozen until 1500 hours of flying time have been reached, which is made up of the following criteria:
    - 500 hrs multi-pilot in transport or commuter aircraft
    - 250 hrs PIC (or 100 Pilot in Command and 150 PIC under supervision)*
    - 200 hrs cross country flights (100 as Pilot in Command)
    - 75 hrs instrument time
    - 100 hrs night flight as PIC or co-pilot.

Ground Training:

- There are 14 exams which cover the following topics:
    - Principles of Flight
    - Airframes/Systems/Powerplant
    - Performance
    - General Navigation
    - Radio Navigation
    - Instrumentation
    - VFR Communications
    - IFR Communications
    - Air Law
    - Operational Procedures
    - Flight Planning & Monitoring
    - Mass & Balance
    - Human Performance
    - Meteorology.

Note, these 14 exams are equivalent to the 13 CPL ground exams plus the instrument rating ground exams.

Assessment:

As far as the UK CAA is concerned, the ATPL skill test is nothing more than your annual Licence Proficiency Check (LPC) coinciding with reaching the required hours.

Application for the Licence

A new **Professional Issue Online Application form** for CPL,CPL IR and ATPL issue is now available to use for applicants who have not previously used the eLicensing system.
Please note that from 10th May 2021, all applications for professional licence issue must be made using eLicensing system or this online application form. The paper versions of SRG1183A/SRG1183H will no longer be accepted.
Guidance on how to apply for Professional licence issue is available on the CAA website.

Validity:

The ATPL, however gained, is a non-expiring 'lifetime' licence. Once issued, the licence is held unless it is provisionally suspended, suspended or revoked by the issuing authority or is surrendered by the holder. However, for the licence to be valid for any particular flight the medical certificate and relevant aircraft ratings contained within it must be valid.

Privileges:

If you hold an ATPL you can, in the appropriate aircraft category:

- Exercise all the privileges of the holder of a LAPL, PPL and CPL. (To exercise LAPL privileges you will need a LAPL licence)
- Act as pilot in command (PIC) of aircraft flown for commercial air transport operations.

Applicants for the issue of an ATPL shall have fulfilled the requirements for the type rating of the aircraft used in the skill test.

Note:

A CPL allows you to fly most multi-crew aeroplanes as a First Officer, provided that you have a rating/IR for that aeroplane. Most pilots start off this way, as they do not have the necessary hours for an ATPL. They will hold what is termed a 'Frozen ATPL'. Essentially that is just a CPL with an Instrument Rating, and a pass in all 14 of the ATPL theory exams (i.e they have taken and passed all the CPL & ATPL exams. When they have the requisite hours for an ATPL they upgrade their licence. You would in practice find that many employers will not let you fly long haul without an unfrozen ATPL, as they like you to be able to act as commander when the Captain is in the bunk, but that is down to the individual company.

The UK LAPL (A)

Pre-Entry Requirements

There are no pre-entry requirements for a LAPL, however, applicants for a LAPL(A) shall be at least 17 years of age. A student pilot for a LAPL(A) shall be at least 16 years of age before first solo flight.

Flight Training:

Applicants for a LAPL(A) shall complete a training course at a DTO or ATO. The course shall include flight instruction. The LAPL course consists of a minimum of 30 hours flight training For further details see the relevant course in the next section.

Ground Training:

Applicants for a LAPL(A) shall complete a training course at a DTO or ATO. The course shall include theoretical knowledge instruction.

Ground Training:

Sufficient ground school is required to allow the applicant to pass 9 multiple choice on-line exams. These must be passed with a pass mark of 75% on the following subjects:
Common Subjects: Air Law, Human Performance, Meteorology, Communications, Navigation.
Specific Class Subjects: Principles of Flight, Operational Procedures, Flight Performance & Planning, Aircraft General Knowledge.
The exams must all be passed within 18 months from the end of the month in which the applicant took the first exam (whether passed or failed). From the date of successful completion of these exams, the 'pass' remains valid for a further 24 months for application for the PPL.

3 attempts at each exam are allowed. Failure of all 3 require the 4th attempt to be booked via the CAA and taken at Gatwick. Failure of the 4th attempt means a 3 month ban on further exams, all previous passes being rendered null and void, and all further exams must be taken at the CAA in Gatwick after further training has been carried out.

A FRTOL (Flight radiotelephony Operator's Licence) Practical Test should be passed for which a minimum demonstrated language proficiency of 4 must be achieved. For further details see the relevant course in the next section. The FRTOL is not an absolute requirement before skill test, but the Communications ground exam is.

Assessment:

A skill test with an Flight Examiner (FE) must be passed once all these requirements have been met.

Validity:

The Light Aircraft Pilot's Licence (LAPL) Aeroplanes is a non-expiring 'lifetime' licence. Once issued the licence is held unless it is provisionally suspended, suspended or revoked by the issuing authority or is surrendered by the holder.

A LAPL(A) gained at a UK DTO or UK ATO is now (as of 01 Jan 2021) only valid in the UK FIR with restrictions on aeroplane weight (MTOW of 2000 kg or less) and with no more than 4 people on board the aircraft (including crew and passengers).

Privileges:

General:

The LAPL(A) is different to other licence types in that it does not contain aircraft type or class ratings with expiry dates that need revalidation. They include privileges built into the licence itself, so a LAPL(A) will not have an SEP (land) rating with expiry date, but it will have stated SEP or TMG privileges which the pilot must keep valid by ensuring at least a certain minimum amount of flying is maintained. A LAPL(A) can however contain other (non-aircraft) ratings e.g. night, or aerobatics.

The privileges of the holder of a LAPL for aeroplanes is to act as PIC on single-engine piston aeroplanes-land (SEP (land)), single-engine piston aeroplanes-sea (SEP (sea)) or TMG with a MTOW of 2000 kg or less, carrying a maximum of 3 passengers, such that there are always a maximum of 4 persons on board of the aircraft.
The LAPL(A) holder may fully exercise the privileges within the UK FIR only since the UK left EASA. The LAPL(A) does not fully comply with the ICAO standards for aeroplane pilot licensing contained in the ICAO Annex 1 'Personnel Licensing'.

Extension of Privileges to another Class or Variant of aeroplane

(a) The privileges of an LAPL(A) shall be limited to the class and variant of aeroplanes (SEP land, SEP sea or TMG) in which the skill test was taken. This limitation may be removed when the pilot has completed, in another class, the requirements below:

- (1) 3 hours of flight instruction, including: (i) 10 dual take-offs and landings. (ii) 10 supervised solo take-offs and landings
- (2) a skill test to demonstrate an adequate level of practical skill in the new class. During this skill test, the applicant shall also demonstrate to the examiner an adequate level of theoretical knowledge for the other class in the following subjects:
  - (i) Operational procedures, (ii) Flight performance and planning, (iii) Aircraft general knowledge.

(b) In order to extend the privileges to another variant within a class, the pilot shall either undertake differences training or do a familiarisation. The differences training shall be entered in the pilot's logbook or into an equivalent record and be signed by the instructor.

Recency:

(a) Holders of a LAPL(A) shall exercise the privileges of their licence only if in the last 2 years they have met any of the following conditions as pilots of SEP aeroplanes or TMGs:

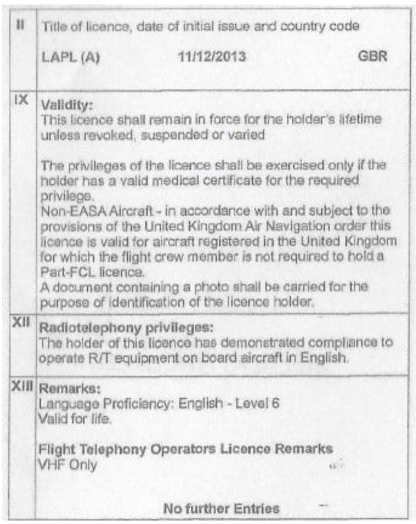
(1) they have completed at least 12 hours of flight time as PIC or flying dual or solo under the supervision of an instructor, including:

- 12 take-offs and landings.
- refresher training of at least 1 hour of total flight time with an instructor. (These 2 together are known as 'Rolling Requirement')

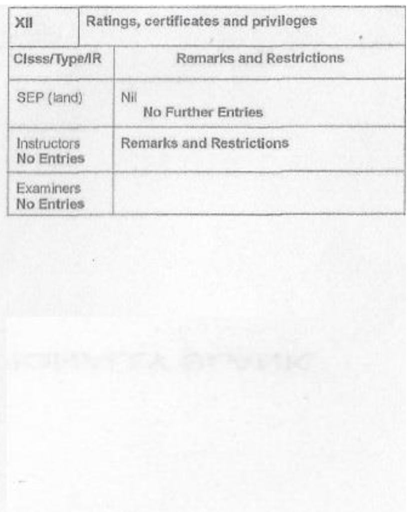
or

(2) they have passed a LAPL(A) proficiency check with an examiner. The proficiency check shall be based on the skill test for the LAPL(A).

(b) If holders of a LAPL(A) hold both a SEP(land) and a SEP(sea) privilege, they may comply with the requirements in point (a)(1) in either class or a combination thereof which shall be valid for both privileges. For this purpose, at least 1 hour of the required flight time and 6 out of the required 12 take-offs and landings shall be completed in each class.



II	Title of licence, date of initial issue and country code LAPL (A) 11/12/2013 GBR
IX	**Validity:** This licence shall remain in force for the holder's lifetime unless revoked, suspended or varied The privileges of the licence shall be exercised only if the holder has a valid medical certificate for the required privilege. Non-EASA Aircraft - in accordance with and subject to the provisions of the United Kingdom Air Navigation order this licence is valid for aircraft registered in the United Kingdom for which the flight crew member is not required to hold a Part-FCL licence. A document containing a photo shall be carried for the purpose of identification of the licence holder.
XII	**Radiotelephony privileges:** The holder of this licence has demonstrated compliance to operate R/T equipment on board aircraft in English.
XIII	**Remarks:** Language Proficiency: English - Level 6 Valid for life. **Flight Telephony Operators Licence Remarks** VHF Only No further Entries



XII	Ratings, certificates and privileges
Clsss/Type/IR	Remarks and Restrictions
SEP (land)	Nil No Further Entries
Instructors No Entries	Remarks and Restrictions
Examiners No Entries	

United Kingdom Civil Aviation Authority

UNITED KINGDOM

FLIGHT CREW LICENCE

Issued in accordance with Part-FCL

This licence complies with ICAO standards, except for the LAPL and BIR privileges or when accompanied by a LAPL medical certificate

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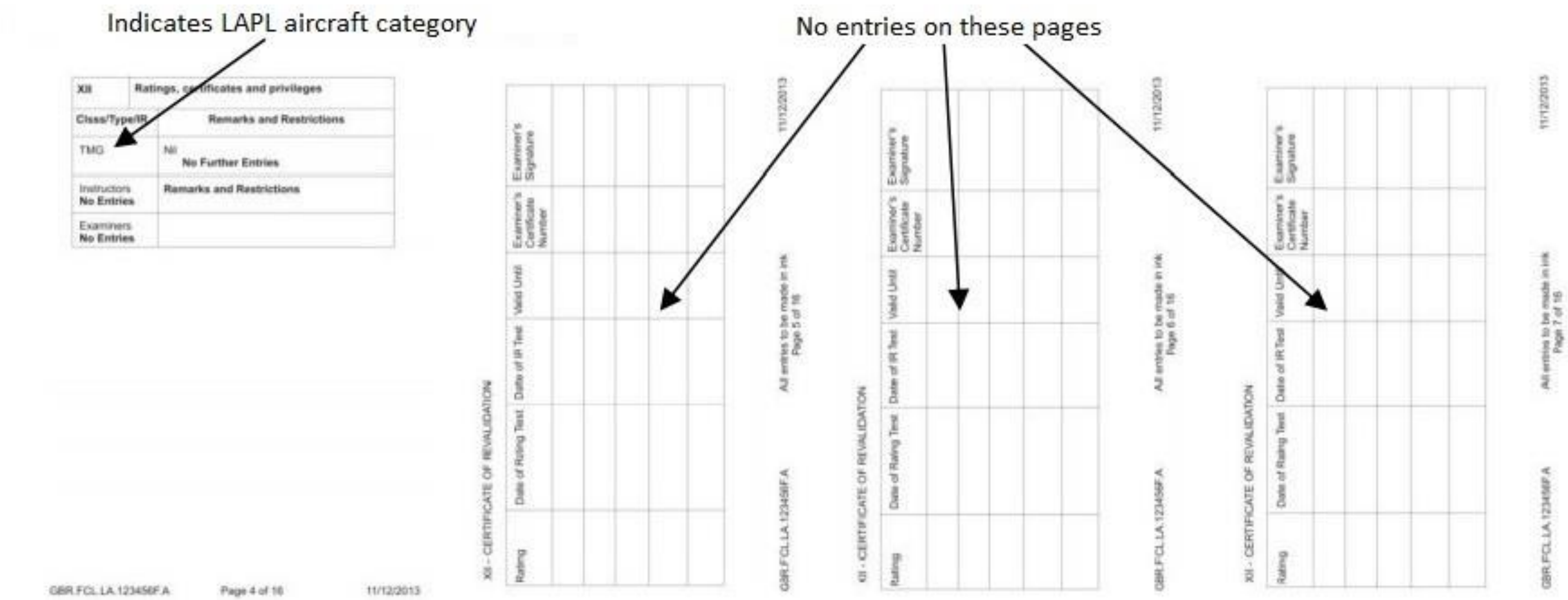
NOTE: The LAPL is not like any other licence because it does not contain ratings that need to be revalidated or renewed. The LAPL itself is both the rating and the licence. Pilots do not revalidate or renew a LAPL, its validity is maintained by recency requirements.

Q: So why is there a rating indicated in Section XII of the licence?

A: This is the UK CAA way of indicating the LAPL aircraft category e.g. SEP (Land), TMG, etc. Unlike other licences it does not mean there should be a signature in Section XII (Certificate of Revalidation) in order to maintain validity. This is done through recency using logbook evidence prior to each and every flight. It is the pilot's responsibility to ensure the recency is met prior to each and every flight.



Q: Should there be a signature on my licence in Section XII Certificate of Revalidation?
A: No there should not be any entry or signature in Section XII Certificate of Revalidation. If there is it is incorrect and could lead to issues with the National Aviation Authority (UK CAA) should your licence be inspected by them.

Q: I already have an entry in Section XII Certification of Revalidation. What should I do?
A: Ignore the entry and the date. It has no relevance to a LAPL. Do not cross it out as this action could be interpreted as defacing the licence. Check the recency requirements for your LAPL in accordance with Part FCL and then follow these recency requirements. If you are still unsure please get in touch with a suitable training organisation for further guidance.

Q: If I have to pass a Proficiency Check in order to regain recency where does the examiner sign?
A: The examiner shall make an entry in your pilot logbook only. The examiner shall not make any entries in the licence.

Suggested entry in pilot logbook:

Passed Proficiency Check in accordance with FCL.140
GBR.123456F

- Holders of a LAPL(A) shall exercise the privileges of their licence only if in the last 2 years they have met any of the following conditions as pilots of Aeroplanes or TMGs:

Rolling Requirement
or
LAPL Proficiency Check with an Examiner

Carriage of Passengers:
A LAPL(A) holder may carry no more than 4 people on board the aircraft (including crew and passengers).

Holders of a LAPL(A) shall carry passengers only if they have completed 10 hours of flight time as PIC on aeroplanes or TMG after the issuance of the licence.
Holders of a LAPL(A) who previously held an ATPL(A), an MPL(A), a CPL(A) or a PPL(A), are exempted from the passenger carrying requirements above.

A pilot shall not operate an aircraft carrying passengers:
(a) as PIC or co-pilot unless he/she has carried out, in the preceding 90 days, at least 3 take-offs, approaches and landings in an aircraft of the same type or class or an FFS representing that type or class
(b) as PIC at night unless he/she has carried out in the preceding 90 days at least 1 take-off, approach and landing at night as a pilot flying in an aircraft of the same type or class or an FFS representing that type or class.

Weather Minima:
Holders of a LAPL are restricted to flight under Visual Flight Rules (VFR) 1.5 km visibility outside controlled airspace or 5 km visibility in Class C, D and E airspace.

Upgrade LAPL to PPL
If you hold a LAPL (A) and are applying for a PPL (A) you must complete the following:

- At least 15 hours of flight time on aeroplanes after the issue of the LAPL (A), of which at least 10 hours should be flight instruction at an ATO. This flight instruction must include 4 hours of supervised solo flight, of which at least 2 hours must be solo cross country, with at least 1 cross country flight of 270km (150NM) or more, plus full stop landings at 2 aerodromes different from the departure aerodrome.
- Pass the PPL Skill test.

The MPL (Multi-Pilot Licence)

A Multi-pilot licence (MPL) allows the holder to act as a co-pilot in an aeroplane required to be operated with a co-pilot for commercial air transport. The holder of an MPL can get extra privileges, to include the privileges of the PPL(A) or of a CPL(A) or single pilot IR, if additional training is completed to meet the requirements of those licences. The MPL only includes instrument rating privileges for multi-pilot operations.
Each MPL course is bespoke to a partner airline and designed for a specific aircraft type. Training incorporates airline specific Standard Operating Procedures (SOP's) from an early stage, with airlines mentoring pre-selected cadets through a customized course, then on to type, base and line training on a specific aircraft. Taking about 18 months to achieve license issue, line training and employment with the mentoring airline then commences. The full privileges and conditions are detailed in FCL.405.A (Unfortunately very basic).

Flight, Ground Training & Assessment:

A training course of ground and flight instruction must be completed at an ATO. See MPL Course in later chapter for details.

Validity:

An MPL can be converted to ATPL at 1500 hours in preparation for captaincy, but the resulting ATPL is multi-crew only so additional training would be needed to operate in a single crew capacity.

Privileges:

(a) The privileges of the holder of an MPL are to act as co-pilot in an aeroplane required to be operated with a co-pilot.
(b) The holder of an MPL may obtain the extra privileges of:

> (1) the holder of a PPL(A), provided that the requirements for the PPL(A) specified in Subpart C are met;
> **Subpart C:** The holder of an MPL shall have the privileges of his/her IR(A) limited to aeroplanes required to be operated with a co-pilot. The privileges of the IR(A) may be extended to single-pilot operations in aeroplanes, provided that the licence holder has completed the training necessary to act as PIC in single-pilot operations exercised solely by reference to instruments and passed the skill test of the IR(A) as a single-pilot.
>
> (2) a CPL(A), provided that the requirements specified in FCL.325.A are met:
> **FCL 325.A:** Before exercising the privileges of a CPL(A), the holder of an MPL shall have completed in aeroplanes:
>
> > (a) 70 hours of flight time:
> > (1) as PIC; or (2) made up of at least 10 hrs as PIC and the additional flight time as PIC under supervision (PICUS).
> > Of these 70 hrs, 20 shall be VFR cross-country as PIC, or cross-country flight time made up of at least 10 hrs as PIC and 10 hrs as PICUS. This shall include a PIC VFR cross-country flight of at least 540 km (300 NM) with 2 full-stop landings at different aerodromes;
> > (b) the elements of the CPL(A) modular course as specified in paragraphs 10(a) and 11 of Appendix 3, E to this Part; and
> > (c) the CPL(A) skill test, in accordance with FCL.320.

Conversion of MPL to PPL

Training as required to reach the standard, but typically min 1 hour general handling followed by 1.5 hour nav & circuits. Then the PPL skill test.

The UK National Pilot's Licence (NPPL)

General:

The National Private Pilot's Licence (NPPL) is a UK specific pilot's licence developed in 2002. It is not an internationally recognised licence and does not automatically entitle the holder to fly aircraft in other countries. The NPPL may include in it aircraft Class Ratings that allow the holder to fly specific classes of aircraft e.g. microlights, SLMG, etc.

The NPPL is available for microlights and other non-EASA aircraft:

- Vintage aircraft
- Permit-to-fly aircraft
- Kit-built aircraft

The NPPL can only be used on UK-registered aircraft inside UK airspace, unless you have an agreement with the aviation authorities in another country which will allow you to fly in that country's airspace.

You can add class ratings to the NPPL to allow you to fly microlights, self-launching motorgliders (SLMGs) and simple single-engine aeroplanes (SSEAs):

- You can apply for class ratings for SLMGs and SSEAs through the Light Aircraft Association (LAA)
- Applications for microlight class ratings can be made through the British Microlight Aircraft Association (BMAA)

The NPPL does not require a language proficiency test, however, to operate radio telephony equipment you must hold a Flight Radio Telephony Operators Licence (FRTOL).

To enable you to fly EASA certified aircraft (eg PA28, Cessna 172), you will need to convert to a minimum of Part FCL LAPL (A). Additionally you will need to meet the medical and recency requirements for the LAPL(A).

To take advantage of conversion to a LAPL(A), the NPPL SSEA or SLMG must have been issued by the UK CAA on or before 7 April 2018. It is not possible to convert a microlight class rating, as there is no EASA equivalent.

Holders of UK licences higher than an NPPL may apply for an NPPL by submitting the application form and paying the fee.

Pre-Entry Requirements

Minimum Age: First solo is 16 years, Issue of an NPPL is 17 years.
Medical Requirements: A certificate of fitness from a GP, equivalent to the DVLA Group 2 professional driving medical standards, is required for solo flying or for passenger carrying. It may be possible for individuals who cannot meet the DVLA Group 2 standards to operate as a solo pilot only with a certificate of fitness equivalent to the DVLA Group 1 standards.

Flight Training:

Training Aircraft: Adequately equipped and maintained aircraft shall be used for training. See specific syllabus requirements.
Training Airfields: Training for the NPPL shall be conducted at suitable airfields. See specific syllabus requirements
Instruction: Instruction for the NPPL must be carried out by a holder of an appropriate flight instructor certificate. There are no special NPPL instructors and an FI with an SEP rating can do the training towards the issue of an NPPL with SSEA.

Ab-initio students should complete flight training in accordance with the specific class rating syllabus requirements. The flight training hours are:

Microlight:	**Simple Single Engine Aeroplane (SSEA):**	**Self Launching Motor Glider (SLMG):**
Minimum dual 25 hours, of which: Minimum solo 10 hours Minimum dual navigation 5 hours Minimum solo navigation 3 hours **Total 25 hours**	Min 22 hrs dual to include 1 hr instrument appreciation Minimum solo 10 hours Minimum solo navigation 4 hrs to include a nav flight of at least 185 km (100 nm) with full stop landings at 2 aerodromes other than that of departure. **Total 32 hours**	Minimum dual 22 hours Minimum solo 10 hours to include a solo nav flight of a defined distance that involves landing at other airfields. **Total 32 hours.**

Ground Training:

Theoretical Knowledge Examinations: Applicants for the NPPL must pass the theoretical knowledge examinations in accordance with the specific class rating syllabus requirements. The subjects examined include:
Air Law, Aeroplane General Knowledge, Airframes, Engines and Instruments, Flight performance and Planning, Human Performance & Limitations, Fire, First Aid and Safety Equipment, Meteorology, Navigation, Operational Procedures, Principles of Flight & Communications.

Assessment:

2 Skill tests must be undertaken:

- **Navigation Skill Test:** Applicants for the NPPL will be required to pass a Navigation Skill Test with an examiner prior to undertaking the qualifying solo cross-country flight.
- **General Skill Test:** Applicants for the NPPL will be required to pass a General Skill Test with an examiner on completion of all the training

Medical:

The holder of an NPPL may make a Pilot Medical Declaration (PMD). It is a free service available via the CAA Customer Portal, and it is no longer possible to use an Avoka form for medical self-declaration. The Pilot Medical Declaration is available **here**.

Validity:

The NPPL remains valid for the lifetime of the holder. Each of the 3 class ratings has a validity period of 2 years.

Revalidation of Class Rating:

Within the validity period of the class rating, a total of at least 12 hours flight time including 8 hours as PIC must be completed in order to revalidate by experience.

- **Holder of a licence with one class rating (SSEA or SLMG or Microlight):**

Complete on the class of aeroplanes held:

(a) within the period of validity of the rating have flown as pilot:

(i) at least 12 hours flight time including 8 hours PIC

(ii) at least 12 take-offs and landings.

(iii) at least 1 hour of flight training with an instructor. If this flight time has not been completed, the rating will be endorsed 'Single seat only'

(b) Within the 12 months preceding the expiry date of the rating, have flown as pilot:

(i) at least 6 hours flight time.

- **Holder of a licence with 2 or 3 ratings (SSEA/SLMG/Microlight):**

(a) Within the period of validity of the rating on any of the classes of aeroplanes held, have flown as pilot:

(i) at least a total of 12 hours including 8 hours PIC

(ii) at least 12 take-offs and landings

(iii) at least 1 hour of flight training with an instructor. If this flight time has not been completed all ratings will be endorsed 'Single seat only'

(b) Within the 12 months preceding the expiry date of the ratings held have flown, as pilot on any of the class ratings held:

(i) at least 6 hours flight time

(c) Within the period of validity of each class rating held, have flown as pilot:

(i) at least 1 hour PIC on each class held **OR**

(ii) undertaken at least 1 hour of flying training on each class held with an instructor entitled to give instruction on aeroplanes of those classes

If (c) has not been fully completed, you will be required to renew the relevant class rating(s) by GST.

Renewal of a Class Rating:
If a class rating has expired it shall be renewed by passing a GST with an examiner.

Privileges:

General:
To fly aircraft up to a maximum mass of 2000kg.

Carriage of Passengers:
A maximum of 3 passengers may be carried.

Weather Minima:
Day only, UK only, VFR only.

Upgrade to LAPL
You can convert a NPPL which was issued before 8th April 2018 directly to an UK PART-FCL LAPL (A) by submitting an application to the UK CAA using form **SRG 1104**.
An NPPL issued after 08Apr18 cannot be directly upgraded. It may be possible to use some of the experience gained towards the minimum hours requirements. Then the following minimum training is required: 15 hours dual training, 6 hours supervised solo including the solo cross country and pass the LAPL skill test with an examiner.
Other hours may be credited towards a LAPL, except that the credit must not exceed the total PIC time that has been accrued. Full details of agreed conversion requirements are contained in CAP 804, Section 4, Part P.

Upgrade to PPL
In order to convert to a PPL further training is required.

United Kingdom Civil Aviation Authority

United Kingdom National Private Pilot's Licence (Aeroplanes)

This licence does not certify compliance with ICAO Annex 1 standards

GBR.NP.552588P.A Page 1 of 16 21/02/2021

I	State of Issue **United Kingdom**
III	Licence Number **GBR.NP.552588P.A**
IV	Last and first name of holder Bloggs, James Peter
IVa	Date of Birth **14/06/1999**
XIV	Place of Birth Bolton, **United Kingdom**
V	Address of holder 3 Ocelot Way, Basingstoke Hampshire BS1 1OC
VI	Nationality **British**
VII	Signature of holder
VIII	**Civil Aviation Authority**
X	Signature of issuing officer and date 21/02/2021
XI	Seal or stamp of CAA

II	Title of Licence, date of initial issue and country code NPPL(A) 09/02/2018 GBR
IX	**Validity:** This licence shall remain in force for the holder's lifetime unless revoked, suspended or varied The privileges of the licence shall be exercised only if the holder has a valid declaration of medical fitness for the required privilege. Non-EASA Aircraft - In accordance with and subject to the provisions of the United Kingdom Air Navigation Order this licence is valid for aircraft registered in the United Kingdom for which the flight crew member is not required to hold a Part-FCL licence.
XII	**Flight Radiotelephony Operator's privileges:** The holder of this licence has demonstrated competence to operate R/T equipment on board aircraft in English.
XIII	**Remarks:** Language Proficiency:English - Level 6 Valid for life **No further Entries**

XII	Ratings, certificates and privileges
Class/Type/IR	**Remarks and Restrictions**
Microlight Aeroplanes	No Remark
SSEA (Land)	No Remark
	No Further Entries
Instructors	**Remarks and Restrictions**
No Entries	
Examiners	
No Entries	

Abbreviations used in this licence	
A	Aeroplane
AFI(Microlights)	Assistant Flying Instructor's Rating (Microlights)
EASA	European Aviation Safety Agency
FI(Microlights)	Flying Instructor's Rating (Microlights)
FI(SLMG)	Flying Instructor's Rating (Self Launching Motor Gliders)
Land	Landplanes
NPPL(A)	National Private Pilot's Licence (Aeroplanes)
SE	Single-Engine
SLMG	Self Launching Motor Gliders
SSEA	Simple Single Engine Aeroplane class rating

XII - CERTIFICATE OF REVALIDATION

Rating Certificate Endorsement	Date of Test / Check (If applicable)	Date of IR Test	Valid Until	Examiner's Signature and date of signing	Examiner's Signature
Microlight	N/A	N/A	30/06/2022	CAA0010 Civil Aviation Authority	
SSEA (Land)	17/07/2021	N/A	31/07/2023	CAA0010	
MICROLIGHT	–	NA	31/6/2024	4044475	

The UK ICAO-Compliant Non Part.FCL PPL

General:

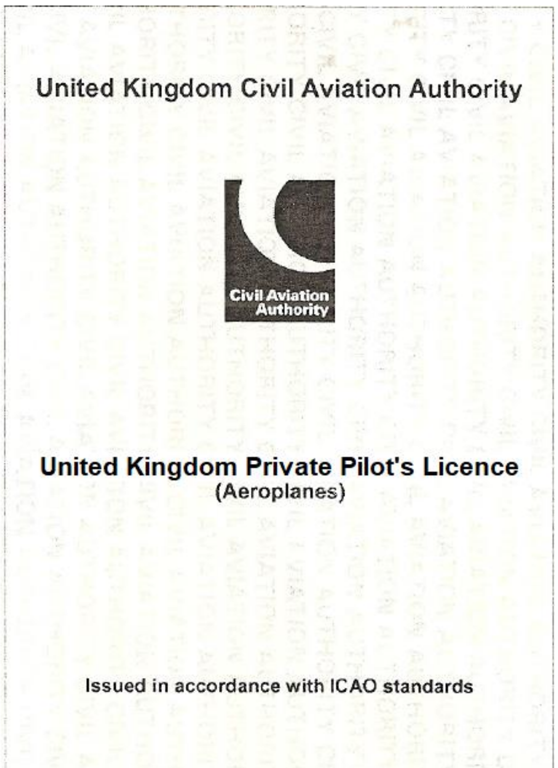
The UK Non Part FCL licence is issued subject to the rules and regulations of the ANO 2016. It can be issued alongside a UK Part-FCL licence, but only is requested.

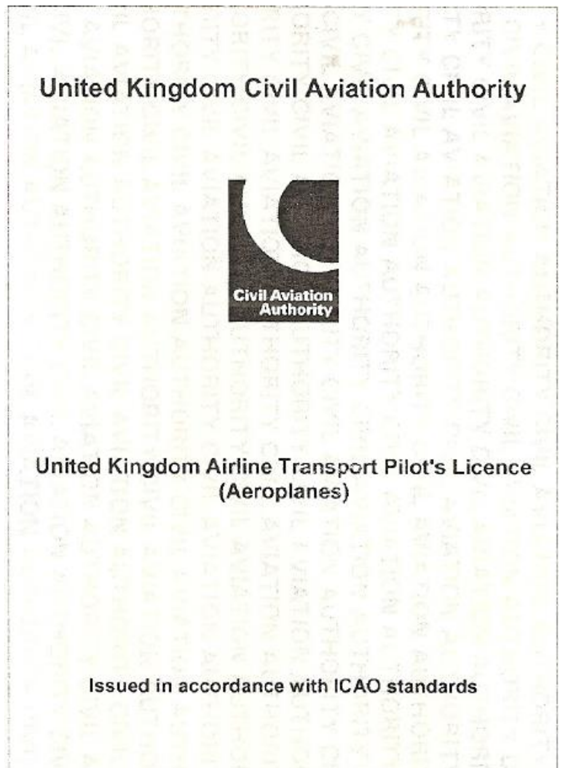
Privileges:

Holders of UK National Licences may no longer fly as Pilot in Command in a UK (G) registered Part 21 aeroplane (formerly called EASA aeroplanes).

The holder of this licence can fly UK (G) registered non-Part 21 aeroplanes and conduct aerobatics without holding an Aerobatic Rating. The DHC 1 Chipmunk is an example of a non-Part 21 aeroplane.

The ANO 2016 requires the holder of a UK National Licence with a valid Single Engine Piston (SEP) Class Rating to complete differences training with an appropriately qualified Instructor prior to flying as pilot in command of a microlight aeroplane. This includes three axis microlights as well as weightshift microlights.





Part 4: Student Ratings & Courses

The UK PPL Course

Pre-Entry Requirements

There are no pre-entry requirements for a PPL course.

Flight Training:

The PPL course consists of a minimum of 45 hours flight training (technically 5 hours of this may be completed in an approved simulator). All training must be carried out at an ATO (Approved Training Organisation) or DTO (Declared Training Organisation) by suitably qualified instructors.
Of these 45 hours, there must be:

- At least 45 hours logged flight time
- At least 25 hours dual instruction
- At least 10 hours of supervised solo flight including at least 5 hours of solo cross country time.
- A solo cross country flight of at least 270 km (150 Nm) with full stop landings at 2 intermediate airfields (Qualifying Cross Country – QXC). This may be included in the 5 hours solo cross country time.

Training can take place and be logged at any age, however, it is a popular myth that hours cannot be logged until age 14. This is not stated anywhere in Part FCL and so should be disregarded. Students can fly solo from their 16th birthday. Minimum age for licence issue is 17.
A Class 1 or Class 2 medical is required before a student may fly solo.

Ground Training:

Ground school is needed to allow the applicant to pass 9 multiple choice written exams must be passed (pass mark 75%) on the subjects of

- Air Law
- Communications
- Principles of Flight
- Navigation
- Meteorology
- Human Factors & performance
- Aircraft General Knowledge
- Flight Planning & Performance
- Operational Procedures.

If the pilot wishes to use the aircraft radio, A FRTOL (Flight radiotelephony Operator's Licence) Practical Test must be passed for which a minimum demonstrated language proficiency of 4 must be achieved. Prior to taking this test the written Communications test must be passed and be at least 16 years old. The test is valid for 24 months, and once the PPL skill test has been passed, is valid for life. This will include English Language Assessment. No FRTOL is required if the pilot wishes to fly non radio aircraft such as vintage aeroplanes.

Assessment:

A skill test with an FE must be passed once all these requirements have been met.
Once passed, the application for a PPL is done online and requires various forms and documents to be scanned and uploaded.

Note: The UK PPL contains no requirement for night flying, and the resulting PPL confers no night privileges. A separate Night Rating must be obtained. This is often not the case in other countries, eg USA, where night flying is a required part of the PPL training.

PPL Course Lessons

The PPL course consists of a sequence of numbered lessons as follows:

Ex 1 -	**Familiarisation and Emergency Procedures**
Ex 2 -	**Preparation before and Action after Flight**
Ex 3 -	**Familiarisation/Air Experience**
Ex 4 -	**Effects of Controls:** Further divided into **Ex 4.1** & **Ex 4.2**
Ex 5 -	**Taxiing**
Ex 6 -	**Straight and Level:** Further divided into **Ex 6.1** & **Ex 6.2**
Ex 7 -	**Climbing** – Often combined with Ex 8 and further divided into **Ex7.1** & **Ex 8.1** and **Ex7.2** & **Ex 8.2**
Ex 8 -	**Descending** – Often combined with Ex 7 and further divided into **Ex7.1** & **Ex 8.1** and **Ex7.2** & **Ex 8.2**
Ex 9 -	**Turning** – Often separated into **9.1: Level Turning** & **9.2: Climbing & Descending Turns**
Ex 10 -	Usually split into **Ex10A - Slow Flight** & **Ex 10bi , Ex 10bii** & **10biii** (Stalling).
Ex 11 -	**Spinning & Spin Avoidance**
Ex 12 -	**Takeoff & Climb**
Ex 13 -	**Circuit, Approach & Landing**
Ex 14 -	**Solo Circuits (First Solo)**
Ex 15 -	**Advanced Turns (Steep Turns)**
Ex 16 -	**Forced Landing without Power**
Ex 17 -	**Precautionary Landings with Power**
Ex 18	**Ex 18A - Basic Navigation, Ex 18B - Low Level Navigation, Ex 18C - Radio Navigation**
Ex 19 -	**Introduction to Instrument Flight**

The briefs that follow in this document are based on the flying characteristics, systems and speeds of the Cessna 152. They should be modified if other aircraft types are used.

New Basic Skills

In the main PPL lessons that follow, there are a number of basic, transferable skills that the student learns. These are in addition to a larger number of abilities and checks. The basic skills are important since they are fundamental building blocks and so it is essential they are learned and understood before the student progresses to the next lesson.

The new skills for each lesson are outlined below:

Exercise	Title	New Basic Skills
Ex 1	Familiarisation & Emerg Procedures	NONE
Ex 2	Preparation before & Action after Flight	NONE
Ex 3	Familiarisation/Air Experience	NONE
Ex 4	Effects of Controls:	SELECT-HOLD-TRIM, LIMITATION-OPERATION-INDICATION
Ex 5	Taxiing	NONE
Ex 6	Straight and Level	LOOKOUT-ATTITUDE-INSTRUMENTS (LAI), PROGRESSIVELY ADJUST ATTITUDE-TRIM (PAAT)
Ex 7	Climbing	ATTITUDE (or Elevator) CONTROLS AIRSPEED, PAT & APT
Ex 8	Descending	ATTITUDE (or Elevator) CONTROLS AIRSPEED, POWER CONTROLS ROD. PAT & APT
Ex 9	Turning	NONE
Ex 10a	Slow flight	Recognition of SLOW FLIGHT
Ex 10b	Stalling	Recognition of the STALL, STANDARD STALL RECOVERY
Ex 11	Spinning & Spin Avoidance	Recognition of the SPIN
Ex 12	Takeoff & Climb	NONE
Ex 13	Circuit, Approach & Landing	Point & Power technique (If used)
Ex 14	Solo Circuits (First Solo)	NONE
Ex 15	Advanced Turns (Steep Turns)	THROTTLE-ROLL-PITCH (For UA recovery)
Ex 16	Forced Landing without Power	Sightline Angle Method (If taught)
Ex 17	Precautionary Landings with Power	NONE
Ex 18	Navigation	Navigation work cycle.
Ex 19	Introduction to Instrument Flight	Selective Radial Scan (SRS)

Flight Prompt Cards

Whilst teaching in the air, it is a good idea to have some kind of notes to help you with the sequence of the flight. Suggested Flight Prompt cards are provided for each lesson, which may be adapted to your own needs.

An example is shown below:

Ex 4.1: Effects of Controls 1

1: Feeling OK? Teach Lookout.
2: DEMO how Stable the a/c is. Show Normal Attitude Fingers on coaming. DEMO what is NOT Norm Att. Ask.
3: Teach/FT Effect of Elevator. Move CC back, nose att up, airspeed decrease, alt incr. Move CC fwd etc. PITCH
4: STUDENT PRACTICE
5. Teach/FT Effect of Ailerons. Rotate CC L, L wing down, R wing up. Angle of Bank. Direction changing. Rotate CC R etc ROLL. 6: STUDENT PRACTICE to L & R.
7: Pick Ref Point Teach/FT Effect of Rudder. (*Hold wings level with aileron)*. YAW Sensation of Skid.
8: STUDENT PRACTICE to L & R (Hold wings level).
9: Teach 2º Effect of Aileron. L. ROLL-SLIP-YAW-PITCH DN-SPIRAL DESC. Recover. STUDENT PRACTICE
10: Teach 2º Effect of Rudder. L. YAW-SKID-ROLL-PITCH DN-SPIRAL DESC. Recover. STUDENT PRACTICE
11: Effect of airspeed @ constant 2300rpm. Pitch down to 115kts/TRIM. STUDENT Feels Controls.
12: Pitch up to 65 knots/TRIM. STUDENT Feels Controls.
13: Effect of slipstream at constant 65kts. Set 65 kt glide STUDENT Feels Controls. Then transition to:
14: Full power 65 kts climb STUDENT Feels Controls.
15: DEMO/FT Control input proportional to result.
16: STUDENT PRACTICE.
17: DEMO/FT Different Attitudes. Put ac in bank to L. Move CC back. See result relative to a/c axis not horizon. 18: STUDENT PRACTICE.

Key

HASELL	Student Checks
DEMO	Instructor demonstration
DEMO/FT	Instructor demo, student follow thru
PATTER	Instructor patters
TEACH	Instructor teaches
NOTE SPEEDS	Notes, things to point out
WARNING!	Warnings
PAAT	Basic Skill (Building Block)
PRACTICE	Student action
REVISION	Revision
MIXTURE	New Topic

CC = Control column
LOI = Limitation-Operation-Indication
LAI = Lookout-Attitude-Instruments
OEI = One engine inoperative/Asymmetric
FT = Follow through
S&L= Straight & Level
RTO= Rejected Take-Off

Ex 1 - Familiarisation & Emergency Procedures

Practical Considerations

This is the student's first lesson and should not be rushed, glossed over, or skipped altogether.

An introduction to aircraft checklist, emergency procedures and general safely awareness is also part of this lesson which can be combined with other lessons, such as Ex5 – Taxiing or Ex3 – Familiarisation/Air Experience.

Long Briefing

From EASA Part-FCL:

(a) Long briefing objectives:

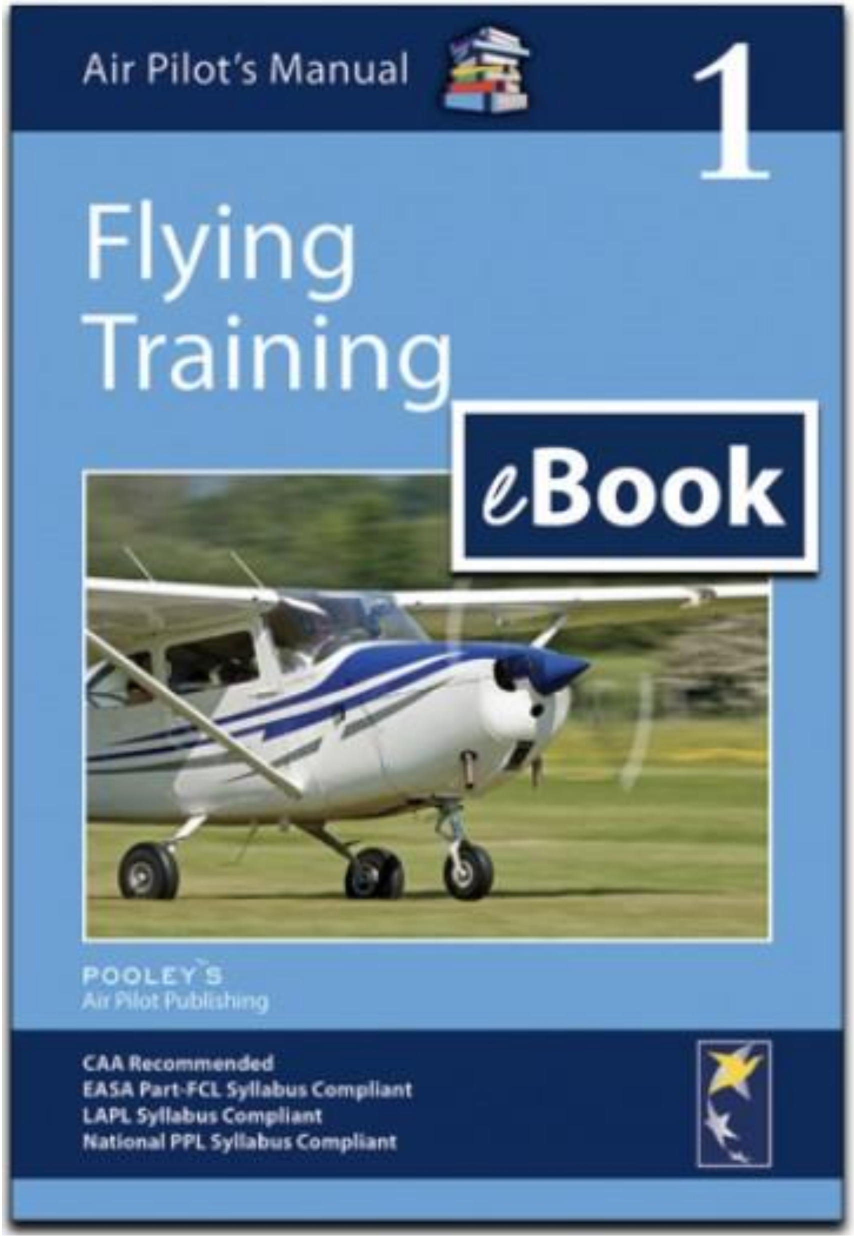
(1) introduction to the aeroplane;
(2) explanation of the cockpit layout;
(3) systems and controls;
(4) aeroplane power plant;
(5) checklists and drills;
(6) differences when occupying the instructor's seat;
(7) emergency drills:
- (i) action in event of fire in the air and on the ground;
- (ii) escape drills: location of exits & use of emergency equipment (eg fire extinguishers, etc.)

(8) pre-flight preparation & a/c inspection:
- (i) aeroplane documentation;
- (ii) external checks;
- (iii) internal checks;
- (iv) harness, seat or rudder pedal adjustment;

(9) engine starting procedures:
- (i) use of checklists;
- (ii) checks before starting;
- (iii) checks after starting.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 1

Aircraft Familiarisation

The basic training aeroplane consists of a **fuselage** to which the **wings,** the **tail,** the **wheels** and an **engine** are attached. A **propeller,** driven by the engine, generates thrust to pull the aeroplane through the air. This enables the airflow over the wings to generate an aerodynamic force, known as **lift,** that is capable of supporting the aeroplane in flight. The aeroplane can fly without thrust if it is placed in a gliding descent.

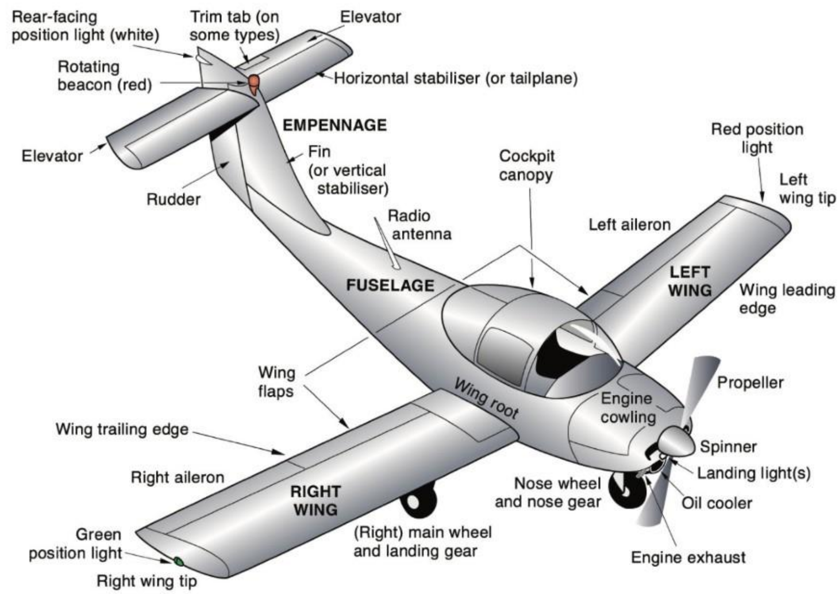


Figure 1-1 ***The aeroplane***

The tail section of the aeroplane is situated some distance to the rear of the main load-carrying sections of the fuselage, and provides a balancing or stabilising force much like the tail feathers on an arrow or a dart. The tail section consists of a **vertical stabiliser** (or fin) and a **horizontal stabiliser,** both of which are shaped to produce suitable aerodynamic forces.

The pilot and other occupants of the aeroplane are accommodated in the **cockpit,** usually in two-abreast seating –

Board Briefing

Usually not necessary for this lesson.

Ground Exercise

The student will benefit from a thorough walkround and internal inspection of the aircraft with explanation of all the components, without the distraction of going flying. An engine start and subsequent shutdown can be used as familiarisation of many of the dials and gauges.

From EASA Part-FCL:

Air exercise:

(1) external features;
(2) cockpit layout;
(3) aeroplane systems;
(4) checklists and drills;
(5) action if fire in the air and on the ground; (i) engine; (ii) cabin; (iii) electrical.
(6) systems failure (as applicable to type);
(7) escape drills (location and use of emergency equipment and exits);
(8) preparation for and action after flight:
  (i) flight authorisation & a/c acceptance; (ii) technical log or certificate of maintenance release;
  (iii) mass and balance and performance considerations; (iv) external checks;
  (v) internal checks, adjustment of harness or rudder pedals; (vi) starting and warming up engines; (vii) checks after starting;
  (viii) radio navigation and communication checks; (ix) altimeter checks and setting procedures; (x) power checks;
  (xi) running down and switching off engines; (xii) completion of authorisation sheet and aeroplane serviceability documents.

NOTE: All long briefing objectives mentioned above should also be trained on site during the air exercise.

Debriefing

- Usually not necessary for this lesson.

Common Student Faults

- Too early in the course for generalised student errors.

Common Instructor Faults

- The temptation here is to rush through this lesson, and this leads to gaps in knowledge and misunderstandings later on. Take the time to do this slowly and thoroughly.

Ex 2 - Preparation Before & Action after Flight

Long Briefing

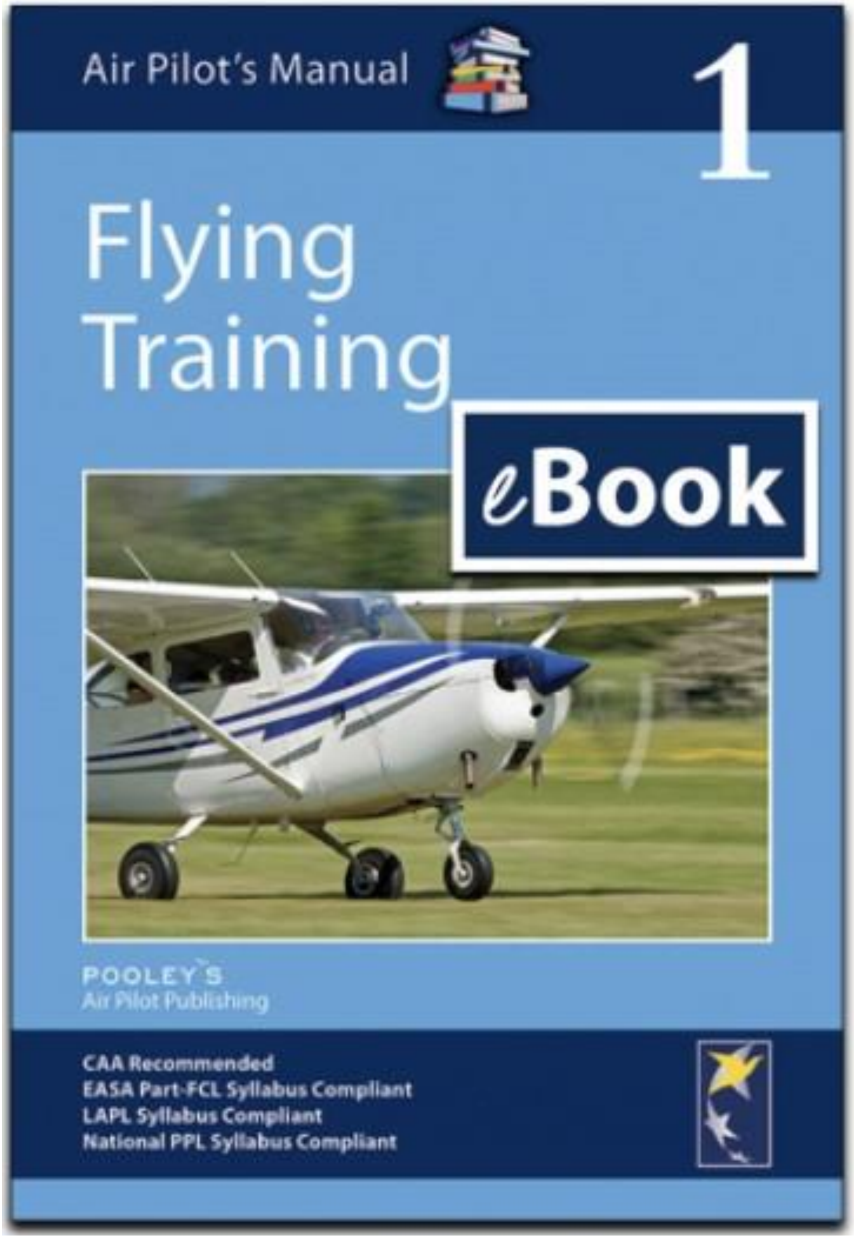
From EASA Part-FCL:

Long briefing objectives:

(1) flight authorisation and aeroplane acceptance, including technical log (if applicable) and certificate of maintenance;
(2) equipment required for flight (maps, etc.);
(3) external checks;
(4) internal checks;
(5) student comfort, harness, seat or rudder pedal adjustment;
(6) starting and warming up checks;
(7) power checks;
(8) running down, system checks and switching off the engine;
(9) leaving the aeroplane, parking, security and picketing;
(10) completion of authorisation sheet and aeroplane serviceability documents.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 2a

Preparation for Flight

Aim

To prepare for flight.

Considerations

The success of a flight depends very much on thorough preparation. In the course of your training a pattern of regular pre-flight actions should be developed to ensure that this is the case. They must be based on the checks in the Pilot's Operating Handbook for your aeroplane. Furthermore, the principles of threat and error management will be considered in relation to every flight. (Further information on this topic is to be found in Volume 6 of this series).

Preparation for a flight commences well before you actually enter the aeroplane, and consists of:

- personal preparation;
- satisfying the pre-flight documentation requirements;
- **'booking out'** the flight with an Air Traffic Service Unit;
- **the pre-flight inspection** of the aeroplane;
- start-up and taxi checks;
- the pre-take-off check.

Personal Preparation for Flight

The pilot is the key person on any flight and must be properly prepared. If you are planning on a flight some days hence, then calm, unhurried and thorough long-term preparation a day or two in advance might be useful, be it preparing the maps for a cross-country flight or reading up on 'turning' for an imminent lesson on that exercise.

Short-term preparation involves such things as being properly equipped, arriving early enough at the aerodrome for any briefing or flight preparation to proceed in an unhurried manner, and carrying out the required pre-flight checks of the aeroplane calmly and thoroughly.

A typical list of items to check before even leaving home should include:

- Am I fit to fly? (You will be required to obtain the appropriate medical certificate before solo flying is permitted).
  - Have I consumed alcohol in the last eight hours?

Board Briefing

Usually not necessary for this lesson. However at this stage an explanation of Aircraft Technical Log procedures and ATC booking out procedures will pay rewards later. The student should then carry out these functions for all future flights. In this way he is taking responsibility for the flight and beginning the process of preparing for his first solo. This is a good lesson for a poor weather day, and could include a visit to the tower.

Ground Exercise

- Demonstrate how to use the aircraft technical log or electronic log
- Demonstrate the different methods of booking out available at the home airfield.

Debriefing

- Usually not necessary for this lesson.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

- This is not an exciting or rewarding lesson, so the student is unlikely to be particularly interested in it. However, it is important to stick with it.

Common Instructor Faults

- It is usually quicker and easier for the instructor to complete these actions themselves, rather than allow the student to do them. Indeed the student will probably be quite happy to let the instructor do them. However, it is important that the student learns how to do these tasks for themselves, as many get as far as their skill tests still unsure about such things.

Ex 3 – Familiarisation/Air Experience

Long Briefing

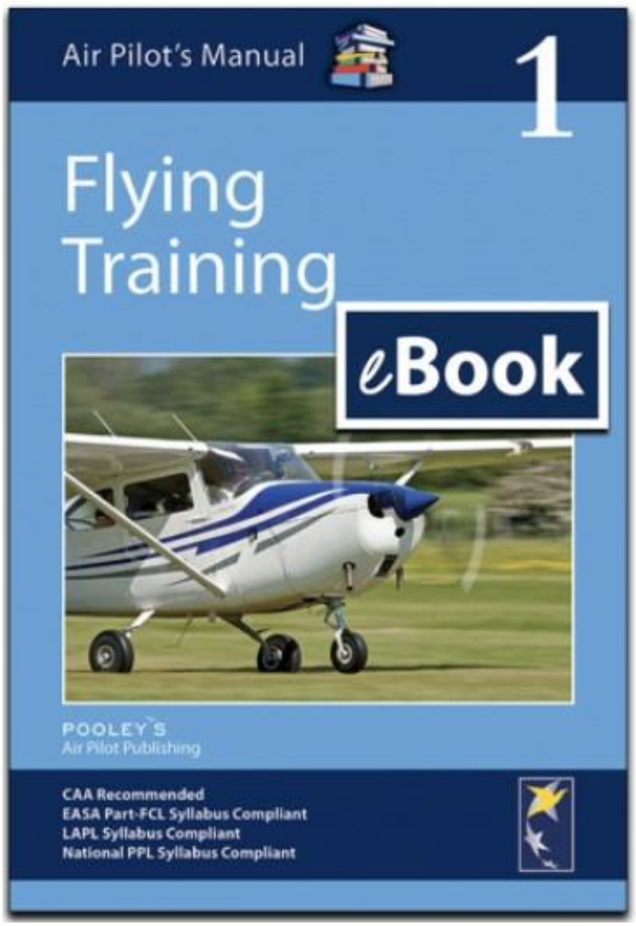
From EASA Part-FCL:

Note: there is no requirement for a long briefing for this exercise.

However, a short presentation of what is to come may be beneficial. Lookout. Local area familiarisation.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 2a

Preparation for Flight

Aim

To prepare for flight.

Considerations

The success of a flight depends very much on thorough preparation. In the course of your training a pattern of regular pre-flight actions should be developed to ensure that this is the case. They must be based on the checks in the Pilot's Operating Handbook for your aeroplane. Furthermore, the principles of threat and error management will be considered in relation to every flight. (Further information on this topic is to be found in Volume 6 of this series).

Preparation for a flight commences well before you actually enter the aeroplane, and consists of:

- personal preparation;
- satisfying the pre-flight documentation requirements;
- **'booking out'** the flight with an Air Traffic Service Unit;
- **the pre-flight inspection** of the aeroplane;
- start-up and taxi checks;
- the pre-take-off check.

Personal Preparation for Flight

The pilot is the key person on any flight and must be properly prepared. If you are planning on a flight some days hence, then calm, unhurried and thorough long-term preparation a day or two in advance might be useful, be it preparing the maps for a cross-country flight or reading up on 'turning' for an imminent lesson on that exercise.

Short-term preparation involves such things as being properly equipped, arriving early enough at the aerodrome for any briefing or flight preparation to proceed in an unhurried manner, and carrying out the required pre-flight checks of the aeroplane calmly and thoroughly.

A typical list of items to check before even leaving home should include:

- Am I fit to fly? (You will be required to obtain the appropriate medical certificate before solo flying is permitted).
  - Have I consumed alcohol in the last eight hours?

Air Exercise

Purely observational for this lesson. The instructor must fly the aircraft as he would expect the student to, and not become sloppy or lazy in any way, as these habits may be picked up by the student.

Debriefing

A short debrief may consolidate such items as lookout etc.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

The student is here purely to absorb and observe. He may never have been in a light aircraft before, so there could be a lot to take in.

Common Instructor Faults

The idea of this lesson is that the student does not take control at all, but purely observes. To this end it is imperative that the instructor flies well and as he would expect the student to fly later on. Everything you do as an instructor will be seen and probably copied later, so make sure it is worth copying! Use the checklist where you would expect the student to, and fly a neat circuit on return. Do not show off or try to impress.

Ex 4.1 - Effects of Controls 1

Exercise 4 is divided into 2 lessons and should not be combined as it is essential the students grasps this lesson before carrying on. There is a huge amount of critical work in this lesson. Any attempt to rush these lessons tends to result in problems later on.

Practical Considerations

- A good horizon is essential for this lesson.
- FREDA checks will be introduced in Exercise 6.1 Straight & level Part 1, so in this lesson, just a look at fuel gauges and engine Ts & Ps is recommended.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- Trimming will be introduced in Ex 4.2. This is to emphasize that the trimmer is not a primary flying control, and should not be used to control the aircraft. Some schools choose to introduce it in Ex4.1.

Long Briefing

It is important to give a full and thorough long brief for this exercise to ensure complete understanding from the student.

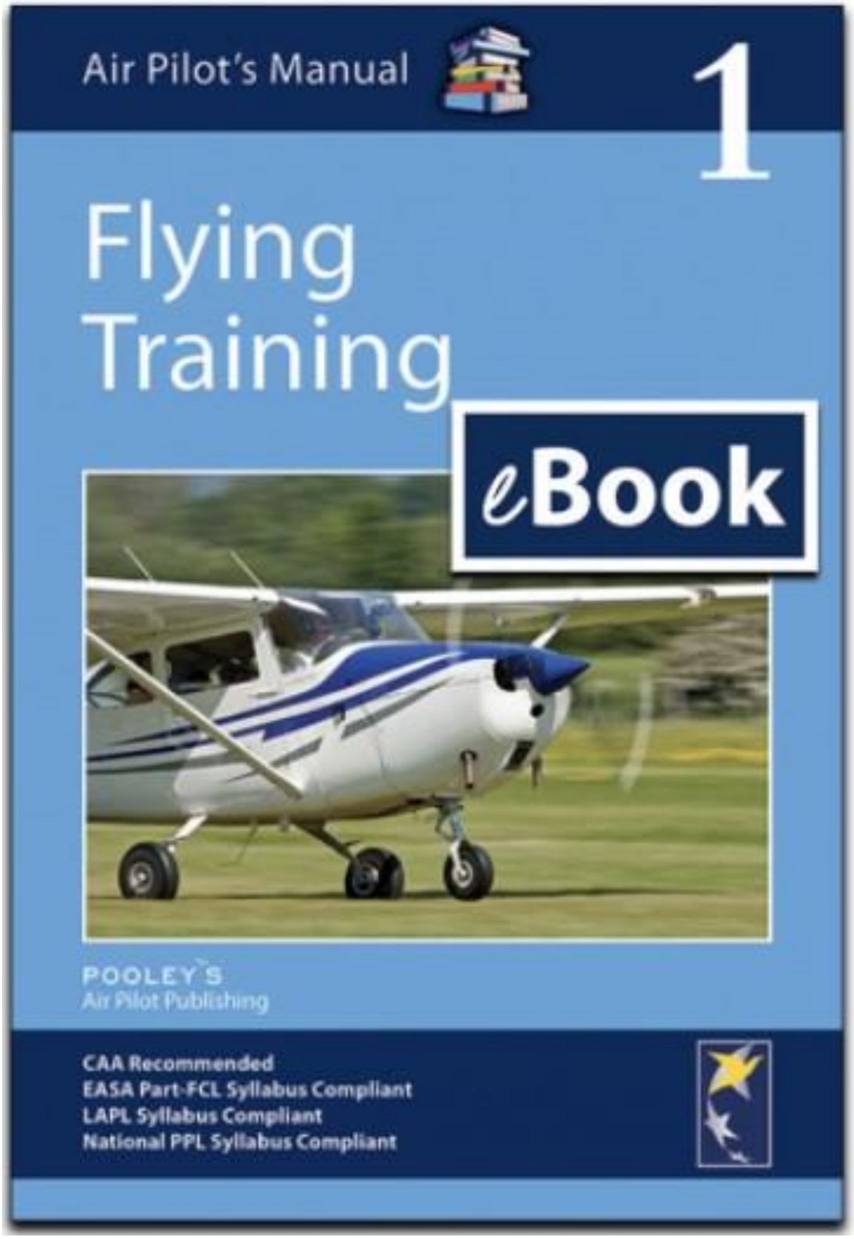
From EASA Part-FCL:

Long briefing objectives:

(1) function of primary flying controls: when laterally level and banked;
(2) further effect of ailerons and rudder;
(3) effect of inertia;
(4) effect of air speed;
(5) effect of slipstream;

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 4a

The Primary Effect of Each Main Flight Control

Aim

To observe the primary effect of moving each main flight control.

Considerations

Aeroplane Movement

An aeroplane moves in three dimensions.

To describe an aeroplane's attitude, or position in flight, three mutually perpendicular reference axes passing through the centre of gravity (CG) are used. Any change in aeroplane attitude can be expressed in terms of motion about these three axes.

*Motion about the lateral axis is known as **pitching**.*
*Motion about the longitudinal axis is known as **rolling**.*
*Motion about the normal axis is known as **yawing**.*

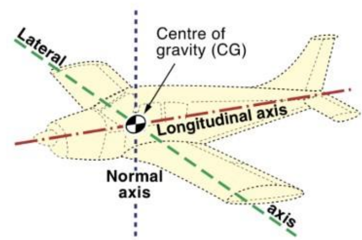


Figure 4a-1 ***Angular motion is described using three reference axes***

NOTE The word *normal* in geometry means perpendicular. We therefore refer to the yaw axis as the *normal axis,* because it is perpendicular to both the longitudinal axis and the lateral axis. It is preferable not to call it the vertical axis, because it is only vertical when the aeroplane is in the cruise attitude. Whenever the aeroplane is banked, or the nose is pitched up or down, the normal axis is not vertical.

Motion about an axis can be described as *motion in a plane.* For instance, the nose pitching up and down can be described as either rotation about the lateral axis, or motion in the pitching plane.

Board Briefing

Ex 4.1 - Effects of Controls 1

07 Jan 22

AIM: To learn the primary and secondary effects of the main controls and the effects of airspeed and slipstream.
T&E: Other a/c, Loss of Control
M: Lookout, Handover, Follow through.

Airex: **1:** External & Internal Checks. **2:** Taxiing **3:** Show Normal Attitude with Reference to Natural Horizon

Control	Primary Effect	Secondary Effect
4: Elevator Control Column moved back Control Column moved forward	**PITCH** Pitches nose up, airspeed decreases Pitches nose down, airspeed increases	**NONE** But note airspeed change
5: Ailerons Control Column rotated Left Control Column rotated Right	**ROLL** Aircraft rolls left Aircraft rolls right	Roll - Slip - Yaw - nose lowers below horizon - spiral descent
6: Rudder Left Rudder Pedal Pressed Right Rudder Pedal Pressed	**YAW** Aircraft yaws left Aircraft yaws right	Yaw - Skid - Roll - nose lowers below horizon - spiral descent

Smooth progreesive movements, Neutral Point, Response proportional to input, Aircraft moves relative to pilot

7: Effect of Airspeed	**Constant Power (2300 rpm)**
High Airspeed (115 kts)	Controls firm and responsive
Low Airspeed (65 kts)	Controls sloppy and unresponsive

8: Effect of Slipstream	**Constant Airspeed (65 kts)**
High RPM (Full)	Rudder & Elevators firmer and more responsive. Ailerons unchanged
Low RPM (Idle)	Rudder & Elevators sloppier and less responsive. Ailerons unchanged

Skeleton Board Briefing

Ex 4.1 - Effects of Controls 1

07 Jan 22

AIM: To learn the primary and secondary effects of the main controls and the effects of airspeed and slipstream.

T&E:

M:

Airex: **1:** External & Internal Checks. **2:** Taxiing **3:** Show Normal Attitude with Reference to Natural Horizon

Control	Primary Effect	Secondary Effect
4: **Elevator** Control Column moved back Control Column moved forward		
5: **Ailerons** Control Column rotated Left Control Column rotated Right		
6: **Rudder** Left Rudder Pedal Pressed Right Rudder Pedal Pressed		

7: **Effect of Airspeed** — **Constant Power (2300 rpm)**

High Airspeed (115 kts)

Low Airspeed (65 kts)

8: **Effect of Slipstream** — **Constant Airspeed (65 kts)**

High RPM (Full)

Low RPM (Idle)

Pre-Flight Briefing

Make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

The following is suggested speech for the board briefing above to a single student:

'Good morning, today we are going to do exercise 4 Part 1, Effects of Controls 1. There are 2 parts to this exercise – the first part we are going to look at today is looking at the effects of the primary flying controls. The second part which we will do tomorrow involves other aircraft controls.'

'So the aim today is written on the board – To learn the primary and secondary effects of the main controls and the effects of airspeed and slipstream.'

We are going to start by discussing some threats and errors that we might encounter today, and then talk about how we might manage them to reduce their impact on us. Looking out of the window here, I can see lots of aeroplanes taxying towards the runway. What do you think may be a big threat once we get airborne?

'Other aeroplanes being in our way'

'Yes, other aeroplanes are also going to be in the local area too. How are we going to manage to keep clear of them?'

'Good lookout.'

'Yes, remember, no-one is watching us on radar, so if either of us see an aeroplane today, we will point it out to the other person. The way we do that is by using the 'clock code'. Imagine that 12 o'clock is in front of the aircraft, then 6 o'clock is at the back, 3 o'clock is off the right wingtip and so on. So if I see an aircraft just left of the nose, I can say – traffic 11 o'clock. That way you will know where to look for it. I could also say high or low to make it ever clearer. So, if you saw an aircraft off the left wingtip, above us, what would you say to me?'

'Traffic 9 o'clock high'

'Yes, that's right. So there should be plenty of practice spotting other aircraft today.

'Now, you haven't done very much flying yet in your training. What error could you make while trying to fly the aircraft?'

'I could do the wrong thing?'

'Yes, it would be quite easy for you to make a mistake and we could end up in a dangerous situation. So, to avoid any danger we have dual controls. However, if you are pulling one way and I am pushing the other, we could end up fighting over the controls. To prevent this happening, we have a very formal system for handover of control.'

'If I am flying and I want you to practice, I will say to you – 'You have control.'

You will place your hands and feet on the controls gently and say 'I have control'. I will then let go of the controls and you will be controlling the aircraft.'

'If, at any time, I want to take control back, I will put my hands and feet on the controls and say 'I have control'. You will immediately release the controls and say 'You have control'. I will then be controlling the aircraft.

'If, for any reason, you want me to take the controls back, just say 'You have control'. I will place my hands and feet on the controls and say 'I have control'. You can then let go. Let's practice that a few times.'

I have Control This humorous video shows some of the pitfalls of knowing who is in charge (internet connection required)

To pilots with a few hour's experience, this procedure is second nature, but to a brand new pilot it may seem a little odd, and it is worth making sure they fully understand it.

'Sometimes, I may want to fly the aircraft, but want you to feel the inputs I am using. In this case I will say 'follow me through on the controls'. When I say that, I want you to lightly place your fingers and feet on the controls, but don't resist my inputs – just feel what I am doing. When I no longer want you to follow me through, I will say 'relax'.

'OK, so after we finish this short briefing, we are going to go and fill out the tech log for the aircraft. Remember, I showed you how to do that before, but we will do it again together today. We will also book out with the tower, telling them we are going to the local area. Then we will go out to the aircraft together, and we will carry out the external checks together from the checklist.'

'Then we will get in the aircraft together and adjust our seats and belts. We will use the checklist to start the engine and carry out the after start actions. Then I will make a radio call to the tower and taxi the aircraft to the run-up area., where we will carry out the power checks and the before take-off checks from the checklist together. I will then taxi to the runway and after the tower has given permission, I will take-off and fly us to the local area.'

'Once there, I will start by showing you the 'normal attitude'. I will place the aircraft in a position where it is travelling in a straight line and is not going up or down. We call this the **normal attitude**, and it is very important to be able to recognise that attitude. I will ask you to look over the nose and put one hand on the coaming and count the fingers between the coaming and the horizon. For me it's usually about 3 fingers, but it could be different for you. We will find out how many fingers it is for you. Also, the wingtips will be the same distance above/below the horizon on each side. Anytime you want to get back to the normal attitude, all you have to do is set the horizon to 3 fingers, and keep the wingtips equidistant from the horizon.'

Make sure you use the model and cut-out horizon at this point.

'I will use the normal attitude as the starting point for all of the demonstrations.'
'The first thing I am going to demonstrate to you is how stable the aircraft is. From the normal attitude, I am going to let go of all of the controls and see what happens. As long as it is not bumpy, the aircraft should sit there quite happily for a while. It is very stable and wants to stay where it is.'

'Next, I will demonstrate, while you follow me through, the primary effect of elevator. I will move the control column gently rearwards. Do you remember what will happen to the nose of the aircraft?
'Yes, it will go up'
'Yes, the nose will pitch up and the altitude will start to increase. If I don't touch any other control, what do you think will happen to the airspeed?'
'It will get slower'
'Yes, the airspeed will reduce. I will then give you control and let you practice that.'
'Then, I will move the control column gently forwards. Do you remember what will happen to the nose of the aircraft?

‘Yes, it will go down’
‘Yes, the nose will pitch down and the altitude will start to decrease. If I don’t touch any other control, what do you think will happen to the airspeed?’
‘It will get faster’
‘Yes, the airspeed will increase. I will then give you control and let you practice that.’

‘So, we will see that the primary effect of elevator is to pitch the aircraft up and down.’

Effect of Elevator This humorous video shows the effect of elevator (internet connection required)

Then we will move on to the primary effect of ailerons. Again we will begin in the normal attitude. You will follow me through as I rotate the control column to the left. Can you remember what will happen?’
‘The left wing will go down’
‘Yes, the left wing goes down and the right wing goes up. We will be rolling to the left. I will then centralise the control column and the roll will stop. We will be banked to the left. Similarly with rotating the controls column to the right. So, the primary effect of aileron is roll. I will then give you a chance to practice that for yourself.’

Then we will move on to the primary effect of rudder. We will begin in the normal attitude. You will follow me through on the rudder pedals as I depress the left pedal. Can you remember what will happen?’
‘The nose will go left’
‘Yes, the aircraft will yaw to the left. Similarly with depressing the right pedal. So, the primary effect of rudder is yaw. I will then give you a chance to practice that for yourself.’

‘After I have taught you the primary effects of the main controls, we will move on to have a look at the secondary effects.’
‘Now for the elevators, there is no secondary effect, however we did say something else happens when we change the pitch of the aircraft. Can you remember what it is?’
‘Yes, the speed will change’.
‘Correct, a change in pitch will cause the airspeed to change.’
‘Then I will teach you the secondary effect of aileron.’
Make sure you use the model at this point.
‘We will start again in the normal attitude. You will follow me through on the ailerons and rudder. I will rotate the control column to the left and release the controls. First we will see the aircraft rolls, but then we will notice that the nose starts to yaw to the left. The ball is out of the centre as the aircraft slips. The nose then drops below the horizon. We will enter a ‘spiral descent to the left. So, you will see that the secondary effect of aileron is yaw, followed by a spiral descent.’

‘I will recover back to the normal attitude and let you practice that. Then I will teach you the secondary effect of rudder. You will follow me through on the ailerons and rudder.’

Make sure you use the model at this point.

'I will depress the left rudder pedal and release the controls. First we will see the aircraft yaws to the left, but then we will notice that the aircraft rolls to the left as well. The ball is out of the centre as the aircraft skids. The nose then drops below the horizon. We will enter a 'spiral descent to the left. So, you will see that the secondary effect of rudder is roll, followed by a spiral descent.'

'I will recover back to the normal attitude and let you practice that.'

'After we have done that, I will stress the importance of using smooth progressive inputs on the controls. I will show you that some of the controls have a neutral point, and that the result of any control input is proportional to the size of the input. This is important – a small input will result in a small aircraft response. A large input will result in a much bigger aircraft response.'

'Finally, at this stage, I will show you that the result of any control input you make is always relative to the pilot, and not relative to the horizon.'

'Then we will move on to the effect of airspeed. First I will set the aircraft up in the normal attitude at our normal cruise speed of around 95 kts. I will give you control briefly, so you can feel the controls in all 3 axes. Then, I will set the aircraft up in a higher than normal cruise speed, say 115 kts, and then I will give you control so that you can again feel the controls. Can you remember how they may feel different?'

'Yes, they should be more responsive'.

'That's right. You will feel that the controls are firm and responsive at the higher airspeed.'

'Then, I will set the aircraft up at a lower than normal cruise speed, say 65 kts, and then I will give you control so that you can again feel the controls. Can you remember how they may feel different?'

'Yes, they should be sloppy'.

'That's right. You will feel that the controls are sloppy and less responsive at the lower airspeed.'

'Then we will move on to the effect of slipstream on the controls. I will set the aircraft up at an airspeed of 65 kts in a descent, with the engine at idle power. There will be a very little air coming back from the propeller. I will then give you control briefly, so you can feel how all the controls are sloppy and unresponsive.'

'Then, I will set the aircraft up at the same airspeed of 65 kts, but this time in a climb, with the engine at full power. There will be a lot of air coming back from the propeller. Which aircraft controls do you think will be affected by this slipstream?'

'The elevator and rudder'.

'That's right. The ailerons are too far out on the wing to be affected. I will then give you control briefly, so you can feel how firm and responsive the elevator and rudder are now, and how the ailerons are much more sloppy.'

'Once we are near the airport, I will take control and make the radio calls and join the circuit and land. I will then vacate the runway and stop. I will give control back to you to carry out the after-landing checks from the checklist. Once I have taxied back to the parking spot, you will shut down the aircraft, again from the checklist, and carry out any other post flight duties like chocking, tie-down, putting on the cover and completing the tech log.'

'Do you understand what we are going to do? Do you have any questions?'

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	On entering the aircraft, take time to make sure the student is comfortable and can reach everything. Practice handover of control at this stage before flight. Explain and demonstrate follow-through. Demonstrate the power checks and before take-off checklists from the printed checklist.
Take-Off:	Carry out the take-off while the student observes. Use the checklist and make all radio calls as you would expect a student to.
Lesson Point 1:	Check the student can hear you properly and is feeling ok. Explain and demonstrate a lookout using a scan system. Invite the student to point out any traffic for the remainder of the flight using the clock code. 'Now we are out in the local area. Can you hear me ok? How are you feeling? I want you to go through a lookout cycle with me. Let's start at the rear right of the aircraft. Look out your window towards the right tailplane. Move your eyes up and down from ground to sky as you move your eyeline forwards to the front. Then carry on towards the left tailplane, keeping your eyes moving up and down. Did you see any traffic? From now on, we will do this regularly and tell each other if we see anything.'
Lesson Point 2:	Now, set the aircraft up straight and level at a convenient altitude. Point out the **normal attitude** and how it can be recognised by the nose a few fingers' width below the horizon in front, and the wingtips equidistant from the horizon at each side. Point out the position of the controls – neutral. Point out that if left alone, the aircraft is quite stable. You could pitch the aircraft up a little and let go and show how over time, it returns to the datum attitude. **NOTE:** We refer to the normal attitude at this stage. It is in fact the 'straight and level attitude', but as the student has not yet done Ex6, we cannot refer to it as that. For Ex 4.1 & 4.2 we must refer to it as the normal (some schools use 'datum') attitude. 'Here we are in the normal attitude. The aircraft is travelling in a straight line and is not going up or down. We call this the **normal attitude**, and it is very important to be able to recognise this attitude. Look over the nose and put one hand on the coaming, like I am, and count the fingers between the coaming and the horizon. For me it's 3 fingers, but it could be different for you. How many fingers is it for you?' 'OK, so for you, the normal attitude is 4 fingers between the coaming and the horizon. Look at the wingtips, they are the same distance from the horizon each side. If we look out of the front again, we can see that we are travelling towards that town in the distance. Anytime you want to get back to the normal attitude, all you have to do is set the horizon to 4 fingers, and keep the wingtips equidistant from the horizon.' 'I am now going to put the aircraft in an attitude that is not the normal attitude. I want you to tell me why it is not the normal attitude.' Place the aircraft in a shallow climb, descent or turn, or a combination of these. 'That's not the normal attitude because the wingtips are not equidistant from the horizon'. 'That's right. Let's try another one.' Repeat with a different attitude. 'That's not the normal attitude because I have 7 fingers between the coaming and the horizon.' 'That's right. Now, make sure the aircraft is well trimmed in straight and level flight and that it is not too bumpy. 'Now, I am going to completely let go of the controls and see what happens. See, the aircraft is very stable. It hardly moved when I let go, and wants to stay in this normal attitude. I only need to make tiny corrections as we get blown by the wind. Now we are going to look at the effect of each of the aircraft controls in turn.'

Lesson Point 3:	First, look at the effect of elevator. Students are less likely to be upset by pitching up than by pitching down, so start by pitching up: ‘We will start with the elevator. Follow me through and watch the horizon. As I move the control column gently backwards, the nose moves up above the horizon. The movement continues until I return the column to the neutral position. The nose is now above the horizon and is no longer in the normal attitude. Note also that the speed has decreased and our altitude has increased.’ Point to the airspeed indicator and altimeter in turn, with a finger. ‘Relax’. Reset the aircraft to the ‘normal attitude’ before continuing. ‘Now, as I move the control column gently forwards, the nose moves down, below the horizon. The movement continues until I return the column to the neutral position. The nose is now below the horizon and is no longer in the normal attitude. Note also that the speed has increased and our altitude has decreased.’ Point to the airspeed indicator and altimeter. ‘Finally I can move the control column back to return the aircraft to the normal attitude. This motion is called pitch, and it is the primary effect of the elevator. Relax.’
Lesson Point 4:	‘I would now like you to try the effect of elevator. You have control’. **STUDENT PRACTICE.**
Lesson Point 5:	Next, look at the effect of ailerons. Students generally feel better on the inside of a turn, so start by rolling left - ‘Notice we are in the normal attitude again, and that both wingtips are equidistant from the horizon. Follow me through and watch the horizon. As I rotate the control column smoothly to the left, the left wing goes down and the right wing goes up. We are rolling to the left. If I centralise the control column, the rolling stops. We are now banked to the left and our direction is changing.’ ‘To roll the wings level back to the normal attitude, I rotate the control column to the right. The left wing comes up to the horizon. When I centralise the control column, the roll stops and we are once again in the normal attitude.’ ‘As I rotate the control column smoothly to the right, the right wing goes down and the left wing goes up. We are rolling to the right. If I centralise the control column, the rolling stops. We are now banked to the right and our direction is changing. To roll the wings level back to the normal attitude, I rotate the control column to the left. The right wing comes up to the horizon. When I centralise the control column, the roll stops and we are once again in the normal attitude. This motion is called roll, and it is the primary effect of the ailerons.
Lesson Point 6:	‘I would now like you to try the effect of ailerons. You have control’. **STUDENT PRACTICE.**

Lesson Point 7:	Next, look at the effect of rudder. For this exercise, unless the instructor discreetly holds the ailerons steady, roll will develop which will mask the intended demonstration. Therefore, make sure you surreptitiously hold the wings level with aileron. 'Notice we are in the normal attitude again. Let's pick a feature on the horizon, and follow me through on the rudder pedals, watching that feature. As I depress the left pedal, notice the nose moves along the horizon to the left, and we are no longer pointing at our feature. There is also an uncomfortable sideways leaning sensation. As I release the pedal the aircraft stops yawing, but the nose has moved away from the feature. As I depress the right pedal, notice the nose moves along the horizon to the right, and we are no longer pointing at our feature. As I release the pedal the aircraft stops yawing, but the nose has again moved away from the feature. This motion is called yaw, and it is the primary effect of the rudder.'
Lesson Point 8:	'I would now like you to try the effect of rudder. You have control. Notice that the control forces for the rudder are much higher than for the elevator or ailerons.' **STUDENT PRACTICE.** (instructor must unobtrusively hold the ailerons during the student practice.)
Lesson Point 9:	Before progressing further, check the student feels ok and is happy to continue. Now we will demonstrate the secondary effects of control inputs. As there is no secondary effect of elevator (only speed change), we begin with aileron. Do not let the spiral descent develop too far as it may upset the student. Best to start with a small roll input: 'Notice we are in the normal attitude again, and I'm going to demonstrate the secondary effect of aileron. I want you to look outside and watch the aircraft attitude as it changes. As I roll the aircraft to the left and release the controls, notice that the nose starts to yaw to the left and is moving below the horizon. We are now entering a 'spiral descent to the left'. To recover, I roll the wings level with aileron, and raise the nose to the normal attitude using the elevator.' 'I would now like you to try the primary and secondary effects of the ailerons, but with right aileron this time. You have control.' **STUDENT PRACTICE.**
Lesson Point 10:	Now the rudder - 'Notice we are in the normal attitude again, and I'm going to demonstrate the secondary effect of rudder. I want you to look outside and watch the aircraft attitude as it changes. As I depress the left rudder pedal, notice that the nose first starts to yaw to the left, and then begins to roll to the left and is moving below the horizon. We are now entering a 'spiral descent to the left'. To recover, I roll the wings level with aileron, and raise the nose to the normal attitude using the elevator.' I would now like you to try the primary and secondary effects of the rudder, but with the right rudder pedal this time. You have control.' **STUDENT PRACTICE.** At this stage, the instructor should carry out a FREDA check with no attempt to teach it.

Lesson Point 11:	Next, we look at the effect of airspeed. 'Here we are, back in the normal attitude. I just want you to remind yourself of the feel of the controls at this, our normal cruising speed. Just have a little wiggle with the elevator, ailerons, and rudder. You have control.' **STUDENT PRACTICE FEELING CONTROLS.** 'I have control. Now I am going to leave the power where it is at 2300 rpm, but lower the nose to increase the airspeed.' Trim the aircraft into a stable descent about 20 kts or so above normal cruise speed. 'Now I want you to notice our new speed. Notice, also, that the engine rpm has increased. I now want you to make similar control inputs as before and notice any difference. You have control.' **STUDENT PRACTICE FEELING CONTROLS.** 'I have control.' Now I am going to leave the power where it is and now raise the nose to decrease the airspeed.' Trim the aircraft into a stable climb about 20 kts or so below normal cruise speed.
Lesson Point 12:	'Now I want you to notice our new speed. Notice, also, that the engine rpm has decreased. I want you to make similar control inputs as before and notice any difference. You have control.' **STUDENT PRACTICE FEELING CONTROLS.** 'I have control.' Return the aircraft to the normal attitude and trim. 'Notice, that at higher airspeeds, the controls are firm and responsive and only a small control movement is needed to get a big response. At lower airspeeds, the controls are loose and sloppy and a much larger control movement is needed to get the same response.
Lesson Point 13:	Next, we are going to look at the effect of slipstream. 'Here we are, back in the normal attitude.' Reduce power to idle and trim the aircraft into a glide at the normal glide speed. 'I now want you to make similar movements on all 3 controls and note the difference. You have control.' **STUDENT PRACTICE.**
Lesson Point 14:	Take control, apply full power, and trim the aircraft into a climb same speed. 'I now want you to make similar movements on all 3 controls and note the difference. You have control.' **STUDENT PRACTICE FEELING CONTROLS.** 'I have control. Notice that the control forces on the ailerons remained the same in both situations, but the rudder and elevator was firmer and more responsive with the presence of the slipstream.'
Lesson Point 15:	Next, we look at the effect of the amount of control deflection and the effect that that has on the aircraft. The effect is best seen with the ailerons, so we start here. 'Notice we are back in the normal attitude. Follow me through and look outside at the attitude of the aircraft as I apply a small aileron deflection to the left. Note the rate of roll. Now I'm going to return the aircraft to the normal attitude. I will now make a larger aileron deflection to the left. Follow me through. Note that the larger control deflection resulted in a much faster rate of roll of the aircraft.

Lesson Point 16:	‘I now want you to practice different sized aileron deflections and see their effect on the roll rate of the aircraft. You have control.’ **STUDENT PRACTICE.** ‘The same principle applies to all 3 controls.’ Practice if desired with elevator and rudder.
Lesson Point 17:	Next, we look at the effect of making control deflections in other than the normal attitude. The effect is best seen in a bank to the left - ‘Notice we are back in the normal attitude. I am now going to roll the aircraft to the left, so that we are banked. Notice we are no longer in the normal attitude. Follow me through and look outside at the attitude of the aircraft as I move the control column gently back. Note the nose of the aircraft rises in relation to the aircraft’s axis rather than the horizon. We are now still banked to the left, but with the nose above the horizon. If I move the control column forward, the aircraft remains in a bank, but the nose lowers relative to the aircraft axis.’ Return the aircraft to a left banked position. Trim.
Lesson Point 18:	‘I now want you to practice this. You have control.’ **STUDENT PRACTICE.**
Approach & Landing:	Carry out a normal approach and landing as you would expect a student to, pointing out things of interest along the way. Make sure you say your pre-landing checks out loud.
After Landing, Shutdown & Post-flight:	Carry out the relevant checks from the checklist. Show how to secure and/or chock the aircraft, including any tie-downs, aircraft covers and pitot covers. The student has already been shown how to complete the tech log, so observe them doing this.

Flight Prompt Card

Ex 4.1: Effects of Controls 1

1: Feeling OK? Teach Lookout.
2: DEMO how Stable the a/c is. Show Normal Attitude Fingers on coaming. DEMO what is NOT Norm Att. Ask.
3: Teach/FT Effect of Elevator. Move CC back, nose att up, airspeed decrease, alt incr. Move CC fwd etc. PITCH
4: STUDENT PRACTICE
5. Teach/FT Effect of Ailerons. Rotate CC L, L wing down, R wing up. Angle of Bank. Direction changing. Rotate CC R etc ROLL. 6: STUDENT PRACTICE to L & R.
7: Pick Ref Point Teach/FT Effect of Rudder. (*Hold wings level with aileron)*. YAW Sensation of Skid.
8: STUDENT PRACTICE to L & R (Hold wings level).
9: Teach 2º Effect of Aileron. L. ROLL-SLIP-YAW-PITCH DN-SPIRAL DESC. Recover. STUDENT PRACTICE
10: Teach 2º Effect of Rudder. L. YAW-SKID-ROLL-PITCH DN-SPIRAL DESC. Recover. STUDENT PRACTICE
11: Effect of airspeed @ constant 2300rpm. Pitch down to 115kts/TRIM. STUDENT Feels Controls.
12: Pitch up to 65 knots/TRIM. STUDENT Feels Controls.
13: Effect of slipstream at constant 65kts. Set 65 kt glide STUDENT Feels Controls. Then transition to:
14: Full power 65 kts climb STUDENT Feels Controls.
15: DEMO/FT Control input proportional to result.
16: STUDENT PRACTICE.
17: DEMO/FT Different Attitudes. Put ac in bank to L. Move CC back. See result relative to a/c axis not horizon. 18: STUDENT PRACTICE.

Debriefing

- This is a fairly long lesson for the student at this stage of training, so a short debrief consolidating the primary and secondary effects of controls, the effects of airspeed and slipstream.
- The take home message from this lesson is that the student must be able to SELECT and HOLD an attitude by looking outside at the horizon. He may not have heard the word 'attitude' before in this context, so it is important to make sure he understands what it is and how to set it.
- An important point, often glossed over, or omitted is that movements are relative to the pilot, not the horizon. This is obvious to the instructor, but may not be to the student at this stage.
- It is important to point out that the rudder pedal forces are much higher than in the other 2 axes.
- Remember, debriefing is a 2 way thing. Make sure you ask the student how they think things went. A facilitative debrief is far more effective than a one-sided list of faults.

New Basic Skills

- The new skill that the student learns in this lesson is: Recognising and reproducing an attitude – the Normal (Datum) attitude.

Common Student Faults

- At this stage, due to the use of PC flight simulators at home, many students tend to look inside rather than outside, so stress the need for lookout, and that more accurate flying is possible using the horizon. The work cycle **LOOKOUT – ATTITUDE – INSTRUMENTS** has not yet been introduced, so just direct their attention outside.

Common Instructor Faults

- Do not refer to 'straight and level' 'climbing', 'descending' or 'turning' at this stage as the student has not covered those lessons yet. Use 'normal attitude', 'altitude increasing/decreasing' or changing direction instead.
- It is tempting to rush ahead if the student is progressing well, but try to stick with the programme and give plenty of practice.
- During the demonstration and practice of the effect of rudder, make sure you surreptitiously hold the aircraft level in roll with ailerons to prevent the unwanted roll developing. At this stage we only want to observe the **primary** effects of controls.
- Make sure you refer to the left rudder pedal and the right rudder pedal, rather than left rudder and right rudder. The training aircraft only has one rudder and you may confuse the student into thinking there are 2.

Ex 4.2 - Effects of Controls 2

Exercise 4 is divided into 2 lessons and should not be combined as it is essential the students grasps this lesson before carrying on. There is a huge amount of critical work in this lesson. Any attempt to rush these lessons tends to result in problems later on.

Practical Considerations

- A good horizon is essential for this lesson.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- Note that some aircraft will behave differently in terms of pitch when flaps are extended or retracted. Get to know what the pitch changes on your aircraft are, or just refer to 'pitch change' rather than pitch up or down, if talking in general terms.
- This lesson is about maintaining an attitude – the normal attitude. The next lesson is about maintaining an altitude. Note the subtle difference.

Long Briefing

It is important to give a full and thorough long brief for this exercise to ensure complete understanding from the student.

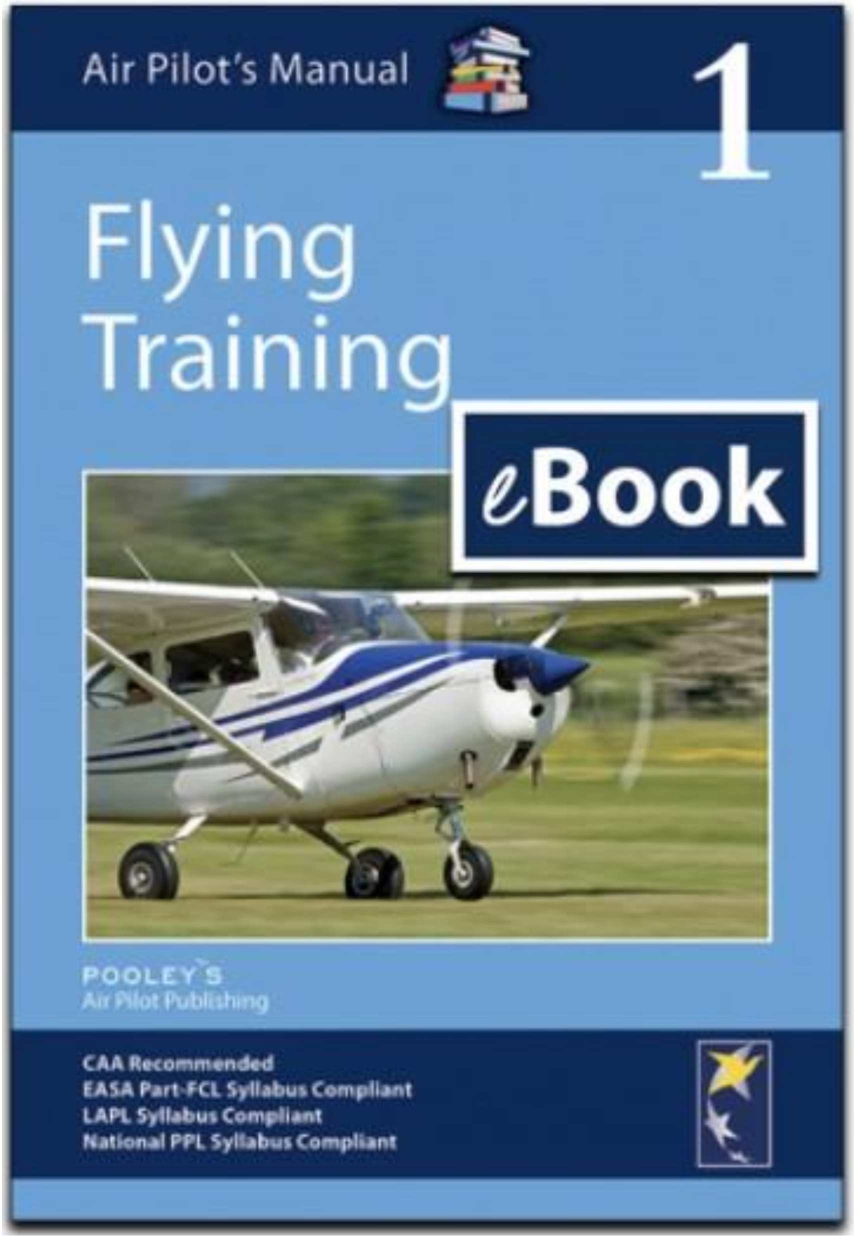
From EASA Part-FCL:

Long briefing objectives:

(1) effect of power;
(2) effect of trimming controls;
(3) effect of flaps;
(4) operation of mixture control;
(10)operation of carburettor heat control;
(11) operation of cabin heat or ventilation systems;

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 4e

The Effects of Power Changes

Aim

To observe the effects of applying and removing power, then to counteract any undesirable tendencies resulting from power changes.

Considerations

Throttle movements to increase and decrease power should be smooth and not too fast.

Pushing the throttle in (or 'opening' it) increases power, which is indicated by increased rpm on the tachometer. This causes the propeller to rotate faster and generate increased thrust. Pulling the throttle out (or 'closing it') reduces power.

Reducing Power

Reducing power causes a pitch-down tendency.

Most aeroplanes are designed so that, if power from the engine is lost, the aeroplane will 'automatically' assume the glide attitude without action being taken by the pilot. This is a safety feature designed into the aeroplane to ensure that flying speed is maintained in case of engine failure.

In normal flight, when power is reduced with the throttle, the tendency for the nose to pitch down still occurs but can be counteracted with back pressure on the control column.

Adding Power

Increasing power causes a pitch-up tendency.

When adding power, the reverse effect occurs; the nose will tend to pitch up. This can be counteracted with forward pressure on the control column.

Yawing

Changing power also causes a yawing tendency.

Adding power increases the slipstream effect on the tail of the aeroplane, causing the nose to yaw to the left (for propellers rotating clockwise when viewed from the cockpit). This yawing tendency can be counteracted with right rudder pressure to keep the aeroplane balanced (i.e. balance ball centred).

Conversely, reducing power reduces the slipstream effect on the tail, causing a yawing tendency in the other direction, which can also be counteracted with opposite rudder.

Some aircraft are fitted with rudder trim, which is used to trim off any steady pressure on the rudder pedals, e.g. on the climb.

Board Briefing

07 Jan 22

Ex 4.2 - Effects of Controls 2

AIM: To learn the effects of some of the other controls in flight.

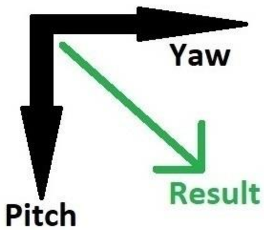
T&E: Other a/c, Engine problems, Overstressing or damaging flaps.

M: Lookout, Ts & Ps, V_{fe}.

Airex: **1: Revision:** Internal & External Checks. Starting the Engine. Taxiing. Power Checks

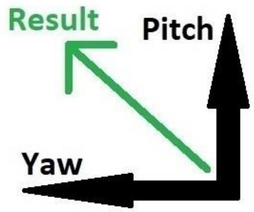
2: Effect of Throttle

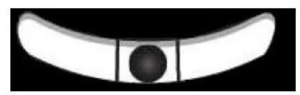
Reduce Power 1500 rpm	Control to Prevent
Nose Pitches Down	Control Column Back Pressure
Aircraft Yaws Right	Left Rudder



Altitude decreases
Airspeed increases

Increase Power Full Power	Control to Prevent
Nose Pitches Up	Control Column Forward Pressure
Aircaft Yaws Left	Right Rudder





Altitude Increases
Airspeed Decreases

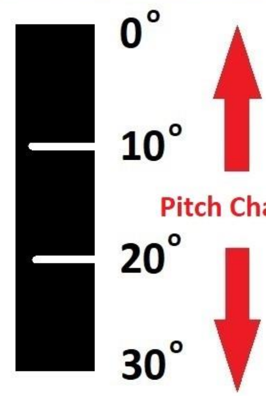
3: Trimming

Nose rising - Trim Forward

Nose falling - Trim Back

SELECT - HOLD - TRIM

4: Effect of Flap



Retract in Stages!

Pitch Change

Control to Prevent

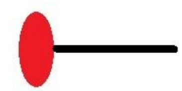
Check V_{fe} Before Extending

LIMITATION - OPERATION - INDICATION

V_{fe} Lever Gauge

5: Mixture Control

- -Pull out to Lean Mixture
- -Pull Out to Stop Engine
- -Push In to richen Mixture
- -FULL RICH for Take-Off + Landing



6: Carb Heat

Pull for ON ON or OFF only - no partial

ON when rpm below Green Arc

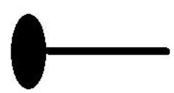
ON for 10 secs for Engine Management

7: Cabin Air + Heat

If using Cabin Heat:

- Make sure Cabin Air is ON

8: Throttle



- Make smooth changes
- Throttle has 'Dead Band'
- RPM Can be set by sound + feel

Skeleton Board Briefing

Ex 4.2 - Effects of Controls 2

07 Jan 22

AIM: To learn the effects of some of the other controls in flight.
T&E:
M:

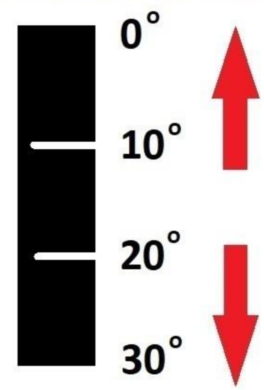
Airex: **1: Revision:** Internal & External Checks. Starting the Engine. Taxiing. Power Checks

2: Effect of Throttle

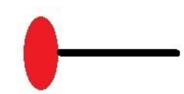
Reduce Power

Increase Power

4: Effect of Flap



5: Mixture Control



3: Trimming

6: Carb Heat

8: Throttle

7: Cabin Air + Heat

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	As previous exercise, student should be more familiar with getting in and settling down. The student should run the checklists, start the engine and carry out the power checks under supervision.
Take-Off:	As before, carry out the take-off while the student observes. Verbalise from the checklist and make all radio calls as you would expect a student to.
Lesson Point 1:	Remind the student to lookout and to point out any traffic for the remainder of the flight. Ask the student to set the **normal attitude** as revision.
Lesson Point 2:	First, look at the effect of power reduction. Set the aircraft up in cruise at 2300 rpm (or a suitable cruise power setting) at a convenient altitude and in trim. Make sure there is a good horizon in front. 'Here we are at 2000' at 2300 rpm with the aircraft pointing towards a feature in the distance. If I let go of the controls, the aircraft remains stable. I am now going to reduce power to 1500 rpm and keep my hands off the controls and see what happens. I want you to look outside towards the horizon. Because 1500 rpm is below the green arc, I will apply Carb Heat before reducing power. Notice, as I reduce power, the aircraft nose drops down below the horizon and the nose yaws slightly to the right of our feature.'
Lesson Point 3:	Return the aircraft to the normal attitude at 2300 rpm. Now the student takes control and must prevent these effects. 'When I give you control, I am going to reduce the power again to 1500 rpm. I want you to prevent the nose drop with elevator, and prevent the yaw with rudder, to keep the aircraft in the normal attitude. Do you understand? You have control.' **STUDENT PRACTICE.** 'I have control. Notice you had to **progressively adjust the attitude** as the aircraft slowed down in order to maintain the altitude.'
Lesson Point 4:	Return the aircraft to the normal attitude at 2300 rpm. Now the student takes control performs the power reduction and the prevention of unwanted effects. 'When I give you control, I want you to reduce the power to 1500 rpm and prevent the nose drop and the yaw, to keep the aircraft in the normal attitude. You have control.' **STUDENT PRACTICE.** Make sure the students remembers the Carb Heat, but do not coach as they are flying.

Lesson Point 5:	Next, look at the effect of power increase. Set the aircraft up in cruise at 2300 rpm at a convenient altitude and in trim. 'Here we are at 2000' at 2300 rpm with the aircraft heading towards a feature as before. Now, I am now going to increase power to full and keep my hands off the controls and see what happens. I want you to look outside towards the horizon. Notice, as I increase power, the aircraft nose pitches up above the horizon and the nose yaws slightly to the left of our feature.' Return the aircraft to the normal attitude at 2300 rpm. Now the student takes control and must prevent these effects. 'When I give you control, I am going to increase the power to full. I want you to prevent the nose from pitching up, and to prevent the yaw, to keep the aircraft in the normal attitude. You have control.' **STUDENT PRACTICE.** 'Notice you had to **progressively adjust the attitude** as the aircraft accelerated in order to maintain the altitude.' Return the aircraft to the normal attitude at 2300 rpm. Now student takes control performs the power increase and the prevention of unwanted effects. 'When I give you control, I want you to increase the power to full, and prevent the pitch and the yaw, to keep the aircraft in the normal attitude. You have control.' **STUDENT PRACTICE.** Then suggest the student increase and decrease the power several times whilst maintaining the normal attitude. The instructor should now carry out a FREDA check with no attempt to teach it at this stage.
Lesson Point 6:	Now, introduce the elevator trim. Place the aircraft in the normal attitude with the trim wound slightly away from neutral towards nose up (not nose down initially as this can startle the student). Hold the control forces with the elevator. 'Notice the aircraft is in the normal attitude, but the aircraft is not in balance. When I give you control, you will have to make an input on the elevator in order to remain in the normal attitude. I want you to apply elevator pressure either up or down as required to keep the aircraft in the normal attitude. Are you ready? You have control.' **STUDENT PRACTICE.** Once the student manages to hold the normal attitude ask whether they are having to apply forward or rearward pressure. Obviously, they should be applying forward pressure. 'It would be unpleasant to have to hold this control pressure for a long flight, so I am going to show you how to remove the pressure and put the aircraft in balance.' Guide their right hand to the trim wheel. 'Looking out of the window and keeping the aircraft in the normal attitude, wind the trim wheel forward and you will start to feel the control force required reducing. Eventually you will reach a point where there is much less elevator force required, and the aircraft is in balance. Remember: **SELECT** the aircraft attitude with the elevator, **HOLD** the attitude, then remove the control pressure with the **TRIM** wheel. Always looking out. Now to check, just release your hands briefly from the controls and see if the aircraft remains in the correct attitude. If it does, then it is properly trimmed. If not, you can apply a little more trim and release again. After a couple of adjustments, the aircraft will be 'in trim'. Point out that the sense of the trim wheel is natural i.e. holding the control column forward – wind the trim wheel forward. Repeat **SELECT – HOLD – TRIM** each time to cement it.

Lesson Point 7:	Now repeat the effect of power exercise with them, asking them to trim the aircraft each time you (or they) change the power setting – always directing them to look outside and maintain the normal attitude. **STUDENT PRACTICE.**
Lesson Point 8:	Next, look at the effect of flap. Set the aircraft up at a convenient altitude in the normal attitude. Set 2000 rpm (or suitable power setting) to allow flap to be selected without exceeding Vfe. 'Here we are at 2000' at 2000 rpm at 80 knots, with the aircraft in trim as before. Now, I am now going to select the first stage of flap and keep my hands off the controls and see what happens. Before selecting flap, we must always make sure the speed is within the white arc (below Vfe). **LIMITATION - OPERATION - INDICATION**. I want you to look outside towards the horizon. Notice, as I select the flap, there is a pitch change. I will reset the normal attitude and we notice that the airspeed has reduced. Now I am going to select the next stage of flap. **LIMITATION - OPERATION – INDICATION.** Notice, again, there is a pitch change. I will reset the normal attitude and notice the airspeed has reduced further. Now I am going to select the final stage of flap. **LIMITATION - OPERATION – INDICATION.** Notice, the pitch change. I will reset the normal attitude and notice the airspeed has reduced yet again.'
Lesson Point 9:	Once flying straight and level with full flap extended and in trim, demonstrate the effect of retracting flap in stages. 'Now, I am now going to retract the flap in stages and keep my hands off the controls and see what happens. I want you to look outside towards the horizon. **LIMITATION - OPERATION – INDICATION.** Notice, as I retract the flap, there is a pitch change. I will reset the normal attitude and notice the airspeed has increased. As I retract the next stage of flap, there is a further pitch change. After resetting the normal attitude, we see that the speed has increased again. As I retract the final stage of flap, there is a further pitch change. After resetting the normal attitude, we see that the speed has increased again.'
Lesson Point 10:	Now the student takes control clean and in the normal attitude. The instructor selects flap in stages, each time, the student prevents the pitch. He should also trim the aircraft to the normal attitude. Then, the instructor retracts the flap in stages, again the student prevents the pitch changes and trims. 'Now, I am going to give you control ask you to maintain the normal attitude while I lower and raise the flaps. Each time I make a selection, you will need to prevent the unwanted effects. I also want you to make sure the aircraft is trimmed. You have control.' **STUDENT PRACTICE.**
Lesson Point 11:	Now the student takes control - clean and in the normal attitude. The student extends and retracts the flap in stages, each time, preventing the pitch changes and trimming. 'I have control. Now I want you to make the flap selections, extending the flaps one stage at a time, then retracting them, one stage at a time, all the time maintaining the normal attitude and trimming. You have control.' **STUDENT PRACTICE.**

Lesson Point 12:	Now a demonstration only of retracting the flap all in one go. Ask the student to set the aircraft up with full flap. Take control. 'Now, I am now going to show you what happens if we retract all of the flap in one go, rather than in stages as we have been doing up until now. Notice, as I move the lever all the way up, there is a large and sudden pitch change, and you can feel a lot of sink. This is undesirable as it leads to a larger loss of altitude. That is why we always retract the flap in stages in the air.
Lesson Point 13:	Now we look at the mixture control (if fitted). 'This red knob here is the mixture control. It controls the ratio of fuel to air entering the carburettor. At the moment, it is fully forward. We call this position RICH. In this position, the engine is getting the maximum amount of fuel possible. We use this position for engine start, taxying, take-of and climb when the aircraft needs a lot of fuel. In the cruise at higher altitude, the air is thinner, so the engine does not need quite so much fuel. We can make the engine run more efficiently and save fuel by reducing the ratio of fuel. We call this process – leaning the mixture. If I pull the knob all the way out, then that cuts of all fuel to the engine and it will stop. We obviously don't want that. Watch, now as I slowly adjust the mixture. Initially you can see a small increase in the rpm, and now a drop and the engine starts to run roughly. It isn't getting enough fuel to run properly. Now I just richen the mixture a little and it is correctly leaned for this altitude. I must remember to return it to full rich before landing. Now I will return it to rich. I want you to have a go at leaning it. You have control.' **STUDENT PRACTICE.** 'We must remember to set the mixture back to rich for landing.'
Lesson Point 14:	Now we look at the carb heat control. 'This knob here is the carburettor heat control. It supplies hot air to the engine carburettor to melt any ice that may form when the engine rpm is low. At the moment, in the cruise, it is off or cold. Whenever we reduce the engine rpm below this green arc on the tachometer, we need to have the carb heat ON to prevent ice from building up. It is important to switch it on before reducing power below the green arc. As I pull the knob all the way out, hot air enters the carburettor and we see a small drop in the engine rpm. We keep the carb heat on all the time the engine rpm is below the green arc. We also use the carb heat during the cruise periodically to melt any ice that may have formed. I pull the know out for 10 secs and then return it to OFF. I want you to have a go at using the carb heat. You have control.' **STUDENT PRACTICE – INSTRUCTOR FLIES WHILE STUDENT USES CARB HEAT.**
Lesson Point 15:	Now we look at the cabin air and heat controls. 'This knob here is the cabin air control. It allows air from outside to enter the cabin for ventilation. This is the cabin heat control and allows warm air in for heating. Because the air is warmed by the engine, always make sure that if using the cabin heat, that the cabin air is also on to provide plenty of ventilation. I want you to have a go at using the carb heat. You have control.' **STUDENT PRACTICE– INSTRUCTOR FLIES WHILE STUDENT USES CABIN AIR & HEAT.**
Approach & Landing:	Ask the student if he can direct you back to the airfield. Carry out a normal approach and landing as you would expect a student to, pointing out things of interest along the way, such as making sure the mixture is rich for landing.
After Landing, Shutdown & Post-flight:	Carry out the relevant checks from the checklist. When you come to retract the flap, point out that it is acceptable to retract it all in one go as we are no longer flying. Observe the student securing and/or chocking the aircraft, including attaching any tie-downs and covers. The student has already been shown how to complete the tech log, so observe them doing this.

Flight Prompt Card

Ex 4.2: Effects of Controls 2

1: REVISION: Lookout. Request Normal Attitude
2: POWER: DEMO (hands free) effect of decrease to 1500 rpm on yaw & pitch. 3: Student takes control and prevents these effects. 4: Student does whole thing.
5: Repeat for power increase to full.
6: Trim. Put a/c in normal att with nose up trim. Student to maintain norm att. Trim works in normal sense. FT how to trim. SELECT-HOLD-TRIM. Repeat nose DN trim. STUDENT PRACTICE.
7: Repeat power Ex2 trimming to norm att each time.
8: FLAP: 2000rpm, Vfe LOI, Teach effect of lowering flap (hands free) to 1 – Pitch Change. Reset Normal Att. NOTE SPEED. Flap to 2 LOI - same effect. Then Flap 3. NOTE SPEED. 9: Teach effects of retracting flap IN STAGES. NOTE SPEEDS.
10: Repeat with student preventing pitch and trimming. Extend & Retract.
11: Student does whole thing inc flap selections & trim.
12: DEMO only effect of retracting all the flap in one go. WARNING!
13: MIXTURE: Teach leaning. STUDENT PRACTICE.
14: CARB HEAT: Teach when & how.
STUDENT PRACTICE
15: CABIN AIR/HEAT: Teach. If using heat, use fresh air also.

Debriefing

- This is a long lesson for the student at this stage of training, so a short debrief will help consolidate the lesson material. Stress '**Progressively adjust attitude**' as it is important in the climbing and descending lessons too.
- This is the time to introduce the concept of **LIMITATION - OPERATION - INDICATION** when changing configuration changes. Make sure they always verbalise a check of the speed when selecting flap, and the habit will stick with them.
- The point of this exercise is keeping the aircraft in the Normal Attitude while things are changing. It doesn't matter if the aircraft ends up in a shallow climb or descent, as long as the picture outside looks like the normal attitude, In the next lesson, the emphasis is on maintaining altitude (S&L).
- Point out that in the next lesson, there will be much more practice in trimming, and that from now on, whenever in flight, the aircraft should be trimmed. If in any doubt, the instructor should take control and assess whether the aircraft is correctly trimmed. If the training aircraft has more than one trim – say rudder trim as well as elevator trim, he should be taught to use them both, trimming in order of severity – worst first.
- Trimming is near impossible if the student is holding the controls in a vice-like grip. Encourage them to hold the controls lightly – show them how to fly using 2 fingers alone.

New Basic Skills

- The new basic skill that the student learns in this lesson is: **LIMITATION - OPERATION - INDICATION**.

Common Student Faults

- Using the trim wheel to alter the aircraft attitude. Stress **SELECT – HOLD – TRIM**.
- At this stage, many students tend to look inside rather than out, so stress the need for lookout, and that more accurate flying is possible using the horizon. The work cycle **LOOKOUT - ATTITUDE - INSTRUMENTS** has **NOT** yet been introduced, so direct their attention outside.
- When using the carb heat, many students reduce power first, then turn on the carb heat. If the carb heat is selected ON first, it gives a blast of hot air into the carburettor which will be much more effective at melting the ice.

Common Instructor Faults

- Do not refer to 'straight and level' 'climbing', 'descending' or 'turning' at this stage as the student has not covered those lessons yet. Use 'normal attitude', 'altitude increasing/decreasing' or changing direction instead.
- During trimming, many instructors teach students to hold the attitude, then trim off and pressure. This sounds reasonable, but next time you as an instructor trim an aircraft out, take time to analyse what you really do – you hold the attitude, trim in the correct direction, and then half release the controls to check for any residual pressure, then repeat until properly timed. Do not teach a student a different method that is harder or impossible to achieve.
- Remember, there is nothing to show the instructor whether the student is flying in trim or not. If they are not properly trimmed, you may notice by inaccurate flying. If in doubt, take control and assess.

Ex 5 – Taxiing the Aeroplane

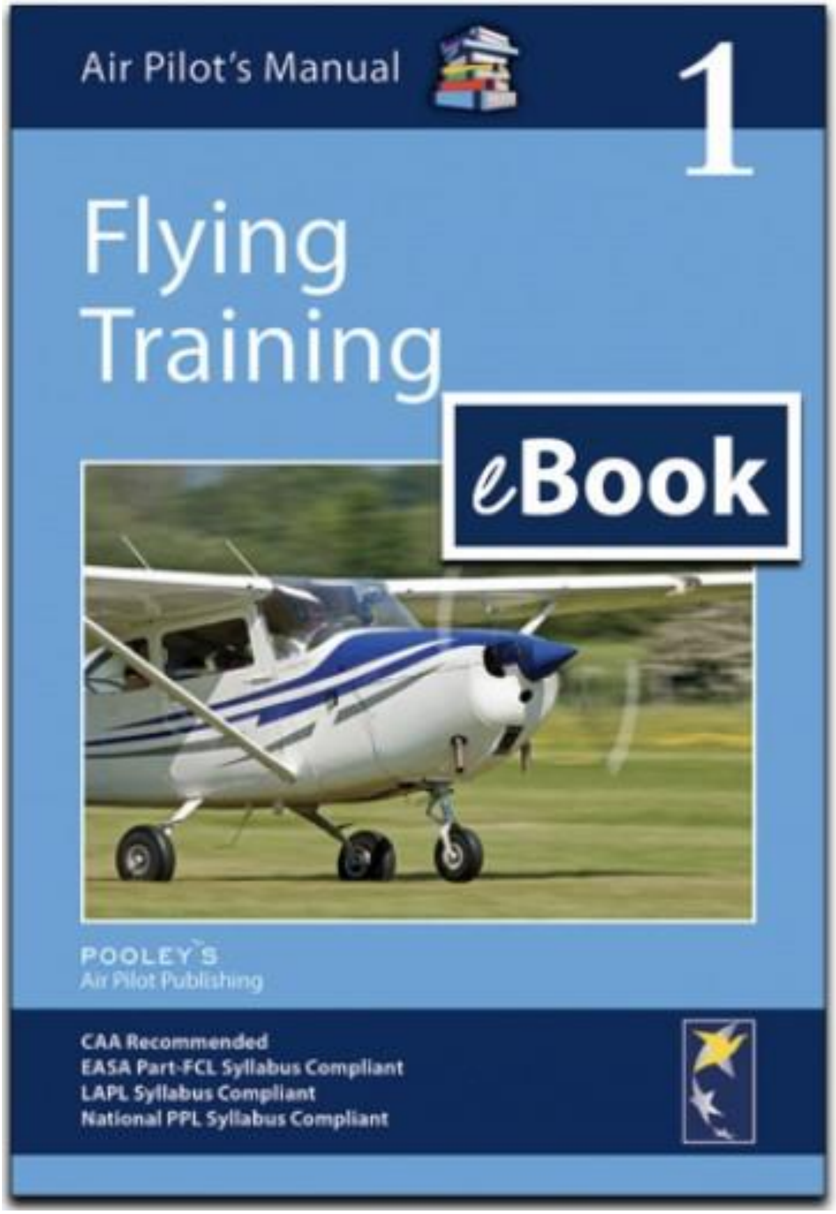
Long Briefing

From EASA Part-FCL:

Long briefing objectives:
(1) pre-taxiing checks;
(2) starting, control of speed and stopping;
(3) engine handling;
(4) control of direction and turning (including manoeuvring in confined spaces);
(5) parking area procedures and precautions;
(6) effect of wind and use of flying controls;
(7) effect of ground surface;
(8) freedom of Rudder movement;
(9) marshalling signals;
(10) instrument checks;
(11) ATC procedures;
(12) emergencies: steering failure and brake failure.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 5

Taxiing an Aeroplane

Aim

To manoeuvre the aeroplane safely on the ground.

Considerations

Taxiing Speed

Use power and brakes to control taxiing speed.

Power is used to commence taxiing an aeroplane. The effects of wheel friction and the brakes are used to stop it.

Like all objects, an aeroplane has inertia and is resistant to change, so it requires more power to start moving than to keep moving. Once the aeroplane is rolling at taxiing speed, the power can be reduced simply to balance the frictional forces and any air resistance so that a steady speed is maintained. On a straight and smooth taxiway with no obstructions, a **fast walking pace** is a safe taxiing speed and this can be judged by looking ahead and to the left of the aeroplane. In a confined area, the ideal speed is somewhat less.

The amount of power required to maintain taxiing speed depends on the ground surface and its slope – a rough, upward-sloping grassy surface requiring much more power than a flat, sealed taxiway. High power may also be required to turn the aeroplane, especially at low speeds.

Brakes should be used gently.

To slow the aeroplane down, the power should be reduced. Friction may cause the aeroplane to decelerate sufficiently, otherwise the brakes can be used gently, but firmly.

Do not use power against brakes.

Generally speaking, power should not be used against brakes. It is a waste of energy and can lead to overheated brakes and increased brake wear. There are some aircraft, however, which have engines requiring a high idling rpm, and occasional braking may be required to avoid the taxiing speed becoming excessive.

Toe brakes are situated on top of each rudder pedal. They are individually applied using the ball of each foot. Normally, taxi with your heels on the floor and the balls of your feet on the rudder pedals, thereby avoiding inadvertent application of the toe brakes. When braking is needed, slide your feet up and, with the ball of each foot, apply the toe brakes as required. To brake the aeroplane while taxiing in a straight line, the toe brakes should be applied evenly.

Board Briefing

Usually not necessary for this lesson.

Taxi Problems

This humorous video shows the importance of a good lookout (internet connection required)

Ground Exercise

Unlikely to be a separate lesson, but can be included in other lessons from the start.

From the start introduce the procedure for moving off: Clear both sides, clear ahead, close throttle, release brakes, add a little power, move forward, test brakes. Offer the instructor an opportunity to test their brakes once clear of obstacles.

From fairly early on, introduce the taxy checks e.g.: Turning left, compass decreasing, DI decreasing, aircraft left (TC), ball right, horizon steady/erect. Do not allow the student to carry these checks out on a straight taxiway by weaving from left to right. It looks unprofessional and in the future may cause passengers to query ability. Instead, before taxi, encourage students to consider the taxi route and build the checks into natural turns.

From EASA Part-FCL:

Air exercise

(1) pre-taxing checks;
(2) starting, control of speed and stopping;
(3) control of direction and turning;
(4) turning in confined spaces;
(5) leaving the parking area;
(6) freedom of rudder movement (importance of pilot ability to use full rudder travel);
(7) instrument checks;
(8) emergencies (brake or steering failure);
(9) pre take-off procedures:
 (i) use of checklist;
 (ii) engine power and system checks;
 (iii) pre take-off checks;
 (iv) instructor’s briefing if emergencies during take-off.

Lesson Prompt Card

Ex 5: Taxiing the Aeroplane

1: Visually show pedals and brake locations.
2: DEMO brake check after starting to taxi.
3: STUDENT PRACTICE.
4: DEMO taxi in straight line at normal speed and stop. Show position of taxiway centreline.
5: STUDENT PRACTICE.
6. DEMO turn L & R using nosewheel steering if fitted.
7: STUDENT PRACTICE.
8: DEMO turn L & R using differential braking/power.
9: STUDENT PRACTICE.
10: DEMO Instrument Taxi Checks.
11: STUDENT PRACTICE.
12: DEMO EMERGENCY STOP.
13: STUDENT PRACTICE.

Debriefing

- Usually not necessary for this lesson.

New Skills

- There are no further basic skills introduced during this exercise.

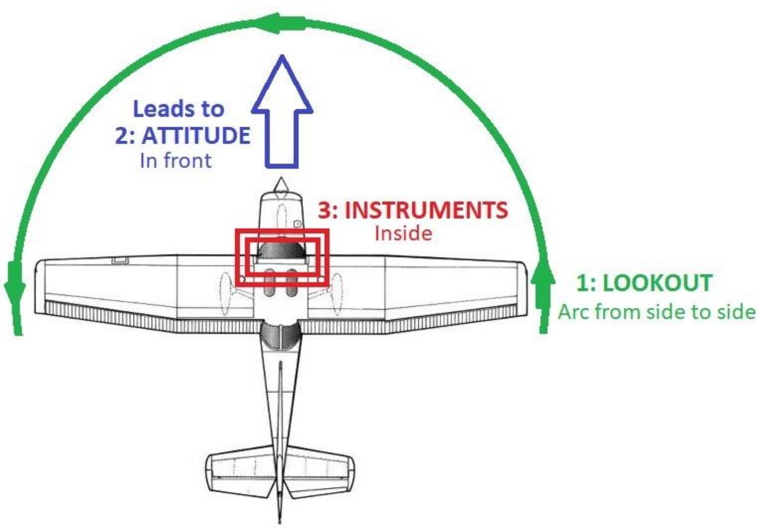
Common Student Faults

- Positioning of the feet can cause problems, and many students struggle to find the brakes. Be aware that some aircraft have steerable nosewheels whilst others are turned by differential braking.
- Many students initially struggle with controlling the aircraft during taxy. These problems often vanish naturally with practice.
- Most students will taxy well to the left of the taxiway centreline, thinking the aircraft is bigger than it is. Ask them to taxy with the centre-line between their right leg and your left leg. Ask them to tell you when they think they are on the centreline. Don't let students become lazy over taxiway positioning as this will be harder to correct later.
- With a low wing aircraft, where the wheels are not visible to the student, they may cut corners, leaving the paved surface. Point out to them that the wheel is not underneath them, but further out, under the wing, so centreline tracking is very important.

Ex 6.1 - Straight and Level 1

Practical Considerations

- A good horizon is essential for this lesson, as is a long straight track, to avoid having to make frequent turns. Plan in advance where you will go. Do not forget to turn around halfway through, or a long transit back to base will result.
- The crux of this lesson is not to teach the student just how to select Straight & level flight, but rather how to **MAINTAIN** it. Make sure the student has plenty of practice doing just that. Ensure they can maintain S&L whilst doing a FREDA check by returning to the work cycle after each letter of FREDA.
- There is much debate whether to teach this as Straight & Level, or Level & Straight. That is, which order to tackle the 2 topics. The argument for Straight and Level is that that is how a pilot recovers from a non-Straight & Level attitude – Roll, then Pitch. The argument for the reverse is that it is easier for the student to grasp pitch attitude than roll. For this reason, Straight & Level is used here. Straight, then Level, then both together.
- A good way of simulating the aircraft slightly above or below the desired altitude is to change the altimeter sub-scale by 1 or 2 hPa either way and then ask the student to regain the altitude. Make sure you don't lose track of what the Altimeter Setting should be – Write it down! A similar trick can be done by adjusting the Direction Indicator 10-20 degrees either way.
- If you want to show a pitch attitude that is too high, a good idea is to lower the nose first to increase the airspeed, then pitch up above S&L. This way the speed is still correct, just the attitude is different. Similarly for too low a pitch attitude, pitch up first.
- To simulate the aircraft out of balance, hold some rudder pedal in and apply opposite bank to maintain constant direction.



- This lesson introduces **LOOKOUT – ATTITUDE – INSTRUMENTS**. One way to help the student visualise it is as follows:

  The cycle starts at one wingtip with a **LOOKOUT**, which then sweeps forward in and arc to the front and then to the other wingtip. It then arcs back to the front where the student can assess the **ATTITUDE**. He then glances down at the relevant **INSTRUMENTS**. Then repeat.

- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

Long Briefing

A thorough briefing is needed for this lesson to ensure full understanding of the underlying principles.

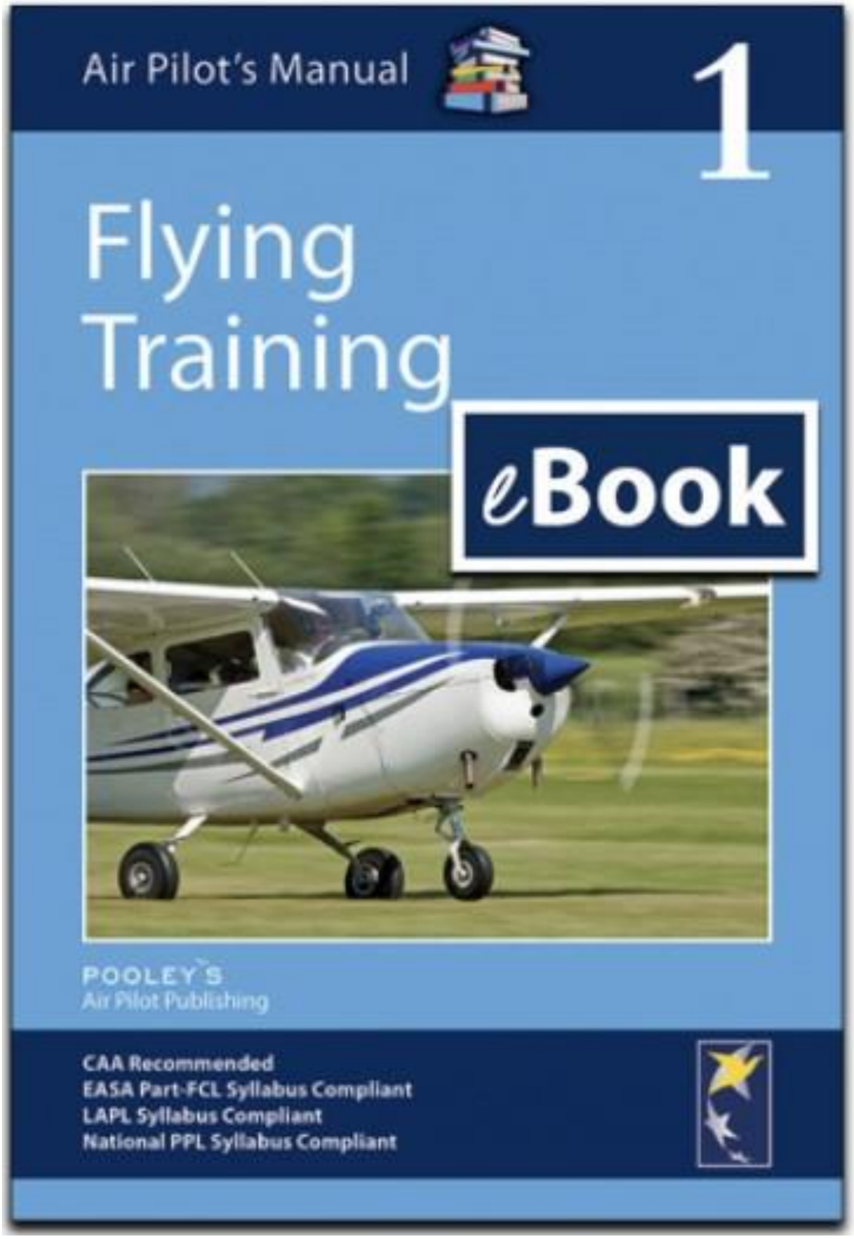
From EASA Part-FCL:

Long briefing objectives:

(1) the forces;
(2) longitudinal stability and control in pitch;
(3) relationship of CG to control in pitch;
(4) lateral and directional stability (control of lateral level and balance);
(5) attitude and balance control;
(6) trimming;
(7) power settings and air speeds;
(8) drag and power curves;
(9) range and endurance.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 6a

Flying Straight and Level in Balance at Constant Power

Aim

To fly straight and level in balance using a constant power setting.

Considerations

Flying **straight** means maintaining a **constant heading,** and this can be achieved by holding the wings level with the ailerons, and preventing any yaw with rudder.

Flying **level** means maintaining a **constant altitude,** which can be achieved by having the correct **power** set and the nose held in the correct **attitude.** Altitude is displayed in the cockpit on the altimeter.

Balanced flight means that the balance ball is maintained in the central position with rudder pressure.

Steady, straight and level **balanced** flight, coordinated and in trim, is desirable for both comfort and good aeroplane performance. Accurate straight and level balanced flying is one sign of a good pilot.

Figure 6a-1
The four main forces in steady, straight and level flight

The Forces that Act on an Aeroplane

There are four main forces that act on an aeroplane in flight:

- weight;
- **lift** generated by the wings;
- **thrust** from the propeller (using engine power); and
- **drag** (or resistance to motion of the aeroplane through the air).

In steady, straight and level flight, the aeroplane is in equilibrium with no tendency to accelerate:

- **lift opposes weight;** and
- thrust opposes drag.

It is unusual for the four main forces to counteract each other exactly. Almost always, a balancing force, either up or down, is required from the tailplane and elevator. Most aeroplanes are designed so that the tailplane creates a downward aerodynamic force. This balancing force is controlled by the pilot with the elevator. In normal flight, continual small adjustments of the elevator with the control column are required.

Aeroplanes are usually designed so that if **thrust is lost** through the engine failing (or the pilot reducing power), the remaining forces will automatically lower the nose into the gliding attitude,

Board Briefing

Ex 6.1: Straight & Level 1

16Jan22

AIM: To learn to flty the aircraft in a constant direction (straight), at a constant altitude (level), at a constant power setting and in balance.
T&E: Other a/c, Unsure of position, Engine overheat, Mis-set altimeter, Mis-aligned DI, Infringement.
M: Lookout, Anchor Point, Chart study, FREDA Cx.

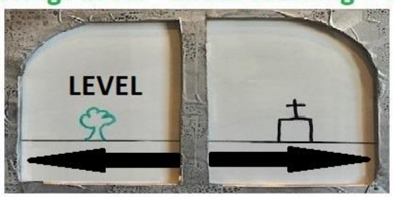
AIREX: 1: REVISION: Start-up, Taxi, Power Checks

Cruise Power = 2300 rpm

2: Straight

2 Requirements

1• Wings Level - Check coaming + wingtips



2• No Yaw present
Check ball + DI

Select

Ailerons:
- Choose feature or heading
- Check DI

Rudder:
- Prevent Yaw

Maintain

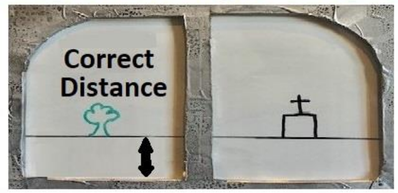
Ailerons:
- Keep wingtips equidistant from horizon
- Regain Ref Pt or heading

Rudder
- Prevent Yaw

3: Level

2 Requirements

1• Attitude for Level flight - check coaming



2• Aircraft in Trim

Select

Elevator:
- Set correct nose att - Fingers
- Check Altimeter + VSI

Trim:
- Trim for Attitude

SELECT - HOLD - TRIM

Maintain

Deviation <100'
- Adjust by 1 finger's width

Deviation >100'

P: Power: +/- 100 rpm
A: Attitude Adjust
T: Trim If needed

4: In Balance

• Use the Balance Ball

In Balance

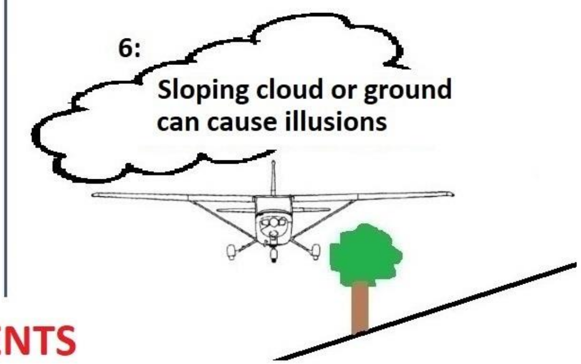
Out of Balance - Use Right Pedal

STEP ON THE BALL
Level the wings with aileron

5: Cruise Checks

Every 15 mins in cruise

F: FUEL -	Sufficient + Balanced
R: RADIOS -	Tuned as Required
E: ENGINE -	Ts + Ps, Carb Heat
D: DI -	Synchronised with Compass
A: ALTIMETER -	Set as Required



LOOKOUT - ATTITUDE - INSTRUMENTS

Skeleton Board Briefing

Ex 6.1: Straight & Level 1

16Jan22

AIM: To learn to flty the aircraft in a constant direction (straight), at a constant altitude (level), at a constant power setting and in balance.
T&E:
M:

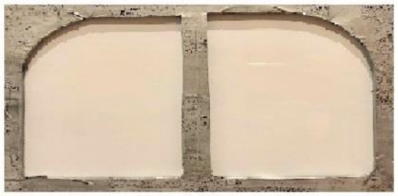
AIREX: 1: REVISION:

Cruise Power =

2: Straight

2 Requirements

1•



2•

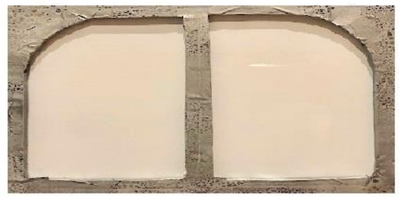
Select

Maintain

3: Level

2 Requirements

1•

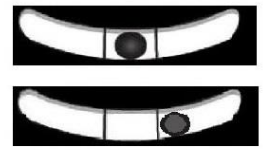


2•

Select

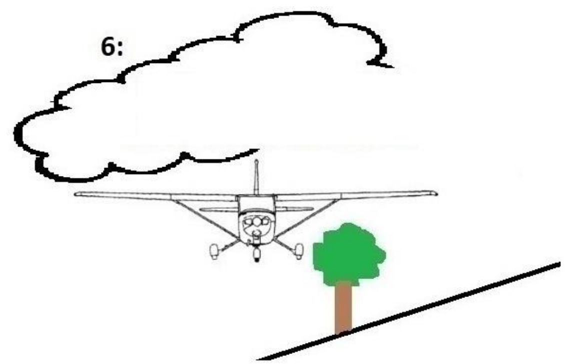
Maintain

4: In Balance



5: Cruise Checks

6:



Pre-Flight Briefing

Make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

The following is suggested speech for the board briefing above to 2 students, A & B:

'Good morning, today we are going to do exercise 6 Part 1, Straight & Level 1. There are 2 parts to this exercise – the first part we are going to look at today is flying straight and level. The second part which we will do tomorrow involves power and flap changes.'
'So the aim today is written on the board – To learn to fly the aircraft in a constant direction, at a constant altitude, and in balance.'
As usual we are going to discuss some threat and error management before we go into the main briefing. Looking out of the window here, I can see lots of aeroplanes taxying towards the runway. What may be a big threat once we get airborne? Student A?'
'Other aeroplanes being in our way'
'Yes, other aeroplanes are also going to be in the local area too. How are we going to manage to keep clear of them, Student B?'
'Good lookout.'
'Yes, so if either of us see an aeroplane today, we will point it out to the other person, as we learned in a previous lesson. Remember, when we are climbing, it is hard to see other aircraft in front of us.
'We will be departing the vicinity of the airfield today and flying in places that may be unfamiliar to us. What possible error could we make there, Student A?'
'We could get lost.'
'Yes, so how can we manage not to do that, Student B?'
'By using an anchor point, and chart and doing some pre-flight planning.'
'Absolutely. We can decide before the flight, that if we stay south of Newbury at 3000' and in sight of Newbury, we will always know how to get back to the airfield.'
'We will be departing the airfield today with enough fuel for the flight we need to do today. But what threat is there regarding the fuel, Student B?'
'We could run out of fuel.'
'Yes. We will learn some checks today, called FREDA checks, that will help us manage that threat. More about that in a moment.'
'That will be enough for us to consider today on the threat and error management side.'
'Let's move on to the actual flight itself. After we finish this briefing, we will do the pre-flight tech log and book out with ATC together, and then we will go to the aircraft and carry out the pre-flight checks together. The next time we fly, I will ask you to do all of that by yourself. Then we will get in together, you will start up the engine using the checklist. I'll make the radio calls, but I want you to listen carefully to them. You will taxi to the run-up area, where we will do the power checks and the before take-off checks from the checklist. Then I will ask you to taxi and line me up on the runway, ready for my take off. I will take-off and get us heading towards Newbury.'

'The first thing I will do is demonstrate to you is maintaining straight and level flight. Then we will break it down into its components – maintaining straight flight, maintaining level flight, and maintaining the aircraft in balance. We will start with straight flight.'

‘There are 2 requirements for straight flight: wings level, and no yaw present. The wings level part we can assess by looking out of the window. We should see the horizon level at the front, and the wingtips equidistant from the horizon at the sides. We may also see the aircraft travelling towards a feature on the ground and maintaining a constant heading on the DI. Student A, how can we tell whether there is yaw present or not?’
‘Using the balance ball.’
‘Yes. The second part we can assess using the balance ball. If the ball is in the middle, there is no yaw present.’
‘But what if we are NOT maintaining constant direction? Well we are going to have to adjust the attitude. We need to use the ailerons to bank the aircraft towards our feature or heading, like this.’ Move the cut-out window to show a bank (remember to exaggerate). ‘Then, when we are tracking towards our feature again, or by glancing at the DI, we can re-select the correct nose attitude.’ Move the cut-out window back to S&L.
‘So, now we move onto the third part – in balance. Student A has already told us that if the ball is in the middle, there will be no yaw, so all we have to do is keep the ball there.’ Student B, what if the ball is out to the right? How can I fix that so there is no yaw present?’
‘Press the right pedal.’
‘Yes. If the ball is out to the right, we can press the right pedal. If the ball is out to the left, we can press the left pedal, making sure we keep the wings level with aileron.’

‘Now we will move on and I will teach you how to maintain level flight.’

‘Again, there are two requirements for level flight – the aircraft must be in the correct attitude, and it should be in trim. Student A, do you remember what we call the attitude which allowed us to fly at a constant altitude?’
‘The normal attitude.’
‘Yes, correct. We are now going to rename that the ‘**straight and level attitude’**. So how are we going to control the aircraft to stay level? Remember, we select the correct nose attitude by using our fingers on the coaming.’ Use the cut-out window model on the board to show the S&L attitude. ‘We must also make sure we have correctly trimmed the aircraft. We SELECT the attitude with the controls, we HOLD the attitude steady, while we TRIM with the trim wheel. Student B, how can we cross check we are maintain the aircraft level?’
‘We could look at the altimeter.’
‘Yes. We can use our instruments. A quick glance at the altimeter and VSI, will tell us if we are maintaining our level. But what if we are NOT maintaining level? Well we are going to have to adjust the attitude. If we are only 100’ or less away from our level, we can adjust the nose attitude by 1 finger’s width, like this.’ Move the cut-out window to show a lower or higher nose attitude (remember to exaggerate). ‘Then, glancing at the altimeter, when we reach our level, we can re-select the correct nose attitude.’
‘But what if we are more than 100’ away from our desired altitude. In this case we will need to adjust the power as well. Just by a small amount, say 100 rpm. We use the order: POWER – ATTITUDE – TRIM. So if we were 200’ low, we would add 100 rpm, adjust the nose attitude up by 1 finger and trim if needed. If we were 200’ high, we would reduce the power by 100 rpm, adjust the nose attitude down by 1 finger and trim if needed. Once back at our datum altitude, we re-select the correct attitude.’
‘And we keep doing this – we use a work cycle to help us. It is LOOKOUT – ATTITUDE – INSTRUMENTS. We look out over the nose. Check the attitude is correct for level flight. Glance in at the instruments to see how we are doing. If adjustments are needed, we make them. Then repeat this cycle over and over to maintain level flight.’

‘Then we will look at flight
‘So once we have learned to maintain straight and level flight in balance, using LOOKOUT – ATTITUDE – INSTRUMENTS, I will teach you how to do the cruise checks. Student A, why do you think we need to do checks during the cruise?’
‘To make sure we don’t run out of fuel?.’
‘Yes, that’s part of it, but there is much more to it than that. We will look at the checks that we call FREDA checks now, and later in the air I will teach you how to carry out a FREDA check.’
‘So F is for fuel like you said, Student A. We need to check that we have enough for the rest of our flight’. Obviously in some aircraft there would be a need to check for balance and maybe switch tanks. ‘R is for radios - we check the frequency in use is correct, and we can set the next frequency up in the standby. E is for engine - we check the temperatures and pressures, then put the Carb Heat on for 10 seconds, then off. D is for DI – we check it is synchronised with the compass – if not we adjust the DI. A is for altimeter – we check it is set to a suitable setting. We do these checks every 10-15 mins during flight.’
‘Finally, we will look at what can happen if there is an optical illusion in the form of sloping ground or cloud. In theory, it could be possible to line the aircraft up with this sloping feature, thinking it was a level horizon, and the aircraft would be out of balance.’
‘Before returning to the airfield you will get plenty of practice maintaining straight and level. As we approach the airfield, I will take control, and I want you to watch and listen as I rejoin for the circuit and landing. After landing, having cleared the runway, I will give you control for more taxi and checklist practice. Do you have any questions?’

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	As previous exercise, student should be more familiar with getting in and settling down. Consider allowing the student to start making the radio calls on the ground, provided this has been pre-briefed and practiced in the classroom.
Take-Off:	As before, carry out the take-off while the student observes. Verbalise from the checklist and make all radio calls as you would expect a student to.
Lesson Point 1:	Revision of the normal attitude and landmarks. Remind the student to lookout and to point out any traffic for the remainder of the flight. Show the student a minute or so of you maintaining straight and level flight.
Lesson Point 2:	'This attitude that up until now we have been calling the '**normal attitude**', will from now on, be called the '**straight and level attitude**'. It is the most important attitude the aircraft has and it is very important that we can recognise it and set it when needed. Remember, the straight & level attitude is when the nose is x-fingers below the horizon and the wings are the same distance above the horizon at either side. When we want to maintain this Straight & Level attitude we use a work cycle to help us. We start with a **LOOKOUT**. Look at the right wingtip, and then move your eyes up and down around the horizon to the front, then to the left wingtip. Then move your eyes back to the front. Here you can assess the aircraft's **ATTITUDE**. Check it is correct. Then we can glance inside at the **INSTRUMENTS** to check our altitude and heading. So the work cycle is **LOOKOUT – ATTITUDE – INSTRUMENTS**.' 'I am now going to show you some aircraft attitudes and you are going to tell me whether or not they are the straight and level attitude, and if not, why not.' Begin by placing the aircraft in a too high nose attitude. 'Is this the straight and level attitude?' The student should say 'no', because the nose is too high. 'OK, I want you to return the aircraft to the straight & level attitude. You have control.' **STUDENT PRACTICE.** Next place the aircraft in too low a nose attitude. 'Is this the straight and level attitude?' The student should say 'no', because the nose is too low. 'OK, I want you to return the aircraft to the straight & level attitude. You have control.' **STUDENT PRACTICE.** Then, place the aircraft in a gentle bank at approximately the correct pitch attitude. 'Is this the straight and level attitude?' The student should say 'no', because the aircraft is banked. 'OK, I want you to return the aircraft to the straight & level attitude. You have control.' **STUDENT PRACTICE.**

Lesson Point 3:	I will teach this lesson as Straight & Level, rather than Level and Straight, so we will start with the straight part. 'Here we are at 3000', straight and level. How do we know we are straight? Well look ahead and pick a reference point in the distance – that yellow field will work nicely. The aircraft is moving towards it – our direction is not changing. Notice also, the DI and compass, both show us on a steady heading of west. Therefore we are flying straight. We are also in balance, because the balance ball is in the middle and the wings are level. Now, I am going to allow the direction to drift off a little from our reference point, like this. Follow me through as I show you how to regain our reference point. The reference point is to the right, so I use the ailerons to bank the aircraft to the right, just a small bank – no more than 5 degrees. Notice now, the wings are not level, and the direction is changing. Now, the reference point is in front again and I can return to the straight and level attitude, checking that the wings are level by looking at each wingtip.'
Lesson Point 4:	'Now I am going to put the aircraft away from the reference point, like this, and I want you to return the aircraft to straight and level towards it. You have control.' **STUDENT PRACTICE.**
Lesson Point 5:	Now is a good time to introduce the cruise checks or **FREDA**. The student will get a chance to practice after the next section. 'Every 10-20 minutes during the cruise part of every flight, we need to make sure everything is in good order. We do this with the help of the mnemonic FREDA. Watch as I carry out a FREDA check – you will get a chance to do one later. F is for Fuel – make sure it is sufficient and if necessary balanced. R is for Radios – make sure they are tuned to something useful, and that the next frequency is ready on standby. E is for Engine – Check the temperatures and pressures are in the green, suction and ammeter are as they should be, and select the carb heat to HOT for 10 seconds. Then cold. D is for DI – make sure it is synchronised with the compass (this can only be done when we are in straight and level flight). A is for Altimeter – make sure it is set to the correct setting such as the local or regional QNH. That completes the FREDA check, you will do another in 10-20 minutes.
Lesson Point 6:	'Here we are again in the straight and level attitude. I wanted to be at 3000'. Notice the altimeter says we are at 3100' and the VSI is showing zero. To get back to our original 3000', I must select a slightly lower nose attitude. Follow me through, as I select 1 finger's width lower. I hold that attitude, and when the altimeter reads 3000', I re-select the straight & level attitude. Notice we are setting the attitude by looking outside. We are only glancing at the altimeter to check the altitude. **LOOKOUT – ATTITUDE – INSTRUMENTS**.'
Lesson Point 7:	'Now I am going to put the aircraft slightly away from 3000' and I want you to return the aircraft to straight and level flight at 3000'. You have control. **STUDENT PRACTICE.** Make sure they have several attempts both above and below the datum attitude. Alter the QNH.

Lesson Point 8:	'That works nicely for small deviations from our target altitude, say up to 100'. Any more than that, and we will need to add or reduce power to assist. Usually 100 rpm is enough. Notice the altimeter says we are at 2700' and the VSI is showing zero. Follow me through as I add 100 rpm and watch the nose rise slightly. As we get to 3000' I re-select the straight and level attitude by looking outside and reducing the power to the cruise setting.' Later. 'Now we are at 3300' and the VSI is showing zero. Follow me through as I reduce the power by 100 rpm and watch the nose lower. As we get to 3000' I re-select the straight and level attitude by looking outside and adding power to get to the cruise setting.'
Lesson Point 9:	'Now I am going to put the aircraft away from 3000' and I want you to return the aircraft to straight and level flight at 3000' using power and pitch. You have control.' **STUDENT PRACTICE.**
Lesson Point 10:	'It is possible for the aircraft to be travelling in a straight line, but not to be in balance. Watch the reference point ahead as I demonstrate.' At this point, cross the controls slightly and continue to track towards the reference point with the ball out of centre. 'Notice that although we are travelling in a straight line, the wings are not level and the ball is not in the middle. This is because the aircraft is not balanced. To balance it, level the wings and press the rudder on the same side the ball is – Step on the Ball. Now the aircraft is straight and level and in balance.'
Lesson Point 11:	'Now, watch as I demonstrate the aircraft grossly out of balance. See how we are still travelling in a straight line, but the wings are far from level and the ball is far from the middle. There is also an unpleasant leaning sensation. What control inputs do I need to make to return to balanced straight and level flight?' 'That's right, right rudder will balance the aircraft. We use the rudder in straight and level flight to prevent any unwanted yaw.'
Lesson Point 12:	'Sometimes it is possible to have a false horizon, due to sloping cloud or ground. Watch now, as I line the wings up with that sloping cloud. Notice that although the wings look to be level, the direction on the compass is changing.'
Lesson Point 13:	'Now I am going to retain control while you carry out a FREDA check for me.' **STUDENT PRACTICE of FREDA.**
Lesson Point 14:	'Now it is time to return to the airport. I want you to fly the aircraft straight and level and in balance all the way back. Remember **LOOKOUT – ATTITUDE – INSTRUMENTS**.' **STUDENT PRACTICE.**
Approach & Landing:	Ask the student if he knows the way to the airfield. Ask him to fly S&L in that direction. Once a few miles out, take control and carry out a normal approach and landing as you would expect a student to.
After Landing, Shutdown & Post-flight:	Carry out the relevant checks from the checklist. Monitor the student completing the tech log, hopefully without being reminded to do so.

Flight Prompt Card

Ex 6.1: Straight & Level Part 1

1: REVISION. Normal Att is now the S&L Att.
2: Introduce LOOKOUT-ATTITUDE-INSTRUMENTS.
DEMO what is NOT S&L Att. Ask why not.
3: STRAIGHT: Use Ref Point to show no direction change, no yaw present & wings level. DEVIATIONS: TEACH/FT use of max 5º bank to regain.
4: STUDENT PRACTICE regaining Ref Pt. L-A-I.
5: TEACH FREDA. STUDENT PRACTICE.
6: LEVEL: DEVIATIONS <100' no power. TEACH/FT Correction using 1 finger's width change.
7: STUDENT PRACTICE.
8: DEVIATIONS >100', +/- 100 rpm. TEACH/FT Correction.
9: STUDENT PRACTICE regaining target alt.
10: Teach BALANCE. DEMO slightly crossed controls, but still tracking towards Ref Pt. Use of ball to prevent YAW: STEP ON THE BALL.
11: DEMO grossly crossed controls.
12: Explain False horizons. DEMO levelling wings with sloping cloud etc. Choose Ref Pt.
13: STUDENT PRACTICE FREDA.
14: STUDENT PRACTICE OF S&L on return to airfield.

Debriefing

- A thorough debrief will help cement this very important lesson. **LOOKOUT -ATTITUDE - INSTRUMENTS** is the take home message.
- Ask them to run through FREDA again for you to make sure it is cemented.

New Basic Skills

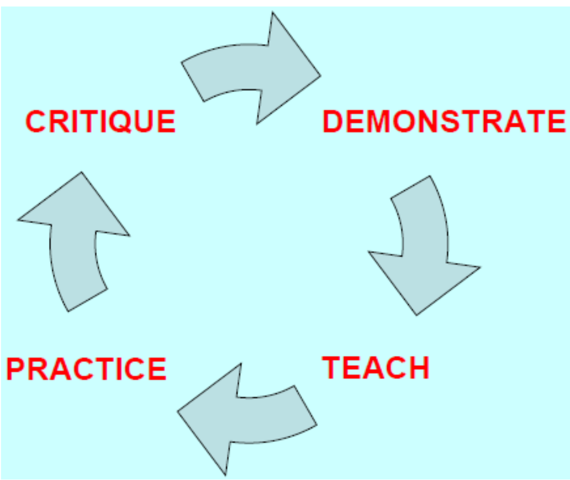
- The new basic skill that the student learns in this lesson is: **LOOKOUT - ATTITUDE - INSTRUMENTS.**

Common Student Faults

- At this stage, many students still tend to look inside rather than outside, so stress the need for lookout, and that more accurate flying is possible at this stage using the horizon to assess the correct attitude. Stress: **LOOKOUT - ATTITUDE - INSTRUMENTS**.
- Trimming is still unlikely to be instinctive, so make sure the aircraft is always kept in trim. If unsure, take control and assess the situation and reinforce the trimming exercise.
- Some students have a tendency to continually apply a little right rudder during this and future exercises. It may be due to driving experience, with a foot resting on the accelerator. Establish early if this is happening and make sure it stops.

Common Instructor Faults

- Don’t be tempted to rush this exercise. Many students’ poor future performance can be traced back to a poor grasp of Ex6.
- Don’t let the student fixate on the instruments. Look at their eyes and see where they are looking. Stress 90% outside, glancing at instruments only.
- Do not refer to ‘turning’ at this stage as the student has not covered this lesson yet. Use the term ‘changing direction’ instead.
- For this and future lessons, remember that you are not required to finish the lesson in one go. At the half-way point, ask the student if they feel ok or are tired. If they are fine then carry on, but don’t hesitate to terminate the lesson early – a tired or uncomfortable student doesn’t learn very much.
- Do not touch the controls while the student is flying. It sends the wrong message to the student and it can cause a lack of confidence in their ability. If you want to or need to move the control, say ‘I have control’ and fly. If you struggle with this, try crossing your arms or putting them in your lap.
- Do not coach the student while he is trying to fly. Some instructors tend to talk a lot while the student is trying to fly. This makes it hard for the student to concentrate on either the flying or the talking. Allow him a chance to make a mistake in silence, then take control and re-teach if necessary. Remember the ‘circle of learning’:



A continuous loop, whereby the student learns by

- Watching a demonstration of the manoeuvre by the instructor.
- The instructor teaches that manoeuvre by breaking it down and pattering it.
- The student practices the manoeuvre.
- The instructor offers feedback, which may entail another loop.

Ex 6.2 - Straight and Level 2

Practical Considerations

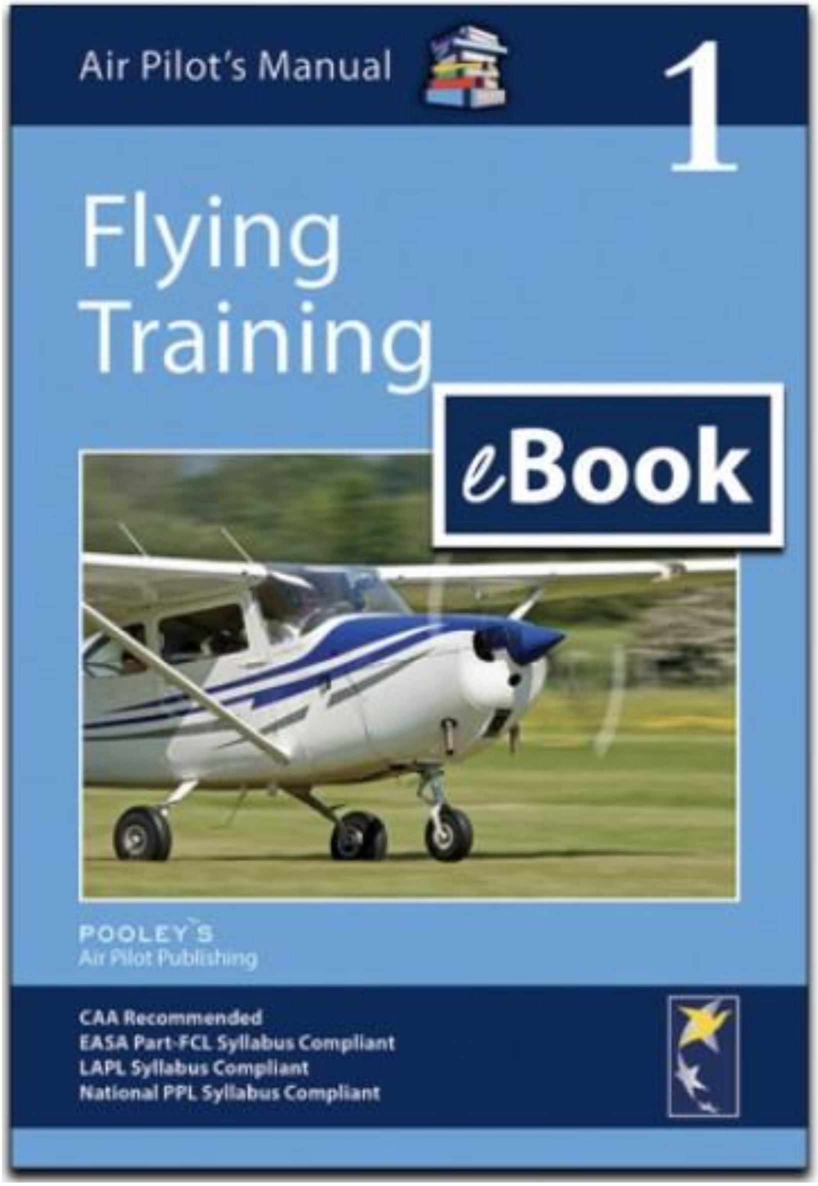
- A good horizon is essential for this lesson.
- A long straight track is needed for this lesson, to avoid having to make frequent turns. Plan in advance where you will go. Do not forget to turn around halfway through, or a long transit back to base will result.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

Long Briefing

A long briefing underlining the aerodynamics of flight at different speeds is needed.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 6b

Flying Straight and Level in Balance at a Selected Airspeed

Aim

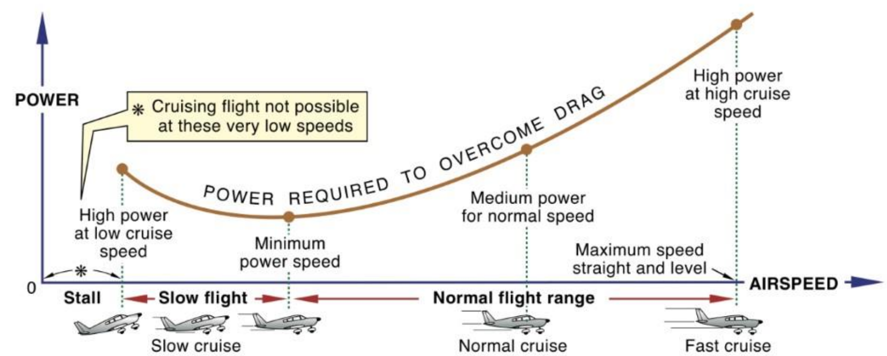
To fly the aeroplane straight and level at a selected airspeed.

Considerations

Straight and level flight can be maintained over a range of speeds – from a high-speed cruise to low-speed flight just above stalling speed. While a normal cruise or high-speed cruise is suitable for cross-country flying, manoeuvring in the circuit in preparation for landing requires a low speed.

Accelerating and Decelerating

In the cruise, **thrust balances drag** – the source of the thrust being engine power. If the desired airspeed is less than that being maintained, then, by reducing power, the thrust will not balance the drag and consequently the aeroplane will slow down (i.e. decelerate). If, however, the desired airspeed is somewhat greater than that being maintained, then, by increasing power, the thrust will exceed the drag and the aeroplane will accelerate until the drag is again equal and opposite to the thrust.



■ *Figure 6b-1* ***Vary the cruising airspeed by altering power***

Board Briefing

Ex 6.2: Straight & Level 2

27Feb22

AIM: To learn to maintain straight and level flight while changing speed and configuration.
T&E: Other a/c, Engine overheat, Mis-set instruments, Flap overspeed, Running out of fuel.
M: Lookout, FREDA Cx, Vfe, Limitation-Operation-Indication.

Airex: **1: Revision:** Aircraft Checks, Taxi, Power Checks, Before Take-Off Checks, FREDA

POWER

ATTITUDE

TRIM

(P.A.T.)

FORWARD VIEW

Controls

Effect of Speed

2: Increase Speed

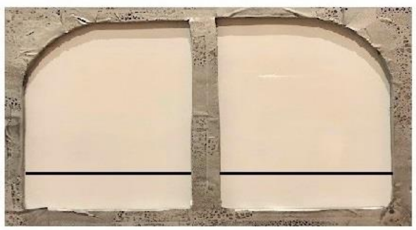
105 kts

Increase to Full Power

Prevent Yaw

Gradually Pitch DOWN to maintain altitude.

SELECT - HOLD - TRIM



Nose LOWER
Better forward visibility

Firm & Responsive

3: Decrease Speed

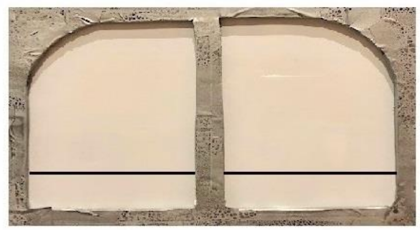
70 kts

Decrease to 1900 rpm

Prevent Yaw

Gradually Pitch UP to maintain altitude.

SELECT - HOLD - TRIM



Nose HIGHER
Poorer forward visibility

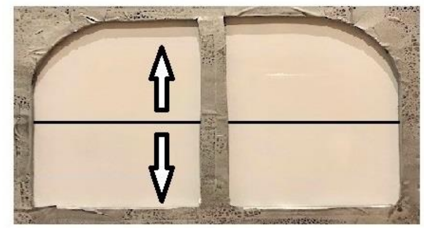
Loose & Sloppy

4: Effect of Flap

Maintain S&L as flaps extend in stages

Maintain S&L as flaps retract in stages

V_{fe}



5: Slow Safe Cruise

(Bad visibility Straight & Level)
70 kts, Approach Flap

Carb Heat ON, Set 1500 rpm

Check V_{fe} - Select App Flap

Gradually pitch DOWN to maintain altitude

SELECT - HOLD - TRIM

Nose as before but better forward viz at low speed

Rudder & Elevator Responsive

Skeleton Board Briefing

Ex 6.2: Straight & Level 2

27Feb22

AIM: To learn to maintain straight and level flight while changing speed and configuration.
T&E:
M:

Airex: 1: Revision:

Effect of Speed

POWER

ATTITUDE

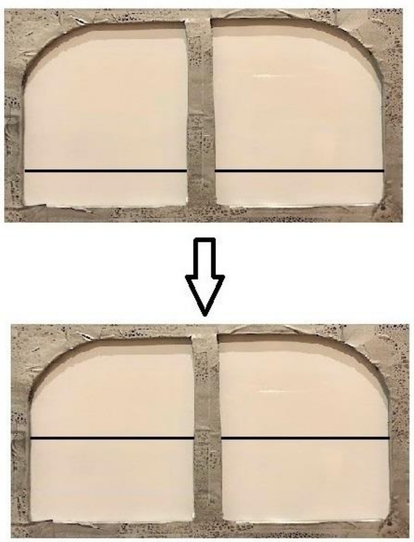
TRIM

(P.A.T.)

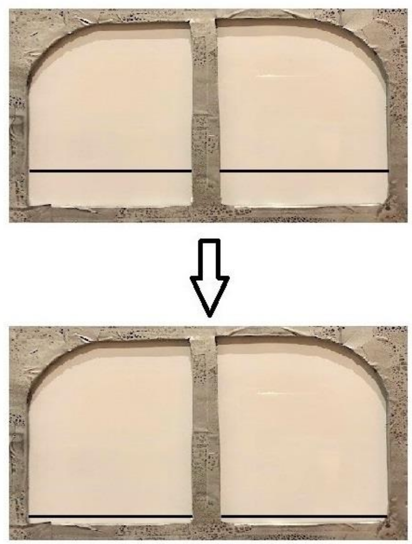
FORWARD VIEW

Controls

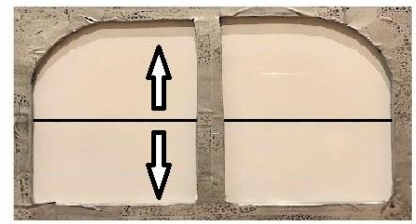
2: Increase Speed



3: Decrease Speed



4: Effect of Flap



5: Slow Safe Cruise

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	Again consider allowing the student to make the ground RT call. As previous exercise, student should be getting to grips with taxying. Make sure they carry out instrument checks during taxy. Make sure the power checks and before take-off checks are completed from the checklist accurately. Allow the student to line the aircraft up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and make all radio calls as you would expect a student to.
Lesson Point 1:	Ask for identification of some of the landmarks on the way to the practice area. Lookout should not need to be mentioned, but make sure they are carrying out an effective scan for other aircraft. 'I would like you to carry out a FREDA check while I fly the aircraft.' After completion of the checks, don't mention FREDA checks for the rest of the flight and see if the student remembers to do them. If not, hint and tip until they get the message.
Lesson Point 2:	Set the aircraft up in straight and level flight at normal power settings (2300 rpm) and speed (say 95 kts). 'Here we are at 3000', straight and level, with our normal cruise power of 2300 rpm set, which is giving us a speed of around 95 kts. I am maintaining it by using the work cycle **LOOKOUT - ATTITUDE - INSTRUMENTS**. Follow me through, as I increase to full power. The tendency would be for the aircraft to pitch up with added power, but I am **progressively** adjusting the attitude downwards to prevent this. I am preventing yaw with right rudder. Notice the airspeed has now increased and the nose attitude is lower and we have better visibility forwards. I now trim the aircraft - SELECT - HOLD - TRIM. Overall, I have been using a new work cycle: PAAT: PROGRESSIVELY ADJUST ATTITUDE - TRIM.I want you to feel the controls now. You have control.' The student should now verify that the controls are firm and responsive. **STUDENT PRACTICE.**
Lesson Point 3:	'I have control. I now want you to follow me through as I return to normal cruise flight. Notice, I am progressively adjusting the attitude nose up. I now re-trim the aircraft - PAAT.'
Lesson Point 4:	The student now flies S&L while the instructor increases the power to full. Now we are back in our familiar straight & level flight. I want you to maintain straight and level flight as I increase the throttle to full power. You have control.' **STUDENT PRACTICE.** 'I now want you to maintain straight and level flight as I reduce the throttle to normal cruise power.'
Lesson Point 5:	The student now repeats, handling the throttle himself. I now want you to accelerate to a full power cruise, maintaining straight and level flight.' **STUDENT PRACTICE.**

Lesson Point 6:	Set the aircraft up again in straight and level flight at normal power settings (say 2300 rpm) and speed (say 95 kts). 'Here we are again at 3000', straight and level, with our normal cruise power of 2300 rpm set, which is giving us a speed of 95 kts. Follow me through as I decrease power.' Decrease to around 2000 rpm. 'The tendency would be for the aircraft to pitch down with a reduction in power, but I am progressively adjusting the nose upwards to prevent this. I am preventing any yaw with left rudder. Notice the airspeed has now decreased to 70 kts, and the nose attitude is higher and we have poorer visibility over the nose. I now trim the aircraft- SELECT - HOLD - TRIM. I want you to feel the controls now. You have control.' The student should now verify that the controls are loose and sloppy. **STUDENT PRACTICE.**
Lesson Point 7:	The student now should be able to return the aircraft to normal S&L cruise, handling the throttle himself. Remember to stress the speed not the rpm as a target. The learning point is S&L at different speeds, not different rpms. 'I now want you to return the aircraft to normal speed straight and level cruise preventing the pitch and yaw. You have control.' **STUDENT PRACTICE.**
Lesson Point 8:	The student now slows to a slow speed 70 kt cruise, and then returns to normal cruise, handling the throttle himself. 'I now want you to reduce to a slow speed, 70 kt cruise. You have control.' **STUDENT PRACTICE.** 'I now want you to return to a normal speed cruise. You have control.' **STUDENT PRACTICE.**
Lesson Point 9:	'I now want you to practice flying straight and level at different speeds, each time preventing the unwanted pitch and yaw. I will call what speeds to cruise at and you will handle the throttle. You have control.' **STUDENT PRACTICE.** Call out various speeds to be flown.
Lesson Point 10:	'Now we are going to look at maintaining straight and level while extending and retracting the flaps. Follow me through as I extend the first stage of flap. **LIMITATION - OPERATION - INDICATION**. First, I check the speed, then select the flap. I prevent any unwanted pitch and keep straight and level flight using **LOOKOUT - ATTITUDE - INSTRUMENTS**. Now I repeat for the next stage, re-selecting straight and level afterwards. Then for the last stage. Note the nose down attitude with full flap.' 'Now continue to follow me through as I retract the flaps in stages. Each time I re-select the straight and level attitude.'
Lesson Point 11:	The student now flies S&L while the instructor changes flap setting. 'Now I want you to fly straight and level at 3000' while I extend and retract the flaps. You have control. Is it safe for me to select the first stage? **STUDENT PRACTICE.**
Lesson Point 12:	The student now flies S&L changes the flap settings himself. 'Now I want you to fly straight and level at 3000' while extending and retracting the flaps. You have control. **STUDENT PRACTICE.**

Lesson Point 13:	Now to introduce the **Slow Safe Cruise**. 'I now want you to imagine we are returning to the airport and there is a slower aircraft in front of us. I need you to slow down to 70 kts and fly straight and level. You have control.' **STUDENT PRACTICE.** Great, we are now no longer catching up the aircraft in front. However, if we just reduce power and fly more slowly, we end up with a high nose attitude, poor forward visibility and sloppy controls. This means we can no longer see the aircraft in front! This is obviously undesirable.'
Lesson Point 14:	'I now want you to return to normal straight and level. You have control.' **STUDENT PRACTICE.**
Lesson Point 15:	'The solution to our problem is to use flap. Follow me through as I set the aircraft up in a different configuration. I select Carb Heat and reduce the power, select 2 stages of flap when it is safe to do so, and decelerate to 70kts. I increase the power again to maintain 70 kts. I am now flying slowly, but look at the forward visibility. It is much better. I would be able to see an aircraft in front of us. Have a feel of the controls – they are less sloppy. Because of the effect of slipstream, the elevator and rudder are responsive. We call this the **Slow Safe Cruise** and it is very useful at times.'
Lesson Point 16:	'Now I would like you to return the aircraft to normal straight and level cruise without flap.' **STUDENT PRACTICE.**
Lesson Point 17:	'Now I would like you to set the aircraft up in the slow safe cruise.' **STUDENT PRACTICE.** 'Now I would like you to return the aircraft to the normal cruise.' **STUDENT PRACTICE.**
Lesson Point 18:	'Now I would like you to fly the aircraft back to the airfield for more practice. I will ask you to fly straight and level at different airspeeds and with different flap settings.' **STUDENT PRACTICE.**
Lesson Point 19:	On downwind leg, set up the scenario where there is a slower aircraft ahead and demonstrate configuring into the slow safe cruise. This practical demonstration is useful as it shows the reasons for such a configuration. 'Now we are in the circuit, and there could be a slower aircraft in front. Watch as I enter the slow safe cruise.'
Approach & Landing:	Carry out a normal approach and landing drawing attention to your flap selections and Vfe checks.
After Landing, Shutdown & Post-flight:	Carry out the relevant checks from the checklist. Allow the student to taxi back to the parking area. Monitor the student completing the tech log, hopefully without being reminded to do so.

Flight Prompt Card

EX 6.2: Straight & Level Part 2

1: REVISION. FREDA. 2: From S&L 95kts 2300 rpm TEACH/IFT entry to high speed Cruise: FULL Power, (Prevent Yaw & Pitch), Attitude (Prog). Trim. PAAT. Note: Fwd viz & control effectiveness. 3: TEACH/IFT Return to normal S&L cruise. 4: STUDENT PRACTICES entering HI speed crz & return to normal S&L instructor handles throttle. PAAT. 5: Then repeat student handling throttle.

6: From S&L 95kts 2300 rpm TEACH/IFT entry to 70 kt Cruise: Reduce ~2000 rpm, PAAT. Note: Fwd viz & control effectiveness. 7: STUDENT PRACTICE return to normal S&L cruise. 8: STUDENT PRACTICES entering 70 kt cruise and return to normal S&L, instructor handles throttle. 9: STUDENT PRACTICES HI & LO speed cruise several times handling throttle. Instructor calls cruise speeds. 10: TEACH/IFT extending & retracting flap in stages (LOI) maintaining S&L. 11: STUDENT PRACTICES maintaining S&L while instructor extends/retracts flap. 12: STUDENT PRACTICES as above selecting own flap.

13: From S&L 95kts 2300 rpm ask student to fly at 70 kts due traffic ahead. NB: Poor Fwd Viz & Control Effectiveness. 14: STUDENT PRACTICES return to normal S&L. 15: SLOW SAFE CRUISE: TEACH/IFT entry to SSC. Note better viz/controls. 16: STUDENT PRACTICES return to normal S&L cruise. 17: STUDENT PRACTICES entering SSC & return to normal S&L cruise. 18: STUDENT PRACTICES S&L on return to airfield. 19: PATTER or request SSC on downwind leg.

Debriefing

- Make sure the student has grasped how to change **speed** during straight and level flight. It is vital that **LOOKOUT - ATTITUDE - INSTRUMENTS** is understood and used.
- It is important that the student understands that flying straight and level at different airspeeds will result in a different pitch attitude and different view outside.

New Basic Skills

- The new basic skill that the student learns in this lesson is: **PROGRESSIVELY ADJUST ATTITUDE - TRIM (PAAT).**
- **NOTE:** Some schools will use PAT (Power Attitude Trim).

Common Student Faults

- At this stage, many students still tend to look inside rather than outside, so stress the need for lookout, and that more accurate flying is possible at using the horizon, especially when changing flap configuration. Repeat: **LOOKOUT - ATTITUDE - INSTRUMENTS**.
- Forgetting to do FREDA checks at this stage is very likely, but it needs to be concreted in their mind at this stage, so that it is second nature later on. If they miss a check, rather than saying 'do a FREDA check', try something to get them thinking like 'do we have enough fuel for another hour's flying?' or 'do you think the engine is getting too hot?'.
- This is a good exercise for consolidating trim. One extra exercise you can do is to tell the student that they have control, except for the throttle. Tell them to maintain straight and level, while you vary the power between full and 1500 rpm. Make sure they trim each time.
- When transitioning to slow safe cruise, the student may forget to check the speed before selecting flap. Do not coach them by reminding them, but rather, as they reach for the flap lever at a speed above Vfe, take control from them and explain why. Then return them to normal cruise and ask them to repeat.
- When returning from slow safe cruise to normal cruise, students may select the flaps up all in one go. Take control, explain and ask them to repeat.

Common Instructor Faults

- Try not to coach the student while they are practicing each manoeuvre. Let them make any mistakes that they are going to and then take control so that they can listen to your feedback. Gently explain what wasn't right and ask them to do it again. At this stage, few students have enough capacity to listen to your feedback or explanations while trying to fly the aircraft.
- Do not refer to 'turning' at this stage as the student has not covered this lesson yet. Use the term 'changing direction' instead.
- The thrust of the first part of this lesson is straight and level at different **airspeeds**, not different **rpm settings**. Make sure that you stress to the student that it is the airspeed that we are interested in – the rpm is just an approximate figure to arrive at this airspeed.

Ex 7 - Climbing

Practical Considerations

- It is impractical to cover lessons 7 & 8 separately so the 2 are nearly always considered together. This lesson requires a decent vertical slice of airspace, so a minimum cloudbase of 3000’ is suggested in an area free from low-lying controlled airspace above. A real danger of this lesson in infringement of controlled airspace by climbing.
- A good horizon is essential for this lesson.
- See following pages for further details of the combined lessons.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

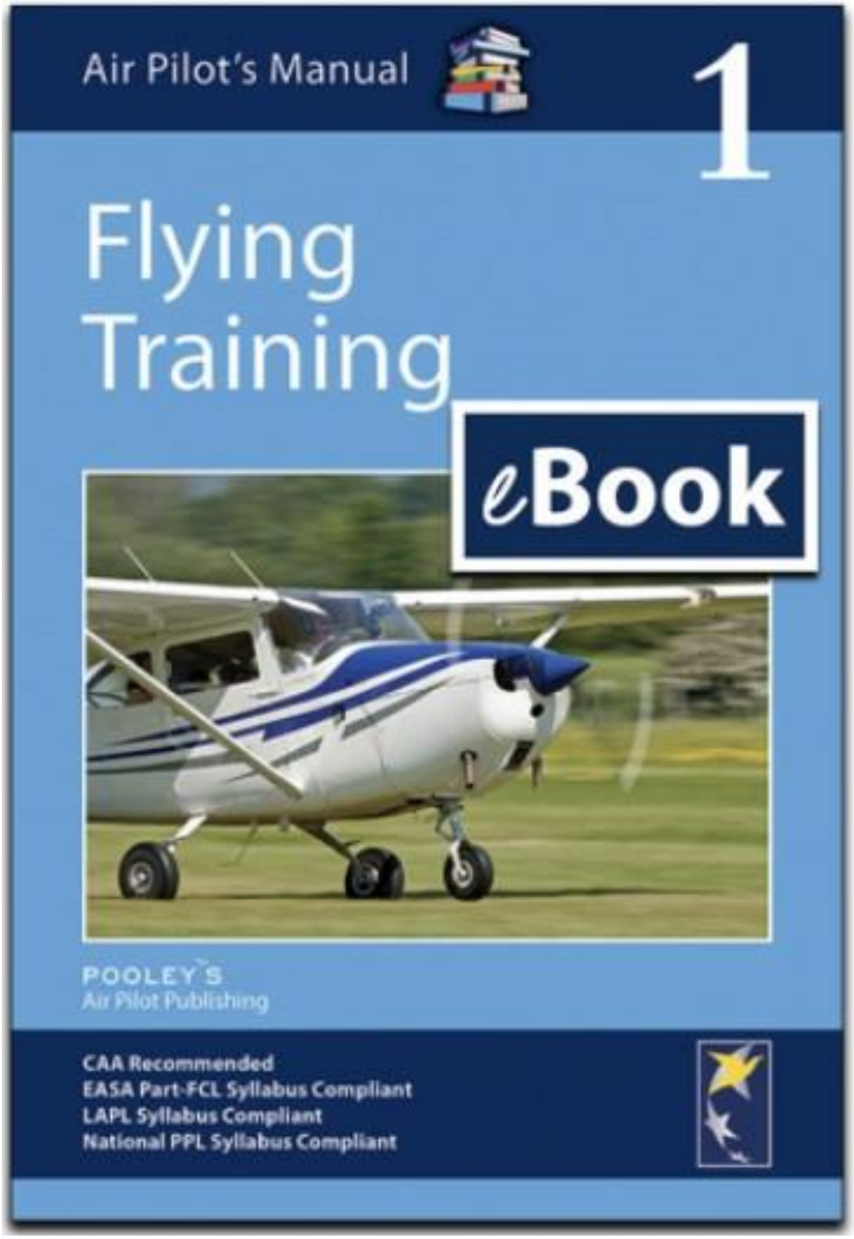
Long Briefing

From EASA Part-FCL:

Long briefing objectives:
(1) the forces;
(2) relationship between power or air speed and rate of climb (power curves maximum rate of climb (Vy));
(3) effect of mass;
(4) effect of flaps;
(5) engine considerations;
(6) effect of density altitude;
(7) the cruise climb;
(8) maximum angle of climb (Vx).

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 7

Climbing

Aim

To enter and maintain a steady climb on a constant heading and to level off at a particular height.

Considerations

The Forces in a Climb

For an aeroplane to climb steadily the thrust must exceed the drag, otherwise it would slow down and the nose would have to be lowered to maintain airspeed. The thrust in excess of that needed to balance the drag is called the **excess thrust.**

In a climb, the vertical component of the excess thrust supports a small part of the weight and the lift generated by the wings supports the remainder – hence the surprising result that **lift is less than weight in a steady climb.**

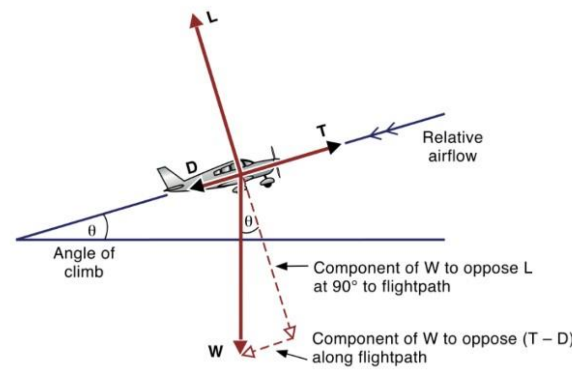


Figure 7-1 ***The four forces in a steady climb***

A component of the weight acts in the direction opposite to the flightpath and opposes the climb.

Performance

Power plus attitude equals performance.

The **power** applied and the **attitude** of an aeroplane determine its **performance** in terms of:

- **airspeed;** and
- rate of climb.

Ex 8 - Descending

Practical Considerations

- It is impractical to cover lessons 7 & 8 separately so the 2 are nearly always considered together. This lesson requires a decent vertical slice of airspace, so a minimum cloudbase of 3000’ is suggested in an area free from low based controlled airspace above. See below for further details of the combined lessons.
- A good horizon is essential for this lesson.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- See following pages for further details of the combined lessons.

Long Briefing

From EASA Part-FCL:

Long briefing objectives:
(1) the forces;
(2) glide descent: angle, air speed and rate of descent;
(3) effect of flaps;
(4) effect of wind;
(5) effect of mass;
(6) engine considerations;
(7) power assisted descent: power or air speed and rate of descent;
(8) cruise descent;
(9) sideslip.

Suggested Long Brief

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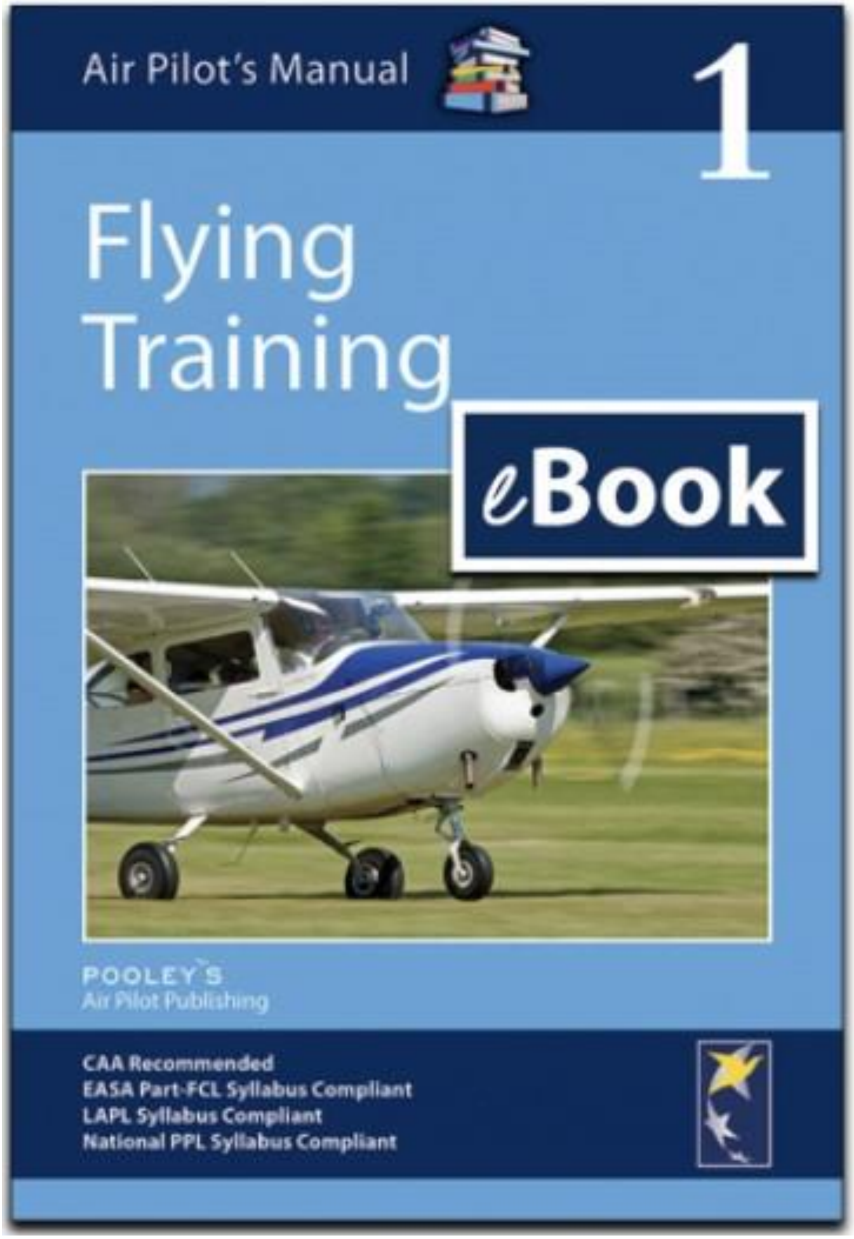


Exercise 8a

The Glide

Aim

To enter and maintain a steady glide and to level off at a particular height.

Considerations

A descent without power is called a glide.

An aeroplane may be descended in two ways:

1. In a **glide,** where engine power is not used and the pilot accepts the resulting rate of descent; or
2. In a **powered descent**, where power is used by the pilot to control the rate of descent.

The Forces in a Glide

The nose must be lowered when thrust is totally removed to maintain flying speed.

If power is removed when the aeroplane is in level flight, the drag will be unbalanced and, if height is maintained, the aeroplane will decelerate. Only three forces will act on the aeroplane when the power is totally removed – drag (no longer balanced by thrust), lift and weight.

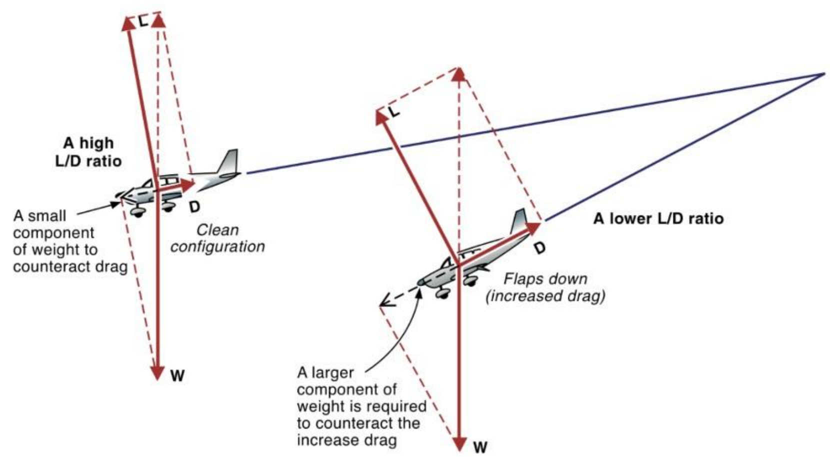


Figure 8a-1 ***The forces in a glide***

Ex 7.1 & 8.1 - Climbing & Descending 1

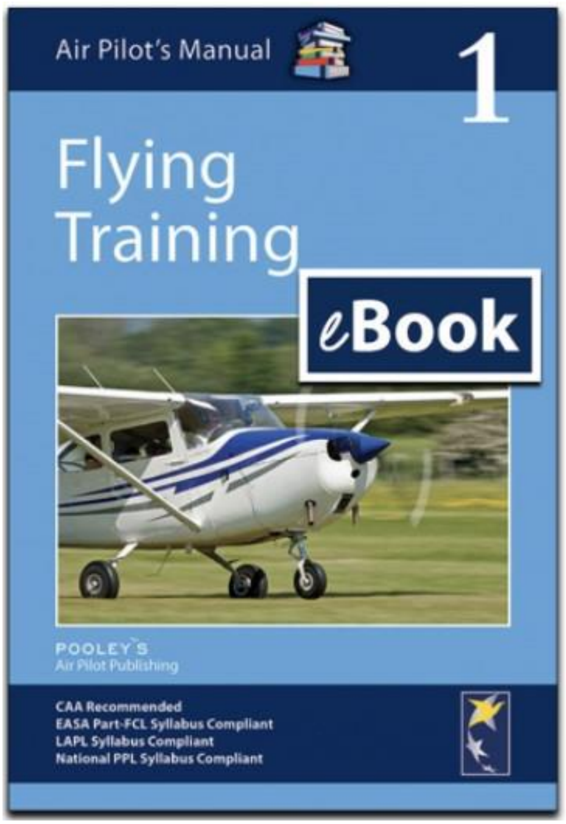
Practical Considerations

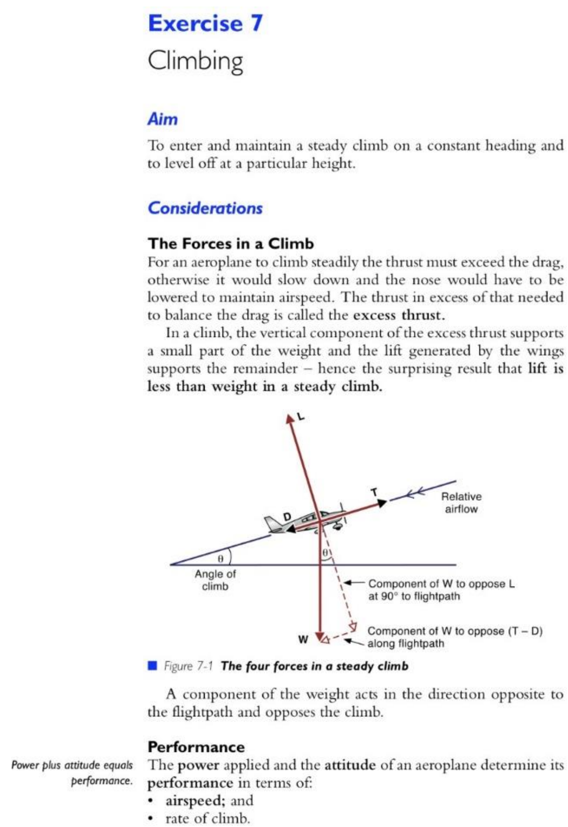
- Ex 7 & 8 (Climbing & Descending) and Ex 9.1 (Level Turning) can be done in either order. If the cloud base does not permit lesson 7 & 8 to be carried out, consider moving on to Ex 9.1, but remember that Ex 9.2 requires climbing and descending to be already covered, so that exercise should not be attempted at this stage.
- Start by teaching maintaining the climb. This is convenient as on the way to the practice area, the aircraft is probably in a climb anyway. Next comes level out. Followed by entry to the climb. Then the same order for descent.

Long Briefing

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.





Exercise 7

Climbing

Aim

To enter and maintain a steady climb on a constant heading and to level off at a particular height.

Considerations

The Forces in a Climb

For an aeroplane to climb steadily the thrust must exceed the drag, otherwise it would slow down and the nose would have to be lowered to maintain airspeed. The thrust in excess of that needed to balance the drag is called the **excess thrust.**

In a climb, the vertical component of the excess thrust supports a small part of the weight and the lift generated by the wings supports the remainder – hence the surprising result that **lift is less than weight in a steady climb.**

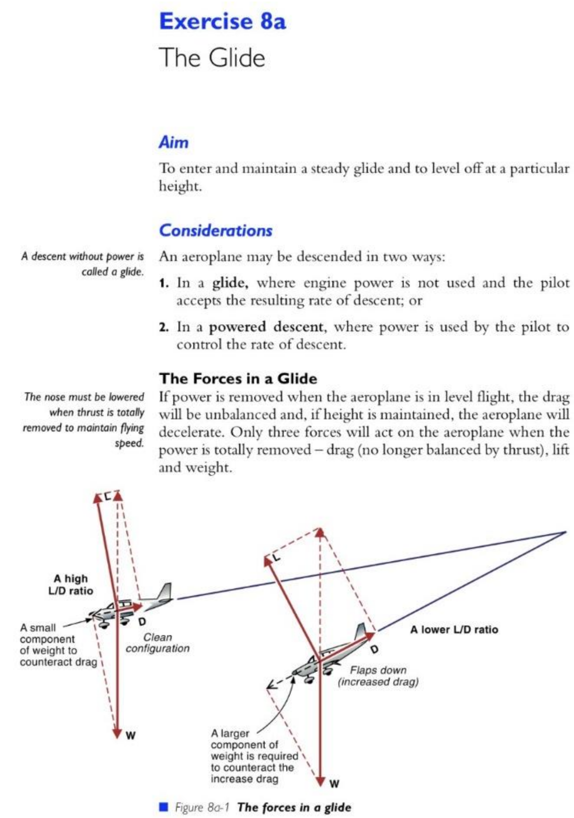
Figure 7-1 ***The four forces in a steady climb***

A component of the weight acts in the direction opposite to the flightpath and opposes the climb.

Performance

Power plus attitude equals performance.

The **power** applied and the **attitude** of an aeroplane determine its **performance** in terms of:
- **airspeed;** and
- rate of climb.



Exercise 8a

The Glide

Aim

To enter and maintain a steady glide and to level off at a particular height.

Considerations

A descent without power is called a glide.

An aeroplane may be descended in two ways:

1. In a **glide,** where engine power is not used and the pilot accepts the resulting rate of descent; or
2. In a **powered descent**, where power is used by the pilot to control the rate of descent.

The Forces in a Glide

The nose must be lowered when thrust is totally removed to maintain flying speed.

If power is removed when the aeroplane is in level flight, the drag will be unbalanced and, if height is maintained, the aeroplane will decelerate. Only three forces will act on the aeroplane when the power is totally removed – drag (no longer balanced by thrust), lift and weight.

Figure 8a-1 ***The forces in a glide***

Ex 7.1 & 8.1 - Climbing & Descending 1

23Apr24

AIM: To learn to climb and descend at a constant airspeed, heading and in balance.
T&E: Other a/c, Engine overheat, Carb icing, Infringement, Running out of fuel, Disorientation.
M: Lookout, FREDA Cx, Carb Heat, Anchor Pt, Pre-flight study.

Airex: 1: **Revision:** Start & Taxy, Power Checks.

3: Level Out from Climb
Anticipate
Attitude (P.A.A towards S&L)
wait.......
Power (2300 rpm)
Trim (S - H - T)

ALT DI

Straight & Level L-A-I

ASI DI

7: Descent Entry
Lookout /CH ON
Power (Idle) Hold back press
wait.......
Attitude (Descending)
Trim (S - H - T)

Attitude controls Airspeed

65 kts

Attitude Controls Airspeed

65 kts

4: Climb Entry
Lookout
Power (Full)
Attitude (Climbing)
Trim (S - H - T)

2: Maintaining Climb
Lookout (lower nose)
(Side Feature)
Attitude
Instruments
L-A-I

5: Maintaining Descent
Lookout (Warm Engine)
Attitude
Instruments
L-A-I

6: Level Out from Descent
Anticipate
CH OFF
Power (2300)
Attitude (S&L)
P.A.A
Trim (S - H - T)

L-A-I
Straight & Level

ALT DI

ATTITUDE CONTROLS AIRSPEED

8: Level out at specified Altitudes
Anticipate 50'

9: Cruise Descent:
2000 rpm 90 kts

Straight & Level
L-A-I

ALT DI

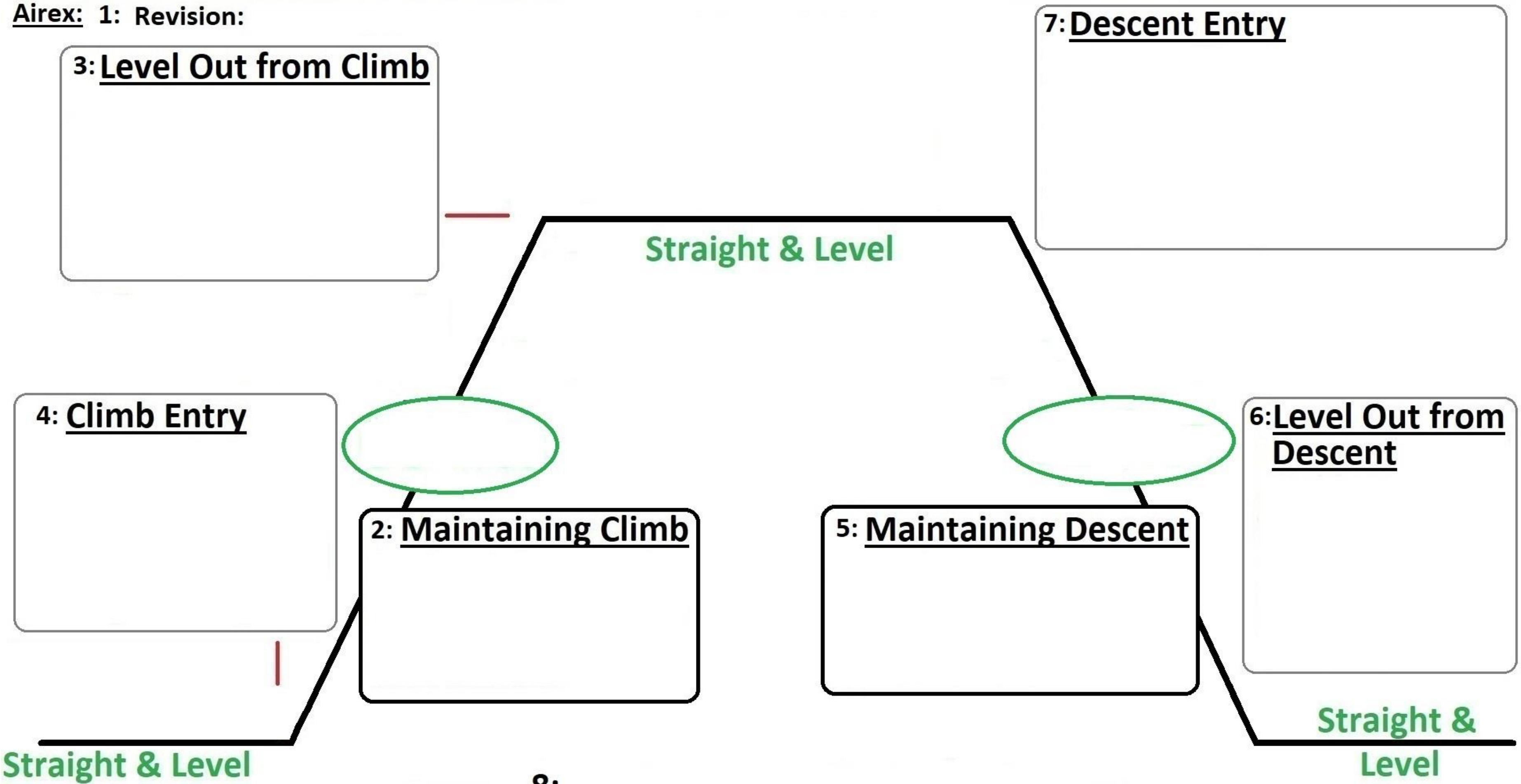
Board Briefing Skeleton Board Briefing

16Jan22

Ex 7.1 & 8.1 - Climbing & Descending 1

AIM: To learn to climb and descend at a constant airspeed, heading and in balance.
T&E:
M:

Airex: **1: Revision:**



8:

9:

Pre-Flight Briefing

Make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

The following is suggested speech for the board briefing above to 2 students, A & B:

‘Good morning, today we are going to do exercise 7 and 8, climbing and descending. There are 2 parts to this exercise – the first part we are going to look at today is climbing and descending without flaps. The second part which we will do tomorrow is climbing and descending with flaps and go-arounds.’

‘So the aim today is written on the board – To climb and descend at a constant airspeed, heading and in balance.’

We are going to discuss some threat and error management before we go into the main briefing. Looking out of the window here, I can see lots of aeroplanes taxying towards the runway. What may be a big threat once we get airborne? Student A?’

‘Other aeroplanes being in our way’

‘Yes, other aeroplanes are also going to be in the local area too. How are we going to manage to keep clear of them, Student B?’

‘Good lookout’

‘Yes, so if either of us see an aeroplane today, we will point it out to the other person, as we learn in a previous lesson. Remember, when we are climbing, it is hard to see other aircraft in front of us.

Now, we are going to be doing lots of climbing during this exercise, with the engine operating at full power. What might be a threat to us if we aren’t careful, Student A?’

‘The engine overheating?’

‘Yes. That’s right. So we need to make sure we check our Ts & Ps regularly and carry out FREDA checks.’

‘We will be climbing fairly high today, and we may even see airliners above us. What possible error could we make there, Student A?’

‘We could climb into controlled airspace by mistake.’

‘Yes, so how can we manage not to do that, Student B?’

‘By using our anchor point, and chart and some pre-flight planning.’

‘Absolutely. We can decide before the flight, that if we stay south of Newbury at 4000’ or below, we won’t enter controlled airspace.’

‘That will be enough for us to consider today on the threat and error management side.’

‘Let’s move on to the actual flight itself. After we finish this briefing, I want you to do the pre-flight tech log and book out with ATC and then go to the aircraft and carry out the pre-flight checks. Then we will get in together, you will start up the engine using the checklist. I’d like you to make the radio calls and taxi to the run-up area, where I want you to do the power checks and the before take-off checks. Then line me up on the runway for my take off. I will take-off and get us heading towards Newbury.’

‘The first thing I am going to do is teach you how to maintain a climb at 65 kts. You will follow me through on the controls, while I show you the attitude required to hold that speed. I will be using a feature to the side of the aircraft to keep straight.’

‘Now, in the climb, we will control the airspeed with attitude using the elevator. What do you think I should do if the speed increases to 75 kts, Student A?’

‘Apply some back pressure on the elevator.’

'Yes, that's right, a little bit of back pressure on the elevator. Now the speed won't change immediately, so we will need to make an adjustment and wait for the speed to change.'

What do you think I should do if the speed reduces to 60 kts, Student B?'

'Apply forward pressure on the control column.'

'Yes, a little bit of forward pressure on the elevator. Again, the speed won't change immediately, so we will need to make a small adjustment and wait for the speed to change.'

'So, in this way we can keep the speed at 65 kts. We can use our work cycle: LOOKOUT-ATTITUDE-INSTRUMENTS to help us during the climb. What instruments do you think we will want to glance at, Student A?'

'The airspeed indicator.'

'Yes, that's right. We also want to make sure we are climbing on a constant heading and in balance, so we need the DI and balance ball as well.'

Now, the nose attitude will be quite high, and it will be hard for us to see aircraft in front of us, so every 500 feet in the climb, I will lower the nose briefly to check for aircraft ahead, then resume the climb.'

'Then I will give you control and let you practice maintaining the climb.'

'After that, I will take control back and you will follow me through as I teach you how to level out from the climb. First I lower the nose TOWARDS the straight and level attitude and then progressively lower it, glancing at the altimeter to make sure I am level. The aircraft will accelerate, and as it does so, I will have to adjust the attitude to stay level. Once we reach 90 kts, I will reduce the power to normal cruise setting. Then trim the aircraft. It's important to look outside during this manoeuvre to make sure the attitude is correct.'

'Then I will put the aircraft back into a climb at 65 kts and give you control. You will maintain the climb, and when I tell you, you will level out.'

'Once you have successfully learned to level out from the climb, the next thing I'm going to teach you is how to enter the climb. First of all, let's find out where we are. Where is our anchor point again, Student A?'

'Newbury'

'So let's find Newbury, check our location is suitable, and then we will lookout for other aeroplanes. Having looked out, we can then enter the climb. Student B, can you describe how you would enter the climb using the various controls?'

'I would apply full power, and raise the nose into the turning attitude you showed me.'

'Yes, and with rudder to keep the ball in the middle'

'So you will follow me through. From straight and level we will check the area is clear, especially above, add full power and prevent yaw with rudder. I will then raise the nose to the climbing attitude. Then I will give you control to maintain the climb and level out on my command.'

'Once you have done that. I will ask you to enter, maintain and level out from a climb on my command.'

'Now, it's no good just levelling out at any old altitude. We really want to be able to level out at a particular altitude. Let's say we want to climb to 3000'. Student A, what will happen if we begin our level out at 3000?'

'We will overshoot the altitude.'

'Yes, so we must anticipate our level out. We must begin the manoeuvre a little bit before 3000'. But how much before. Student B?'

'Maybe 100'?'

'Sounds reasonable. A good rule of thumb is to use 10% of your rate of climb. So if we are climbing at 500 feet per minute, we could start the manoeuvre at 2950'.

‘So, I will give you an altitude to climb to. Entry and maintaining the climb are the same, it’s just the level out that we need to look at. Let’s say we are climbing to 3000. You will enter the climb, maintain it and level out at 3000’.

‘OK, so by now we will have done quite a bit of climbing and we might be fairly high. We will use our anchor point to orientate ourselves before moving on to descending. I will start by demonstrating a power off glide at 65 kts. Then I will give you control and you will maintain the glide on a constant heading at 65kt. The nose will be much lower in the descent so it will be easier to pick a feature in front of us. Student A, how will I maintain the speed at 65 kts during the descent?’

‘With attitude using the elevator.’

‘Yes, the speed is controlled in the descent by attitude using the elevator, just as in the climb. The only difference is the power setting.’

‘Once you have learned to maintain the descent, I will take control, while you follow me through, and level off. The order of actions to level off from a descent is: POWER-ATTITUDE-TRIM. I will select cruise power and progressively adjust the attitude to maintain level flight. After we are straight and level I will trim the aeroplane. Now in our aeroplane, at low power setting we need to use the Carb Heat. So the Carb Heat will be on throughout the descent. Every 1000’ we will warm the engine by increasing the rpm to 2000 rpm whilst holding the attitude steady, then back to idle. Before we level out, we need to turn the Carb Heat off.’

‘Then I will put the aircraft back in a 65 kt glide with the Carb Heat on and you will take control. You will maintain the descent and level out when I tell you.’

‘Once you have learned that, I will teach you how to enter the descent. Before we begin an idle descent, what must we do to protect our engine, Student B?’

‘Use the Carb Heat.’

‘Yes. So we will lookout first, then select the Carb Heat to ON. Then I will close the throttle. If I do nothing else, what will happen to the nose of the aircraft if I reduce the power to idle, Student A?’

‘The nose will drop.’

‘Yes, and at this stage, I don’t want that to happen. So you will follow me through as I apply back pressure to maintain altitude. As we do this, the airspeed will reduce. When it gets to 65 kts, I can release some of the back pressure and maintain the descent at 65 kts as before. There will be a bit of a trim change, so I will have to retrim the aeroplane. Then I will give you control to maintain the descent and level out on my call.’

‘After that you will enter a descent, maintain it and level out on my call.’

‘Now, just as in climbing, it would be nice to be able to level out at a specific altitude. Again, all we have to do is anticipate the level out by about 10% of our rate of descent. So I will then ask you to descend to a specified altitude.’

‘Now descending at 65kts and idle power is not the only way to descend. It’s quite slow and we can choose to descend a bit faster with some power on. So I will demonstrate how to enter a cruise descent at 90 kts with about 2000 rpm set. It’s very similar to entering a glide except we don’t need the Carb Heat ON and we won’t have to hold the back pressure, as we are no longer waiting for the airspeed to reduce. Then I will give you control to maintain that 90 kt cruise descent back to the airfield.

Now you haven’t done rejoin, approach or landing yet, so I will take control and do that for you. After landing, I will give you control and you can carry out the checks and taxi back to parking and shutdown. Then we will return here for a debrief.’

‘Do you have any questions on what we are going to do?’

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	By now, the student should be able to taxy without problem. A ground briefing should have taken place previously to allow the student to make all the ground based radio calls. Make sure they carry out all relevant checks during taxy. Make sure the power checks and before take-off checks are completed from the checklist accurately without missing any items. Allow the student to line the aircraft up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and make all radio calls as you would expect a student to.
Lesson Point 1:	**Climb:** This lesson begins in the climb with the recognition and practicing of maintaining the climbing attitude. Many students ask, 'what is the climbing attitude?' or 'How do I know if I have the correct climbing attitude?' The answer is simple. The correct climbing attitude is that which gives the correct climb speed – in our case 65 kts. On the climbout, away from the airfield, in a climb at 65 kts, ask the student to follow you through maintaining the climb. 'Here we are in the climb, passing 1500', note the airspeed is 65 kts. This is the climbing attitude. Notice how high the nose is, and how difficult it is to see ahead. Look at the wingtips left and right. They are equidistant from the horizon, so we know we are travelling in a straight line. I am holding the ball is in the middle with right rudder. Look forward out of the left window and pick a feature as a reference point. It should stay in roughly the same place at the side if we are going straight. Just like with straight and level flight, I am maintaining the climb using LOOKOUT - ATTITUDE - INSTRUMENTS.' 'In the climb we want to make sure we stay in the climbing attitude. How do we know we are in the correct attitude for the climb? Well the speed is 65 kts, so that means that we are in the correct attitude. I also check the temperatures and pressures.' Now, lower the nose slightly so that the speed increases by 10 kts or so. 'Are we in the climbing attitude now? No, because the speed is no longer 65 kts. Remember, in the climb, we control the airspeed with attitude via the elevator, so if I want to regain the climbing attitude, I must apply back pressure on the elevator. Now, follow me through. As I raise the nose, it takes a while for the airspeed to reduce, so notice I apply a small amount of back pressure and wait and see what happens. And after a moment, we are showing 65 kts – we are in the climbing attitude again. Now, raise the nose slightly so that the speed decreases by 10 kts or so. 'Are we in the climbing attitude now? No, because the speed is no longer 65 kts. I must apply forward pressure on the elevator. As I lower the nose, the airspeed slowly increases. Notice, now, the speed has increased to 60 kts, so a little more forward pressure is needed. And there, after a moment, we are showing 65 kts – we are in the climbing attitude again. Every 500' or so in the climb, I am going to lower the nose to improve my lookout, then raise it again to continue the climb'.
Lesson Point 2:	'Now, I want you to take control and practice climbing at 65 kts, using attitude to control the airspeed. You have control.' **STUDENT PRACTICE.**

Lesson Point 3:	Once the climbing is satisfactory, take control back and trim the aircraft into a 65 kt climb in order to demonstrate the level out. 'Now, I want you to follow me through as I demonstrate how to level of from a climb. Can you remember the order of actions when levelling off from a climb? Good, so the first thing I do is lower the nose towards the straight and level attitude. Then I need to progressively adjust the attitude as airspeed increases. Remember: Lookout - Attitude - Instruments. I will get a much better result by looking out the window during this manoeuvre. I only glance at the instruments to check my performance. Now, the speed is increasing and I am maintaining forward pressure on the elevator. As I reach 90 kts, I reduce the power to the cruise setting, 2300 rpm, then trim.
Lesson Point 4:	Place the aircraft back in a trimmed 65 kt climb. 'Now, I want you to continue this climb in a straight line and level out when I tell you, to straight and level flight. You have control, I am holding right rudder.' **STUDENT PRACTICE.**
Lesson Point 5:	Place the aircraft in straight and level flight. If no mention of FREDA checks has been made by the student up until this point, hint or tip to get this to happen. 'Now, I want you to follow me through as I demonstrate the entry to the climb. Can you remember the order of actions to enter a climb? So first looking out, particularly above, then Power – full power, Attitude – I select and hold the climbing attitude, Trim – I select, hold and trim.' Place the aircraft back in straight and level flight. 'Now, I want you to enter a 65 kt climb and level off when I tell you to. You have control.' **STUDENT PRACTICE.**
Lesson Point 6:	Now the student gets to practice the whole climb. Place the aircraft back in straight and level flight. 'Now, I want you to enter a 65 kt climb and level off when I tell you. You have control.' **STUDENT PRACTICE.** Notice that there has been a lot of climbing and no descending, so the aircraft may now be quite high. That is fine if weather and airspace permit it, as now there is going to be a lot of descending with no climbing. In less than ideal circumstances, the instructor may have to carry out an intermediate descent.
Lesson Point 7:	Now, the student levels off at an assigned altitude. Place the aircraft back in straight and level flight. 'Now, I want you to enter a 65 kt climb and level off at 4000'. You have control.' **STUDENT PRACTICE.**
Lesson Point 8:	**Descent:** Full demo of a descent and level out. Place the aircraft into a 65kt glide with the Carb Heat on. 'Here we are in the descent or glide, note the airspeed is 65 kts. This is the descending attitude. Notice how much lower the nose is, how much better the forward visibility is, and how quiet it is now that the engine is at idle. I am easily able to maintain straight flight by reference to a feature. In the descent, I use attitude to control the airspeed, just like in the climb, and I can keep the aircraft straight more easily due to the forward visibility. Every 500' during the descent I will warm the engine by increasing the engine rpm to 2000 momentarily whilst holding the attitude steady, then back to idle.'

<u>Lesson Point 9:</u>	Place the aircraft back into a 65kt glide with the Carb Heat on. 'Now I want you to practice maintaining the descent at 65 kts in a straight line. You have control.' **STUDENT PRACTICE.**
<u>Lesson Point 10:</u>	Once the descending is satisfactory, take control back and trim the aircraft into a 65 kt glide in order to demonstrate the level out. 'Now, I want you to follow me through as I demonstrate how to level of from a descent. Can you remember the order of actions when levelling off from a descent? Good, so the first thing I do is turn off the Carb Heat, add power to 2300 rpm – the cruise setting, then progressively adjust the attitude to maintain level flight, then trim. Remember: Lookout - Attitude - Instruments. I will get a much better result by looking out the window during this manoeuvre. I only glance at the instruments to check my performance.'
<u>Lesson Point 11:</u>	Place the aircraft back in a trimmed 65 kt glide with the Carb Heat ON. 'Now, I want you to continue this descent in a straight line and level out when I tell you, to straight and level flight. You have control, I am holding left rudder.' **STUDENT PRACTICE.**
<u>Lesson Point 12:</u>	Place the aircraft in straight and level flight. If no further mention of FREDA checks has been made, hint or tip further. 'Now, I want you to follow me through as I demonstrate the entry to the descent. Can you remember the order of actions to enter a descent? So first looking out, particularly below, then I select the Carb Heat to ON, reduce the power to idle, and prevent the nose from dropping by holding back pressure on the elevator. I am maintaining my original altitude as the speed reduces. As the speed approaches my descent speed of 65 kts, I lower the nose slightly to maintain that speed. Then trim: Select-Hold-Trim.'
<u>Lesson Point 13:</u>	Place the aircraft back in straight and level flight with the Carb Heat OFF. 'Now, I want you to enter a 65 kt descent and level off when I tell you to. You have control.' **STUDENT PRACTICE.**
<u>Lesson Point 14:</u>	Now, the student levels off at an assigned altitude. Place the aircraft back in straight and level flight. 'Now, I want you to enter a 65 kt descent and level off at altitude 2000'. You have control.' **STUDENT PRACTICE.**
<u>Lesson Point 15:</u>	**<u>Go-Around:</u>** Demonstration with follow through of a descent into a climb – a go-around. 'Sometimes, when flying, we might want to go straight from a descent into a climb. Such as when we are coming in to land and decide to discontinue the approach for whatever reason. This is called a go-around. Follow me through as I demonstrate. I am set up in a 65 kt glide, and plan to go-around when we reach 1500'. Descending as before, controlling the airspeed with attitude and keeping the aircraft straight and in balance. Approaching 1500': Carb Heat Off - Power to full but prevent yaw with rudder – Attitude to the climbing attitude – Trim. Now we are climbing away at 65 kts, still in a straight line.'

Lesson Point 16:	Place the aircraft back in a trimmed 65 kt glide with the Carb Heat ON. 'Now, I want you to continue this descent in a straight line and go-around at 1000'. You have control.' **STUDENT PRACTICE.**
Lesson Point 17:	**Cruise Descent:** Place the aircraft back in straight and level flight, heading back towards the airfield. 'When we practiced descents, we practiced them with the power at idle and the speed at 65 kts. We call that a glide, but it is not the only way to descend. Now I am going to demonstrate to you a cruise descent, which is with the power at 2000 rpm (or as required) and the speed at 90 kts. Follow me through. As the rpm stays in the green range, there is no need for Carb Heat. I lookout, then reduce power to 2000 rpm, lower the nose slightly straight away, as there is no speed reduction to wait for. I trim into the descent. I still control the airspeed with attitude, leaving the power at a constant 2000 rpm. Notice that the rate of descent is lower, but the forward speed is higher, ideal for getting back to the airfield faster. To level out, as before: Power - Attitude - Trim.'
Lesson Point 18:	'Now I want you to practice entering and maintaining a cruise descent at 90 kts. You have control.' **STUDENT PRACTICE.**
Approach & Landing:	Guide the student directionally towards the airfield while he carries out the cruise descent. Once a few miles out, take control and carry out a normal approach and landing. During the base and final legs of the circuit, point out that you are controlling the speed to 65 kts with elevator, just like during the exercise.
After Landing, Shutdown & Post-flight:	Allow the student to carry out the relevant checks from the checklist. Monitor the student completing the tech log and other post flight duties.

Flight Prompt Card

Ex 7.1: Climbing & Ex 8.1 Descending

CLIMB:
1: During climb TEACH/FT climbing & the climbing att. ATTITUDE controls AIRSPEED.
2: STUDENT PRACTICE maintaining climb. L-A-I
3: TEACH/FT level off. APT. PAAT.
4: STUDENT PRACTICE maintaining climb (with Lookout & Eng cx). Student levels off when told.
5: TEACH/FT entry to climb. PAT.
6: STUDENT PRACTICE enter climb, maintain, & level off when told.
7: As above but level off at assigned alt.
DESCENT:
8: TEACH 'Descending Att' & engine checks. ATTITUDE controls AIRSPEED.
9: STUDENT PRACTICE maintaining descent.
10: DEMO/FT level off. PAAT.
11: STUDENT PRACTICE LEVEL-OFF when told.
12: TEACH/FT Entry to desc.
13: STUDENT PRACTICE entry to desc, maintains & levels-off when told. PAT. L-A-I.
14: STUDENT PRACTICE as above, levelling off at assigned alt.
15: GO-AROUND: TEACH/FT entering a clb from a desc at an assigned alt, to simulate go-around. CH. 16: STUDENT PRACTICE.
17: CRUISE DESCENT: On return to airport, TEACH/FT Cruise descent (2000 rpm 90kts).
18: STUDENT PRACTICE

Debriefing

- A short debrief, ensuring the take home points are remembered – PAT & APT. One technique I sometimes use for cementing these work cycles is to tell them that when they get home, every time they go up the stairs to say to themselves 'POWER, ATTITUDE, TRIM' as they take the first step up, then on the way up to say 'attitude controls airspeed'. As they reach the top step to say 'ATTITUDE, POWER, TRIM', etc etc.

New Basic Skills

- The new basic skills that the student learns in this lesson are:
  - **ATTITUDE controls AIRSPEED**.
  - **PAT** and **APT**.
  - **PAAT.**

Common Student Faults

- It is important to emphasise in the climb and descent that attitude controls airspeed (using elevator). This will pay dividends later when flying approaches to land. Some students, may, in the climb, on finding the speed too high, attempt to reduce the speed by reducing engine power. If this happens, take control, re-apply full power and explain that we need full power in the climb, otherwise the aircraft will not climb. Repeat the mantra that 'attitude controls airspeed' and give back control.
- Students often forget to lower the nose periodically in the climb for lookout. Suggest **lookout** when the altimeter is at the 12 O'clock position, and **Ts & Ps** when it is at the 6 O'clock position.
- When levelling out from a climb, many students do not look outside and select and maintain the straight and level attitude, especially as the airspeed begins to increase. Make sure their eyes are on the horizon. Many students are told by instructors to select the straight and level attitude when levelling out from a climb, but this can cause problems, since the desired attitude is a little higher than the normal straight and level attitude due to the reduced speed initially. This can result in students losing height during the level out. Better to tell your students to lower the nose TOWARDS the straight and level attitude.
- At top of climb, make sure the student waits for the airspeed to increase before reducing power.
- Many students allow the nose to drop when entering a glide, and if the back pressure is not held, the airspeed will never reduce to the desired 65kts. Stress the need to hold the back pressure until the airspeed reaches 65 kts.
- When setting cruise power settings, the student will often look inside at the tachometer at the expense of looking at the nose attitude. This will cause the attitude to deviate from the desired straight and level. A good trick is to take control in straight and level flight and select full power. Ask the student to keep looking outside, but set 2300 rpm solely by ear, then check to see how close they were. After a few attempts, this can be done fairly accurately and will improve level outs.
- When using the carb heat during descent, many students reduce power first, then turn on the carb heat. If the carb heat is selected ON first, it gives a blast of hot air into the carburettor which will be much more effective at melting the ice.

Common Instructor Faults

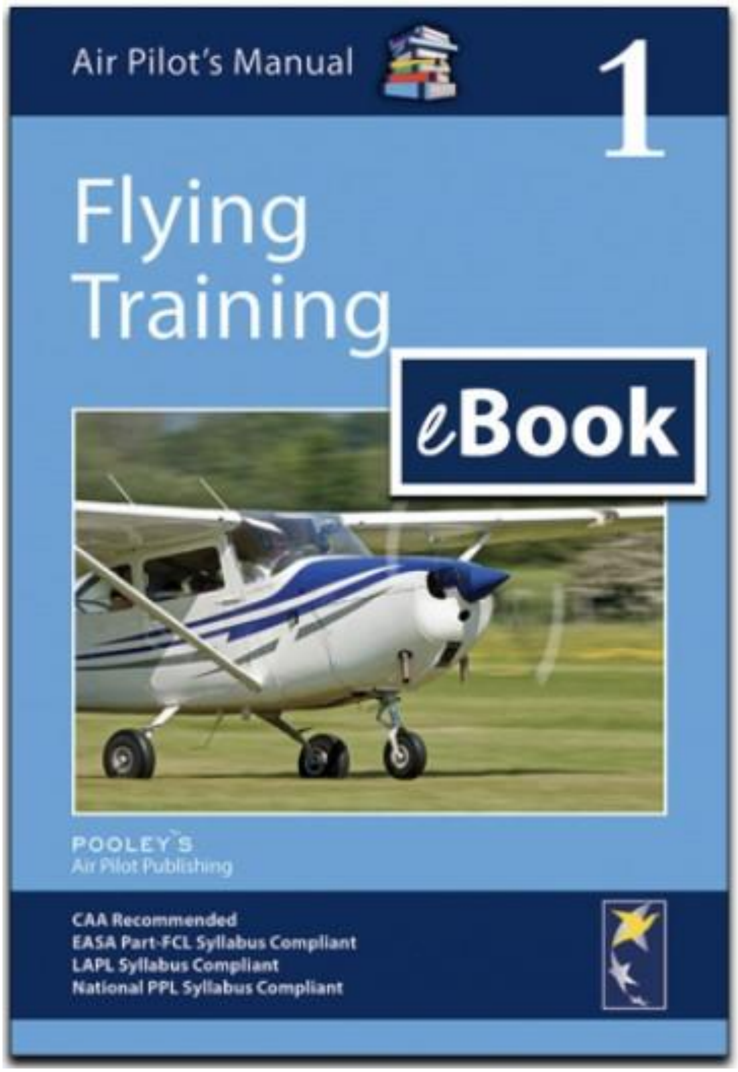
- Do not refer to 'turning' at this stage as the student has not covered this lesson yet. Use the term 'changing direction' instead.
- Many instructors teach **ATTITUDE-POWER-TRIM** at top of climb. When asked what they mean by attitude, they usually state: 'the straight and level attitude'. If a student selects the normal straight and level attitude from the climb at only 65 kts, the aircraft will descend. For this reason, it is so much better to say: progressively adjust attitude towards straight and level.
- When talking about warming the engine in descent, many instructors tell the student WHAT to do, but not HOW to do it: What to do is: Briefly increase the rpm to 2000, then back to idle. The HOW is: push in the throttle until the rpm reads 2000 rpm whilst holding the attitude steady with elevator to prevent a pitch up. Then, still holding the attitude, close the throttle to idle.

Ex 7.2 & 8.2 - Climbing & Descending 2

Long Briefing

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 8b

The Powered Descent

Aim

To control the rate of descent and the flightpath using power, while maintaining a constant airspeed.

Considerations

The Forces in a Powered Descent

If power is applied in a descent, the resulting thrust will balance some of the drag. Consequently, the component of weight acting along the flightpath need not be as great for the same airspeed to be maintained. The pitch attitude will be higher and the rate of descent less, resulting in the descent being shallower.

The pitch attitude for a powered descent is not as low as for the glide.

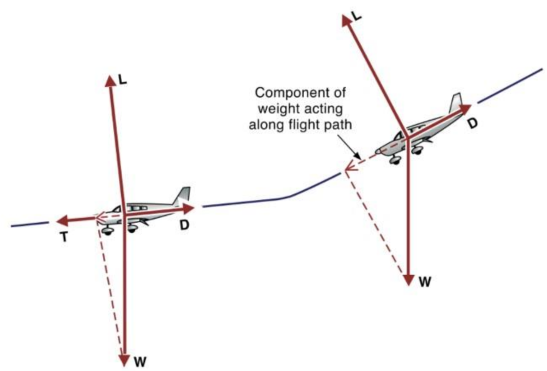


Figure 8b-1 ***Adding power flattens the descent***

Performance

Power plus attitude equals performance. The performance achieved by an aeroplane depends both on the **power** selected and the **attitude.** To alter the rate of descent and the flightpath, while maintaining a constant airspeed, both power and attitude must be adjusted – power with the throttle and attitude with the control column. This is precisely what happens on a normal approach to land and during a cruise descent.

Board Briefing

Ex 7.2 & 8.2: Climbing & Descending 2

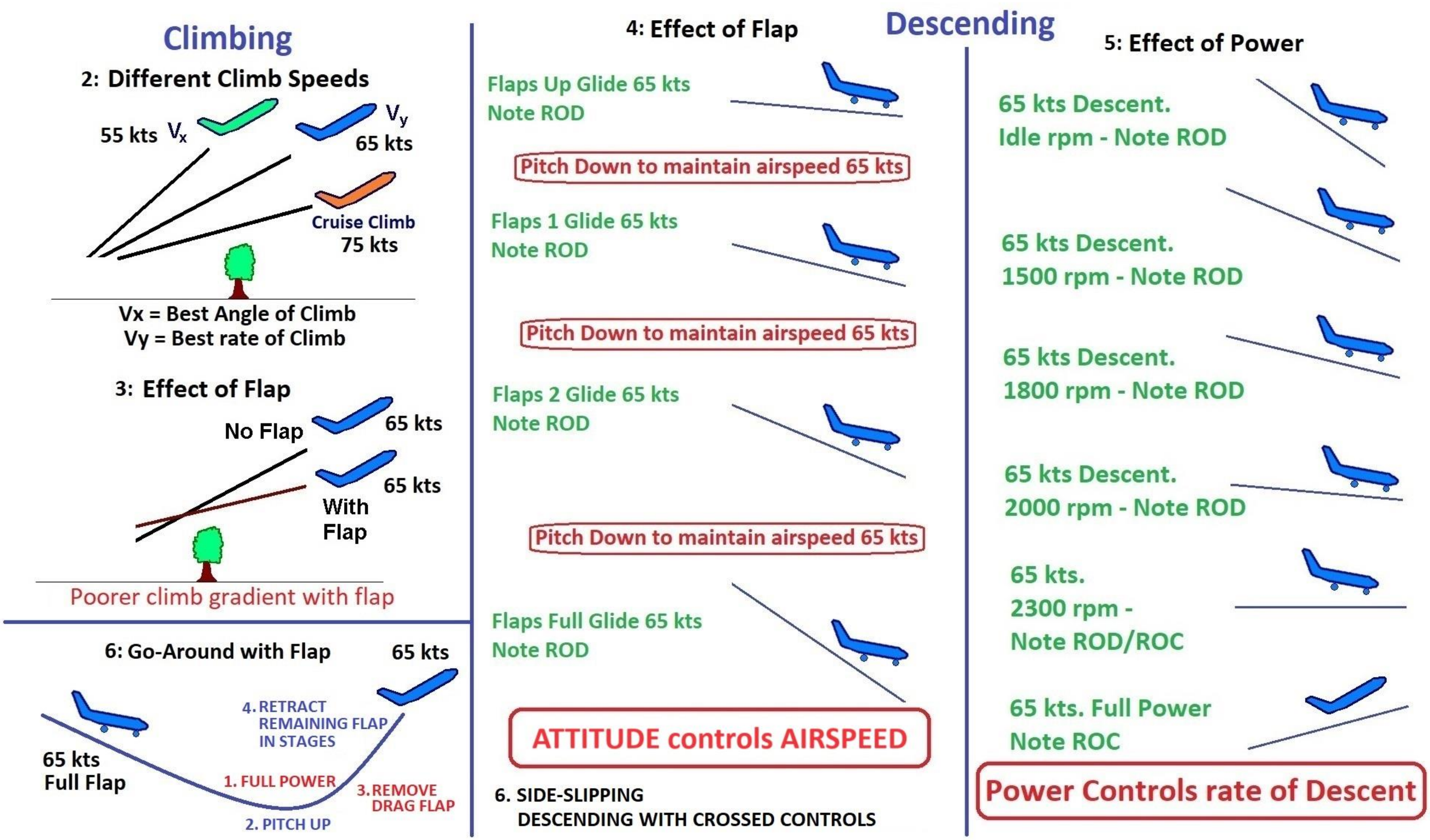
23Apr24

AIM: To learn to climb at Vx and Vy, and with flap. To learn to descend with flap and with power. To learn to perform a go-around.

T&E: Other a/c, Engine overheat, Carb icing, Obstacles and terrain, Mis-set instruments, Infringement, Loss of control, Fuel exhaustion.

M: Lookout, FREDA Cx, Carb Heat, Pre-flight planning, Airspeed awareness.

Airex: 1: Revision: Start Up, Taxi & Checks. Climbing at 65 kts.



Skeleton Board Briefing

Ex 7.2 & 8.2: Climbing & Descending 2

16Jan22

AIM: To learn to climb at Vx and Vy, and with flap. To learn to descend with flap and with power. To learn to perform a go-around.

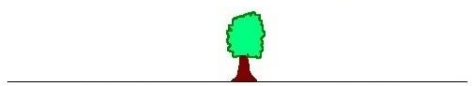
T&E:

M:

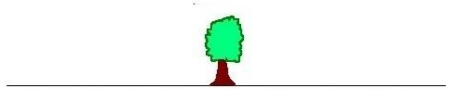
Airex: 1: Revision:

Climbing

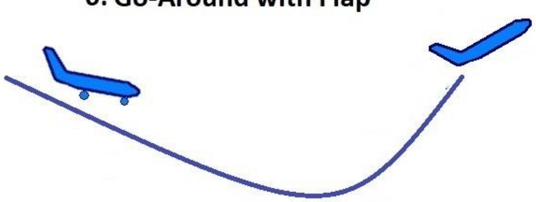
2: Different Climb Speeds



3: Effect of Flap



6: Go-Around with Flap



4: Effect of Flap

Descending

5: Effect of Power

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	Taxying and ground radio calls should now be happening without problem. Monitor all checks on the ground. Allow the student to line the aircraft up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and make all radio calls as you would expect a student to.
Lesson Point 1:	This lesson begins in the climb with revision of climbing then an introduction of climbing at different speeds and with flap. At around 1000' heading away from the airport with all checks and frequency changes complete, ask the student to maintain the climb. 'Here we are in the climb, passing 1500', note the airspeed is 65 kts. I'd like you to maintain the climb. You have control.' **STUDENT PRACTICE.**
Lesson Point 2:	After satisfactory climbing, we can now introduce other speeds: 'I have control. We are climbing at 65 kts, which is Vy for this aircraft, and it is the best rate of climb. It gets us up to our altitude in the shortest time. Now watch as I raise the nose slightly and climb the aircraft at 55 kts. Remember: Attitude Controls Airspeed. Note the higher nose attitude. This is called the best angle of climb for this aircraft and is called Vx. It is the steepest angle we can climb at, but it takes longer to climb. Now watch as I lower the nose attitude and climb at 75 kts. Note the lower nose attitude. This is a cruise climb. It allows us to climb faster, with a lower nose attitude, and more efficient engine cooling.'
Lesson Point 3:	'You have control. I would like you to continue climbing at 75 kts – cruise climb. Now I would like you to climb at the best rate of climb, Vy. Now I would like you to climb at the best angle of climb, Vx.' Etc. **STUDENT PRACTICE.** Practice climbing at the 3 different airspeeds until proficient.
Lesson Point 4:	Now it is time to introduce climbing with flap. Each time a flap selection is made, draw attention to the speed being in the white arc. 'Now we are in the climb at 65 kts. Note the rate of climb. Follow me through as we look at the effect of flap in the climb. I check the speed is below Vfe and select the first stage of flap. Notice the pitch change, which I am preventing with elevator. I now trim. Note the slightly reduced rate of climb. Now I add the second stage of flap, again preventing the pitch change and trimming to 65 kts. Note now the rate of climb is much poorer. Finally, I add the last stage of flap and trim for 65 kts. Notice now the aircraft is barely climbing at all.' 'Now, I am going to remove the flap in stages. Keep following me through. As I remove the last stage of flap and retrim to 65 kts, notice the improvement in climb rate. Now the next stage. And now we are back with no flap, climbing at 65 kts at a good rate of climb.' Now return the aircraft to straight and level, and wait and see if a FREDA check is forthcoming.

Lesson Point 5:	'Now, I would like you to put the aircraft into a climb at the best rate of climb. You have control.' **STUDENT PRACTICE.** 'Now, I would like you to select the first stage of flap and continue climbing at 65 kts. Now, add the next stage of flap and continue climbing at 65 kts. Now, the final stage of flap and continue climbing at 65 kts'. Later. 'And now, I would like you to remove each stage, always trimming the aircraft to 65 kts.'
Lesson Point 6:	Now we carry out a similar exercise in the glide. Set the aircraft up in the glide at the relevant glide speed with Carb Heat on if required. 'Now we are in the glide at 65 kts. Note the rate of descent. Follow me through as we look at the effect of flap in the glide. I check the speed is below Vfe and select the first stage of flap. Notice the pitch change, which I am preventing with elevator. I now trim. Note the slightly increased rate of descent. Now I add the second stage of flap, again preventing the pitch change and trimming to 65 kts. Note now the rate of descent is even greater. Finally, I add the last stage of flap and trim for 65 kts. Notice how the aircraft is now in a high rate of descent.' 'Now, I am going to remove the flap in stages. Keep following me through. As I remove the last stage of flap and retrim to 65 kts, notice the decrease in descent rate. Now the next stage. And now we are back with no flap, gliding at 65 kts at a normal rate. Did you see that throughout the exercise I was controlling the airspeed with elevator?'
Lesson Point 7:	'Now, I would like you to put the aircraft into a glide at 65 kts. You have control.' **STUDENT PRACTICE.** 'Now, I would like you to select the first stage of flap and continue gliding at 65 kts. Now, add the next stage of flap and continue gliding at 65 kts. Now, the final stage of flap and continue gliding at 65 kts.' Later. 'And now, I would like you to remove each stage, always trimming the aircraft to 65 kts.'
Lesson Point 8:	Probably time for another FREDA check. Now we look at the effect of power on the rate of descent. Set the aircraft up in the glide at the relevant glide speed with Carb Heat on if required. 'Now we are in the glide at 65 kts. The power is at idle. Note the rate of descent. Follow me through as we look at the effect of power in the glide. I will now increase the rpm to 1500. Notice the pitch change, which I am preventing with elevator. I now trim. Note the reduced rate of descent. Now I increase to 1800 rpm, again preventing the pitch change and trimming to 65 kts. Note now the rate of descent is even less. Now I increase to 2000 rpm, again preventing the pitch change and trimming to 65 kts. Note now the rate of descent is less again. Now I increase to 2300 rpm, again preventing the pitch change and trimming to 65 kts. Note now the rate of descent is more or less zero. Finally, I add full power and trim for 65 kts. Notice now the aircraft is climbing. Now, I am going to decrease the power in stages. Keep following me through. As I reduce to 2300 rpm and retrim to 65 kts, notice the aircraft has stopped climbing. Now I reduce to 2000 rpm and we descend gently. Further reduction to 1800 rpm gives a higher rate of descent. Even more so at 1500 rpm. And now we are at idle, gliding at 65 kts. So notice how the power controls rate of descent.'

Lesson Point 9:	'Now, I would like you to put the aircraft into a glide at 65 kts. You have control.' **STUDENT PRACTICE.** 'Now, I would like you to increase the power in stages and continue gliding at 65 kts. First 1500 rpm, then 1800, then 2000, then 2300 and finally full power.' Later. 'And now, I would like you to reduce the power in stages, always trimming the aircraft to 65 kts. So in summary – Attitude Controls Airspeed & Power controls Rate of Descent.'
Lesson Point 10:	Now it is time to combine both of these together in one exercise. Find a suitable field in the local area – ideally one that looks like a runway, or even a disused airfield or farm strip. Set the aircraft up in the base leg configuration – 2 stages of flap, 1500 rpm, carb heat ON at 65 kts. 'Now, do you see that disused runway in front of us over there? We are going to pretend that is our runway and make an approach to it and then go-around. Follow me through as I demonstrate. So I am going to enter a descent with 1500 rpm and 2 stages of flap. First, the carb heat on. Then reduce the power to 1500 rpm, looking outside. I am preventing the nose from dropping by applying back pressure. Notice the airspeed reducing as I maintain 2500'. Now the airspeed is below Vfe I add 2 stages of flap, still holding 2500'. Now the speed is 65 kts, I will lower the nose slightly to maintain 65 kts with elevator, and trim. So, looking at our runway, I think we are a little too high, so I will reduce the rpm slightly as power controls rate of descent. I pitch down slightly to maintain 65 kts as attitude controls airspeed.' Later: 'Now, I think we are a little low, so I will add some power as power controls rate of descent. I pitch up slightly to maintain 65 kts as attitude controls airspeed. And we will continue like this all the way down. How is my speed? It is 70 kts, so I am a little fast. Attitude controls airspeed, so I pitch up a little. There are only 2 things I need to look at during the approach – the runway and the airspeed. Once we get to 1000' I will go around.' At 1000': 'So at 1000', it is time to go around - Full power, pitch to the climbing attitude, prevent yaw with rudder, aiming for 65 kts. Now we have a positive rate of climb on the VSI and the speed is 65 kts, I raise one stage of flap. Controlling the speed to 65 kts with elevator. Again, showing a positive rate of climb on the VSI and the speed is 65 kts, I raise the last stage of flap. Controlling the speed to 65 kts with my attitude. We are now climbing away.' Level out at 2500' and reposition to the same of similar field.
Lesson Point 11:	'Now, there is our runway again. I want you to enter a powered descent at 1500 rpm, 2 stages of flap and make an approach to that runway, going around at 1000' You have control.' **STUDENT PRACTICE.** At this stage, the student is unlikely to know if they are high or low on the approach due to lack of experience at seeing the visual picture. Ask them throughout whether they think they are high or low. Then, if necessary, correct their thinking. If no corrective action happens, repeat the mantra: Attitude controls airspeed – Power controls rate of descent. If still no correction, then a little gentle coaching is appropriate.

Lesson Point 12:	Now we repeat the exercise using full flap and 60 kts, ie the final approach configuration. Return to the suitable field in the local area. Set the aircraft up in the base leg configuration initially at 65 kts. 'Now, there is our runway again in front. We are going to repeat the exercise, but this time we will use full flap for the approach, and then go-around. Because we have the extra flap, we use 60 kts as our approach speed. Follow me through as I demonstrate. So, as before, I am going to enter a descent with 1500 rpm and 2 stages of flap. First, the carb heat on. Then reduce the power to 1500 rpm, looking outside. I am preventing the nose from dropping by applying back pressure. Notice the airspeed reducing as I maintain 2500'. Now the airspeed is below Vfe I add 2 stages of flap, still holding 2500'. Now the speed is 65 kts, I will lower the nose slightly to maintain 65 kts with elevator, and trim. Now I add the final stage of flap, and hold 60 kts, controlling the speed with attitude as before. So, looking at our runway, I think we are a little too high, so I will reduce the rpm slightly as power controls rate of descent. I pitch down slightly to maintain 60 kts as attitude controls airspeed.' Later: 'Now, I think we are a little low, so I will add some power as power controls rate of descent. I pitch up slightly to maintain 60 kts as attitude controls airspeed. And we will continue like this all the way down. How is my speed? It is 55 kts, so I am a little slow. Attitude controls airspeed, so I pitch down a little. There are only 2 things I need to look at during the approach – the runway and the airspeed. Once we get to 1000' I will go around.' At 1000': 'So at 1000', it is time to go around - Full power, pitch to the climbing attitude, prevent yaw with rudder, immediately retract the last stage of flap - the drag flap, aiming for 65 kts. Now we have a positive rate of climb on the VSI and the speed is 65 kts, I raise the next stage of flap, controlling the speed to 65 kts with my attitude. Again, showing a positive rate of climb on the VSI and the speed is 65 kts, I raise the last stage of flap, controlling the speed to 65 kts with my attitude. We are now climbing away. So you see when we perform a go-around with full flap, it is important to retract that last stage straight away, as it produces a lot of drag and prevents us climbing away at a good rate.'
Lesson Point 13:	Level out at 2500' and reposition to the same of similar field. 'Now, there is our runway again. I want you to enter a powered descent at 1500 rpm, 2 stages of flap initially, and then full flap, and make an approach to that runway at 60 kts, going around at 1000'. You have control.' **STUDENT PRACTICE.** As before, a little gentle coaching is appropriate.

Lesson Point 14:	Now, we introduce the sideslip. Take the aircraft up to a suitable altitude, say 3000' and get the student to establish in a clean glide towards a reference point. 'Now, some aeroplanes don't have flaps to help them descend more steeply. Sometimes we might want to descend at a higher rate of descent than a glide will allow. This is when we might use a side slip. I want you to set the aircraft up in a glide without flap at 65 kts towards that field over there. You have control.' **STUDENT PRACTICE.** Once satisfactory - 'Good. I have control. Follow me through as I place the aircraft in a sideslip. First, let's notice our rate of descent – it's about 800 feet per minute. Now I start to press on a rudder pedal, I'll use the left this time. As I press the left rudder, the aircraft nose moves to the left, so I can counteract that by applying right aileron to keep us pointing towards the field. Now I apply more rudder, and more aileron, still maintaining direction. I'm also having to pitch down to maintain our 65 kts. Notice now, that the rate of descent is over 1000 feet per minute. Finally I have almost full left rudder and quite a bit of right aileron and you can see that to maintain the 65 kts, we have a very high rate of descent. Notice that my controls are crossed – left rudder, right aileron, and it feels a little uncomfortable as we are tilted at an odd angle. In this configuration we have to be very careful we don't let the speed get too slow, so it's not something we would do often. Now to return to a normal glide, I slowly release the rudder pressure and aileron and glide at 65 kts.' Level the aircraft out and ask the student to climb back up to 3000'. 'Now, I would like you to climb up to 3000' for me at the best rate of climb, and level out there - you have control.' **STUDENT PRACTICE.** 'Now, I would like you to practice sideslipping. First set up in a 65 kt glide, then gently put the aircraft into a sideslip, left or right, leading with rudder, then aileron. Remember to watch your airspeed carefully. You have control.' **STUDENT PRACTICE.**
Lesson Point 15:	By now, the student should be able to find their way back to the airfield, and if some ground briefing has been done on the subject, this is a good time to allow them to make a rejoin call and response. 'Do you know where you are, and where the airfield is? OK, take me back to the airfield and I will talk you through setting up the aircraft for final approach.' Guide the student throughout the rejoin by giving headings and altitudes to fly. Once on base leg. 'OK, I now want you to set the aircraft up in a powered descent at 1500 rpm, 2 stages of flap and 65 kts, just like we did earlier. Keep an eye on the runway, and we will shortly line up with it. OK, you can bank to the left to line up with the runway now. Now I want you to add the final stage of flap and control the airspeed to 60 kts with attitude. Only 2 things you need to look at – the runway and the airspeed. Lots of small adjustments.'
Approach & Landing:	As long is the approach is reasonable allow it to continue. Once it gets too divergent: 'I have control.' Take over and continue to talk through your actions to touchdown.

After Landing, Shutdown & Post-flight:	Return control to the student after vacating and at a standstill. Make the student carry out the relevant checks from the checklist. If previously discussed, they should make any radio calls for taxy. Monitor the student parking, shutting down, securing the aircraft and completing the tech log.

Flight Prompt Card

Ex 7.2: Climbing 2 & 8.2 Descending 2

1: REVISION: Handover during clb. Student maintains.
2: TEACH: Climb at Vx, Vy & Cruise Climb. ATTITUDE controls AIRSPEED.
3: STUDENT PRACTICE.
4: TEACH/FT: Set up in clb at 65kts - add flap in stages. L.O.I. Retrim. Note Rate of Climb. Remove flap in stages.
5: STUDENT PRACTICE.
6: Set up glide at 65kts (CH). NOTE VS. Select Flap 1, Pitch for 65kts, Trim. NOTE VS. Select Flap 2, Pitch for 65kts, Trim. NOTE VS. Select Flap 3, Pitch for 65kts, Trim. NOTE VS. Then retract flap in stages repeating as above. 7: STUDENT PRACTICE.
8: TEACH/FT: Set up glide at 65kts (CH). NOTE VS. Set 1500 rpm, Trim. NOTE VS. Set 1800 rpm, Trim. NOTE VS. Set 2000 rpm (CH in) Trim. NOTE VS. Set 2300 rpm, Trim. NOTE VS. Set Full Power, Trim. NOTE VS. Then in reverse back to Idle (CH) NB: POWER controls ROD.
9: STUDENT PRACTICE.
10: Choose field ahead into wind. Set up 65kt glide (CH) at ~2000', flap 2, 1500 rpm. (Base Leg config). Show windscreen position & control via POWER controls ROD, ATTITUDE controls AIRSPEED. Keep field in ideal position.
11: STUDENT PRACTICE. 12: Repeat TEACH/FT at Flap 3/60kts. (Final Config). At min alt, Go-Around (flap to 2 ASAP). 13: STUDENT PRACTICE.
14: TEACH Sideslipping & STUDENT PRACTICE.
15: REVISION: On return to airfield, student sets up approach.

Debriefing

- It is absolutely essential at this stage that the student understands the most important message of this lesson: Attitude (Elevator) Controls Airspeed & Power controls Rate of Descent. Make sure in debriefing that this message has sunk in. Ask the student the following 4 questions:

On approach to land:

- What would you do if the aircraft was **TOO FAST**?
- What would you do if the aircraft was **TOO HIGH**?
- What would you do if the aircraft was **TOO SLOW**?
- What would you do if the aircraft was **TOO LOW**?

New Basic Skills

- The new basic skill that the student learns in this lesson is: **POWER controls RATE of DESCENT.**

Common Student Faults

- In the entry to the powered descent with 2 stages of flap, it is very common for the student to allow the aircraft to descend before the 2 stages of flap and the 65 kts have been achieved. This exercise is the set-up for approach on base leg, and so it is very important that the student gets it right. If necessary, take control and demonstrate again the correct entry.
- Students may be looking at all sorts of things during the simulated approach to the field. Stress that there are only 2 important things at this stage – The runway to assess height, and the airspeed.
- In a go-around, the rudder is often missed leading to change of direction. Also there is often a delay in getting the aircraft climbing. A nice positive transition from descent to climb is the order of the day.
- Make absolutely sure the student gets the go-around actions with full flap correct. It is common to see the drag flap left down for far too long. Also, the transition from descending to climbing flight needs to be positive and without direction change.

Common Instructor Faults

- By the time they become an instructor, most pilots are no longer flying approaches using the mantra - Attitude Controls Airspeed & Power controls Rate of Descent. By then, it tends to have become a co-ordinated combination of the two, or Pitch & Power (see later in Ex13). When pattering your own approaches to land, bear this in mind so as not to confuse the student.
- When talking about reducing airspeed, do not use the phrase 'airspeed coming back to 65 knots' or similar. The phrase is 'airspeed reducing to 65 knots'.
- When setting up the approach to a field in the local area, make sure that the aircraft is not high on approach. In fact, making sure that the aircraft is low will make sure that the student has some corrections to make.

Ex 9 – Medium Level Turning

Practical Considerations

- Divided into 9.1: Level turns & 9.2: Climbing and Descending Turns. A good student & instructor should be able to combine both lessons.
- Ex 7 & 8 (Climbing & Descending) and Ex 9.1 (Level Turning) can be done in either order. If the cloud base does not permit lesson 7 & 8 to be carried out, consider moving on to Ex 9.1, but remember that Ex 9.2 requires climbing and descending to be already covered, so that exercise should not be attempted at this stage.
- Always begin with maintaining the turn, as it is the crux of the exercise. Stress the work cycle: **LOOKOUT-ATTITUDE-INSTRUMENTS**. Next comes the entry to the turn – once entered they can already maintain it. Lastly teach the rollout. As the student has already mastered straight and level, all you really have to say to get them to rollout correctly is 'select the straight & level attitude'.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

Long Briefing

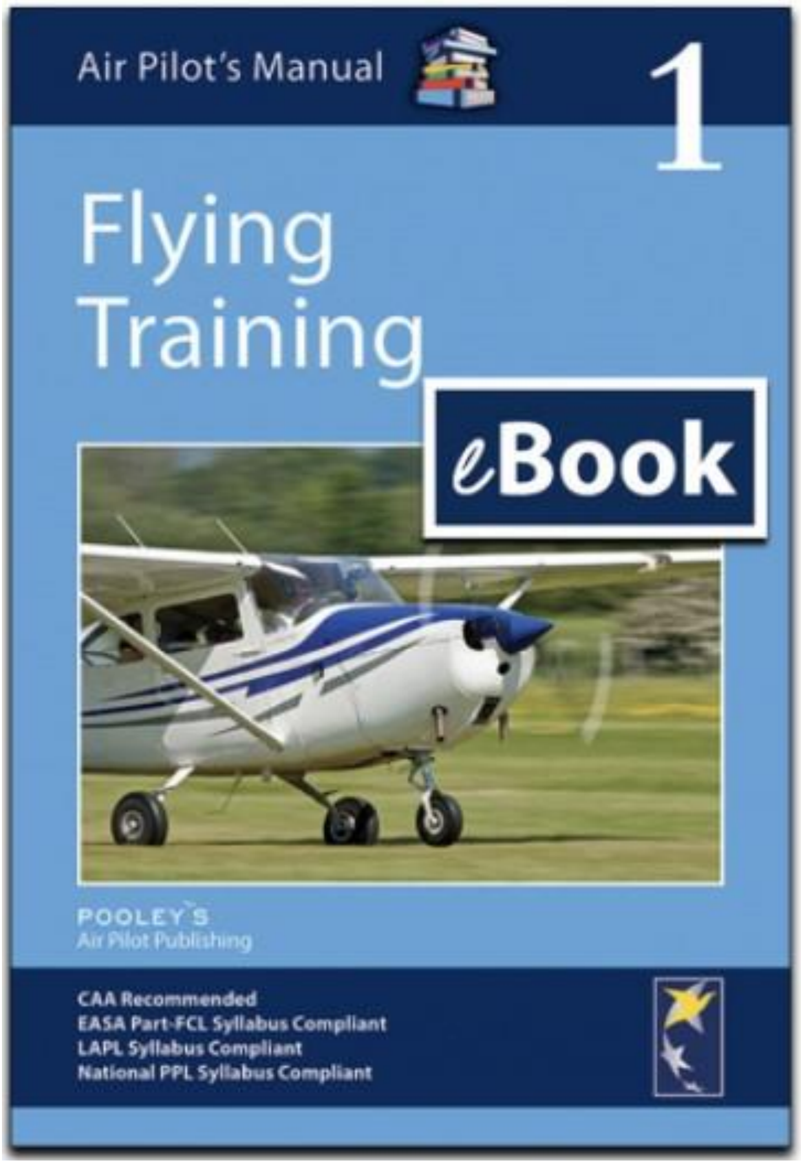
From EASA Part-FCL:

Long briefing objectives:
(1) the forces;
(2) use of controls;
(3) use of power;
(4) maintenance of attitude and balance;
(5) medium level turns;
(6) climbing and descending turns;
(7) slipping turns;
(8) turning onto selected headings: use of gyro heading indicator and magnetic compass.

Ex 9.1 – Level Turning

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 9a

The Medium Level Turn

Aim

To fly a medium level turn at constant power.

Considerations

What is a Medium Level Turn?

A medium level turn is a turn performed:

- **at a constant height;** with
- **a medium angle of bank** (30° or less);
- **at constant power;** and
- in balance.

Apart from the medium level turn, other turns which you will master in the course of your training are:

- climbing turns;
- descending turns;
- **rate 1 turns** (a rate of turn to achieve 360° in 2 minutes);
- **steep turns** (bank angle 45° or greater).

The Forces in a Turn

A turn is achieved by banking the aeroplane.

Banking the aeroplane tilts the lift, which provides a horizontal turning force (known as the *centripetal force*). Since there is no other horizontal force to counteract it, the aeroplane is no longer in equilibrium and will be pulled into a turn. The greater the bank angle, the greater the turning force.

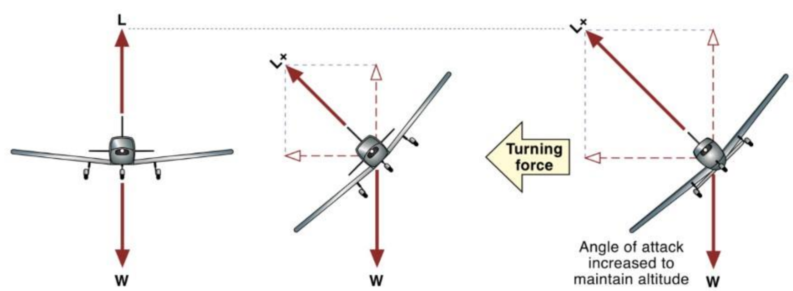


Figure 9a-1 **Banking an aeroplane creates a turning force**

Board Briefing

Ex 9.1: Level Turning

11 May 23

Aim: To learn to turn, in level flight, at 30° angle of bank onto various headings.
T&E: Other a/c, Disorientation, Infringement.
M: Lookout, Anchor Point, Pre-flight Planning

Airex: 1: Revision: Start-UP, Taxi, Climb to 3000', Checks

3: Entry

Lookout Esp In direction of turn.

Bank: 30° with Ailerons

Balance: With Rudder

Then Centralise Controls

Pitch: Back Pressure with Elevator
To maintain altitude
DO NOT TRIM

2: Maintaining

Lookout: Esp in Direction of Turn

Control with:

Elevator: Maintain Attitude & Altitude
Ailerons: Maintain Correct Bank Angle
Rudder: To Balance

DO NOT TRIM IN THE TURN

Lookout - Attitude - Instruments
Alt, Ball, DI

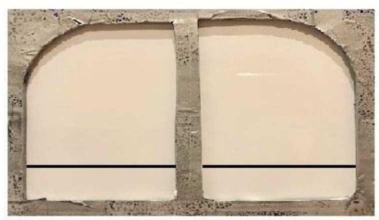
4: Rollout

Anticipate

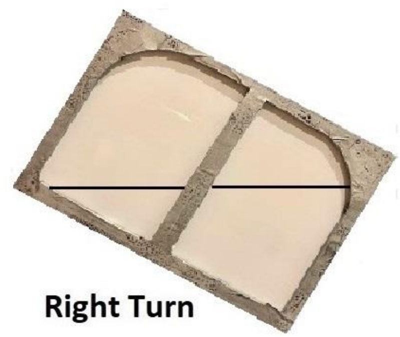
Wings Level with Aileron
Balance with Rudder
Pitch Attitude Release pressure on Elevator

Lookout

Left Turn



Straight & Level



Right Turn

Different Outside Pictures

5: Turning onto a Feature
Anticipation

6: Turning onto a Heading
Anticipate by 10° (1/3 AoB)

<u>**Skeleton Board Briefing**</u>

Ex 9.1: Level Turning

30 NOV 21

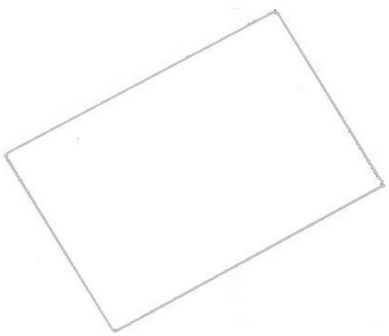
Aim: To learn to turn, in level flight, at 30° angle of bank onto various headings.

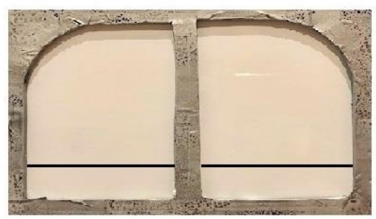
T&E:

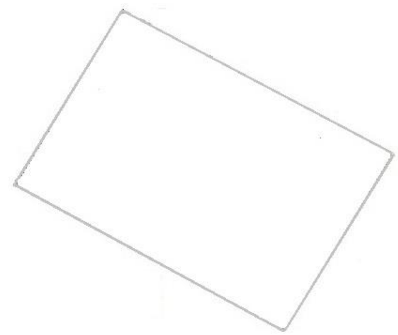
M:

Airex: **1: Revision:**

3: Entry | **2: Maintaining** | **4: Rollout**







5: **6:**

Pre-Flight Briefing

Make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

The following is suggested speech for the board briefing above to 2 students, A & B:

'Good morning, today we are going to do exercise 9, turning. There are 2 parts to turning - the first part we are going to look at today is level turns. The second part which we will do tomorrow is climbing and descending turns.

So the aim today is written on the board – To turn, level using 30 degrees angle of bank onto various headings.

We are going to discuss some threat and error management before we go into the main briefing. Looking out of the window here, I can see blue sky and sunshine, and I can hear lots of aeroplanes. What may be a big threat once we get airborne? Student A?'
'Other aeroplanes being in our way'
'Yes, other aeroplanes are also going to be in the local area. How are we going to manage not to hit those, Student B?'
'Good lookout'
'Yes, so if either of us see an aeroplane today, we will point it out to the other person, using the normal way.
Now, we are going to be doing lots of turning during this exercise, going round and round and round. What might be a threat to us if we are doing all this turning, Student A?'
'Becoming disoriented as to where we are?'
'Yes. Disorientation can be a problem, and considering that we fly near controlled airspace, not knowing where we are could lead to further issues. So, we need a method to keep us oriented. How might we do that, Student B?'
'Familiarity with local features and an anchor point.'
'Good. Now, a very useful anchor point here at Blackbushe is the town of Newbury. It is large and unique, as it has Greenham Common to the SE and a racecourse in the city centre. I will point that out to you today, and you can use it to help with orientation. So, Newbury will be our anchor point today.'
'I mentioned controlled airspace earlier. What possible error could we make there, Student A?'
'We could turn into or climb into the airspace by mistake.'
'Yes, so how can we manage not to do that, Student B?'
'By using our anchor point, and chart and some pre-flight planning.'
'Absolutely. We can decide before the flight, that if we stay south of Newbury at 3000' or below, we won't enter controlled airspace.'

'That will be enough for us to consider today on the threat and error management side.'

'Let's move on to the actual flight itself. After we finish this briefing, I want you to do the pre-flight tech log and book out with ATC and then go to the aircraft and carry out the pre-flight checks. Then we will get in together, you will start up the engine using the checklist. I'd like you to make the radio calls and taxi to the run-up area, where I want you to do the power checks and the before take-off checklist. Then line me up on the runway for my take off. I will take-off and get us heading towards Newbury. I will then give you control and ask you to climb in that direction to 3000', level out and carry out any checks. Let me know when you have completed that, and I'll begin the exercise.'

‘The first thing I am going to do is point out where Newbury is, and then I will show you what a level, 30° angle of bank turn looks like. It will only be a demonstration. During the demonstration, I want you to do 2 things. The first thing I want you to do is look over the nose of the aeroplane as I turn to the left, and I want you to look at the attitude, and as I continue the turn, I want you to notice where the horizon cuts the nose of the aircraft. The second thing I want you to do, after you have recognised that attitude, is that I am going to give you control of the aircraft briefly during the demo, and I want you to tell me what you feel on the controls. What do you think you might have to do to with the elevator to maintain a level turn at 30° angle of bank, Student A?’

‘Apply some back pressure’

‘Yes, that’s right, a little bit of back pressure. You’ll feel how much it is, when you actually take control yourself. I am going to fly a full 360° turn to give you a chance to do those 2 things – note the attitude and feel the back pressure. Every time we roll out of a turn, I want you to try to locate Newbury, so that we can keep orientated.’

‘So that will demonstrate what are trying to achieve by the end of the flight. I am going to break the turn down into 3 parts. The first part of the turn is going to be teaching you how to maintain the turn. So, I will enter the turn to the left, and then, once we are established in the turn I will ask you to follow me through on the controls, and we will look at a work cycle that will help us maintain the turn. Once we have the correct turning attitude, we will go into the work cycle. Now, we don’t want to hit anyone else while we are doing this turn, so what did you say we must do, Student B?’

‘Lookout’

‘Yes, so we need to lookout. So here is our model aeroplane turning to the left. We are going to start by looking to the far left, near the tail, and look above and below the horizon, all the way around until we get to the front, looking for other aeroplanes. Now, let’s say that by the time we get to the front, this is the attitude we see.’ Move cut-out on board so that the nose has dropped.

‘Student A, what is the problem here?’

‘The nose is too low’

‘Correct, so maybe during the lookout, we have relaxed a little bit, and let the nose go down. So we will pause at this stage in the lookout and re-select the correct attitude. How are we going to do that, Student B?’

‘Back pressure on the elevator’

‘We can apply some more back pressure on the elevator to regain the correct attitude.’ Move cut-out on board so that the angle of bank has reduced to 15°.

‘Student B, what is the problem here?’

‘The angle of bank is wrong.’

‘Yes, so maybe during the lookout, we have relaxed a little bit, and let bank reduce. So we will pause at this stage in the lookout and re-select the correct attitude. How are we going to do that, Student A?’

‘Increase the bank using aileron.’

‘Yes, If the angle of bank was wrong, we need to use aileron to regain the correct attitude. But how can we be sure that this attitude is indeed going to give us a level turn? What instrument are we going to look at? Student A’

‘The altimeter’

‘Exactly. Student B, what time is it?’
‘1015.’
‘Great, it took you about 3 seconds to look at your watch and tell me that. So, that’s how long I want you to look at the altimeter for, and then look outside again to check the attitude. We don’t want to be staring at the altimeter. Glance at it, and then think about what the altimeter was telling you while looking out at the nose of the aeroplane, maintaining the attitude. If the altimeter is still moving slightly, then, adjust the attitude in pitch to stop it. If, however, the altimeter was correct, then we can continue the lookout. So the work cycle is: LOOKOUT - ATTITUDE - INSTRUMENTS’

‘In a low wing aeroplane, it can be difficult to see past the wing, but look as best you can, both sides of the wing, starting from the back to the front. LOOKOUT - ATTITUDE - INSTRUMENTS.’

‘Now we also want to maintain balanced flight, so what other instrument should we look at to make sure we are in balance, Student B?’
‘The balance ball.’
‘Yes, so as well as the altimeter, we can glance at the ball for a few seconds. We carry on our lookout all the way round again using the work cycle. And we recognise that this is exactly the same work cycle we used for straight and level flight.’
‘Once I have taught you how to fly the turn, I will give you control and allow you to practice.’
‘Once you have successfully learned to maintain the turn, the next thing I’m going to teach you is how to enter the turn. First of all, let’s find out where we are. Where is our anchor point again, Student A?’
‘Newbury’
‘So find Newbury, check our location is suitable, and then we will lookout for other aeroplanes. Having looked out, we can then enter the turn. Student B, can you describe how you would enter the turn using the various controls?’
‘I would use the ailerons co-ordinated with the rudder to ensure a balanced roll into the turning attitude you showed me.’
‘Yes, rudder to keep the ball in the middle and aileron to select the 30° angle of bank. How are you going to deal with the back pressure requirement?’
‘I am anticipating some back pressure required, but I will be looking out for the correct attitude.’
‘Exactly. So it is a co-ordinated manoeuvre. We are flying along straight and level we have checked the area is clear, so we use the ailerons with rudder to balance the turn, to roll to 30° angle of bank, and as we get there, you are looking over the nose, and if you see any change in the attitude, then you haven’t got enough back pressure on. It’s only a small amount, so add some back pressure if needed. If it changes once you get there, you know to deal with that as you’ve just done the work cycle. So carry on and maintain the turn.’

‘So, I will teach you how to enter the turn, then I will roll the wings level again and we can orientate ourselves again. Then I will give you control and you will enter and maintain a 30° angle of bank turn to the left.’

‘The final element to the turn is rolling out. If I said to you, Student A, select straight and level flight, what would you do with the controls?’
‘I would rotate the control column to the right and balance with rudder.’
‘OK, and what about the extra back pressure you are holding?’
‘I would gently release it.’

‘Yes, and that in essence, is rolling out of a turn. So you actually already know how to do that. However, I will teach you, with you following through on the controls, that very manoeuvre. We will use aileron and rudder to select straight and level while reducing the back pressure to select the attitude for normal cruise.’

‘While we are in the turn, we will lose a couple of knots airspeed, but it’s not significant and we will regain them when we rollout back to straight and level flight.’

‘Once we have completed the turn, what do we need to do to make sure nothing is sneaking up on us from the right? Student B?’
‘Lookout to the right.’
‘Yes, lookout in the direction that was blocked during the turn. In this case, the right. Do that immediately you have got the wings level. Then you can return to your straight and level attitude and maintain it using our work cycle.’

‘Once you have done that, we will return to the beginning and I will ask you to enter, maintain and rollout of a turn to the left when I tell you to. We will practice that a couple of times.’

‘Now, obviously, we don’t just want to be able to turn to the left. We want to be able to turn both ways. The only difference between turning to the left and turning to the right in our aeroplane, is the picture out of the front window. Because we are sat side by side, the picture will look different. So, I will demonstrate to you the turning picture to the right. During the demonstration, I want you to look over the nose of the aeroplane and remember the picture. There is no point in me teaching you how to enter, maintain and roll out of the turn, because the technique is identical. It’s just the picture that is different. So, then I will let you have a go at turning to the right. Once again, I will tell you when to roll out.’

Now, it’s no good just rolling out on any old heading. We really want to be able to roll out in a particular direction. One useful thing to be able to do, is to turn the aeroplane around and point it where we want to go. And where we want to go might be back to the airfield. So, when you have practiced a few turns in both directions, I will ask you to orientate yourself and find the airfield in relation to where we are Then I will teach you how to roll out pointing at the airfield or another feature. Entry and maintaining the turn are the same, it’s just the roll out that we need to look at. Let’s say we are turning to the right. The problem is, if you wait until the airfield appears on the nose, by the time you roll out, it will be too late. The airfield will now be to the left. So, we have to anticipate the point at which we begin the rollout.’

I want you to put your arms out straight in front of you. Look at where your hands are. That is the position that the airfield needs to be when you begin your rollout. Turning right on the right hand, turning left on the left hand. So, when you see the airfield in that position, that’s where you start the roll out. So, you will enter and maintain a turn, and I will take over and teach you how to roll out on a feature in that way. Now, this isn’t an exact science, so it may be that when you roll out from your turn, that the feature is still a small way to one side of the nose. If that’s the case, all we need to do is apply a few degrees angle of bank towards it and allow the aircraft to drift across. Once it’s on the nose, roll the wings level.’

‘Now, that’s fine if we want to roll out on a big feature, but in our aim, we stated that we wanted to roll out on specific headings. What do we use to make sure we are flying on a particular heading, Student A?’
‘The D.I.’
‘Yes, and so we therefore need to include the D.I. in our work cycle during the turn. Now, how often we glance at the D.I. will depend on how much of a turn we are doing. The closer we are to our heading, the more we will need to look at it. Just as when we rolled out on a feature, when we roll

out on a heading, we must anticipate the rollout. If we start our rollout when we reach the heading, we will overshoot. So, how many degrees do you think we should anticipate by, when we roll out on a specific heading, Student B?'

'Maybe 10 degrees?'

'Yes, that should work. We use one third of the angle of bank, and that tends to work nicely. Here we are using 30^o angle of bank, so 10^o anticipation should be perfect. So, we enter and maintain the turn in the normal way. Let's assume a large left hand turn. For the first part of the turn we don't really need to glance at the D.I. as we have a long way to go. But as we get closer to our desired heading, we need to start looking at the DI more. Once we get to 10^o before the heading, we need to look over the nose and begin the rollout. As before, if after the rollout, we notice we are a few degrees away from the desired heading, all we need to do is apply a few degrees angle of bank towards it and allow the aircraft to drift across. Once it's on the nose, roll the wings level. So you will enter and maintain the turn. Then I will take control and teach you how to roll out on a specific heading. After that, I will give you control and headings to fly for practice. Once we've completed that, I will once again ask you to orientate yourself. I will ask you to locate the airfield and tell me which way to turn to get there. You will then turn the aeroplane, using the techniques we have just learned and point me at the airfield, and fly back towards it. Now you haven't done approach and landing yet, so I will take control and do that for you. After landing, I will give you control and you can carry out the checks and taxi back to parking and shutdown. Then we will return here for a debrief.'

'Do you have any questions on what we are going to do?'

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	Taxying and ground radio calls should now be the norm. Make sure no bad habits creep in. Monitor all checks on the ground for accuracy. Allow the student to line the aircraft up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls.
Lesson Point 1:	This lesson begins in the climb with revision of the climbing lessons. Instruct the student to climb at various speeds to a suitable altitude for the exercise. There will be no further mention of FREDA checks in this lesson. The student must now be carrying them out regularly or reinforcement is needed. 'Here we are passing 1000' in the climb at 65 kts. I want you to continue the climb, level out at 3000'. You have control.' **STUDENT PRACTICE.**
Lesson Point 2:	Set the aircraft up straight and level at the normal cruise speed. You are just going to show the student the left turn at this stage. Make a 30 degree banked turn to the left. Draw their attention to the turning attitude. 'We are now in a medium level turn to the left. Notice the picture out the front window. I am having to apply a small amount of back pressure to maintain ailerons, but there is no need to trim in a turn. Most of my attention is outside, checking the correct attitude and looking for other aircraft, occasionally glancing at the altimeter to check the altitude, and the balance ball. Lookout – Attitude – Instruments. Roll back to straight and level.
Lesson Point 3:	Roll back into a medium turn to the left. 'We are now in another turn to the left. I am going to give you control and I want you to maintain this left turn. You have control.' **STUDENT PRACTICE.** Student maintains the left turn. Make sure they are mostly looking outside and occasionally glancing at the altimeter and balance ball. Stress: Lookout – Attitude – Instruments. Once the turning is satisfactory: 'I have control.'
Lesson Point 4:	Remain in the left turn. The student is already familiar with the straight and level attitude, so returning to it should cause no problems, however a follow through of the control inputs will be helpful. 'Now I want you to follow me through as I return the aircraft to straight and level flight using aileron and rudder together. I rotate the control column to the right and simultaneously apply a small amount of rudder to balance. I am looking out of the window to set the straight and level attitude.'
Lesson Point 5:	Make another 30 degree banked turn to the left. 'We are now in another medium level turn to the left. I want you to maintain that turn again, and when I tell you, I want to you to roll out of the turn, back to straight and level. You have control.' **STUDENT PRACTICE.** Make sure the turn is satisfactory before calling for the roll out.

Lesson Point 6:	'Now I want you to follow me through as I demonstrate the entry to a turn to the left. Lookout is really important when we are turning, so I look all around to the left. As this is a high wing aircraft, we can't see over there, as the left wing is in the way, so I'm just going to tilt the wings with aileron to have a quick look.' Obviously not necessary in low wing aircraft. In low wing aircraft, during a left turn, the right wing blocks the view to the right, so a good lookout in that direction needs to be stressed in such aircraft. 'Now, I am going to bank the aircraft to the left with aileron, and at the same time balance with left rudder. Notice now, the picture out the front window. I am having to apply a small amount of back pressure to maintain altitude, but there is no need to trim in a turn. Lookout – Attitude – Instruments. Now I am going to give you control and I want you to maintain this left turn. You have control.' **STUDENT PRACTICE.** When turn practised for a while: 'Now, I would like you to roll out of the turn back to straight and level flight.' **STUDENT PRACTICE.**
Lesson Point 7:	'Now I want you to practice the whole thing. Roll into the turn, maintain the turn until I tell you to roll back to straight and level. You have control.' **STUDENT PRACTICE.**
Lesson Point 8:	Now is a good time to demonstrate adverse yaw. Many students are unsure as to why the rudder is needed in a turn (they can turn perfectly well without it!). A demonstration here shows that the rudder is only needed rolling into or out of a turn. 'Now I want to show you something. We are now straight and level, and see how the nose is pointing towards that building in the distance. I want you to watch the nose carefully as I roll the aircraft to the left with ailerons alone.' Rotate the control column briskly to the left. 'Did you notice which way the nose moved initially? Yes, it initially moved right briefly, but then moved to the left. This is known as Adverse Yaw, and it is to prevent this that we use rudder when rolling into and out of a turn. I will now repeat that using rudder, and watch how the nose moves left straight away. I use just enough rudder to stop this adverse yaw from happening.' This is just a demonstration, and there is no need for the student to practice it. If the adverse yaw is not particularly obvious, repeat the demonstration at a lower airspeed, where it will be more significant.
Lesson Point 9:	Now we move onto medium turns to the right. Most is the same as for left turns, but the picture whilst maintaining the turn is different for side-by-side seating. 'Now I will demonstrate a turn to the right. First a good lookout, then aileron and rudder together as we roll into the turn. Now we are in the steady turn, look at the different picture out of the window. Now I will roll back to straight and level using aileron and rudder together.'
Lesson Point 10:	'Now I want you to practice a turn to the right, rolling out on my call. You have control.' **STUDENT PRACTICE.**

Lesson Point 11:	Now it is time to introduce turning onto specific headings, starting with the cardinals. 'Now I will demonstrate a turn on to a specified heading, let's use East. As before, a good lookout, then co-ordinated use of rudder and aileron into the turn. Good lookout throughout, LOOKOUT – ATTITUDE – INSTRUMENTS. About 10 degrees before East, I anticipate rolling out. Rudder and aileron together, back to straight and level flight.'
Lesson Point 12:	'Now I want you to turn onto West for me. You have control.' **STUDENT PRACTICE.** Repeat a few times.
Lesson Point 13:	Once this can be done to a good standard, ask for turns onto random headings. 'Now I want you to turn onto heading 140 for me. You have control.' **STUDENT PRACTICE.** Repeat a few times.
Lesson Point 14:	On the way back to the airfield, invite the student to navigate and practice descent (if already taught). 'Now it is time to return to the airfield. Do you know where it is? I would like you to fly me there using a cruise descent. I would like you to make the radio calls.' **STUDENT PRACTICE.** I will talk you through setting up the aircraft for final approach.' Once on base leg. 'OK, I now want you to set the aircraft up in a powered descent at 1500 rpm, 2 stages of flap and 65 kts, just like we did on the last lesson. Keep an eye on the runway, and we will shortly line up with it. OK, you can bank to the left to line up with the runway now.
Approach & Landing:	Now I want you to add the final stage of flap and control the airspeed to 60 kts with elevator. Only 2 things you need to look at – the runway and the airspeed. Lots of small adjustments.' As long is the approach is reasonable allow it to continue. Once it gets too divergent: 'I have control.' Take over and continue to talk through your actions to touchdown.
After Landing, Shutdown & Post-flight:	Return control to the student after vacating and at a standstill. The student should now need no prompting in completing the after landing actions and post flight duties.

Flight Prompt Card

Ex 9.1: Medium Level Turns

1: REVISION (Climbout by Student)
2: LEFT TURN DEMO Entry (No /FT) to a L turn. Student noting nose att & horizon. (L.A.I.)
3: STUDENT PRACTICES maintaining L turn.
4: TEACH/FT rollout.
5: Enter (No FT) a left turn. Student maintains turn (L.A.I.) and rolls-out on command.
6: Student TEACH/FT entry, maintains and rolls-out unaided.
7: STUDENT PRACTICES whole thing.
8: DEMO Adverse Aileron Yaw: Slow to 55 kts, pick a point on horizon. Ask student to watch when you use ailerons only to turn. Nose goes wrong way first.
9: RIGHT TURN. DEMO (No FT) lookout and 360º turn to Right. Student noting different nose att & horizon.
10: STUDENT PRACTICES R turns in full.
11: TEACH/FT turn to either direction rolling out on a selected cardinal point. Anticipation.
12: STUDENT PRACTICE turning to L & R, rolling-out on selected cardinal points.
13: STUDENT PRACTICE turning to L & R, rolling-out on random headings. 14: REVISION: Practice of descending on return to airfield.

Debriefing

- The benefit of a good lookout cannot be overstressed. Make sure the student has grasped this. Many students are able to perform beautiful turns on instruments (as a result of Flight Simulator programs), but struggle to do so whilst looking outside.

New Basic Skills

- There are no further basic skills learned in this lesson.

Common Student Faults

- No rudder, leading with rudder.
- Descending right turns, climbing left turns.
- No Lookout – not lifting the wing on a high wing aircraft.

Common Instructor Faults

- The student will watch everything you do and will copy your actions (bad as well as good), so make sure you carry out a good lookout at all times.

Ex 9.2 – Climbing & Descending Turns

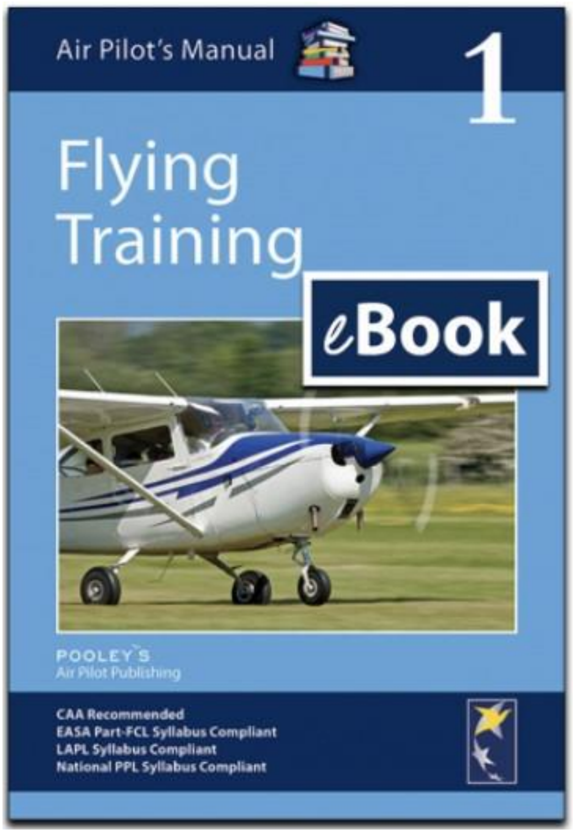
Practical Considerations

- Divided into 9.1: Level turns & 9.2: Climbing and Descending Turns. A good student & instructor should be able to combine both lessons.
- Ex 7 & 8 (Climbing & Descending) and Ex 9.1 (Level Turning) can be done in either order. If the cloud base does not permit lesson 7 & 8 to be carried out, consider moving on to Ex 9.1, but remember that Ex 9.2 requires climbing and descending to be already covered, so that exercise should not be attempted at this stage.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

Long Briefing

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 9b

The Climbing Turn

Aim

To change heading while climbing at a constant airspeed.

Considerations

The Forces in a Climbing Turn

The forces in a climbing turn are similar to those in a straight climb except that, because the lift is tilted to turn the aeroplane, its contribution to supporting the weight is reduced. The result is a decreased climb performance (reduced rate of climb) if airspeed is maintained.

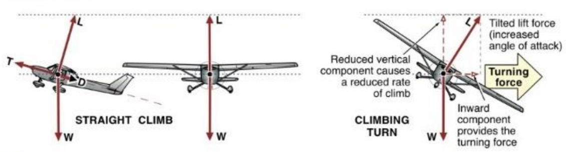


Figure 9b-1 ***A straight climb and a climbing turn***

Rate of Climb

The rate of climb depends on the excess power, i.e. the amount of power available in excess of that required to overcome the drag. Tilting of the lift and the increased drag in a climbing turn reduces the excess power available for climb performance. The result is a decreased rate of climb in a turn, as indicated on the vertical speed indicator and the altimeter.

The rate of climb decreases in a climbing turn.

The steeper the bank angle in a climbing turn, the poorer the rate of climb. To retain a reasonable rate of climb, the bank angle in climbing turns should be limited to 15° or 20°.

Limit the bank angle in a climbing turn.

Airspeed

Climb performance depends on the correct climb speed being flown with climb power set. For many training aeroplanes, climb power is maximum power, so the tendency to lose airspeed cannot be overcome by adding extra power (since there is no more). To maintain the correct climb speed in a turn it is therefore necessary to lower the nose.

Maintain airspeed in a climbing turn by lowering the nose.

Board Briefing

Ex 9.2: Climbing & Descending Turns

16Jan22

AIM: To learn to carry out climbing and descending turns.
T&E: Other a/c, Infringement, Loss of control, Obstacles and terrain, Engine Overheat, Carb icing, Disorientation, Fuel exhaustion.
M: Lookout, Pre-flight planning, FREDA Cx, Carb Heat, Anchor Pt.

Climbing Turns

ENTRY

LOOKOUT

Enter Normal Climb at 65 kts

Note Rate of Climb

Bank 20° L or R with	**Aileron**
Balance with	**Rudder**
Maintain Speed with	**Elevator**

Pitch Down required

Note New Rate of Climb

MAINTAINING

LOOKOUT - ATTITUDE - INSTRUMENTS

Use:

Elevator	to maintain	**Airspeed**
Ailerons	to maintain	**Bank Angle**
Rudder	to maintain	**Balance**

Note:
Rate of Climb
Effect of Slipstream

ROLL OUT OF TURN

Anticipate

Wings Level	with	**Aileron**
Balance	with	**Rudder**
Climb Attitude	with	**Elevator**

Note Rate of Climb

Descending Turns

ENTRY

LOOKOUT

Enter Normal Glide at 65 kts

Note Rate of Descent

Bank 30° L or R with	**Aileron**
Balance with	**Rudder**
Maintain Speed with	**Elevator**

Pitch Down required

Note New Rate of Descent

MAINTAINING

LOOKOUT - ATTITUDE - INSTRUMENTS

Use:

Elevator	to maintain	**Airspeed**
Ailerons	to maintain	**Bank Angle**
Rudder	to maintain	**Balance**

Note:
Rate of Descent
Effect of Slipstream

ROLL OUT OF TURN

Anticipate

Wings Level	with	**Aileron**
Balance	with	**Rudder**
Glide Attitude	with	**Elevator**

Note Rate of Descent

Skeleton Board Briefing

Ex 9.2: Climbing & Descending Turns

16Jan22

AIM: To learn to carry out climbing and descending turns.

T&E:

M:

Climbing Turns

ENTRY	MAINTAINING	ROLL OUT OF TURN

Descending Turns

ENTRY	MAINTAINING	ROLL OUT OF TURN

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	The student should now need no assistance or prompting to get the aircraft as far as lining up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls. Handover control shortly after take-off to allow revision of climbing at Vy.
Lesson Point 1:	This lesson begins in the climb with more revision of the climbing lessons. Instruct the student to climb at various speeds to a suitable altitude for the exercise. There should be no further prompting of FREDA checks in this lesson. **STUDENT PRACTICE.**
Lesson Point 2:	Take control from the student when the aircraft is set up in a trimmed climb at 65 kts. A demonstration with follow through of a climbing turn follows. 'I have control. We are now in climb at 65 kts. Notice the rate of climb. Follow me through as I demonstrate a climbing turn to the left. I lookout, particularly above, and roll the aircraft into a 15° bank to the left, co-ordinating with rudder. Notice the airspeed has reduced slightly, so I lower the nose to maintain 65 kts. I am looking outside mostly at the attitude, but occasionally checking my speed and balance from the instruments. Notice the new, reduced rate of climb. I am now ready to roll out of the turn. Co-ordinated use of aileron and rudder levels the wings, and I can use the elevator to pitch up slightly to maintain the airspeed. Now we are once again in a climb at 65kts. Note the rate of climb has increased.'
Lesson Point 3:	I now want you to practice a climbing turn to the left, rolling out on North. You have control.' **STUDENT PRACTICE.** Student carries out climbing left turn. Make sure they are mostly looking outside and occasionally glancing at the airspeed and balance ball. Stress: Lookout - Attitude - Instruments. Once the turning is satisfactory: 'I have control.'
Lesson Point 4:	A demonstration of the reason for reduced angle of bank in the climb follows. 'Now I want to show you why we only use 15° angle of bank in a climbing turn. Here we are in a straight climb at 65 kts. Note the rate of climb. Now I will enter a climbing turn using 15° angle of bank. Note the reduced rate of climb. I am increasing the bank angle to 30°. Note the rate of climb has reduced further. Now at 45° angle of bank, the aircraft barely climbs at all. That is why we use 15° angle of bank.'
Lesson Point 5:	The student should now have no problem carrying out a climbing turn to the right without a demo. 'I would now like you to make a climbing turn to the right, rolling out on South. You have control.' **STUDENT PRACTICE.**

Lesson Point 6:	Ask the student to set up the aircraft in a glide at 65kts. When satisfactory, take control from the student and demonstrate a descending turn to the left. 'I have control. We are now in a glide at 65 kts. Notice the rate of descent. Follow me through as I demonstrate a descending turn to the left. I lookout, particularly below, and roll the aircraft into a 30^{o} bank to the left, co-ordinating with rudder. Notice the airspeed has reduced slightly, so I am lowering the nose to maintain 65 kts. I am looking outside mostly at the attitude, but occasionally checking my speed and balance from the instruments. Notice the new, increased rate of descent. I am now ready to roll out of the turn. Co-ordinated use of aileron and rudder levels the wings, and I can use the elevator to pitch up slightly to maintain the airspeed. Now we are once again in a glide at 65kts. Note the rate of descent has decreased.'
Lesson Point 7:	'Now I want you to practice a descending turn to the left rolling out on east. You have control.' **STUDENT PRACTICE.** 'Now I want you to practice a descending turn to the right rolling out on west.' Further practice as required.
Lesson Point 8:	Now is a good time to demonstrate overbanking in a descending turn. 'Now I want to show you the effect of using too much bank in a descending turn. Here we are in a descending turn with 30^{o} angle of bank. Note the rate of descent. Now watch as I increase the bank to 45^{o}, then 60^{o}. Note the very high rate of descent. This is why we use 30^{o} angle of bank.' This is just a demonstration, and there is no need for the student to practice it.
Lesson Point 9:	Now we move onto descending turns with approach flap set. The student should have no problem setting up a descent with flap, and most students should be able to carry out descending turns with flap without a demonstration. 'Now, I want you to set the aircraft up in a descent with 2 stages of flap. I want you to practice turns in this configuration. You have control.' **STUDENT PRACTICE.** Once satisfactorily in a descent with flap: 'Now I want you to roll out onto East.' Further practice as needed.
Lesson Point 10:	On the way back to the airfield, invite the student to navigate and descend towards the airfield and onto final for landing. Ideally a standard overhead join would be conducted, giving the student a great opportunity to carry out a descending turn. 'Now it is time to return to the airfield. Do you know where it is? I would like you to fly me there using a cruise descent. I would like you to make the radio calls.' **STUDENT PRACTICE.**
Approach & Landing:	I would like you to set up the aircraft for final approach.' Once on base leg. 'OK, I now want you fly me round the circuit and line up with the runway.' As long is the approach is reasonable allow it to continue. Once it gets too divergent: 'I have control.' Take over and continue to talk through your actions to touchdown.
After Landing, Shutdown & Post-flight:	Return control to the student after vacating and at a standstill. The student should now need no prompting in completing the after landing actions and post flight duties.

Flight Prompt Card

Ex 9.2: Climbing & Descending Turns

1: REVISION (Initial climb by Student)
2: TEACH/FT lookout & climbing turn to Left (15° AoB). Maintain climb speed. Note reduced RoC. (L.A.I.) TEACH Rollout to straight climb.
3: STUDENT PRACTICE climbing L turn to specified hdg. 4: DEMO ONLY effect of too much bank. Loss of RoC & IAS.
5: STUDENT PRACTICE climbing Right turn to specified hdg.
6: TEACH/FT lookout & desc (gliding) Turn to Left (30°AOB). Maintain descent speed. Note increased RoD. (L.A.I.) TEACH Rollout to straight descent.
7: STUDENT PRACTICE descending L then R turns to specified hdgs.
8: DEMO ONLY effect of too much bank. High RoD.
9: STUDENT PRACTICE descending L & R turns to specified hdgs with approach flap. L.O.I.
10: STUDENT PRACTICE descending turns on return to airfield & in circuit.

Debriefing

- Consolidation of the required angles of bank in climb, level and descending flight should be given.

New Basic Skills

- There are no further basic skills learned in this lesson.

Common Student Faults

- No rudder, leading with rudder.
- No Lookout
- Overbanking, particularly in the climb.

Common Instructor Faults

To be added

Ex 10a - Slow Flight & Ex 10b (i), (ii) & (iii) – Stalling

Practical Considerations

- Exercise 10 deals with all aspects of flight at critically low airspeed.
    - Ex10a deals with general handling at speeds just above the stall warner.
    - Ex10b(i) is concerned with symptoms of the clean stall and recovery. Standard stall Recovery (SSR)
    - 10b(ii) deals with stalling with flap and in turns.
    - Ex 10b(iii) deals with incipient and secondary stalls.
    - All of the above should never be completed in a single flight, as there is simply too much to cover and it is very important material. However, it may be possible to combine a couple of exercises into one lesson, say 10b(ii) & 10b(iii).
    - For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

Ex 10a - Slow Flight

Practical Considerations

- Flying at such critically low airspeeds is of no practical benefit to the student. It provides no useful tool to take away as there are no circumstances in which it would be needed. It is also potentially dangerous. It also involves flying around with the stall warner sounding continuously which is negative training. Therefore it should be stressed to the student that this is purely for them to experience flight at low speed, so that if they ever encounter that in the future, they can recognise it for what it is and recover to normal flight. It has some minor benefit, as it requires accurate and co-ordinated flight from the student.
- Although many sources (including EASA AMC) quote 5 kts above the stall for slow flight, the PPL syllabus only states recognition and recovery from critically slow airspeed. The full brief is given below, but on a practical basis for the PPL syllabus, it will neither be taught in full or examined at all, except during approach to the stall.

Long Briefing

From EASA Part-FCL:

Long briefing objectives:

(1) aeroplane handling characteristics during slow flight at:

(i) Vs1 & Vso + 10 knots;

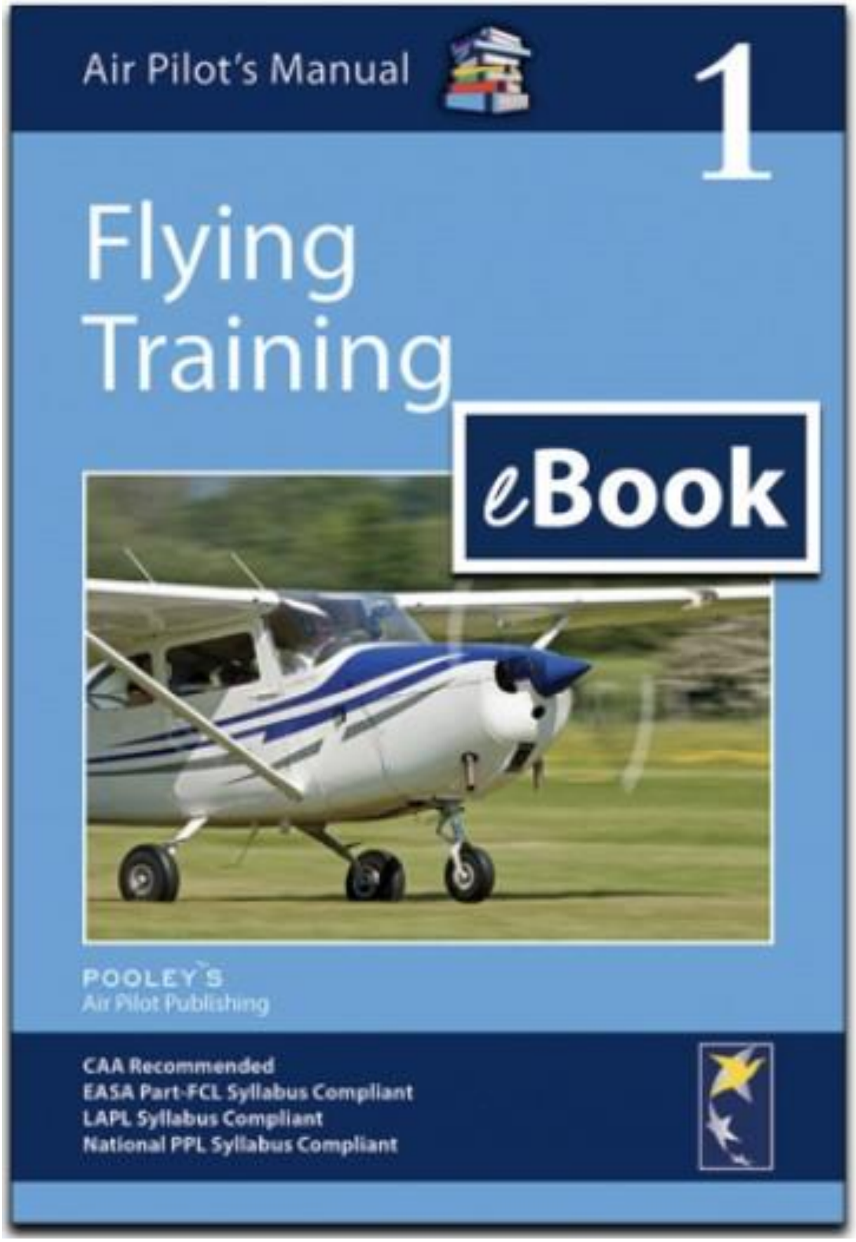
(ii) Vs1 & Vso + 5 knots.

(2) slow flight during instructor induced distractions;

(3) effect of overshooting in configurations where application of engine power causes a strong ‘nose-up’ trim change.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 10a

Slow Flying

Aim

Note that your instructor may prefer to sequence stalling (Ex. 10b) before the slow flying exercise.

To develop an awareness of the aeroplane's handling characteristics at abnormally low airspeeds, and to return the aeroplane to a safe flying speed.

Considerations

Slow Flight

Slow flying is an awareness exercise.

This exercise is designed to provide exposure to flight at abnormally low airspeeds so that the pilot can:

- recognise an inadvertent approach to the stall;
- **experience how the aeroplane handles** at an abnormally low airspeed; and
- **take recovery action** by returning the aeroplane to a safe flying speed.

The exercise also provides handling practice for those brief periods of low airspeed that do occur in normal flight, when the aeroplane is accelerating to climbing speed immediately after lift-off, and during the landing flare as the airspeed decreases prior to touchdown.

Power Required for Steady Flight

To maintain a steady airspeed, engine power must produce enough thrust from the propeller to balance the total drag. The power-required curve is therefore similar in shape to the drag curve. It shows that high power is required for steady flight at both high and low speeds, with minimum power occurring at a specific speed in between.

Minimum power will give minimum fuel consumption and consequently maximum endurance, so this speed is often listed as the endurance speed in the Pilot's Operating Handbook.

Flight at speeds less than the best endurance speed is slow flight.

Power Handling

At normal cruising speeds, higher speeds require higher power settings. Also, any minor speed variations due to gusts will automatically correct themselves in the normal flight range – a slight increase in speed causing a drag increase that will slow the aeroplane down.

Board Briefing

Ex 10a: Slow Flight

03Jan23

AIM: To recognise when the aircraft is in slow flight. To learn how to handle the a/c in slow flight and how to return to normal S+L flight.
T&E: Other a/c, Engine overheat, Disorientation, Carb icing.
M: Lookout, FREDA Checks, Anchor Point, Carb Heat.

Airex: **1: Revision:** Climbing, S+L.

2: Straight + Level Flight

Entry to Slow Flight:
- Carb Heat ON
- Reduce Power 1700 rpm
- Adjust Att
- Maintain Altitude
- Reset Power to maintain (CH Off)

Note:
- High nose att - poor fwd visibility
- Low airspeed
- Sloppy controls
- Stall warner
- Rudder required

3: Straight + Level with Flap
- Select Flap (V_{fe})
- Allow att to stabilise
- Maintain altitude
- Adjust power

4: Turning
- Shallow Turns - 15° AoB
- May need extra power

5: Turning with flap
- Shallow Turns - 15° AoB
- Will need extra power

6: Climbing
- Full power needed
- Low rate of climb
- Very high nose att
- High rudder force

7: Climbing with flap
- As above
- Minimal rate of climb

8: Descending
- CH On - Reduce power
- Nose att higher than normal

9: Descending with flap
- Nose att higher than normal

10: Return to Normal S&L Flight

- Full Power
- Balance with Rudder
- Select Lower Nose Attitude
- As Speed Increases.......Reduce Power
- Trim

Skeleton Board Briefing

Ex 10a: Slow Flight

30 NOV 20

AIM: To recognise when the aircraft is in slow flight. To learn how to handle the a/c in slow flight and how to return to normal S+L flight.
T&E:
M:

Airex: **1: Revision:**

2: Straight + Level Flight

3: Straight + Level with Flap

4: Turning

5: Turning with flap

6: Climbing

7: Climbing with flap

8: Descending

9: Descending with flap

10: Return to Normal S&L Flight

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	The student should now need no assistance or prompting to get the aircraft as far as lining up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls. Handover control shortly after take-off to allow revision of climbing.
Lesson Point 1:	**STUDENT PRACTICE** of climbing into the local area to a suitable altitude (say 3000'). Take control from the student when the aircraft is set up, trimmed in straight and level flight at the assigned altitude.
Lesson Point 2:	Ask the student to set the aircraft up in straight and level flight at 65 kts in a clean configuration. When satisfactory: 'I have control. Here we are in straight and level flight, trimmed at 65 kts. I am now going to reduce to 60 kts. Notice the higher nose attitude. Notice how much power is needed. Notice the poor forward visibility due to the high nose attitude. When I give you control, I want you to feel all the flight controls at this speed. You have control.' **STUDENT PRACTICE.**
Lesson Point 3:	Now take control and demonstrate the characteristics and dangers of slow flight. Avoid stall warner activation. 'I have control. Notice how strange the aircraft looks and feels at this speed. We have the high nose attitude and the sloppy controls. Look out of the side window and you will see how slowly we are moving relative to the ground. This is not a situation we would normally want to find ourselves in. It is important to be able to recognise slow flight in order to get out of it. I now want you to practice flying straight and level like this, but I want you to make very gentle inputs on the controls.'
Lesson Point 4:	'You have control.' **STUDENT PRACTICE** After satisfactory straight and level flight take back control. 'I have control.'
Lesson Point 5:	'Now I want you to follow me through on the controls as I demonstrate a left turn in slow flight. First a good lookout, then co-ordinated rudder with aileron as I roll to the left to 15 angle of bank. Notice the speed reducing, so I add a little more power to maintain 60 kts. As I roll out of the turn, rudder, and aileron together back to straight and level, and I can remove a little power.'
Lesson Point 6:	'Now I want you to practice gentle turns to the left and right at this speed. You have control.' **STUDENT PRACTICE.**
Lesson Point 7:	'Now I want you to follow me through on the controls as I demonstrate a climb in slow flight. First a good lookout, particularly above, then FULL POWER co-ordinated rudder and raise the nose slightly to maintain 60 kts. I am controlling the airspeed with elevator now. Notice the very high nose attitude. As I reach 3500' I will level out. First lower the nose, and as the speed increases, I can reduce the power a little, maintaining my altitude.'
Lesson Point 8:	'Now I want you to climb at 56 kts to 4000'. You have control.' **STUDENT PRACTICE.**

Lesson Point 9:	'Now I want you to follow me through on the controls as I demonstrate a descent in slow flight. First a good lookout, particularly below and to the sides, then Carb Heat ON, reduce power a little, co-ordinated rudder, and lower the nose slightly to maintain 60 kts. I am controlling the airspeed with elevator now. Notice the relatively high nose attitude. As I reach 3500' I will level out. First increase power, preventing yaw with the rudder, raise the nose slightly, and maintain my altitude.'
Lesson Point 10:	'Now I want you to descend at 60 kts to 3000'. You have control.' **STUDENT PRACTICE.**
Lesson Point 11:	Now is a really good time to repeat the demonstration of adverse yaw, as at these lower speeds it is more obvious. 'Now I want to show you how pronounced adverse yaw is at these speeds. Pick a feature in the distance if you can. Now, watch as I make a turn to the left.' Rotate the control column briskly to the left. 'Did you see the nose move to the right?' This is just a demonstration, and there is no need for the student to practice it.
Lesson Point 12:	Now we repeat the exercises with various flap settings to gain more practice in co-ordination. Some students may require a demonstration, others will be able to carry out the manoeuvres for themselves. 'Now I want you to select two stages of flap and fly straight and level at 55 kts. You have control' **STUDENT PRACTICE.** Now I want you to climb at 55 kts in this configuration. You have control' **STUDENT PRACTICE.** Now I want you to descend in this configuration at 55 kts. You have control' **STUDENT PRACTICE.**
Lesson Point 13:	Now there can be an optional demonstration of a stall. Many students can be anxious about stalling, so a demonstration of a full stall (held in for a short while) and recovery should help calm nerves.
Approach & Landing:	On the way back to the airfield, the student should be able to navigate and descend towards the airfield and onto final for landing with little or no assistance. 'Now it is time to return to the airfield. I would like you to fly me there using a cruise descent and make the radio calls for the rejoin.' **STUDENT PRACTICE** 'I would like you to set up the aircraft for the circuit and final approach.' Once on base leg. 'OK, I now want you fly me round the circuit and line up with the runway.' As long is the approach is reasonable, allow it to continue. Once it gets too divergent take over and continue to talk through your actions to touchdown.
After Landing, Shutdown & Post-flight:	As before, return control to the student after vacating and at a standstill.

Flight Prompt Card

Ex 10a: Slow Flight

1: REVISION: Student Climb out.
2: Ask student to set up S&L at 65 kts clean.
3: Take control. Reduce to 60 kts. Point out Sloppy Controls, High nose att. High Power Requirement. EMPHASIZE DANGER Show low GS, drift effects, possible stall warner.
4: STUDENT PRACTICE S & L at 60 kts.
5: TEACH/FT 15º bank turns to L & R.
6: STUDENT PRACTICE.
7: TEACH/FT climb at 60kts.
8: STUDENT PRACTICE
9: TEACH/FT descent at 60 kts.
10: STUDENT PRACTICE
11: TEACH/FT adverse aileron yaw at low speed.
12: STUDENT PRACTICE 4-10 above at Flap 2, 55 kts.
13: Optional DEMO only of full stall (held in) and recovery)
14: REVISION: STUDENT PRACTICE setting up approach for landing.

Debriefing

- Emphasize that slow flight is not something we would choose to do for real (if we need to fly slowly in the circuit for spacing, Slow Safe Cruise is much more appropriate). It is only a training exercise to show them how the aircraft handles at critically low airspeed.

New Basic Skills

- There are no further basic skills learned in this lesson. However, recognition of the slow flight regime is important.

Common Student Faults

- Selecting the normal straight and level attitude when in slow flight, and thus descending. Reinforce the higher nose attitude.
- Insufficient rudder.
- Overbanking. Use a maximum of 15º.

Common Instructor Faults

- Do not allow the stall warner to sound too often. It will alarm the student and is negative training. Choose a slightly higher airspeed if needed.

Ex 10b(i) – Stalling 1

Practical Considerations

- Ideally, the student will have seen a DEMO only of a full stall and **Standard Stall Recovery** at the end of the last lesson, to prepare them for Ex10b(i). If this was not possible, then begin with a demonstration.
- Make sure there is a good horizon and plenty of vertical airspace available for this exercise. The instructor should maintain a careful watch on airspace, as it is easy to infringe vertically during these exercises.
- There are 3 lessons shown here – Ex10b(i), Ex10b(ii) & Ex10b(iii). The third exercise may be included with the others or used as a consolidation lesson.
- Many students are anxious about stalling, so a good idea is to make the first demo, just an approach to the stall, showing how to remove each symptom as it occurs. This way the student learns the power off recovery without realising, and is not frightened by a sudden wing drop at the start of the lesson.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

Long Briefing

From EASA Part-FCL:

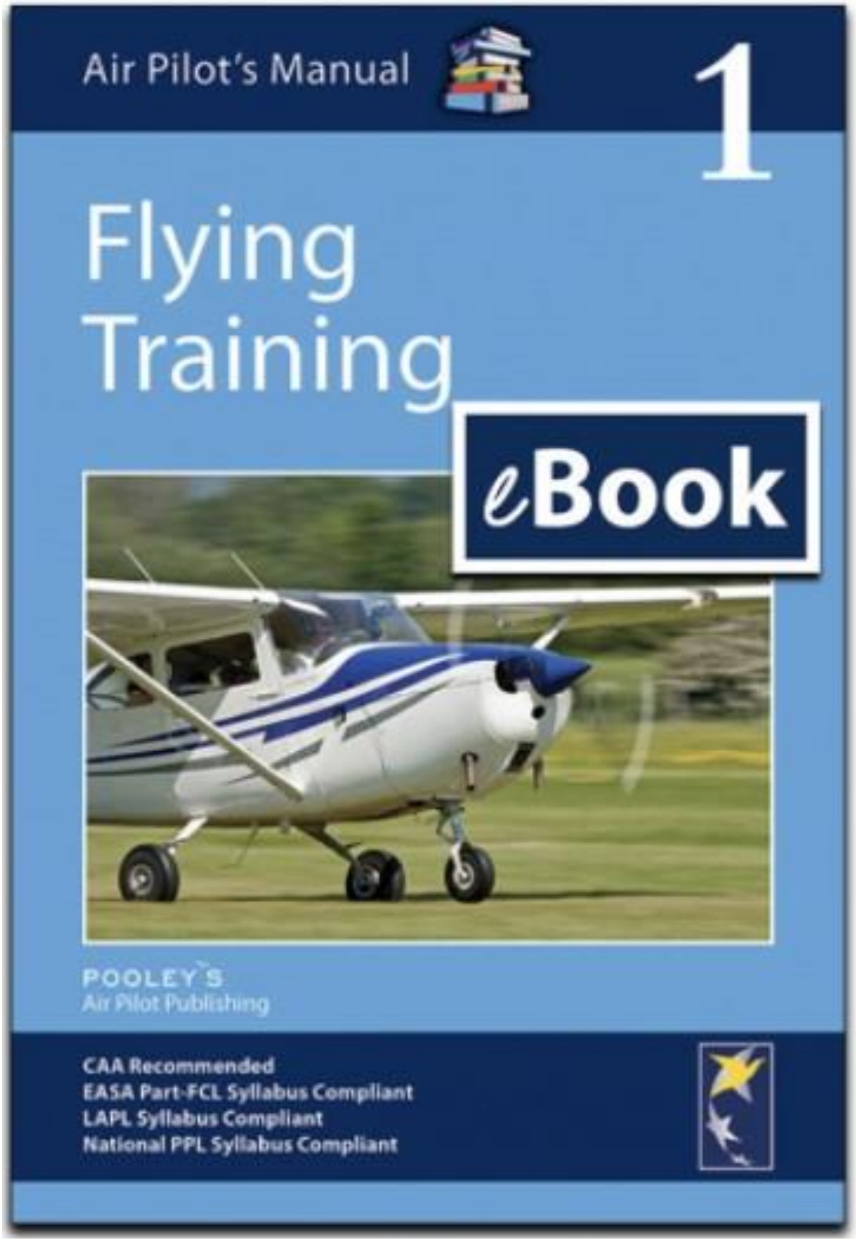
Long briefing objectives:

(1) characteristics of the stall;
(2) angle of attack;
(3) effectiveness of the controls at the stall;
(4) factors affecting the stalling speed: (i) effect of flaps, slats and slots; (ii) effect of power, mass, CG and load factor.
(5) effects of unbalance at the stall;
(6) symptoms of the stall;
(7) stall recognition and recovery;
(8) stalling and recovery:

    (i) without power;
    (ii) with power on;
    (iii) with flaps down;
    (iv) maximum power climb (straight and turning flight to the point of stall with uncompensated yaw);
    (v) stalling and recovery during manoeuvres involving more than 1 G (accelerated stalls, including secondary stalls and recoveries);
    (vi) recovering from incipient stalls in the landing and other configurations and conditions;
    (vii) recovering at the incipient stage during change of configuration;
    (viii) stalling and recovery at the incipient stage with 'instructor induced' distractions.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 10b

Stalling

Aim

To recognise the stall, and to recover from it with a minimum loss of altitude.

Considerations

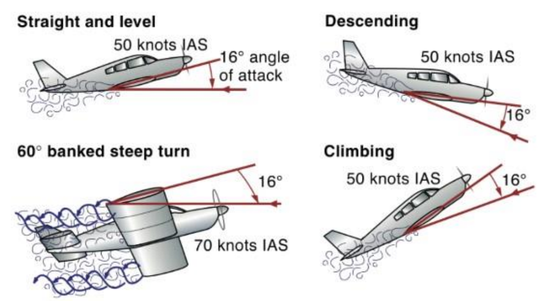
What is Stalling?

Stalling occurs when the critical angle of attack is exceeded, irrespective of airspeed.

Streamline flow over the wings breaks down and becomes turbulent when the critical (or stalling) angle of attack is exceeded. This causes:

- **buffeting** (shaking or shuddering) of the airframe, felt through the controls;
- **a marked decrease in lift,** resulting in sinking;
- **rearward movement of the centre of pressure** (through which the lift acts), resulting in the nose dropping;
- a marked drag increase.

Stalling will occur whenever the critical angle of attack is exceeded, irrespective of airspeed. The only way to recover is to decrease the angle of attack (i.e. relax the back pressure and/or move the control column forward).



■ *Figure 10b-1* ***Stalling occurs at the critical angle of attack***

The pilot can increase the angle of attack (and reduce airspeed) by pulling the control column back. This happens in many manoeuvres such as:

- establishing slow flight;
- turning (especially steep turns);

Board Briefing

08Jan23

Ex 10b(i) STALLING 1

AIM: To learn to recognise and recover from a clean stall with minimum height loss.
T&E: Other a/c, Engine overheat, Personal Injury, Terrain, Stalling outside envelope, Loss of control.
M: Lookout, HASELL Checks, Pre-Flight Planning, W&B, Standard Stall Recovery.

AIREX: **1:** Revision: Start-up, Taxy, Power Checks, Climbing, Turning

2: DEMO of Clean Stall + Recovery

3: ENTRY

H: Height - Sufficient
A: Airframe - as reqd
S: Security - Check
E: Engine - Ts + Ps, CH, Mixture
L: Location - Clear of ABC+D
L: Lookout - 2 x 90° or 1 x 180° turn

(CH) Close Throttle
Maintain Altitude - PAAT
Ailerons Neutral
No Trim <70 kts

Lookout
Turn

7: STANDARD STALL RECOVERY (SSR)

Control Column Centrally fwd until symptoms stop
Apply FULL Power
Hold Att Steady
Level the Wings
Ease out of the dive

8: RECOVERY AT FIRST SYMPTOM

SSR at first symptom of stall

4: SYMPTOMS OF APPROACHING STALL

Low + Decreasing Airspeed
Sloppy/Unresponsive Controls
High Nose Att
Stall Warning
Light Buffet

5: SIGNS OF THE STALLED CONDITION

Stall Warning
Heavy Buffet
High R.O.D.
Nose Drop
Wing Drop

6: POWER-OFF RECOVERY

CC Centrally fwd until symptoms stop
Hold Att Steady
Level the Wings
Dive at 65 kts

Skeleton Board Briefing

03Jan23

Ex 10b(i) STALLING 1

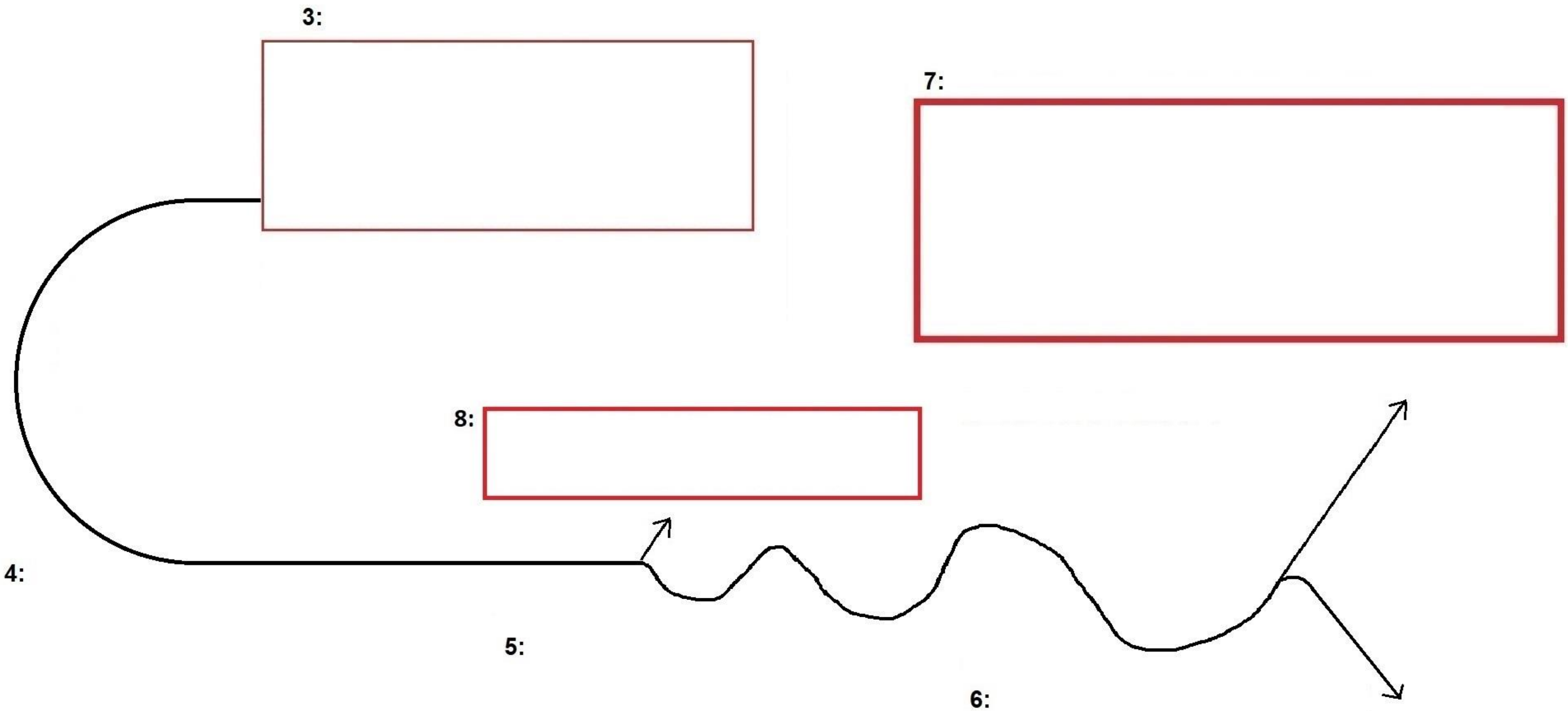
AIM: To learn to recognise and recover from a clean stall with minimum height loss.

T&E:

M:

AIREX: 1:

2:



Pre-Flight Briefing

Make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.

The following is suggested speech for the board briefing above to a single student:

'Good morning, today we are going to do exercise 10b - Stalling Part 1. There are 3 parts to this exercise – the first part we are going to look at today is concerned with recognising and recovering from stalls in the clean configuration. The subsequent parts which we will do in the following lessons involve other configurations.'

'So the aim today is written on the board – **To learn to recognise and recover from a clean stall with minimum height loss**.'

As usual we are going to discuss some threat and error management before we go into the main briefing. Looking out of the window here, I can see lots of aeroplanes taxying towards the runway. What may be a big threat once we get airborne?'

'Other aeroplanes being in our way'

'Yes, other aeroplanes are also going to be in the local area too. How are you going to manage to keep clear of them?'

'Good lookout.'

'Yes, so if either of us see an aeroplane today, we will point it out to the other person, just like before. Remember, when you are climbing, it is hard to see other aircraft in front of you.

'You will be climbing a lot during this exercise in order to get the height we need. Can you think of a threat to the aeroplane from all this climbing?'

'The engine might get hot.'

'Yes, so how can you manage that?'

'By checking Ts and Ps.'

'Absolutely. You can do your normal climb checks and FREDA checks. I will also be introducing a new pre-stalling check called HASELL checks. More about that later.'

'The aircraft may make some abrupt movements during the stalling exercise. What could happen if we are not strapped in?'

'We might get injured.'

'Yes. That will also be managed in the new HASELL checks. It is important to make sure the aircraft is correctly loaded and within the envelope for stalling, so I want you to carry out a mass and balance calculation before we go.'

'That will be enough for us to consider today on the threat and error management side.'

'Let's move on to the actual flight itself. After we finish this briefing, I want you to complete the pre-flight tech log and book out with ATC, and then I want you to go out to the aircraft and carry out the pre-flight checks. Then we will get in together, you will start up the engine using the checklist. I want you to make the radio calls today. You will taxi to the run-up area, where you will do the power checks and the before take-off checks from the checklist. Then I will ask you to taxi and line me up on the runway, ready for my take off. I will take-off and get us heading towards Newbury before handing control back to you. I want you to climb to 3500' in the normal way and then carry out a FREDA check.'

'The first thing I will do is demonstrate to you a full clean stall and recovery using the **Standard Stall Recovery** technique. Then I will teach you how to carry out a HASELL check. Every time we stall the aircraft we must carry out a HASELL check – not just for the first stall, but for all subsequent stalls.'

'During a stall, the aircraft will lose height, so it is important to make sure we start at a suitable altitude in the first place. At this school we teach that we must begin at a suitable height to recover by 2000' above ground level. So, by starting at 3500' we can be sure of that. So, H is for height. Then we come to A – Airframe. What gear and flap configuration do we want for out stall? Well, in this aircraft, the gear is fixed, and today, we will be doing clean stalls, so we just check that the flaps are retracted. S is for security – check that both of us have our seat belts fastened, and that there are no loose articles in the cabin. E is for engine – we check the Ts and Ps, and give the carb heat 10 seconds at hot. The first L is for location - we don't want to stall over a built up area or too close to cloud, so we check that we are clear of As, Bs, Cs and Ds – Airfields, Built-up areas, Controlled airspace and cloud, and danger areas. The second L is for lookout. We need to make sure that there are no other aircraft near us, particularly below us, so we make a lookout turn or two. We can either make a 180 degree turn, or two 90 degree turns. During these turns, we will both look out, especially below. Once the HASELL check is complete I will teach you the symptoms of an approaching stall. First, I will put the carb heat on and close the throttle, maintaining altitude with elevator. I will keep the ailerons neutral.'

'First you will notice the airspeed low and decreasing, then I will give you control briefly to feel that the controls are sloppy and unresponsive. You will notice the high nose attitude. You will hear the stall warner, and you may notice a light buffet. These are all symptoms that the aircraft is approaching the stall.'

'Then I will fully stall the aircraft. I will teach you the symptoms of the stalled condition – The stall warner will be going, there will be heavy buffeting, there will be a high rate of descent, there may be a wing drop and the nose will drop. I will then show you that at any time, just by moving the control column centrally forwards, I can make these symptoms go away. I will move the control column centrally forward and the buffet will go away, the stall warner will stop, and the high nose attitude and sloppy controls will go away. We will still have the high rate of descent though, but we have recovered from the stall.'

'Then I will put us back at 3500', carry out another HASELL check and I will repeat the stall and recovery while you follow me through on the controls. After that I will put us back at 3500' and I want you to set the aircraft up for a stall and recover using the elevator. What must you remember to do before that stall?'

'A HASELL check.'

'Yes. Always. The stall recovery we have just practiced gets us out of the stall, but it leaves us descending towards the ground – not an ideal situation. So next, you will follow me through while I teach you a better method called the Standard Stall Recovery. I want you to put one finger on the throttle too so you can feel my inputs there, because in this technique, I will use full power as well as elevator to recover from the stall. Once we have recognised that the aircraft is stalled, I will move the control column centrally forward until the buffet or stall warner stops, and then apply full power. I may need to balance this with some right rudder. I will then hold the attitude steady and level the wings if necessary. I will then ease out of the dive gently. I want you to notice how much altitude was lost during the recovery.'

'After that, I will give you control, and I want you to practice recovering from a few stalls using the Standard Stall Recovery.'

'But why would you wait for all of these symptoms to occur before recovering from the stall. It would be much better if you were to recover at the first sign of any of these symptoms. This is sometimes called the incipient stage, and it occurs before the aircraft has actually stalled. So, you will follow me through with one finger on the throttle, while I teach you how to recover from a stall at this stage. I will set it up as before, but this time, as soon as I hear the stall warner I will apply the Standard Stall Recovery straight away. You will see that we lose very little height doing it this way.'

‘Then I will give you control and I want you to practice recovering from stalls at the first symptom.’

‘Once you have had plenty of practice at stall recovery, you will fly me back to the airfield. As we approach, I will take control, and I want you to watch as I rejoin for the circuit and landing. I want you to make the radio calls. After landing, having cleared the runway, I will give you control to taxi clear and carry out the after landing actions. Do you have any questions?’

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	The student should now need no assistance or prompting to get the aircraft as far as lining up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls. Handover control shortly after take-off to allow revision of climbing and turning.
Lesson Point 1:	**STUDENT PRACTICE** of climbing into the local area to a suitable altitude (say 3000’). Take control from the student when the aircraft is set up, trimmed in straight and level flight at the assigned altitude with all checks complete.
Lesson Point 2:	A demonstration only, with no follow through, of the approach to a clean stall (including HASELL Checks. **NOTE:** It is acceptable (and indeed preferable) to give this demonstration at the end of the last Exercise: Slow Flight. ‘I have control. I am now going to demonstrate the full stall and standard stall recovery. I just want you to watch what happens – we will break it down later’. Carry out a HASELL check and demonstrate in silence a full clean stall with SSR. ‘So, by the end of this lesson, you should be able to do that.’
Lesson Point 3:	Teaching of the HASELL checks. ‘I have control. We are now in the local area and ready to start the exercise. Remind me what we must always do before practicing a stall.’ ‘That’s right a HASELL check. So, our Height is 3000’, which is sufficient to recover by 2000’ agl. Airframe: We are clean, which is what we want for this stall. Security: I am secure, are you? No loose articles in the aircraft. Engine: Ts & Ps are checked OK, and I will put the Carb Heat on for 10 seconds. Location: We are not above any Airfields, Built-Up areas, Controlled Airspace or Cloud, or Danger Areas. Now the Lookout. I will do a 90 degree turn to the left followed by one to the right. Give me a hand looking for other traffic, please.’
Lesson Point 4:	‘OK, so we are now ready to start the approach to the stall. No need to follow me through, just watch my demonstration. So, I begin by putting on the Carb Heat to protect the engine. I close the throttle, keeping the aircraft straight with rudder. I am preventing the nose from dropping by holding the back pressure. I am trimming some of it off. Still holding the back pressure.’ You may wish to leave some power on to prolong the deceleration and allow you to better point out the symptoms. ’Notice the high nose attitude. I can remove this symptom of the stall by simply moving the control column centrally forwards – see. But let’s say I don’t do that – I keep holding the nose up. The next thing I notice is the reduced airspeed. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. But let’s say I keep holding the nose up. The next thing I notice is the sloppy controls – have a feel. Again, I can remove this symptom of the stall by moving the

	control column centrally forwards – see. But let's say I keep holding the nose up. The next thing I notice is the stall warner sounding. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. At any time that any of these symptoms of an approaching stall occur, I can remove them by just moving the control column centrally forwards.' At this point, move the control column centrally forwards to remove all symptoms of the approaching stall.
Lesson Point 5:	Reposition the aircraft to 3000'. 'Now I'd like you to have a go at carrying out a HASELL check and setting the aircraft up for the approach to the stall. I want you to note each symptom and when you have seen all the symptoms, remove them by moving the control column centrally forwards. You have control.' **STUDENT PRACTICE.**
Lesson Point 6:	Reposition the aircraft to 3000'. 'Now I'd like you to carry out another HASELL check. Then you will follow me through as I repeat that all the way through to a full stall and recovery by moving the control column centrally forwards. You have control.' **STUDENT PRACTICE.** Once satisfactorily carried out. 'I have control follow me through. I look ahead for a feature to help me keep straight throughout – let's use that lake. I apply the carb heat, close the throttle and hold the altitude. The speed is reducing, the controls are becoming sloppy, the stall warner sounds, and there, feel the buffet and see how the nose dropped? That is the stall. I recover by moving the control column centrally forward. Notice now all of those symptoms have gone and the aircraft is flying normally again.'
Lesson Point 7:	Ask the student to reposition the aircraft to 3000'. 'Now I'd like you to carry out another HASELL check. Then I want you to set the aircraft up for a full stall and recover by moving the control column centrally forwards. You have control.' **STUDENT PRACTICE.** Further practice as needed. The student should go straight into a HASELL Check. If not, take control and ask them if it is safe to practice a stall? You should not need to mention HASELL checks again.
Lesson Point 8:	'Notice in the stalls we practiced, we lost about 400' during the stall and recovery. This could be quite a lot if we were close to the ground. So, now, we will move on to recovery from the stall using power. I will teach you the **Standard Stall Recovery**. Again we will start at 3000', and let's see how much altitude we lose in the recovery. First the HASELL Checks. You have control' **STUDENT PRACTICE.** Once satisfactory. 'Follow me through on the controls and put one of your fingers on the throttle so you can feel my input there. So, again, I am looking for a feature in the distance to help me keep straight. I put on the Carb Heat and close the throttle. I am holding the back pressure and maintaining my altitude of 3000' as the airspeed reduces. Now we hear the stall warner. I'm still holding the

	back pressure. There is the buffet and now the nose drop. To recover I move the control column centrally forwards until the symptoms stop, and then apply full power. As soon as I do that, the stall warner stops and the airspeed increases. I hold that attitude. Now I can slowly recover from the descent and turn off the Carb Heat. Notice we have only lost about 200' during that recovery. So the Standard Stall Recovery results in a reduced height loss and is a much safer way to recover.'
Lesson Point 9:	'Now, I want you to practice recovering from a fully developed stall using the Standard Stall Recovery. You have control.' **STUDENT PRACTICE.** Make sure the student goes straight into a HASELL Check. Then more practice. At least 5 standard stall recoveries should be completed to an acceptable standard.
Lesson Point 10:	'So, by using the Standard Stall Recovery we have improved our height loss, but 200' is still a lot to lose. Can we do any better? Well the way to do that is to recover before the aircraft fully stalls, at the first symptom of the approaching stall. This time I will teach you to recover as soon as we hear the stall warner. First the HASELL Checks.' **STUDENT PRACTICE.** Once satisfactory. 'Follow me through, one finger on the throttle. So, as before, I am looking for a feature in the distance to help me keep straight. I put on the Carb Heat and close the throttle. I am holding the back pressure and maintaining my altitude of 3000' as the airspeed reduces. Now we hear the stall warner. To recover I move the control column centrally forwards until the warner stops and then apply full power. As soon as I do that, the airspeed increases. Now I can slowly recover from the descent and turn off the Carb Heat. Notice we have only lost about 100' during that recovery. So recovery at the first symptom of the approaching stall with the Standard Stall Recovery gives the least height loss.'
Lesson Point 11:	'Now, I want you to practice recovering from a stall at the first symptom, using the Standard Stall Recovery. You have control.' **STUDENT PRACTICE.** Make sure the student goes straight into a HASELL Check. Practice several stalls at different stages of the stall.
Approach & Landing:	As before, the student should be able to fly the rejoin, making all radio calls, as far as final. Take over and land, pattering the last part of the approach and landing.
After Landing, Shutdown & Post-flight:	As before, return control to the student after vacating the runway. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 10b(i): Stalling 1

1: REVISION: Climbing & Turning. FREDA.
2: DEMO only Clean Stall & SSR (Standard Stall Recovery). 3: TEACH HASELL cx.
4: DEMO/FT approach only to clean stall. Show symptoms one at a time - High Nose Att, Low IAS, Sloppy Controls, Buffet, Stall warner. Remove symptoms by Control Column (CC) centrally forward.
5: STUDENT PRACTICE HASELL & approach to stall as above. Recovers by CC centrally fwd.
6: DEMO/FT full clean stall & recovery by CC cent fwd.
7: STUDENT PRACTICE with HASELL.
8: Height LOSS was unacceptable. STANDARD STALL RECOVERY DEMO/FT Student FT with 1 finger on throttle. Height Loss - still significant.
9: STUDENT PRACTICE (Several times).
10: DEMO/FT SSR AT FIRST SIGN. Recover at stall warner or buffet. NOTE: Height Loss - much better.
11: STUDENT PRACTICE (Several times).

Debriefing

- The take home message is that moving the **control column centrally forwards** will break the stall, but that the '**Standard Stall Recovery**' is even better. The best of all is the Standard Stall Recovery actioned at the first symptom of the approaching stall. Make sure the student can recite it correctly and without hesitation.

New Basic Skills

- The new basic skills learned in this lesson are:
    - Recognition of the stall
    - The Standard Stall Recovery SSR.

Common Student Faults

- Failure to carry out **HASELL** Checks before each and every stall. I personally dislike the abbreviation to **HELL** Checks for subsequent stalls, as the vital items of Airframe and Security are removed!! No examiner will ask the student to carry out HASELL checks – they are an integral part of the stalling exercise, and their omission could result in failure of that section. Make sure that the student involves you in the lookout. You could pretend to be looking at your kneeboard – heads down – while the student is looking out, to see if this gets any reaction. If the student attempts to practice a stall without first carrying out a HASELL check, take control and ask them if it is safe to do that?
- Sometimes the student carries out a perfect HASELL check, and then delays before starting the stall. As soon as the lookout is complete, go straight into the stall before the traffic situation changes.
- No examiner will call for a student to 'Recover Now' – those days are long gone! In real life, there will be no-one to call it either.
- Too slow a response to recovering from the stall, especially with the throttle. Students have been correctly taught to be gentle with the throttle, but this is the exception!
- Applying power before moving the control column centrally forwards. This can lead to a pitching up moment and worsen the situation. Ensure that the 2 actions occur in the correct order and not simultaneously.
- An insufficiently positive recovery action. This is not a gentle lowering of the nose - It should be positive but not violent.
- Many students become very concerned about the Carb Heat, and will often delay the stall recovery in order to turn it off. Point out that a stall is a potentially life-threatening situation, and the first action must be the Standard Stall Recover. Turning the Carb Heat to cold can come later.
- Some students interpret 'controls centrally forward' to mean halfway along the travel of the control rather than to be moved forward without aileron input. The control should be moved far enough forward to stop the symptoms.

Common Instructor Faults

- This is the first exercise in which synchronising the flying demonstration and the speech poses a major problem. The entry to and recovery from the stall can happen very quickly, and it is really hard to keep the speech at the same pace. One way round this, in the entry to the stall, is to add a little power, rather than start from idle. This makes the deceleration slower and gives the voice a chance to catch up.
- Most instructors will teach the student to move the control column centrally forward. This is correct, but some students may continue to push forward, as no limit has been given. The correct terminology is to *move the column centrally forward until the stall warner and buffet stops*.
- Do not refer to 'lowering the nose' as a way to break the stall. The correct term is 'moving the control column centrally forwards'. If the aircraft were inverted, lowering the nose would make the situation worse.
- When demonstrating a HASELL check followed by a stall, once the lookout is complete, go straight into the stall before the traffic situation changes.
- The terms 'incipient stall' and 'first sign' are falling out of fashion. Better to say 'first symptom of an approaching stall'.
- For a while, the standard stall recovery was taught with a **simultaneous** movement of the control column and power. Now, the preferred way to teach it is control column centrally forward, **THEN** apply full power. This advice is contained in **CAA SN-2014/003** partly reproduced below:

> - Following recent accidents and incidents, a great deal of research has been conducted by both industry and regulators on how best to train pilots to avoid losing control of their aircraft (LOC accidents).
> - The use of an incorrect technique when attempting to recover from a stall has been identified as a causal factor in several Loss of Control (LOC) accidents. The standard stall recovery technique should always emphasize the requirement to reduce the angle of attack in order to return the aeroplane to a safe flying condition. When an approach to the stall is recognised early, and the correct recovery action is initiated without delay, this reduction in angle of attack (and consequential height loss) will be minimised.
> - It should be noted that at high altitudes, compressibility has a marked effect on the stalling angle of attack, reducing it significantly. The pilot is thus faced with a narrow manoeuvre margin; in addition, the thrust available at high altitudes is also significantly reduced. Both factors mean that any stall recovery at altitude may prove surprisingly different from those set piece exercises that are routinely practiced at low to medium levels.
> - **NOTE:** Any manufacturer's recommended stall recovery techniques must always be followed, and will take precedence over the technique described above should there be any conflicting advice.

The order should be firstly the control column centrally forward, **THEN** followed by the power. It is acceptable to do the two actions at the same time, but **NEVER** allow the student to lead with power. If the aircraft is not stalled, ie in a recovery from the first symptom, then it is not absolutely necessary for the control column to be moved forward at all, since no stall has occurred. However, for the sake of simplicity, always insist on the SSR as described. See next page for more information.

Recovery technique

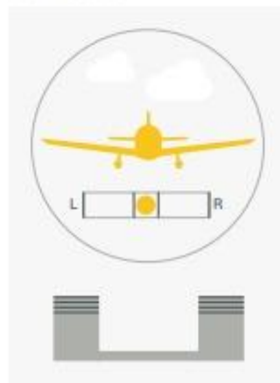
Be ready to apply immediate recovery action whenever you perceive the aircraft is approaching a stall or not responding correctly. Follow the stall and/or spin recovery technique recommended in the AFM or POH.

The following is the correct stall recovery technique for most light aircraft:

Move the control column centrally forward to reduce the angle of attack

Apply full power (if available), counter any pitch up tendency

Maintain balance using the rudder, but do not apply aileron until the angle of attack has been reduced



Once the angle of attack has been reduced and the aircraft is no longer stalled:

Level the wings with aileron

Accelerate, retracting flaps/landing gear as required

Once the situation is stabilised, review what happened and why.

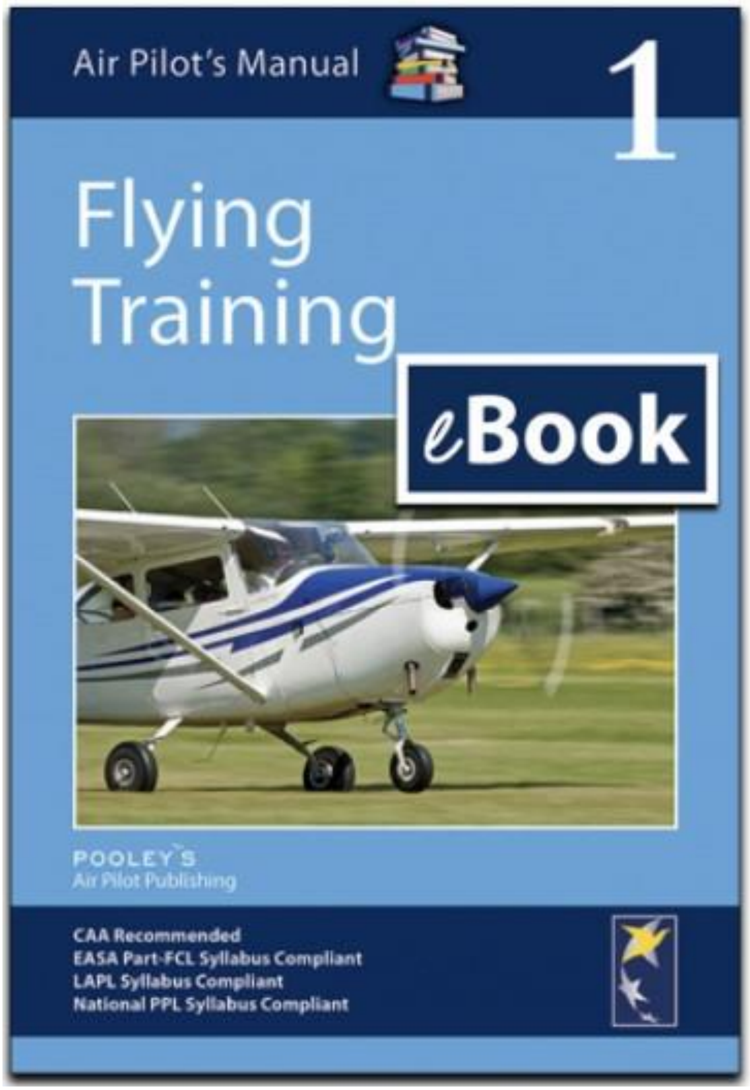
The extract on the left is from CAA Safety Sense Leaflet 30 and describes the current CAA thinking on stall recovery.

Ex 10b(ii) – Stalling 2

Long Briefing

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 10b

Stalling

Aim

To recognise the stall, and to recover from it with a minimum loss of altitude.

Considerations

What is Stalling?

Stalling occurs when the critical angle of attack is exceeded, irrespective of airspeed.

Streamline flow over the wings breaks down and becomes turbulent when the critical (or stalling) angle of attack is exceeded. This causes:

- **buffeting** (shaking or shuddering) of the airframe, felt through the controls;
- **a marked decrease in lift,** resulting in sinking;
- **rearward movement of the centre of pressure** (through which the lift acts), resulting in the nose dropping;
- a marked drag increase.

Stalling will occur whenever the critical angle of attack is exceeded, irrespective of airspeed. The only way to recover is to decrease the angle of attack (i.e. relax the back pressure and/or move the control column forward).

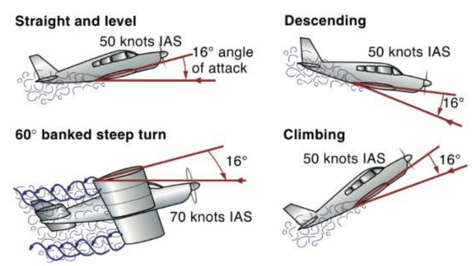


Figure 10b-1 ***Stalling occurs at the critical angle of attack***

The pilot can increase the angle of attack (and reduce airspeed) by pulling the control column back. This happens in many manoeuvres such as:

- establishing slow flight;
- turning (especially steep turns);

Board Briefing

Ex 10b(ii) Stalling 2

08Jan23

AIM: To learn to recognise and recover from stalls entered with flap, power and bank with minimum ht loss.
T&E: Other a/c, Envelope, Engine overheat, Terrain and obstacles, Flap overspeed, Loss of control.
M: Lookout, HASELL checks, Pre-flight planning, V_{fe}, Standard Stall Recovery (SSR).

Airex: 1: Revision: Clean Stall Recovery

2: EFFECT OF FLAP

FULL FLAP - IDLE - S&L
- Lower Stalling Speed
- Lower Nose Att
- Increased Decel
- Wing Drop?

SSR - Remove Drag Flap First

3: EFFECT OF POWER

CLEAN - 1500 rpm - S&L
- Lower Stalling Speed
- Higher Nose Att
- Slower Deceleration
- Wing Drop?

SSR

4: EFFECT OF AoB

CLEAN - IDLE - 30° AoB
- Higher Stalling Speed
- Increased Decel
- Wing Drop?

SSR - Level wings later

5: APPROACH CONFIG STALL

ENTRY
HASELL
SET 1500 rpm (Approach Power)
SET APPROACH FLAP
20-30° AoB LEVEL TURN

SSR - Lower Nose First
Level Wings After
Flaps in Stages

RECOVER AT
1ST SYMPTOM OF
APPROACHING STALL

6: LANDING CONFIG STALL

ENTRY
HASELL
SET 1500 rpm (Approach Power)
SET FULL FLAP
MAINTAIN LEVEL (PAAT)
AILERONS NEUTRAL

SSR - Remove Drag Flap First
Remove Remaining Flap After

RECOVER AT
1ST SYMPTOM OF
APPROACHING STALL

7: DEPARTURE STALL

FULL POWER CLIMB
FLAP FULL
RECOVER AT 1ST SYMPTOM OF APPROACHING STALL
SSR - Drag Flap!

Skeleton Board Briefing

Ex 10b(ii) Stalling 2

07 Aug 21

AIM: To learn to recognise and recover from stalls entered with flap, power and bank with minimum ht loss.
T&E:
M:

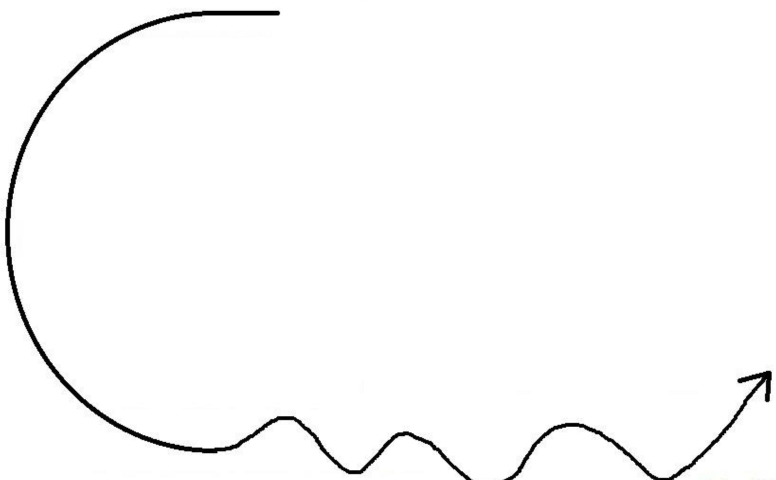
Airex: 1: Revision: Clean Stall Recovery

2: EFFECT OF FLAP

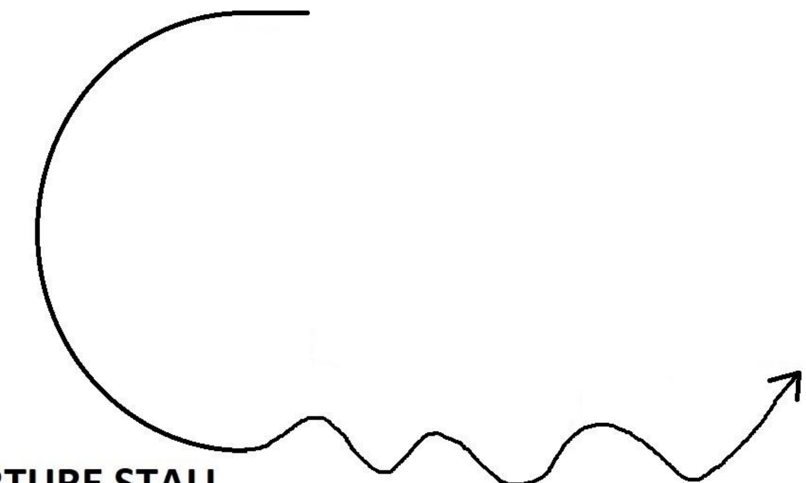
3: EFFECT OF POWER

4: EFFECT OF AoB

5: APPROACH CONFIG STALL



6: LANDING CONFIG STALL



7: DEPARTURE STALL

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	The student should now need no assistance or prompting to get the aircraft as far as lining up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls. Handover control shortly after take-off to allow revision of climbing and turning.
Lesson Point 1:	**STUDENT PRACTICE** of climbing into the local area to a suitable altitude (say 3000'). Ask to see a stall and recovery using the standard stall recovery. Once satisfactory:
Lesson Point 2:	Effect of Flap: Full flap stall. 'We are now at 3000' in the local area and are going to have a look at the effect of flap on the stall. I'd like you to set the aircraft up ready for a stall, please. You have control.' Make sure a satisfactory HASELL check is carried out. Then reduce speed and set up in straight and level flight with full flap: 'I have control. I want you to follow me through as I demonstrate a stall and recovery with full flap set. I pick a feature in the distance, add the carb heat, reduce power to idle and hold the altitude steady at 3000'. I am maintaining the aircraft in balance with rudder. Note the lower nose attitude and slower stall speed as a result of the flap. There is the stall – I recover using the standard stall recovery. However, as soon as I have added full power, I remove the drag flap. I remove the rest of the flap in stages when we have a positive rate of climb and the speed is 65 kts or more. Did you notice how the wing dropped when the aircraft stalled. That is quite common when stalling with flaps.'
Lesson Point 3:	'Now, I want you to practice a stall with full flap set, and recover at the stalled condition. You have control'.' **STUDENT PRACTICE.**
Lesson Point 4:	Effect of Power: Power on stall. 'We are now at 3000' in the local area and are going to have a look at the effect of engine power on the stall. I'd like you to set the aircraft up ready for a clean stall, please. You have control.' Make sure a satisfactory HASELL check is carried out. Then: 'I have control. I want you to follow me through as I demonstrate a full stall and recovery with approach power set. Instead of closing the throttle, I am going to set 1500 rpm (or as required). I pick a feature in the distance, add the carb heat, reduce power to 1500 rpm and hold the altitude steady at 3000'. I am maintaining the aircraft in balance with rudder. Note the higher nose attitude and slower stall speed as a result of the power. There is the stall – I recover using the standard stall recovery. Did you notice how the wing dropped a bit when the aircraft stalled. That is quite common with power on stalls.'
Lesson Point 5:	'Now, I want you to practice a stall with approach power set, and recover at the stalled condition. You have control'.' **STUDENT PRACTICE.**

Lesson Point 6:	Effect of Angle of Bank: 'We are now at 3000' again in the local area and are going to have a look at the effect of angle of bank on the stall. I'd like you to set the aircraft up ready for a clean stall, please. You have control.' Make sure a satisfactory HASELL check is carried out. Then: 'I have control. I want you to follow me through as I demonstrate a full stall and recovery with 30 degrees angle of bank. I add the carb heat, reduce power to idle, bank left or right 30° and hold the altitude steady at 3000. I am maintaining the aircraft in balance with rudder. There is the stall – I recover using the standard stall recovery: Control column centrally forward, full power, roll the wings level.'
Lesson Point 7:	'Now, I want you to practice a stall with 30° angle of bank, and recover at the stalled condition. You have control' **STUDENT PRACTICE.** Make sure that the correct technique is followed.
Lesson Point 8:	Full stall in 'Base Turn Configuration': 'We are now at 3000' again in the local area and are going to have a look at the effect of a combination of the previous factors on the stall. I'd like you to set the aircraft up ready for a stall with approach flap, please. You have control.' Make sure a satisfactory HASELL check is carried out. Then: 'I have control. I want you to follow me through as I demonstrate a full stall and recovery in the base turn configuration. I add the carb heat, reduce power to 1500 rpm, bank left or right 30° and hold the altitude steady at 3000. I am maintaining the aircraft in balance with rudder. There is the stall – I recover using the standard stall recovery: Control column centrally forward, full power, roll the wings level. As I climb away and the speed is good, I retract the flap in stages.'
Lesson Point 9:	'Now, I want you to practice a stall in the base turn configuration, and recover at the stalled condition. You have control' **STUDENT PRACTICE.** Make sure that the correct technique is followed.
Lesson Point 10:	Full stall in 'Final Approach Configuration': 'We are now at 3000' again in the local area and are going to have a look at the effect of another combination of the previous factors on the stall. I'd like you to set the aircraft up ready for a stall with full flap, please. You have control.' Make sure a satisfactory HASELL check is carried out. Then: 'I have control. I want you to follow me through as I demonstrate a stall and recovery in the final approach configuration. I pick a feature in the distance, add the carb heat, reduce power to 1500 rpm and hold the altitude steady at 3000'. I am maintaining the aircraft in balance with rudder. There is the stall – I recover using the standard stall recovery. However, as soon as I have added full power, I remove the drag flap. I remove the rest of the flap in stages when we have a positive rate of climb and the speed is 65 kts or more.'
Lesson Point 11:	'Now, I want you to practice a stall in the final approach configuration, and recover at the stalled condition. You have control'.' **STUDENT PRACTICE.** Again, make sure that the correct technique is followed.

<u>Lesson Point 12:</u>	Departure Stall. 'We are now at 4000' in the local area and are going to have a look at the approach to a stall on departure. We are going to imagine that we have mishandled a go-around and have left the flaps at full and allowed the speed to reduce. I'd like you to prepare the aircraft for a full flap stall please. Make sure a satisfactory HASELL check is carried out. Make sure sufficient height is available in case a spin develops: 'I have control. I want you to follow me through as I demonstrate the approach to a departure stall and recovery. I add full power and adopt the climbing attitude. I am maintaining the aircraft in balance with rudder. I allow the speed to reduce below the normal climb speed. Note the very high nose attitude. There is the stall warner– I recover using the standard stall recovery. However, full power is already on. I remove the drag flap after moving the control column centrally forward. I remove the rest of the flap in stages when we have a positive rate of climb and the speed is 65 kts or more. Did you notice how the wing dropped when the aircraft approached the stall? This is a dangerous situation in which to stall the aircraft as a spin can develop.'
<u>Lesson Point 13:</u>	'Now, I want you to practice the approach to a departure stall with full flap set, and recover at the first symptom of the stall. You have control'.' **STUDENT PRACTICE.** Do not allow a severe wing drop or spin to develop.
<u>Lesson Point 14:</u>	Approach to stall in 'Base Turn Configuration': 'We are now at 3000' again in the local area and I want you to show me a stall in the base turn configuration, but I want you to recover at the first symptom of the stall. You have control.' Make sure a satisfactory HASELL check is carried out.
<u>Lesson Point 15:</u>	Approach to stall in 'Final Approach Configuration': 'We are now at 3000' again in the local area and I want you to show me a stall in the final approach configuration, but I want you to recover at the first symptom of the stall. You have control.' Make sure a satisfactory HASELL check is carried out.
<u>Approach & Landing:</u>	As before, the student should be able to fly the rejoin, making all radio calls, as far as final. Take over and land, pattering the last part of the approach and landing.
<u>After Landing, Shutdown & Post-flight:</u>	As before, return control to the student after vacating the runway. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 10b(ii): Stalling 2

1: REVISION Climbing & Full Stall with SSR.
2: EFFECT OF FLAP: TEACH/FT Full Flap Stall & SSR. NOTE: Lower Nose Att, Stall speed slower, More pronounced Stall. Wing drop more likely.
3: STUDENT PRACTICE.
4: EFFECT OF POWER: TEACH/FT full stall with 1500 rpm & SSR. NOTE: Higher Nose Att, Slower stall speed. Wing drop more likely. More Pronounced Stall.
5: STUDENT PRACTICE.
6: EFFECT OF AoB: TEACH/FT clean stall with 20-30° AoB. NOTE: CC Centrally fwd then full power, then roll.
7: STUDENT PRACTICE.
8: FULL STALL IN BASE TURN CONFIG: DEMO/FT. Base Turn Full Stall & SSR. 9: STUDENT PRACTICE.
10: FULL STALL IN FINAL APP CONFIG: TEACH/FT. Final App Config full stall & SSR.
11: STUDENT PRACTICE.
12: DEPARTURE STALL: TEACH/FT. Full Power, enter a climb & continue back press until stall warner. SSR. NOTE: High Nose Att, Severe Wing drop in either direction. Possible Spin.
13: STUDENT PRACTICE.
14: STALL IN BASE TURN CONFIG STUDENT PRACTICE of Base Turn Stall & SSR at 1st symptom.
15: STALL IN FINAL APP CONFIG: STUDENT PRACTICE of Final App Config stall & SSR at 1st symptom.

Debriefing

- The important message here is that whatever configuration, the Standard Stall Recovery works.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

- Hesitation before initiating recovery.
- In the stall during a turn, many students will level the wings before moving the control column centrally forwards. Stress the Standard Stall Recovery. In the final approach stall, many students will leave the drag flap extended until a positive rate of climb has been noted. Point out that a positive rate of climb may not ever be achieved if the drag flap is not retracted straight away.

Common Instructor Faults

- The Standard Stall Recovery is absolutely critical. It must be taught correctly and be learned correctly by the student:

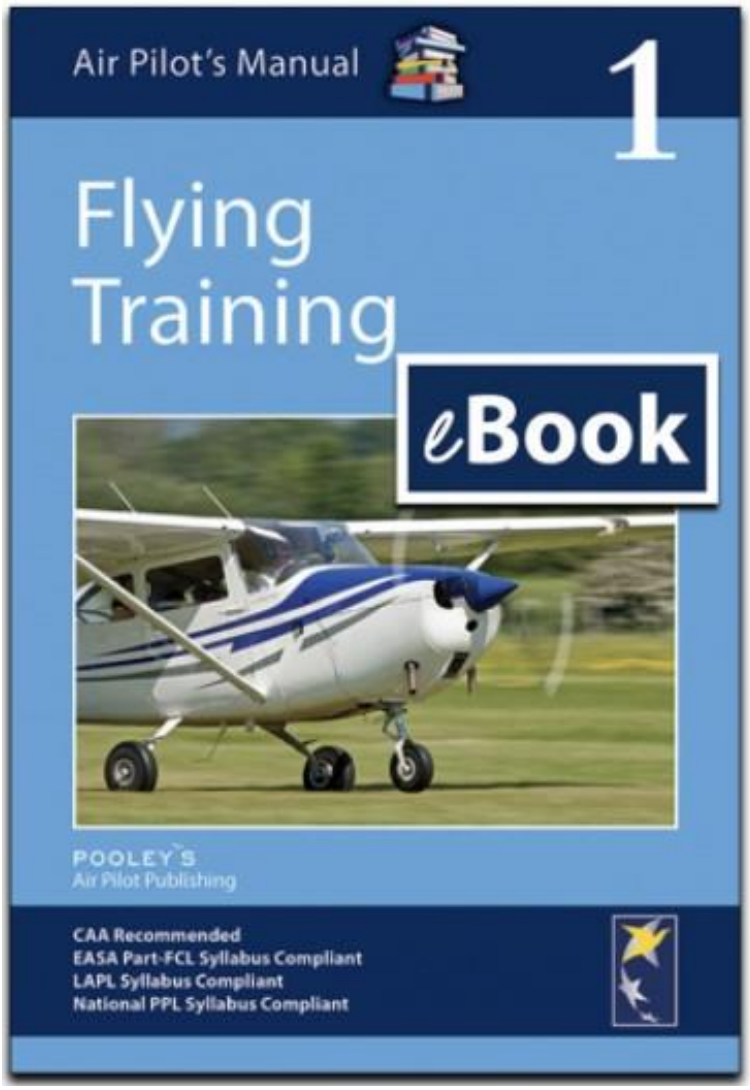
  Imagine two students put forward for test. In the clean stall, student A performs the perfect recovery technique, but loses 600'. Student B adds power first the holds the attitude steady, resulting in no altitude loss. Which student(s) should pass or fail? The answer is student A should pass. His technique will improve, since he has grasped the correct technique. Student B should fail since his incorrect technique will lead to problems in the future, despite getting away with it this time.

Ex 10b(iii) – Stalling 3

Long Briefing

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 10b

Stalling

Aim

To recognise the stall, and to recover from it with a minimum loss of altitude.

Considerations

Stalling occurs when the critical angle of attack is exceeded, irrespective of airspeed.

What is Stalling?

Streamline flow over the wings breaks down and becomes turbulent when the critical (or stalling) angle of attack is exceeded. This causes:

- **buffeting** (shaking or shuddering) of the airframe, felt through the controls;
- **a marked decrease in lift,** resulting in sinking;
- **rearward movement of the centre of pressure** (through which the lift acts), resulting in the nose dropping;
- a marked drag increase.

Stalling will occur whenever the critical angle of attack is exceeded, irrespective of airspeed. The only way to recover is to decrease the angle of attack (i.e. relax the back pressure and/or move the control column forward).

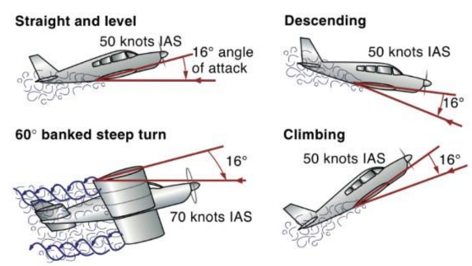


Figure 10b-1 ***Stalling occurs at the critical angle of attack***

The pilot can increase the angle of attack (and reduce airspeed) by pulling the control column back. This happens in many manoeuvres such as:

- establishing slow flight;
- turning (especially steep turns);

Board Briefing

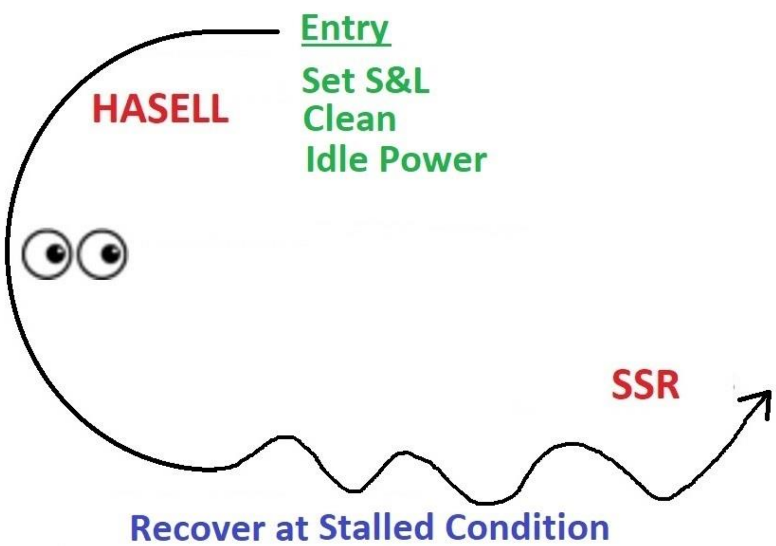
Ex 10b(iii) Stalling 3

08Jan23

AIM: To learn to recognise and recover from secondary stalls and unbalanced stalls.
T&E: Other a/c, Envelope, Engine overheat, Terrain and obstacles, Loss of control.
M: **Lookout, HASELL Checks, Pre-Flight Planning, W&B, Standard Stall Recovery.**

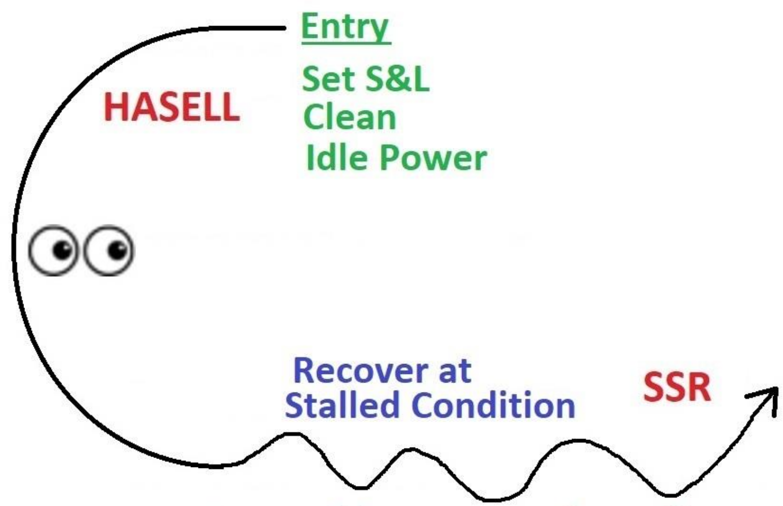
Airex: 1: Revision: Practice Various Stall Recoveries

2: Secondary Stalls



Insufficient pitch results in Secondary Stall!

3: Secondary Dynamic Stalls

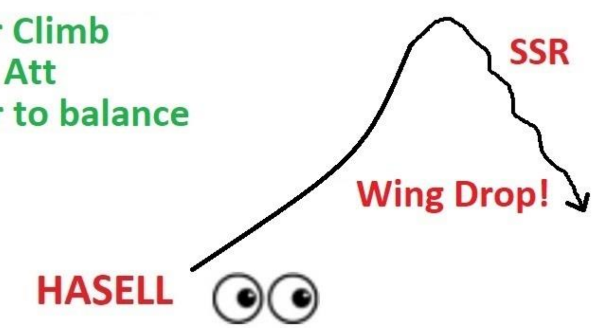


Too rapid a recovery from dive results in Secondary Stall!

4: Unbalanced Stall

Entry

Full Power Climb
High Nose Att
No Rudder to balance



Skeleton Board Briefing

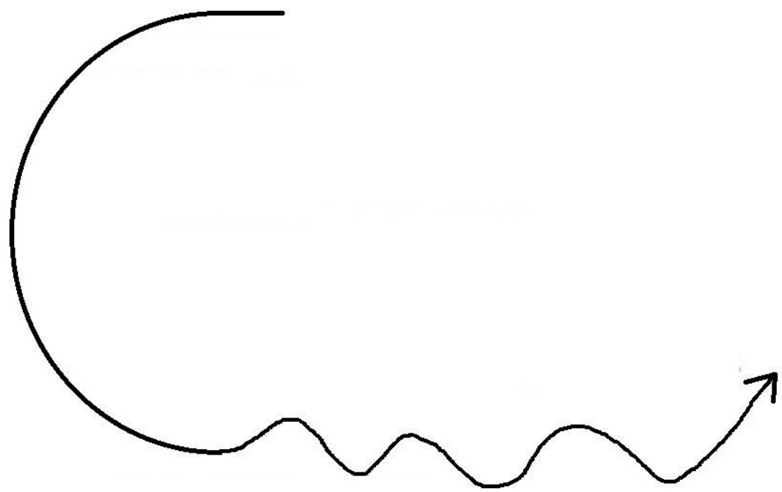
Ex 10b(iii) Stalling 3

03Jan23

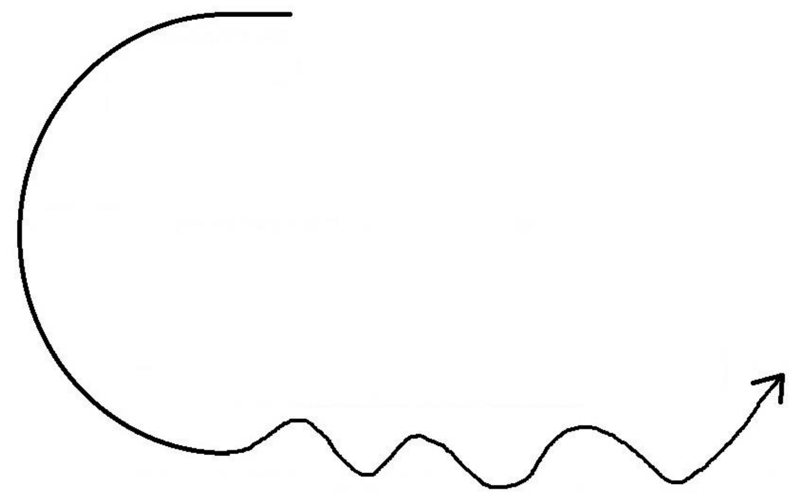
AIM: To learn to recognise and recover from secondary stalls and unbalanced stalls.
T&E:
M:

Airex: 1: Revision:

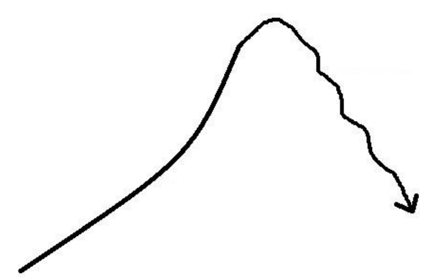
2: Secondary Stalls



3: Secondary Dynamic Stalls



4: Unbalanced Stall



Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	The student should now need no assistance or prompting to get the aircraft as far as lining up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls. Handover control shortly after take-off to allow revision of climbing and turning.
Lesson Point 1:	**STUDENT PRACTICE** of climbing into the local area to a suitable altitude (say 3000'). Ask to see a clean stall and recovery using the standard stall recovery, recovering at the stalled condition. Ask to see recovery from the approach to a stall in the base turn configuration. Ask to see recovery from the approach to a stall in the final approach configuration. Once satisfactory:
Lesson Point 2:	Secondary Stall: 'We are now at 3000' in the local area and are going to have a look at what is called a secondary stall. I'd like you to set the aircraft up ready for a clean stall, please. You have control.' Make sure a satisfactory HASELL check is carried out. 'I have control. I want you to follow me through as I demonstrate a stall and recovery with insufficient pitch during recovery. This will lead to a secondary stall. I pick a feature in the distance, add the carb heat, reduce power to idle and hold the altitude steady at 3000'. I am maintaining the aircraft in balance with rudder. There is the stall warner, now the nose drops. I recover using the standard stall recovery. However, I don't move the control column forward enough. Notice the stall warner sounds again. That is called a secondary stall and could have been avoided if I had used more control movement. I don't want you to practice that.'
Lesson Point 3:	Secondary Dynamic Stall: 'We are now at 3000' in the local area and are going to have a look at what is called a secondary stall. I'd like you to set the aircraft up ready for a clean stall, please. You have control.' Make sure a satisfactory HASELL check is carried out. 'I have control. I want you to follow me through as I demonstrate a stall and recovery with too rapid a pull-out from the dive during recovery. This will lead to a secondary dynamic stall. I pick a feature in the distance, add the carb heat, reduce power to idle and hold the altitude steady at 3000'. I am maintaining the aircraft in balance with rudder. There is the stall warner, now the nose drops. I recover using the standard stall recovery. However, I pull out of the dive too rapidly. Notice the stall warner sounds again. That is called a secondary dynamic stall and could have been avoided if I had eased out of the dive gently. I don't want you to practice that.'

Lesson Point 4:	Unbalanced Yaw at the Stall: 'We are now at 4000' in the local area and are going to have a look at the effect of unbalanced yaw on a clean stall. I'd like you to prepare the aircraft for a clean stall please. Make sure a satisfactory HASELL check is carried out. Make sure sufficient height is available in case a spin develops: 'I have control. I want you to follow me through as I demonstrate a full stall with unbalanced yaw. I add full power and adopt the climbing attitude. I am NOT maintaining the aircraft in balance with rudder. I allow the speed to reduce below the normal climb speed. Note the very high nose attitude. There is the stall warner. I keep holding the high nose attitude. Recover as soon as the wing drop occurs and before a spin develops by moving the control column centrally forward. 'I move the control column centrally forward and recover. Did you notice how the wing dropped when the aircraft approached the stall? This is a dangerous situation in which to stall the aircraft as a spin can develop. It is because I did not keep the ball in the centre. I don't want you to practice that.'
Lesson Point 5:	'What I do want you to practice is the CORRECT stall recovery technique. Ask to see one or more of the test stalls. Ensure the recovery is correct.
Lesson Point 6:	'Are you interested in seeing a spin at all?' If so, demo/patter a short spin. If the student does not want to, do NOT push it!
Approach & Landing:	As before, the student should be able to fly the rejoin, making all radio calls, as far as final. Take over and land, pattering the last part of the approach and landing.
After Landing, Shutdown & Post-flight:	As before, return control to the student after vacating the runway. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 10b(iii): Stalling 3

1: REVISION: STUDENT PRACTICE of the 3 Test Stalls: Clean, Base Turn Config & Final App Config.
2: SECONDARY STALLS. DEMO/FT ONLY Sec Stall due insufficient CC movement. HASELL Cx, CH on, power to idle. Insufficient CC fwd at stall. NOTE: Secondary stall, Possible wing drop. No Practice.
3: SECONDARY DYNAMIC STALLS. DEMO/FT Sec Stall due to over-rapid recovery from dive. HASELL Cx, CH on, power to idle. At the stall CC centrally fwd. Demo rapid pitch up to induce secondary stall.
4: UNBALANCED YAW AT THE STALL. DEMO Only. HASELL Checks. Simulate after take-off with no rudder applied. Apply full power (NO RUDDER), keep pulling back until a/c stalls. Severe wing drop. CC Cent fwd. Level wings. Ease out of dive.
5: STUDENT PRACTICE of CORRECT recovery technique. SSR.
6: REVISION: Practice of S&L, turning & descending on return to airfield.

Debriefing

- The take home message is still that the Standard Stall Recovery, if applied promptly and correctly will unstall the aeroplane.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

To be added

Common Instructor Faults

- It can be difficult to produce these examples of 'mishandled stall recovery'. A little practice is needed to be able to show the desired effects in your aircraft type.

Ex 11 – Spinning & Spin Avoidance

Practical Considerations

- Full spinning is not part of the EASA PPL (or LAPL) syllabus, neither is it part of the EASA FI course. However, the UK CAA has decided that all new instructors are to be examined on spinning in the AoC, and so the FIE will usually include spinning as one of the secondary exercises. As such, during an FI course, the trainee will learn how to teach the entry to and recovery from a spin. The FIC instructor will need to make mistakes in the entry and recovery to check that the trainee instructor has learnt correctly.
- Spin avoidance and recovery at the incipient stage of a spin are very much in the EASA PPL syllabus, and so during the stall training, attempts should be made to show students a wing drop at the stall, and how to recover from it.
- Most pilots embarking on an FI course will NEVER have seen a spin. In that case, that pilot must first be taught spinning, before being taught how to teach spinning. This can take several hours and may extend the hours needed to complete the course. Effectively, the FIC Instructor must both teach spinning, and then teach how to teach spinning. Some trainees may be apprehensive about the training, and others may suffer from airsickness.
- Ab-Initio spin training needs a careful look at Threat & Error Management. Some aircraft lose a lot of height in a fully developed spin. Also, during training, recoveries may be mishandled, resulting in further height loss. 4000-6000' should be viewed as a minimum height depending on aircraft type. Remember, unlike stalling, there is **NO STANDARD SPIN RECOVERY**! Many actions are similar, but the AFM/PoH must be consulted.
- The FI trainee may be doing the course on a non-spinnable aircraft. If this is the case, he may fly with an FIE in a spinnable aircraft and be assessed on the spinning part of the AoC. If the FIC Instructor conducting the course also has FIE privileges, then he may also carry out this function on a separate, dedicated flight. Any hours used with the FIE to sign off the spinning cannot be counted towards the 30 hours minimum.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- This may need to be completed over more than one flight. The lesson should begin with HASELL+ checks followed by the demonstration of a full 3 turn spin and recovery. Then it is important to check the effect this has had on the student. It may be necessary to end the lesson at this point if reactions are adverse. Remember, the chances are, the student has never seen an aeroplane behave remotely like this before.
- The Cessna 172 is not a good aircraft for spinning: It does not want to spin and easily falls out from a spin if the controls are released. However, the best results may be obtained using the following method:
    - Set 1500-1700 rpm, raise the nose.
    - As the speed approaches 60-65 kts, abruptly apply full left rudder and hold the controls full back. Any release of the back pressure will cause the aircraft to recover prematurely.
    - During the recovery, do not release back pressure until after the opposite rudder has been applied.

HASELL+ Checks

Before spinning, it is a good idea to carry out an enhanced HASELL check.

A good horizon is necessary, the window should be clean and clear, and a good surface below (not 8/8 cloud or featureless sea). Normal HASELL checks can be upgraded to **HASELL+**, where the + part is:

- Clear Horizon
- Window Clear
- Surface below
- Safety Brief – Run through actions of both pilots, emergency brief, what happens if intercom is lost, what if student freezes?

Notes:

- Under Security in the HASELL checks, remember, before even starting the engine, make sure any loose articles are stowed or removed. It will be too late once in flight!
- If a student freezes on the controls and will not let go, hitting them in the throat will cause them to release their grip and raise their hands.
- The student may be flying in a different aircraft type to their normal trainer, since most are not cleared for intentional spinning. Make sure you teach them the aircraft differences on take-off and climb up to the training area.
- This topic may need to be completed over more than one flight.
- Do not attempt to talk to the student during the manoeuvre. On one of the demonstration spins, before entry, ask him to note the direction of spin from the TC and the airspeed. After the spin is complete, ask him what the values were. Many students are surprised by the high IAS (say 70 kts in a C152) and assume the aircraft cannot be stalled. Remember if the aircraft is descending at 3000 fpm, that is 30 kts downwards just from descent!
- During the spin demonstration, hold the pro-spin controls fully in, to maintain the spin. In a C152, releasing the controls will cause the aircraft to exit the spin.
- Remind the trainee that the spin may speed up before recovery. This is normal, and due to gyroscopic precession.
- The FIC AoC will always include teaching a spin.

Long Briefing

From EASA Part-FCL:

EXERCISE 11a: SPIN RECOVERY AT THE INCIPIENT STAGE

Long briefing objectives:

(1) causes, stages, autorotation and characteristics of the spin;
(2) recognition and recovery at the incipient stage: entered from various flight attitudes;
(3) aeroplane limitations.

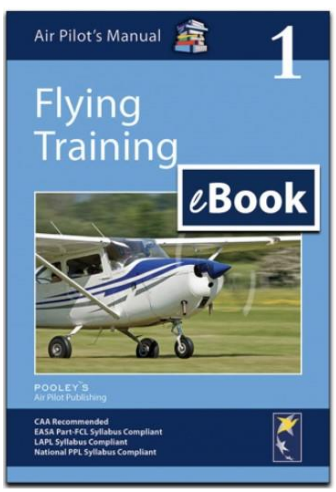
EXERCISE 11b: SPIN RECOVERY AT THE DEVELOPED STAGE

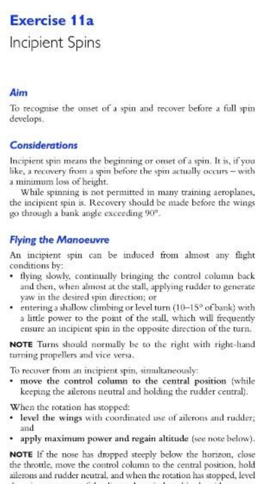
Long briefing objectives:

(1) spin entry;
(2) recognition and identification of spin direction;
(3) spin recovery;
(4) use of controls;
(5) effects of power or flaps (flap restriction applicable to type);
(6) effect of the CG upon spinning characteristics;
(7) spinning from various flight attitudes;
(8) aeroplane limitation;
(9) safety checks.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.





Exercise 11a

Incipient Spins

Aim

To recognise the onset of a spin and recover before a full spin develops.

Considerations

Incipient spin means the beginning or onset of a spin. It is, if you like, a recovery from a spin before the spin actually occurs – with a minimum loss of height.

While spinning is not permitted in many training aeroplanes, the incipient spin is. Recovery should be made before the wings go through a bank angle exceeding 90°.

Flying the Manoeuvre

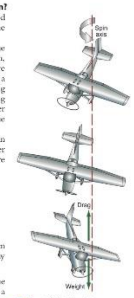
An incipient spin can be induced from almost any flight conditions by:
- flying slowly, continually bringing the control column back and then, when almost at the stall, applying rudder to generate yaw in the desired spin direction; or
- entering a shallow climbing or level turn (10–15° of bank) with a little power to the point of the stall, which will frequently ensure an incipient spin in the opposite direction of the turn.

NOTE Turns should normally be to the right with right-hand turning propellers and vice versa.

To recover from an incipient spin, simultaneously:
- **move the control column to the central position** (while keeping the ailerons neutral and holding the rudder central).

When the rotation has stopped:
- **level the wings** with coordinated use of ailerons and rudder; and
- **apply maximum power and regain altitude** (see note below).

NOTE If the nose has dropped steeply below the horizon, close the throttle, move the control column to the central position, hold ailerons and rudder neutral, and when the rotation has stopped, level the wings, ease out of the dive and regain lost altitude with power.



Exercise 11b

Full Spins

Aim

To enter, maintain and recover from a fully-developed spin (provided it is an approved manoeuvre for the aeroplane).

NOTE This exercise is not mandatory.

Considerations

What is a Developed Spin?

A spin is a condition of stalled flight in which the aeroplane describes a spiral descent.

As well as the aeroplane being in a stalled condition, one wing is producing more lift than the other (caused by a roll at low speed). Greater drag from the stalled lower wing results in further yaw, further roll, etc., etc. Pitching of the nose may also occur.

The aeroplane is in motion about all three axes. In other words, lots of things are happening!

In a spin, the aeroplane is:
- stalled;
- rolling;
- yawing;
- pitching;
- sideslipping; and
- **rapidly losing height,** even though the airspeed may not be increasing.

NOTE In a developed spin the aircraft is also acting as a gyroscope. Therefore mass distribution will have an effect on the form the spin takes and how easily it will recover.

Figure 11b-1 **The spin**

Example Long Briefing

Spin Avoidance & Training in Cessna 152 Aircraft

Anatomy of a Spin

A spin cannot exist without both a stall and yaw.

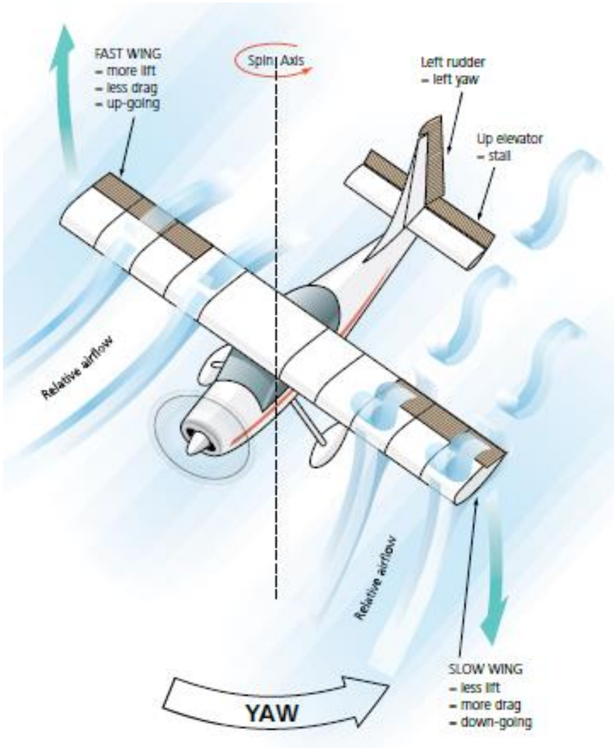
Stall

As a reminder, the stall angle of attack is the critical angle which, when exceeded, will cause the normally streamlined flow of air that follows the curvature of the upper wing surface to separate from the wing and leave as turbulent air flow.

Yaw

If the aircraft is yawed, a roll will develop in the direction of yaw as a secondary effect of that yaw. If this wing is at or near the stall angle, its lift reduces. When one wing goes down, the other will rise. The relative airflow now produces a reduction in angle of attack on the up-going wing, which may be below the stall angle (in effect it has become less stalled). The effect of these differences in lift will be to produce an accelerating roll rate in the direction of the initial yaw. These changing angles of attack also affect drag. The down-going wing with an increased angle of attack suffers increasing drag. The up-going wing gets a drag reduction. The difference causes even more yaw towards the down-going wing.

Autorotation



The yawed and stalled aircraft then starts to rotate. However, it not only rolls about the longitudinal axis due to the differences in lift from each wing, but also simultaneously rotates (yaws) about the vertical axis due to the differences in drag. The combination of these two movements gives us a new axis, the spin axis. The aircraft will continue in a self-perpetuating spin, or autorotation, about this axis until opposing forces come into play.

Causes of Yaw

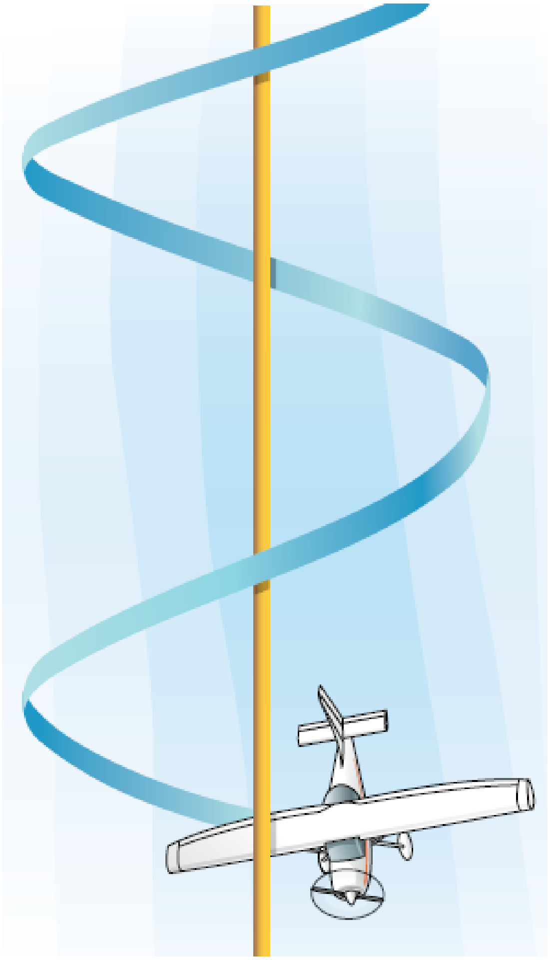
• Out of balance flight caused by inducing (or not preventing) yaw with rudder.
• Wing drop at the stall, due to rigging or dimensional differences between wings.
• Application of aileron will cause aileron drag. On some aircraft when stalled, this will produce yaw.
• Gyroscopic effect from the propeller when the aircraft is pitching with power on, such as falling out of an aerobatic manoeuvre. This effect is more pronounced in high-powered aircraft.
• Gusts.
• One wing producing more lift, due to ice or damage to a wing surface.
• Asymmetric power on twin-engine aeroplanes.

By far the most common cause of entry to an unintentional spin is the first of these – yaw at the stall caused by out-of-balance flight.

Spin Characteristics

The development and characteristics of a spin vary between aircraft types, but an aircraft will usually rotate several times before it settles down into a state of spinning steadily. The spin stabilizes once a complicated balance is reached between the various aerodynamic and inertial forces acting on the aircraft. The pitch angle it finally adopts may be steep (60 degrees or more with the nose low) or flat (nose on the horizon). The aircraft will lose altitude rapidly and descend along a vertical path about the spin axis. The rates of roll and yaw, and the pitch attitude, can all oscillate.

Spin characteristics vary depending on aircraft type, but even a given type of aircraft can have markedly changed spin characteristics depending on the aircraft weight, the aircraft centre of gravity, and how the controls (including engine power) are handled during the spin. A four-seat aircraft with docile stall and spin characteristics at training weights with 2 people on board can have very different characteristics at maximum all up weight with an aft centre of gravity due to people and baggage in the back.



An aircraft descends about its spin axis at a steep, nose low attitude.

The 3 Stages of a Spin

Incipient Stage

This is the transitional stage, during which the aircraft progresses from a fully developed stall into autorotation. This progression may be very rapid and is sometimes described as a flick. It may last only 2 turns, during which time the rotation tends to accelerate towards the rate found in the developed stage. The final balancing of aerodynamic and inertial forces has yet to occur. The incipient stage is generally driven by pilot inputs. As a very general rule, if pro-spin control inputs are removed in the incipient stage (the elevator is moved forward to unstall the wings, or the out-of balance yaw is removed), then the aircraft will not continue to enter a stable spin.

Developed Stage

In the developed stage, a state of equilibrium is reached, characterised by a low and constant airspeed. Rates of descent will be as high as 5000 to 8000 feet per minute. At this stage the spin will be self-perpetuating. If the pilot does nothing about it, the spin is likely to continue until the aircraft hits the ground. Positive anti-spin control inputs will be required to recover from the fully developed spin.

Recovery Stage

Spinning ceases only if and when opposing forces and moments overcome auto-rotation. Since yaw coupled with roll powers the spin, the pilot must forcibly uncouple them by applying full opposite rudder. After a brief pause, this is followed by forward movement on the stick or control column. During the recovery phase, the nose attitude typically steepens and the rate of rotation may momentarily accelerate as well, giving the impression that the spin is actually getting worse. It is not, and the anti-spin control inputs must be maintained until the spin stops.

Spin recovery is not instantaneous. It may take up to several turns for the anti-spin control inputs to finally overcome pro-spin forces. The longer an aircraft is in a spin, the more turns it may take to recover. Spins are recoverable only when the cumulative effects of the interacting variables favour recovery and there is enough altitude.

Avoiding Spins

Prevention is better than cure. The following situations can cause a spin.

Low-speed Climbing Turns

The aircraft is already vulnerable by being at low speed and in a nose-up attitude and therefore close to the stall. Low-energy, low-powered aeroplanes in this situation will suffer some performance loss during a turn. If this is not compensated for by lowering the nose, the speed will further diminish. Turning – or even the application of aileron – may give the required yaw to precipitate the spin.

Skidding Turn on to Final

Consider a late turn on to final approach, overturning the centre line, particularly on a glide or forced-landing approach, or in a crosswind. If any attempt is made to correct the situation by increasing rudder in the direction of the turn without increasing bank, this coupled with a reducing or low airspeed will result in a skidding turn, and will provide all the ingredients needed to start a spin. The low altitude will preclude the chance of recovery.

False Visual Horizons

Flying in hilly terrain may distort the visual cues needed to ascertain both the pitch and roll attitudes of the aircraft. It is easy to allow airspeed to reduce further than anticipated. When combined with a turn, particularly in confined areas, this can produce stall and yaw, the two components needed for a spin.

Engine Failure After Takeoff

In a high nose-up attitude, with high power and low speed, the immediate priority is to lower the nose and preserve existing airspeed. In most cases, there is little option but to land ahead. Attempting a turn back to the runway or to a limited selection of landing areas will provide the G loading to increase the stall speed. Any yaw will now put the aeroplane into the incipient spin situation.

Spin Recovery

To have a chance at recovery, the pilot must immediately recognise the spin, and its direction, know exactly what to do in the right order, and then execute the procedure correctly the first time. In most aircraft there is little time to do all this. The minimum altitude loss for a text-book recovery will be about 1000 to 1500 feet.

Direction of Spin

Problems can occur in determining spin direction due to extreme disorientation and shock/surprise. The spin (yaw) direction will always be correctly indicated by the turn needle of the TC. The ball cannot be trusted. It is likely to be centrifuged away from the centre of the aeroplane and its reaction may depend on where it is mounted on the aircraft in relation to the centre of gravity.

Recovery Technique

Spin recovery does not follow a pilot's natural instincts.

Incipient Spin

Recovery from an incipient spin (a spin that has just started) requires instant recognition, an immediate check forward on the stick or control column (to unstall the wing) and sufficient opposite rudder to eliminate yaw and further wing drop. This must be instinctive. Be wary of pitching forward too much.

Developed Spin
In a developed spin, full deflection of controls is required. Although there is no universal spin recovery technique, the one from the Cessna 152 PoH is shown below.

Cessna 152 Spin Recovery (From PoH)

Should an inadvertent spin occur, the following recovery procedure should be used:

1. **Place ailerons in neutral position**
2. **Close the throttle.**
3. **Apply and hold full opposite rudder against the direction of rotation.**
4. **Just after the rudder reaches the stop, move the elevator control briskly forward far enough to break the stall.** (Full down elevator may be required at aft C of G.)
5. **Hold these inputs until the spin stops.** (Premature relaxation of the inputs may extend the recovery)
6. **As the rotation stops, neutralise rudder, and make a smooth recovery from the resulting dive.**

NOTE: If disorientation precludes visual determination of the direction of rotation, the symbolic airplane in the turn coordinator may be referred to for this information.

Board Briefing

Ex 11: 11a: Spin Avoidance & 11b: Full Spinning

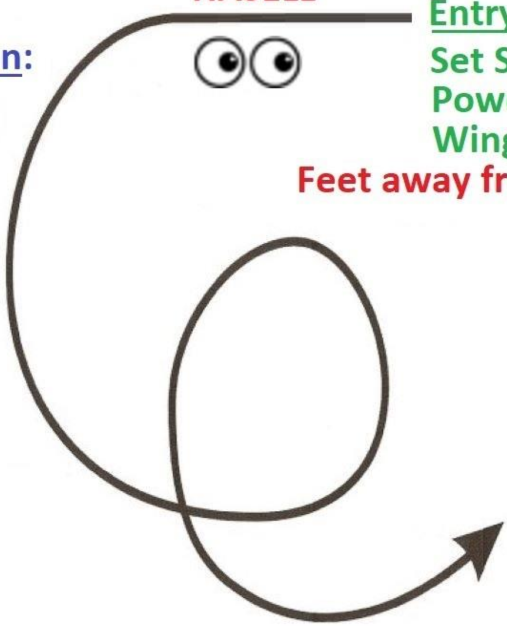
03Jan23

AIM: **a:** To learn to recognise and recover from a spin at the incipient stage. **b:** To learn how to recover from a fully developed spin.
T&E: Other a/c, Envelope, Terrain and obstacles, Engine overheat, Loose articles, Personal injury, Loss of control.
M: HASELL Checks, W&B, Pre-Flight Planning, Learn Spin Recovery Technique from PoH/AFM.

Airex: **1:** Revision: Stalling

2: Incipient Spin

Recognition:
A/c Flicks



HASELL

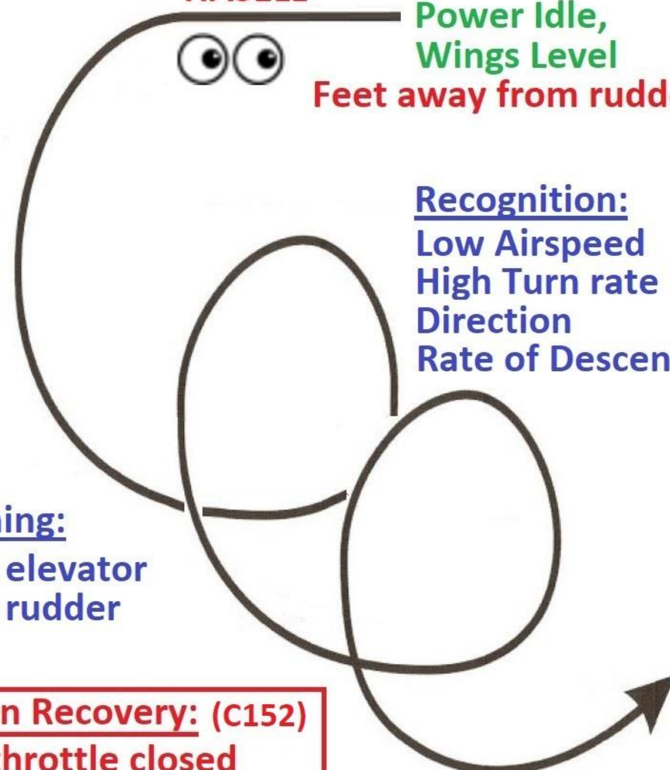
Entry
Set S&L,
Power Idle,
Wings Level
Feet away from rudder!

Spin Recovery at Incipient Stage
Centralise Controls
When rotation stops - Recover
If it doesn't stop - Full Spin Recovery!

3: Full Spin

HASELL

Entry
Set S&L,
Power Idle,
Wings Level
Feet away from rudder!



Recognition:
Low Airspeed
High Turn rate
Direction
Rate of Descent

Maintaining:
Hold full elevator
Hold full rudder

Full Spin Recovery: (C152)
Check throttle closed
Check spin direction
Full opposite rudder
C.C. centrally fwd
Centralise rudder
Ease out of dive

No Standard Spin Recovery exists!!!

Skeleton Board Briefing

03Jan23

Ex 11: 11a: Spin Avoidance & 11b: Full Spinning

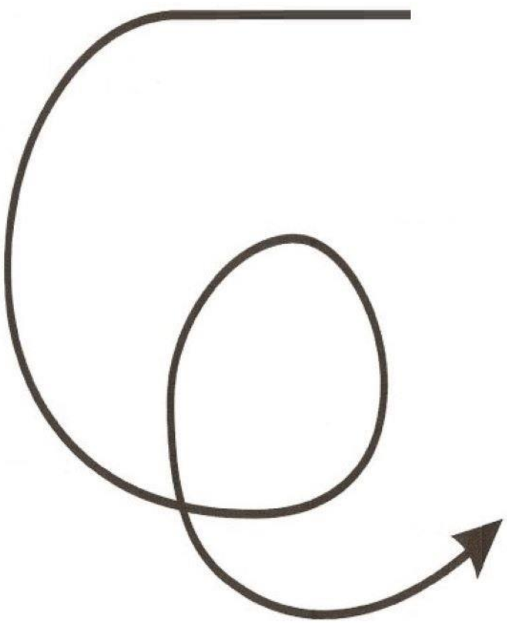
AIM: **a:** To learn to recognise and recover from a spin at the incipient stage. **b:** To learn how to recover from a fully developed spin.

T&E:

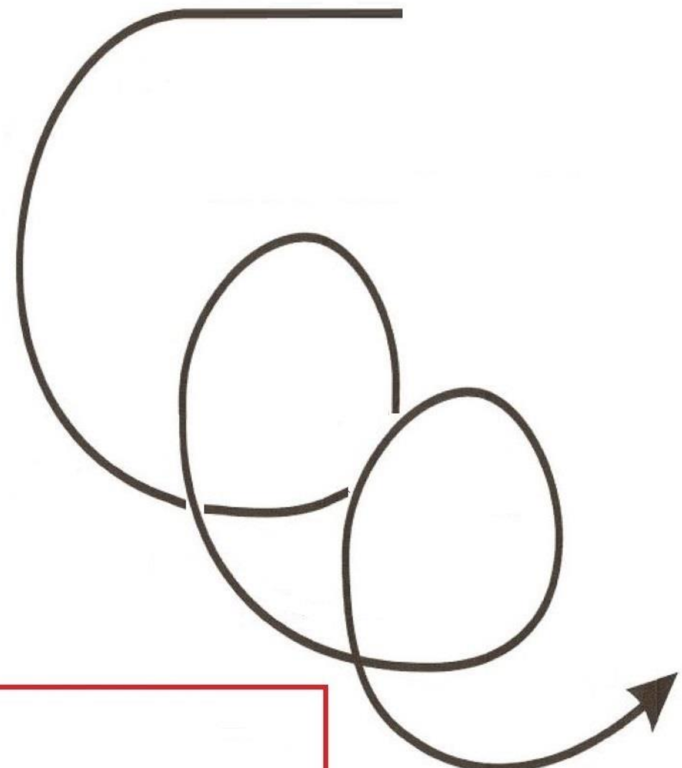
M:

Airex: **1:** Revision:

2: Incipient Spin



3: Full Spin



Inadvertent Spin This humorous video shows a full spin in a Cessna 152 (internet connection required)

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

On the Ground:	The student should now need no assistance or prompting to get the aircraft as far as lining up on the runway for your take-off.
Take-Off:	As before, carry out the take-off while the student observes. Use the checklist and ask the student to make the radio calls. Handover control shortly after take-off to allow revision of climbing and turning.
Lesson Point 1:	**STUDENT PRACTICE** of climbing into the local area to a suitable altitude (say 3000').
Lesson Point 2:	'We are now at 5000' in the local area. I am going to demonstrate an incipient spin to you. I just want you to watch what is happening.' Carry out a HASELL+ check. 'I pick a feature in the distance, put the carb heat ON and reduce the power to 1800 rpm (or as required) and maintain altitude. There is the stall warner. I keep maintaining altitude.' Make no attempt to keep the aircraft in balance. You want a wing drop to occur. Recover as the wing drop gets to 45-60^0 angle of bank, and before a spin develops by 'Power OFF – Centralise'. 'There is a wing drop, so Power OFF – Centralise controls. Did you notice how the wing dropped when the aircraft stalled? If we had let that develop, the aircraft would have gone into a spin. So, to recover before a spin develops, we use: Power OFF – Centralise. Are you feeling OK? Are you happy to continue?'
Lesson Point 3:	'I'd like you to practice recovering at the incipient stage of the spin. You have control.' **STUDENT PRACTICE**.
Lesson Point 4:	'We are now at 5000' in the local area. I am going to demonstrate a full spin to you. I just want you to watch what is happening. Try and note the airspeed, rate of descent and turn co-ordinator indications.' Carry out a HASELL+ check. 'I put the carb heat ON and reduce the power to 1500 rpm (or as required) and maintain altitude. There is the stall warner. At 60 kts I apply full up elevator and full rudder left or right. Notice the aircraft spinning. Note the low airspeed. Note the Turn Co-ordinator showing my direction of spin. Note the high rate of descent.' After 3 turns: 'I am now ready to recover: Power off, flaps up, full opposite rudder. Control column centrally forward until the spin stops. Ease out of the dive. Did you notice the airspeed? Are you feeling OK?'

Lesson Point 5:	'Now, I'd like you to practice setting up and recovering from a full spin. You have control.' **STUDENT PRACTICE**. Practice as required. It is acceptable at this stage to coach the student through entering and recovering from the spin.
Approach & Landing:	As before, the student should be able to fly the rejoin, making all radio calls, as far as final. Take over and land, pattering the last part of the approach and landing.
After Landing, Shutdown & Post-flight:	As before, return control to the student after vacating the runway. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 11a: Spinning (Recovery at Incipient)

1: REVISION: STUDENT PRACTICE climbing to local area.
2: TEACH HASELL+ Cx.
3: INCIPIENT SPIN
TEACH/FT Spin recovery at Incipient stage. Reduce power ~1800 rpm. Gradually apply back pressure without maintaining balance. Stall the a/c. Wing will drop. Wait until wing drops 45-60º before recovery: 'POWER OFF-CENTRALISE!'
4: STUDENT PRACTICE.

Ex 11b: Spinning (Full)

4: FULL 3 turn SPIN & RECOVERY:
PATTER ONLY HASELL+ Cx. CH on, power 1500 rpm. Maintain altitude. At 55 kts, apply full rudder and hold CC fully back. NOTE: Airspeed & Direction of spin on TC.

> **C152 SPIN RECOVERY: •Identify direction of spin •Throttle closed •Flaps UP •Full Opposite Rudder •CC Cent Fwd until spin stops •Centralise rudder •Ease out of dive gently**

5: STUDENT PRACTICE.
6: REVISION: STUDENT PRACTICE setting up return to airfield & approach for landing.

Debriefing

- Make sure the student knows the incipient recovery: **Power OFF - Centralise** as well as the spin recovery for the aircraft type in use.

New Basic Skills

  - The new basic skill learned in this lesson is: Recognition of the spin or incipient spin.

Common Student Faults

- During a spin in a Cessna 152 or 172, it is important to keep **FULL** rudder and **FULL** back pressure on until ready to recover. These aircraft are reluctant to spin.

Common Instructor Faults

- Try not to refer to the ‘Incipient Spin Recovery’. The phrase ‘Recovery at the Incipient Stage’ is better.
- Recovery at the incipient stage tends to be fast and there is not much time to patter. The phrase ‘**Power Off - Centralise**!’ usually does the trick.
- Do not forget to point out the low and fluctuating airspeed, direction of turn on the TC/TI and the rate of turn and descent during the spin. Point out how these are different to a spiral dive.
- Make sure that in the recovery, the first action is to reduce the power to idle, otherwise the spin will flatten, and the dive after recovery will be faster.
- During a spin in a Cessna 152 or 172, it is important to keep FULL rudder and FULL back pressure on until ready to recover. In more aerobatic aircraft such as a Slingsby, this is not necessary.

Ex 12 - Takeoff and Climb to Downwind

Practical Considerations

- Ex 12 is usually combined with Ex 13 and called 'Ex 12&13: Circuits'.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- Spacing in the circuit can often cause problems. Remember, the best leg to take action on is the climbout. If there is traffic close ahead, extending the climbout (where permitted) can be an effective solution.

Long Briefing

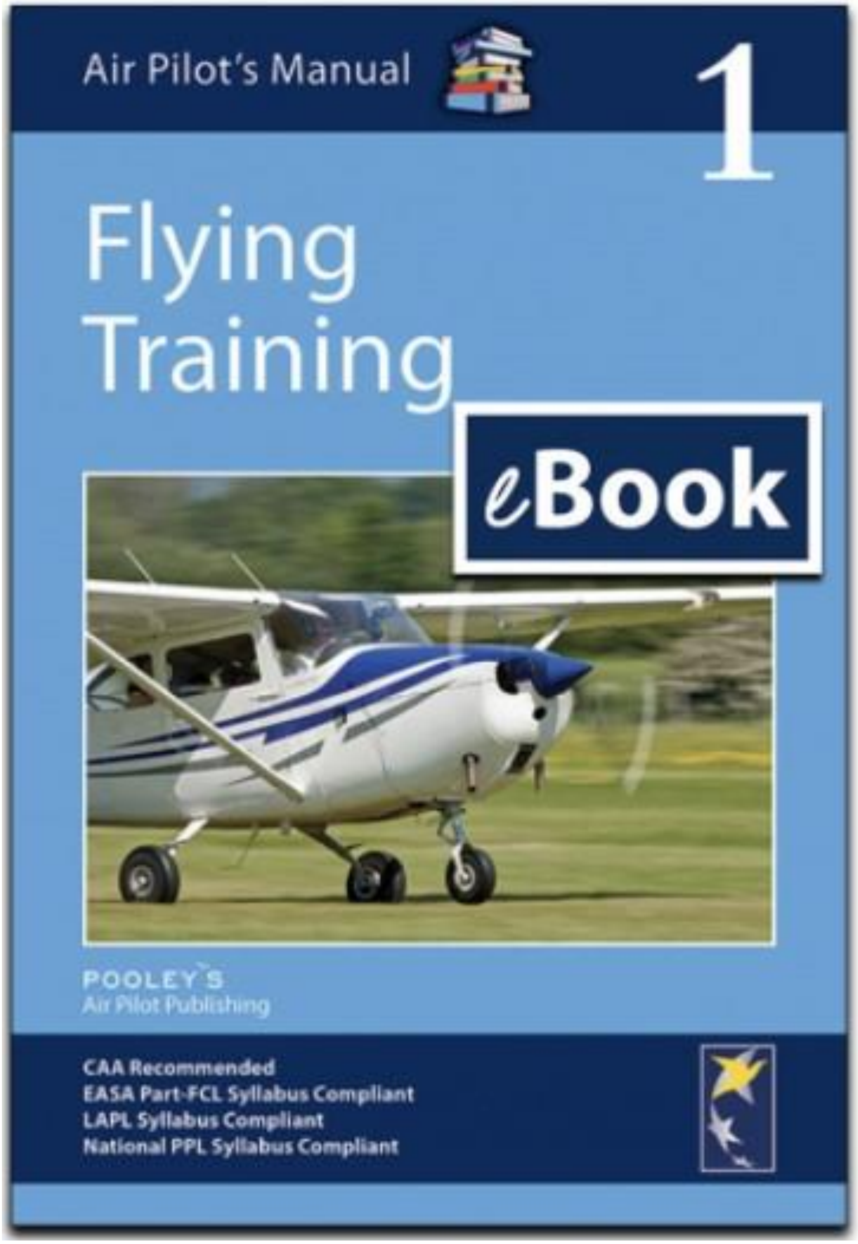
From EASA Part-FCL:

Long briefing objectives:

(1) handling: factors affecting the length of take-off run and initial climb;
(2) correct lift off speed, use of elevators (safeguarding the nose wheel), rudder and power;
(3) effect of wind (including crosswind component);
(4) effect of flaps (including the decision to use and the amount permitted);
(5) effect of ground surface and gradient upon the take-off run;
(6) effect of mass, altitude and temperature on take-off and climb performance;
(7) pre take-off checks;
(8) ATC procedure before take-off;
(9) drills, during and after take-off;
(10) noise abatement procedures;
(11) tail wheel considerations (as applicable);
(12) short or soft field take-off considerations or procedures;
(13) emergencies: (i) aborted take-off; (ii) engine failure after take-off.
(14) ATC procedures.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 12

Standard Take-Off and Climb to Downwind Leg

Aim

To take off into wind and climb out in the circuit pattern to downwind leg.

Considerations

This manoeuvre involves:

- **flying the aeroplane off the ground** and clearing any obstacles;
- **a climb to circuit altitude;** and
- **positioning the aeroplane on downwind leg**.

The Take-Off

Take-off into wind if possible.

During the take-off, the aeroplane must be accelerated to an airspeed at which it is capable of flying. Having a headwind component on a runway 'gives' you airspeed even before you have started rolling. For example, a 10 knot headwind component gives you 10 kt of airspeed over and above the groundspeed on take-off.

Taking off into wind is good airmanship because it gives:

- the shortest ground run;
- **the lowest groundspeed** for the required take-off airspeed;
- **the best directional control,** especially at the start of the ground run, when there is not much airflow over the control surfaces;
- **no side forces** on the undercarriage (as in a crosswind);
- **the best obstacle clearance** because of the shorter ground run and the steeper flightpath over ground;
- **the best position in the climb-out** from which to make an into-wind landing straight ahead (or slightly to one side) in the case of engine failure immediately after take-off.

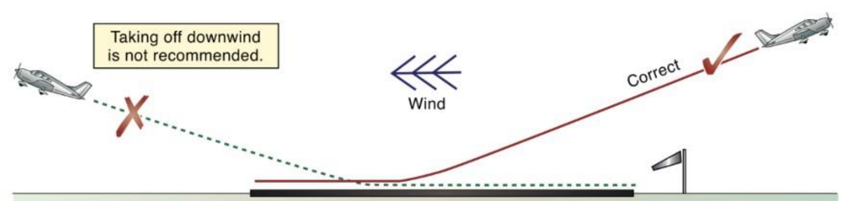


Figure 12-1 ***Take-off into wind***

Board Briefing

Ex 12: TAKE-OFF & CLIMB TO DOWNWIND POSITION

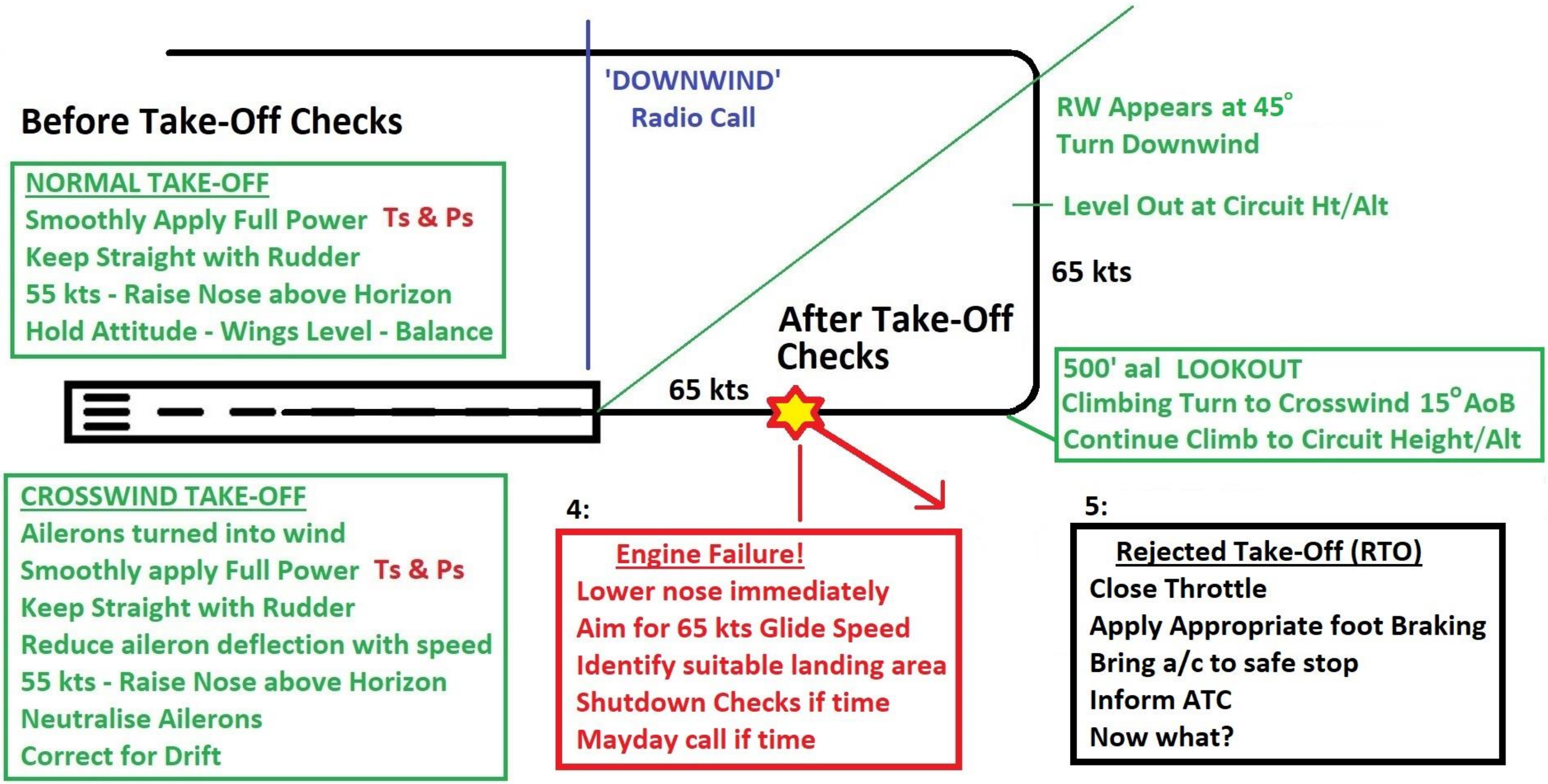
28Feb22

AIM: To learn to take-off and fly a normal circuit to the downwind position. To learn how to handle an Engine Failure after Take-Off (EFATO) and RTO.
T&E: Other a/c, Engine overheat, Wake Turbulence, Take-Off w/o clearance
M: Lookout, Ts & Ps, Perf Calculation, Good RT

AIREX: 1: Demonstrate Take-Off to Downwind

2: Take-Off and Climb to Downwind

3:



Skeleton Board Briefing

28Feb22

Ex 12: TAKE-OFF & CLIMB TO DOWNWIND POSITION

AIM: To learn to take-off and fly a normal circuit to the downwind position. To learn how to handle an Engine Failure after Take-Off (EFATO) and RTO.

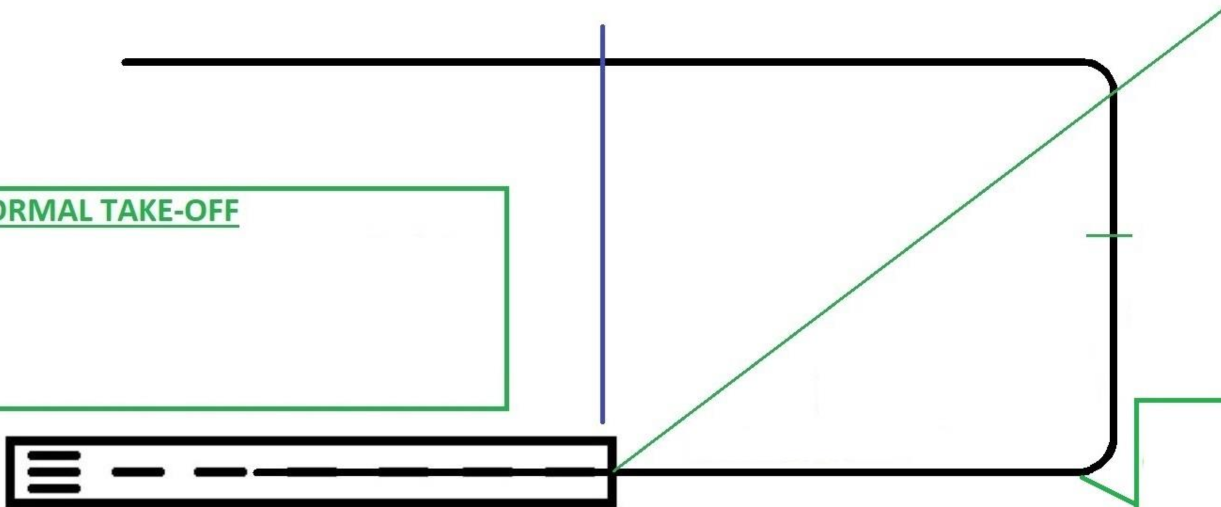
T&E:

M:

AIREX: 1:

2:

3:



NORMAL TAKE-OFF

CROSSWIND TAKE-OFF

4:

Engine Failure!

5:

Rejected Take-Off (RTO)

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will need no assistance or prompting to get the aircraft as far as lining up on the runway. Make sure there is a suitable gap in traffic to allow an unhurried take-off.
Lesson Point 2:	By now, the student has seen you demonstrate and patter several take-offs, and is now more than ready to try for themselves. However, if it has been a while since the last lesson, the demonstration/patter of a full circuit may be helpful. 'Here we, stopped are on the runway centreline with all the checks completed and take-off clearance received. I want you to follow me through as I teach you the take-off. My heels on the floor and I have one hand on the throttle and the other hand holding the yoke neutral (or ailerons into wind). I check the heading on the DI is correct for the runway and smoothly apply full power. I want you to look at the far end of the runway. I use the rudder pedals to keep the aircraft straight along the runway. As speed starts to increase, I check that the airspeed is increasing on the ASI and the Ts & Ps are in the green. Then I look only outside at the far end of the runway, keeping one hand on the throttle and the yoke neutral. As the speed reaches 55 kts, I move the control column rearwards until the nose rises and then hold the attitude, adjusting to the normal climbing attitude.' Then round the circuit, pattering until landing and vacating. Taxy back to the holding point.
Lesson Point 3:	'Here we, stopped short of the runway. When I give you control, I want you to line up, carry out all necessary checks and take off when cleared. You have control.' **STUDENT PRACTICE.** Ideally you should remain silent and not coach the student during the take-off, but as things happen quite quickly, the odd helpful remark may be needed, such as 'more right rudder pedal', 'more/less back pressure' etc.
Lesson Point 4:	Once the climbing attitude has been established: 'Check the ASI to make sure you are climbing at 65 kts and check the ball is in the middle – you will need right rudder pedal. Look over your shoulder to check you are climbing straight out (in aircraft with rear windows!).
Lesson Point 5:	'Now as you reach 500', a good lookout and then a 15 degree banked climbing turn to the left/right. As you approach circuit height, level out in the normal way.'
Lesson Point 6:	'Look out the rear window, and as you see the runway appear 45 degrees over your shoulder (or as required locally), start a 30 degree banked level turn onto the downwind leg. Make sure you are tracking parallel to the runway.'
Lesson Point 7:	'I have control.' Demonstrate (with follow through) and patter the remainder of the circuit and landing. Vacate and taxy back to the holding point.
Lesson Point 8:	'Here we are again, short of the runway. When I give you control, I want you to line up, carry out all necessary checks and take off again when cleared. You have control.' **STUDENT PRACTICE.**

Lesson Point 9:	Once proficient at take-offs, it is time to introduce the Engine Failure After Take-Off (EFATO) drills. Once the student has demonstrated a good take-off: 'I have control. I now want you to follow me through as I demonstrate the engine failure after take-off drills.' At a safe altitude (400' agl) turn ON the carb heat and close the throttle. 'Engine Failure! I now lower the nose towards the descending attitude and maintain 65kts glide speed, controlling with elevator. I look forwards for a suitable landing site. That large green field will do. I check out seat belts are secure and if time permits carry out any shutdown checks. I now go-around.' Demonstrate (with follow through) and patter the remainder of the circuit and landing. Vacate and taxy back to the holding point.
Lesson Point 10:	'Here we are again, short of the runway. When I give you control, I want you to line up, carry out all necessary checks and take off again when cleared. You have control.' **STUDENT PRACTICE.** At a safe altitude (400' agl) turn ON the carb heat and close the throttle.
Lesson Point 11:	Once proficient at take-offs, it is time to introduce the Rejected Take-Off (RTO). Once lined up on the runway with no traffic to affect: 'I have control. I now want you to follow me through as I demonstrate the rejected take-off procedure.' I start a normal take-off. Heels on the floor, smoothly add full power, looking at the far end of the runway. Temperatures and pressures are good. No airspeed!! I am going to stop. I close the throttle, apply braking with my feet and keep looking outside. Once stopped, I call '*G-AB stopped on the runway*'. I need to decide what to do next. Lack of airspeed is not a life threatening situation, so I will taxy clear of the runway. *'G-AB vacating'*'' Vacate the runway and taxy back to the holding point.
Lesson Point 12:	'Here we are again, short of the runway. When I give you control, I want you to line up, carry out all necessary checks and begin a take-off when cleared. You have control.' **STUDENT PRACTICE.** At a suitable speed (40 kts) point out something wrong that will require an RTO. Oil temp/pressure anomaly, smoke/fire from the engine etc, but noting that will require the student to use excessive braking (such as a blocked runway ahead).
After Landing, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 12: Take-Off & Climb to Downwind
1: REVISION: Start-Up, Taxy, Run-Up, Checks. T/O Brief.
2: If Required DEMO/FT or PATTER normal take-off. Land & taxy back.
3: STUDENT PRACTICE take-off roll & rotate.
4: STUDENT PRACTICE climbout.
5: STUDENT PRACTICE turn crosswind & level out.
6: STUDENT PRACTICE turn to downwind.
7: DEMO/FT or PATTER Circuit to land, taxi back.
8: STUDENT PRACTICE take-off. Repeat as reqd.
9: DEMO/FT/TEACH EFATO drills. Land, taxi back. Repeat.
10: STUDENT PRACTICE
11: DEMO/FT/TEACH RTO drills. Taxi back. Repeat
12: STUDENT PRACTICE.

Debriefing

- During the EFATO, students frequently underestimate the amount of forward pitch required to go from climbing at 65 kts to gliding at 65 kts. Make sure they make a positive effort to pitch forward.

New Basic Skills

- There are no further basic skills learned in this lesson.

Common Student Faults

- Before the students begins a take-off roll, say ‘heels on the floor’ and look down to see that they are. Otherwise you may feel braking inputs during take-off.
- Students frequently do not hold right rudder during the take-off roll, leading to a close encounter with the left hand runway edge.
- Students sometimes overcontrol on the rudder pedals during take-off.
- Once airborne, if there is a crosswind, many students fail to maintain the runway centreline. In some aircraft you can point out of the rear window to highlight this problem. Otherwise, make sure they have a feature ahead and to the left that they can use.
- During the EFATO, students frequently underestimate the amount of forward pitch required to go from climbing at 65 kts to gliding at 65 kts. Make sure they make a positive effort to pitch forward.

Common Instructor Faults

To be added

Ex 13 - Circuit, Approach and Landing

Practical Considerations

- Ex 13 is usually combined with Ex 12 and called 'Ex 12&13: Circuits'.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- This exercise is often best started away from the airfield using a runway shaped field (or disused runway). It allows the student to learn the procedures without the worry of other traffic and radio calls.
- A good way to start landings is to fly a circuit to a go-around. Subsequent circuits can be planned for a go around, but if the aircraft is well placed, then a landing can be attempted. This way, there is no feeling of failure if a go-around occurs.
- Introduce the concept of a 'stabilised approach'. Ask the student on each approach if they are stabilised. If not, they should know to carry out a go-around. Discourage orbits in the circuit. Teach go-arounds from downwind and base legs as well as from final.
- Much debate surrounds the teaching of the final approach. There are 2 camps into which instructors fall: The '*attitude controls airspeed'* group and the '*point and power*' group. The 'attitude controls airspeed' method is fairly easy to understand – attitude (via elevator) controls airspeed and power controls the rate of descent. Point and power involves pointing the aircraft towards the aiming point on the runway and using power to control the airspeed. Point and power is slowly gaining popularity as it is more useful in larger aircraft and instrument flying. (See Later Note)

Long Briefing

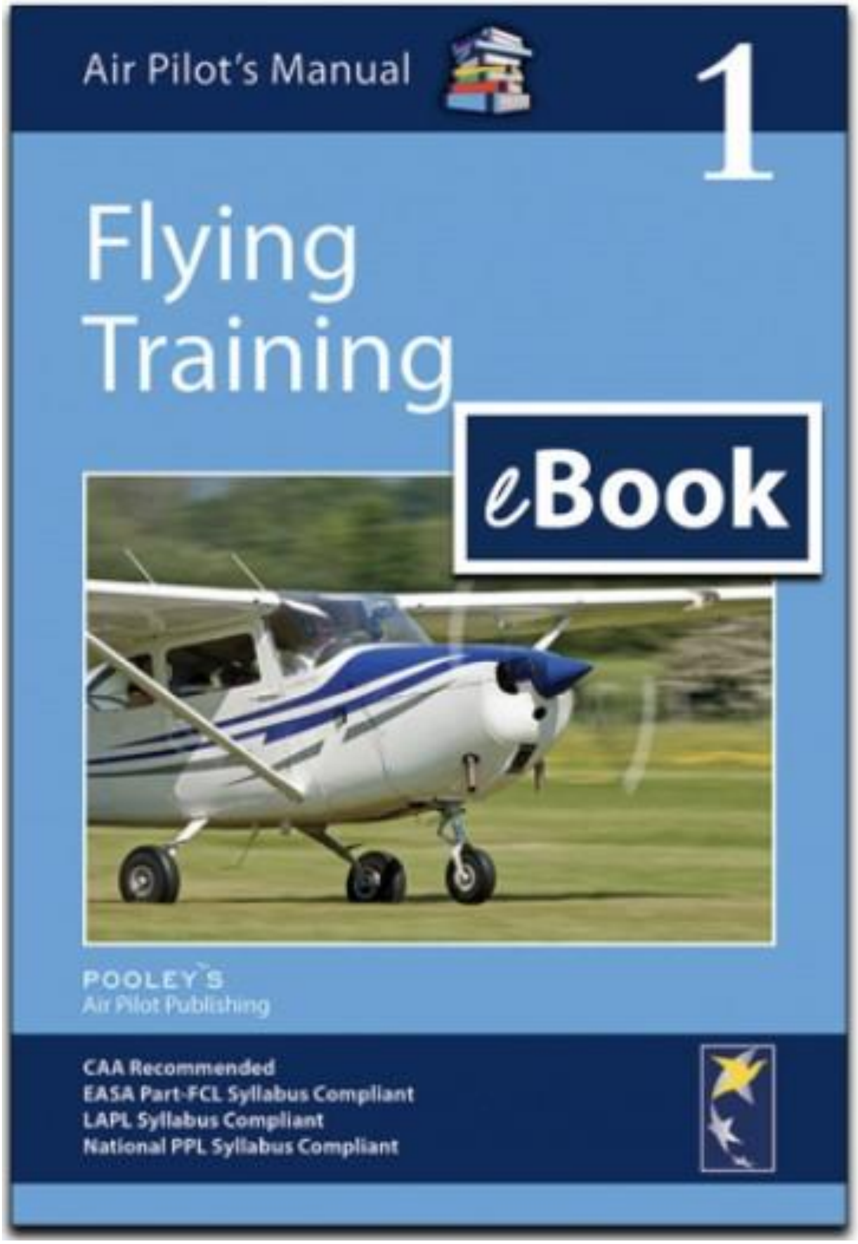
From EASA Part-FCL:

Long briefing objectives:

(1) downwind leg, base leg & approach: position & drills;
(2) factors affecting the final approach & landing run;
(3) effect of mass;
(4) effects of altitude and temperature;
(5) effect of wind;
(6) effect of flap;
(7) landing;
(8) effect of ground surface and gradient on landing run;
(9) types of approach and landing:
(i) powered;
(ii) crosswind;
(iii) flapless (at an appropriate stage of the course);
(iv) glide;
(v) short field;
(vi) soft field.
(10) tail wheel aeroplane considerations (as applicable);
(11) missed approach;
(12) engine handling;
(13) wake turbulence awareness;
(14) windshear awareness;
(15) ATC procedures;
(16) mislanding and go-around;
(17) special emphasis on look-out.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 13a

The Circuit, Powered Approach and Normal Landing

Aim

To continue a normal circuit for a powered approach and landing into wind.

Considerations

Continuing from Exercise 12, this manoeuvre involves:

- flying an accurate circuit based on the runway used;
- making a powered descent, an approach; and
- an into-wind landing.

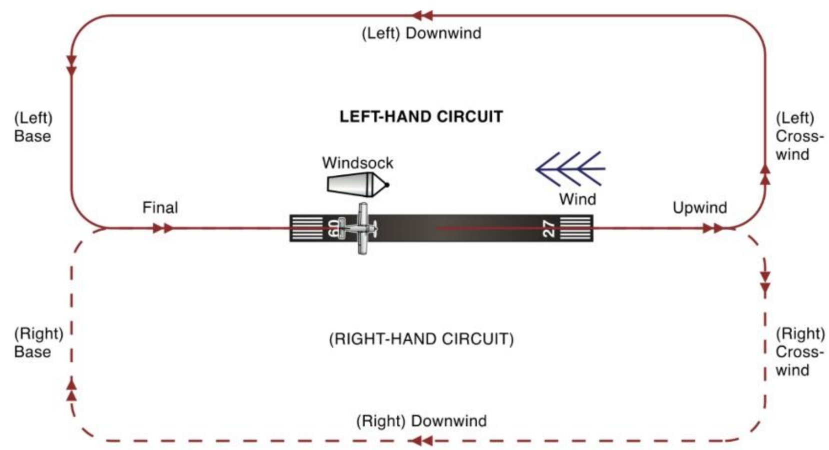


Figure 13a-1 **The circuit pattern**

Wind

Land into a headwind if possible.

Landing into wind is desirable because:

- for a given airspeed on approach, a headwind gives the lowest groundspeed;
- there is no tendency to drift sideways;
- it allows the best directional control both in flight and on the ground; and
- the landing distance required is least.

Board Briefing

Ex 13: Circuit, Approach and Landing

23Apr24

AIM: To learn to fly a normal circuit, approach and landing from the downwind position.
T&E: Other a/c, Engine overheat, wake turbulence, Infringement, Flap overspeed, Unstable approach, RW Excursion, Carb icing.
M: Lookout, Pre-Landing Cx, V_{fe}, Carb Heat, Stabilised Approach Criteria or Go-around.

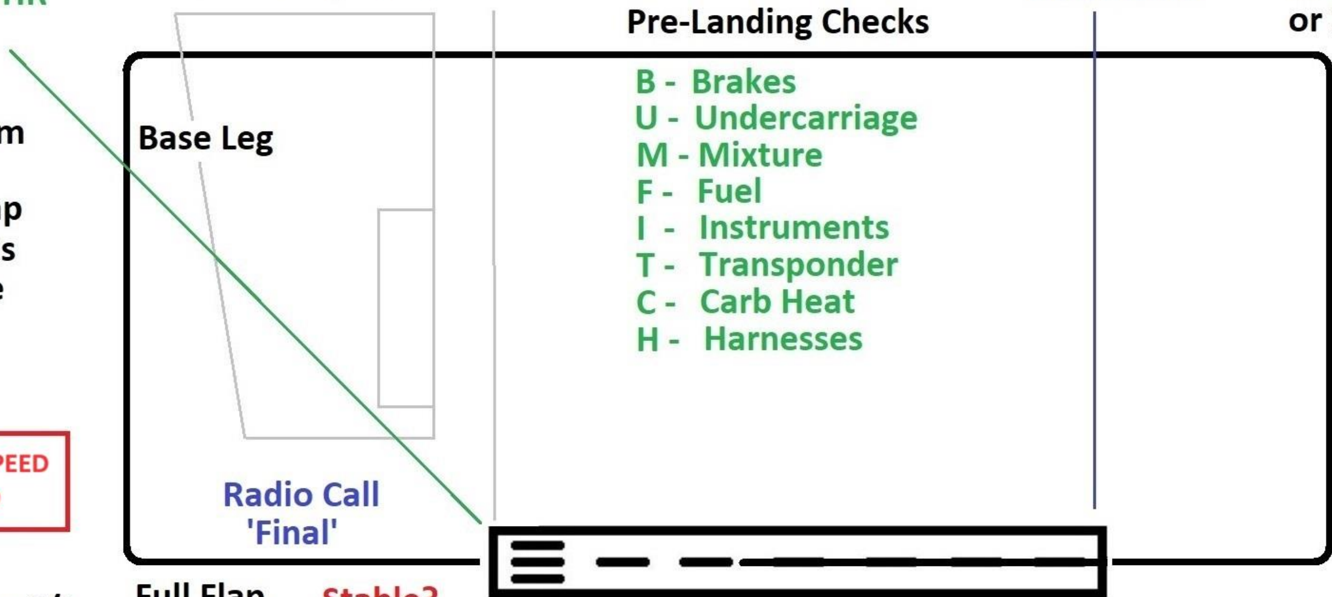
Airex: 1: Demo Circuit. 2: Take-off + Climb to Downwind. 3: Normal Take-off, Circuit, Approach + Landing

45° to THR

Turn Base
1-1½ Chords past THR

Radio Call
'Downwind'

Circuit Ht 800
or 1000'



Maintain Alt:
CH On
Set 1500 rpm
V_{fe}
2 Stages Flap
Speed 65 kts
Lower Nose
Trim

Crosswind

ATTITUDE controls AIRSPEED
POWER controls ROD

600'
Approaching C/L
Turn onto Final

Full Flap
60 kts
Trim

Stable?
or
Go-around

POINT & POWER

4: Landing
Look at far end of RW
Select + Hold Ldg Att
Close Throttle
Hold Ldg Att
Main wheel touchdown
Lower Nosewheel gently

5: Touch + Go
Keep straight with rudder
Flap UP, CH Off
Full Power

6: Go-Around
CH Off
Full Power
Nose to Horizon
Drag Flap Up
65 kts
Retract Flap in stages

Skeleton Board Briefing

Ex 13: Circuit, Approach and Landing

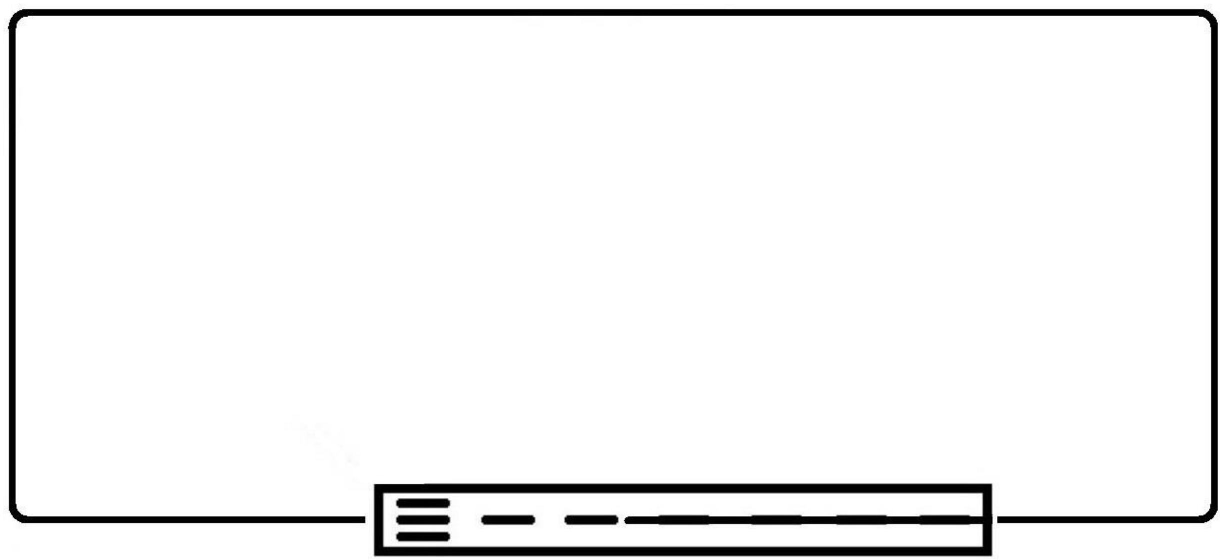
28Feb22

AIM: To learn to fly a normal circuit, approach and landing from the downwind position.

T&E:

M:

Airex:



4: ________ 5: ________

6: ____________

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will need no assistance or prompting to get the aircraft as far as lining up on the runway. Make sure a take-off brief is given. Allow the student to take-off and once on downwind leg:
Lesson Point 2:	'I have control. Follow me through. Here we are on downwind leg. First I make my call '*G-AB downwind for a go-around*'. Then I carry put my pre-landing checks: Brakes are off, mixture is rich, fuel is sufficient for a go-around, Instruments set, carb heat checked, temperatures & pressures checked, transponder set, seat belts secure. As the runway gets to 45 degrees over my shoulder I begin to turn onto base leg. Good lookout, balanced turn onto base. Now I put the carb heat on, reduce power to about 1500 rpm and maintain my circuit altitude. Holding the back pressure as the speed reduces. Once in the white arc, I select 2 stages of flap, still maintaining my altitude. As the speed reaches 65 kts, I lower the nose and trim. I now maintain 65 kts with elevator. Looking for any traffic on long final – none seen. Looking at the runway and judging my height. If I am too high I will reduce power. If I am too low I will add power. Now turning onto final. Using the runway numbers as my aiming point. Pointing the aircraft towards the numbers and controlling my speed with the throttle. I select full flap and reduce to 60 kts. Controlling speed with the throttle. Only small corrections now. Looking only at the runway (to gauge my height) and ASI to check my speed. Runway – Airspeed. Runway – Airspeed. I plan to go-around at 200'. '*G-AB on final for a go-around*'. As I approach 200', carb heat off, full power, nose up. Remove the drag flap and climb away. Positive rate of climb and speed above 65 kts – remove one stage of flap. Positive rate of climb and speed above 65 kts – remove last stage of flap. '*G-AB, going around*'.'
Lesson Point 3:	Once clean in the climbout: 'I want you to practice the approach and go-around at 200'. 'You have control.' **STUDENT PRACTICE.**
Lesson Point 4:	Once on downwind leg after several successful approaches and go-arounds. As before demonstrating with follow through, but this time to a touch and go. 'Now turning onto final. Using the runway numbers as my aiming point. Pointing the aircraft towards the numbers and controlling my speed with the throttle. I select full flap and reduce to 60 kts. Controlling speed with the throttle. Only small corrections now. Looking only at the runway (to gauge my height) and ASI to check my speed. Runway – Airspeed. Runway – Airspeed. '*G-AB on final touch and go*'. I keep the aircraft coming down making small corrections. Looking at the runway numbers and the ASI. As I approach the numbers, I look at the far end of the runway, close the throttle and try to maintain level flight. Gradually increasing the back pressure, holding the aircraft off the ground. As soon as we touch down, I turn off the carb heat, retract all the flap and apply full power. Looking at the far end of the runway. As the airspeed reaches 55 kts I rotate into the climbing attitude.'

Lesson Point 5:	'I want you to practice the circuit and approach. If the approach is not stable at 200' I want you to go-around. If the approach is stable I will instruct you to land. 'You have control.' **STUDENT PRACTICE several approaches.**
After Landing, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 13: Circuit, Approach & Landing

AIREX:

1: REVISION: Start-Up, TAXI, Run-Up, Checks, Take-Off Brief, Take-Off to downwind.

2: From downwind. DEMO/FT or PATTER App & G/A.

3: STUDENT PRACTICE several approaches to G/A.

4: DEMO/FT or PATTER App & Ldg from Downwind.

5: STUDENT PRACTICE several approaches to G/A or T&G as dictated by stability.

Debriefing

- This is a busy lesson for the student. A debrief of the main points will help them to remember the key points. Encourage the student to 'armchair fly' at home to consolidate the procedures.

New Basic Skills

- The new basic skill learned in this lesson, is Point & Power (if the school uses that method. See next page).

Common Student Faults

- On final, students sometimes have their attention focussed on all manner of things, such as the altimeter. The only things they should be concerned with are the runway and the ASI. Saying '**Runway - Airspeed**' repeatedly can be helpful.
- Student often become nervous approaching the ground and an otherwise good approach can begin to level out as the students gets 'fear of the ground'. Gently use the words 'keep it coming down'. This will relax the student and should bring about the desired effect.

Common Instructor Faults

- Do not be tempted to let the student land from an unstable approach. Practice of stable approaches and go-arounds are just as useful, and eventually a stable approach will present itself for landing practice.

Point and Power

There are two ways to teach the student pilot to fly the final approach to landing on a runway.

1. Attitude Controls Airspeed & Power Controls rate of descent

In this method, the student flies the aircraft all the way down final approach using the attitude of the aircraft (via elevator) to control its airspeed.

If the speed becomes too low, the student is taught to lower the nose attitude using elevator until the speed increases. Conversely, if the speed becomes too high, the nose attitude is raised.

If the aircraft becomes too low on approach, the student is taught to add power. Conversely, if the aircraft becomes too high, they are taught to reduce power.

This was the original method taught to pilots in the early days of powered aviation. The reason for this is because aircraft had no flaps or other means of increasing drag. Power and attitude were the only controlling variables.

2. Point & Power

With the invention of flaps and other devices such as speedbrakes, a new method became available: Pointing the aircraft towards the aiming point on the runway, and controlling the speed by changing the engine power. This led to a much more stable approach with a better chance of landing close to the aiming point.

It is possible to watch training aircraft coming in to land at a busy airport and tell which student is using which method.

Which to Use?

Method 1 is still needed at times. For example on base leg or on initial descent. The reason for this is because point and power requires an aiming point, and on base leg there is no physical point in space that the pilot can aim for. Incidentally, this is the reasons seaplanes use method 1, since there is usually no aiming point on the water.

Once a runway aiming point is visible ahead, the pilot can switch to the point and power method. Most modern, forward thinking flight schools now use this method.

Ex 12 & 13 - Circuits

Practical Considerations

- Ex 12 and 13 are usually combined and called ‘Circuits’. This particular section will deal with ‘normal landings’ only – that is with the normal land flap selected.
- This combined exercise contains no new ‘building blocks’. It is an amalgamation of previously learned skills, and it is the putting of all these skills together in a busy circuit that causes most problems – workload management.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- This exercise is often best started away from the airfield using a runway shaped field (or disused runway). It allows the student to learn the procedures without the worry of other traffic and radio calls.
- A good way to start landings is to fly a circuit to a go-around. Subsequent circuits can be planned for a go around, but if the aircraft is well placed, then a landing can be attempted. This way, there is no feeling of failure if a go-around occurs.
- Introduce the concept of a ‘stabilised approach’. Ask the student on each approach if they are stabilised. If not, they should know to carry out a go-around. They should not be waiting for you to call ‘go around’.
- Spacing in the circuit can often cause problems. Remember, the best leg to take action on is the climbout. If there is traffic close ahead, extending the climbout (where permitted) can be an effective solution. Discourage orbits in the circuit. Teach go-arounds from downwind and base legs as well as from final.
- Variant circuits are also covered in this lesson, such as flapless, glide, bad-weather and short field circuits to land which have been labelled 13b, 13c, 13d & 13e respectively.

Long Briefing

Not required for this lesson as there are no new concepts to be introduced.

Board Briefing

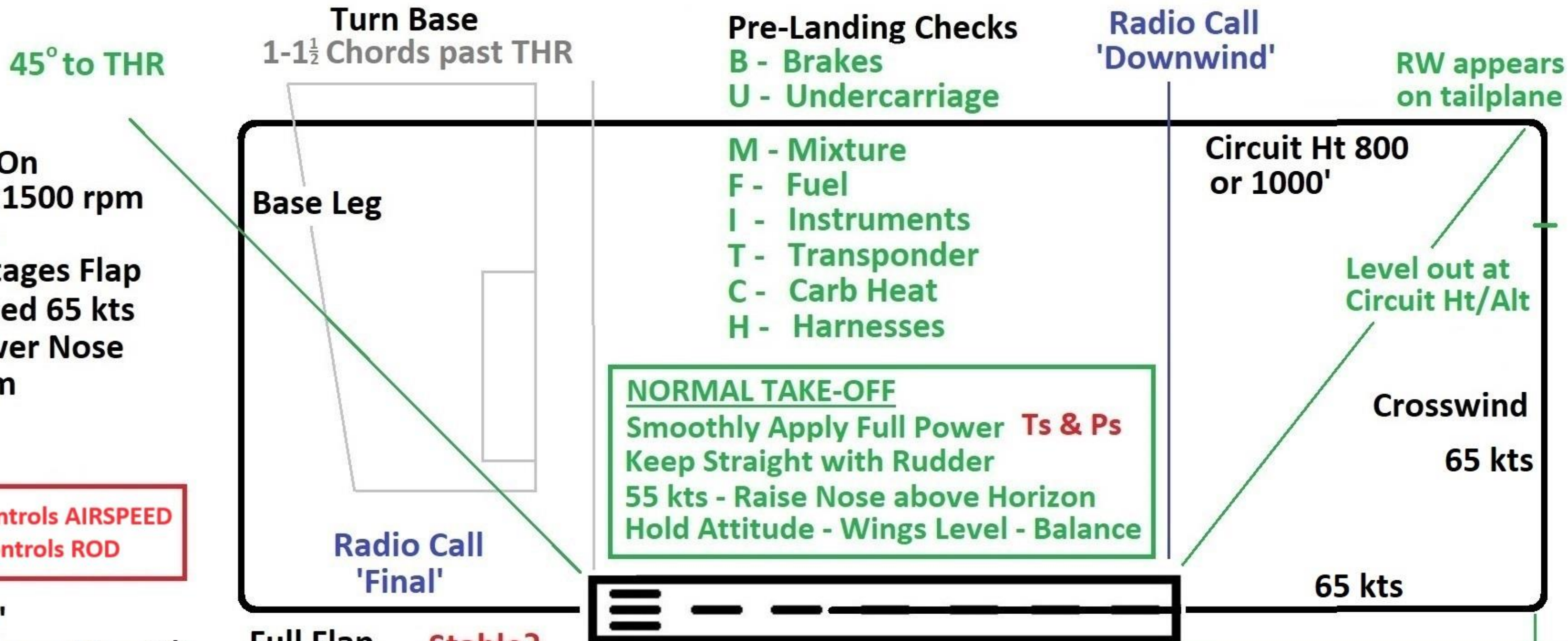
23Apr24

Ex 12+13a: Normal Circuits

AIM: To learn to fly a normal take-off, circuit, approach and landing.
T&E: Other a/c, Engine overheat, wake turbulence, Infringement, Flap overspeed, Unstable approach, RW Excursion, Carb icing.
M: Lookout, Pre-Landing Cx, V_{fe}, Carb Heat, Stabilised Approach Criteria or Go-around.

Airex: 1: Demo Circuit. 2: Take-off + Climb to Downwind. 3: Normal Take-off, Circuit, Approach + Landing

Maintain Alt
- CH On
- Set 1500 rpm
- V_{fe}
- 2 Stages Flap
- Speed 65 kts
- Lower Nose
- Trim



ATTITUDE controls AIRSPEED
POWER controls ROD

600'
Approaching C/L
Turn onto Final

Full Flap
60 kts
Trim

Stable? or Go-around

POINT & POWER

4: Landing
Look at far end of RW
Select + Hold Ldg Att
Close Throttle
Hold Ldg Att
Main wheel touchdown
Lower Nosewheel gently

500' aal
LOOKOUT
Climbing Turn to Crosswind 15° AoB
Continue Climb to Circuit Height/Alt

6: Go-Around
CH Off
Full Power
Nose to Horizon
Drag Flap Up
65 kts
Retract Flap in stages

5: Touch + Go
Keep straight with rudder
Flap UP, CH Off
Full Power

Skeleton Board Briefing

28Feb22

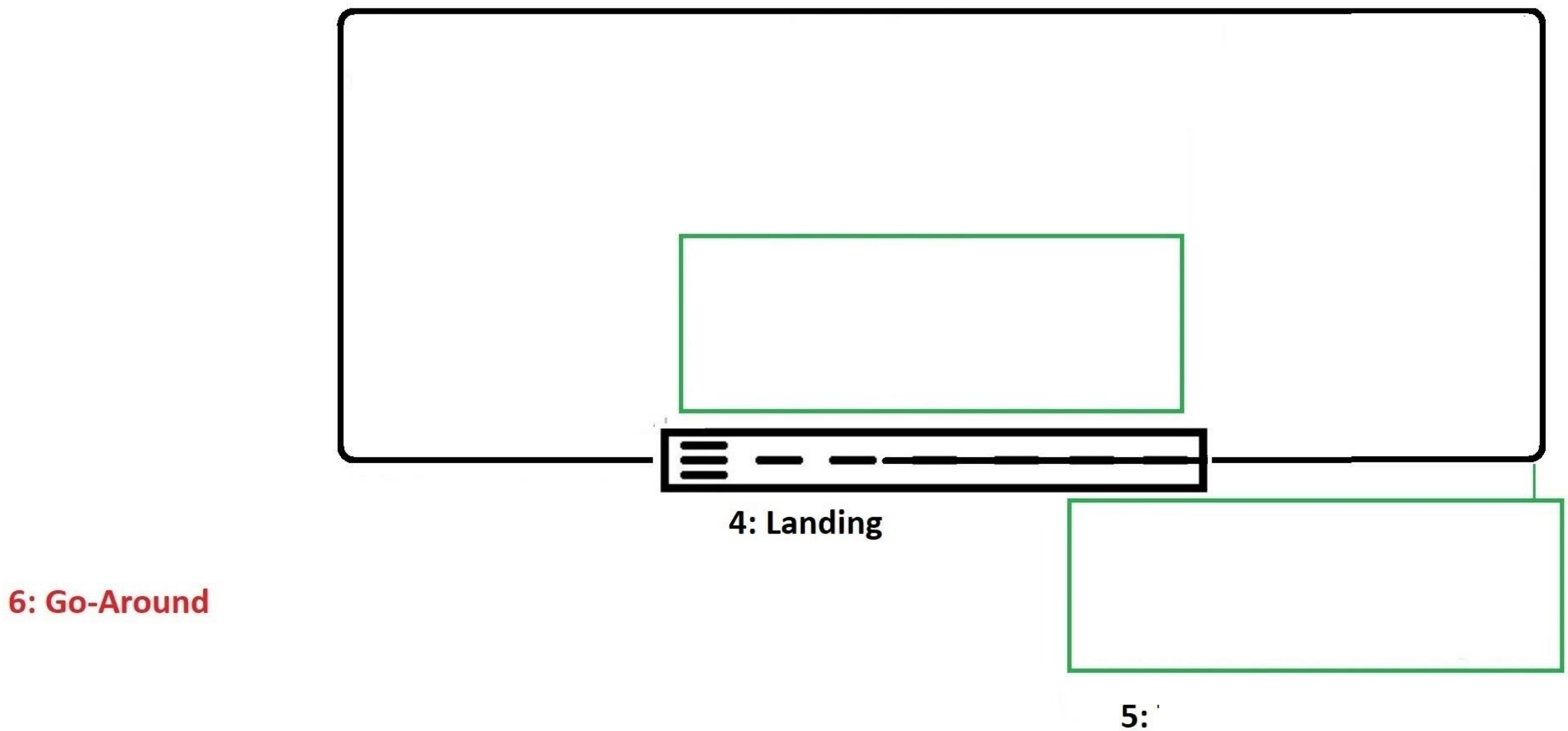
Ex 12+13a: Normal Circuits

AIM: To learn to fly a normal take-off, circuit, approach and landing.

T&E:

M:

Airex:



Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will need no assistance or prompting to get the aircraft as far as lining up on the runway. Make sure there is a suitable gap in traffic to allow an unhurried take-off.
Lesson Point 2:	By now, the student has seen you demonstrate and patter several take-offs, and is now more than ready to try for themselves. However, if it has been a while since the last lesson, the demonstration/patter of a full circuit may be helpful. 'Here we, stopped are on the runway centreline with all the checks completed and take-off clearance received. I want you to follow me through as I teach you the take-off. My heels on the floor and I have one hand on the throttle and the other hand holding the yoke neutral (or ailerons into wind). I check the heading on the DI is correct for the runway and smoothly apply full power. I want you to look at the far end of the runway. I use the rudder pedals to keep the aircraft straight along the runway. As speed starts to increase, I check that the airspeed is increasing on the ASI and the Ts & Ps are in the green. Then I look only outside at the far end of the runway, keeping one hand on the throttle and the yoke neutral. As the speed reaches 55 kts, I move the control column rearwards until the nose rises and then hold the attitude, adjusting to the normal climbing attitude.' Then round the circuit, pattering until landing and vacating. Taxy back to the holding point.
Lesson Point 3:	'Here we, stopped short of the runway. When I give you control, I want you to line up, carry out all necessary checks and take off when cleared. You have control.' **STUDENT PRACTICE.** Ideally you should remain silent and not coach the student during the take-off, but as things happen quite quickly, the odd helpful remark may be needed, such as 'more right rudder pedal', 'more back pressure' etc.
Lesson Point 4:	Once the climbing attitude has been established: 'Check the ASI to make sure you are climbing at 65 kts and check the ball is in the middle – you will need right rudder pedal. Look over your shoulder to check you are climbing straight out (in aircraft with rear windows!).
Lesson Point 5:	'Now as you reach 500', a good lookout and then a 15 degree banked climbing turn to the left/right. As you approach circuit height, level out in the normal way.'
Lesson Point 6:	'Look out the rear window, and as you see the runway appear 45 degrees over your shoulder (or as required locally), start a 30 degree banked level turn onto the downwind leg. Make sure you are tracking parallel to the runway.'
Lesson Point 7:	'I have control.' Demonstrate (with follow through) and patter the remainder of the circuit and landing. Vacate and taxy back to the holding point.
Lesson Point 8:	'Here we are again, short of the runway. When I give you control, I want you to line up, carry out all necessary checks and take off again when cleared. You have control.' **STUDENT PRACTICE.**

Lesson Point 9:	'I have control. Follow me through. Here we are on downwind leg. First I make my call '*G-AB downwind for a go-around*'. Then I carry put my pre-landing checks: Brakes are off, mixture is rich, fuel is sufficient for a go-around, Instruments set, carb heat checked, temperatures & pressures checked, transponder set, seat belts secure. As the runway gets to 45 degrees over my shoulder I begin to turn onto base leg. Good lookout, balanced turn onto base. Now I put the carb heat on, reduce power to about 1500 rpm and maintain my circuit altitude. Holding the back pressure as the speed reduces. Once in the white arc, I select 2 stages of flap, still maintaining my altitude. As the speed reaches 65 kts, I lower the nose and trim. I now maintain 65 kts with attitude. Looking for any traffic on long final - none seen. Looking at the runway and judging my height. If I am too high I will reduce power. If I am too low I will add power. Now turning onto final. Using the runway numbers as my aiming point. Pointing the aircraft towards the numbers and controlling my speed with the throttle. I select full flap and reduce to 60 kts. Controlling speed with the throttle. Only small corrections now. Looking only at the runway (to gauge my height) and ASI to check my speed. Runway – Airspeed. Runway – Airspeed. I plan to go-around at 200'. '*G-AB on final for a go-around*'. As I approach 200', carb heat off, full power, nose up. Remove the drag flap and climb away. Positive rate of climb and speed above 65 kts – remove one stage of flap. Positive rate of climb and speed above 65 kts – remove last stage of flap. '*G-AB, going around*'.'
Lesson Point 10:	Once clean in the climbout: 'I want you to practice the approach and go-around at 200'. 'You have control.' **STUDENT PRACTICE.**
Lesson Point 11:	Once on downwind leg after several successful approaches and go-arounds. As before demonstrating with follow through, but this time to a touch and go. 'Now turning onto final. Using the runway numbers as my aiming point. Pointing the aircraft towards the numbers and controlling my speed with the throttle. I select full flap and reduce to 60 kts. Controlling speed with the throttle. Only small corrections now. Looking only at the runway (to gauge my height) and ASI to check my speed. Runway – Airspeed. Runway – Airspeed. '*G-AB on final touch and go*'. I keep the aircraft coming down making small corrections. Looking at the runway numbers and the ASI. As I approach the numbers, I look at the far end of the runway, close the throttle and try to maintain level flight. Gradually increasing the back pressure, holding the aircraft off the ground. As soon as we touch down, I urn off the carb heat, retract all the flap and apply full power. Looking at the far end of the runway. As the airspeed reaches 55 kts I rotate into the climbing attitude.'
Lesson Point 12:	'I want you to practice the circuit and approach. If the approach is not stable at 200' I want you to go-around. If the approach is stable I will instruct you to land. You have control.' **STUDENT PRACTICE several approaches.**

Lesson Point 13:	Once proficient at take-offs, it is time to introduce the Engine Failure After Take-Off (EFATO) drills. Once the student has demonstrated a good take-off: 'I have control. I now want you to follow me through as I demonstrate the engine failure after take-off drills.' At a safe altitude (400' agl) turn ON the carb heat and close the throttle. 'Engine Failure! I now lower the nose towards the descending attitude and maintain 65kts glide speed, controlling with attitude. I look forwards for a suitable landing site. That large green field will do. I check out seat belts are secure and if time permits carry out any shutdown checks. I now go-around.' Demonstrate (with follow through) and patter the remainder of the circuit and landing. Vacate and taxy back to the holding point.
Lesson Point 14:	'Here we are again, short of the runway. When I give you control, I want you to line up, carry out all necessary checks and take off again when cleared. You have control.' **STUDENT PRACTICE.** At a safe altitude (400' agl) turn ON the carb heat and close the throttle.
Lesson Point 15:	Once proficient at take-offs, it is time to introduce the Rejected Take-Off (RTO). Once lined up on the runway with no traffic to affect: 'I have control. I now want you to follow me through as I demonstrate the rejected take-off procedure.' I start a normal take-off. Heels on the floor, smoothly add full power, looking at the far end of the runway. Temperatures and pressures are good. No airspeed!! I am going to stop. I close the throttle, apply braking with my feet and keep looking outside. Once stopped, I call '*G-AB stopped on the runway*'. I need to decide what to do next. Lack of airspeed is not a life threatening situation, so I will taxy clear of the runway. *'G-AB vacating''*' Vacate the runway and taxy back to the holding point.
Lesson Point 16:	'Here we are again, short of the runway. When I give you control, I want you to line up, carry out all necessary checks and begin a take-off when cleared. You have control.' **STUDENT PRACTICE.** At a suitable speed (40 kts) point out something wrong that will require an RTO. Oil temp/pressure anomaly, smoke/fire from the engine etc, but noting that will require the student to use excessive braking (such as a blocked runway ahead).
After Landing, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 12&13: Take-Off, Circuit, App & Ldg

1: REVISION: Start-Up, Taxy, Run-Up, Checks. T/O Brief.
2: IF Reqd DEMO/FT or PATTER normal take-off. Land & taxi back.
3: STUDENT PRACTICE take-off roll & rotate.
4: STUDENT PRACTICE climbout.
5: STUDENT PRACTICE turn crosswind & level out.
6: STUDENT PRACTICE turn to downwind.
7: DEMO/FT or PATTER Circuit to land, taxi back.
8: STUDENT PRACTICE take-off. Repeat as reqd.
9: From downwind. DEMO/FT or PATTER App & G/A.
10: STUDENT PRACTICE several approaches to G/A.
11: DEMO/FT or PATTER App & Ldg from Downwind.
12: STUDENT PRACTICE several approaches to G/A or T&G as dictated by stability.
13: DEMO/FT/TEACH EFATO drills. Land, taxy back. Repeat.
14: STUDENT PRACTICE
15: DEMO/FT/TEACH RTO drills. Taxy back. Repeat.
16: STUDENT PRACTICE.

Debriefing

- During the EFATO, students frequently underestimate the amount of forward pitch required to go from climbing at 65 kts to gliding at 65 kts. Make sure they make a positive effort to pitch forward.
- This is a busy lesson for the student. A debrief of the main points will help them to remember the key points. Encourage the student to ‘armchair fly’ at home to consolidate the procedures.

New Basic Skills

- The new basic skill learned in this lesson, is Point & Power (if the school uses that method).

Common Student Faults

- Before the students begins a take-off roll, say 'heels on the floor' and look down to see that they are. Otherwise you may feel braking inputs during take-off.
- Students frequently do not hold right rudder during the take-off roll, leading to a close encounter with the left hand runway edge.
- Students sometimes overcontrol on the rudder pedals during take-off.
- Once airborne, if there is a crosswind, many students fail to maintain the runway centreline. In some aircraft you can point out of the rear window to highlight this problem. Otherwise, make sure they have a feature ahead and to the left that they can use.
- During the EFATO, students frequently underestimate the amount of forward pitch required to go from climbing at 65 kts to gliding at 65 kts. Make sure they make a positive effort to pitch forward.
- On final, students sometimes have their attention focussed on all manner of things, such as the altimeter. The only things they should be concerned with are the runway and the ASI. Saying '**Runway – ASI**' repeatedly can be helpful.
- Student often become nervous approaching the ground and an otherwise good approach can begin to level out as the students gets 'fear of the ground'. Gently use the words 'keep it coming down'. This will relax the student and should bring about the desired effect.

Common Instructor Faults

- Do not be tempted to let the student land from an unstable approach. Practice of stable approaches and go-arounds are just as useful, and eventually a stable approach will present itself for landing practice.

Ex 13b – Flapless Approach & Landing

Practical Considerations

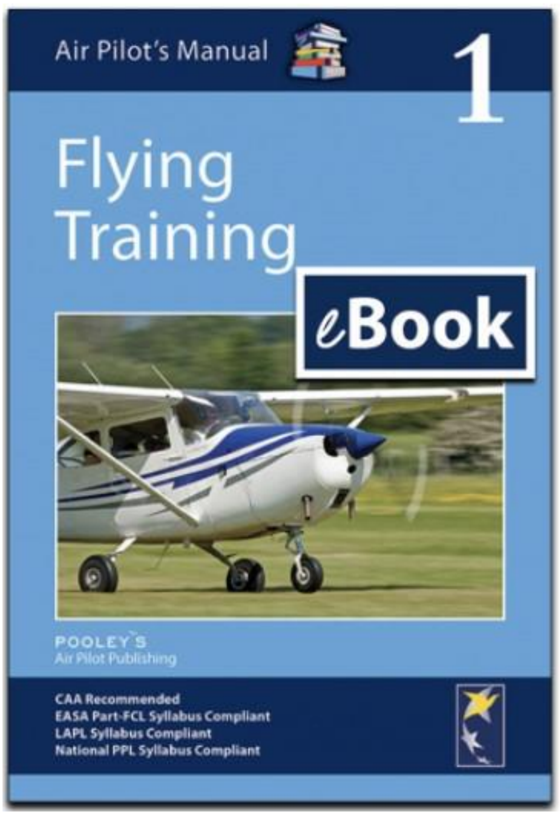
- Ex 12 and 13 are usually combined and called ‘Circuits’.
- The student should be competent at normal circuits before moving onto flapless.
- The take-off and climb to downwind is identical to that for a normal circuit, so no need to demonstrate that.

Long Briefing

- A brief discussion of the reasons why a flapless landing might be necessary is useful.
- A discussion of the differences that can be expected from a normal approach.

Suggested Long Brief

The Air Pilot’s Manual Vol 1 published by Pooley’s provides excellent material for the long brief.



Exercise 13d

The Flapless Approach and Landing

Aim

To approach and land without the use of flaps.

Considerations

A flapless approach will be necessary if a failure of any part of the flap system occurs (a rare event), and is advisable in strong and gusty winds. Crosswind landings are often made in such conditions.

Compared to a normal approach and landing with flap, the main features of a flapless approach and landing are:

- **a flatter flightpath** (but not normally below a 3° approach) requiring an extended circuit;
- **a higher approach speed** (due to the higher stalling speed);
- **a higher nose attitude** and poorer forward vision;
- **almost no round-out** and a longer float (due to less drag) if the hold-off is prolonged before the aeroplane touches down;
- **a risk of scraping the tail** if the nose is raised too high on touchdown; and
- a longer landing run.

It is most important to control the flightpath and airspeed fairly tightly on a flapless approach. As usual, airspeed is controlled with elevator and flightpath with power. If too high, reduce power and lower the nose slightly – if the power is already at idle, consider a sideslip to increase the rate of descent and lose height.

A ‘clean’ wing has less drag than a flapped wing, which means that excess speed takes longer to ‘wash-off’, i.e. a flapless aeroplane is ‘slippery’. This can lengthen the hold-off and float considerably. To avoid using too much runway and also to avoid the risk of scraping the tail, do not prolong the hold-off, particularly on a short runway.

Once the nosewheel is on the ground, brakes can be used if required.

Board Briefing

23Apr24

Ex 13b: Flapless Approach + Landing

AIM: To learn to approach and land without the use of flaps.

T&E: Other a/c, Engine overheat, wake turbulence, Infringement, Unstable approach, RW Excursion, Carb icing.

M: Lookout, Pre-Landing Cx, Carb Heat, Stabilised Approach Criteria or Go-around.

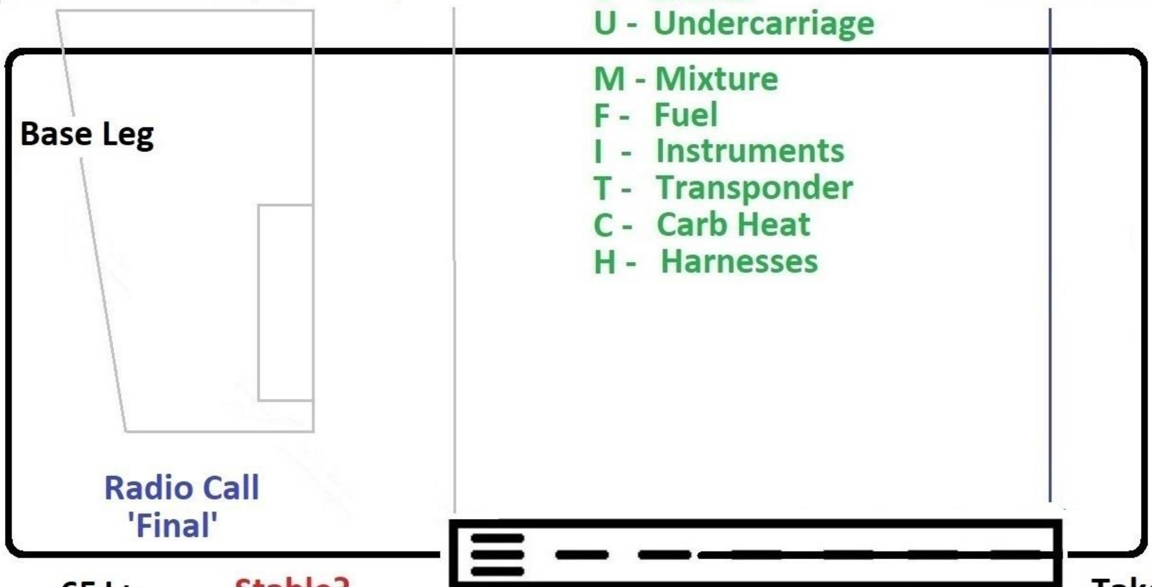
Airex: 1: Take-off + Climb to Downwind. 2: DEMO Flapless Approach + Landing. 3: Flapless Circuits.

Turn Base
2-3 Chords past THR

Extend Downwind
(If possible)

Pre-Landing Checks
B - Brakes
U - Undercarriage

Radio Call
'Downwind'



Maintain Alt
CH On
Set 1200 rpm
Speed 65 kts

Lower Nose
Trim

Circuit Ht 800 or 1000'

ATTITUDE controls AIRSPEED
POWER controls ROD

600'
Approaching C/L
Turn onto Final

65 kts
Trim

Stable?
or
Go-around

Take-off + climb as normal

4: Landing
Look at far end of RW
Hardly any flare needed

6: Go-Around
CH Off
Full Power
Climbing Attitude
65 kts

POINT & POWER

5: Touch + Go
Keep straight with rudder
CH Off
Full Power

Skeleton Board Briefing

Ex 13b: Flapless Approach + Landing

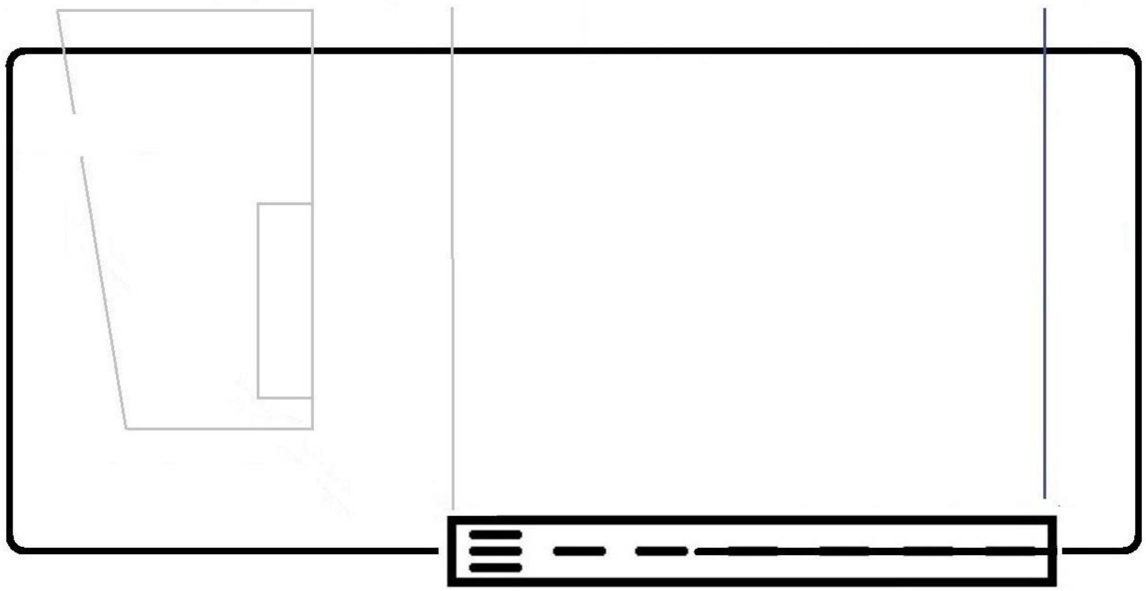
28Feb22

AIM: To learn to approach and land without the use of flaps.

T&E:

M:

Airex: 1: 2: 3:



4: Landing

6:

5: Touch + Go

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will need no assistance or prompting to get the aircraft as far as lining up on the runway and taking off. Once on downwind leg:
Lesson Point 2:	'I have control. Follow me through as I demonstrate a flapless approach and go-around. Here we are on downwind leg. First I make my call '*G-AB downwind for a go-around*'. Then I carry put my pre-landing checks. I can expect getting the aircraft to descend will be a little harder. The aircraft will be fast to accelerate, but slow to decelerate. The picture on final approach will look different, with the runway lower in the windscreen. When I come to flare, the aircraft will almost be in the touchdown attitude, so less of a flare is required. Due to the lack of drag from the flap, the aircraft is likely to float. As the runway gets to 45 degrees over my shoulder I extend a little if I can, and then begin to turn onto base leg. Good lookout, balanced turn onto base. Now I put the carb heat on, reduce power to about 1500 rpm and maintain my circuit altitude. Holding the back pressure as the speed reduces. As the speed reaches 65 kts, I lower the nose and trim. I now maintain 65 kts with elevator. Looking for any traffic on long final. Looking at the runway and judging my height. If I am too high I will reduce power. If I am too low I will add power. Now turning onto final. Using the runway numbers as my aiming point. Notice the higher nose attitude making it harder to see the aiming point. Pointing the aircraft towards the numbers and controlling my speed with the throttle. Speed control is harder than with flaps due to the lack of drag. I plan to go-around at 200'. As I approach 200', carb heat off, full power and rotate into the climbing attitude. You have control'
Lesson Point 3:	'I want you to practice the circuit, approach and go-around without the use of flaps. You have control.' **STUDENT PRACTICE several flapless approaches followed by go-around.**
Lesson Point 4:	Later on final: 'Pointing the aircraft towards the numbers and controlling my speed with the throttle. Only small corrections now. Looking only at the runway (to gauge my height) and ASI to check my speed. Runway – Airspeed. Runway – Airspeed. As I approach the numbers, I look at the far end of the runway, close the throttle and try to maintain level flight. We are almost in the landing attitude, so not much back pressure is needed. Hold the aircraft off the ground and expect a float. As soon as we touch down, I turn off the carb heat and apply full power, keeping straight with rudder. Looking at the far end of the runway. As the airspeed reaches 55 kts I rotate into the climbing attitude.'
Lesson Point 5:	'Now, I want you to fly a flapless circuit and approach. If the approach is not stable at 200' I want you to go-around. If the approach is stable I want you to land. You have control.'
After Landing, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All actions and checks should now be flowing well.

Flight Prompt Card

Ex 13b: Flapless Circuit & Landing

1: REVISION: Student take-off to downwind.
2: DEMO/FT/TEACH flapless approach & go-around.
3: STUDENT PRACTICE.
4: DEMO/FT/TEACH flapless approach & landing.
5: STUDENT PRACTICE.

Debriefing

The main debrief points are

- the difficulty in losing height,
- the different picture on approach,
- the much smaller flare required,
- the harder it will be to control the airspeed on approach
- the increased possibility of a float.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

- Without the use of flap, the student may struggle to get the aircraft to descend, especially in light wind conditions. This is why the downwind leg may be extended and/or less power is used on base leg.
- On the final approach, without flaps, the aircraft is almost in the landing attitude already. Therefore very little flare is needed. If too much flare is used, the aircraft will float or balloon. Call for a go-around.

Common Instructor Faults

- It is common to hear instructors telling students that a flapless approach is flown much flatter and at a lower glidepath than a normal approach with full flap. This is mistaken. Although the attitude of the aircraft on final approach is more nose up, the actual profile of the approach is the same. This is very important if there are obstacles under the approach.

Ex 13c – Glide Approach & Landing

Practical Considerations

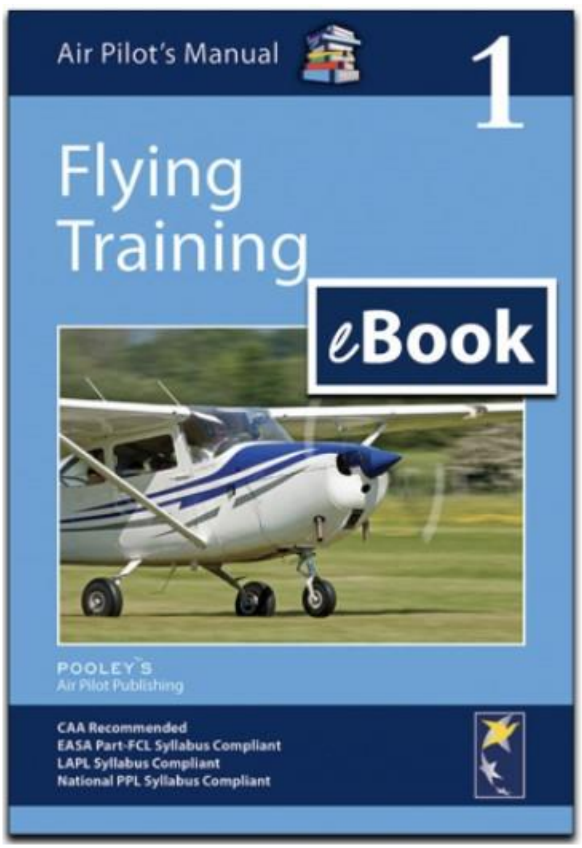
- Ex 12 and 13 are usually combined and called 'Circuits'.
- The student should be competent at normal circuits before moving onto this lesson.

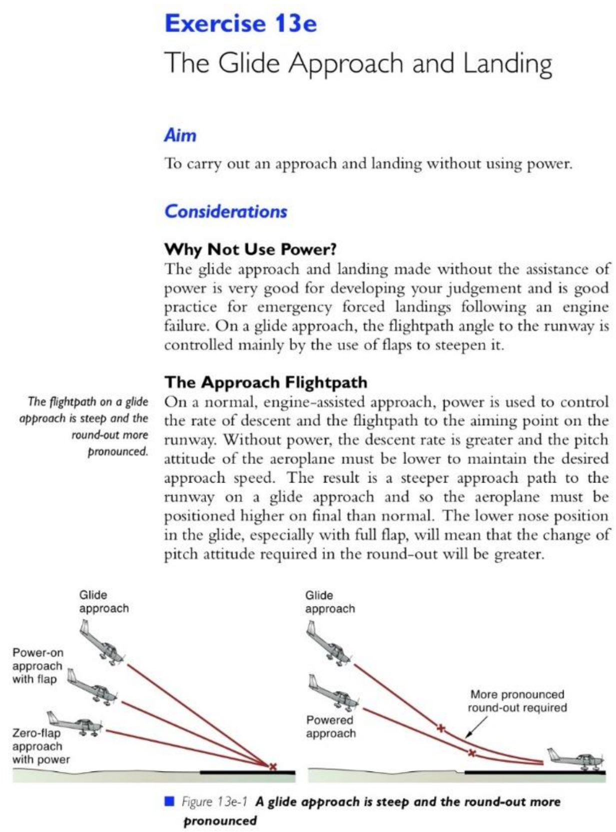
Long Briefing

- A brief discussion of the reasons why a glide approach and landing might be necessary is useful.
- A discussion of the differences that can be expected from a normal approach.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.




Exercise 13e

The Glide Approach and Landing

Aim

To carry out an approach and landing without using power.

Considerations

Why Not Use Power?

The glide approach and landing made without the assistance of power is very good for developing your judgement and is good practice for emergency forced landings following an engine failure. On a glide approach, the flightpath angle to the runway is controlled mainly by the use of flaps to steepen it.

The Approach Flightpath

The flightpath on a glide approach is steep and the round-out more pronounced.

On a normal, engine-assisted approach, power is used to control the rate of descent and the flightpath to the aiming point on the runway. Without power, the descent rate is greater and the pitch attitude of the aeroplane must be lower to maintain the desired approach speed. The result is a steeper approach path to the runway on a glide approach and so the aeroplane must be positioned higher on final than normal. The lower nose position in the glide, especially with full flap, will mean that the change of pitch attitude required in the round-out will be greater.

Figure 13e-1 ***A glide approach is steep and the round-out more pronounced***

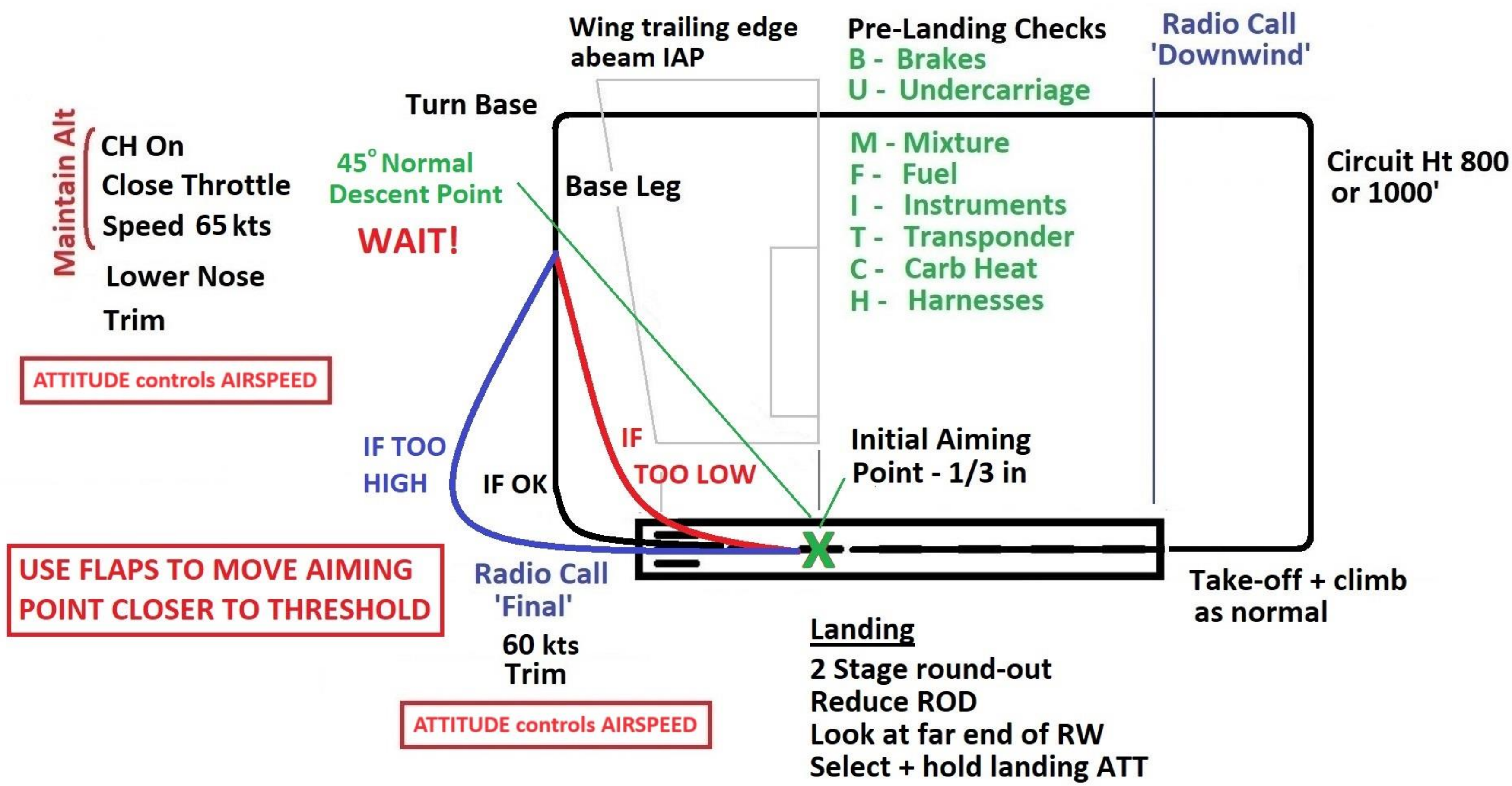
Board Briefing

Ex 13 c: Glide Approach + Landing

23Apr24

AIM: To learn to approach and land without the use of engine power.
T&E: Other a/c, Engine overheat, wake turbulence, Infringement, RW Excursion, Carb icing.
M: Lookout, Pre-Landing Cx, Carb Heat.

Airex: 1: Take-off + Climb to Downwind. 2: DEMO Glide Approach + Landing. 3: Practice Glide Approaches



Skeleton Board Briefing

Ex 13 c: Glide Approach + Landing

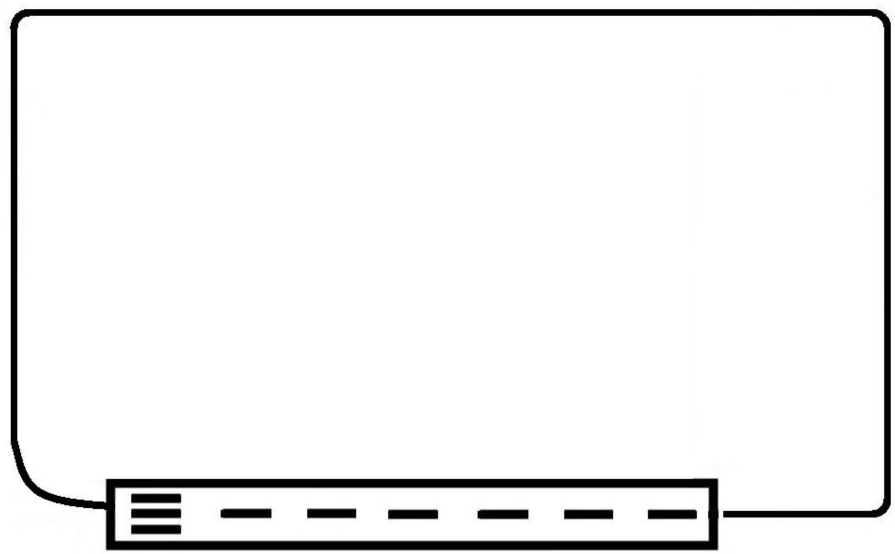
28Feb22

AIM: To learn to approach and land without the use of engine power.

T&E:

M:

Airex: 1: 2: 3:



Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will need no assistance or prompting to get the aircraft as far as lining up on the runway and taking off. Once on downwind leg:
Lesson Point 2:	'I have control. Follow me through as I demonstrate a glide approach and landing. Here we are on downwind leg. First I make my call, then carry put my pre-landing checks. As the runway gets to 45° over my shoulder I begin to turn onto base leg in the normal way. But I am not going to reduce power or select flap at this stage. I maintain the circuit height until I am sure I could get to the middle of the runway with idle power only. Do you think I could make it in from here? I think we should leave it a few seconds more with today's wind. Now, I am fairly sure I could make the runway – I turn on the carb heat, close the throttle and maintain circuit altitude as the speed reduces. As the speed reaches 65 kts, I lower the nose and trim. I now maintain 65 kts with elevator. Looking at the runway and judging my height. How does it look to you? Where do you think we will touchdown? I think we will land half way down the runway, so I use flaps to bring the aiming point closer to the start of the runway. I select a stage of flap and notice that the aiming point now seems to be about a third of the way in. I select a second stage. Now turning onto final. My aiming point still needs to be brought a little closer, so I select final flap and reduce to 60 kts. Then I continue the landing as before.'
Lesson Point 3:	'I want you to practice the circuit, followed by a glide approach and landing. You have control.' **STUDENT PRACTICE several glide approaches to landing or touch and go.**
Lesson Point 4:	If traffic and local rules permit, a glide approach from overhead can be a good exercise for the student. Place the aircraft over the middle of the runway at 2000' agl pointing towards the middle of the downwind leg. Make sure the circuit is clear and ATC are aware. 'I have control. Here we are 2000' above the runway and watch as I demonstrate a glide to landing from here. I put on the carb heat and close the throttle. I make sure I am always aware where the runway is. Currently it is just behind me. I am going to fly away for a short while, then turn into the circuit, all the time noting my altitude. Here we are roughly downwind at about 1500', which is a good height. I carry on along the downwind leg and do the before landing checks. I judge the turn on to base leg at about 1000'. I think I am going to touchdown close to the start of the runway, so I will delay flap. Now turning onto final. My aiming point is now about a quarter of the way in, so I start selecting flap to bring it closer. I select final flap and reduce to 60 kts. Then I continue the landing as before.'
Lesson Point 5:	If traffic and local rules permit, place the student in the same position as before. 'I want you to practice the glide approach and landing from here. You have control.' **STUDENT PRACTICE of a glide approach to landing.**
After Landing, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All taxy, shutdown and post-flight duties should now be second nature.

Flight Prompt Card

Ex 13c – Glide Approach & Landing

1: REVISION: Student take-off to downwind.
2: DEMO/FT/TEACH glide approach & landing.
ATTITUDE controls AIRSPEED.
3: STUDENT PRACTICE glide from normal circuit.
4: DEMO or PATTER (if reqd) glide app from overhead (2000' aal).
5: STUDENT PRACTICE glide from overhead.

Debriefing

- There is a subtle difference in the way the flaps are used in a glide approach. In a normal approach, the flaps are selected on a schedule determined by the position in the circuit – 2 stages on base, 3rd stage on final. However in a glide approach it is quite different. The flaps are used to move the aiming point closer to the ideal point on the runway. If, in a clean configuration, the aiming point is already the start of the runway, then it is quite possible that no further flap will be used.
- You can further test the student's judgement of the glide by asking them to perform a glide approach without the use of flaps or side-slipping. This means that if they close the throttle too late, they cannot bring the aiming point closer other than by S turns.

New Basic Skills

- The new basic skill learned in this lesson is: **Sight Line Angle** – Judging whether or not they will make the runway by using the position of the aiming point in the window.

Common Student Faults

- Students are often optimistic about the glide performance of their aircraft. They also fail to grasp that the performance will change with the weather, so what worked yesterday, may well not work today. Initially, involve them in deciding when to close the throttle and help them learn the decision making processes.

Common Instructor Faults

- Some instructors like to close the throttle on behalf of the student and then ask them to make a glide approach from here. This is not ideal since it removes the student from the decision making process.

Ex 13d – Bad-Weather Circuit & Landing

Practical Considerations

- This exercise is not strictly part of the PPL or LAPL syllabus but is included here for completion.
- Bad weather circuits are often called low-level circuits and are usually flown due to low cloud base and/or visibility.
- The student should be competent at normal circuits before moving onto this lesson.
- The take-off and climb out on bad weather circuits are different to a normal circuit, so the instructor should demonstrate an entire circuit first.

Long Briefing

- A brief discussion of the reasons why a bad-weather circuit might be necessary is useful.
- A discussion of the differences that can be expected from a normal approach.

Board Briefing

Ex 13d: Bad-Weather Circuit

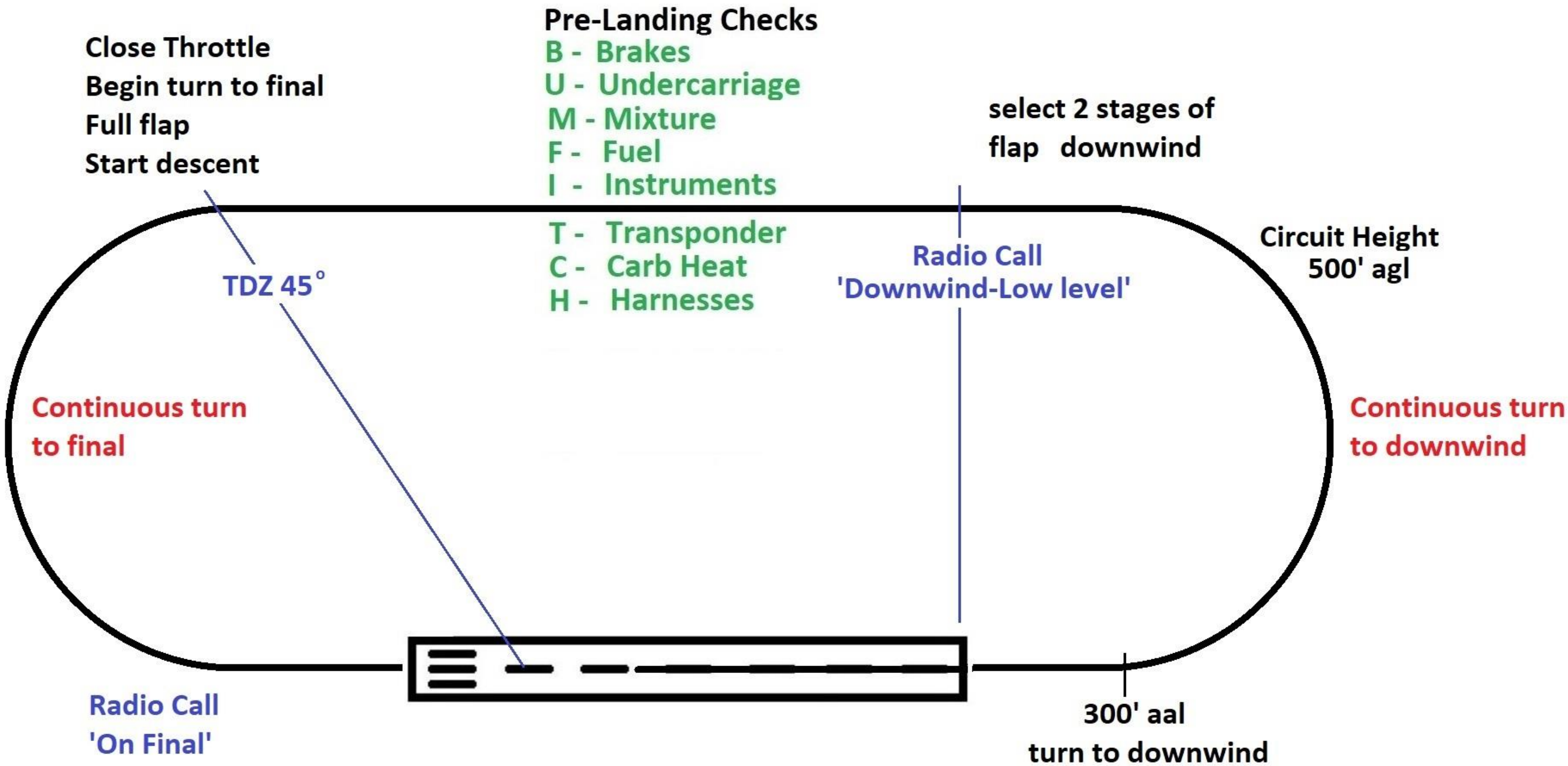
05 Mar 21

AIM: To learn to fly a bad weather circuit to land.

T&E: Circuit traffic, Terrain, Obstacles, Loss of control.

M: Lookout, MSA, Pre-flight study, Instruments, Bank angle.

Airex:



Skeleton Board Briefing

Ex 13d: Bad-Weather Circuit

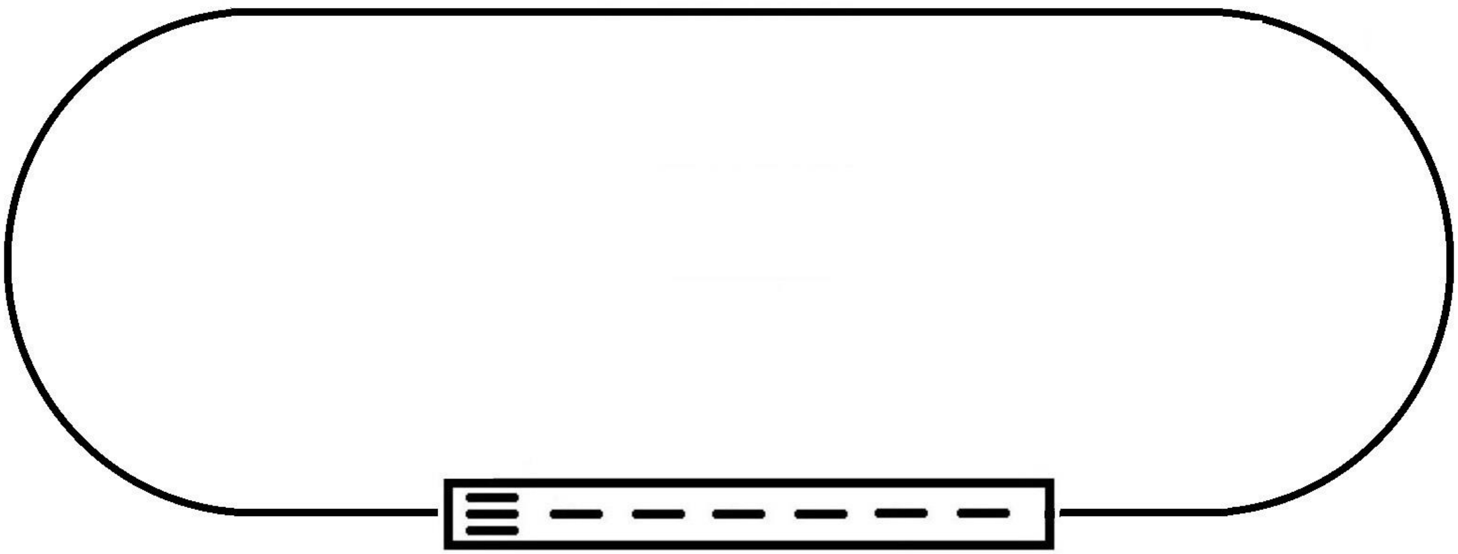
28Feb22

AIM: To learn to fly a bad weather circuit to land.

T&E:

M:

Airex:



Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will prepare the aircraft and get it as far as the holding point for the instructor's take-off. Since the first turn is made at 300', it is best for the instructor to handle the take-off:
Lesson Point 2:	'I have control. Follow me through as I demonstrate a bad weather circuit, approach and landing. Here we are on the runway. We are going to assume the weather is poor with a cloud base of 600' agl and a visibility of only 1500m. I apply full power as normal and rotate at 55 kts. Once established in the climb at 65 kts, I turn onto downwind at 300. Note there is no crosswind leg, just a continuous 15 degree angle of bank climbing turn to 500' on the downwind leg. Once downwind, I select 2 stages of flap and make my call '*G-AB downwind low-level, touch and go*'. I now complete the checks. Notice how much closer we are to the runway, but given the poor visibility, that is what we need. As the runway threshold passes 45° over my shoulder, I put on the carb heat, close the throttle, select full flap and begin a continuous turn onto final. Note again, no base leg. Rolling out on final, I make my call and land in the normal way'
Lesson Point 3:	'I want you to practice the bad weather circuit, approach and landing. You have control.' **STUDENT PRACTICE several bad weather circuits to landing or touch and go.**
After Landing, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All taxy, shutdown and post-flight duties should now be second nature.

Flight Prompt Card

Ex 13d: Bad-Weather Circuit
1: REVISION: Student prepares a/c for take-off.
2: DEMO/FT/TEACH or PATTER bad weather circuit, approach & landing to Touch & Go.
3: STUDENT PRACTICE bad wx circuits.

Debriefing

- Point out the usefulness of this technique when the weather is bad. Remind the student not to use it to cut in front of other aircraft in the circuit.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

- The bad-weather circuit is flown closer to the runway than the student is used to. He may be tempted to move away to generate more room. This will result in him becoming low on base or final, and in real bad weather runs the risk of losing sight of the runway.
- A wind across the circuit can cause problems if not considered beforehand. Be ready to call for adjustment to the downwind heading to allow for such wind.

Common Instructor Faults

- Make sure the traffic situation in the circuit will permit you to carry out this kind of circuit. Aircraft on downwind may object to you cutting in front.

Ex 13e – Soft/Short Field Approach & Landing

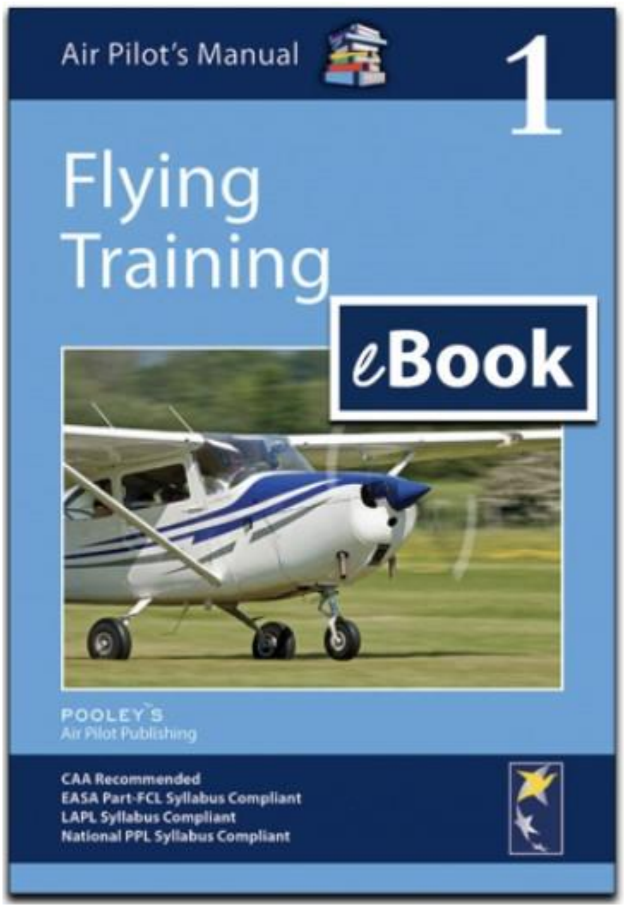
Practical Considerations

- Ex 12 and 13 are usually combined and called ‘Circuits’.
- The student should be competent at normal circuits before moving onto this lesson.
- If available, take the student to a soft or short airfield.

Long Briefing

Suggested Long Brief

The Air Pilot’s Manual Vol 1 published by Pooley’s provides excellent material for the long brief.



Exercise 13g

Short-Field Operations

Aim

To operate safely and efficiently out of and into a short field.

Considerations

What is a Short Field?

A short field is one at which the **runway length available** and/or the **obstacle-clearance gradients** are only just sufficient to satisfy take-off and landing requirements.

Performance Charts

The take-off and landing performance charts for your aeroplane should be consulted to ensure that a short field in a confined area is indeed adequate for the planned operations under the existing conditions. An inspection on foot of the proposed take-off and landing surface and the surrounding area may be necessary. During the inspection remember that the take-off is not complete until all obstacles are cleared in the climb-out, so not only the take-off surface, but also the surrounding area, need to be considered.

Refer to the appropriate performance charts for your aeroplane. An additional safety factor of 1.33 should be added to the take-off distance.

CONDITIONS:
Flaps 10°
Full Throttle Prior to Brake Release
Paved, Level, Dry Runway
Zero Wind

TAKEOFF DISTANCE

SHORT FIELD

SAMPLE ONLY not to be used in conjunction with flight operations or flight planning

NOTES:
1. Short field technique as spucified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

WEIGHT LBS	TAKEOFF SPEED KIAS		PRESS ALT FT	0°C		10°C		20°C		30°C		40°C	
	LIFT OFF	AT 50 FT		GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS	GRND ROLL	TOTAL TO CLEAR 50 FT OBS
1670	50	54	S.L.	640	1190	695	1290	755	1390	810	1495	875	1605
			1000	705	1310	765	1420	825	1530	890	1645	960	1770
			2000	775	1445	840	1565	910	1690	980	1820	1055	1960

Figure 13g-1 **Consult the performance charts**

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student will prepare the aircraft and get it as far as the holding point for the instructor's take-off. The student may have to be reminded to use the appropriate take-off flap setting depending on type.
Lesson Point 2:	Soft Field Take-Off: 'I have control. Follow me through as I demonstrate the soft field take-off technique. The idea is to get the nosewheel off the ground as soon as possible and then get airborne and stay in ground effect as the speed increases. We have one stage of flap selected which will help. I smoothly apply full power, holding the control column a little way back. Notice as the speed passes 50 kts, the nose starts to lift and the aircraft becomes airborne. It is too slow for safe flight, so I check forward to the straight and level attitude just a few feet above the runway. Notice the speed increasing. As it reaches 65 kts, I climb away as normal. Once I have positive rate of climb and the speed is 65 kts, I can retract the flap. You have control'
Lesson Point 3:	The student can be given the task of flying the circuit until on final. **STUDENT PRACTICE circuit to final.**
Lesson Point 4:	Once on final. Soft Field Landing: 'I have control. Follow me through as I demonstrate a soft field approach and landing. All is the same as a normal circuit until on final. I make sure I have full flap selected, and reduce to the recommended short field speed of 54 kts. Controlling my speed accurately with throttle. As I touch down, I hold the nosewheel off the ground as long as possible. Then gentle braking to bring the aircraft to a halt.'
Lesson Point 5:	Student taxy back to take off position: 'I now want you to practice a soft field take-off and landing. You have control.' **STUDENT PRACTICE of soft field take-off and landing.**
Lesson Point 6:	Short Field Take-Off: 'I have control. Follow me through as I demonstrate the short field take-off technique. The idea is to get the aircraft off the ground as soon as possible and stay in ground effect as the speed increases towards Vx. We have one stage of flap selected which will help. I smoothly apply full power, holding the control column a little way back. Notice as the speed passes 50 kts, the nose starts to lift and the aircraft becomes airborne. It is too slow for safe flight, so I check forward to the straight and level attitude just a few feet above the runway. Notice the speed increasing. As it reaches 55 kts, Vx, I climb away at that speed. Once clear of obstacles I can increase to 65 kts, Vy. Once I have positive rate of climb and speed is 65 kts, I can retract the flap. You have control'
Lesson Point 7:	The student can be given the task of flying the circuit until on final. **STUDENT PRACTICE circuit to final.**

Lesson Point 8:	Once on final. Short Field Landing: 'I have control. Follow me through as I demonstrate a short field approach and landing. All is the same as a normal circuit until on final. I make sure I have full flap selected, and reduce to the recommended short field speed of 54 kts. Controlling my speed accurately with throttle. It is important I touch down right at the start of the runway at the correct speed. I mustn't hold off to get a smoother landing. As I touch down, I would apply maximum braking, but for the purposes of this practice I will use normal braking to prevent damage.'
Lesson Point 9:	Student taxy back to take off position: 'I now want you to practice a short field take-off and landing. You have control.' **STUDENT PRACTICE of short field take-off and landing.**
After Ldg, Shutdown & Post-flight:	The student may vacate the runway and carry out all checks and radio calls. All taxy, shutdown and post-flight duties should now be second nature.

Flight Prompt Card

Ex 13e – Short/Soft Field App & Landing

1: REVISION: STUDENT PRACTICE start, taxy, checks.
2: DEMO/FT/TEACH Soft-field take-off with flap.
3: STUDENT PRACTICE circuit to final.
4: DEMO/FT/TEACH Soft field ldg to fullstop. Taxi back.
5: STUDENT PRACTICE soft field T/O & Landing.
6: DEMO/FT/TEACH Short Field t/o w flap & Vx climb.
7: STUDENT PRACTICE circuit to final.
8: DEMO/FT/TEACH Short Field appr & ldg to full stop. Taxi back.
9: STUDENT PRACTICE short field t/o & ldg.

Debriefing

To be added

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

To be added

Common Instructor Faults

To be added

Ex 14 – First Solo Circuit

Practical Considerations

- Prior to the first solo, it is common practice at most training establishments that 2 instructors should independently agree that the student is ready for first solo. So, a different, unrestricted instructor should fly 3 circuits with that student, with little or no comment. If all circuits are to a good and safe standard, then the student is ready.
- The student must be 16 or more years old, have a valid medical, and have completed any necessary Theoretical Knowledge exams. Note that there is no legal requirement for TK exams to be passed at this stage, however some schools require it.
- The instructor should get out on the taxiway after the student has completed the after landing checks. Inform him that you are getting out, and you would like him to do one circuit just like before. He should use the student callsign to ATC. There is no need to carry out the power checks again, but do the Before Take-Off Checklist again. Tell him the aircraft will perform better due to the lower mass. Inform ATC that there is a change of Captain, and that it will be a student first solo. Some students will be anxious. Be firm and instructive and tell them to enjoy it.

Long Briefing

The solo should be a surprise for the student, as this will help to reduce anxiety.

From EASA Part-FCL:

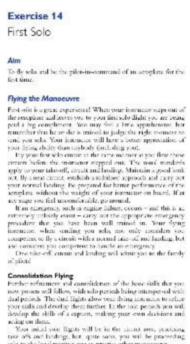
Long briefing objectives:

During the flights immediately following the solo circuit consolidation period the following should be covered:

(1) procedures for leaving and rejoining the circuit;
(2) local area (restrictions, controlled airspace, etc.);
(3) diversion to a nearby airfield

Suggested Reading

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.


Exercise 14
First Solo

Aim

To fly solo and be the pilot-in-command of an aeroplane for the first time.

Flying the Manoeuvre

[illegible]

Consolidation Flying

[illegible]

Board Briefing

- Not required for this lesson. The solo should be a surprise for the student, as this will help to reduce anxiety.

Air Exercise

- A single circuit only, however if the approach is not stable, the student should go around and make another circuit and landing.

Flight Prompt Card

Ex 14: First Student Solo

TEM: Medical, Fatigue, Weather, Circuit traffic level, TK Exams Completed (not a legal requirement but some ATOs require), Second Instructor Opinion (if required by ATO), Unrestricted Instructor!

1: Stop after Landing, Student After Ldg checks.
2: Advise you are getting out.
3: They are to make one circuit just like before, but if the approach is not stable they must go around.
4: The aircraft will perform better with reduced mass.
5: Use the student callsign to ATC.
6: No need for further power checks but do Before Take-off Checks again.
7: Inform ATC that there is a change of Captain, and that it will be a student first solo.
8: Enjoy!

Debriefing

- Ask the student to debrief themselves on what went well, and what they would do differently next time.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

- Students have been known on a first solo to land badly from a very poor approach. When asked why they didn't go-around, they often say 'I was told I could only do one circuit'. Thus, it is important to emphasise that a go-around is still allowed!

Ex 15 - Advanced Turns

Practical Considerations

- Some sources divide this lesson into 2 parts: 15.1: Level steep turns and 15.2: Descending steep turns.
- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- Do not forget to teach steep descending turns and recovery from spiral descent in this lesson.

Long Briefing

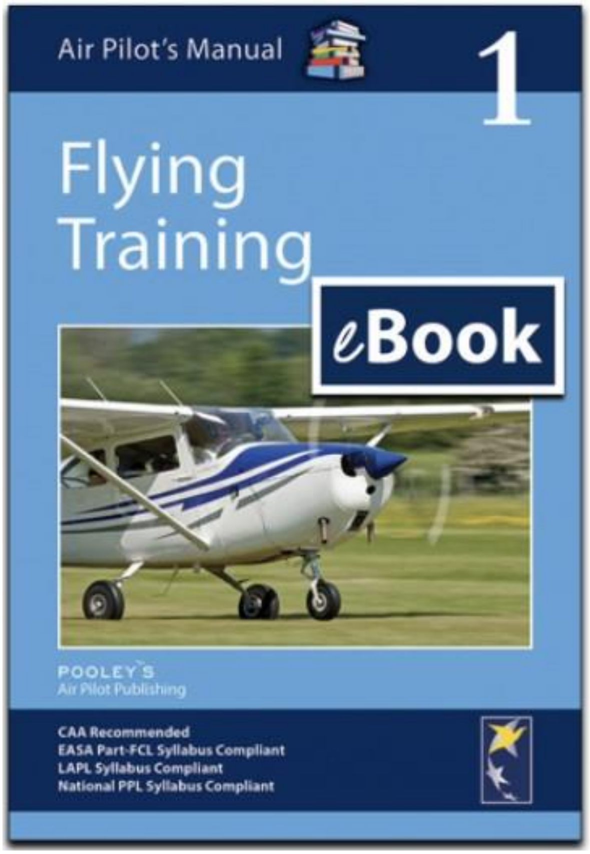
From EASA Part-FCL:

Long briefing objectives:

(1) the forces;
(2) use of power;
(3) effect of load factor: (i) structural considerations (ii) increased stalling speed.
(4) physiological effects;
(5) rate and radius of turn;
(6) steep, level, descending and climbing turns;
(7) stalling in the turn and how to avoid it;
(8) spinning from the turn: recovery at the incipient stage;
(9) spiral dive;
(10) unusual attitudes and recoveries.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 15a
The Steep Level Turn

Aim

To perform a steep level turn, maintaining constant height and airspeed.

Considerations

A steep turn is a turn in which the bank angle exceeds 45°. It is a high-performance manoeuvre which requires good coordination and positive control.

Increased Lift

A steep level turn requires increased lift, and this requires back pressure on the control column.

In straight and level flight, the lift produced by the wings balances the weight of the aeroplane. In turns, the lift force is tilted and consequently the lift generated by the wings must be increased to provide not only a vertical component to balance the weight but also a horizontal component (known as the *centripetal force*) to pull the aeroplane into the turn. In a 60° banked turn, for example, the lift produced must be double the weight if height is to be maintained.

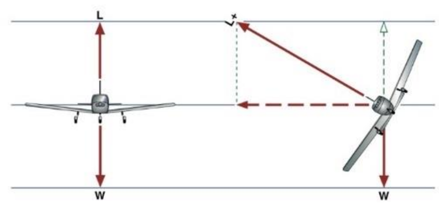


Figure 15a-1 **A steep level turn requires increased lift**

Increased lift in a turn is generated by an increased angle of attack.

The increased lift in a turn is generated by back pressure on the control column which increases the angle of attack. The back pressure required to maintain height is quite significant in a steep turn.

Exercise 15b
The Steep Descending Turn

Aim

To perform a steep gliding turn.

Considerations

A steep descending turn can be made in:
- **a glide**; or
- a powered descent.

Fly Faster

Fly faster in a steep descending turn because of the increased stalling speed.

It is usual to increase the flying speed as a steep descending turn is commenced to retain an adequate safety margin above the stalling speed (which increases during a turn). Typical speed increases above the best gliding speed are:
- **10 kt for a 45°** steep descending turn; and
- **20 kt for a 60°** steep descending turn.

In a steep gliding turn, the rate of descent will increase markedly. It can be controlled by reducing the bank angle.

Flying the Manoeuvre

A steep descending turn is flown like a steep level turn except that the **increased airspeed** is maintained with the elevator.

The nose will tend to drop in a descending turn and so, even though the nose position is lower to achieve a higher airspeed, some back pressure on the control column may be needed to stop it dropping too far.

If airspeed becomes excessive:
- **ease off the bank angle** with ailerons;
- **raise the nose** with elevator; and
- **re-establish** the desired steep turn.

The lack of slipstream in a glide will mean that more rudder is required when rolling in one direction than when rolling in the other.

Simply exerting increased back pressure on the control column in a steep descending turn may *tighten* the turn and increase the g loading beyond acceptable limits. A spiral dive may also result if attitude and airspeed are not monitored.

Board Briefing

EX 15: Advanced Turning

07 Aug 21

AIM: To learn to fly level and descending steep turns at 45°AoB.
T&E: Other a/c, Disorientation, Terrain, Overbanking, Spiral descent, Loss of Control.
M: Lookout, Anchor point, Map study, Learn unusual attitude recovery technique (TRP).

Airex: **1: Revision:** Medium Turns. **2:** Demonstration of Steep Turn at 45° AoB.
3: Steep Level Turn at 45° AoB

Entry

Lookout 
Select Att
Aileron - 45° AoB
Rudder to balance 
Elevator - add back pressure
Power - +200 rpm

Maintain

LOOKOUT - ATTITUDE - INSTRUMENTS
Altimeter - ASI - DI - Ball - AI

Exit

Anticipate - 1/3 AoB
Select S & L Attitude
Ailerons - Wings Level
Rudder to balance
Elevator - Relax back pressure
Power - -200 rpm
Lookout 

4: Overbanking
60°AoB Steep Turns
Repeat exercise at 60 AoB
Full Power Needed!

5: Steep Descending Turns
Enter Glide Descent
Increase AoB as required
No power needed
Maintain AoB accurately

IAS +5 kts for each 10° over 30°AoB

6: Unusual Attitudes
TRP: THROTTLE - ROLL - PITCH
Spiral Descent
Recovery - Reduce Power
Reduce AoB
Then adjust pitch

Skeleton Board Briefing

EX 15: Advanced Turning

07 Aug 21

AIM: To learn to fly level and descending steep turns at 45°AoB.
T&E:
M:

Airex: **1: Revision:** **2:**

3: Steep Level Turn at 45° AoB

Entry	**Maintain**	**Exit**
		
4: Overbanking	**5:** Steep Descending Turns	**6:** Unusual Attitudes

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Lesson Point 1:	**Revision:** The student has now gone solo. The start-up, taxy, power checks, before take-off checks and the take-off and climb should all now occur without prompting.
Lesson Point 2:	**Revision:** Ask the student to carry out a medium bank turn to both the left and right to ensure the correct technique. **STUDENT PRACTICE.**
Lesson Point 3:	**Steep Turn to Left:** 'I have control. Watch as I demonstrate the attitude for a steep turn to the left at 45 degrees angle of bank. Note where the horizon cuts the coaming. Note the 45 degree angle of bank shown on the attitude indicator. I want you to remember this attitude.'
Lesson Point 4:	'Now, I want you to take control and maintain this steep turn to the left.' **STUDENT PRACTICE.**
Lesson Point 5:	Once satisfactory for at least 360 degrees, the student is asked to roll out. He hasn't been taught to do this, all he has to do is reset the straight and level attitude. He will need to be told to reset the power. 'Now, I want you to return to normal straight and level flight. The power will also need to be reset to the cruise setting.' **STUDENT PRACTICE.**
Lesson Point 6:	'Now, I want you to follow me through as I demonstrate how to roll into a steep turn to the left. First a good lookout, especially to the left, then I look to the front and roll the aircraft about the spinner, balancing with rudder. As I pass 30 degrees, I add a little power and continue to 45 degrees. I now maintain the attitude we saw before. All the time keeping a good lookout and checking the instruments. Now I want you to maintain the steep turn. You have control.' **STUDENT PRACTICE.** 'Now, I want you to roll out of the turn, back to normal straight and level flight. Remember to reset the cruise power.' **STUDENT PRACTICE.**
Lesson Point 7:	'Now, I want you to practice the whole thing: roll into a steep turn to the left, maintain it, and roll out of the turn on my command back to normal straight and level flight. After rolling out, have another lookout for traffic. You have control' **STUDENT PRACTICE.**
Lesson Point 8:	'Now, I want you to practice a steep turn to the left rolling out on north. You are going to have to anticipate by 20-30 degrees. You have control.' **STUDENT PRACTICE.**
Lesson Point 9:	**Steep Turn to Right:** 'I have control. Watch as I demonstrate the attitude for a steep turn to the right at 45 degrees angle of bank. Note where the horizon cuts the coaming. Note how the picture is different from a steep turn to the left. I want you to remember this attitude.'
Lesson Point 10:	'Now, I want you to take control and maintain this steep turn to the right.' **STUDENT PRACTICE.**

Lesson Point 11:	Once satisfactory for at least 360 degrees: 'Now, I want you to return to normal straight and level flight.' **STUDENT PRACTICE.**
Lesson Point 12:	'Now, I want you to follow me through as I demonstrate how to roll into a steep turn to the right. First a good lookout, especially to the right, then I look to the front and roll the aircraft about the spinner, balancing with rudder. As I pass 30 degrees, I add a little power and continue to 45 degrees. I now maintain the attitude we saw before. All the time keeping a good lookout and checking the instruments. Now I want you to maintain the steep turn. You have control.' **STUDENT PRACTICE.** 'Now, I want you to roll out of the turn, back to normal straight and level flight.' **STUDENT PRACTICE.**
Lesson Point 13:	'Now, I want you to practice the whole thing: roll into a steep turn to the right, maintain it, and roll out of the turn on my command. You have control' **STUDENT PRACTICE.**
Lesson Point 14:	'Now, I want you to practice a steep turn to the left rolling out on west. You have control.' **STUDENT PRACTICE.**
Lesson Point 15:	**60° Steep Turns:** Once 45° turns are satisfactory: 'Now, I want you to follow me through as I demonstrate how to roll into a 60° steep turn to the left. First a good lookout, especially to the left, then I look to the front and roll the aircraft about the spinner, balancing with rudder. As I pass 30 degrees, I add full power and continue to 60 degrees. Note this new attitude and the high g force. All the time I am keeping a good lookout and checking the instruments. Now I want you to maintain the steep turn at 60°. You have control.' **STUDENT PRACTICE.** 'Now, I want you to roll out of the turn, back to normal straight and level flight. Remember to reset the cruise power and lookout.' **STUDENT PRACTICE.** 'Now, I want you to practice the steep turn to the left at 60° and roll out on my command. You have control.' **STUDENT PRACTICE.** 'Now, I want you to try a steep turn to the right at 60° and roll out on east. You have control.' **STUDENT PRACTICE.**
Lesson Point 16:	**Steep Gliding Turns at 40°:** Once 45 & 60° turns are satisfactory: 'Now, I want you to set the aircraft up in a glide descent. You have control.' **STUDENT PRACTICE.** 'Now, I want you to follow me through as I set the aircraft up in a steep gliding turn. I lookout to the left and roll into a 40° turn to the left. Because of the angle of bank, I increase the speed to 70kts with elevator. Notice our hight rate of descent. This is very useful when descending through a gap in the clouds, for example. When I am ready to exit the gliding turn, I roll back to wings level and return to 65 kts.'

Lesson Point 17:	'Now, I want you to practice a steep gliding turn to the right. You have control.' **STUDENT PRACTICE.**
Lesson Point 18:	**Unusual Attitude (UA) Recoveries:** Once steep gliding turns are satisfactory: 'Now, we are going to look at the recovery from unusual attitudes. If the aircraft gets itself into such an attitude, we need to know the best way to recover. The first thing we do is look at the speed. If the speed is high and/or increasing I close the throttle. If the speed is low and/or reducing I add full power. Then I roll to wings level. Then I set the correct pitch attitude for straight and level flight. So the sequence is: **THROTTLE-ROLL-PITCH**: T-R-P. Watch as I demonstrate. • Here, the speed is high and increasing, so I close the throttle, then roll wings level, then raise the nose. • Here, the speed is low and reducing, so I add full power, then roll wings level, then lower the nose. • Here, the speed is normal and not changing, so I leave the throttle alone, then roll wings level. The nose is already in the correct attitude.
Lesson Point 19:	'Now, I am going to put the aircraft into an unusual attitude. When I give you control, I want you to return to straight and level at no particular heading or altitude. You have control.' **STUDENT PRACTICE.**
Landing & Post-flight:	The student has now gone solo. The circuit, approach, landing, after landing and shutdown should all now occur without prompting.

Flight Prompt Card

Ex 15: Steep/Advanced Turns

1: REVISION STUDENT PRACTICE Start-up thru to clb.
2: REVISION Revise medium level turns L & R.
3: STEEP LEFT TURN: DEMO 45º turn to left. Student watches only. Note nose/horizon att.
4: STUDENT takes control and maintains steep turn.
5: Student rolls out to S&L att on command. (Power)
6: TEACH entry to 45º turn to left, STUDENT takes control to maintain & roll out on command. (Power)
7: STUDENT PRACTICE whole thing.
8: Repeat rolling out on headings (anticipation!).
9: STEEP RIGHT TURN: DEMO 45º turn to right. Student watches only. Note nose/horizon att.
10: STUDENT takes control and maintains steep turn.
11: STUDENT rolls out to S&L att on command.
12: TEACH entry to 45º turn to right, STUDENT takes control to maintain & roll out on command.
13: STUDENT PRACTICE whole thing.
14: Repeat rolling out on headings (anticipation!).
15: Repeat at 60º AoB.
16: STUDENT takes control and sets up glide descent. FT as instructor rolls into steep gliding turn (40° AoB & 70 kts) and rolls out.
17: STUDENT PRACTICE
18: TEACH recovery from Unusual Attitudes (UAs).
A: nose low with bank, B: nose high with bank,
C: Level steep turn. TRP (Throttle-Roll-Pitch).
19: STUDENT PRACTICE of the 3 scenarios.

Debriefing

- Make sure the student remembers the order of actions for recovers from unusual attitudes.

New Basic Skills

- The new basic skill learned in this lesson is THROTTLE - ROLL - PITCH

Common Student Faults

- Student does not look out over the spinner during entry, and so ends up nose low.
- Student does not add power and the speed reduces.
- Student does not apply back pressure and enters a spiral dive.
- Student performs a perfect steep turn but is doing so on instruments with no lookout.
- Student does not understand the AI fitted to the aircraft and cannot gauge 45° AoB.

Common Instructor Faults

- Remember, the mechanics of a steep turn are similar to those of a medium level turn, so not too much instruction should be required. The main differences is the picture outside the window, and this should be emphasised.
- When setting up the aircraft into the unusual attitudes, it is easy to leave the aircraft either too fast in the descending turn, or at the point of stall in the climbing turn. A good way of setting this up is as follows:
    - **Steep Descending Turn:** First raise the nose to reduce speed then bank left or right and lower the nose below the horizon. This gives a steep descending turn with the airspeed still well below Vne.
    - **Climbing Turn:** First lower the nose to increase speed then bank left or right and raiser the nose well above the horizon. This gives a climbing turn with the airspeed still well above the stall.

Ex 16 - Forced Landing without Power

Practical Considerations

- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- Make sure you know an area where there are plenty of good fields.
- Run through the engine failure checks in the classroom first so the student doesn't have to learn this in the air.
- Rather than going straight into engine failures, a good way to introduce this is to fly around looking for fields and assessing them as suitable landing sites. Then build up to picking out 1500' and 1000' points. Only then should you proceed to the simulated failure.
- During the course of practice engine failures in single-engined aircraft, the instructor is effectively also acting as a safety pilot. In a real engine failure, the student would not be expected to 'warm the engine' periodically. If they choose to do so then that is ok, otherwise the instructor must do so since he has a 'duty of care' to the aeroplane. This is no negative reflection on the student. In a similar manner, the instructor is responsible for making sure the carb heat is on, low flying rule adherence and calling the go-around.

Long Briefing

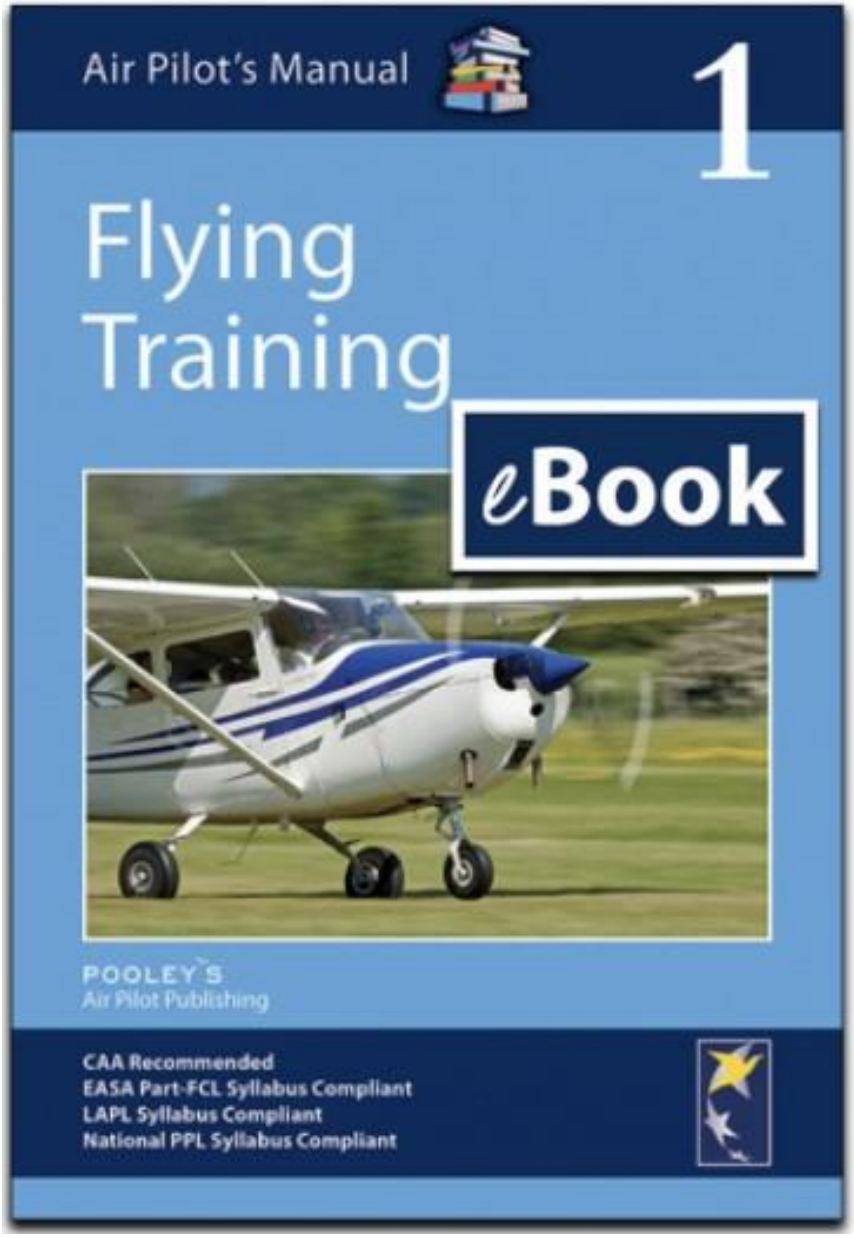
From EASA Part-FCL:

Long briefing objectives:

(1) selection of forced landing areas;
(2) provision for change of plan;
(3) gliding distance: consideration;
(4) planning the descent;
(5) key positions;
(6) engine failure checks;
(7) use of radio: R/T 'distress' procedure;
(8) base leg;
(9) final approach;
(10) go-around;
(11) landing considerations;
(12) actions after landing: aeroplane security;
(13) causes of engine failure.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 16

The Forced Landing Without Power

Aim

To carry out a safe approach and landing following engine failure.

Considerations

Why Would an Engine Fail?

A forced landing as a result of a mechanical malfunction or a structural problem is a rare event with modern aeroplanes. However, occasionally it happens, so be prepared.

Always check the fuel prior to flying.

Fuel starvation is often the cause of an engine stopping in flight. Fuel gauges can be inaccurate and fuel agents have on rare occasions loaded incorrect or contaminated fuel. A visual inspection of the fuel tanks and of the fuel itself during your pre-flight inspection should prevent insufficient or incorrect fuel causing a forced landing.

Always check your fuel selection and use the mixture and carburettor heat controls correctly.

Forgetting to switch from a near-empty fuel tank in flight to an alternative tank, incorrect use of the mixture control and failure to use carburettor heat can all lead to an engine stoppage through fuel starvation.

■ Figure 16-1 ***Safe forced landings can be made in small fields***

Performance data published in Flight Manuals is obtained from test results achieved by experienced test pilots flying new aeroplanes under ideal conditions. Similar results will be difficult to achieve for an average pilot in a well-used aeroplane. The published fuel consumption and range figures assume **correct leaning** of the mixture. If this is not done by the pilot when cruising at 75% maximum continuous power or less, the manufacturer's range figures will not be attained.

Ex 16: FORCED LANDING WITHOUT POWER

23Apr24

AIM: To fly a forced landing pattern from Cruising Altitude.

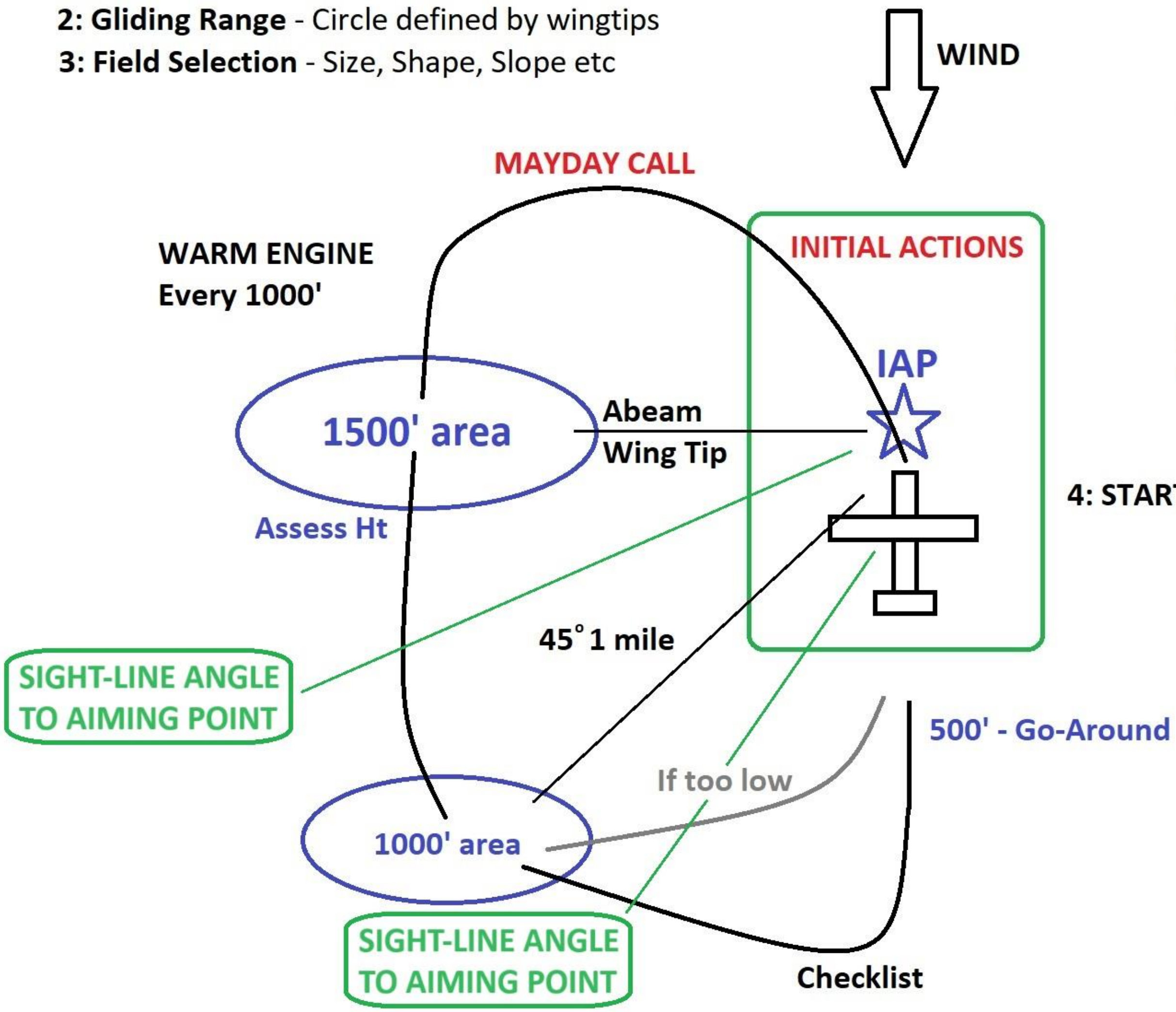
T&E: Other a/c, Terrain, Obstacles, Engine Overheat, Real Engine Failure, Rule Breaking.

M: Lookout, Ts & Ps, Carb Heat, 500'.

AIREX: 1: REVISION: Glide Approach

2: Gliding Range - Circle defined by wingtips

3: Field Selection - Size, Shape, Slope etc



INITIAL ACTIONS

FLy the a/c - 65 kts Glide Speed

Locate Field

Fly to Overhead

IAP 1/3 way in

Select 1000' area

Select 1500' area

Turn towards 1500' area

Skeleton Board Briefing

Ex 16: FORCED LANDING WITHOUT POWER

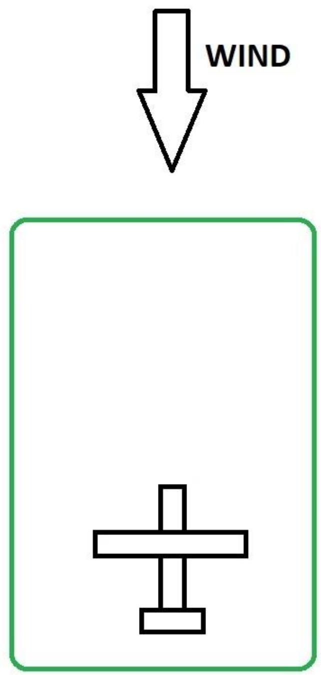
28Feb22

AIM: To fly a forced landing pattern from Cruising Altitude.

T&E:

M:

AIREX:



Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Revision:	The student has now gone solo. The start-up, taxy, power checks, before take-off checks and the take-off and climb should all now occur without prompting.
Lesson Point 1:	**Field Selection** On the way to the local area start involving the student in selection and assessment of suitable fields. Ask the student what the surface wind is likely to be in this area and which way they would approach the field.
Lesson Point 2:	Position the aircraft directly above a large field. 'I have control. Watch as I demonstrate the procedure for a practice forced landing without power. Engine Failure! First, I fly the aeroplane. I trim for 65 kts best glide. I'm looking around, there are plenty of fields around. I'll come back to that later. How's my descent going? Still maintaining 65 kts. Why has the engine stopped? Could it be carburettor heat? Carb heat to ON (Leave on for exercise) Could it be Fuel? Fuel quantity checked. Fuel cock ON. Doesn't seem to be a fuel problem. Could it be electrical? Battery Master/Alternator ON, ammeter checked. Doesn't seem to be an electrical problem. Could it be ignition? Magnetos on BOTH. Try L then R. Then BOTH again. Doesn't seem to be an ignition problem. I will try a restart. (Simulate for exercise). OK, no restart. For the purposes of the exercise, I will warm the engine. How's my descent going? Still maintaining 65 kts. OK, it looks like I will have to make a forced landing. I will have another look for a field. I see one down there on the left. I will assess the field using the S system. It is a good Size, has the right Shape, no adverse Slope, the Surface is suitable for landing, no Stock in it, the Surroundings are clear of any obStructions, there is Sivilisation nearby, there is a good underShoot and overShoot field if needed. How's my descent going? Still maintaining 65 kts OK, so I am going to have to land in that field. I will make a MAYDAY call. '*MAYDAY MAYDAY MAYDAY G-ABCD engine failure, making forced landing in field 2 miles south of Newbury. 2 on board. Student pilot*'. How's my descent going? Still maintaining 65 kts. I will plan the descent to the field. The wind is from the north so I will land towards the north. I plan to be over that lake on the downwind leg at 1500' and over that village at the end of downwind leg at 1000'. I'm going to brief you, my passenger on the brace position, seat belts, and how to leave the aircraft after landing. How's my descent going? Still maintaining 65 kts. I am now over the lake at 1600' so all is good. Carrying along towards the village. Over the village at 1000', so turning left onto base leg. Am I high or low? I feel OK. Turning final. I think I will land halfway into the field, so I will select 2 stages of flap. Still a little high, so last stage of flap. For the purposes of the exercise, I will warm the engine again. OK, I am committed to landing. One last radio call, then shutdown drills: Throttle IDLE, Mixture IDLE CUT-OFF, Ignition/Magnetos OFF, Batter Master/ALT Switch OFF. Seat Belts SECURE. Final assessment of height. All looking good. I am happy I would make that field. I will now go around.'

Lesson Point 3:	Get the student to climb you to 1500' agl and start looking for a different field. Arrange the student to be 1500' agl on a downwind leg for the field. Make sure the wind direction is considered. 'I have control. Now here we are downwind at 1500' for that nice big green field on the left. I want you to fly the circuit to short final and go-around on my call. I don't want you to worry about any of the checks or calls, just fly the circuit. You have control.' **STUDENT PRACTICE.**
Lesson Point 4:	Get the student to climb you to 2000-2500' agl and start looking for a different field. Arrange the student to be at the beginning of a downwind leg for the field. Again, make sure the wind direction is appropriate. 'I have control. Now here we are at the beginning of the downwind leg at 2200' for that green field on the left. I want you to fly the circuit to short final and go-around on my call, just like before. I don't want you to worry about any of the checks or calls, just fly the circuit. You have control.' **STUDENT PRACTICE.**
Lesson Point 5:	Get the student to climb you to 2500' agl and look for a different field. Arrange the student to be overhead the field or slightly to the right of it, so he can see it down on his left. Again, make sure the wind direction is appropriate. 'I have control. Now here we are at 2800' just over that big field you can just see out on your side. I want you to fly the circuit from here to short final and go-around on my call, just like before. I don't want you to worry about any of the checks or calls, just fly the circuit. You have control.' **STUDENT PRACTICE.**
Lesson Point 6:	If satisfactory, get the student to climb you back to 2500' agl to the same position. It may be necessary to reteach the checks and calls. 'I have control. Now here we are again at 2800' in the same position as before. I want you to fly the circuit again, this time I want you to carry out the checks and practice MAYDAY calls. You have control.' **STUDENT PRACTICE.**
Lesson Point 7:	If satisfactory, get the student to climb you to 3000' agl, without positioning the aircraft close to a chosen field. 'I have control. Now here we are at 3200'. Soon, I am going to close the throttle and simulate an engine failure. I want you to fly the whole procedure including the field selection, checks and practice MAYDAY calls. You have control.' **STUDENT PRACTICE.**
Lesson Point 8:	On climbout from successful PFL with the flaps now retracted and at least 800' agl: 'I want you to imagine we have just taken off from our home airfield.' Turn on the carb heat and close the throttle. 'Engine failure!'
Lesson Point 9:	Repeat Lesson Point 7 and possibly 8 until satisfactory.
Revision:	The circuit, approach, landing, after landing and shutdown should all now occur without prompting.

Flight Prompt Card

Ex 16: Forced Landings without Power

1:Start looking for fields and assess. Wind direction?
2: PATTER Only FULL PFL. Pick field on left into wind.
3: Put student at 1500’ L downwind for a different field. Allow to descend and go-around at 500’. No checks.
4: Put student further back downwind at 2- 2500’. Repeat with no checks.
5: Repeat without checks overhead new field at 2500’.
6: Repeat with checks overhead same field at 2500’.
7: Repeat with checks away from field at 3000’.
8: EFATO on climb away if appropriate. 9: More practice. 10. Discuss/DEMO SIGHT-LINE ANGLE.

Debriefing

- The take home message here is to fly the best glide speed and not try to stretch the glide. This will probably seem counter-intuitive to the student. If a student persists in stretching the glide, a quick demonstration can show them the futility.
- The crux of this exercise is not the low approach/landing (that has already been covered in Ex13 Glide Approaches), but getting to the 1000’ point at the correct height with all the checks done. If that happens, then the landing should be straightforward.

New Basic Skills

- The new basic skill learned in this lesson is: Sight Line Angle - Judging whether or not they will make the runway by using the position of the aiming point in the window (if not previously introduced).

Common Student Faults

1. Once a field has been picked, a student can often be reluctant to change it, even when it is clear that the approach is not going to work. For the purposes of the skill test, the student may change the field only once. Other students may dither and keep changing field, never settling on one until all other options have been removed.
2. The student may be concerned about warming the engine, and some may over-use it in order to gain height. In the skill test, it is made clear that warming the engine is not necessarily the student’s responsibility. The examiner will warm the engine if the student fails to do so, and no negative marking will occur.
3. The student may carry out all the drills required for the exercise in silence, and the examiner has no idea what is going on in their head, or if they have a plan. If that student makes it to a suitable field for a forced landing, the examiner will not know if it was due to good planning, or sheer luck! A better way is for the student to verbalise everything, leaving the examiner in no doubt as to his thinking processes. A suggested patter follows (actual checks and speeds may differ slightly depending on aircraft type):

- Engine Failure! First, fly the aeroplane. Trim for 65 (75 or as appropriate) kts best glide
- Find a field. Look around, there are plenty of fields around, I'll come back to it later.
- How's my descent going? Still maintaining 65 kts
- Why has the engine stopped?
- Could it be carburettor heat? Carb heat to ON (Leave on for exercise)
- How's my descent going? Still maintaining 65 kts
- Could it be Fuel? Quantity checked. Selector on correct tank. Change tank if an option. Fuel pressure ok. Doesn't seem to be a fuel problem.
- How's my descent going? Still maintaining 65 kts
- Could it be electrical? Battery Master/Alternator ON, ammeter checked. Doesn't seem to be an electrical problem.
- How's my descent going? Still maintaining 65 kts
- Could it be ignition? Magnetos on BOTH. Try L then R. Then BOTH again. Doesn't seem to be an ignition problem.
- How's my descent going? Still maintaining 65 kts
- Let's try a restart (Simulate for exercise). OK, no restart.
- For the purposes of the exercise, let's warm the engine.
- How's my descent going? Still maintaining 65 kts
- OK Let's have another look at that field. Am I happy with it, or can I find a better one?
- Let's assess the field using the S system. It is a good Size, has the right Shape, no adverse Slope, the Surface is suitable for landing, no Stock in it, the Surroundings are clear of any obStructions, there is Sivilisation nearby, there is a good underShoot and overShoot field if needed.
- How's my descent going? Still maintaining 65 kts
- OK, so we are going to have to land in that field. Let's make a MAYDAY call. 'MAYDAY MAYDAY MAYDAY G-ABCD engine failure, making forced landing in field 2 miles south of Newbury. 2 on board. Student pilot'.
- How's my descent going? Still maintaining 65 kts
- Let's plan the descent. The wind is from the north. Choose a method and any specific points around the circuit and corresponding altitudes.
- I'm going to brief my passenger(s) on the brace position, seat belts, and how to leave the aircraft after landing. Consider unlatching a door.
- How's my descent going? Still at 65 kts. Descending towards the field at a suitable height. Do I need gear and/or flaps yet? Am I high or low?
- For the purposes of the exercise, let's warm the engine again.
- OK, we are committed to landing. One last radio call, then crash drills: Throttle IDLE, Mixture IDLE CUT-OFF, Fuel Selector OFF, Ignition/Magnetos OFF, Batter Master/ALT Switch OFF. Seat Belts SECURE
- Final assessment of height. Consider use of flap, gear, sideslipping, S turns as needed to make the field.

Common Instructor Faults

- Many instructors teach this lesson using the **TLAR** method. That is – That Looks About Right. The instructor has the benefit of many hours of flight time and a lot of practice at PFLs. The student is not so lucky. Therefore trying to teach the student to plan a descent and approach to a field using this method is doomed to failure. Hence the method suggested above – the student is starting from a known position (directly over the field) and has a defined path to take to reach final approach. It is a **repeatable** method. Height checks are provided along the way to modify if needed.
- It can be tricky arranging placement of the aircraft for the student before failing the engine. Make sure you know where the wind is coming from, and which way you want the student to land. Try to keep the field on the student's side, especially for the first few PFLs.

Ex 17 - Precautionary Landings with Power

Practical Considerations

- For the pre-flight briefing, make sure you have an aircraft model available and that you use it in the correct orientation relative to the student.
- Make sure you know an area where there are plenty of good fields.
- Make sure you will not cause nuisance to people living near your chosen field.
- This is not a very satisfactory lesson to teach, since due to the constraints of low flying rules, the student doesn't get to see the field from a very low level circuit. The only way round this is to go to an uncontrolled grass strip (with the necessary permissions from the owner)

Long Briefing

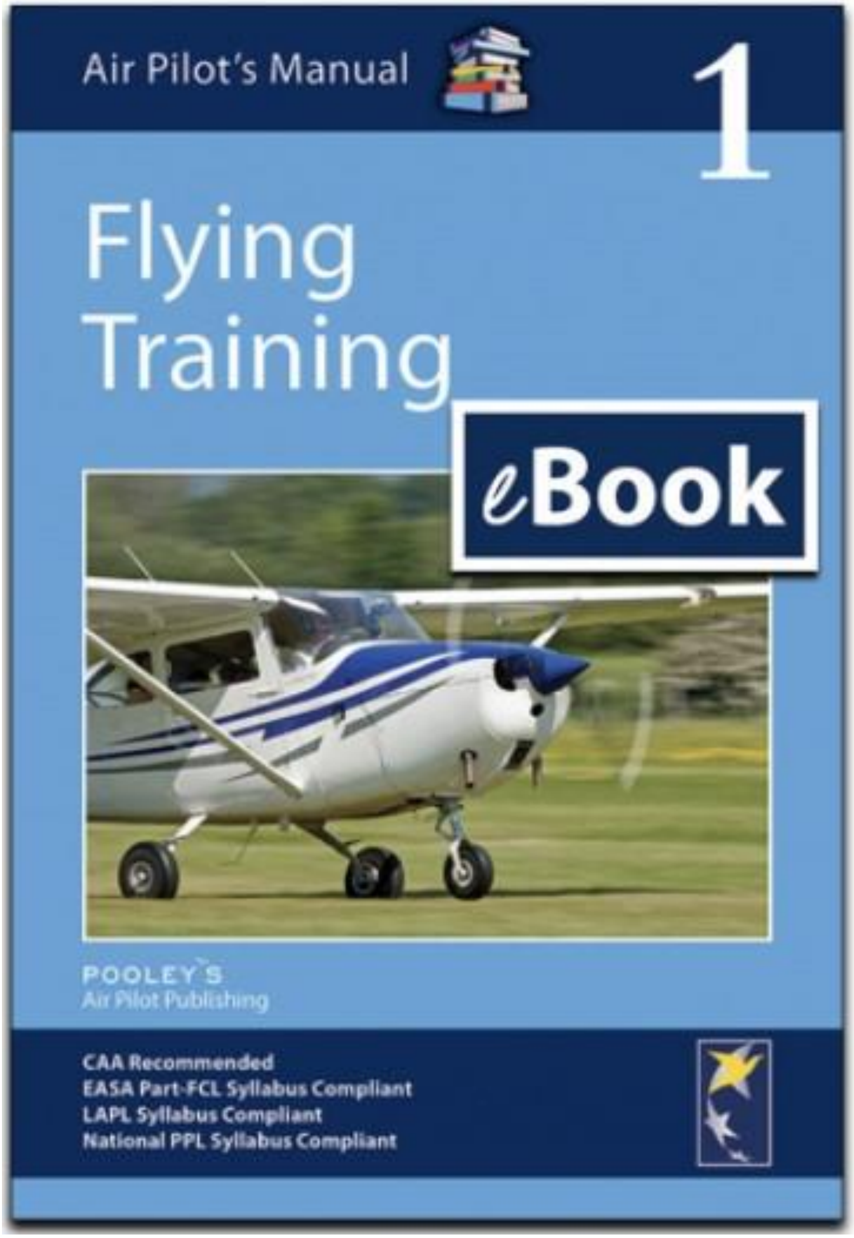
From EASA Part-FCL:

Long briefing objectives:

(1) occasions when necessary (in-flight conditions);
(2) landing area selection and communication (R/T procedure);
(3) overhead inspection;
(4) simulated approach;
(5) climb away;
(6) landing area selection:
  (i) normal aerodrome;
  (ii) disused aerodrome;
  (iii) ordinary field;
(7) circuit and approach;
(8) actions after landing; aeroplane security.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 17a

The Precautionary Search and Landing

Aim

To carry out a safe powered approach and landing at an unfamiliar field.

Considerations

Why Land on an Unfamiliar or Unprepared Field?

A pilot may be faced with the decision to land away from an aerodrome for a number of reasons. These include suspected engine or airframe problems; a sudden deterioration in weather, with low cloud and decreasing visibility making further flight unsafe; or as a result of deficient flight planning or navigation. Being totally lost, having insufficient fuel or insufficient daylight remaining are good enough reasons to consider making a precautionary landing in a field.

Impending incapacitation of the pilot, say because of food poisoning, is best coped with on the ground. Land sooner rather than later, but ensure that the field chosen for landing is suitable.

If you are about to land at an unfamiliar field, then you should consider a **precautionary inspection** before landing, especially if there is no other activity at the field.

Decision to Land

Make an early decision to land.

If any doubt exists as to the advisability of continuing the flight, make the decision to land while there is still time to do so with the aeroplane under full control and before conditions deteriorate to a dangerous level. It is better to land before you run out of either fuel, daylight or visibility, even if the landing is in a field rather than at an aerodrome.

Estimate what time you do have available. Slowing the aeroplane down and possibly lowering some flap may help enormously. Slow flight gives you more time to observe the ground and to plan, as well as making the aeroplane more manoeuvrable. Turning performance is better at slow speeds and forward vision from the cockpit is improved. Slow flight may reduce the problems facing you and may even eliminate them.

Board Briefing

24Feb22

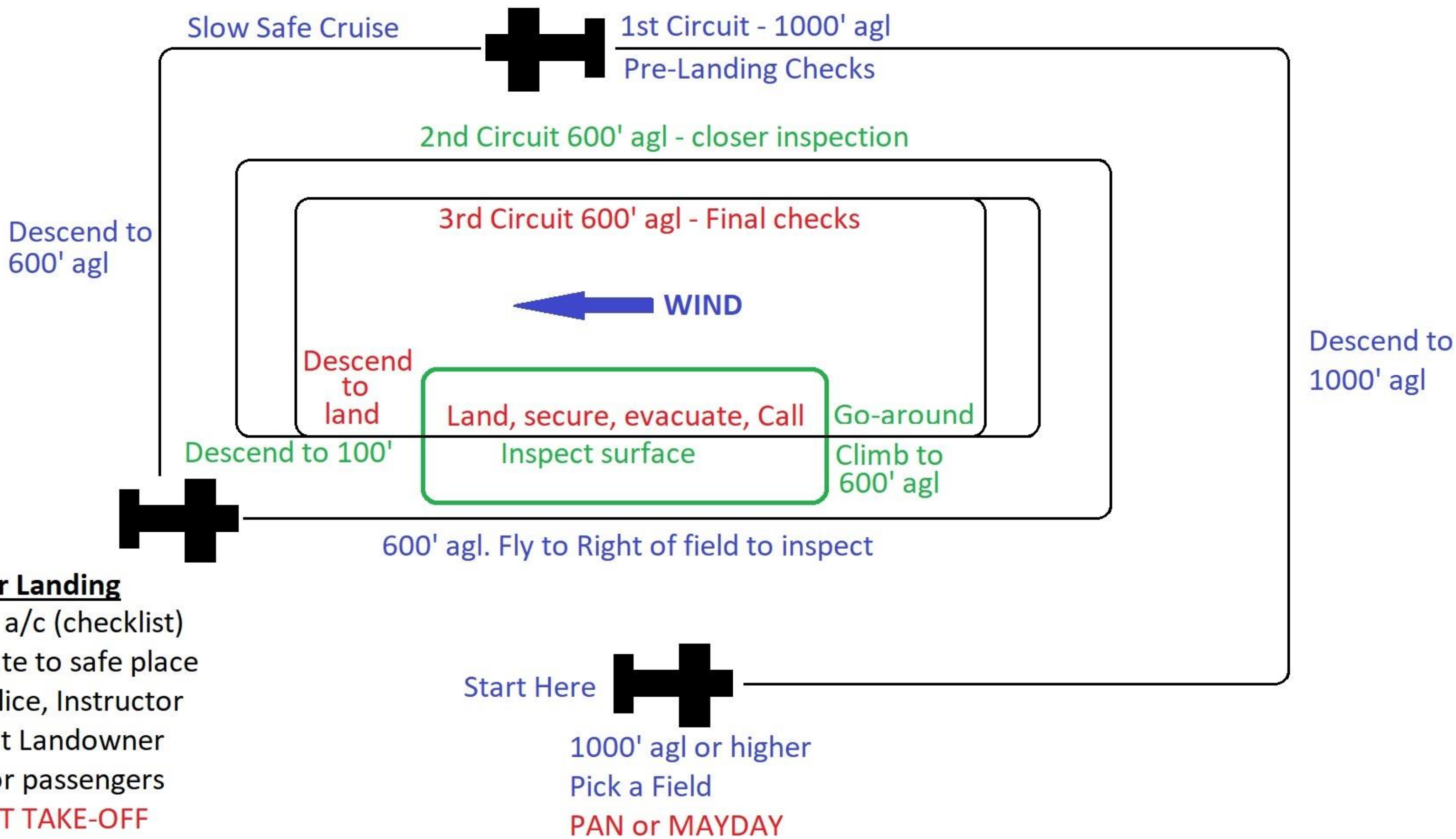
Ex 17: Precautionary Landing with Power

AIM: To learn to identify a suitable off-airport landing site and land with power.

T&E: Other a/c, Low flying rules, Terrain & Obstacles, Engine Overheat, Carb Icing.

M: Lookout, Go-around, Pre-Flight Planning, Ts & Ps, Carb Heat.

AIREX
1: Why?: Lost, Getting dark, Fuel, Illness, Engine problems.
2: Where?: Farm strip, Active airfield, Disused airfield, field.
3: Plan: Make a Positive decision, Radio Call, Assess 5 S's, Inspection circuits.



4: After Landing
Secure a/c (checklist)
Evacuate to safe place
Call Police, Instructor
Contact Landowner
Care for passengers
DO NOT TAKE-OFF

Skeleton Board Briefing

24Feb22

Ex 17: Precautionary Landing with Power

AIM: To learn to identify a suitable off-airport landing site and land with power.

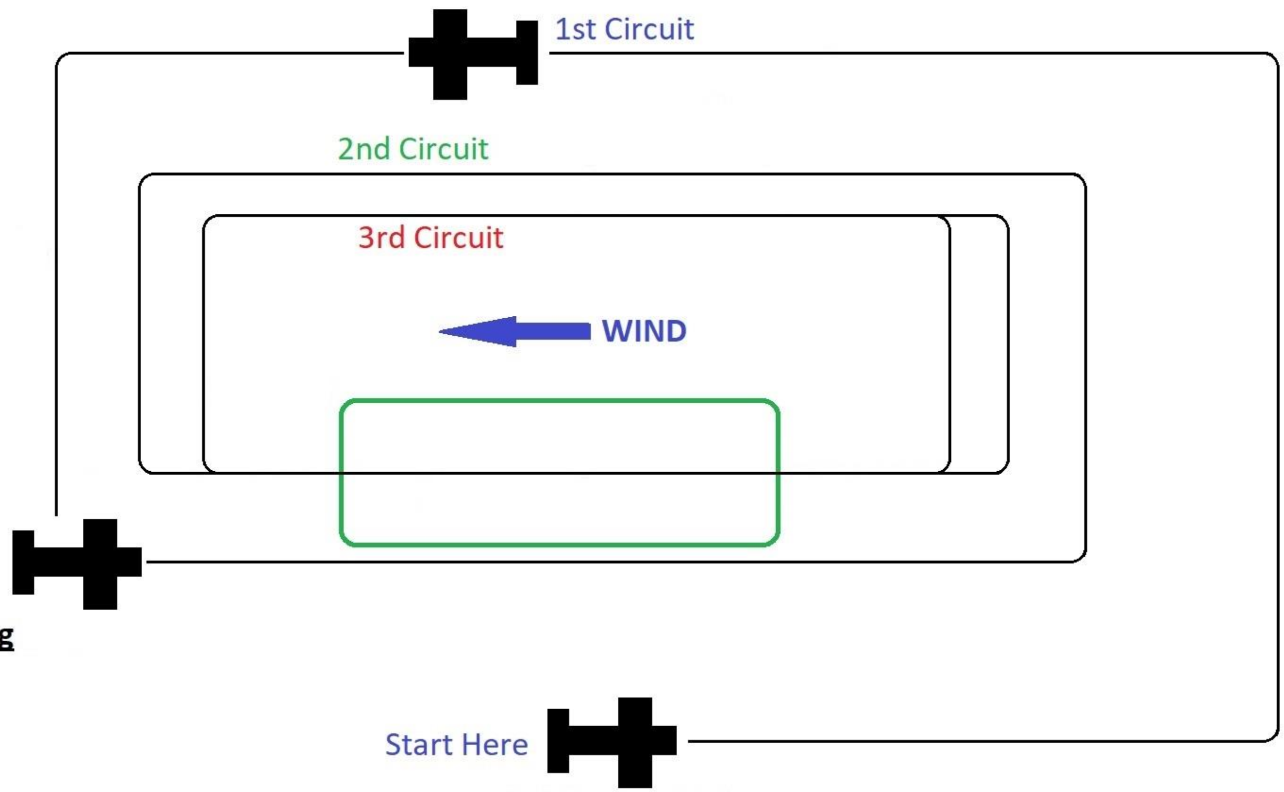
T&E:

M:

AIREX **1: Why?:**

2: Where?:

3: Plan:



4: After Landing

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Revision:	The start-up, taxy, power checks, before take-off checks and the take-off and climb should all now occur without prompting. Be increasingly critical of any errors as the student is approaching skill test.
Lesson Point 1:	Position the aircraft at 1500’ agl with a suitable field out to the left somewhere. ‘I have control. Watch as I demonstrate the procedure for a precautionary landing with power. Let’s imagine that our engine is running very roughly, and we are worried it may soon fail. Lets start by looking for a suitable field. Can you see any your side? Yes that one looks good.’
Lesson Point 2:	‘I will start by flying an inspection circuit around it at 1000’ agl. For the purposes of the exercise, I will add 500’ so that we don’t break any rules. As I fly around it I am assessing its size, shape and slope. I am checking for any animals or power lines in the field. I am looking for any obstacles such as high trees or masts nearby. Thinking of the wind, I am planning to make my approach this way. That puts my downwind leg over there. That church would be a good place to turn onto base leg, and that lake is on final. Having flown all the way round the field, I am happy with it so far. I will make a radio call to let the authorities know.’
Lesson Point 3:	‘This time, I will descend to 500’, or 1000’ in our case, to have a closer look. I descend on base leg down to 1000’. I am looking for obstacles on the approach, and I want to have a closer look at the surface of the field. Still looking good. There is also a farmhouse nearby to raise the alarm.
Lesson Point 4:	‘This time, I will descend to 100’, or 600’ in our case, to have a very close look. I descend on base leg down to 1000’, and once on final I continue down to 600’. I fly level over the field looking for any ruts or potholes in the surface.
Lesson Point 5:	‘This time, I would land, or carry out a touch and go if I was unsure of the surface. I am using the short and soft field techniques, so full flap and 55 kts on final. For the purposes of the lesson, I go-around at 600’ agl.’
Lesson Point 6:	Climb back to 2000’ agl with no field planned. ‘OK, now it’s your turn. Due to the fact that we are simulating rapidly running out of fuel, I happen to know that in 15 minutes, the engine will stop. I’d like you to find and assess a suitable landing site please. You have control.’ **STUDENT PRACTICE as required.**
Revision:	The circuit, approach, landing, after landing and shutdown should all now occur without prompting. Be increasingly critical of any errors as the student is approaching skill test.

Flight Prompt Card

Ex 17: Precautionary Landings

1: Choose a field on the left. For the purposes of the exercise, 500' is added to all altitudes. Ex altitudes in brackets.
2: TEACH: Inspect the field from 1000' (1500') carry out full circuit to left. Note landmarks for turning X-wind, base and final. Radio Call.
3: TEACH: Descend to 500' (1000') for closer inspection. Carry out another circuit.
4: TEACH: Third time round, descend on final to 100' (600') for close examination. Fly level & Go-Around.
5: TEACH: Next time would land or T&G. Short field landing technique.
6: STUDENT PRACTICE

Debriefing

To be added

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

- Students often struggle with this exercise. They have just managed to do PFLs without power in a limited time. Now you are giving them much more time. Many students spend too long looking for a field, and then changing their minds. It is important they make a positive decision to land. I often say to them that 'I happen to know that in 20 mins, the engine will stop'. I then start the stopwatch. Many are still making inspection runs 20 mins later.

Common Instructor Faults

- Many instructors choose not to teach this lesson, and just mention it in passing. It is worth practicing this lesson, even if only tagged onto the end of Ex16 as it highlights different priorities.

Ex 18A – Navigation, Ex 18B - Low Level Nav, Ex 18C - Radio Navigation

Practical Considerations

- Ex18 is more than just a lesson. It is a whole phase of flight training, and one that most students find very difficult. It is divided into cross-country navigation, low-level navigation, and radio-navigation. Each one has its own challenges to the student.
- This lesson is also the one most inadequately covered on FI courses, but is very important and often difficult for the student.

Ex 18a – Basic Navigation

Practical Considerations

- Make sure the student has all the necessary equipment: Up to date 1:500 000 chart, ruler with 1:500 000 scale, protractor, marker pens, CRP computer and if needed, a diversion plotter.
- Make sure that the student has spent some time beforehand familiarising themselves with the chart.
- Arrange a ground school session to show how a route is planned and a plog is produced. This session should last about 3 hrs and should not be scheduled just before the student's first navigational flight. The student will need a few days to practice at home before ready for flight.
- This exercise will be covered in several flight rather than a single exercise.
- The first flight should either be a single straight line route and return (eg Blackbushe – Stokenchurch Mast and return), or a simple triangular route. Then build up more complex routes, including those with controlled airspace transits. Then, typically a student solo nav, on one of the easier routes already practiced. The next stage is a dual landaway to one of the airfields to be used on the QXC. Then that same landaway solo. Then a dual landaway at the other airfield to be used in the QXC, followed by the same trip solo.
- The requirements for student solo in the PPL course are as follows: '10 hours of supervised solo flight time, including at least 5 hours of solo cross-country flight time with at least 1 cross country flight of at least 270 km (150 NM) that includes full stop landings at 2 aerodromes different from the departure aerodrome.' This 150 Nm flight is informally known as the Qualifying Cross Country or QXC. The route must be at least 150 nm (airport to airport to airport – airport, rather than actual route flown) and must involve landing at 2 aerodromes other than the airfield of departure and arrival. No passengers may be carried on the flight (since the PIC has no PPL yet). At each airfield, the student must get a signed document (certificate or logbook) from the airport authority to show he did land there and received no assistance from another person.
- For student landaways and the Qualifying Cross country (QXC), authorisation sheets should be prepared, and in the case of the QXC, carried by the student. (see next page). Such forms are not official CAA documents and are not technically required, but they do make it easy to record and verify the student's flight.

Blackbushe Aviation Cross Country Certificate

To be completed by a flight instructor:

This is to certify that student pilot:

flying aircraft type ______________ G-______ was authorised to leave Blackbushe (EGLK)

At______________hours on ______________________________20 .

Routing: ____

Name: ______________ Signature: ____________ Licence No: ____________

To be completed by a Flight Instructor or Air Traffic Controller:

This is to certify that the above named pilot landed at (airfield):____________________

At ____________ hours on ______________________20 .

The standard of the landing was ____

The standard of airmanship displayed was __________________________________

To the best of my knowledge the pilot was alone in the aircraft and unaccompanied by any other aircraft.

Name:______________ Signature: ____________ Licence No: ____________

To be completed by a Flight Instructor or Air Traffic Controller:

This is to certify that the above named pilot landed at (airfield): ____________________

at ____________ hours on ______________________20 .

the standard of the landing was ____

the standard of airmanship displayed was __________________________________

to the best of my knowledge the pilot was alone in the aircraft and unaccompanied by any other aircraft.

name: ______________ signature: ____________ Licence No: ____________

To be completed by the Chief Flying Instructor:

The above qualifying cross-country test was carried out to my satisfaction.

Name: ______________ Signature: ____________ Licence No:: ____________

Notice to pilot: If you have to make a landing at any other airfield, or if you have any difficulty, you must inform Air Traffic Control or the CFI if there is a flying school on the airfield. Report to us by telephone (reverse charge if necessary). **The telephone number is 01252 877 727.**

Blackbushe Aviation Solo Navigation Briefing Form

This certificate is to be left at Blackbushe when completed.

Authorisation:

This is to certify that student pilot: ____________ has been briefed for a solo navigation exercise as follows. the navigation flight plan has been checked and the following items discussed and, where applicable, the required facts noted on the navigation flight plan. ETD of ________ hours (local)________________20

From: ______________________ To: ______________________

From: ______________________ To: ______________________

From: ______________________ To: ______________________

Weather:

- ☐ Current meteorological forecasts for the route and destination(s).

Destination ______________________ actual: ______________________

Destination ______________________ actual: ______________________

Route:

- ☐ altitude to fly and terrain clearance.
- ☐ altimeter setting procedures.
- ☐ need and method for maintaining VMC flight.
- ☐ military zones/areas and crossing procedures.
- ☐ danger areas.
- ☐ applicable Notams, navigational warnings & Royal Flights.
- ☐ knowledge of controlled/special rules airspace

Destination(s):

- ☐ PPR if applicable.
- ☐ position reporting, circuit joining procedures.
- ☐ knowledge of landing runways.
- ☐ land away procedures (parking, refuelling, booking in and out).

Radio:

- ☐ use of RTF including position reports.
- ☐ selection and noting of communication frequencies.
- ☐ use of SSR Transponder.
- ☐ use of VHF/DF.

Aeroplane:

- ☐ fuel and oil state.
- ☐ aeroplane serviceability.
- ☐ weight & balance/performance

Abnormal And Emergency Procedures:

- ☐ action in the event of intrusion into controlled/special rules airspace.
- ☐ action in the event of fuel shortage.
- ☐ action in the event of weather deterioration.
- ☐ action in the event of diversion.
- ☐ action in the event of an unscheduled landing..
- ☐ action in the event of radio failure.
- ☐ action in the event of becoming lost

Instructor name: ______________ Signature: ______________ Licence No: ____________

I certify that I have been briefed for the solo navigation exercise detailed above and understand that in the event of an unscheduled landing I will contact the CFI, or Ops, by the quickest possible means and act according to their instructions.

Student signature: ______________ Date: ________ Time: ________ Mobile: ____________

Long Briefing

From EASA Part-FCL:

Long briefing objectives:

(1) Flight Planning;

- (i) weather forecast and actual(s);
- (ii) map selection, orientation, preparation & use:
  - (A) choice of route;
  - (B) regulated or controlled airspace;
  - (C) danger, prohibited and restricted areas;
  - (D) safety altitude.
- (iii) calculations:
  - (A) magnetic heading(s) & time(s) en-route;
  - (B) fuel consumption;
  - (C) mass and balance;
  - (D) mass and performance.
- (iv) flight information:
  - (A) NOTAMs etc.;
  - (B) noting of required radio frequencies;
  - (C) selection of alternate aerodrome(s).
- (v) aeroplane documentation.
- (vi) notification of the flight:
  - (A) pre-flight administration procedures;
  - (B) flight plan form (where appropriate).

(2) Departure;

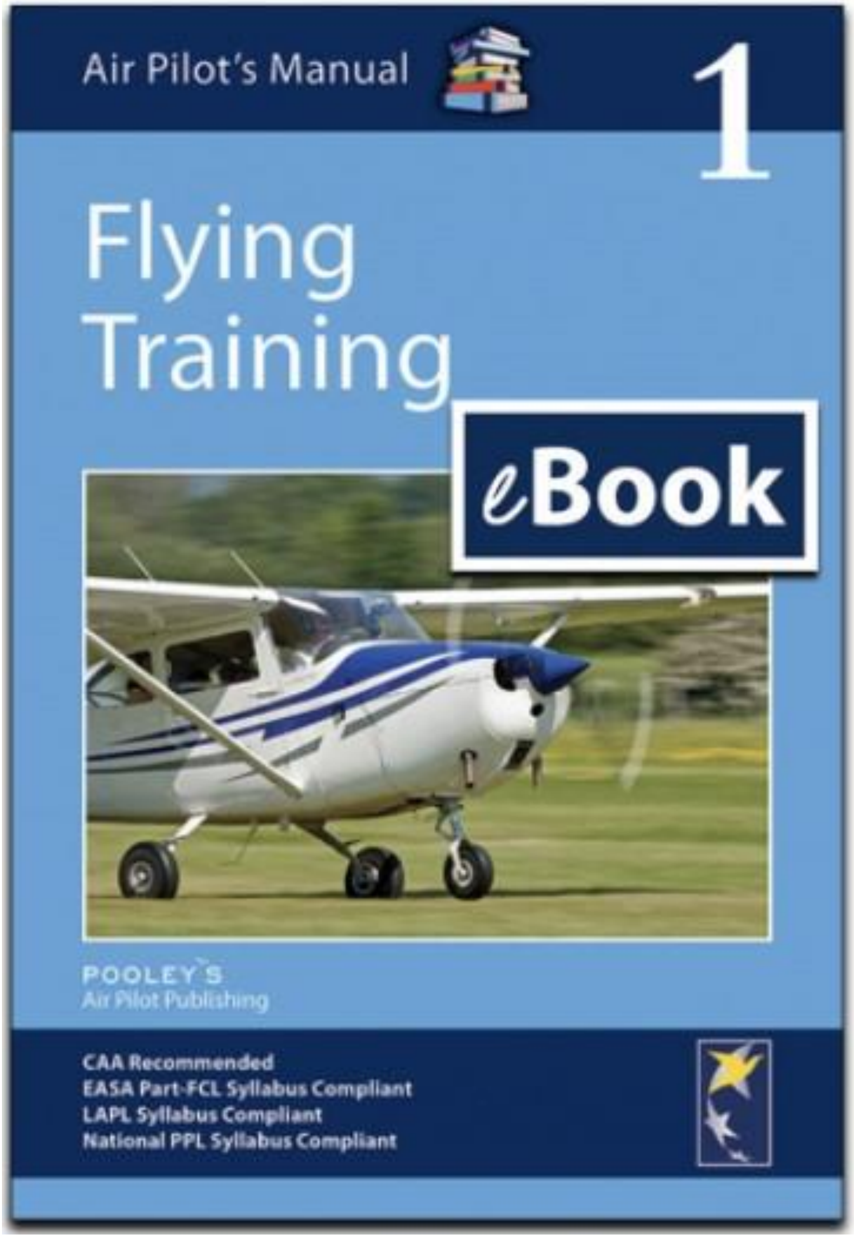
- (i) organisation of cockpit workload;
- (ii) departure procedures:
  - (A) altimeter settings;
  - (B) setting heading procedures;
  - (C) noting of ETA(s).
- (iii) en-route map reading: identification of ground features;
- (iv) maintenance of altitudes and headings;
- (v) revisions to ETA & hdg, wind effect, drift angle & GS checks;
- (vi) log keeping;
- (vii) use of radio (including VDF if applicable);
- (viii) minimum weather conditions for continuance of flight;
- (ix) 'in-flight' decisions;
- (x) diversion procedures;
- (xi) operations in regulated or controlled airspace;
- (xii) procedures for entry, transit and departure;
- (xiii) navigation at minimum level;
- (xiv) uncertainty of position procedure, including R/T proc
- (xv) lost procedure;
- (xvi) use of radio navaids.

(3) Arrival procedures and aerodrome circuit joining procedures:

(i) ATC liaison, R/T procedure, (ii) altimeter setting, (iii) entering the traffic pattern (controlled or uncontrolled aerodromes);
(iv) circuit procedures; (v) parking procedures; (vi) security of aircraft; (vii) refuelling; (viii) booking in.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 18a

Pilot Navigation

Aim

To navigate an aircraft safely under Visual Meteorological Conditions without infringing controlled airspace.

Considerations

Instruction in pilot navigation is based on the fundamentals of **dead reckoning**. Dead reckoning involves the determination, without radio navigation aids, of the position of an aircraft from:

- **A record of the track flown;**
- **The distance flown along the track** (estimated from groundspeed and timing);
- **The known starting point;**
- **The estimation of, and correction, for drift.**

In the modern world, this may be considered rather old fashioned, however the principles underpin all navigation practices including those involving radio navigation aids which will be introduced in *Exercise 18c*. *Exercise 18a* involves the preparation of a pre-flight plan comprising aspects of navigation, meteorology, weight and balance limitation, air law and aircraft performance. The airwork provides you with the opportunity to execute the pre-flight plan whilst controlling the aircraft safely, legally and within its operation limits. You will also be given the opportunity see how the pre-flight plan is amended, in flight, if the planning assumptions made on the ground prove to be incorrect or inaccurate.

It is essential that the theoretical aspects of navigation, meteorology, air law, communications and aircraft performance are studied thoroughly and, where applicable, practised before cross-country flying commences. Pilot navigation cannot be taught in short pre-flight briefings or during the flight itself. The next three chapters, dealing with *Exercises 18a, b and c,* are designed to prepare you for pilot navigation training rather than deal with the theoretical subject matter, in detail. Throughout this introduction, you will be directed to other resources for more in-depth study.

Board Briefing

Ex 18a: Navigation

28Feb22

AIM: To learn to navigate safely by purely visual means.

T&E: Other a/c, Getting lost, Running out of fuel, Engine overheat.

M: Lookout, Pre-Flight Planning, FREDA Checks.

AIREX: 1: REVISION: Start-Up, Taxi, Run-up, Take-Off

2: Depart Overhead

HAT Checks: H = Heading
A = Altitude
T = Time

Lookout - Attitude - Instruments

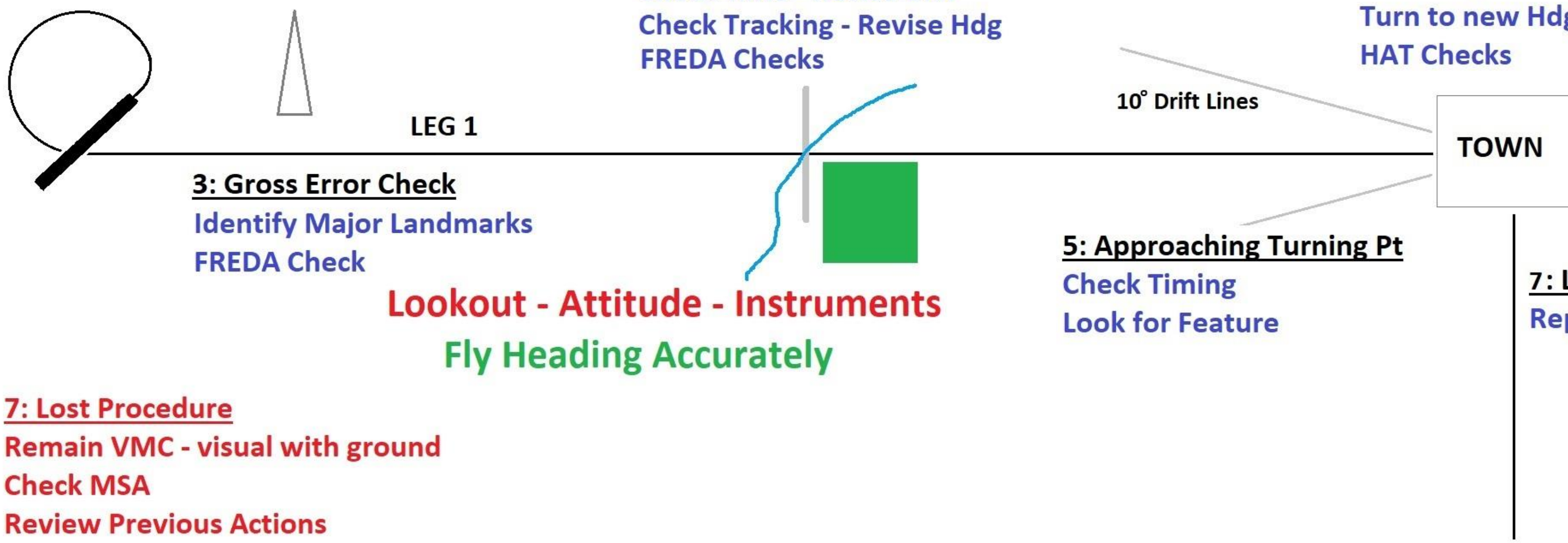
Fly Heading Accurately

4: Halfway Point

Identify Feature
Check Time - Revise ETA
Check Tracking - Revise Hdg
FREDA Checks

6: Over Turning Pt

Positively Identify
Turn to new Hdg
HAT Checks



3: Gross Error Check

Identify Major Landmarks
FREDA Check

5: Approaching Turning Pt

Check Timing
Look for Feature

7: Leg 2

Repeat

Lookout - Attitude - Instruments

Fly Heading Accurately

7: Lost Procedure

Remain VMC - visual with ground
Check MSA
Review Previous Actions
Circle of Uncertainty
Read Ground to Map
Look for Line Feature
Call ATC or 121.5
Remain Calm

Skeleton Board Briefing

Ex 18a: Navigation

28Feb22

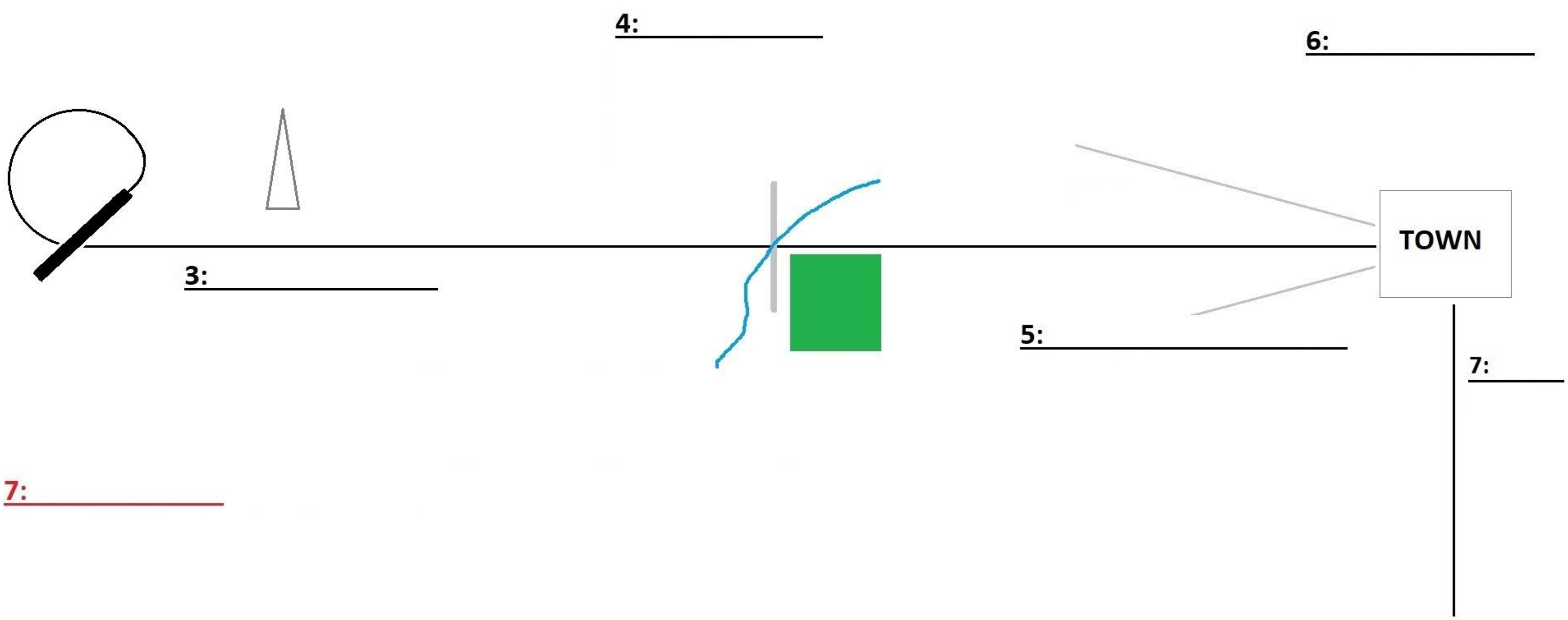
AIM: To learn to navigate safely by purely visual means.

T&E:

M:

AIREX: 1: REVISION:

2: ______________



7: ______________

Air Exercise (Lesson Points correspond to the numbers in the Flight Prompt Cards)

Make sure the student has a PLOG with them with the relevant wind calculations completed.

First Navigation Lesson

1: Revision:	The start-up, taxy, power checks, before take-off checks and the take-off and climb should all now occur without prompting. Be increasingly critical of any errors as the student is approaching skill test.
Lesson Point 2:	Shortly after take-off. 'I have control. Watch as I position the aircraft overhead the airfield at 2500 feet ready for the first navigation leg.'
Lesson Point 3:	'Here I am, overhead at 2500 feet. I start with my HAT checks. Heading – I turn onto my first heading of 280 degrees. Altitude – I am maintaining 2500 feet in trim. Time – I note that the time is 1324 and write this on my PLOG. I calculate the ETA at my halfway point and at the next turning point as 1334 and 1344 and write them down too.' A short time later. 'Now, I will carry out a gross error check. From the map, I expect to see Basingstoke on my left and Reading on my right. Can you see those towns? There they are, so I am confident we are going the right way.' A short time later. 'Now, I will carry out a FREDA check'. A short time later at the halfway point. 'I am now approaching my halfway point that I calculated on the ground. I notice that the time is 1335, so I am one minute late. I revise my ETA at the turning point by 2 minutes to 1346. I also see that I am about 5 degrees north of the feature, so I will change my heading by 10 degrees to 270 degrees. I note this on the PLOG too.' Approaching the turning point. 'I am now approaching my first turning point and begin to start looking for it and other features that will confirm I have the correct town. The map shows the turning point as a large town, just beyond a large forest, with a prominent mast just beyond. This agrees with what I can see ahead.' A short time later over the turning point. 'It is now 1346, I am over a large town. It has a racecourse, a river and a mast beyond. I am confident this is my turning point. I note ate ATA as 1346.'
Lesson Point 4:	'Now, I am ready to fly the next leg. I want you to do the navigation duties and fill out the PLOG while I fly. What heading should I fly?'
Lesson Point 5:	Fly one orbit over the 2nd turning point to make time for the handover. 'In a moment, I'll give you control to fly the leg and do the PLOG and checks. You have control.' **STUDENT PRACTICE**
Lesson Point 6:	The re-join, circuit, approach, landing, after landing and shutdown should all now occur without prompting. Be increasingly critical of any errors as the student is approaching skill test.

Flight Prompt Card

Ex 18a: - Navigation 1st Lesson

1: REVISION: STUDENT PRACTICE Start-up, Take-Off.
2: Take over after take-off and position overhead AD.
3: TEACH navigation on 1st Leg. TEACH HAT Cx, FREDA, Gross Error Cx, L-A-I, Halfway Point & Corrections, Approaching Turning Point, Over Turning Pt.
4: 2nd Leg: STUDENT PRACTICE NAV. Instructor flies.
5: 3rd leg: STUDENT PRACTICES everything.
6: STUDENT PRACTICES Return to base and landing.

Subsequent Navigation Lessons

1: Revision:	STUDENT PRACTICE of the start-up, taxy, power checks, before take-off checks, take-off and climb to overhead.
Lesson Pt 2:	STUDENT PRACTICE of navigation legs while instructor observes.
Lesson Point 3:	Over a suitable feature. 'I have control. Here I am, overhead Wantage 2500 feet. Let's say I no longer wish to continue to my next turning point, but want to divert to a different place, say Popham airfield. I am going to need to do the planning in the air. I will remain in the vicinity of Wantage while I do this. I draw a line on my map from Wantage to Popham, and mark a halfway point. I measure the distance as 25 miles and the still air track as 163 degrees. With today's wind I expect a ground speed of about 90 kts and a heading to be flown of about 195°. I now proceed to fly the nav leg as before, carrying out all my checks as before.'
Lesson Pt 4:	STUDENT PRACTICE of a diversion leg while instructor observes.
Lesson Point 5:	At a suitable point in flight. 'Let's imagine I am now not sure where I am. I are going to have a look at what to do in this situation. I start by looking outside to see if I can find any prominent features such as a town, lake, mast or coastline. Then I try to find them on the map. That may be enough to locate me. If I am still unsure of my position, I could ask for help. Farnborough is not far away and they have radar, so I could ask them.' Demo radio call to ask for position fix. 'Another way to do this is to call on the distress frequency 121.5. As it is only a practice, I will be sure to start my call with PRACTICE PAN spoken 3 times.' Demo PRACTICE PAN on 121.5 and ask for a steer to a local airfield.
Lesson Point 6:	STUDENT PRACTICE of lost procedure.

Lesson Point 7:	At a suitable point in flight. 'Let's imagine there is a parachuting site in front of me that I want to avoid. I will avoid it to the left by making a 60 degree turn. My new heading is 210 degrees. I turn onto that heading and start my stopwatch. After 2 minutes I turn back 120 degrees to the right onto heading 330 degrees and fly that for another 2 minutes to regain track. I am now back on track after 2 minutes, and regain my planned heading of 270 degrees. I must remember to add 4 minutes to my ETA at the turning point.
Lesson Pt 8:	STUDENT PRACTICE of dog-leg procedure.
Lesson Point 9:	STUDENT PRACTICE of a diversion back to the home airfield, followed by re-join, circuit, approach, landing, after landing and shutdown. Be increasingly critical of any errors as the student is approaching skill test.

Ex 18a: - Navigation Subsequent Lessons
1: REVISION: STUDENT PRACTICE Start-up, Take-Off & climb to Overhead.
2: Nav Legs: STUDENT PRACTICES NAVIGATION using the NAV work cycles above. 3: TEACH DIVERSION.
4: STUDENT PRACTICES DIVERSION.
5: TEACH LOST PROCEDURE. 6: STUDENT PRACTICE. 7: TEACH dog-leg around feature.
8: STUDENT PRACTICE. 9: STUDENT PRACTICES diversion to base airfield, circuit and landing.

Debriefing

- Make sure the student appreciates the importance of good pre-flight planning and PLOG preparation.

New Basic Skills

- The new basic skill learned in this lesson is: A Navigation work cycle.

Common Student Faults

To be added

Common Instructor Faults

- When planning a navigation route, bear in mind the wind on the day. Do not plan a long leg to the west with a strong easterly wind blowing, otherwise it will take a long time to return. A good leg length is about 20 minutes.
- When planning a diversion for the student, don't make the legs too long, and try to have them going in the general direction of the home airfield. A good length is 10-15 mins.
- Make sure the student sets course overhead the airfield, at least initially since it gives a good clear starting point and stopwatch point. Those going on to CPL can be taught commercial departures later.

Ex 18b - Low Level Navigation

Practical Considerations

To be added

Long Briefing

From EASA Part-FCL:

Long briefing objectives:

(1) General Considerations:

- (i) planning requirements before flight in entry or exit lanes;
- (ii) ATC rules, pilot qualifications & aircraft equipment;
- (iii) entry/exit lanes and areas where specific local rules apply.

(2) Low Level Familiarisation:

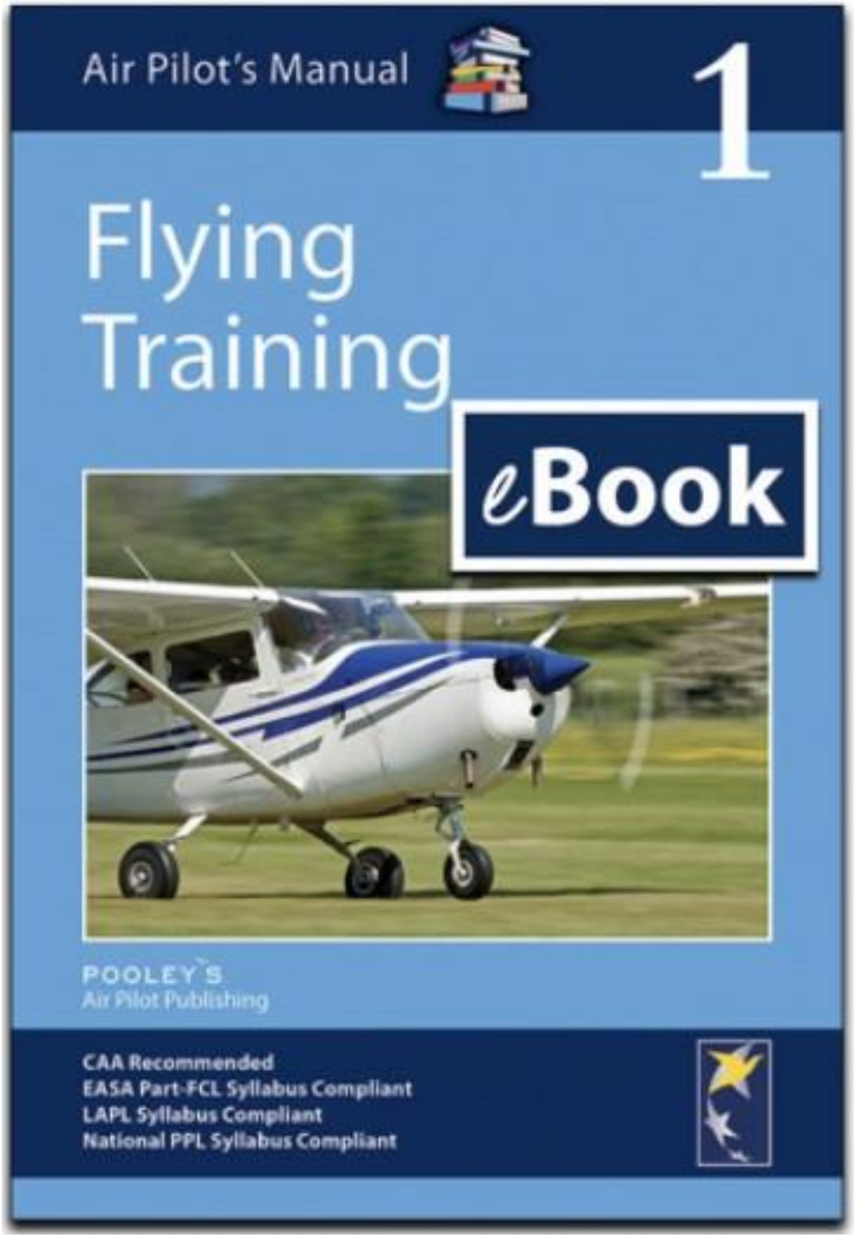
- (i) actions before descending;
- (ii) visual impressions and height keeping at low altitude;
- (iii) effects of speed and inertia during turns;
- (iv) effects of wind and turbulence;

(3) Low Level Operation:

- (i) weather considerations;
- (ii) low cloud and good visibility;
- (iii) low cloud and poor visibility;
- (iv) avoidance of moderate to heavy rain showers;
- (v) effects of precipitation;
- (vi) joining a circuit;
- (vii) bad weather circuit, approach & landing.

Suggested Long Brief

The Air Pilot’s Manual Vol 1 published by Pooley’s provides excellent material for the long brief.



Exercise 18b

Navigation at Lower Levels and in Reduced Visibility

Aim

1. To fly the aeroplane safely at a low level.
2. To observe the misleading visual effects caused by a strong wind at low levels.

Considerations

Why Fly at a Low Level?

Low-level flying is at 500 ft agl or below.

A low level is generally considered to be 500 ft above ground level or lower. Low-level flying may be necessary:

- **in poor weather conditions** such as low cloud and/or poor visibility;
- **to inspect a field** in preparation for a forced landing with power available;
- **in the VFR Entry/Exit Lanes** that provide access to certain aerodromes beneath airspace reserved for Instrument Flight Rules (IFR) operations.

Pilot Responsibilities

Remain aware of your pilot responsibilities when low flying.

Do not fly within 500 ft of any person, building, animal, etc., except when taking off or landing. There are other restrictions regarding flight over built-up areas (1,000 ft) and large open-air gatherings (1,000 metres horizontally and 1,000 ft vertically), which are covered in the Aviation Law section of Vol. 2 of *The Air Pilot’s Manual.*

Low cloud or some other unforeseen situation may force you below the minimum legal levels. As a visual pilot, you are not qualified to enter cloud and this should be avoided at all costs. If low cloud is encountered, it is better to fly slowly beneath it closer to the ground and turn back as soon as possible, rather than to enter it. This is because, in cloud, all visual contact with the ground and the horizon will be lost and the consequences for an untrained pilot are usually fatal!

Be aware that **radio communication,** which depends on line-of-sight transmission, may be poor at low levels.

Board Briefing

Ex 18b: Low Level Navigation

28Feb22

AIM: To learn to navigate safely at minimum level or in pooor visibility by visual means.

T&E: Other a/c, Getting lost, Running out of fuel, Engine overheat, low-flying rules, obstacles + terrain, VMC minima.

M: Lookout, Pre-flight planning, FREDA checks.

AIREX: 1: REVISION: Start-Up, Taxi, Run-up, Take-Off

2: DEMO of Low-level Navigation

3: **Entry**

- FREDA
- Lights ON
- Lookout

NOTE:

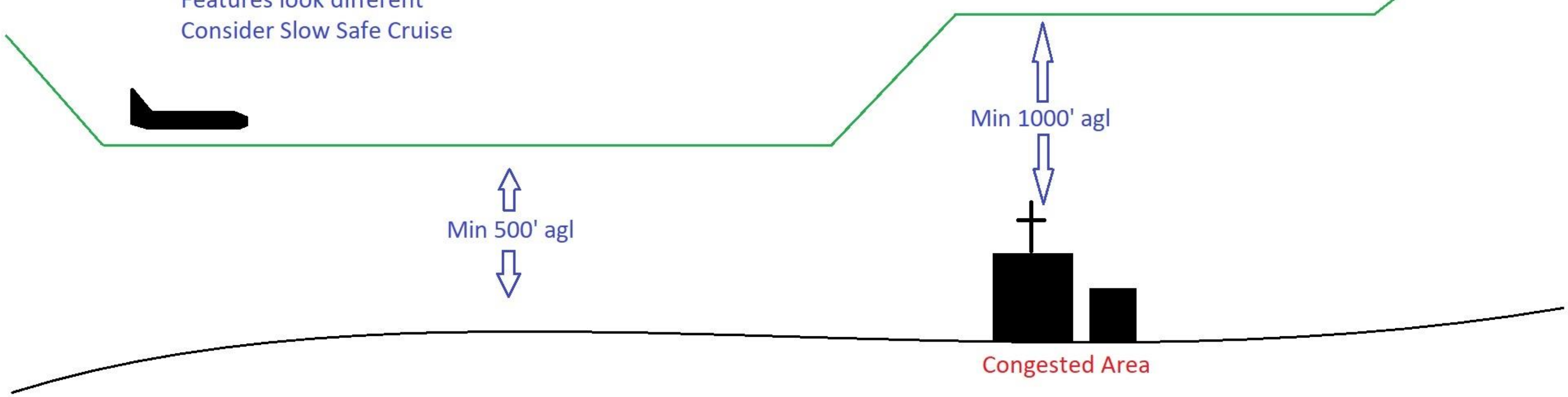
- Assess 500' visually
- Visual range reduced
- Increased turbulence
- Impression of speed + drift
- Features look different
- Consider Slow Safe Cruise

4: Maintaining

- Lookout
- Visual Picture
- Instruments (ASI, ALT, DI)
- Height visually assessed

5: Exit

- Lookout
- Climb to normal height
- FREDA
- Lights OFF



6: Wind Effects

- High GS downwind
- Low GS upwind
- Drift effects crosswind
- Turbulence

7: Terrain Flying

- Be aware of wind direction + strength
- Anticipate power requirements
- Beware ridges
- Valleys - Consider escape route

8: Turning

- Beware of overbanking - Max 30° AoB
- Reduce AoB before climbing

9: Navigation

- Use tall features
- Reduces Radio range
- Reduced Navaid range

Skeleton Board Briefing

Ex 18b: Low Level Navigation

28Feb22

AIM: To learn to navigate safely at minimum level or in pooor visibility by visual means.

T&E:

M:

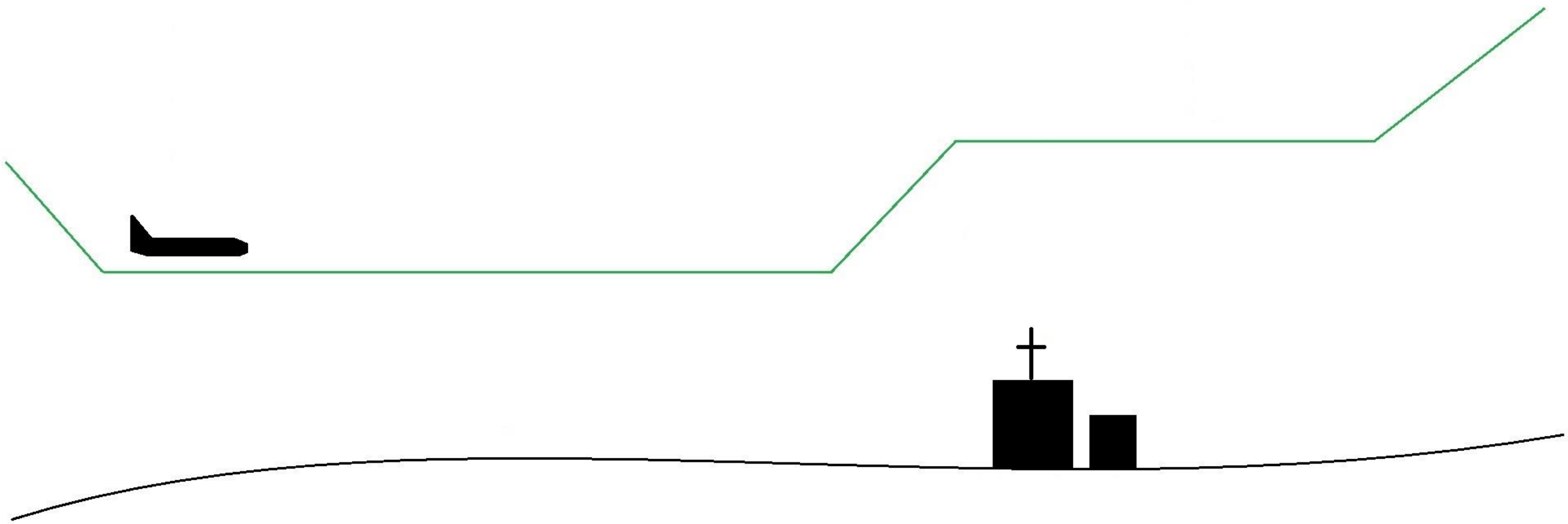
AIREX: 1: REVISION:

2:

3: _____ _____

4: ___________

5: ____



6: ___________

7: ____________

8: _______

9: _________

Air Exercise

To be added

Flight Prompt Card

Ex 18b: Navigation at Minimum Level

1: Fly at 500-1000' agl. TEACH: Point out: Perspective, Wind drift effects, poor distance visibility.
2: Use line features and tall features to navigate.
3: Avoid towns & villages.
4: In poor viz Slow Safe Cruise. 5: Increased turbulence. AoB restrictions. 6: Terrain Flying considerations. STUDENT PRACTICE.

Debriefing

- Point out that we don't usually plan to fly at low level, but sometimes it may become necessary due to weather.

New Basic Skills

- There are no new basic skills learned in this lesson.

Common Student Faults

To be added

Common Instructor Faults

- Beware low flying regulations, especially over built up areas.

Ex 18c - Radio Navigation

Practical Considerations

To be added

Long Briefing

From EASA Part-FCL:

Long briefing objectives:

(1) Use of VOR:
- (i) availability, AIP and frequencies;
- (ii) signal reception range;
- (iii) selection and identification;
- (iv) radials and method of numbering;
- (v) use of OBS;
- (vi) to or from indication and station passage;
- (vii) selection, interception & maintaining a radial;
- (viii) use of two stations to determine position.

(2) Use of ADF Equipment:
- (i) availability of NDB stations, AIP & frequencies;
- (ii) signal reception range;
- (iii) selection and identification;
- (iv) orientation in relation to NDB;
- (v) homing to an NDB.

(3) Use of VHF/DF:
- (i) availability. AIP & frequencies;
- (ii) R/T procedures;
- (iii) obtaining QDMs and QTEs.

(4) Use of Radar Facilities:
- (i) availability & provision of service & AIS;
- (ii) types of service;
- (iii) R/T procedures & use of transponder:
  - (A) mode selection;
  - (B) emergency codes.

(5) Use of distance DME:
- (i) availability and AIP;
- (ii) operating modes;
- (iii) slant range.

(6) Use of GNSS (GPS):
- (i) availability;
- (ii) operating modes;
- (iii) limitations.

Suggested Long Brief

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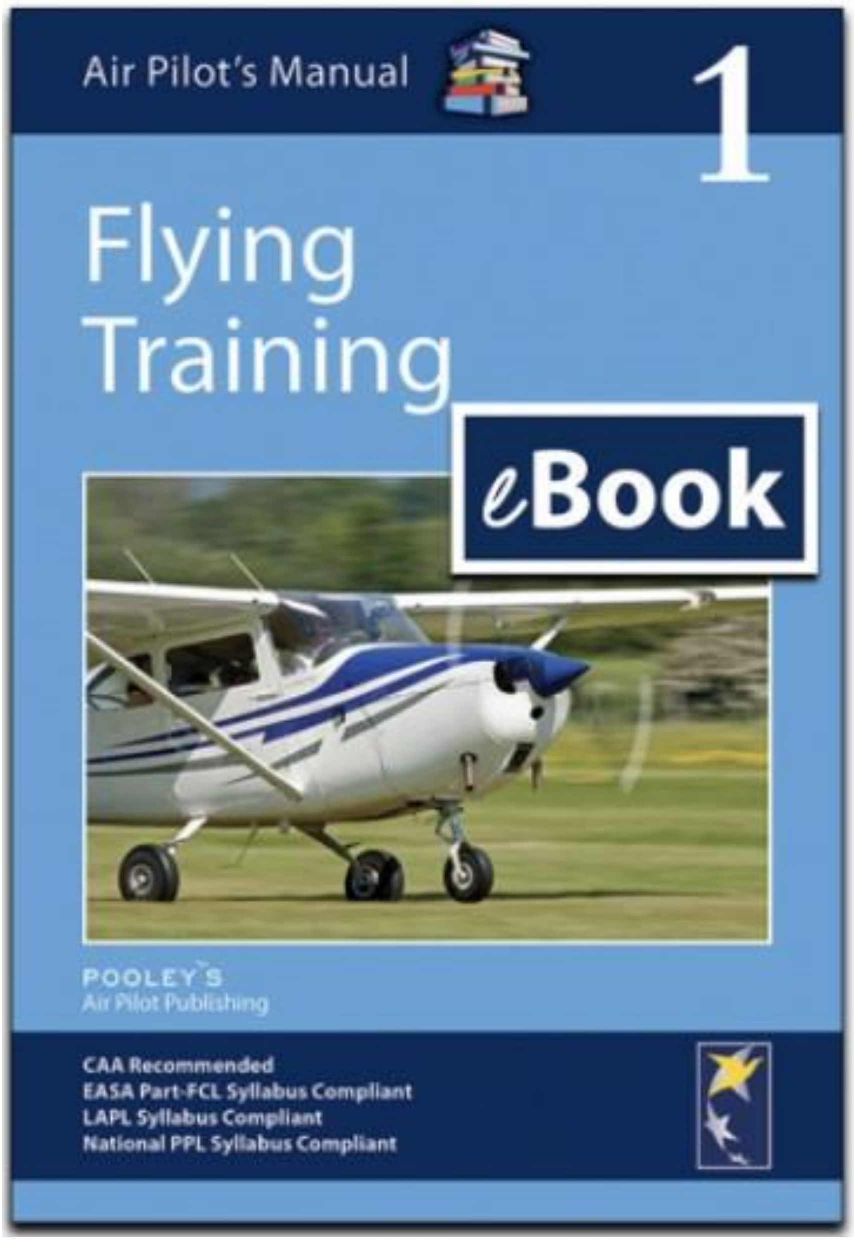


Exercise 18c

Use of Radio Navigation Aids under VFR

Aim

To learn how to intercept specific bearings and fly to and from a radio navigation aid within ±5°

Considerations

Radio navigation is an extremely useful tool under VFR to provide information about the position of an aircraft. It is particularly valuable when you are uncertain of your position. It can automatically provide bearing and distance guidance as well as track information.

The use of radio navigation aids is not an alternative to dead reckoning navigation but serves to underpin it. The pre-flight planning process, described in *Exercise 18a,* must always be followed and it is a legal requirement to carry an up to date aeronautical chart, with intended route markings, and a completed Pilot Log on cross-country flights, irrespective of whether the intention is to use radio navigation aids or not.

In this part of the flight training programme, you will be shown how to obtain information from automatic or service-based radio navigation aids and then how to use the information to fix your position and track towards (or away from) a ground installation.

Introduction to Radio Navigation Aids and Services

Primary Radar Surveillance

One of the most useful and accessible forms of radio navigation is radar surveillance. This involves contacting an Air Traffic Service Unit, capable of providing a radar service, on a published frequency with a request for assistance. Some larger aerodromes in the UK have radar facilities and offer a Lower Airspace Radar Service (LARS). Details of en-route radar surveillance services can be found in UK AIP ENR 1.6 and on the NATS Frequency Reference Card. The availability of radar services at aerodromes is published in the UK AIP in Sections AD 2.18 (Air Traffic Services Communication Facilities) for specific aerodromes.

Board Briefing

Ex 18c: Radio Navigation

28Feb22

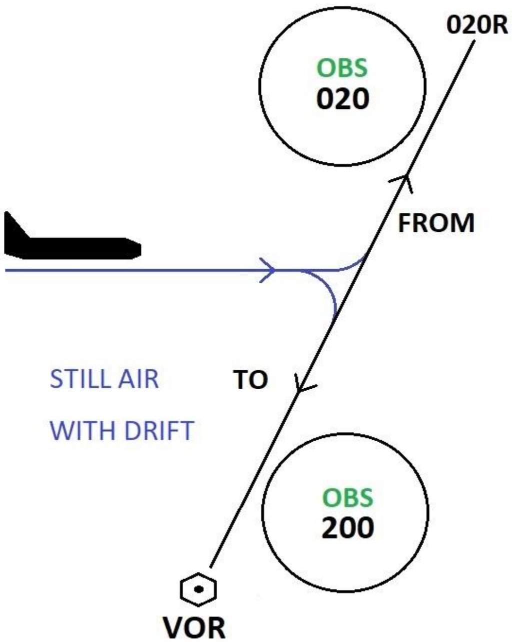
AIM: To learn to navigate using radio navigation aids.

T&E: Other a/c, Distraction, Navaid mis-identification

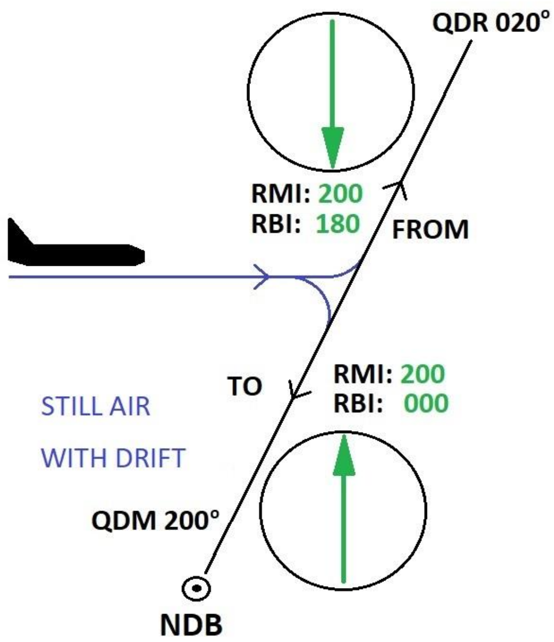
M: Lookout, TITS check.

Airex: 1: Revision: Start-up, Taxi, Checks, Take-off, Climb.

3: VOR Navigation
- VOR tuning + Ident
- VOR/VOR Position fixing
- Tracking FROM a VOR
- Tracking TO a VOR
- Intercepting a radial to a VOR
- Intercepting a radial from a VOR
- Overhead indications



4: NDB Navigation
- NDB tuning + Ident
- NDB/NDB Position fixing
- Tracking TO an NDB
- Tracking FROM an NDB
- Intercepting a QDM to an NDB
- Intercepting a QDR from an NDB
- Overhead indications



2: Navaid Checks **TITS**

T: Tune	Frequency
I: Ident	Morse Code
T: Twist	VOR or ILS course
S: Sensible	Gross Error, VLOC/GPS

5: DME Navigation
- DME tuning + Ident
- VOR/DME position fixing
- NDB/DME position fixing
- DME/DME position fixing
- Overhead indications
- Remote Function

6: GNSS Navigation
- GNSS Position fix
- Direct To waypoint navigation
- VLOC/GPS Switch

7: Radar Services

Transponder Modes:
OFF, STBY, ON, ALT, IDENT

Squawks:
Conspicuity - 7000, 2000, 7010, Monitoring (4572), 7700, 7500, 7600

Radar Services:
Basic, Traffic, Deconfliction
Radar Control

Skeleton Board Briefing

Ex 18c: Radio Navigation

28Feb22

AIM: To learn to navigate using radio navigation aids.

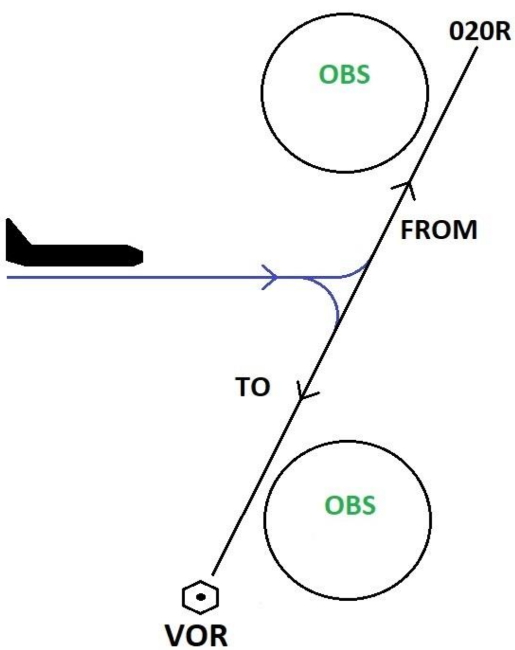
T&E:

M:

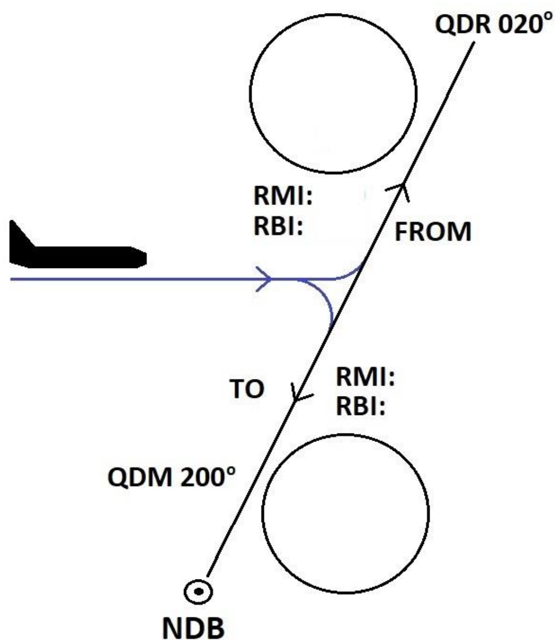
Airex: 1: Revision:

2: ______________

3: ______________



4: ______________



5: ______________

6: ______________

7: ______________

Air Exercise

To be added

Flight Prompt Card

Ex 18c: Radio Navigation

1: REVISION: Start-up – Take-Off.

VOR:
2: TEACH tracking a VOR radial to a VOR.
3: STUDENT PRACTICES MAINTAINING VOR RADIAL.
4: TEACH tracking radial from a VOR.
5: STUDENT PRACTICE.
6: TEACH Intercepting a VOR radial.
7: STUDENT PRACTICE INTERCEPT.

NDB:
8: TEACH only tracking towards NDB.
9: STUDENT PRACTICES.
10: TEACH tracking from NDB.
11: STUDENT PRACTICE.
12: TEACH Intercepting QDM to NDB.
13: STUDENT PRACTICE INTERCEPT.
14: TEACH Intercepting QDR from NDB.
15: STUDENT PRACTICE INTERCEPT.

GNSS:
16: TEACH set Direct To WPT and track to WPT.
Show CDI Output Selector.
17: STUDENT PRACTICE.

Debriefing

To be added

Common Student Faults

- Many students struggle with Radio Navigation, and end up as PPL holders still unable to intercept and maintain a VOR radial. This can be remedied at low cost with the use of whiteboard explanations and iPAD Apps or similar. The real aircraft is a very expensive way to train this material, and it cannot be paused for explanations!

Common Instructor Faults

- Instructors can forget how difficult most students find the concept of VOR and NDB navigation. Take the time to make sure they understand the theoretical and practical aspects.

From CAA Training Com Summer 2024:

LAPL, PPL and CPL QXC Flight requirements

In order to qualify for the issue of a pilot's licence the student pilot is normally required to complete a cross-country flight. For example,

- for the LAPL(A), a cross-country flight of at least 150 km (80 NM), during which one full stop landing at an aerodrome different from the aerodrome of departure shall be made.
- for the PPL(A), a cross-country flight of at least 270 km (150 NM), during which full stop landings at two aerodromes different from the aerodrome of departure shall be made.
- for the CPL(A), one VFR cross-country flight of at least 540 km (300 NM), in the course of which full-stop landings at two aerodromes different from the aerodrome of departure shall be made.

Preferably, aerodromes should be chosen for these landings such that a straight-line route between them will achieve the required distance. The spirit of the cross-country flight is for the pilot to apply their navigation skills to a practical navigation route, rather than to zigzag around the local area, landing at familiar aerodromes to achieve the required distance.

However, it should be noted that the requirement is first and foremost to complete a flight of (at least) the required distance, and that this flight may consist of any number of legs, and may utilise any appropriate turning points, which may not necessarily be aerodromes , if good airmanship so dictates; the aerodromes at which the full stop landings are to be made may be located anywhere along these legs.

For ab-initio training the Head of Training may use their discretion to select appropriate turning points, applying the spirit of the cross-country flight in the context of operational considerations such as the local geography or aerodrome availability. When a turning point is used that is not an aerodrome at which a landing is to be made, the Head of Training should still ensure that the turning point is achieved; for example, by using flight tracking software.

Pilots undertaking a cross-country flight may be qualified to act as pilot in command, for example a pilot undertaking the CPL(A) cross-country flight may be the holder of a PPL(A). In such circumstances the route will be at the discretion of the pilot concerned, who should provide evidence, acceptable to the Head of Training, to support their achievement.

It is a requirement to complete the cross-country flight as a single flight, i.e., normally during the same day. However, this should not be achieved at the expense of safety, and so where unforeseen operational circumstances arise, (such as weather, illness, fatigue or technical issues), the pilot should not be penalised for applying good airmanship and decision making. In such exceptional circumstances, and where the requirement of the cross-country flight has otherwise been met, a reasonable delay to part of the flight is acceptable. Advice may be sought from the Authority.

Ex 19 - Instrument Appreciation

Practical Considerations

- Do not forget to take a vision restricting device to the aircraft!

Long Briefing

From EASA Part-FCL:

Long briefing objectives:

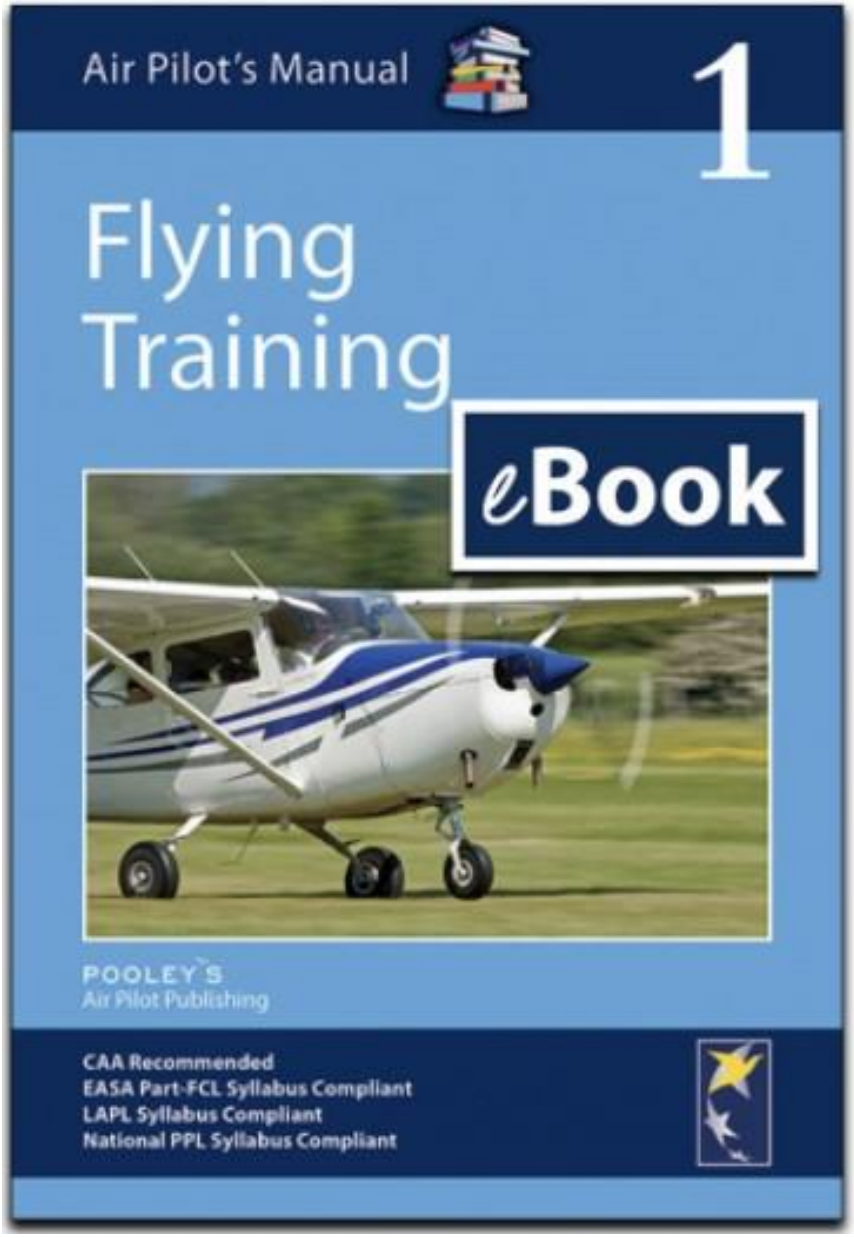
(1) Flight instruments;
- (i) physiological sensations;
- (ii) instrument appreciation;
- (iii) attitude instrument flight;
- (iv) pitch indications;
- (v) bank indications;
- (vi) different dial presentations;
- (vii) introduction to the use of the attitude indicator;
- (viii) pitch attitude;
- (ix) bank attitude;
- (x) maintenance of heading and balanced flight;
- (xi) instrument limitations (inclusive system failures).

(2) Attitude, power and performance;
- (i) attitude instrument flight:
- (ii) control instruments;
- (iii) performance instruments;
- (iv) effect of changing power and configuration;
- (v) cross-checking the instrument indications;
- (vi) instrument interpretation;
- (vii) direct & indirect indications (performance instruments);
- (viii) instrument lag;
- (ix) selective radial scan;

(3) Basic flight manoeuvres (full panel);
- (i) S&L flight at various airspeeds & a/c configurations;
- (ii) climbing;
- (iii) descending;
- (iv) standard rate turns onto pre-selected headings:
  - (A) level;
  - (B) climbing;
  - (C) Descending.

Suggested Long Brief

The Air Pilot's Manual Vol 1 published by Pooley's provides excellent material for the long brief.



Exercise 19

Instrument Flying *(not required for LAPL(A))*

Introduction to Attitude Instrument Flying

As an instrument pilot, you must learn to trust what you see on the instruments.

We normally use our **vision** to orientate ourselves with our surroundings, supported by other bodily senses that can sense gravity, such as *feel* and *balance.* Even with the eyes closed, however, we can usually manage to sit, stand and walk on steady ground without losing control. This becomes much more difficult standing on the bed of an accelerating or turning truck, or even in an accelerating elevator.

Figure 19-1 **Flying on instruments**

In an aeroplane, which can accelerate in three dimensions, the task becomes almost impossible without using your eyes.

The eyes must gather information from the external ground features, including the horizon, or, in poor visibility, gather **substitute information** from the instruments.

A pilot's eyes are very important, and the starting point in your instrument training will be learning to use your eyes to derive information from the instruments.

Board Briefing

Ex 19: Instrument Flying

30Jul22

AIM: To learn to safely fly basic manoeuvres on instruments alone.

T&E: Other a/c, disorientation, motion sickness, loss of control, icing.

M: Instructor Lookout, Radar service, Trust instruments, Selective radial scan, FREDAMI checks.

Airex: 1: Revision: Start-up, Taxi, Checks, Take-off, Climb.

2: Instrument Taxi Checks

Use natural turns - plan ahead

Turning Right - Compass increasing
DI increasing
Plane right - Ball left
Horizon erect

Turning Left Compass decreasing
DI decreasing
Plane left - Ball right
Horizon erect

7: Selective Radial Scan

Return to AI every time

3: Trust Your Instruments

A/c Straight + Level
Close your eyes
Try to maintain S+L
DO NOT TRUST YOUR SENSES

4: AI is Master Instrument

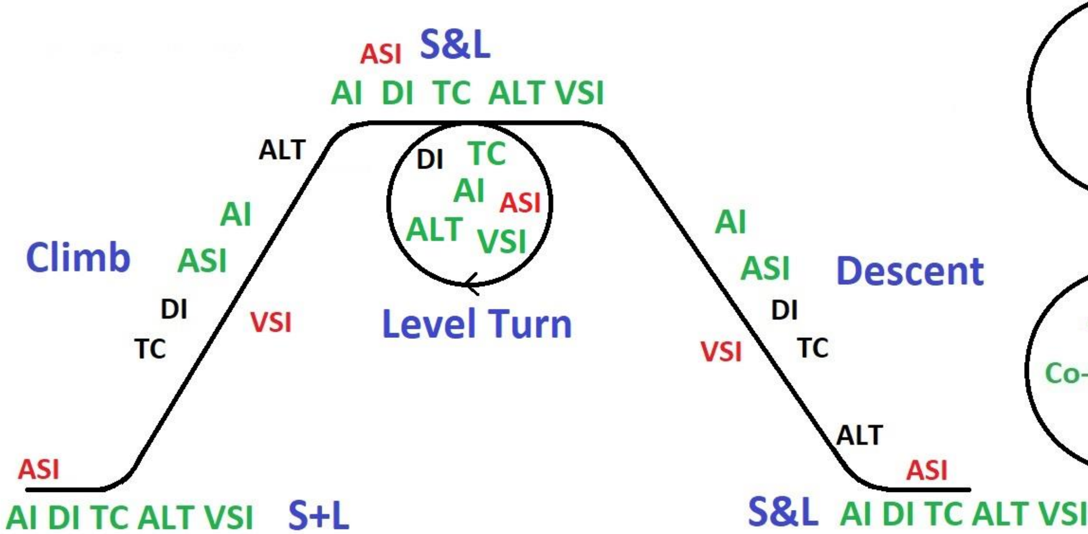
Shows bank well
Shows pitch poorly
No heading indication
No yaw indication
SCAN AI FREQUENTLY

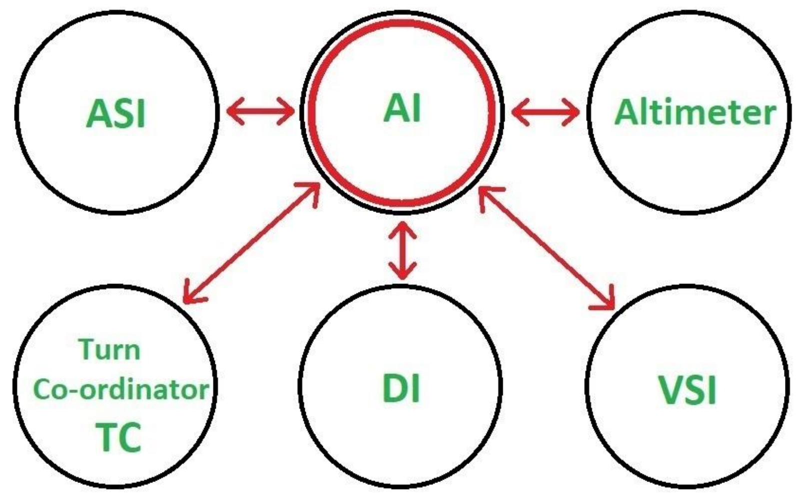
5: Control Instruments

Attitude Indicator (AI)
RPM Gauge
Balance Ball

6: Performance Instruments

Altimeter
ASI
DI
VSI
Turn Co-ordinator





Skeleton Board Briefing

Ex 19: Instrument Flying

30Jul22

AIM: To learn to safely fly basic manoeuvres on instruments alone.

T&E:

M:

Airex: 1:

2: Instrument Taxi Checks

Turning Right -

Turning Left

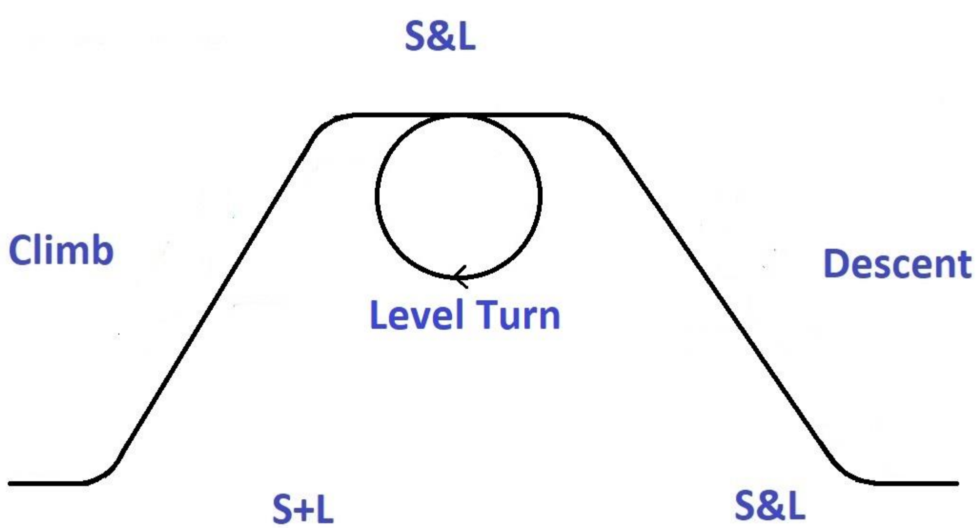
3: Trust Your Instruments

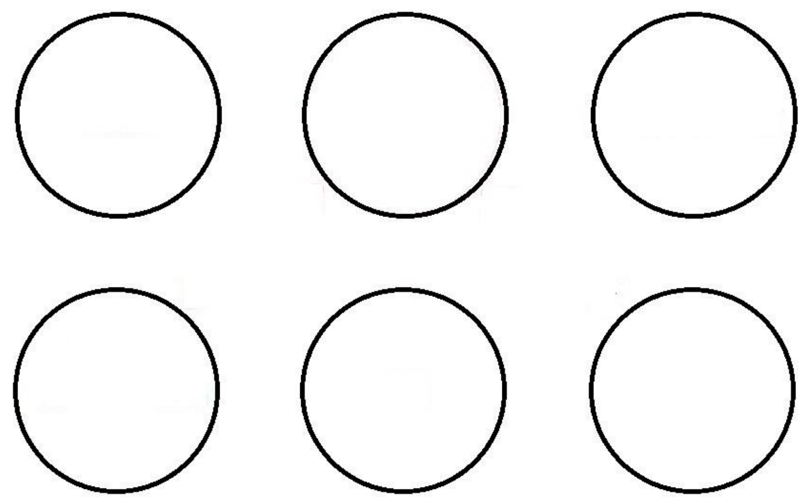
4: AI is Master Instrument

5: Control Instruments

6: Performance Instruments

7: Selective Radial Scan





Air Exercise

To be added

Flight Prompt Card

Ex 19: Instrument Appreciation

1:DISORIENTATION. Student closes eyes. Manoeuvre the a/c gently. Get student to describe a/c attitude.
2: Get student to maintain S&L with eyes closed.
3: AI: Introduce instrument. Show correspondence with natural horizon. Big pitch change outside - small change inside.
4: PITCH Repeat Effect of Elevator ex on instruments.
5: AI Show roll marks. Master instrument.
6: ROLL Repeat Effect of Aileron ex on instruments. Show that pitch still works in a turn.
7: YAW Repeat Effect of Rudder ex on instruments. No direct yaw info on AI.
8: TEACH S&L on Instruments. Selective Radial Scan SRS: 1º Scan AI/DI/AI/ALT 2º Scan VSI, Ball
9: STUDENT PRACTICE. S&L and power changes.
10: TEACH Climbing & Descending on Instruments. SRS: 1º Scan: AI/ASI/AI/DI. 2º Scan: Ball, VSI. Once in climb/descent, introduce ALT into 2º scan.
11: STUDENT PRACTICE.
12: TEACH Turning on instruments. Rate 1 turns (TC). SRS: 1º Scan: AI/TC & Ball/AI/ALT. 2º Scan: ASI, VSI. Once in turn, introduce DI to 2º Scan.
13: STUDENT PRACTICE.
14: Inadvertent entry into IMC. Discuss. STUDENT PRACTICE of 180° rate 1 level turn.
15: Instructor vectors student for approach at home airfield.

Debriefing

- The only manoeuvre required to be flown in the PPL skill test on instruments is the 180° level rate 1 turn. All the rest is practice asnd confidence building. Make sure that by the end of the lesson that, as a minimum, the student can perform this well.

New Basic Skills

- The new basic skill learned in this lesson is the selective radial scan SRS.

Common Student Faults

- The most common fault is over-concentration on one instrument with a breakdown in the radial scan. Very often this occurs during power changes where, with the engine power instruments outside the normal scan pattern the student, in attempting to set the power accurately, will ignore the indications of the flight instruments. The instructor must insist that this is an extension of the selective scan technique and that the scan must be maintained.
- Over-controlling is another common fault often due to tension, failure by the student to allow time for the instruments to settle after a change and the failure by the student to relate the miniaturised presentation of attitude changes on the AI with large attitude changes by the aircraft. Generally tension disappears as proficiency increases but the instructor may need to re-demonstrate the relationship between instrument and visual indications to cure gross over-control. Finally the student must be taught that control movements in instrument flight should generally be partial to changes in pressure with hands and feet rather than obvious movement. If the problem persists have the student hold the controls only with the finger tips whilst carrying out some manoeuvres.

Common Instructor Faults

- Give plenty of practice. Do not be tempted to rush ahead.

Extra FI Lesson 1 – Mock PPL Skill Test

Practical Considerations

- As an FI, it is very likely that at some point, you are going to be asked to carry out a mock skill test on a student as they reach the end of their training. However, little guidance is given to instructors as to what exactly is in the skill test, and how it is likely to be conducted. In this lesson, you will learn a few examiner's techniques to allow you to effectively deliver the test and evaluate the student's performance.
- Make sure your student has read **CAA Standards Document 19** before this lesson.

Pre-Flight Briefing

- The pre-flight briefing for this lesson will be very similar to the briefing that an examiner would give to the applicant prior to the skill test. The briefing may be in one or two parts.
- The first briefing is to introduce the student to the examiner, give a broad outline of the test and to give a route for the navigation section. The examiner's weight should also be given at this stage. There should be enough information in the first briefing for the applicant to go away and plan the flight. The first briefing might take place by telephone the day before, or on the day of the test.
- The second briefing usually follows around an hour after the first and will be a detailed breakdown of what is expected of the applicant, and all the manoeuvres to be tested. There will be ample opportunity for the applicant to ask questions throughout.
- It is suggested that the instructor uses the actual examiner report form to add realism.
- The instructor may find this lesson difficult as once he has asked for the appropriate manoeuvre, he must sit quietly and observe, rather than being tempted to instruct or coach. After each manoeuvre, avoid the temptation to say 'good' or 'well done'. The best thing to say is 'thank you'.
- It is important that each manoeuvre is correctly briefed to make sure the applicant understands exactly what is required. Your instructor will give you practice with this.
- Many examiners have a 'crib sheet' that they use to make sure all relevant points are covered. Examples shown below:

PPL(A) Skill Test

PPL Pre-Test Requirements	
Applicant:	
Minumum Age:	17 years
TK Exams Passed:	9 PPL on-line exams passed. Validity 24 months from end of last exam plus rest of month.
Class Rating:	Fulfilled requirements of training towards the SEP Class rating
FRTOL:	Radio Licence not required prior to test. However Communications written exam must.
Hours (Must be completed before test):	Minimum 45 hours total logged flight time. (5 can be done in a suitable simulator) Minimum 25 hours dual instruction. Minimum 10 hours solo inc 5 hrs solo X-country (150Nm/270km XC inc 2 landaways).
Course Completion Certificate:	**CAA 5016**. Will include evidence of training completed and TK Exams passed. Now includes a recommendation for test. Within 6 months from end of training.
UK LAPL Holders:	Will require DTO or ATO training. See details later in section.
ICAO Foreign PPL Holders:	Will require DTO or ATO training. See details later in section.
Aircraft:	
Aircraft Requirements:	Suitable instruments for navaid tracking eg VOR or ADF. Instruments to allow 180° turn in IMC.
Examiner:	
Can you do this test?	Are your ratings valid?
	Friend or family?
	Did you conduct over 25% of training (dual & solo as needed), final part of training, or recommend?
	CAA designation? On ATO/DTO list, or email send to CAA.
	Are you insured to fly this aircraft?
	Differences training.

PPL Skill Test Pre-Flight Brief - Part 1	
Greet:	●**Establish ID**: Passport, Driving licence etc. ●Health & Safety (Fire). ●Toilets, Briefing Facilities, Booking Out. Etc. ●Ask **Questions** at any time.
Weather:	●**General:** Do you think the weather is suitable for what we need to do? **VMC** & **daylight** throughout. ●**Visibility:** Generally >6km but not <3000m. ●**Cloud: Nav:** >1500', not <1100'. **GH:** not <1500', **Stalling:** not <2500'. **Circuits:** Cloud base at airfield allows visual circuits? ●**Wind:** Max 30kt wind speed, X-wind: aeroplane limits.
Documents:	●Course Completion Certificate **CAA SRG 5016**. Within 6 months from completion of training. Check pre-test requirements. ●**Previous Test Paperwork** (**SRG 2128** & **2129** if applicable). Any mandated **retraining** complete. ●Training Records, Logbook & Medical. Licence, if LAPL, NPPL or foreign licence holder.
Purpose:	●To Carry out your Initial PPL Skill Test & SEP (land) Class Rating. ●**This is an opportunity for you to demonstrate your ability to act as P1 of a private flight carrying a pax in VMC/VFR.** ●You are required to manage **T&E** throughout**.** ●You should manage the flight to be **safe**, **expeditious** and **practical**.
Collect:	●Headset & Checklists. IMC goggles. A/c documents for later
Format:	●This will be a **short introductory brief** to allow you to plan the flight. Main brief will follow later.
W&B and RW Perf:	●Plan fuel and oil for a **2 hour flight** plus any reserve and contingency that you deem necessary. ●My **weight** is …..lbs/……kg. Prepare **Mass & Balance** calculations for the aircraft with the fuel load we have today. ●Prepare **take-off and landing performance** for the actual conditions today, in accordance with the PoH/AFM.
Flight Overview:	**Flight will be as follows** (there will be more detail in the next brief): ●**Start-up**, **departure**, **visual NAV**, **Navaid work**, **IMC**, **visual airwork**, then return to EGXX for **circuits**. ●**Emergencies** will be simulated at various points. More about this later. ●The NAV to prepare is from EGXX to XXX (show on map), via YYY. I will need a copy of your PLOG. ●I will guide you through the further exercises/Visual Airwork later. ●There may be **questions** about the a/c and its systems. ●**Class Rating** Items.
Admin:	●Do you have enough information to plan the flight? ●Fill out **SRG 2128**. Point out legal statement. Applicant **signs**. ●Have you read **Standards Document 19**? ●What time do you make it? Let's reconvene at…… ●Bring your briefing paperwork and a/c docs with you.

PPL Skill Test Pre-Flight Brief - Part 2	
Readiness:	●Is your Planning Complete? Have you had enough time? Remember to ask questions at any time.
Reminder:	●NAV – Navaid Work – IMC Encounter - Visual Airwork - Circuits. Simulated Emergencies - Class Rating Items/RTO.
Responsibilities: I will remind you of responsibilities as they change.	●I am legal commander of a/c but will act as interested pax. You will act as commander and make all decisions. Conversation. ●**RT & NAV:** You, except during airwork**.** ●**Lookout:** You, always, except during IMC. Point out other a/c. ●You are required to manage **threats & errors** throughout. What threats do you see for today's flight?.
ATC Considerations:	●Obey all instructions unless I intervene. ATC take precedence over this brief. We may need to be flexible. **Plan B**.
Operation of A/C:	●Operate the flight according to the PoH/AFM, National Rules & Regulations & ATO/DTO rules. ●Use the checklist & verbalise, especially during Emergencies. In the air OK to use checks from memory, but still verbalise.
Tolerances/Mistakes:	●Explain **tolerances** & **note taking** - Do not be concerned. Do not fixate on errors. After the flight I will retire to make my decision.
Flight Sequence (Plan A):	
External Cx:	●Assume first flight of the day. Possible Oral Questions. I will need a passenger briefing.
Navigation:	●**1st Nav Leg** purely visual, using a recognized method. Tell me altitude, heading & ETA for each leg ASAP. Advise changes. ●**2nd Nav leg**, you can use navaids for fixing (not tracking) if needed. Can set up navaids on leg 1. ●At some point non-urgent **diversion to ZZZ**. Give heading, altitude & ETA when you can. ●**IMC encounter**. What would you do? Level Rate 1 turn. **Real wx deterioration**. Discuss actions. ●**Position Fix** using suitable Navaids of your choosing. **Navaid Tracking** on XYZ.
Airwork: Not memory Test. I will advise. I take NAV/ATC. Your lookout.	●**Stalls:** Up to 3 stalls. Recovery using SSR with min ht loss to clean climb at Vy, constant hdg, I will call level out. Explain each stall. ●**Slow Flight.** Flight at a nominated low IAS maintaining heading and altitude. Turns to given headings. ●**Steep Turns:** L and R maintaining entry speed & alt. Min 45^{o} AOB. Rollout on my call. ●Recovery from **Spiral Dive** (min height loss) no specific alt or hdg. Recover to S&L or Vy climb. ●**Steep Stable Gliding Turn** min 40 degrees AoB at a suitable safe airspeed.
Systems:	●If fitted, A/P, GNSS, De-icing, etc.
Emergencies (Touch Drills Only except throttle, fuel pump etc):	●**Sim Forced Landing:** In order to manage Threats & Errors, use items such as **Fuel Pump**, **CH** & **Engine warming** as reqd. Nominate field. Change once only. Sim radio calls. G/A on my call. If **retractable** – state gear UP or DN. ●Precautionary Landing with power. ●**EFATO** – I will call G/A. May be in the circuit or after the PFL. ●Simulated **FIRE** (cabin or engine). ●**System Failure**. Remember, checklists are available. ●**Real Emergencies:** Please carry on until I decide I wish to intervene.
Circuits & Landings:	●I will locate you. Nav to EGXX. **Touch & Goes:** Normal, Flapless, Short Field (explain), Glide app/ldg (explain). **Nominate TDZ**. ●**RTO:** Taxy back/remain on RW for RTO - Stop in available RW. No need for excessive braking.
Applicant's Brief:	●Show me your planning: Wx Charts, NOTAMs, W&B, RW Perf etc. Check map & PLOG. Ask Q's MSA? Chart Symbols? Fuel? ●How have you made sure the a/c is legal to fly? Study documents together. Ask Questions.
Aircraft Speeds:	●Ask and note aircraft Speeds? Changes. Nominate TDZ.
Comprehension:	●Do you Understand? Have you got any Questions? Have you Done all this before? What time do you want to go out to a/c?

One-Stop Briefing

The above formats represent the CAA approved method of delivering the relevant test. Sometimes, however, this is not practical. In such circumstances it may be appropriate to make contact with the applicant by phone the day before and conduct a mini brief. The remainder of the brief can be conducted on test day. A suggested format is shown:

PPL Skill Test Pre-Flight Brief – One Stop Briefing – Day Before	
Introduction:	●Welcome ●Feel free to ask questions at any time.
Training Complete?	●Is it your first PPL test? ●Recommendation for test? ●I will need to see a Course Completion Certificate.
Weather:	●What do you think about the weather?
Aircraft:	●What aircraft will we be using? ●You will need to provide a hood/goggles.
Route:	●Agree location to meet. ●Give route (2 legs). Do you know where these places are? ●Agree times for brief, go out to a/c and off blocks.
Purpose:	**●An Opportunity for you to demonstrate your ability to plan & act as PIC of a private flight in VMC with a pax.**
Flight Profile:	●Outline of flight: Pre-flight planning, Checks, Taxy, Take-Off, Navigation inc diversion, IMC encounter, Navaid work, General handling, Emergencies, Circuits at…..
Planning Info:	●Examiner weight.
Items to bring:	●Medical, logbook, course completion certificate and photo ID. ●Briefing material and PLOG.
Questions?	●Do you have enough information to plan the flight?
Contact:	●Do not hesitate to get in touch if things change.

PPL Skill Test Pre-Flight Brief – One Stop Briefing – On the Day	
Greet:	●**Establish ID**: Passport etc. **Health & Safety** (Fire). Toilets, Briefing Facilities, Booking Out. Etc. Ask **Questions** at any time.
Readiness & Form:	●Is your Planning Complete? Have you had enough time? Fill out **SRG 2128**. Applicant signs.
Purpose:	●**An Opportunity for you to demonstrate your ability to plan & act as PIC of a private flight in VMC with a pax.**
Responsibilities:	●I am **legal commander** of a/c but will act as interested pax. You will act as legal commander and make all decisions. **Conversation**. ●**RT & NAV:** You will be responsible throughout, except during **General Handling**. I will advise when responsibilities change. ●**Traffic Avoidance:** As this is a single crew flt, you will be responsible for Traffic Avoidance. ●**TEM**: You will be responsible for managing threats and errors throughout to ensure a **safe** and **comfortable** flight.
ATC Considerations:	●You must liaise with ATC in a practical manner to achieve the aims of the flight. ATC take precedence over this brief. **Plan B**.
Operation of A/C:	●Operate the flight according to the **PoH/AFM**, **National Rules & Regulations** and the **ATO rules**. ●Use the checklist & **verbalise checks**, especially during emergencies.
Tolerances/Mistakes:	●Explain **tolerances** & **note taking** - do not be concerned. **Do not fixate** on errors. After flight I will retire to make my decision.
Flight Sequence (Plan A):	
External Cx:	●Assume first flight of the day. I will need a **passenger briefing**.
Navigation	●**1st Nav Leg** purely visual, using a recognized method. Tell me altitude, heading & ETA for each leg ASAP. Advise changes. ●**2nd Nav leg**, you can use navaids for fixing (not tracking) if needed. Can set up navaids on leg 1. ●At some point non-urgent **diversion to ZZZ**. Give heading, altitude & ETA when you can. ●**IMC encounter**. What would you do? Level Rate 1 turn. **Real wx deterioration**. Discuss actions. ●**Position Fix** using Navaids & **Navaid Tracking**.
Airwork: Not memory Test. I will advise. I take NAV/ATC. Your lookout.	●**Stalls:** Up to 3 stalls. Recovery using SSR with min ht loss to clean climb at Vy, constant hdg, I call level out. Explain each stall. ●**Slow Flight.** S&L at a nominated low IAS & turns to given headings. ●**Steep Turns:** L and R maintaining entry speed & alt. Min 45^{o} AOB. Rollout on my call. ●Recovery from **Spiral Dive** (min height loss) no specific alt or hdg. Recover to S&L or Vy climb. ●**Stable Steep Gliding Turn** min 40 degrees AoB at a suitable safe airspeed.
Systems:	●If fitted, A/P, GNSS, De-icing, etc.
Emergencies (Touch Drills Only except throttle, fuel pump):	●**Sim Forced Landing:** In order to manage Threats & Errors, use items such as **Fuel Pump**, **CH** & **Engine warming** as reqd. Nominate field. Change once only. Sim radio calls. G/A on my call. If **retractable** – state gear UP or DN. ●Precautionary Landing with power. ●**EFATO** – I will call G/A. May be in the circuit or after the PFL. ●Simulated **FIRE** (cabin or engine). ●**System Failure**. Remember checklists are available. **Real emergencies**.
Circuits & Landings:	●I will locate you. Nav to EGXX. **Touch & Goes:** Normal, Flapless, Short Field (explain), Glide (explain). Nominate **TDZ**. ●**RTO:** Taxy back/remain on RW for RTO - Stop in available RW. No need for excessive braking.
Applicant's Brief:	●Show me your planning: Wx Charts, NOTAMs, W&B, RW Perf etc. Check map & PLOG. Ask Questions. MSA? Chart Symbols? Fuel? ●How have you made sure the a/c is legal to fly? Study **A/C docs**. Ask questions.
Aircraft Speeds:	●Ask and note aircraft Speeds? Advise any Changes.
Comprehension:	●Do you **Understand**? **Questions**? Have you done all this before? Have you read **Standards Doc 19**? What time to go out to a/c?

Typical PPL Oral Questions

- **Chart questions:**
  - What is this symbol (gliding site, MEF, HIRTA, IAP outside controlled airspace etc)? Further questions regarding such things.
  - What class of airspace are we in at the moment? What about as we climb up from here? What are associated VMC rules?
  - Why have you chosen the cruise altitude you have?
- **Aircraft Technical:**
  - How many cylinders does the engine have? How many spark plugs in each? What about when Magnetos set to L?
  - What kind of flaps does this aeroplane have? What is their purpose?
  - Describe the fuel/electrical/landing gear system on this aeroplane.
  - What is the demonstrated crosswind/crosswind limit for this aircraft?
- **Met Questions:**
  - Decode the local METAR and TAF for me please.
  - Using the Met Office F215 chart, explain the weather we are likely to encounter on today's flight.
- **Air Law Questions:**
  - When does your SEP (land) rating expire? How can it be revalidated/renewed?
  - What are the dimensions of an ATZ/MATZ? What must I do to enter one?
- **Operational Procedures Questions:**
  - How will you manage TEM on arrival at our airfield to avoid infringement?

Typical PPL Skill Test Flight Test Format

1. Departure

3. Navigation:

- Blackbushe to Marlborough to Westcott.
- Diversion (from near Wantage) to Popham.
- Tracking of a VOR or NDB course for several minutes
- Simulated IMC encounter.

2. Airwork:

- Steep turns L & R.
- Slow flight: turns at given IAS.
- Up to 3 of the stalls.
- Stable steep gliding turn.
- Recovery from spiral dive.

5. Practice Forced Landing:

- Set scenario of rough running engine before closing throttle.
- Glide approach assessed during the PFL.
- Go-around assessed during PFL
- EFATO assessed after go-around from PFL.

3. Navigation:

- Position fix using navaids (CPT and OCK or SAM).

6. Installed Systems:

- Use of GPS and autopilot to return to Blackbushe

5. Fire Drill & System Failure

- Smoke from instrument panel. Solved by turning off Master Battery switch.
- Discuss loss of radio, transponder and possibly flaps.

4. Rejoin, Circuits & RTO:

- Rejoin of circuit.
- Normal landing to touch & go.
- Flapless landing to touch & go.
- Short field landing to full stop.
- RTO from stopped position or taxy back.

PPL Skill Test Tolerances	
Altitude:	+/- 150’
Heading:	+/- 10°
Tracking: Single needle: Deviation Bar:	+/-10° Half Scale deflection
Speed: Take-Off & Approach: Other flight regimes:	+15/-5 kts +/-15 kts

PPL Skill Test Debrief

The Result is:

PASS	Congratulations. Complete **SRG 2128**. Both parties sign. Sign applicant's logbook. Student uses **PPL/LAPL On-line Application.** Applicant logs as PI/S as long as medical is valid. Otherwise PUT. Must wait for licence to arrive from CAA before carrying passengers unless LAPL or NPPL held. School can authorise solo.
PASS (with Admonishment)	Discuss area of concern to ensure full attention before delivering result. Ensure understanding. Complete **SRG 2128**. Both parties sign. Sign applicant's logbook. Student uses **PPL/LAPL On-line Application.** Applicant logs as PI/S as long as medical is valid. Otherwise PUT. Must wait for licence to arrive from CAA before carrying passengers unless LAPL or NPPL held. School can authorise solo.
PARTIAL PASS	Because section X was unsatisfactory due to… Do you understand why you have failed this section? Retraining requirements/recommendations. Retest of Section X. Complete **SRG 2128**, **SRG 2129**. Both parties sign. Sign applicant's logbook. Applicant logs as PUT. Retest within 6 months of course completion with same or different examiner. Mention **Reg 6**.
FAIL	Because sections X & Y were unsatisfactory due to …. Do you understand why you have failed? Retraining requirements/recommendations. Repeat entire test. Complete **SRG 2129**. Both parties sign. Applicant logs as PUT. Sign applicant's logbook. Mention **Reg 6**
TEST INCOMPLETE	Due to …. Result may be Pass, Fail or Partial on retest. Explain. Must complete test before any section retested. Complete **SRG 2128** (always) and **SRG 2129** if any section failed. Both parties sign. Sign logbook. If any items not assessed/completed (eg due to bad wx) examiner writes N/F or INC against that item and INC at the top of the section. In 'Re-test' line examiner writes nothing until test has been completed. In 'Test sections incomplete due' line examiner writes brief reason eg Low Cloud. In 'Items not completed' examiner writes items not tested yet, or ALL if it is the whole section. For any failed items examiner must complete **SRG 2129** with reasons for failure of the section. In a convenient space examiner writes 'FREE RETEST NEEDED TO COMPLETE TEST' or similar.

The 6 R's

- RESULT
- REASON
- RETRAINING
- RETEST
- RATING
- REG 6

In All Cases:

- Do you understand the result?
- Photocopy and distribute copies of paperwork. Applicant gets original.
- I have some (minor) debrief points if you are interested.

PPL Skill Test SE Examiner Proforma

SERIES: ATTEMPT: Single Engine Only v1.26 SDP Sep23

Applicant	Examiner	Aircraft	Date

Speeds etc:				Dep Airfield:		ATIS:	
TO Flap:		Ldg Flap:		RW:		Fuel B4:	
Vr:		Flapless:		Rw state:		Tacho:	
Vx:		FL Vref:		Wind:		OUT	
Vy:		Short Fld		Viz:		OFF	
Climb:		SF Vref:		Cloud:		ON	
Nav:		Limitations		Temp:		IN	
Glide:		Xwind:		Dew Pt:		Block:	
Stp Gl Tn		Vne:		QNH:		Tacho:	
Nm App:		Vfe:		QFE:		Fuel:	
Nm Vref:		Vlo/Vle:		Taxy:			

1: Pre Flight Operations & Departure:			PASS / FAIL
a. Pre-Flt Planning:		e. Taxy:	
b. W & B:		e. Power Checks:	
b. TO & Ldg Perf:		e. Pre-Dep Checks:	
c. Ext/Int Checks:		f. Take-Off & Cx:	
d. Engine Start:		g. AD Dep Procs:	
d. After Eng Start:		h. ATC Liaison:	

3: En-Route Procedures:			PASS / FAIL
Route:			
b. 1st Nav Leg:	Hdg:	Alt:	ETA:
b. 2nd Nav Leg:	Hdg:	Alt:	ETA:
d. Diversion Leg:	Diversion To:		
	Hdg:	Alt:	ETA:
a. Flt Planning:		c. CAS Aware:	
a. Ded Reckoning:		c. Timing:	
a. Map Reading:		g. Flt Manage:	
b. Maint of S&L:		g. Fuel Manage:	
c. Orientation:		h. ATC Liaison:	
e. Tracking Navaid:			
e. Navaid Fix:			
f. Basic IF 180 turn:			

2: General Airwork:	PASS / FAIL
b. S & L Flight:	
d. Medium Turn:	
c. Climbing/Desc:	
e. Steep Turn L&R:	
e. Steep Glide Turn:	
e. Spiral Dive Rec:	
f. Slow Flight:	
g. Stall (clean):	
g. Stall (base turn):	
g. Stall (final app):	

5: Abnormal & Emergency Procedures:	PASS / FAIL
a. EFATO:	
a. Fire Drill:	
b. F Ldg w/o power:	
c. Precaution Ldg:	
d. Sim Emergencies:	
e. Oral Qs:	

4: Approach & Landing Procedures:	PASS / FAIL
Airfield & Wx:	
a. AD Arrival/Join:	
b. Normal App/Ldg:	
b. Short Field Ldg:	
b. Xwind App/Ldg:	
c. Flapless App/Ldg:	
d. Glide App/Ldg:	
e. Touch & Go:	
f. Low Go-Around:	
g. ATC Liaison:	
h. Post Flight:	

6: Relevant SEP Class Rating Items:	PASS / FAIL
e. ATC Liaison:	
f. Systems:	
f. RTO:	
g. Oral Qs:	

Tolerances:	
PPL Tolerances:	Alt: +/-150', Hdg: +/-10°, Tracking:+/-10° or half scale. Speed: Take-Off & App: +15/-5 kts. Other: +/- 15 kts.
Cx/TEM/Control:	
Result:	PASS / PARTIAL / FAIL / INCOMPLETE

Examiner Report for PPL(A) Skill Test

Civil Aviation Authority

Please complete this form in BLOCK CAPITALS using black or dark blue ink.

1. APPLICANT DETAILS

Surname: .... Forename(s): ....

CAA Personal reference number [ ][ ][ ][ ][ ][ ][ ] Licence Type: ....

Series: .... Attempt:.......... Date: .... Place of Test: ....

FALSE REPRESENTATION STATEMENT
It is an offence under Article 256 of the Air Navigation Order 2016 to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine up to £5000, and on conviction on indictment with an unlimited fine or up to two years imprisonment or both.

I declare that the information provided is correct. Applicant's Signature: ....

2. FLIGHT TEST **To be completed by the Examiner**

Route

Aircraft Type and Reg Block Times: Depart Arrival Total

Test Sections:	1	2	3	4	5	6
Sections to be taken:	☐	☐	☐	☐	☐	☐
Result:						
(a)						
(b)						
(c)						
(d)						
(e)					N/A	
(f)					N/A	
(g)					N/A	
(h)					N/A	N/A
Re-test Sections:						
Test Sections incomplete due:						
Items not completed:						
Re-training required/recommended:	Aircraft:			FSTD:		

I confirm the applicant's instruction and experience complies with Part-FCL, that all theoretical examinations are valid and I also confirm that all the required manoeuvres and exercises have been completed. ☐

I have assessed the ICAO English Language Proficiency of the Applicant at Level 6: Yes ☐ No* ☐ Not Assessed ☐
(*I have advised the Applicant to complete Form SRG 1199 and be assessed by an appropriate organisation, see CAP 804, Section 4, Part M.) Assessment is not required if Applicant holds Level 6.

Examiner's Name:	Examiner's No.:
Examiner's Signature:	Date:
Authorising Competent Authority:	Date of Examiner UK briefing (if applicable):
Received (Applicant) Signature:	Date:

3. APPROVED TRAINING ORGANISATION

ATO:.. Date Training Completed:..

Recommended for test by (name):..

Copies of the report shall be submitted to (1) The Applicant (2) The Applicant's Competent Authority (3) The Examiner (4) The Examiner's Competent Authority (if different)

Civil Aviation Authority Regulation 6
Regulation 6(5) of the Civil Aviation Authority Regulations 1991 provides as follows: Any person who has failed any test or examination which he is required to pass before he is granted or may exercise the privileges of a personnel licence may within 14 days of being notified of his failure request that the Authority determine whether the test or examination was properly conducted. In order to succeed you will have to satisfy the Authority that the examination or test was not properly conducted. Mere dissatisfaction with the result is not sufficient reason for appeal.

Use of checklist, airmanship, control of aeroplane or TMG by external visual references, anti-icing procedures, etc. apply in all sections.

SECTION 1. PRE-FLIGHT OPERATIONS AND DEPARTURE

a	Pre-flight documentation, NOTAM and weather briefing
b	Mass, balance and performance calculation
c	Aeroplane inspection and servicing
d	Engine starting and after starting procedures
e	Taxiing and aerodrome procedures, pre-take-off procedures
f	Take-off and after take-off checks
g	Aerodrome departure procedures
h	ATC liaison - compliance, R/T procedures

SECTION 2. GENERAL AIRWORK

a	ATC liaison - compliance, R/T procedures
b	Straight and Level flight, with speed changes
c	Climbing: (i) Best rate of climb (ii) Climbing turns (iii) Levelling off
d	Medium (30° bank) turns, lookout procedure and collision avoidance
e	Steep (45°bank) turns (including recognition and recovery from a spiral dive)
f	Flight at critically low airspeed with and without flaps
g	Stalling: (i) (i) Clean stall and recover with power (ii) Approach to stall descending turn with bank angle 20 approach configuration (iii) Approach to stall in landing configuration
h	Descending: (i) With and without power (ii) Descending turns (steep gliding turns) (iii) Levelling off

SECTION 3. ENROUTE PROCEDURES

a	Flight plan, dead reckoning and map reading
b	Maintenance of altitude, heading and speed
c	Orientation, airspace structure, timing and revision of ETAs, and log keeping
d	Diversion to alternate aerodrome (planning and implementation)
e	Use of radio navigation aids
f	Basic instrument flying (180° turn in simulated IMC)
g	Flight management (checks, fuel systems and carburettor icing etc.)
h	ATC compliance and R/T procedures

SECTION 4. APPROACH AND LANDING PROCEDURES

a	Aerodrome arrival procedures
b	*Precision landing (short field landing), crosswind, if suitable conditions available
c	*Flapless landing
d	*Approach to landing with idle power (SE only)
e	Touch and go
f	Go around from low height
g	ATC compliance and RT procedures
h	Actions after flight

SECTION 5. ABNORMAL AND EMERGENCY PROCEDURES

This section may be combined with sections 1 through 4

a	Simulated engine failure after take-off (at a safe altitude), fire drill (SE only)
b	*Forced landing (simulated) (SE only)
c	Simulated precautionary landing (SE only)
d	Simulated emergencies
e	Oral questions

SECTION 6. SIMULATED ASYMMETRIC FLIGHT AND RELEVANT CLASS OR TYPE ITEMS

This section may be combined with sections 1 through 5

a	Simulated engine failure during take-off (at a safe altitude unless carried out in an FFS)
b	Asymmetric approach and go-around
c	Asymmetric approach and full stop landing
d	Engine shutdown and restart
e	ATC compliance, R/T procedures or airmanship
f	As determined by the FE - any relevant items of the class or type rating skill test to include, if applicable: (i) Aeroplane systems including handling of autopilot (ii) Operation of pressurisation system (iii) Use of de-icing and anti-icing system
g	Oral questions

* these items may be combined at the discretion of the FE.

Note: If the test is completed in two parts then Section 1 and Items a, b and h of Section 4 (aerodrome arrival, landing, actions after flight) shall be assessed on both flights.

Examiner Report - Failure of Test, Check or Assessment of Competence

This form can be part filled in on screen then printed, completed, signed and submitted as instructed. Please complete this form in BLOCK CAPITALS using black or dark blue ink.

FALSE REPRESENTATION STATEMENT
It is an offence under Article 256 of the Air Navigation Order 2016 to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine up to £5000, and on conviction on indictment with an unlimited fine or up to two years imprisonment or both.

Civil Aviation Authority Regulation 6
Regulation 6(5) of the Civil Aviation Authority Regulations 1991 as follows: Any person who has failed any test or examination which he is required to pass before he is granted or may exercise the privileges of a personnel licence may within 14 days of being notified of his failure request that the Authority determine whether the test or examination was properly conducted. In order to succeed you will have to satisfy the Authority that the examination or test was not properly conducted. Mere dissatisfaction with the result is not sufficient reason for appeal.

1. APPLICANT'S DETAILS — **To be completed by the Examiner**

CAA Personal reference number (if known): ☐☐☐☐☐☐☐ Forename(s): ....

Surname: .... Email address: ....

2. TEST CONDUCTED — **To be completed by the Examiner**

Aeroplane ☐ Helicopter ☐ Powered Lift ☐ Airship ☐ Balloon ☐ Sailplane ☐ RT ☐ SP ☐ MP ☐

Initial Issue ☐ Revalidation ☐ Renewal ☐

(Specify type of test or assessment):

.... Series (if applicable): ....

Attempt: .... Date: .... Place of Test: ....

A/C or Sim Type: .... A/C Registration/Approval No: .... Total Flight time: ....

3. REASONS FOR FAILURE — **To be completed by the Examiner**

Section	Sub Section	Reasons for Failure

Further training: Mandatory ☐ Recommended ☐

Flight Hours: .... FSTD Hours: ....

Specific Training Required: ....

....

Examiner's Name: .... Examiner's No: ....

Authorising Competent Authority: ....

Non-UK Examiners - I have reviewed and applied the relevant national procedures and requirements of the UK CAA contained in version ...... of the Examiner Differences Document. ☐

Examiner's Signature: .... Date: ....

I understand that I have failed the items notified above. I also understand that I may not exercise the privileges related to that rating/ certificate.

Applicant's Signature: .... Date: ....

Copies of the report shall be submitted to (1) The applicant (2) The Applicant's Competent Authority (3) The Examiner (4) The Examiner's Competent Authority (if different).

Notes on PPL Skill Tests

- The skill test shall be taken within 6 months of the completion of training and all sections of the test must be completed within 6 months of the first attempt. (**Standards Document 19**).
- An applicant for a skill test shall have successfully completed all theoretical ground training examinations associated with the issue of a PPL (A). (**Stds Doc 19**).
- An applicant for a skill test shall have successfully completed the flight training stated in Part-FCL Annex 1, Subpart C (PPL).
- Upon completion of all required training, the training organisation responsible for the applicant's training is required to provide a course completion certificate and recommend the applicant for test. The applicant's training records should also be made available to the examiner. (**Stds Doc 19**).
- **SRG 2128** has some items which are marked with an M, meaning mandatory. However, all items should be assessed.
- **Standards Document 19** mentions 4 different stalls, particularly one with take-off power and flap set. This does not appear on **SRG 2128** so need not be completed. The other 3 stalls need to be assessed.
- The RTO is an integral part of the SEP (land) Class Rating, so must be carried out as part of the PPL Skill Test conducted in an SEP (land) aeroplane.
- Touch and go landings are part of the PPL course. Discuss with the applicant who will move various levers on the runway as this applicant's training may be different to others.
- Radio navigation equipment should be installed including at least one VOR or ADF.
- During the briefing, refer to the skill test as a 'flight' rather than a 'test' to reduce applicant anxiety.
- IMC Encounter: The examiner will simulate inadvertent entry into cloud, by means of screens, visor, hood or goggles and the applicant will be required to execute a rate one level turn on instruments through 180^{o} to return the aircraft to VMC on a suitable heading. Applicants are expected to show consideration of the safety factors necessary for flight in IMC. (**Stds Doc 19**).
- A stalled flight condition can exist at any attitude and airspeed, and may be recognised by at least one of the following:
  a) continuous stall warning activation; b) buffeting, which could be heavy at times;
  c) lack of pitch authority and/or roll control; and d) inability to arrest the descent rate.
- First indication of a stall means the initial aural, tactile or visual sign of an impending stall, which can be either naturally or synthetically induced.

Extra FI Lesson 2 – Pre-Test Paperwork

Practical Considerations

As an FI, it is a very important part of your student's training, that you ensure his paperwork is ready for the examiner. Few examiners have the patience to wait while badly completed forms are filled out or corrected.

The Course Completion Certificate

The examiner will need to see a correctly completed and signed course completion certificate. Form CAA 5016 is used. This form is shown on the next page.

Page 1:

- Section 1: Make sure that not only the name of the training organisation is written, but the number too.
- Section 2: The student's CAA ref number can be found on the medical.
- Section 3: Be sure to tick the correct box as this form is used for LAPL as well.
- Section 4: The theoretical knowledge passes can be found in the student's CAA portal or from the ATO/DTO.

Page 2:

- Section 5: A CAA ground examiner needs to certify the TK exams. Most ATOs/DTOs have one.
- Section 6: Dates when the training started and were completed are needed. Usually best to look in the student's logbook. The aircraft class if also required here. Usually SEP (land).
- Sections 7 & 8 deal with LAPL.

Page 3:

- Sections 9 & 10 deal with LAPL.
- Section 11 needs the actual number of training hours completed, both dual and solo. This must be equal to or above the minimum hours required for the course.
- Section 12 is for helicopters.

Page 4:

- Section 13 is for the upgrade from LAPL to PPL. Section 14 is the same but for helicopters.
- Section 15 is for former military pilots.
- Section 16 is where you as the instructor have to sign to say that the student is ready for test. You must be sure the student has completed all the lessons, read **Standards Document 19** and completed the necessary hours. Otherwise the examiner will refuse to carry out the test.
- Section 17 is where the ATO/DTO head of training must sign. This MUST be completed and signed by the HoT before the skill test.

Make sure the student has the Course Completion Certificate ready to show the examiner.

Course Completion Certificate
LAPL(A), LAPL(H), PPL(A) and PPL(H) Training Courses

This certificate has been completed by an **Approved Training Organisation (ATO)** or a **Declared Training Organisation (DTO)** to verify that it complied with the applicable regulatory requirements (or alternative military aircrew accreditation scheme) while delivering its approved training course. It has been issued to the student after successful completion of the required training.

The successful completion of Sailplane, Balloon and Airship training courses will be certified separately by the ATOs or DTOs that delivered them.

For the conversion of ICAO licences this training organisation certifies that the rules for acceptance of third-country certification of pilots contained in UK Regulation (EU) 2020/723 have been complied with.

For the acceptance of military qualifications this training organisation certifies that the rules contained in CAA publication CAP 2254 Military Aircrew Accreditation Scheme have been complied with.

1. TRAINING ORGANISATION DETAILS

Details of the training organisation under whose approvals the training was carried out.

Name of organisation: ....

ATO Certificate or DTO Declaration reference number: ....

2. STUDENT DETAILS

CAA personal reference number (if known): ☐☐☐☐☐☐☐

Title: .... Forename(s): ....

Surname: .... Date of Birth: (dd/mm/yyyy) ....

3. COURSE COMPLETED (please tick)

LAPL(A) Flight training	☐	PPL(A) Flight training	☐
LAPL(H) Flight training	☐	PPL(H) Flight training	☐
LAPL(A) Extension to another class or variant	☐	LAPL(H) Extension to another type or variant	☐
LAPL(A) to PPL(A) Flight training	☐	LAPL(H) to PPL(H) Flight training	☐
Conversion of an ICAO LAPL or PPL	☐	Military Aircrew Accreditation Scheme	☐

4. THEORETICAL KNOWLEDGE EXAMINATIONS (LAPL & PPL)

Common Subjects (FCL.215 (a))	Date 1st Attempt	Date Passed	Credited* (Y/N)
Air Law			
Human Performance			
Meteorology			
Communications			
Navigation			
Aeroplane Specific Subjects (FCL.215 (b))	**Date 1st Attempt**	**Date Passed**	**Credited* (Y/N)**
Principles of Flight – Aeroplane			
Operational Procedures – Aeroplane			
Flight Performance and Planning – Aeroplane			
Aircraft General Knowledge – Aeroplane			
Helicopter Specific Subjects (FCL.215 (b))	**Date 1st Attempt**	**Date Passed**	**Credited* (Y/N)**
Principles of Flight – Helicopter			

Course Completion Certificate
LAPL(A), LAPL(H), PPL(A) and PPL(H) Training Courses

4. THEORETICAL KNOWLEDGE EXAMINATIONS (LAPL & PPL)

Helicopter Specific Subjects (FCL.215 (b))	Date 1st Attempt	Date Passed	Credited* (Y/N)
Operational Procedures – Helicopter			
Flight Performance and Planning – Helicopter			
Aircraft General Knowledge – Helicopter			

5. THEORETICAL KNOWLEDGE CERTIFICATION

I hereby certify that ***all*** the following statements are true:

(a) the training course included theoretical knowledge instruction appropriate to the privileges of the LAPL or PPL, and

(b) if the theoretical knowledge instruction or examinations were completed at a DTO or at an ATO different from the one where the student commenced their training, I have verified the validity and currency of the Ground Examiner's Certificate, the theoretical knowledge instruction and the examination results forwarded by that organisation, and

(c) all the appropriate elements of the training course of theoretical knowledge instruction were completed to a satisfactory standard and the student was consequently recommended for the theoretical knowledge examinations, and

(d) the student demonstrated an appropriate level of theoretical knowledge by passing examinations on all the required subjects.

Ground Examiner's signature: .... Name: ....

Ground Examiner's CAA personal reference number: ☐☐☐☐☐☐☐ Date:......................

6. COURSE DATES & AIRCRAFT CLASS / TYPE USED

Date training course started:		Date training course completed:	
Aircraft Class or Type the course was conducted on:			

7. LAPL(A) FLIGHT TRAINING (FCL.110.A)

Experience	Required	Credited*	Actual
Dual flight instruction time (FCL.110.A (a)(1))	15 hours		
6 hours of supervised solo flight time, including at least **3** hours of solo cross-country flight time with at least **1** cross-country flight of at least 150 km (80 NM), during which **1** full stop landing at an aerodrome different from the aerodrome of departure was made. (FCL.110.A (a)(2))	6 hours	**Nil**	
Additional dual instruction and/or supervised solo flight time	9 hours		
Total	30 hours		

8. LAPL(A) EXTENSION OF PRIVILEGES TO ANOTHER CLASS OF AEROPLANE (FCL.135.A(a)(1))

Experience	Required	Credited*	Actual
Dual flight instruction time including: (i) 10 dual take-offs and landings, and (ii) 10 supervised solo take-offs and landings	3 hours	**Nil**	

Student's CAA reference number:

9. LAPL(H) FLIGHT TRAINING (FCL.110.H (a))			
Experience	**Required**	**Credited***	**Actual**
Dual flight instruction time (FCL.110.H (a)(1))	20 hours		
10 hours of supervised solo flight time, including at least **5** hours of solo cross-country flight time with at least **1** cross-country flight of at least 150 km (80 NM), during which **1** full stop landing at an aerodrome different from the aerodrome of departure was made. (FCL.110.H (a)(2))	10 hours	**Nil**	
Additional dual instruction and/or supervised solo flight time	10 hours		
Total	40 hours		

10. LAPL(H) EXTENSION OF PRIVILEGES TO ANOTHER TYPE OF HELICOPTER (FCL.135.H(a)(1))			
Experience	**Required**	**Credited***	**Actual**
Dual flight instruction time including: (i) 15 dual take-offs, approaches and landings (ii) 15 supervised solo take-offs, approaches and landings	5 hours	**Nil**	

11. PPL(A) FLIGHT TRAINING (FCL.210.A)			
Experience	**Required**	**Credited***	**Actual**
Dual flight instruction time (FCL.210.A (a)(1))	25 hours		
10 hours of supervised solo flight time, including at least **5** hours of solo cross-country flight time with at least **1** cross-country flight of at least 270 km (150 NM), during which full stop landings at **2** aerodromes different from the aerodrome of departure were made. (FCL.210.A (a)(2))	10 hours	**Nil**	
Additional dual instruction and/or supervised solo flight time	10 hours		
Total	45 hours		

12. PPL(H) FLIGHT TRAINING (FCL.210.H)			
Experience	**Required**	**Credited***	**Actual**
Dual flight instruction (FCL.210.H (a)(1))	25 hours		
10 hours of supervised solo flight time, including at least **5** hours of solo cross-country flight time with at least **1** cross-country flight of at least 185 km (100 NM), with full stop landings at **2** aerodromes different from the aerodrome of departure were made. (FCL.210.H (a)(2)) 35 of the 45 hours of flight instruction were completed on the same type of helicopter as the one used for the skill test. (FCL.210.H (a)(3))	10 hours	**Nil**	
Additional dual instruction and/or supervised solo flight time	10 hours		
Total	45 hours		

Student's CAA reference number:

13. LAPL(A) TO PPL(A) FLIGHT TRAINING (FCL.210.A)			
Experience	**Required**	**Credited***	**Actual**
Dual flight instruction time (FCL.210.A (b))	6 hours	**Nil**	
At least **4** hours of supervised solo flight time, including at least **2** hours of solo cross-country flight time with at least **1** cross-country flight of at least 270 km (150 NM), during which full stop landings at **2** aerodromes different from the aerodrome of departure were made. (FCL.210.A (b))	2 hours	**Nil**	
Other supervised solo flight time (FCL.210.A (b))	2 hours	**Nil**	
Total	10 hours	**Nil**	

14. LAPL(H) TO PPL(H) FLIGHT TRAINING (FCL.210.H)			
Experience	**Required**	**Credited***	**Actual**
Dual flight instruction time (FCL.210.H (b))	5 hours	**Nil**	
At least **5** hours of dual flight instruction time and at least **1** supervised solo cross-country flight of at least 185 km (100 NM), with full stop landings at **2** aerodromes different from the aerodrome of departure were made. (FCL.210.H (b))	Not stated	**Nil**	
Total	Not stated	**Nil**	

15. *REGULATORY REFERENCE (OR MILITARY AIRCREW ACCREDITATION SCHEME REFERENCE) THAT ALLOWS THE ABOVE-MENTIONED TRAINING CREDITS OR EXAMINATION CREDITS

*Applicable regulatory reference or applicable accreditation scheme reference that allows training to be credited (e.g., FCL.210.A (d), FCL Appendix 1, UK Regulation (EU) 2020/723, CAP 2254):

16. RECOMMENDATION FOR SKILL TEST

I hereby verify that the student **completed** the training course **successfully** and is recommended by me to attempt the required LAPL or PPL Skill Test.

Instructor's signature: .... Name: ....

Instructor's CAA personal reference number: | | | | | | | | Date: ....

17. HEAD OF TRAINING (HT) DECLARATION

I hereby certify that all applicable statements in this certificate have been entered correctly and are true. I also certify that, for this course, the training organisation has completed accurate student training records which have been reconciled with entries in the student's personal flying logbook.

HT's signature: .... Name: ....

HT's CAA personal reference number (if applicable): | | | | | | | | Date: ....

Student's CAA reference number:

From **CAA Training.com** Summer 2023:

PPL issue – requirement for logbook pages

The requirements for the initial issue of a UK Part-FCL PPL(A) have been updated. For all applications, a certified true copy of the logbook pages (preferred method) or original logbook showing the PPL(A) flying experience must be submitted. Full guidance on supporting documentation can be found on the CAA dedicated webpage:
https://www.caa.co.uk/General-aviation/Pilot-licences/Aeroplanes/Private-Pilot-Licence-for-aeroplanes/

Extra FI Lesson 3 – The Club Checkout

Scenario:

Often, working as a flying instructor, you will be asked to check a pilot out in a new aircraft. This extra lesson is designed to give experience and confidence in doing such a flight. **Remember:** Start from where the student is!

CRI SE Ex2: The 'Club Checkout'- Long Briefing Topics:

(1) Booking in and out.
(2) Aircraft Tech Log & MEL.
(3) A/C Documents.
(4) Aircraft Features and Instrumentation.
(5) External & Internal Checks – The importance of a written checklist.
(6) Taxiing & Power Checks – Use of checklist. Pre-flight normal & non-normal briefing.
(7) Take-off & Climb. Knowledge of and adherence to: (i) Published Speeds & power settings, (ii) Local Procedures
(8) Cruise Flight:
(i) Fuel consumption considerations. (ii) Trimming controls. (iii) Flight Controls: elevator, aileron and rudder;
(9) Operation of wing Flaps:
(i) Vfe. Concept of 'Limitation – Operation – Indication'.
(ii) effect of flaps on pitch attitude and airspeed.
(10) Operation of Landing gear:
(i) Knowledge of limiting speeds. 'Limitation – Operation – Indication'.
(ii) effect landing gear on pitch attitude, airspeed and power requirement.
(11) Use of Mixture controls; Alternate air or Carburettor heat controls; Operation of Cowl flaps as fitted;
(12) Safe use of Cabin ventilation and heating systems;
(13) Operation of Autopilot and Navigation systems as fitted. As a minimum know how to go 'Direct To' a waypoint.
(14) Steep Turns (if required)
(15) Stalling (if required)
(16) Operation and use of the other systems (as applicable to type, such as de-icing equipment);
(17) Practice Forced Landing without Power (if required)
(18) Any other exercises as determined by the trainee CRI.
(18) Descending:
(i) pre-descent checks; (ii) normal descent;
(iii) selection of throttle, pitch & mixture controls; (iv) engine cooling/icing considerations;
(19) Post flight activities & Tech Log. Pilot Logbook.

CRI SE Air Ex2: The 'Club Checkout'

(1) Pre-Flight Planning & Authorisation. Met, NOTAMS etc.
(2) Aircraft Documents check.
(3) Aircraft External & Internal checks from checklist.
(4) Aeroplane Familiarisation.
(3) Engine Starting procedures. Cold, Hot, Flooded. Priming.
(4) Taxying. Speed, Instrument checks.
(5) Take-Off & Initial Climb into wind or crosswind:

- (i) ATC considerations;
- (ii) Directional control and use of power;
- (iii) Lift-Off and other critical speeds;
- (iv) Crosswind effects and procedure;
- (v) Short/Soft Field take-off procedures.
- (vi) After Take-Off Procedures (Power, speed, local rules)

(6) Climbing:

- (i) After Take-Off Checks;
- (ii) Power Selection for normal & maximum rate climb;
- (iii) Effect of Altitude on MP, full throttle height;
- (iv) Level off - power selection;
- (v) En-Route Climb/Cruise Climb;
- (vi) Max Angle of Climb;
- (vi) Altimeter Setting Procedures;
- (viii) Prolonged Climb and use of cowl flaps;

(7) Straight & Level flight;

- **A:** At normal cruising power:
- **B:** Instrument appreciation (if appropriate);
- **C:** Operation of flaps (in stages):
- **D:** Operation of landing gear:
- **E:** Use of mixture, alternate air & carburettor heat controls;
- **G:** Operation of cowl flaps;
- **H:** Operation of cabin ventilation or heating systems;
- **I:** Operation and use of other systems as applicable to type;
- **J:** Use of Autopilot and/or GNSS systems.

(8) Steep Turns (if required)
(9) Stalling(if required)
(10) PFL without power (if required)
(8) Descending;

- (i) Pre-descent checks;
- (ii) Power selection: MP & RPM;
- (iii) Powered descent (cruise descent);
- (iv) Engine cooling considerations: use of cowl flaps;
- (v) levelling off;
- (vi) Descending with flaps;
- (vii) Descending with landing gear down;
- (viii) altimeter setting procedure;
- (xi) limitations in turbulence (Vno).

(9) Circuits.
(10) Other Exercises as determined by trainee CRI.
(11) Actions After Flight.

Considerations

Aircraft General

- External Features. Relevant items as defined by checklist. Precautions when handling propeller. Moving the aircraft manually. No smoking.
- Internal features. How to enter and leave the a/c. General layout, door operation, equipment stowage, control locks, seat and harness adjustments, heating and ventilation.
- Cockpit & Controls. Familiarisation with all controls and the location of instruments. The importance of systematic checks.
- Introduction to the Check List. Explain the methods of use on the ground and in the air. Specify any sequences to be memorised.

Aircraft Systems, Normal and Abnormal Operation

- All Systems, Normal Operation. Explain/demonstrate check list procedures.
- System Failures, Abnormal Operation and procedures. Explain/demonstrate check list procedures.

Pre and Post Flight Procedures

- Pre-Departure Procedures. Flight authorisation; weather and flight information; loading, weight and performance calculations; flight planning and flight plans as applicable; aircraft documents; equipment required and aircraft acceptance.
- Check List Procedures. Explain/demonstrate/practice the following:
  A: Pre-flight inspection. Seat & Pedal adjustments.
  B: Internal checks & before start checks.
  C: Starting procedure.
  D: Checks after starting.
  E: Radio and instrument checks.
  F: Power check and pre-take off checks.
- Arrival Procedures. Parking & closing down checks; a/c security and picketing; ATC requirements; aircraft & school documents/procedures.

Taxying

- Basic Control Technique, Precautions and Taxying Checks.
- Preliminary Checks and Lookout. Adjustment of seat and rudder pedals; throttle friction; windscreen clear of mist etc; brakes checked.
- Starting-off, Control of Speed and Stopping. Control column position; inertia; avoidance of power against brake; engine handling; assessment of correct speed; dangers of harsh braking; RPM setting after stopping.
- Control of Direction and Turning. Use of nose wheel steering, rudder and brake as appropriate.
- Effects of Wind. Weathercock tendency; turning into and out of wind; control of speed downwind; max permitted surface wind for taxying.
- Effects of Ground Surface. Gradient; grass and hard surfaces; precautions when taxying from one surface to another; wet and slippery surfaces; uneven surfaces.
- Special Precautions and Abnormal Procedures. The apron; use of marshallers and marshalling signals; turning in a confined space; avoidance of locked wheel turns; parking; possibility of damage from slipstream of other aircraft.
- Taxying Checks. All round lookout; brakes, flight and engine instruments; full and free movement of rudder. Instrument checks.
- Taxy Emergencies. Explain actions to be carried out in the event of brake and steering failures.

En-Route Flight

- Straight & Level – En-Route Flight:
- Setting of correct attitude, power and speed.
- Use of mixture & cowl flaps.
- Fuel management.
- Navigation & Log keeping

Take-Off & Climb

- Take Off into Wind: Pre-Take Off and Runway Checks. Check list; positioning at holding point; R/T procedures; traffic sequencing; adherence to correct procedure when entering the runway; nose (or tail) wheel straightened; runway checks.
- Take Off and Initial Climb to Circuit Height. Reference point; keeping straight; throttle handling; rotation; gradual transition to climbing attitude; checks; trim; noise abatement procedures; turn onto crosswind leg; drift allowance; levelling off; position to turn downwind.
- Take Off and Circuit Departure. Planning departure to conform with local procedures/traffic patterns; RT clearance; altimeter settings.

Crosswind Take Off:

- Calculation of Crosswind Component. Obtaining surface wind from ATC before take off; methods of computing crosswind component; reference to PoH for crosswind limits for take off.
- Take Off and Initial Climb. Anticipation and prevention of weathercocking; clean lift off; allowance for drift when airborne.
- Performance Take Off.

Short/Soft Field Take-Off

- Technique to 50ft. Reference to PoH for scheduled take off technique; vital actions; use flap only if take off data available; use maximum take off run available; power anticipation; lift off speed; climb technique to 50ft; performance calculations.
- Effects of Different Types or Contaminated Surfaces on Control and Take-Off Distance. Comparison between runway and grass surfaces; wet/slippery surface; dry/wet snow; slush; ice. Reference to PoH, Performance tables and AICs for extra allowance and limitations in respect of grass surface, dry/wet snow, and slush.
- Noise Abatement Procedures. Local Procedures.
- Effect on take-off roll and climb performance; routings.

Steep Turns

See Ex15.

Stalling

See Ex10a.

Approach & Landing

See Circuit Exercises.

Typical Pilot Errors

Aircraft Systems, Normal and Abnormal Operation

- Failure to use checklist, or the missing of checklist items.
- Failure to understand magnetos and their checks.

Taxying

- Use of brake against power during taxy.
- Weaving on the taxyway whilst conducting instrument checks. Use natural turns. Plan ahead.
- Failure to select and maintain the correct attitude and therefore to maintain desired altitude.
- Failure to lean the mixture and manage fuel appropriately.

Pre and Post Flight Procedures

- Failure to check and/or understand aircraft documents.

Take-Off & Climb

- Use of incorrect or unapproved flap setting for take-off or landing.
- Use of incorrect technique with regard to RW surface or wind direction.
- Failure to keep wings level in a crosswind take-off. Failure tolay off the drift after lift off.
- Failure to calculate or understand the crosswind component.
- Failure to keep the aircraft balanced with rudder, resulting in drift to the left.
- Chasing of airspeed in the climb.
- Poor lookout. Poor monitoring of Ts & Ps in the climb.
- Excessive of lack of use of pitch trimmer.

Steep Turns

See Ex15.

Stalling

See Ex10a.

Approach & Landing

See Circuit Exercises.

Ex 20 – Night Flying

See section on **Night Rating** for this exercise

Ex 21 – Aerobatics

Currently beyond the scope of this document

The UK LAPL (A) Course

Pre-Entry Requirements

- There are no pre-entry requirements for a LAPL course.

Course Details

Flight Training: The EASA PPL course consists of a minimum of 30 hours training in aeroplanes or TMGs. All training must be carried out at an ATO (Approved Training Organisation) or DTO (Declared Training Organisation) by suitably qualified instructors. Of these 30 hours, there must be:

- At least 30 hours logged flight time
- At least 15 hours dual instruction
- At least 6 hours of supervised solo flight including at least 3 hours of solo cross country time.
- A solo cross country flight of at least 150 km (80 Nm) with full stop landings at an intermediate airfield (Qualifying Cross Country – QXC). This may be included in the 3 hours solo cross country time.

Hours can be logged from the age of 14. Students can fly solo from their 16th birthday. Minimum age for licence issue is 17.
A LAPL medical certificate is required before a student may fly solo.

Ground Training: Ground school is needed to allow the applicant to pass 9 multiple choice written exams must be passed (pass mark 75%) on the subjects of

- Air Law, Communications, Principles of Flight. Navigation, Meteorology, Human Factors & performance, Aircraft General Knowledge, Flight Planning & Performance & Operational Procedures.
- A FRTOL (Flight radiotelephony Operator's Licence) Practical Test must be passed for which a minimum demostrated language proficiency of 4 must be achieved. Prior to taking this test the written Comminications test must be passed and be at least 16 years old. The test is valid for 24 months, and once the PPL skill test has been passed, is valid for life.

Assessment: A skill test must be passed once all these requirements have been met.

Note: The EASA LAPL contains no requirement for night flying, and the resulting LAPL confers no night privileges. A separate Night Rating must be obtained.

Privileges

The privileges of the holder of a LAPL for aeroplanes is to act as PIC on single-engine piston aeroplanes-land: SEP(land), SEP(sea) or TMG only, with a maximum certificated take-off mass of 2000 kg or less, carrying a maximum of 3 passengers, such that there are always a maximum of 4 persons on board of the aircraft. The LAPL (H) is also available for helicopters.
The LAPL(A) holder may not exercise the privileges within the EU Member States without permission from each state. At present (Mar 23) only France allows it.
NOTE: The LAPL(A) does not fully comply with the ICAO standards for aeroplane pilot licensing contained in the ICAO Annex 1 'Personnel Licensing'.

Extension of Privileges to another Class or Variant of aeroplane:

(a) The privileges of an LAPL(A) shall be limited to the class and variant of aeroplanes or TMG in which the skill test was taken. This limitation may be removed when the pilot has completed in another class both the requirements below:

(1) 3 hours of flight instruction, including: ○ 10 dual take-offs and landings ○ (ii) 10 supervised solo take-offs and landings
(2) a skill test to demonstrate an adequate level of practical skill in the new class. During this skill test, the applicant shall also demonstrate to the examiner an adequate level of theoretical knowledge for the other class in the following subjects: ○ (i) Operational procedures, ○ (ii) Flight performance and planning & ○ (iii) Aircraft general knowledge.

(b) In order to extend the privileges to another variant within a class, the pilot shall either undertake differences training or do a familiarisation. The differences training shall be entered in the pilot's logbook or into an equivalent record and be signed by the instructor

Recency Requirements

(a) Holders of a LAPL(A) shall exercise the privileges of their licence only if in the last 2 years they have met either of the following conditions as pilots of aeroplanes or TMGs:

(1) they have completed at least 12 hours of flight time as PIC or flying dual or solo under the supervision of an instructor, including: - 12 take-offs and landings. - - refresher training of at least 1 hour of total flight time with an instructor.
(2) they have passed a LAPL(A) proficiency check with an examiner. The proficiency check programme shall be based on the skill test for the LAPL(A).

(b) If holders of a LAPL(A) hold both a SEP(land) and a SEP(sea) privilege, they may comply with the requirements in point (a)(1) in either class or a combination thereof which shall be valid for both privileges. For this purpose, at least 1 hour of the required flight time and 6 out of the required 12 take-offs and landings shall be completed in each class.

See the following for more info:

Light Aircraft Pilot Licence (LAPL)

There is some confusion about the LAPL in particular how the pilot maintains validity to fly. The following information should provide the answer.

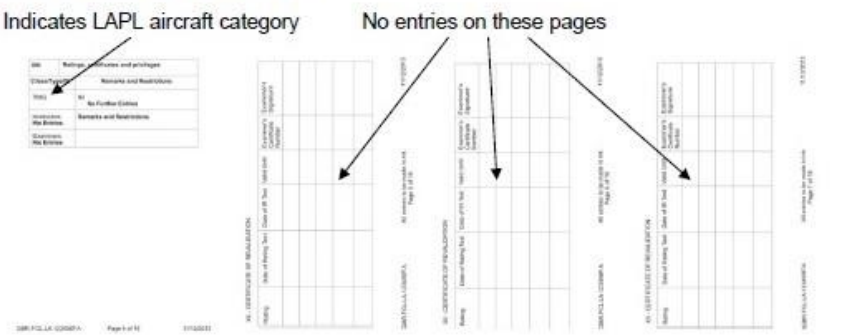
Background

The LAPL is not like any other licence because it does not contain ratings that need to be revalidated or renewed. The LAPL itself is both the rating and the licence.

So why is there a rating indicated in Section XII of the licence?

This is a UK CAA way of indicating the LAPL aircraft category e.g. SEP (Land), TMG, etc.

Unlike other licence's it does not mean there should be a signature in Section XII Certificate of Revalidation in order to maintain validity. This is done through recency using logbook evidence prior to each and every flight. It is the pilot's responsibility to ensure the recency is met prior to each and every flight.



So how do I ensure I have met the recency requirements before I fly?

EASA Part FCL (as amended) gives the recency requirements for each type of LAPL (see below):

FCL.140.A LAPL(A) - Recency requirements

(a) Holders of a LAPL(A) shall exercise the privileges of their licence only if in the last 2 years they have met any of the following conditions as pilots of aeroplanes or TMGs:

(1) they have completed at least 12 hours of flight time as PIC or flying dual or solo under the supervision of an instructor, including:

- 12 take-offs and landings
- refresher training of at least 1 hour of total flight time with an instructor

(2) they have passed a LAPL(A) proficiency check with an examiner. The proficiency check programme shall be based on the skill test for the LAPL(A)

(b) If holders of a LAPL(A) hold both a SEP(land) and a SEP(sea) privilege, they may comply with the requirements in point (a)(1) in either class or a combination thereof which shall be valid for both privileges. For this purpose, at least 1 hour of the required flight time and 6 out of the required 12 take-offs and landings shall be completed in each class.

FCL.140.H LAPL(H) - Recency requirements

Holders of an LAPL(H) shall exercise the privileges of their licence on a specific type only if in the last 12 months they have either:

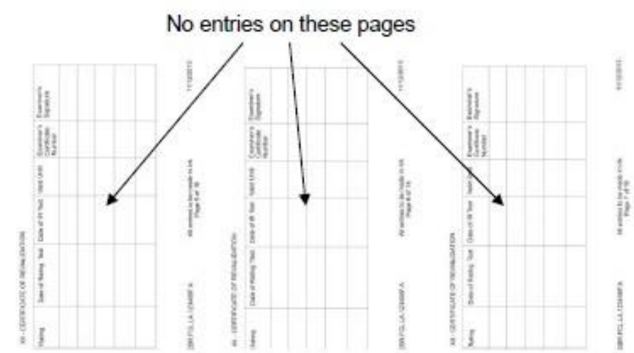
(a) completed at least six hours of flight time on helicopters of that type as PIC, or flying dual or solo under the supervision of an instructor, including six take-offs, approaches and landings and completed a refresher training of at least 1 hour of total flight time with an instructor

(b) passed a proficiency check with an examiner on the specific type before resuming the exercise of the privileges of their licence. That proficiency check programme shall be based on the skill test for the LAPL(H).

Should there be a signature on my licence in Section XII Certificate of Revalidation?

No there should not be any entry or signature in Section XII Certificate of Revalidation.

If there is it is incorrect and could lead to issues with the National Aviation Authority should your licence be inspected by them.



I already have an entry in Section XII Certification of Revalidation. What shall I do?

Ignore the entry and the date. It has no relevance to a LAPL. Do not cross it out as this action could be interpreted as defacing the licence.

Check the recency requirements for your LAPL in accordance with Part FCL (as amended) and follow these recency requirements.

If I have to pass a Proficiency Check in order to regain recency where does the examiner sign?

The examiner shall make an entry in your pilot logbook only. The examiner shall not make any entries on the licence.

Suggested entry in pilot logbook:

Passed Proficiency Check in accordance with FCL.140
GBR.123456F

Revalidation

None – see recency above.

Renewal

None – see recency above.

Carriage of Passengers

Holders of a LAPL(A) shall carry passengers only if they have completed 10 hours of flight time as PIC on aeroplanes or TMG after the issuance of the licence. Holders of a LAPL(A) who previously held an ATPL(A), an MPL(A), a CPL(A) or a PPL(A), are exempted from these passenger carrying requirements.

Typical LAPL Skill Test Flight Test Format

Since the student will have to pass a LAPL skill test with an examiner, it is important that the instructor is familiar with the content and profile of the test.

Navigation:

- Blackbushe to Hungerford.
- Diversion from Hungerford to Wantage.

Airwork:

- Steep turns L & R.
- Slow flight: turns at given IAS.
- Up to 3 of the stalls.
- Recovery from spiral dive.

Practice Forced Landing:

- Set scenario of rough running engine before closing throttle.
- Glide approach assessed during the PFL.
- Go-around assessed during PFL
- EFATO assessed after go-around from PFL.

Installed Systems:

- Use of GPS and autopilot to return to Blackbushe

Fire Drill & System Failure:

- Smoke emanating from instrument panel. Solved by turning off Master Battery switch.
- Discuss loss of radio, transponder and possibly flaps.

Rejoin & Circuits:

- Rejoin of circuit.
- Normal landing to touch & go.
- Flapless landing to touch & go.
- Short field landing to full stop.

The NPPL (UK National Private Pilot's Licence) Course

Pre-Entry Requirements

An applicant for an NPPL(A) Microlight (or Microlight–Powered Parachute) shall be at least 17 years of age. The minimum age for the first solo flight is 16 years of age.

Medical Requirements: An applicant for an NPPL(A) shall hold a valid NPPL medical declaration or a Part-MED Class 1, 2 or LAPL medical certificate. For information regarding the medical requirements for the NPPL Medical Declaration please refer to Section 4, Part N, or the CAA web site at www.caa.co.uk/medical.

Course Details

An applicant for an NPPL(A) Microlight shall pass theoretical knowledge examinations in the following subjects: 1. Aviation Law, Flight Rules and Procedures 2. Human Performance and Limitations 3. Navigation 4. Meteorology 5. Aircraft (General) 6. Aircraft (Type) (Oral as part of the NPPL(A) Microlight GFT).

An applicant for an NPPL(A) Microlight shall pass all the examinations within 24 months prior to applying for the licence. Details of the NPPL(A) Microlight syllabi of flying training, flight tests and theoretical knowledge requirements can be found in Part II to CAP 804, Section 5, Part A, Appendix1.

Validity

NPPLs remain valid for the lifetime of the holder. They can only be used, however, if they contain a valid Class Rating (SLMG/SSEA/Microlight). Full details for keeping a Class Rating valid are in Schedule 7, Part C of CAP393: Air Navigation: The Order and Regulations.

As from 30 June 2009, all Class Ratings on NPPLs have a 24 month validity period. In this period, a total of at least 12 hours flight time, including 8 hours as PIC must be completed in order to revalidate by experience.

1. Holder of a licence with one class rating (SSEA* or SLMG or Microlight): Complete on the class of aeroplanes held:

   (a) within the period of validity of the rating have flown as pilot:

   - at least 12 hours flight time including 8 hours PIC.
   - at least 12 take-offs and landings.
   - at least 1 hour of flight training with an instructor. If this flight time has not been completed, the rating will be endorsed 'Single seat only'.

   (b) Within the 12 months preceding the expiry date of the rating, have flown as pilot:

   - at least 6 hours flight time.

2. Holder of a licence with 2 or 3 ratings (SSEA/SLMG/Microlight):

(a) Within the period of validity of the rating on any of the classes of aeroplanes held, have flown as pilot:
- at least a total of 12 hours including 8 hours PIC
- at least 12 take-offs and landings
- at least 1 hour of flight training with an instructor. If this flight time has not been completed all ratings will be endorsed 'Single seat only'.

(b) Within the 12 months preceding the expiry date of the ratings held have flown, as pilot on any of the class ratings held:
- at least 6 hours flight time.

(c) Within the period of validity of each class rating held, have flown as pilot:
- at least 1 hour PIC on each class held; or
- undertaken at least 1 hour of flying training on each class held with an instructor entitled to give instruction on aeroplanes of those classes.

If (c) has not been fully completed, you will be required to renew the relevant Class Rating(s) by GST.

Privileges

Exercising licence privileges on SSEA, SLMG and Microlight aeroplanes on the basis of a SEP (Land) Class Rating: The SEP Class rating includes the SSEA. The holder of a UK/Part-FCL licence (not NPPL) with a SEP rating, may, subject to differences training on the appropriate class with a suitably qualified instructor, exercise the privileges of their licence on microlight aircraft or SLMG. However, any experience gained in microlight aircraft or SLMG cannot be counted towards the flying experience necessary to maintain the full SEP or TMG privileges of their UK/ Part-FCL licence. If the holder of a UK national aeroplane licence (not a JAR-FCL or Part-FCL licence) that includes a valid SEP rating no longer qualifies for a Class 1 or 2 medical (JAR or PartMED) but obtains a LAPL medical certificate or NPPL medical declaration, the licence holder may continue to fly SSEA, SLMG or Microlight aeroplanes, subject to the condition of the applicable general exemption in the Official Record Series 4 – currently ORS4 995. The exemption may be found on the CAA website, however this provision is restricted to the remaining validity of the SEP when the Class 1 or 2 medical certificate becomes invalid. An SEP rating cannot be revalidated or renewed unless the holder has a valid Class 1 or 2 medical certificate in accordance with Part-MED. When the SEP expires the holder must convert to a licence for which he holds the appropriate medical – i.e. a LAPL(A) or NPPL(A). All UK national licences (non-JAR, non Part-FCL) cease to be valid for any EASA aircraft from 8th April 2018 onwards.

Issue of Microlight Aeroplane Class Rating on the basis of an SEP(Land) Class Rating: Provided that an SEP aeroplane class rating is valid in a UK national licence, an Examiner may revalidate the SEP aircraft class rating as a Microlight aircraft class rating. The Examiner makes the relevant entry in the Certificate of Revalidation page in the holder's licence, entering the revalidation date in the "Date of Check or Test" column and entering the "Valid To" date as 24 months later. The holder must then apply to CAA Pilot Licencing for the inclusion of the Microlight Class Rating in their licence as the Examiner is not permitted to make entries in the ratings page of the licence. If the SEP rating or the licence has expired, application for an NPPL with the required ratings should be made to the BMAA (for Microlight) or the LAA for SSEA/SLMG.

Exercising the privileges on Microlight aeroplanes on the basis of an SEP(Land) Class Rating: The holder of a UK issued licence or any Part-FCL licence with an SEP rating, may, subject to differences training on the appropriate class with a suitably qualified instructor, exercise the privileges of their licence on microlight aircraft. However, any experience gained in microlight aircraft cannot be counted towards the flying experience necessary to maintain the full SEP or TMG privileges.

Revalidation & Renewal

See validity section above

Notes

The National Private Pilot Licence (NPPL) is available for microlights and other non-EASA aircraft:

- vintage aircraft
- permit-to-fly aircraft
- kit-built aircraft

The NPPL can only be used on UK-registered aircraft inside UK airspace, unless you have an agreement with the aviation authorities in another country which will allow you to fly in that country's airspace.

You can add class ratings to the NPPL to allow you to fly microlights, self-launching motorgliders (SLMGs) and simple single-engine aeroplanes (SSEAs).

- You can apply for class ratings for SLMGs and SSEAs through the Light Aircraft Association (LAA)
- Applications for microlight class ratings can be made through the British Microlight Aircraft Association (BMAA)

An NPPL does not require a language proficiency test, however, to operate radio telephony equipment you must hold a Flight Radio Telephony Operators Licence.

Full details of requirements for the NPPL are available in the CAA publication CAP 804, Part I, Section 5.

From 8 April 2018 you will only be able to fly UK Annex II non EASA aircraft using your NPPL, subject to holding the minimum level of medical required and a valid rating. To enable you to fly EASA certified aircraft you will need to convert to a minimum of Part FCL LAPL (A). Additionally you will need to meet the medical and recency requirements for the LAPL(A). To take advantage of our conversion terms to convert to a LAPL(A) your NPPL SSEA or SLMG must have been issued by the UK CAA on or before 7 April 2018. It is not possible to convert a microlight as there is no EASA equivalent.

THE NPPL SKILL TEST (From CAP 804)

There are 2 parts to the NPPL skill test – a Navigational and a general skill test:

THE NPPL GENERAL SKILL TEST

1. An applicant for an NPPL(SSEA) shall have demonstrated the ability to perform as pilot in command of an aeroplane the procedures and flight manoeuvres described in the foregoing pages of this syllabus with a degree of competency appropriate to the privileges granted to the holder of an NPPL(SSEA).
2. An applicant for an NPPL(SSEA) General Skill Test shall have satisfactorily completed all of the required flight training, including instruction on the same class/type of aeroplane to be used during the Navigation Skill Test (NST) and the General Skill Test (GST).
3. The General Skill Test shall be taken within 6 months of the completion of training and all sections of the test must be completed within 6 months of the first attempt. If the applicant does not pass all sections of the skill test at the first attempt, the section(s) which have been failed may be attempted in a further test. There is no limit to the number of tests that may be taken.
4. A pass will be achieved when all sections of the General Skill Test have been passed.
5. The General Skill Test shall be conducted by an authorised Flight Examiner.
6. An applicant for a General Skill Test shall have successfully completed all theoretical knowledge examinations including examinations in Communications with a practical Radio Telephony (R/T) examination.
7. Provision of aeroplanes for the General Skill Test - The aeroplane used for the test shall meet the requirements for training aeroplanes.

8. SECTIONS OF THE FLIGHT TEST

Section 1: Pre-flight operations and departure
Section 2: General Airwork
Section 3: Approach and landing procedures.
Section 4: Abnormal and emergency operations.

9. FLIGHT TEST TOLERANCES

The applicant shall demonstrate the ability to: - operate the aeroplane within its limitations; - complete all manoeuvres with smoothness and accuracy; - exercise good judgement and airmanship; - apply aeronautical knowledge; and - maintain control of the aeroplane at all times in such a manner that the successful outcome of the procedure or manoeuvre is never seriously in doubt. The following limits are for general guidance. The examiner will make allowances for turbulent conditions and for the handling qualities and performance of the aeroplane used. Height ± 150ft. Heading ± 10°. Speed ± 15kt.

CONTENTS OF THE GENERAL SKILL TEST

The General Skill Test contents for the issue of an NPPL (SSEA) are shown below: Use of checklists, control of the aeroplane by external visual reference, anti/de-icing procedures, etc. apply in all sections.

SECTION 1 – PRE-FLIGHT OPERATIONS AND DEPARTURE

A: Pre-flight documentation and weather brief.
B: Mass and balance and performance calculation.
C: Aeroplane inspection and servicing.
D: Passenger care and considerations.
E: Engine starting and after starting procedures.
F: Taxiing and aerodrome procedures, pre take-off procedures
G: Take-off and after take-off checks
H: Aerodrome departure procedures
I: ATC liaison - compliance, R/T procedures, Airmanship.

SECTION 2 - GENERAL AIRWORK

A: ATC liaison and compliance, R/T procedure, Airmanship
B: Straight and level flight, with speed changes
C: Climbing: i best rate of climb, ii climbing turns, iii levelling off.
D: Medium (30° bank) turns.
E: Steep turns (360° left and right - 45° bank) including recognition and recovery from a spiral dive.
F: Flight at critically low airspeed with and without flaps. Best angle of climb.
G: Stalling:
- i Clean stall and recovery with power
- ii Approach to stall descending turn with bank angle 20°, approach configuration
- iii Approach to stall in landing configuration

h: Descending: i With & without power, ii Descending turns (steep gliding turns), iii Levelling off.

SECTION 3 - APPROACH AND LANDING PROCEDURES

A: Aerodrome arrival procedures
B: *Precision landing (short field landing), cross wind, (if suitable conditions available)
C: *Flapless landing
D: Approach to landing with idle power
E: Touch and go
F: Go-around from low height
G: ATC liaison -compliance, R/T procedures, Airmanship

H: Actions after flight including documentation.

SECTION 4 - ABNORMAL AND EMERGENCY PROCEDURES

This section may be combined with Sections 1 through 3.

A: Simulated engine failure after take-off
B: *Simulated forced landing.
C: Simulated precautionary landing.
D: *Simulated emergencies.

*some of these items may be combined at the discretion of the Flight Examiner.

THE NPPL NAVIGATION SKILL TEST

The Navigation Skill Test (NST) is a qualifying requirement for the grant of a NPPL (SLMG) or NPPL (SSEA). The aim of the test is to provide an independent check of the student pilot's ability to apply visual navigation techniques, to prepare for an in-flight diversion, to liaise with ATC and, in the case of the SLMG NST only, to navigate safely following change to the planned route resulting from an unsuccessful soaring opportunity. Before attempting this test, the student must have satisfactorily completed all the dual navigation training in the NPPL syllabus, except as defined for applicants claiming cross-crediting allowances against training as outlined in the NPPL Licence Allowance document. The student must have passed the Navigation Skill Test **before** undertaking the qualifying solo cross-country.

The test comprises the following:

1. Flight planning and self-briefing (including assessment of weather suitability) for a route of not less than 60 minutes flying time.
2. In-flight recording of the progress of the flight. Notes made on the map are acceptable for this requirement.
3. ATC liaison and compliance; observance of ATC Regulations and Rules of the Air.
4. DR navigation (correction of track error, revision of ETA, heading-setting technique including, where fitted, synchronising directional gyro with magnetic compass in flight).
5. Map reading. 'Track crawling' through continuous map reading will not be considered an acceptable visual navigation technique.
6. Maintenance of heading, height and airspeed at normal cruising levels.
7. (SLMG only) Re-establishment of position by visual methods following deliberate disruption of the original flight plan, simulating an unsuccessful attempt to take advantage of an off-track soaring opportunity.
8. Diversion procedure following simulated adverse weather conditions en-route.

Pre-Flight Planning Requirements Weather - obtaining appropriate information - interpreting the information - assessing weather suitability Airspace - obtaining appropriate information including relevant NOTAMs - interpreting the information - assessing any threats Navigation flight plan & map preparation Fuel plan & aircraft loading Booking out/ local procedures.

Flight Test Procedure

1. The route should not be made available to the applicant earlier than 2 hours before walking out to the aircraft.
2. The applicant must not have practised (either dual or solo) flying the route to be used.
3. The flight is to be non-stop; i.e. without an intermediate landing.
4. Radio navigation aids or GPS may not be used, except during the practice diversion once the applicant has made an initial assessment of the required heading to the diversion and the ETA at the diversion. If such navigation aids are used, their correct use will be assessed. Radar navigational assistance may not be used at any time.
5. The planned route is normally to be A - B - C, subject to the following provisos:- leg A - B should require at least 20 mins flight time; - track change at B should be between 60° and 120º and the distance B - C should require at least 20 mins flight time.
6. During leg B-C: - (SLMG only) between about 10-15 min after B the examiner will direct the applicant, simulating changed soaring opportunities, to a position about 5 nm off track. - (SLMG only) when directed, the applicant must make and implement an appropriate decision either to regain the planned track or to plan a revised track direct to the next turning point. - between 10-15 min after B (or, SLMG only, once the applicant's revised tracking and timing have been assessed), the applicant will be told to assume weather deterioration and to prepare for a practice diversion to a point not less than 20 nm off track. - The test may be terminated when the applicant has demonstrated the ability to track towards the diversion for not less than 10 minutes, has told the examiner the location of the aeroplane and has given an acceptable ETA at the diversion.
7. Appropriate systems management, including fuel use and carburettor heat operation is to be assessed throughout the test.
8. The record of the flight in the applicant's logbook is to include the examiner's signature and examiner number, stating that the flight was a NST and whether a successful pass was achieved. The planned route is to be shown in the remarks column, together with details of the diversion point. Successful applicants should log the flight time as PIC U/S.

Typical NPPL Navigation Skill Test Flight Test Format

Since the student must pass NPPL skill tests with an examiner, it is important that the instructor is familiar with the content and profile of the test.

Navigation:

- Blackbushe to Marlborough to Westcott.
- Diversion (from near Wantage) to Popham.
- Return to Blackbushe (not assessed)

Typical NPPL General Skill Test Flight Test Format

Departure:

- Blackbushe to local area

Airwork:

- Steep turns L & R.
- Slow flight: turns at given IAS.
- Up to 3 of the stalls.
- Steep Gliding Turn.
- Recovery from spiral dive.

Practice Forced Landing:

- Set scenario of rough running engine before closing throttle.
- Glide approach assessed during the PFL.
- Go-around assessed during PFL
- EFATO assessed after go-around from PFL.

Installed Systems:

- Use of GPS and autopilot to return to Blackbushe

Fire Drill & System Failure

- Smoke emanating from instrument panel. Solved by turning off Master Battery switch.
- Discuss loss of radio, transponder and possibly flaps.

Rejoin & Circuits

- Rejoin of circuit.
- Normal landing to touch & go.
- Flapless landing to touch & go.
- Short field landing to full stop.

The Night Rating, Night Rating Course & Night Rating Instructor Course - See Separate Manual in this series.

The Aerobatics Rating, Aerobatics Rating Course & Aerobatics Rating Instructor Course - See Separate Manual in this series.

The SEP (land) Rating & Course

Pre-Entry Requirements

There are no pre-entry requirements.

Course Details

Flight Training: The SEP(land) course consists of sufficient dual flight training as required to pass the skill test. Instruction may be conducted by an FI(A) or CRI(A) and must be conducted at an ATO or DTO.

Ground Training: There is no specific requirement for ground tuition.

Assessment: There will be a skill test/proficiency check with an examiner at the end, which is similar in content to the PPL initial skill test, but with a reduced navigation section.

Validity

The rating is valid for 24 months plus the remainder of the month of test.

Revalidation

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

(b) Revalidation of single-pilot single-engine class ratings:

(1) Single-engine piston aeroplane class ratings and TMG ratings. For revalidation of single-pilot single-engine piston aeroplane class ratings or TMG class ratings the applicant shall:

- (i) within the 3 months preceding the expiry date of the rating, pass a proficiency check with an examiner;
  OR
- (ii) within the 12 months preceding the expiry date of the rating complete 12 hours of flight time in the relevant class, including:
  - 6 hours as PIC,
  - 12 take-offs & 12 landings, **and**
  - Refresher Training of at least 1 hour of total flight time with a flight instructor (FI) or a class rating instructor (CRI). Applicants shall be exempted from this refresher training if they have passed a class or type rating proficiency check, skill test or assessment of competence in any other class or type of aeroplane.

Renewal
To renew an expired rating, refresher training at an ATO or DTO is required to the necessary standard, followed by a proficiency check with an examiner.

Recency
FCL.060 Recent experience:
(b) Aeroplanes, helicopters, powered-lift, airships and sailplanes.

A pilot shall not operate an aircraft in commercial air transport or carrying passengers:
as PIC or co-pilot unless he/she has carried out, in the preceding 90 days, at least 3 take-offs, approaches and landings in an aircraft of the same type or class or an FFS representing that type or class.

Additionally, to carry passengers at night, the PIC must, in the preceding 90 days, have completed at least 1 take-off, approach and landing at night as a pilot flying in an aircraft of the same type or class or an FFS representing that type or class, or hold an instrument rating.

Differences Training
In order to be able to fly aircraft with the following characteristics:

- Variable Pitch Propeller
- Retractable Undercarriage
- Turbo or Supercharged Engine
- Electronic Flight Instrument System (EFIS)
- Single Lever Power Control (SPLC)
- Tail Wheel

Differences training with an instructor (FI or CRI) must be carried out and signed in the student's logbook.
For single-engined aircraft this is a one-time sign-off and is valid for life.
The differences training shall be conducted at any of the following:

- an ATO;
- a DTO in the case of aircraft referred to in points (a)(1)(c) and (a)(2)(c) of point DTO.GEN.110 of Annex VIII;
- an AOC holder having an approved differences training programme for the relevant class or type.

Notwithstanding the requirement in point (b), differences training for TMG, single-engine piston (SEP), single- engine turbine (SET) and multi-engine piston (MEP) aeroplanes may be conducted by an appropriately qualified instructor unless otherwise provided in the OSD.

Future chapters cover this training.

Typical SEP (land) ST/PC Flight Test Format

It is important that an instructor is familiar with the content of each test and typical test profiles to be flow during test in order to better prepare the student.

Navigation:

- Blackbushe to Newbury, Thame, or Whitchurch.

Airwork:

- Steep turns L & R.
- Slow flight: turns, climbs descent.
- 2 of the 3 stalls.

Practice Forced Landing:

- Set scenario of rough running engine before closing throttle.
- Glide approach assessed during the PFL.
- Go-around assessed during PFL
- EFATO assessed after go-around from PFL.

Installed Systems:

- Use of GPS and autopilot to return to Blackbushe

Fire: Drill & System Failure

- Smoke emanating from instrument panel. Solved by turning off Master Battery switch.
- Discuss loss of radio, transponder and possibly flaps.

Rejoin, Circuits & RTO:

- Rejoin of circuit.
- Normal landing to touch & go.
- Flapless landing to touch & go.
- Short field landing to full stop.
- RTO from stopped position or taxy back.

The SEP (sea) Rating & Course

Pre-Entry Requirements

There are no specific pre-entry requirements for the course of training. However the amount of dual flight instruction is dependent on whether the applicant holds the land version of the relevant class or type rating (see Flight Training).

Course Details

Flight Training: The SEP(sea) course must be conducted at an ATO or DTO and shall include at least 8 hours of dual flight instruction if the applicant holds the land version of the relevant class or type rating, or 10 hours if the applicant does not hold such a rating.

Ground Training: The theoretical knowledge course for the single pilot aeroplane sea class rating shall include:

(a) the importance of preparation for flight and the safe planning taking into consideration all the factors for manoeuvring the aircraft on the wind, tidal currents, high and low water times and water movements at sea, river estuaries and lakes. In addition, icing conditions, ice covered water and broken ice flows

(b) the techniques about the most critical moments at take-off, landing, taxiing and mooring the aircraft

(c) the construction methods and characteristics of floats and water rudders and the importance of checking for leaks in the floats

(d) the necessary requirements for the compliance of the rules for the avoidance of collisions at sea, in regard to sea charts, buoys and lights and horns.

Assessment:

Theoretical Knowledge Examination

Pass a written examination consisting of 30 multiple choice questions covering aspects of seamanship and seaplane operations. The pass mark is 75%. The subjects covered include:

- Symbols and abbreviations used in Admiralty charts and plans which are of importance to seaplane and amphibian pilots
- The regulations for preventing collisions at sea
- Lights and shapes to be carried by ships and aeroplanes
- Sound and light signals of distress (ships)
- International Association of Lighthouse Maritime Buoyage - Region A
- Knowledge of tides and tidal definitions in general use
- Seaplane operations
- Water characteristics and conditions
- Floats and hulls
- Principles of seaplanes on water and in flight

Flight Assessment:

The applicant shall pass the skill test within a period of 6 months after commencement of the class or type rating training course and within a period of 6 months preceding the application for the issue of the class rating. Before the skill test for the issue of the rating is taken, the applicant must have passed the required theoretical knowledge examination. In any case, the theoretical knowledge instruction shall always have been completed before the skill test is taken.

The applicant for a skill test shall be recommended for the test by the organisation/person responsible for the training, once the training is completed. The training records shall be made available to the examiner. The skill test/proficiency check schedule is given below

Section 1 Departure

Pre-flight including: Documentation, NOTAM, Mass and Balance, Weather briefing

Pre-start checks: External and Internal

Engine Start-up and Shutdown: Normal and Malfunctions

Taxiing, Step Taxiing

Mooring: Beach, Jetty/Pier, Buoy

Engine off sailing

Pre-departure checks: Engine run-up (if applicable)

Take-off procedure: Normal with Flight Manual flap settings, Crosswind (if conditions available)

Climbing: Turns onto headings, Level off

ATC liaison - Compliance, R/T procedure (assessed in all sections)

Section 2 Airwork (VFR)

Straight and level flight at various airspeeds including flight at critically low airspeed with and without flaps

Steep turns: 360º left and right at 45º bank

Stalls and recovery:

(i) Clean stall

(ii) Approach to stall in descending turn with bank with approach configuration and power

(iii) Approach to stall in landing configuration and power

(iv) Approach to stall, climbing turn with take-off flap and climb power (SE only)

Handling using autopilot and flight director (may be conducted in Section 3) (if applicable)

Section 3 En-Route Procedures (VFR)

Flight plan, dead reckoning and map reading

Maintenance of altitude, heading and speed

Orientation, timing and revision of ETAs

Use of radio navigation aids (if applicable)

Flight management (flight log, routine checks including fuel, systems and icing)

Section 4 Arrival and Landings
Aerodrome arrival procedure (amphibians only)
Normal landing, Flapless landing
Crosswind landing (if suitable conditions)
Approach and landing with idle power from up to 2000 ft above the water
Go-around from minimum height
Glassy water landing, Rough water landing

Section 5 Abnormal and Emergency Procedures (This section may be combined with sections 1 through 4)
Rejected take-off at a reasonable speed
Simulated engine failure after take-off
Simulated forced landing without power
Simulated emergencies: Fire or smoke in flight, System's malfunctions as appropriate.

Revalidation

As per SEP (land). However, if the pilot holds both SEP (land) and SEP (sea), the requirement for 12 hours in each class is not required. A total of 12 hours flight time, plus at least 6 hours PIC in the second year. At least one hour PIC must be in each type. The flight with an instructor may be in either type.

Renewal

To renew an expired rating, refresher training at an ATO or DTO is required to the necessary standard, followed by a proficiency check with an examiner.

Recency

FCL.060 Recent experience:
(b) Aeroplanes, helicopters, powered-lift, airships and sailplanes.

A pilot shall not operate an aircraft in commercial air transport or carrying passengers:
as PIC or co-pilot unless he/she has carried out, in the preceding 90 days, at least 3 take-offs, approaches and landings in an aircraft of the same type or class or an FFS representing that type or class.

Additionally, to carry passengers at night, the PIC must, in the preceding 90 days, have completed at least 1 take-off, approach and landing at night as a pilot flying in an aircraft of the same type or class or an FFS representing that type or class, or hold an instrument rating.

Typical SEP (sea) ST/PC Flight Test Format

It is important that an instructor is familiar with the content of each test and typical test profiles to be flow during test in order to better prepare the student.

Navigation:

- Prestwick to Loch Doon.

Airwork:

- Steep turns L & R.
- Slow flight: turns, climbs descent.
- 2 of the 3 stalls.

Practice Forced Landing:

- Set scenario of rough running engine before closing throttle.
- Glide approach assessed during the PFL.
- Go-around assessed during PFL
- EFATO assessed after go-around from PFL.

Installed Systems:

- Use of GPS and autopilot en-route.

Fire: Drill & System Failure

- Smoke emanating from instrument panel. Solved by turning off Master Battery switch.
- Discuss loss of radio, transponder and possibly flaps.

Landings & RTO:

- Inspection and Rejoin of water circuit.
- Normal water landing to touch & go.
- Flapless water landing to touch & go.
- Glassy water landing to full stop.
- RTO from stopped position or taxy back.

Differences Training

FCL.710 addresses class and type ratings concerning variants.

In order to extend privileges to another variant of aircraft within one class or type rating, the pilot shall undertake differences or familiarisation training as appropriate.

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

Familiarisation training requires the **acquisition of additional knowledge** (GM1 FCL.710). This could be self study of the PoH.

2.1 Class ratings (aeroplane): SP and SEP or MEP aeroplane (land or sea):

Manufacturer	Aeroplanes		Licence Endorsement
All manufacturers	SEP (land)	**(D)**	**SEP (land)**
	SEP (land) with variable pitch propellers		
	SEP (land) with retractable undercarriage		
	SEP (land) with turbo or super charged engines		
	SEP (land) with cabin pressurisation		
	SEP (land) with tail wheels		
	SEP (land) with EFIS		
	SEP (land) with SLPC		
	SEP (sea)	**(D)**	**SEP (sea)**
	SEP (sea) with variable pitch propellers		
	SEP (sea) with turbo or super charged engines		
	SEP (sea) with cabin pressurisation		
	SEP (sea) with EFIS		
	SEP (sea) with SLPC		
All manufacturers	MEP (land)	**(D)**	**MEP (land)**
	MEP (sea)	**(D)**	**MEP (sea)**

2.2 Class ratings (aeroplane): SP and SEP TMG (land):

Manufacturer	Aeroplanes		Licence Endorsement
All manufacturers	All TMGs having an integrally mounted, non-retractable engine and a non-retractable propeller		**TMG**

Whenever "(D)" is indicated in column 3 in one of the lists mentioned in paragraphs 2.1 to 2.3 above, it indicates that differences training in accordance with FCL.710 is required when moving between variants or other types of aircraft which are separated by the use of a line, in column 2.

Although the licence endorsement (in column 4) contains all aircraft listed in column 2, the required familiarization or differences training must be completed before operating the respective variants

For SEP class ratings, differences training is a one-time sign off and never needs to be renewed.

For MEP class ratings, each different MEP aircraft is considered as a difference. The differences last for 2 years and must then be renewed.

Other than VP prop, differences are transfereable between SEP and MEP class ratings. VP prop needs a separate sign-off for SEP and MEP due to the differences in design of the system.

DIFFERENCES TRAINING: RETRACTABLE UNDERCARRIAGE (LANDING GEAR)

A study Guide by Steve Pells   Issue 06 19 Jun 21

The purpose of this document is to provide guidance and backround information for pilots who already hold as SEP (Land) rating, and wish to undertake differences training to allow them to fly aircraft with the following characteristics:

- Variable Pitch Propeller
- Retractable Undercarriage
- Turbo or Supercharged Engine
- Electronic Flight Instrument System (EFIS)
- Single Lever Power Control (SPLC)
- Tail Wheel
- Oxygen & Pressurisation

1: Rules & Regulations:

Differences Training should be conducted by the holder of an appropriate instructor rating who meets the following requirements:

(a) *Hold a valid Flight Instructor or Class Rating Instructor qualification (SPA) for the aircraft on which the training is to be carried out.*
(b) *Hold a valid Type/Class Rating applicable to the particular aircraft to be flown.*
(c) *Have completed their own Differences Training to fly the particular aircraft on their own licence.*

Upon completion of Differences Training, and when the instructor is satisfied that an acceptable level of competency has been achieved, the pilot's logbook or equivalent document should be annotated to show successful completion and be signed by the instructor who conducted the training.

The Differences Training certification is recommended to take the following format and should include the Type or Class Rating designation of the Aeroplane;

Date	Certified Differences Training In:	Signed	CAA Reference Number						
	Example:- **Single Power Lever Controls** **SE Piston (Land)**	.... Name							

Date	Certified Differences Training In:	Signed	CAA Reference Number						
	Example:- **Manual Engine Controls** **Turbocharged Engines** **ME Piston (Land)**	.... Name							

There is no test, as such, and for single-engine aeroplanes, this is a one-time sign-off that never expires. It is valid for 2 years on multi-engined aeroplanes.

If it has been a while since your last flight in such an aircraft, a review of procedures, or a flight with an instructor is recommended.

<u>PART-FCL: EASA Differences Notes & Syllabus for Retractable Undercarriage:</u>

NOTE: *Differences Training completed, for this section (retractable undercarriage), on an SEP aeroplane, does provide equivalent qualification on MEP aeroplanes and vice versa.*

<u>Theoretical Knowledge Topics:</u>

All Aeroplanes:

Principles and effect on performance;
System construction and function;
Limitations – raising, lowering and extended.
Operation including pre-flight checks and normal handling:
After take-off & On approach/go-around and landing.
In-flight system failures and emergency lowering.
Operation of undercarriage during: Engine failure after take-off/go-around (Emergency raising – as applicable to type) & Engine failure during other phases of flight, including approach and landing.
Effect on glide performance.

Considerations for MEP Aeroplanes:

Effect on performance – one or more engines inoperative.
Handling during approach and landing/go-around with one or more engines inoperative.
Effect on engine out allowance and landing committal height.

2: Introduction:

Throughout this section, reference will be made to the undercarriage system and speed limits that apply to Piper PA28R-201 Arrow III, such as G-CBZR and G-OARU, but the principles for other aircraft are similar.

In order to reduce drag and allow the aircraft to cruise faster and burn less fuel, some aircraft are equipped with retractable landing gear. The operation of the undercarriage system is rarely complicated, but the consequences of getting it wrong cannot be overstated.

Although gear-up landings are rarely fatal in light aircraft, they are always expensive and highly embarrassing for the pilot.

To be honest, there is really only one rule when it comes to flying aircraft with retractable landing gear:

Make Sure the Gear is DOWN for Landing!!!

It sounds obvious, but it continues to happen on a regular basis worldwide.

Not only this, but sometimes the gear is retracted on the ground by accident. Usually, there is some kind of a guard on the switch to prevent inadvertent retraction, and usually a ‘weight on wheels’ sensor prevents operation of the gear on the ground. But these systems do fail. The best practice is to be very careful when getting in and out of the aircraft, so that you do not accidentally knock the gear lever. Also, never touch it on the ground. Some people check the gear lever is down, and then touch the lever to verify its position. Best practice suggests just looking at it and only touching it in the air when the time comes to retract it.

3. Landing Gear Retraction:

Placard speeds for an Arrow III

Usually there are airspeed limits for the retraction and lowering of the gear, and these 2 limits are often different. Sometimes there is a third limit, a maximum airspeed with the gear lowered. These limits are often placarded next to the gear lever.
Usually the gear retraction limit is the lowest, for example in the PA28R-201 Arrow III the maximum gear retraction speed is 107 KIAS. Above this speed the gear must not be retracted. Should this situation occur, simply raise the nose to reduce airspeed below the limit and then retract.

The maximum speed for gear lowering in this aircraft is 129 KIAS.
The maximum speed with the gear down is also 129 KIAS.

The next question is when do we retract the gear? The best answer is 'when we no longer require it'. Do not be in a hurry to retract the gear after take-off. Should sink be encountered, or an engine failure occur immediately after rotation, you will be glad to have the gear down. Once there is no longer sufficient runway remaining to land back on in case of need, then we can retract the gear.

Usually, before retracting the gear, it is good practice to apply the brakes first, to stop the main wheels from spinning.

To retract the gear, there is usually some kind of latch to be moved to allow the lever to move. On the Arrow, you pull the lever towards you and then move it to UP. On aircraft such as the Bonanza, there is a sliding latch under the switch that need to be moved.

On the Arrow, there is a red gear unsafe light above the AI/Horizon, and a loud horn that operate together while the gear is retracting. Once retraction is complete, the light goes out and the horn silences. The 3 green lights go out.

On the Mooney, there is only one light for gear down, and another for gear up. These is also a floor mounted sight window which displays the word UP or DN.

A special note about the Arrow:
The design of the aircraft includes an automatic dimming of the 3 green gear position lights. Whenever the NAV lights are turned on, the 3 green lights dim. This makes them perfectly visible at night, but during the day, you would swear that they are not illuminated. This has caused numerous Arrow pilots to declare emergencies, thinking that the gear has failed to extend. If you ever find a situation in such an aircraft when all 3 green lights appear to be out, check the NAV light switch first!
Also, in the Arrow, and some other Piper aircraft too, the 3 square green gear position lights can be swapped over. This is to allow you to check that the gear is down when a bulb has failed. Let's say that when you lower the gear you only get 2 out of the 3 lights. Simply pull out the unilluminated green square and one of the others that was working. Then put them back in the other way round. If the same light fails to illuminate, then you may have a problem.

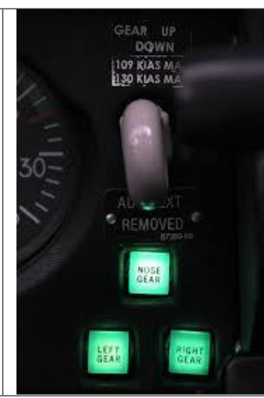
4: Landing Gear Warnings:

Most aircraft are equipped with a system to warn the pilot in case (s)he forgets to lower the gear. These are not failsafe and should never be relied upon. As well as providing useful warnings, they frequently occur as nuisance warnings as well. For example, in the Arrow:

a: Low power: If the power is reduced to idle, with the gear up, regardless of flap position, the gear unsafe light and horn will sound continuously. This means that in a descent, in order to get rid of the noise, you will have to add a little power (or lower the gear)
b: Landing Flaps: If more than Flap 10 is selected (i.e. 2 or 3 notches of flap) with the gear up, the warnings occur again. This can be a nuisance when taking off from a grass field with flap 25. Once airborne, you retract the gear. The warning will then sound continuously until the flap is retracted to 10 or less.
c: Gear Selector UP on the ground with the throttle at idle.

NOTE: These warnings usually require the Battery Master Switch to be in the **ON** position.

Auto Extension Feature:
As a result of several gear-up landings in the early days, some aircraft manufacturers, in an attempt to reduce mishaps, added a Gear Auto Extension Feature.
This was common on many Arrow aircraft. Basically, once the aircraft reduced speed below a set limit, the gear would automatically extend, thus eliminating accidents. However, this made life very difficult for training. Every time you practiced slow flight, or stalling, the gear would fall out. So, many operators have inhibited this feature.
No aircraft in the Blackbushe Flying Group currently has this feature enabled.



After landing, never be in a hurry to retract flaps, or switch off other items such as pitot heat. You could inadvertently retract the gear by mistake. Never do any of these actions while still on the runway. Vacate the runway and stop before moving any critical switches.

6: Normal Gear Extension:

When it's time to land, obviously we need to lower the landing gear. But when is the best time to do this?
If the circuit is busy with slower aircraft, it can sometimes be useful to lower the gear early. The gear produces quite a bit of drag, and can be useful in slowing you down, or getting you down if you are a little high.
However, the most usual place to take the gear is downwind. I suggest starting your pre-landing checks by lowering the gear. Always remember the gear lowering speed limit! I always wait until I have the correct gear down indication before moving on to other checklist items, because the check that it's down and locked can be missed otherwise.
A real danger occurs when you don't have a downwind position to trigger the lowering of the gear, for example if you join on base or on a long final. That is why, once established on short finals, we should always do our **Red, Blue, Green Checks**:

- REDS Mixture(s) Fully Rich
- BLUES Propeller(s) Max RPM
- GREENS Gear Down, 3 Greens

The landing gear switch and landing gear indication system in a Beechcraft Duchess Be-76 aircraft.
Note the 'Gear in Transit' light.

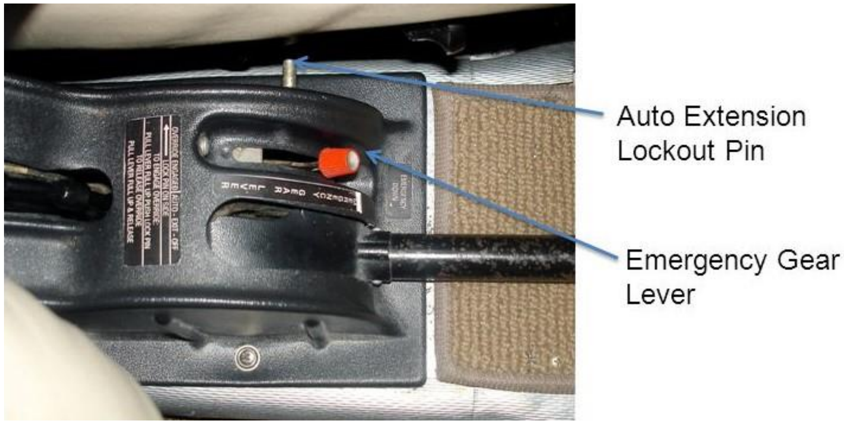
5: Emergency Landing Gear Extension:

Most light aircraft have gear that is controlled by a system of electrical signalling and hydraulic actuation. Should any of these systems fail, there is usually an emergency gear extension system which allows the gear to drop by gravity. Usually once lowered by such a system, the gear cannot be retracted again.

In the Arrow, there is a small lever below and at the front of the flap lever quadrant.

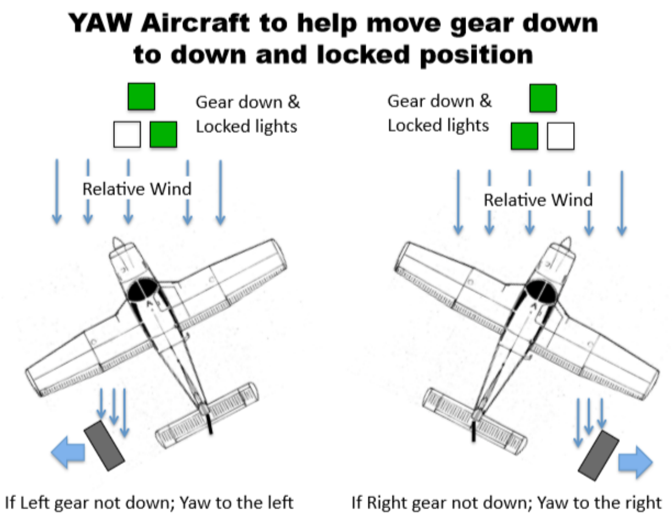
Emergency Landing Gear Extension

- Auto extension lockout pin must be pulled out to allow automatic or manual emergency gear extension to work
- Gear will automatic extend when speed is 87 KIAS or below
- To manual lower gear if normal system is not working, push and hold the emergency gear lever switch down towards the floor
- Extension is accomplished by manually releasing hydraulic pressure; gear free-falls; nose gear is assisted in free-fall/lock by a spring
- If gear does not indicate down and locked, yaw the airplane side to side



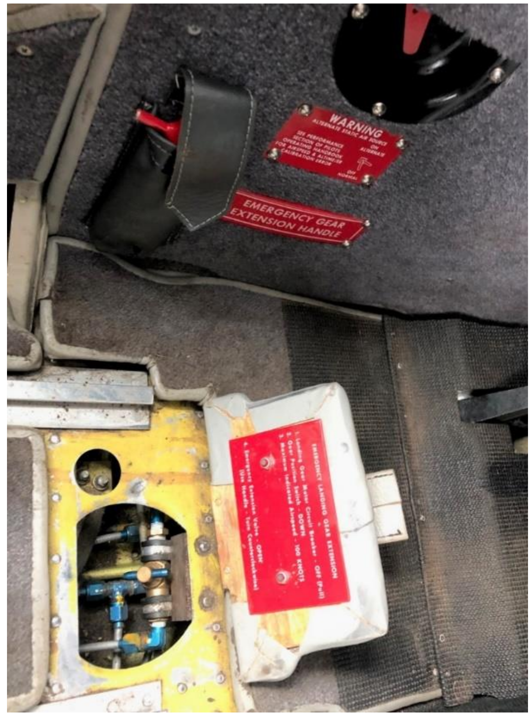
If the emergency lowering is required, don't try to remember the checklist. Get the checklist out and go through it carefully. It's not a time critical situation.

Part of the Emergency checklist suggests yawing the aircraft with rudder if necessary, to help lower the gear.



In the Mooney, a safety latch at floor level at the front of the passenger cabin has to be moved, to allow a handle to be pulled up to 20 times to allow the gear to fall.

On the Beechcraft Duchess Be-76 aircraft, a special tool is used to operate the emergency landing gear extension system, which is located under a flap between the pilot's feet. Obviously, following the pre-flight check should make sure the tool is on board!



Be-76 Gear Tool and its stowage in the cockpit. Access to the operation mechanism is under a flap at floor level. Operating instructions are also provided.

Typical emergency checklist shown below:

PA28R-201 ARROW III: EMERGENCY LANDING GEAR EXTENSION

Prior to emergency Extension Procedure:

1. BATT MASTER/ALT Switch **CHECK ON**
2. Circuit Breakers **MONITOR**
3. NAV Light Switch **OFF (In daytime)**
4. Gear Indication Bulbs **CHECK**

- If landing gear does not check down and locked:

1. Airspeed **REDUCE BELOW 87 KIAS**
2. Landing Gear Selector Switch **GEAR DOWN POSITION**

- If gear has still failed to lock down, move and hold the emergency lever down to the Emergency Down Position.
- If gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

6: Engine Failure & Forced Landings:

If an engine fails, pilots who already have an SEP (land) class rating, will be familiar with PFLs (Practice Forced Landing). With a retractable geared aircraft, there are a couple of new considerations. First, if the engine fails with the landing gear in the UP position, the Gear Unsafe warning is likely to sound continuously until the ger is lowered. This can be highly distracting, but lowering the gear too early, greatly reduces your gliding range. A decision needs to be made as to when to lower the landing gear (if at all).

The following is from the PoH for the Arrow:

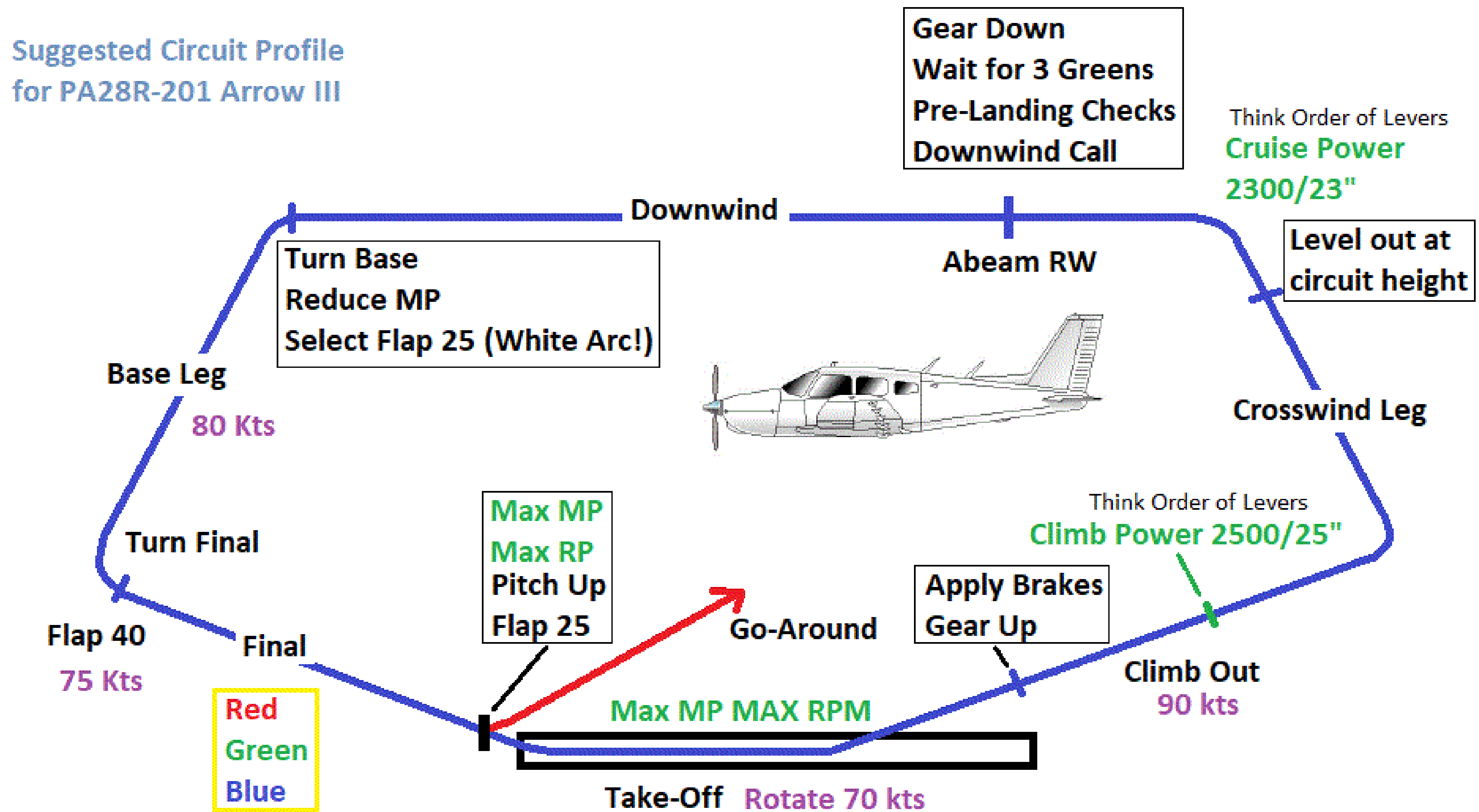
> Whether to attempt a landing with gear up or down depends on many factors. If the field chosen is obviously smooth and firm, and long enough to bring the plane to a stop, the gear should be down. If there are stumps or rocks or other large obstacles in the field, the gear in the down position will better protect the occupants of the aircraft. If, however, the field is suspected to be excessively soft or short, or when landing in water of any depth, a wheels-up landing will normally be safer and do less damage to the airplane.
>
> Touchdown should normally be made at the lowest possible airspeed.

7: Suggested Flight Profile for Training

A typical training flight will involve:

- External Checks to include undercarriage bays and services
- Familiarisation of the cockpit controls and indicators.
- Airspeed Limitations for operation
- Take off and gear retraction
- A look at the Gear warnings
- Practice using the Emergency Gear Lowering Procedure alongside the aircraft checklist.
- Practice Forced Landing (PFL) to highlight differences and show glide range
- Return to the airfield for touch and go training.

8: Suggested Circuit Profile for PA28R-201 Arrow 3



DIFFERENCES TRAINING: Variable Pitch/Constant Speed Propellers

A study Guide by Steve Pells Issue 05 19Jun21

The purpose of this document is to provide guidance and backround information for pilots who already hold as SEP (Land) rating, and wish to undertake differences training to allow them to fly aircraft with the following characteristics:

- Variable Pitch Propeller
- Retractable Undercarriage
- Turbo or Supercharged Engine
- Electronic Flight Instrument System (EFIS)
- Single Lever Power Control (SPLC)
- Tail Wheel
- Oxygen & Pressurisation

1: Rules & Regulations:

Differences Training should be conducted by the holder of an appropriate instructor rating who meets the following requirements:

(a) Hold a valid Flight Instructor or Class Rating Instructor qualification (SPA) for the aircraft on which the training is to be carried out.

(b) Hold a valid Type/Class Rating applicable to the particular aircraft to be flown.

(c) Have completed their own Differences Training to fly the particular aircraft on their own licence.

Upon completion of Differences Training, and when the instructor is satisfied that an acceptable level of competency has been achieved, the pilot's logbook or equivalent document should be annotated to show successful completion and be signed by the instructor who conducted the training.

The Differences Training certification is recommended to take the following format and should include the Type or Class Rating designation of the Aeroplane;

Date	Certified Differences Training In:	Signed	CAA Reference Number
	Example:- **Single Power Lever Controls** **SE Piston (Land)**	.... Name	

Date	Certified Differences Training In:	Signed	CAA Reference Number
	Example:- **Manual Engine Controls** **Turbocharged Engines** **ME Piston (Land)**	.... Name	

There is no test, as such, and, for single-engined aeroplanes, this is a one-time sign-off that never expires. For multi-engined aeroplanes it is valid for 2 years. If it has been a while since your last flight in such an aircraft, a review of procedures, or a flight with an instructor is recommended.

<u>Variable Pitch (VP) Propellers (all propeller aeroplanes) EASA PART FCL</u>

These systems make a significant difference to performance in all phases of flight. Mostly, the instruction in this section will be given to pilots converting from SEP aeroplanes with fixed pitch propellers to SEP or MEP aeroplanes with VP propellers and constant speed units (CSU). The system on some older types may not include a CSU and instructors must ensure that all of the system differences and handling techniques, introduced by the new type, are properly covered in the training given.

NOTE: Differences Training completed, for this section (VP Props), on an SEP aeroplane, does **NOT** provide equivalent qualification on MEP aeroplanes (due to the system differences) nor vice versa.

<u>Theoretical Knowledge Topics: All Aeroplanes</u>

Principle of operation and effect on performance;
System construction and function;
Propeller system limitations;
Engine limitations and instrumentation.
Operation of throttle, mixture and propeller controls, including pre-flight checks &normal handling during:

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

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

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

Emergency handling, during:

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

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

2: Introduction:

Up until now, all the single-engined piston (SEP) aircraft you have flown are likely to have had a fixed pitch propeller. That is, the blade angle of the propeller is fixed, and cannot be adjusted by the pilot. This is a compromise, because propeller efficiency varies with aircraft speed, and so the propeller cannot be operating at maximum efficiency for both take-off and cruise. Some propellers have the blade angle set to make them most efficient for take-off, but this makes them less efficient in cruise, reducing their range and increasing fuel burn. Other propellers are set to be at maximum efficiency in the cruise, but this leads to poorer take-off performance.
An early solution to this problem was to have a 2-position lever in the cockpit which manually changed the blade angle of the propeller between take-off and cruise settings. As propeller and engine design improved, this has changed to a continuously variable propeller angle, controlled by a new lever in the cockpit.

Here, on the left, is the throttle quadrant for a Piper Arrow, showing the new Propeller Control Lever or RPM lever.

On most aircraft it is the middle of the 3 levers, and usually coloured blue.

In a twin enginned aircraft, this leads to a lot of levers to be managed!

The similar arrangement of levers in Cessna aircraft

The operation of the Mixture control is unchanged.

3: Constant Speed Unit (CSU) or Propeller Governor:

Rather than changing the blade angle of the propeller directly, the Propeller Control Lever (RPM lever) is used to select a desired RPM within the operating range (usually around 1500-2600 rpm). The blade angle then changes automatically to keep the RPM constant as speed changes. This is done by setting the desired RPM on the RPM gauge using the RPM lever to make changes. The propeller governor then uses a combination of springs and engine oil pressure to alter the blade angle to keep the RPM at the desired value.

When in the typical operation range for in-flight use (typically 2000-2600 RPM), the RPM lever is used to set a desired RPM value. This lever is quite sensitive, and so only small movements are needed. Once set, the RPM value should not change with speed or altitude (hence constant speed). The throttle (which used to be used to set engine RPM in fixed pitch aircraft), in now used to set a new parameter – Manifold Pressure (MP). Generally, this lever is much less sensitive and much larger movements are needed to produce the desired changes.

Below the usual flight operating range (say 2000-2600 RPM), the RPM Lever is mostly ineffective, and in these low power situations, such as taxying, the throttle controls engine RPM as before.
With the RPM lever fully forward, we say the prop is at MAX RPM or in FINE pitch. With the RPM lever fully rearward, we say the prop is at MIN RPM or in COARSE pitch.

3a: Order of Operation of Levers:

We now understand which levers control RPM and MP. However, when we want to make a change to either or both of these values, there is a specific order which MUST be adhered to, to prevent engine stress and possible damage.

When increasing power, the **BLUE (RPM)** lever must be advanced before the **BLACK (Throttle)**
When decreasing power, the **BLACK (Throttle)** lever must be retarded before the **BLUE (RPM)**

There are various ways to try to remember this:

Increase power – levers Right to Left Decease power – levers Left to Right	Blue UP, Black Down	REV UP – POWER DOWN

However you remember, it is important to get the order right, so every time you touch the levers, stop, think and make sure you know what you are going to do.

4: Typical Operation:

We will now go through a typical flight profile, taking the Piper Arrow as our example, although very similar figures will apply for other aircraft.

4a: Pre Flight:

On the ground, with the engine shut down, the RPM will be reading zero, fairly obviously, and the Manifold Pressure gauge will be reading atmospheric pressure in inches of mercury (Usually about 29-31" at sea level but decreases by 1" per 1000' as you gain altitude or elevation).

The RPM lever should be in the fully forward/Fine/Max RPM position when you enter the aircraft.

After engine start, the RPM should be kept at around 1000-1200 RPM (see PoH) using the throttle alone. The RPM lever will remain at MAX throughout the taxy phase.

RPM lever should be fully forward when you enter the aircraft.

4b: Power Checks:

Power checks are carried out as shown in the checklist or PoH. The power is increased to 2000 RPM (1700 for Cessna 182) using the throttle alone. RPM lever remains at MAX. When the check of the propeller governor is reached, the Blue RPM lever is cycled to MIN RPM and back to MAX 3 times, accompanied by a change in engine note. It should take about 3-5 seconds to cycle the lever there and back, and each time we do this, we are looking at a different gauge for verification.

1: **RPM decreases and returns to initial value of 2000/1700 RPM. Try not to let the RPM reduce by more than 500 RPM during the check.**
2: **MP increases and returns.**
3: **The oil pressure (which moves the propeller blade) shows a change in pressure.**

After the power checks, the RPM lever should be returned to MAX for take-Off.

4c: Take Off:

For take-off in a non turbo charged engine, all levers – Throttle, RPM & Mixture should be fully forward. In a turbo charged engine, a maximum MP will be stated (and must be observed).
Monitor oil temperatures, pressures and MP (in a turbo-charged) engine during take-off.

Above we see the levers and MP/RPM readings during take-off in an Arrow III. Note the Fuel Flow

And here at Climb power

4d: Climb Power:

Although it is permissible to climb at full take-off power, on most variable pitch propeller aircraft, a reduced power is often set after take-off. This is known as climb power. Climb power is usually set at a safe height, when initial obstacles have been cleared, often 500 - 1000' agl.

On the Piper Arrow, climb power is 2500 rpm & 25" MP. This is usually abbreviated to 25/25 or 25 squared.
Remember, when setting climb power, that there is an order of levers. As we are reducing power, we move the throttle first (large lever movement) then RPM (very small lever movement).

On the Cessna 182, climb can be at full power or at 2400 RPM/23" MP (24/23).

4e: Climb:

During the climb, the RPM will stay at whatever value you set with the RPM lever (it is a constant speed prop). However, as atmospheric pressure drops by 1" for every 1000' altitude gained, the MP will fall by 1" for each 1000' climbed. So, it is important to continually move the throttle forward in the climb to maintain the MP, otherwise the power output of the engine will decrease. Eventually, full throttle will be needed to maintain climb power. This is known as 'full throttle height'. It is typically around 5-6000'. Further climb will result in the loss of climb performance. In a turbo charged aircraft, the full throttle height will be much higher than for a normally aspirated engine.

4f: Cruise:

In the cruise, you must select a suitable cruise setting. A typical setting for the Piper arrow is 2300/23" (23 squared). The PoH will recommend a selection of different cruise settings depending on speed and range requirements.
Again, when we come to set cruise power after levelling off after a climb, this will involve a reduction in power, so the throttle is retarded before the RPM lever.

Power Setting Table for Lycoming Model IO-360-C1C6
Engine as Installed in PA-28R-201 Arrow   Best Economy Mixture

POWER SETTING TABLE (Best Economy)

Pressure Altitude	ISA Temperature		55% Power 110 BHP @ Propeller Mixture Peak EGT Manifold Pressure - In. Hg		65% Power 130 BHP @ Propeller Mixture Peak EGT Manifold Pressure - In. Hg		Pressure Altitude
Feet	°F	°C	2200 RPM	2500 RPM	2200 RPM	2500 RPM	Feet
S.L.	59	15	24.8	22.2	27.5	24.5	S.L.
1000	55	13	24.4	22.0	27.1	24.3	1000
2000	52	11	24.0	21.8	26.7	24.1	2000
3000	48	9	23.7	21.5	26.3	23.8	3000
4000	45	7	23.3	21.3	26.0	23.6	4000
5000	41	5	22.9	21.1	25.6	23.3	5000
5250	40	4	22.8	21.0	F.T.	23.2	5250
6000	38	3	22.5	20.8		23.1	6000
7000	34	1	22.1	20.6		22.8	7000
8000	30	-1	21.8	20.4		22.6	8000
8750	28	-2	21.5	20.2		F.T.	8750
9000	27	-3	F.T.	20.1			9000
10000	23	-5		19.9			10000
11000	19	-7		19.7			11000
12000	16	-9		F.T.			12000

← Some suggested cruise settings for the Piper Arrow.

CRUISE PERFORMANCE
PRESSURE ALTITUDE 4000 FEET

CONDITIONS:
2950 Pounds
Recommended Lean Mixture
Cowl Flaps Closed

NOTE
For best fuel economy at 65% power or less, operate at the leanest mixture that results in smooth engine operation or at peak EGT if an EGT indicator is installed.

Cruise table for the Cessna 182Q →

		20°C BELOW STANDARD TEMP -13°C			STANDARD TEMPERATURE 7°C			20°C ABOVE STANDARD TEMP 27°C		
RPM	MP	% BHP	KTAS	GPH	% BHP	KTAS	GPH	% BHP	KTAS	GPH
2400	22	---	---	---	76	139	13.0	73	140	12.5
	21	74	135	12.6	71	136	12.1	69	136	11.7
	20	69	131	11.8	66	132	11.3	64	133	11.0
	19	64	127	10.9	62	128	10.6	60	128	10.2
2300	23	---	---	---	76	140	13.1	74	141	12.6
	22	75	135	12.8	72	136	12.3	70	137	11.9
	21	70	132	12.0	68	133	11.5	65	134	11.2
	20	66	128	11.2	63	129	10.8	61	130	10.4
2200	23	75	135	12.8	72	136	12.3	70	137	11.9
	22	70	132	12.0	68	133	11.6	66	134	11.2
	21	66	129	11.3	64	129	10.9	61	130	10.5
	20	62	125	10.5	59	126	10.2	57	126	9.8
	19	57	121	9.8	55	121	9.5	53	121	9.2
2100	23	70	132	11.9	67	133	11.5	65	133	11.1
	22	66	128	11.2	63	129	10.8	61	130	10.4
	21	62	125	10.5	59	126	10.1	57	126	9.8
	20	57	121	9.8	55	121	9.5	53	122	9.3
	19	53	117	9.2	51	117	8.9	50	117	8.7
	18	49	112	8.6	47	112	8.3	46	112	8.1
	17	45	107	8.0	43	107	7.8	42	106	7.6

← A twin engined aeroplane set at 22 squared in the cruise

4g: Descent:

During the descent, the RPM lever is often left at the cruise setting. Indeed, it can remain there until shortly before landing. However, the MP will need to be reduced continually. Remember, in the climb, how the MP reduced by 1” for every 1000’ climbed? Well the reverse happens during descent, so every 1000’ or so, inch the throttle back to keep the desired MP.

In larger engines, say over 200 HP, such as the Cessna 182, care should be taken to avoid shock cooling of the cylinders. This is best achieved by only reducing the MP slightly. A typical minimum of 20” will help, and an absolute minimum of 15” if needed. Cylinder Heat Temperature (CHT) can be monitored in descent to check that cooling is not too rapid.

4h: Landing:

The propeller will perform quite happily during landing at most RPM settings, however in case of a go-around, maximum RPM will be needed. For this reason, prior to every landing, the RPM lever should be moved fully forward. This can either be done as part of the Pre-Landing checklist (typically downwind), or on base leg or on finals. The best time to do this is when the throttle is at a low setting, as this reduces the unwanted noise change associated with the increasing engine RPM. For this reason, I recommend advancing the RPM lever to MAX once descent has begun on the base leg.
Once established on short finals, we should always ensure that the RPM lever is set to MAX by doing our **Red, Blue, Green Checks**:

- REDS Mixture(s) Fully Rich
- BLUES Propeller(s) Max RPM
- GREENS Gear Down, 3 Greens

4i: Go Around:

Since we moved the RPM lever to MAX on finals (or before), should a go-around be necessary, the lever is already in the correct position. Just advancing the throttle is needed to achieve go-around power.

4j: After Landing:

The RPM lever should be left at MAX until and after shutdown.

5: Abnormal Operations

There are 2 main things that could go wrong with the constant speed propeller:

- **Loss of oil pressure:** How a loss of oil pressure affects the constant speed prop, generally depends on whether you are in a single or multi engined aeroplane. In singles, a loss of oil pressure usually drives the propeller to high RPM (low pitch) to allow the engine to supply maximum power in the event of a failure. In a twin, the propeller will normally feather – drive to low RPM (high pitch) to reduce drag.
- **Propeller Overspeed:** Normally a matter of trying to control the prop as best you can. Often a checklist in the manual.

PA28R-201 Arrow III: PROPELLER OVERSPEED

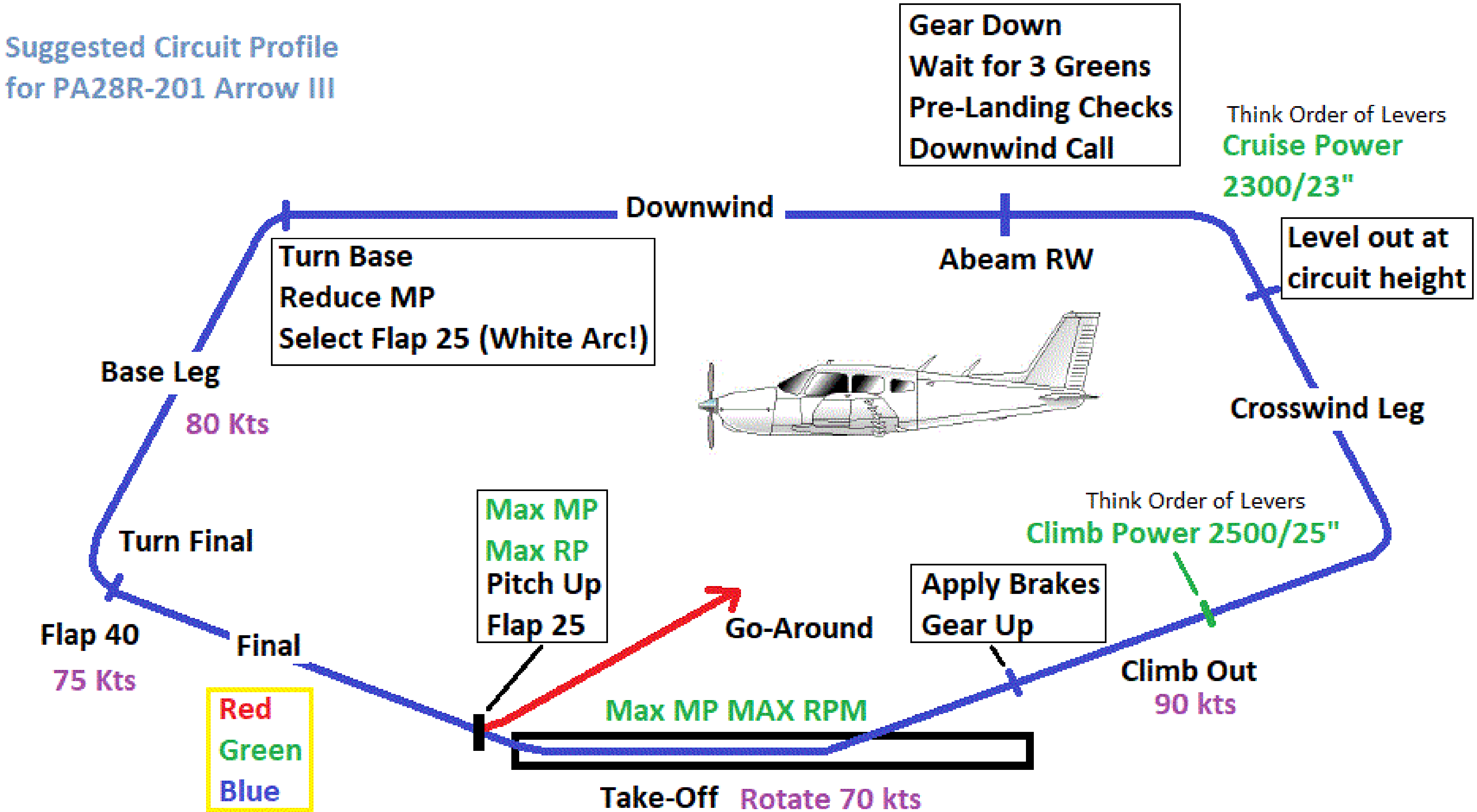
1.	Throttle	**RETARD**
2.	Oil Pressure	**CHECK**
3.	Propeller Control	**FULL DECREASE RPM**. Then set if any control available.
4.	Airspeed	**REDUCE**
5.	Throttle	**AS REQD TO KEEP BELOW 2700 rpm**

6: Suggested Flight Profile for Training

A typical training flight will involve:

- External Checks to include propeller and engine
- Familiarisation of the cockpit controls and indicators.
- Power Checks including propeller RPM check
- Selection of climb power after take-off
- Cruise power settings
- Descent management
- Propeller overspeed considerations
- Return to the airfield for touch and go training.

8: Suggested Circuit Profile for PA28R-201 Arrow 3



Tailwheel Differences Training

General

In order to extend a pilots privilege to another variant of aircraft within one class or type rating, the pilot shall undertake differences or familiarisation training

GM1 FCL.710

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

A pilot wishing to fly a tail wheel aeroplane is required to complete Differences Training to the satisfaction of an appropriately qualified instructor. The type and content of the Differences Training is given in CAP 804

Pre-Course Entry Requirements

Before beginning a course of training the applicant shall hold:

(a) NPPL(A), LAPL(A), PPL(A), CPL(A) or ATPL(A)
(b) SEP (land) Class Rating or SSEA (as applicable)
(c) Medical Certificate appropriate to the licence held

Ground Training

The ground training consists of 2 hours of ground instruction on subjects associated with tail wheel operations including:

Physical differences
Loading and Effect of CG Position
Dynamic differences and handling during:

Ground handling
Starting and taxiing
Taking-off
Engine failure during take-off
Landings including 2-point “wheelers” and 3-point landings
Crosswind operations
Parking and mooring

Type specific training to include:

Take-off and climb performance
Cruise performance
Landing performance
Speeds for normal operation
Speeds for emergency operation
Airframe and manoeuvre limitations
Spinning
Stall/Spin warning
Fuel system
Engine systems and instrumentation
Undercarriage system
Electrical system
Cabin and environmental system
Flight instrumentation
Other systems including pneumatic, vacuum and hydraulic
Aerodynamic controls and handling characteristics
Engine handling
Flaps and trim systems
Emergency procedures

Flying Training

The flight training consists of a 5 hours of dual instruction covering the following:

Ground handling
Starting and taxiing
Taking-off
Engine failure during take-off
Visual circuit pattern
Landings including 2-point "wheelers" and 3-point landings
Crosswind operations
Parking and mooring

Skill Test

There are no formal tests on completion of the course of training

References

CAP 804
Part FCL, AMC and GM
The Complete Taildragger Pilot by Harvey S Plourde
Royal Air Force Manual Flying (AP3456) Principles of Flight (Volume 1)

Privileges

Permits a pilot to fly single engine tail wheel aeroplanes as PIC.
Note: To extend the privileges to multi-engine tail wheel aeroplanes requires further differences training.

Validity, Revalidation & Renewal

If the variant has not been flown within a period of 2 years following the differences training, further differences training or a proficiency check in that variant shall be required to maintain the privileges, except for types or variants within the single-engine piston and TMG class ratings.
The differences training shall be entered in the pilot's logbook or equivalent record and signed by the instructor as appropriate.

Part 5: Appendices

Appendix 1: Instructional Techniques

Building Blocks

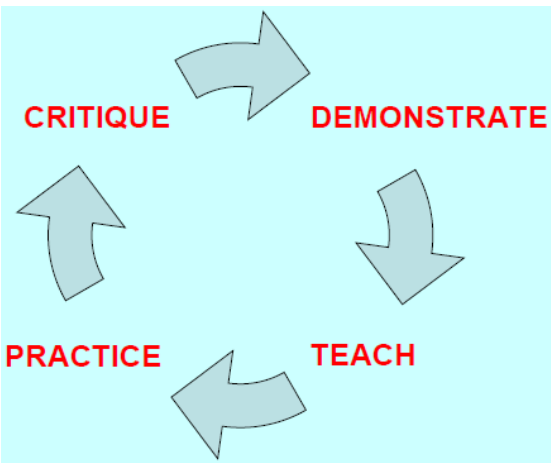
Several exercises can be broken down into smaller parts that can be mastered individually before being added together to create the finished product. Examples would be:

Turning, Climbing, Descending:	Entry. Maintaining. Rollout
Forced Landings:	Initial Actions. Troubleshooting. Field Selection. Mayday. Approach Planning etc
Circuits:	Take-Off. Climb. Downwind. Base. Final. Go-Around etc

Known to Unknown

There is a huge amount of material that the student must absorb in the process of flight training, so it always a good idea to start with something that they are familiar with. For example, before teaching levelling out from a climb, make sure they are happy maintaining a climb first. Then you can add-on the new skill to the old. Afterwards, you can go back and teach the entry.

Circle of Learning



A continuous loop, whereby the student learns by

- Watching a demonstration of the manoeuvre by the instructor.
- The instructor teaches that manoeuvre by breaking it down and pattering it.
- The student practices the manoeuvre.
- The instructor offers feedback, which may entail another loop.

Following Through on the Controls

In the early lessons, it can be beneficial for the student to place their hands and feet lightly on the controls while the instructor demonstrates a manoeuvre. This way they can gauge the amound and rate of input required before having a go for themselves. A similar method can be used by asking the student to place one finger on the throttle, for example during stall recovery demonstrations. Remember to tell the student to 'Relax' when you no longer need them to follow you through.

Work Cycles

There are several useful work cycles in basic flight training that can make life easier for both student and instructor. Do not hesitate to keep repeating them whenever reinforcement is needed.

SELECT – HOLD – TRIM:	Used when learning to trim the aircraft. It stops the student flying by trimwheel and makes them look outside.
LOOKOUT – ATTITUDE – INSTRUMENTS:	A very useful cycle used in Straight & Levl, Climbing, Descending and Turning. It forces the attention outside, and reminds them to glance at their instruments.

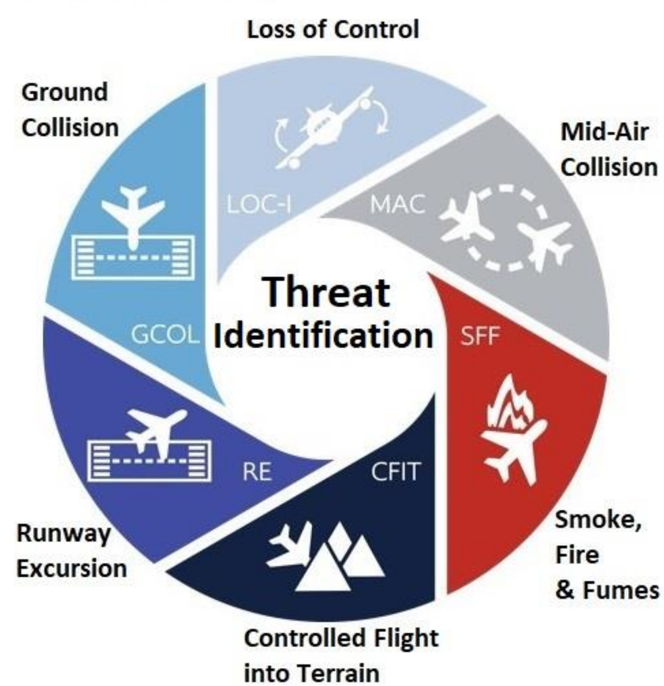
Threat & Error Management (TEM)

Examiners now want to see a thorough culture of TEM from all instructors and will expect frequent reference to be made to it. Not only should TEM be mentioned in ground briefings, but should then be referred to again in the air as relevant topics arise.

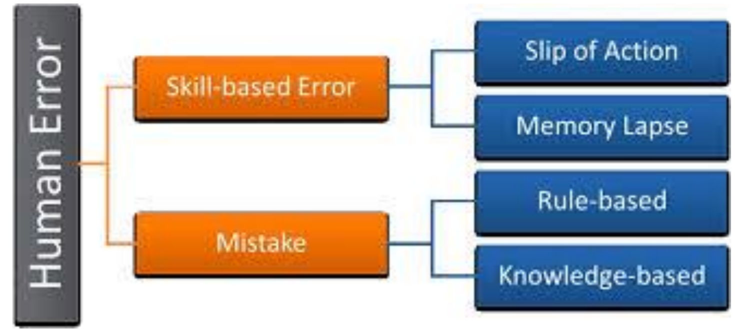
Make sure the student understands the diference between threats and errors: Threats are generally external to us and are present in our operating environment. Errors are usually internal to us – so human error and mistakes.

Threat Identification:

Try to elicit possible threats from the student either by asking open questions about the threats in the environment, or by guiding them with leading questions, or a model:



Identification of Errors:

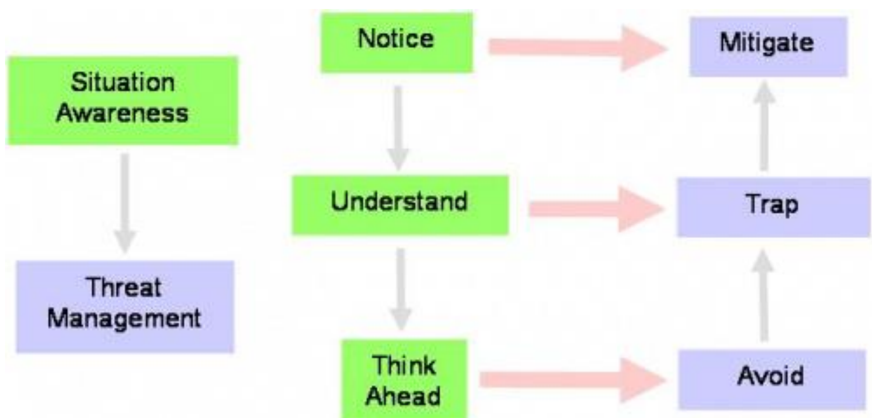


Depending on the experience of the student, it may be harder to identify errors. For example:

- Mis-set Altimeter or DI
- Airspace Infrincgement
- Forgetting to change fuel tanks
- Forgetting to carry out checks when required
- Forgetting to use Carb Heat on descent or forgetting to turn it off afterwards
- Joing for the wrong runway

Management:

Then when it comes to management of these threats and errors, it is important to suggest solutions. It is not enough to simply identify errors – they must be managed: avoided, trapped or mitigated. Once mentioned, try to revist these threats and errors frequently throughout the brief and flight. TEM can thus permeate the whole instructional process rather than just be a monotonous list at the beginning of a pre-flight brief.



Negative Training:

Avoid the use of negative training: Always tell the student what you want him to do, not what you DON'T want him to do. He may focus on these items instead of the primary task.

In the air, this can result in a poor instructional technique known as 'Instruction by Fault Analysis' where the instructor does not 'teach' the student what to do, he merely tells him that he is doing it incorrectly. This must be avoided at all costs.

Another example of negative training is flying around with the stall warner sounding during slow flight.

Debriefing:

- Debriefing is a very important, and often underused, part of the teaching process. It is important to consolidate the lerning objectives from the lesson before the student goes home and forgets. Just 5 minutes of debrief time can be invaluable.
- Make sure the student writes something down during the debrief. A student listening to a long list of importantpoints without a pen and paper is not going to improve.
- A facilatative approach to debriefing is often a good ide, especially with more advanced students. Questions like the following can prove enlightening: How did you feel that went? What could you have done differently? What were your best and poorest parts?
- Do not make a debrief a long, chronological list of student faults. Pick one or two good points, and a few negative points and debrief those.

Appendix 2: Long Briefings

Introduction

A detailed explanation and discussion conducted by a qualified flight instructor and covering the major considerations of an air exercise. The normal length should be approximately 40-50 minutes and it may be given either as a tutorial to an individual student or as an informal lecture to two or more students.

Long briefings are frequently given to students on bad weather days, and there is a requirement in every instructor AoC to deliver one:

From CAA Standards Doc 10:

The Lecture or Long Briefing

- The instructor will be expected to give a long briefing or short lecture lasting approximately 30 to 40 minutes.
- The subject will be determined by the examiner and should be made known to the instructor not less than 2 days before the date of the assessment. Subject matter should be relevant and related to the appropriate instructional privileges and pilot training syllabus. Examiners should vary the subject matter so that it becomes a useful and challenging exercise for the instructor to research and prepare the lesson and not just repeat something that has been prepared and delivered as part of the course.
- Instructors should expect to give the long briefing or lecture to a small audience comprising the examiner and other student pilots or instructors. Instructors will be expected to demonstrate effective use of a variety of training aids and equipment. Therefore, prior preparation and practice with such equipment is essential.
- Some time should be allowed at the end of the briefing or lecture for a reasonable number of questions from the audience. The examiner must ensure however, that this does not become a lengthy session or that the instructor is exposed to unreasonable questioning.

Typical Examiner Requested Long Briefs:

- The UK airspace system.
- Prohibited Areas, Danger Areas, Restricted Areas & NOTAMs. What, where and where to find the information.
- Light Aircraft take-off and landing performance.
- Mass & Balance.
- Pick any recent light aircraft accident and analyse using TEM.
- RT at UK aerodromes.
- Avoiding infringement.
- The SEP (land) rating and how to keep it current.

Useful Tips:

- Have a handout like the one below available to give to students either before of after the lesson. This will enable them to either follow you through as you give the lecture, or to consolidate with afterwards.
- Have printed pictures and illustrations available for students to look at. They will be drawn much more professionally that you can draw freehand on a whiteboard.
- Ask yourself the following questions: Why did you decide on that title? Why did you choose the illustrations you did? Why did you choose to present it in this way?
- During FIC training, it is a good idea to introduce each pre-flight briefing or lecture with a relevant accident. This will make it more real and give purpose to the exercise.

Common Faults:

- Avoid talking and writing on the white board at the same time with your back to the student(s).
- Make sure you use an aircraft model and keep it correctly oriented for the student's benefit.
- Make sure you include the student(s) in any briefing or lecture. Use eye contact and ask questions.

Example 1 Long Brief:

WELCOME TO YOUR

AVIATION SAFETY MODULE

13 Jan 2024: Instructor: Steve Pells

Video 1 **click left (internet required)**

QUESTION 1:

What do the following incidents have in common?

1:  	**In 2018 a training aircraft at Blackbushe taxies into the fuelling building.** **On talking to the solo student afterwards, it transpires that he was looking at his phone whilst taxying.**
2: 	**On 29 Dec 1972, an Eastern Airlines Tristar crashed into the Everglades killing 101 people.** **The cockpit voice recorder provided evidence that all 3 crew members were engrossed in trying to check a faulty bulb on the gear position indicator.**
3:  	**After a busy departure from Blackbushe in 2018, a light aircraft flies all the way to France with the flaps in the take-off position.**

A common theme in all of these incidents is……

DISTRACTION

QUESTION 2:

WHAT IS DISTRACTION?

The Oxford Dictionary defines distraction as:

'a thing that prevents someone

from giving full attention to something else'

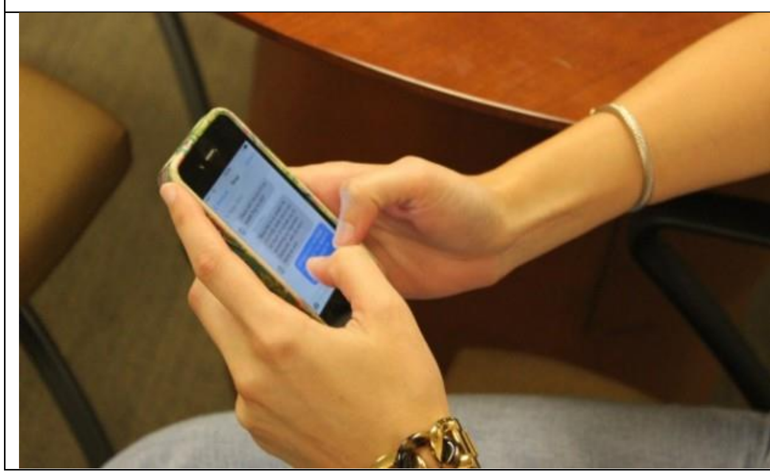
Does this sound like something

we want in aviation?????

Let's look at the 3 incidents again in a bit more detail:

- **G-BZEA, a Cessna 152, was being taxied by a student on a solo exercise.**
- **As it passed close to the refuelling building there was a crunching sound and the aircraft came to a halt.**

- **The student got out and found damage to the wing leading edge.**
- **He then taxied back to parking.**

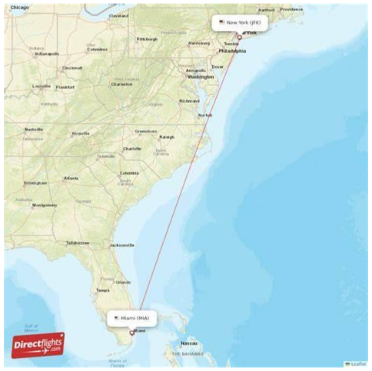


- **His instructor asked him what had happened.**
- **He said it wasn't his fault as he was sending a text message on his phone at the time.**

How do you think this incident could have been prevented?

- Turn your phone off before getting into the aircraft.
- Do not allow yourself to be distracted from the primary job of controlling the aircraft.
- Remember who is responsible!!
- Concentrate on the job at hand.
- Even taxying is a critical stage of flight!!

- Eastern Air Lines Flight 401 was a scheduled flight from New York JFK to Miami.



- Shortly before midnight on Dec 29, 1972, the Lockheed TriStar crashed into the Florida Everglades, causing 101 total fatalities.
- 3 of the 4 cockpit crew members, 2 of the 10 flight attendants, and 96 of the 163 passengers were killed; 75 people survived.

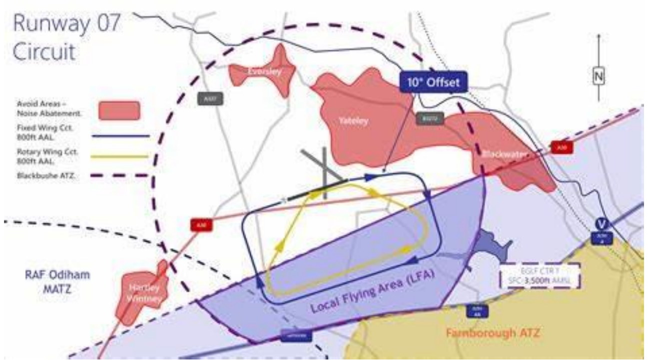
- The crash occurred while the entire flight crew were preoccupied with a burnt-out landing gear indicator light.

- The captain accidentally bumped the control yoke on the aircraft, causing it to turn off the autopilot.
- Due to the focus on the landing gear, the pilots didn’t notice.
- Because of this, the aircraft gradually lost altitude and crashed.

How do you think this accident could have been prevented?

- **One person could have been designated to watch the aircraft flight path.**
- **This would have allowed the other crew members to focus on the problem with the gear light.**

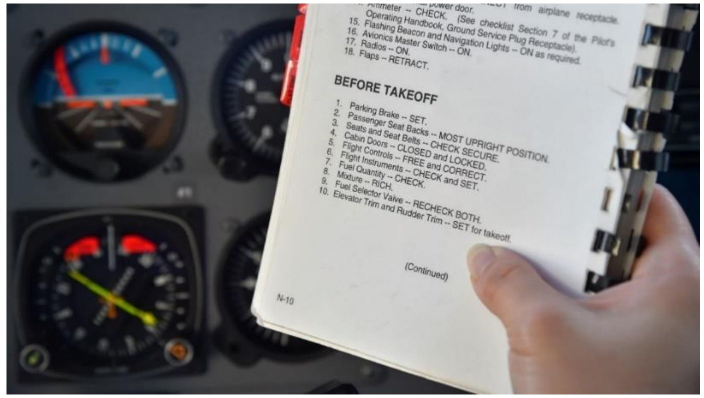
- **G-OSUS, a Mooney 230, was being flown from Blackbushe to Le Touquet, France.**



- **On departure, the circuit was busy and a Farnborough transit was required. This led to a lot of RT work.**
- **The after take-off checks were not completed.**
- **On selecting flaps for the approach into Le Touquet, it was discovered that they were already at the take-off position.**

How do you think this incident could have been prevented?

- **Strict checklist discipline could have prevented this from happening.**



- **Regular FREDA checks could be widened to take in the whole aircraft state, including flaps and landing gear.**
- **Think ahead and identify busy times of flight and have a system to manage workload.**

Now let's remind ourselves about:

TEM:

Threat & Error Management

Threats:

What do we mean by Threats?

Threats can be defined as situations or events that have the potential to have a negative effect on safety.

Threats can be classified as internal or external.

Internal threats are related to the individual – they are about YOU

Can you think of some examples of INTERNAL Threats?

Examples of internal threats are:

- **fatigue**
- **experience**
- **personal attitude**
- **lack of recency and proficiency**
- **health and wellbeing.**

External threats can relate to the context of the operation and therefore can be different depending on the situation.

Can you think of some examples of EXTERNAL Threats?

Examples of external threats are:

- **adverse weather**
- **high terrain or obstacles**
- **night operations**
- **other traffic**
- **equipment faults**
- **remote strips/landing sites**
- **weight and balance issues**
- **airspace design**
- **airport layout**
- **co-ordination**
- **communication failure**
- **navigation aids confusion**
- **other traffic**
- **visibility/weather issues.**

Errors:

What do we mean by Errors?

Errors can be defined as actions or inactions which can lead to:

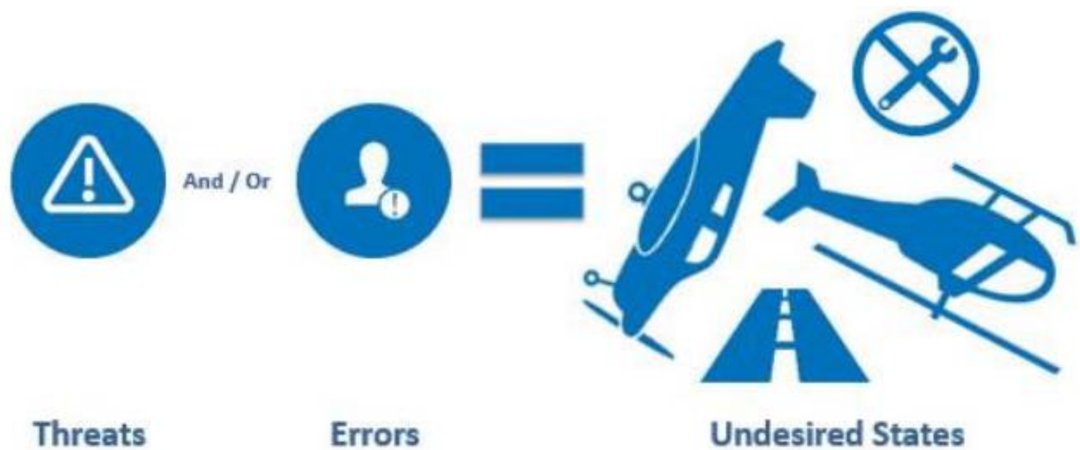
- a deviation from intentions or expectations
- reduced safety margins
- increased probability of undesirable events occurring.

Errors can be classified as **slips**, **lapses**, or **mistakes**, and are generally considered **unintentional**.

Can you think of some typical errors that could be made in aviation?

Typical errors may include:

- **incorrect calculations**
- **inaccurate planning**
- **non-standard communications**
- **incorrect altimeter setting**
- **incorrect systems operation or management, ie, selecting the wrong switch**
- **procedure or checklist errors.**



Threat and/or errors can lead to undesired states

Where do you think DISTRACTION fits into this framework?

Remember the ways we can MANAGE threats and errors:

AVOID

Take steps to avoid the error – prior planning etc

TRAP

Trap the error early on – maintain good situational awareness

MITIGATE

Reduce the consequences of the error

Now let's revisit each of the scenarios and see how we could manage distraction.

	**AVOID:** **TRAP:** **MITIGATE:**
	**AVOID:** **TRAP:** **MITIGATE:**
	**AVOID:** **TRAP:** **MITIGATE:**

What can cause a distraction whilst operating an aircraft?

- **Passengers**
- **Instructor**
- **Student**
- **Air Traffic Control**
- **Other aircraft**
- **Weather**

Have you ever been distracted while operating an aircraft?

Tell us what happened and how you managed the situation.

What will you do in future to manage distraction?

Video 2 **click left (internet required)**

Any Questions?

What Will You Take Away from this Module to make you a better pilot?

Long Brief Example 2:

Loss of Control in Basic Flight Training

A study in **Threat and Error Management** in light aircraft training accidents

Stephen Pells 28Mar23

We are used to discussing threats and errors every time we go flying, so let's have a quick recap:

What are threats & errors?

Threats:

Threats can be defined as a situation or event that has the potential to have a negative effect on safety. Threats can be classified as internal and external. Internal threats are related to the individual.

Examples of internal threats are:

- **fatigue**
- **experience**
- **attitude**
- **lack of recency and proficiency**
- **health and wellbeing.**

External threats can relate to the context of the operation and therefore can be different depending on the situation. Examples of external threats are:

Pilot Related Threats

- **adverse weather**
- **high terrain or obstacles**
- **night operations**
- **other traffic**
- **equipment faults**
- **remote strips/landing sites**
- **weight and balance**

ATC & Weather Related Threats

- **airspace design**
- **airport layout**
- **co-ordination**
- **communication failure**
- **navigation aids**
- **traffic**
- **visibility/weather.**

Errors:

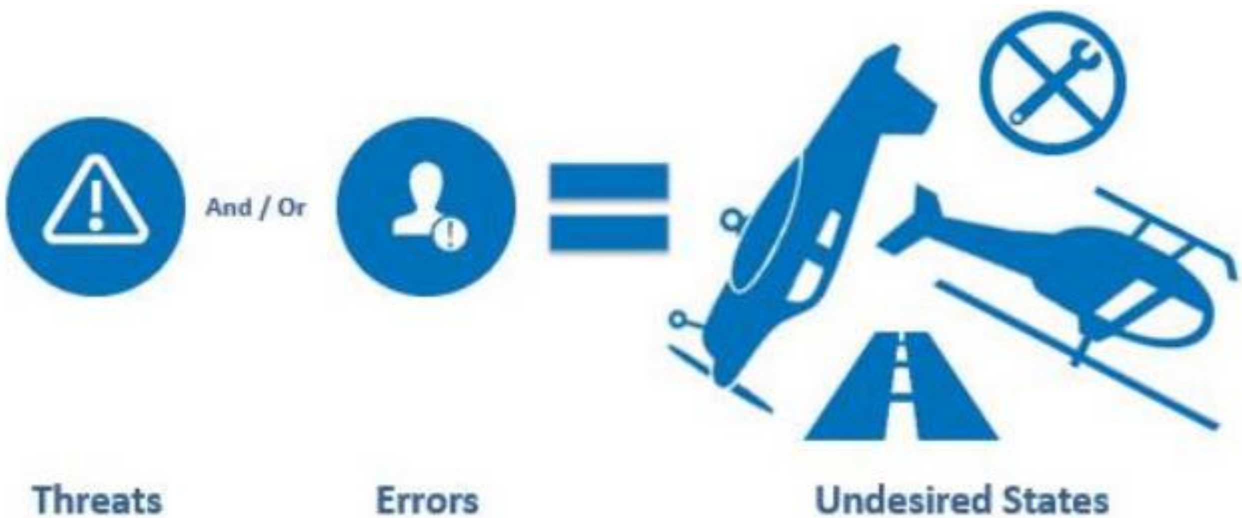
Errors can be defined as actions or inactions which can lead to:

- a deviation from individual or organisational intentions or expectations
- reduced safety margins
- increased probability of undesirable events on the ground and/or during flight.

Errors can be classified as **slips**, **lapses**, or **mistakes**, and are generally considered unintentional.

Typical errors may include:

- **incorrect calculations or input errors**
- **inaccurate planning or scheduling**
- **non-standard communications or handovers**
- **mishandling the aircraft/equipment**
- **incorrect systems operation or management, ie, selecting the wrong switch**
- **procedure or checklist errors.**



Threat and/or errors can lead to undesired states

Some Threats and Errors seen during basic flight training:

1: Loss of Control

2: Mid-air collision

3: Runway Incursion

4: Runway Excursion

5: Infringement

How does loss of control arise during flight training?

More importantly, how do we try to prevent loss of control?

[Play Video Clip](#)

Internet connection required

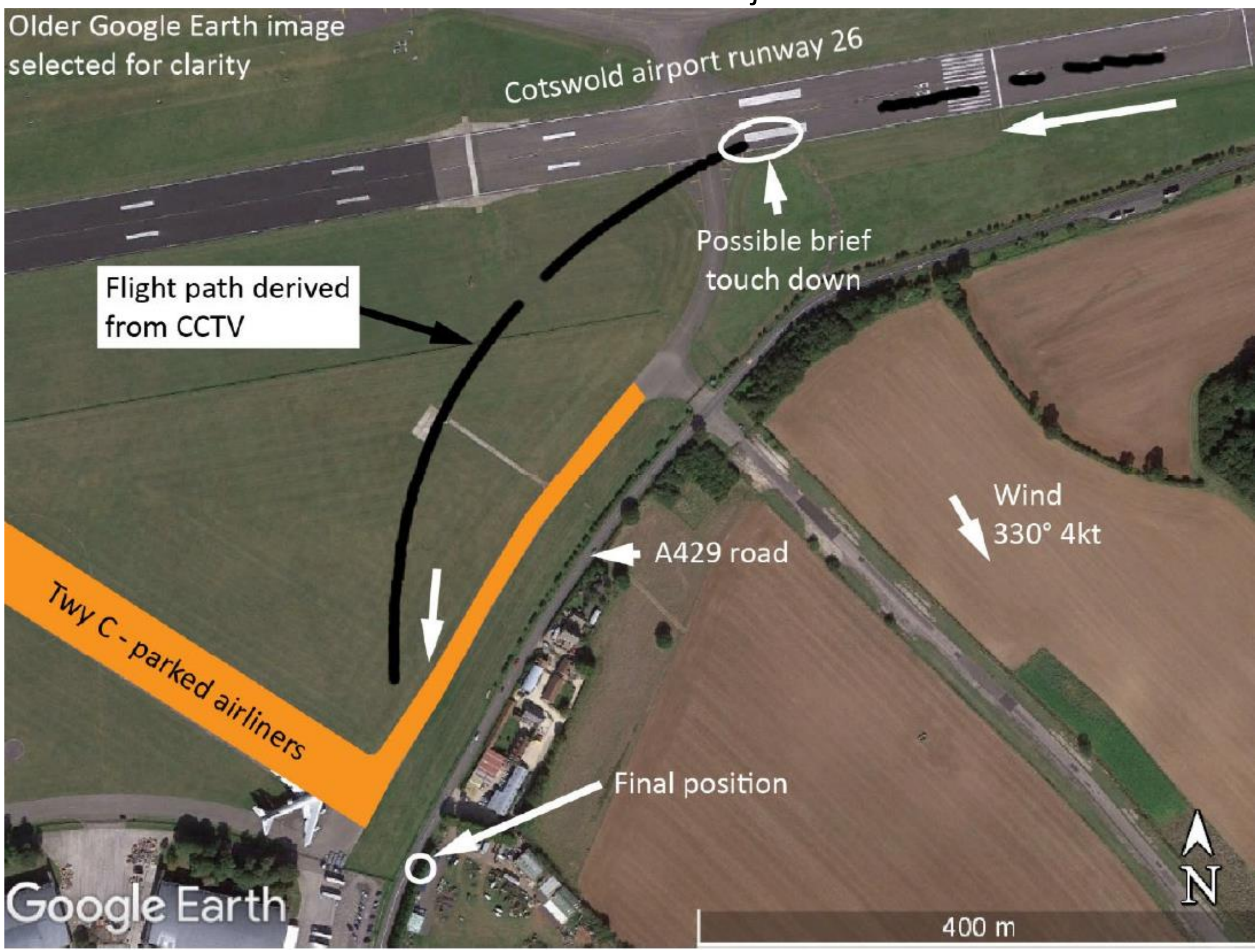
But fighting over the controls couldn't really cause an accident, could it???

https://www.youtube.com/watch?v=O8c57u3wYk4

Internet connection required

On 04 Aug 2022, a PPL student and their instructor went to Kemble airport to practice some circuits in a PA28-140.

During an attempted go-around the aircraft veered left from the runway track. The instructor was unable to establish a climb and the aircraft touched down approximately 350 m from the end of the runway, tracking approximately perpendicular to the left of the runway track. As the aircraft touched down it passed between two parked, out of use, airliners and its right wing tip struck the nose landing gear of one of the parked aircraft. The outer portion of the right wing was severed and the aircraft continued across the grass. It passed through the airfield perimeter fence, crossed the A429 road and came to rest in a ditch adjacent to the road.



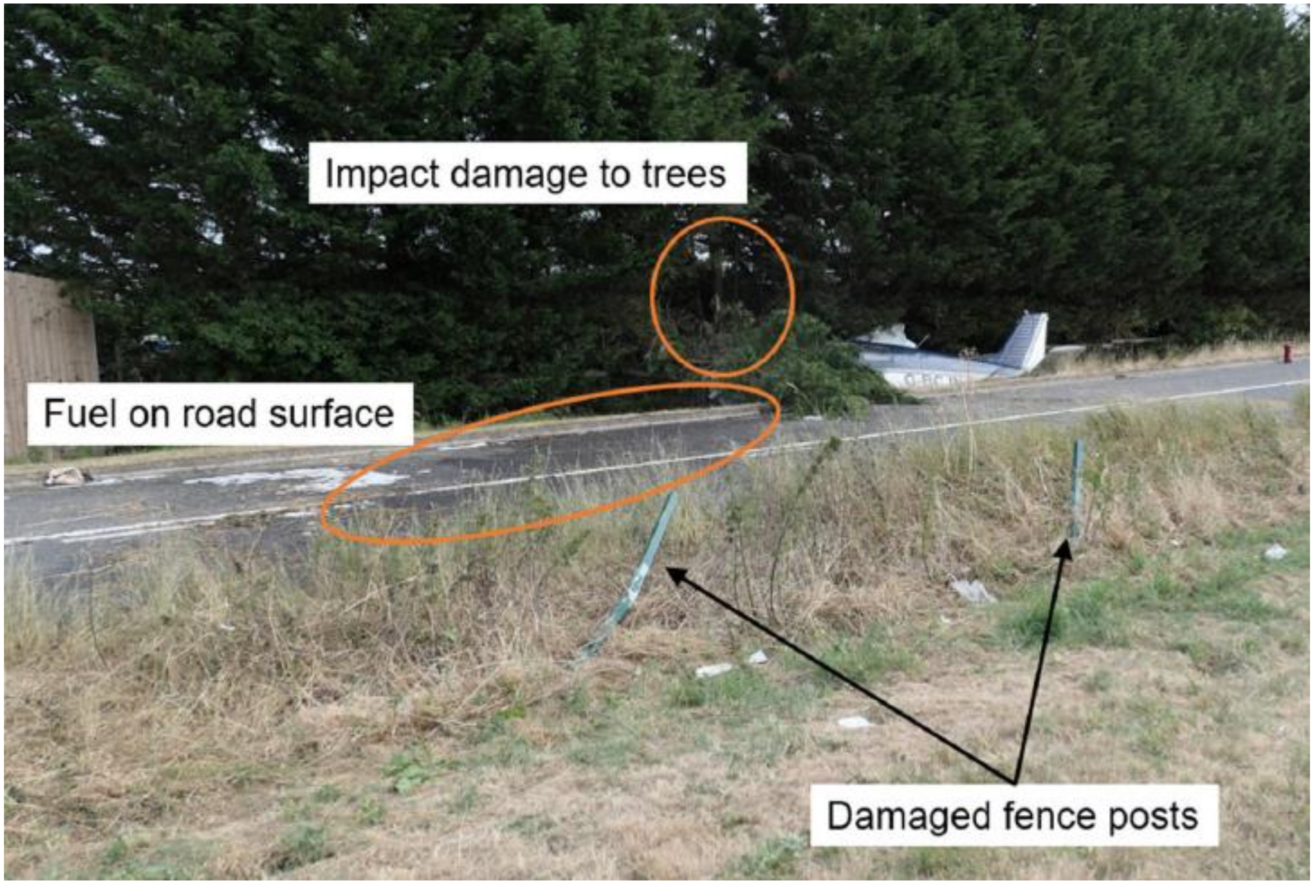
But Why???????

The instructor recalled stating “**I have control**” at approximately 100 ft agl.
He applied full power and retracted the flaps to 25° which is standard for a go-around.
At this point the airspeed was approximately 60 kt whereas the planned approach speed was 70 kt.
As the instructor applied power, he recalled the aircraft pitching up more than he expected and rolling left.

The instructor noticed that the student was continuing to make control inputs.

He described using explicit language to encourage the student to fully relinquish control.

The instructor did not recall the student stating “**you have control**” at any point nor did he recall stating “**I have control**” a second time.



The accident report has this very interesting sentences:

‘Both pilots felt the other continue to make control inputs and there was confusion between them as to what actions were being taken.

As a consequence, the go-around was not effectively instigated.’

Luckily, neither pilot was injured.

How can we stop this happening again?

- **Always know who has control**
- **Always release the controls on hearing ‘I have control’**
- **If in doubt check**

Further Reading

A copy of the AAIB report into the accident of PA28 G-BCJN contains the full details and is available free for download.

https://www.gov.uk/aaib-reports/aaib-investigation-to-piper-pa-28-140-cherokee-g-bcjn

Appendix 3: Pre-Flight Briefings (Short Briefings)

Introduction

The student has already either had a long brief on the subject, or self studied, so the purpose is not to teach the theory, but to provide a punchy overview of the entire flight that is about to take place, including pre-flight and post flight duties. It should leave the student in doubt about who will be doing what during the exercise.

In this regard, I am always reminded of the following limerick:

A gay man who lived in Khartoum,
Took a lesbian up to his room,
They argued a lot,
About who should do what,
And how, and with what, and to whom.

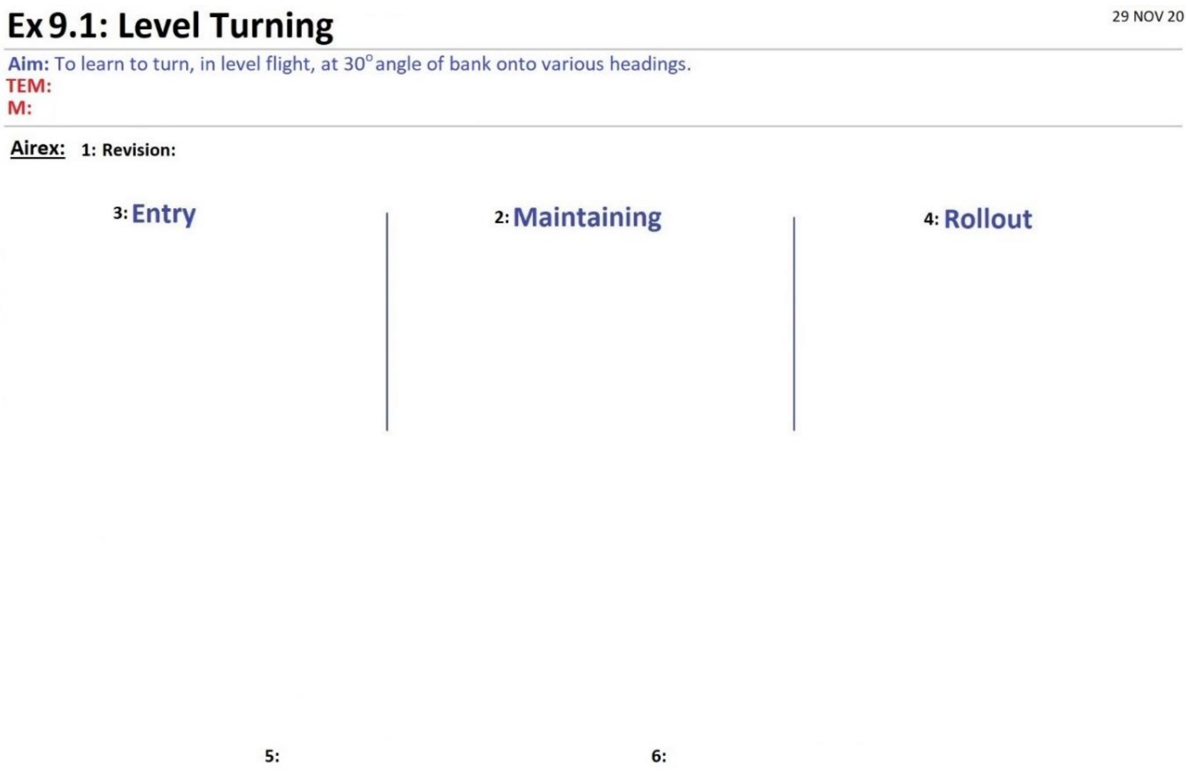
Although undoubtedly silly, it does get to the crux of the point of a short briefing! Note, not once do the participants use the word 'we'. 'How' is the most importand word of all.

The briefing normally includes a statement of the aim and brief allusion to principles of flight only if relevant. An explanation is to be given of the air exercises which are to be taught by the instructor and practised by the student during the flight. It should include how the flight will be conducted with regard to who is to fly the aeroplane and with what airmanship, weather and flight safety aspects which currently apply. The nature of the lesson will govern the order in which the constituent parts are to be taught.
The four basic components of the briefing will be:
1. The aim
2. Principles of flight (briefest reference only)
3. Threat & Error Management TEM.
4. The air exercise(s) what, and why and how and by whom.

Preparation

Make sure everything you need to deliver the pre-flight brief is available. There is nothing worse than an instructor having to leave the room to look for models or other aids. Even if this means delaying the start of the briefing, get everything together and ready, including the notes you will be using during the briefing.

Before starting the briefing, write the first part of the briefing on the board. Leave marks and spacers where you will write the remaining text, otherwise crowding can occur.



Ex 9.1: Level Turning

29 NOV 20

Aim: To learn to turn, in level flight, at 30° angle of bank onto various headings.
TEM:
M:

Airex: 1: Revision:

3: Entry | 2: Maintaining | 4: Rollout

5: 6:

Do this in silence. Remember, NEVER talk to the student(s) while your back is turned and you are writing.

For example in EX9.1 you could prepare this part and lead the students through what follows.

Writing in CAPITALS rather than *cursive script* can be more legible to a class, depending on how neat your writing is. But avoid too many capitals.

Do not under-estimate the effectiveness of underlining something.

Do not be afraid to use abbreviations on your board briefing, as long as they have been explained: eg: clb for climb, Att for Attitude etc. Little diagrams are helpful too such as a mini balance ball  for balance, or pair of eyes  for lookout. This will make the board look more appealing than one covered with words.

Use colour consistently, with **RED** being used for importand things or danger.

Build Up The Brief

From Exercise 6 onwards, it can be a good idea to address the question as to WHY we are doing each lesson, as it is not always obvious to the student. 'Why are we learning to fly S&L?' 'Because when we are flying somewhere far away, the majority of our flying will be S&L.'

Make sure the student knows what the difference between a threat and an error is. Then, elicit the threats and possible errors from the students that you want, by guiding your questions: eg: 'what possible threat could we have on a busy weekend in the local area?' or 'what possible errors could we make when using the altimeter?' Just asking 'what threats are there today' could create all sorts of answers, many of them not relevant to the direcion you want to lead them. Then in the 'Management' row, add solutions to these threats and errors. It is not enough to simply identify errors – they must be managed: avoided, trapped or mitigated. Once mentioned, try to revist these threats and errors frequently throughout the brief and flight. TEM can thus permeate the whole instructional process rather than just be a monotonous list at the beginning of a pre-flight brief.

Outline how the flight will begin and who will do what to get the aircraft airborne. Use the words I and YOU (see below).

The use of colour on the board is important. Do not write everything in the same coulur. Have a system. **Red is useful for important or dangerous things.**

Then build up the rest of the board briefing by using building blocks. In this case begin with the ‘Maintaining’ building block. Then move onto the ‘Entry’ etc. Remember talk to the students, then turn and write in silence, then turn back and talk.

Remember to ask question regularly to prevent ‘instructor drone-on’. An interactive and facilitative style is much preferable.

Talk about **HOW** things will be done, not just what will be done: ‘I will enter the turn using co-ordinated input on the rudder and ailerons.’

Although it can be difficult at times, avoid the use of **WE** as much as possible. Use **I** and **YOU**. For example: ‘I will fly the aircraft to the local area, where you will carry out a FREDA check. Then I will demonstrate how to carry out a HASELL check. You will then have a chance to practice.’

Make sure you use the word ‘Teach’ as appropriate. Many instructors say they will demonstrate a manoeuvre then the student will practice. There needs to be an element of teaching, after all, that is what an instructor does! Remember the Circle of Learning.

Avoid the use of negative training: Tell the student what you want him to do, not what you DON’T want him to do. He may focus on these items instead of the primary task.

Use of Visual Aids

Try to incorporate models and visual aids as much as possible. Always use the airraft model for all pre-flight briefings, especially when under assessment.

When holding the aircraft model, always orient the model so that it appears the correct way round for the student rather than the instructor.

Which of these instructors has mastered the technique?

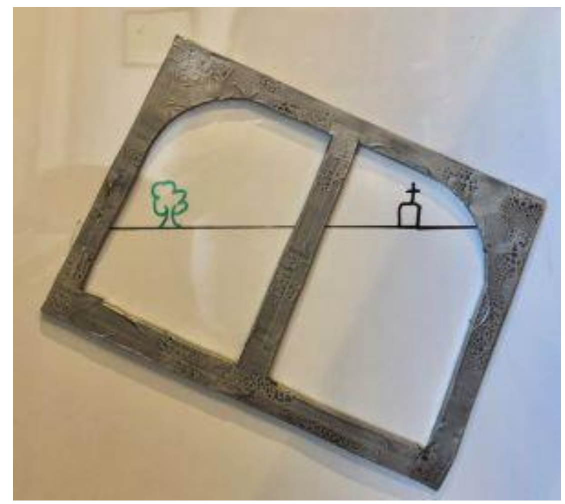
Actual aircraft instruments make very compelling teaching aids:

But having blown up diagrams of cut-away instruments allows you to explain their operation in more detail.

An aircraft window cutout can be used very effectively to show changing attitudes without having to redraw:

Straight & Level

Level turn to the right



Descending turn to the right

These can be made easily from cardboard, and if your whiteboard is magnetic, small magnets can be attached to the cutout to make it stay in place.

When showing changes in attitude using the cutout, be sure to exaggerate the changes to make them more visible to the student.

Appendix 4: FI Groundschool

Teaching & Learning

There is a requirement for the trainee instructor to have a minimum of 25 hours of **Teaching & Learning** Groundschool. A suggested breakdown is as follows:

1. The Learning Process	
Motivation for Learning	Establish why the student wants to learn. It makes a huge difference to their performance if they actually want to learn. Common motivations include: Self-improvement, Career goal, Personal achievement, Financial reward, Desire to please family or employer.
Incentives to Learning	Learning is always easier if there is some reward at the end. Find out what the student is looking forward to. Common incentives include: Self-improvement, Career advancement, Personal improvement, Financial reward, Desire to please family.
Obstacles to Learning	Find out if there are any special needs. Medical, for example dyslexia is common in trainee pilots. Disability, airsickness, vertigo, phobias. Finance and time availability can also be huge obstacles. Aptitude, or lack of aptitude can also be a considerable obstacle. Remember, students need to be physically, mentally and emotionally ready to learn.
Learning Methods	Everyone learns in a different way: Some students are happy to self-study using on-line resources and books. Some students will need more intensive one on one teaching. Most will be in the middle. Some students like to understand everything and relish formulae. Others are happy to accept certain facts and move on. Some students need visual aids and lack the ability to create mental models easily. Others are good at this.
Rates of Learning	Each student will have a natural pace of learning. Establish that pace early on and don't try to push them to accelerate too much. This is easy for one on one learning, but in a group can cause problems.
Perception & Understanding	Students will find different topics harder or easier than you did when you were learning. Remember everyone is different and learns in their own way. It is your job to harness the student's ability.
Memory and its Application	People remember things in different ways. You may need to use inventive methods to solidify a concept or routine. Acronyms can be a good way. As can cockpit flows. Others prefer to count the number of actions.
Habits & Transfer	Remember, the student will watch you like a hawk in the early days, so it is vital that you don't let them mimic any bad habits that you may have. Strive to uphold the highest standards at all times.

2. The Teaching Process	
Elements of Effective Teaching	What makes a good teacher? Think of examples from your and their history. Why are some teachers better than others? **Enthusiasm:** Keen to get on with the job and do it in a positive manner. Enthusiasm is contagious. On the other hand, a lack of enthusiasm will sow the seeds for similarly negative attitude in your students. **Patience:** Many of your students will need to have procedures and techniques explained to them time and time again. Even though you may feel that you are 'banging your head against a brick wall' you must remain patient. Patience is especially needed when dealing with inexperienced, forgetful or underconfident students. **Sincerity:** Takes an interest in his student's progress both on the ground and in the air. Having an open and honest attitude with the student which will gain respect and confidence. Lies, half-truths and false write ups will undermine trust, destroy the instructor/student relationship and obstruct the student's ability to learn. **Adaptability.** An instructor must be adaptable or flexible as every student is different and requires a different approach. **Fairness:** An instructor never shows favouritism - do not be over friendly with one student and distant with another. **Honesty:** Instructors never bluff - if you need to discipline a student or threaten to take action, then do it. Do not make threats that you have no intention of carrying out. If an instructor does not know the answer to a question, then he says so. An instructor admits to his own mistakes. He never blames others and to admit that 'you were right and I was wrong' does much to improve the relationship with your student. **Considered:** An instructor does not make quick 'on the spot' judgements. When assessing a flight, he should take some time to think it over so that good points as well as bad points are considered. A balanced view will give an assessment that is valid and reliable. **Decisive:** They consider all the factors so that they make correct decisions and then act upon them. **Interested**: A good instructor is interested in his students and lets them know this by taking an interest in their backgrounds, problems, achievements and ambitions. **Motivating:** Good teachers tend to be able to motivate well. So, the key to being an effective teacher, is often how to motivate the student (see the Learning Process).
Planning of Instructional Activity	It is important to have a well-structured plan for lessons and for the overall course. This takes time and will involve the preparation of course content and teaching aids. Avoid having multiple sessions of the same kind of instruction - mix up between flights, lectures, practice sessions and hands-on learning if possible.
Teaching Methods	There are many ways to teach, just as there are many ways to learn. Which methods are used will in part be decided by the instructor, and in part by the needs of the student.
Known to Unknown	See Appendix 1: Instructional techniques
Use of Lesson Plans	Rather than make things up as you go along, it is much better to have a lesson plan which will keep you on the correct track. Use pre-prepared documents and teaching aids.

3. Training Philosophies	
Value of a Structured (approved) **Course of Training**	A structured course of training is always better for everyone - The student knows what is coming next, and the instructor can use it to keep him on track. If training at an ATO or DTO, there should already be an approved course of training for most courses. Outside such an establishment, the instructor needs to have a framework. Time should be taken to work out a syllabus that can be followed. Basic topics can then be expanded by group discussion or examples from real life instruction. A good FIC instructor will always have a good supply of stories to share.
Importance of a Planned Syllabus	Flying training is a complex business, and the well-defined syllabus that has been developed over the years, helps everyone understand the path that needs to be followed. Use either a commercially available course book, or devise one of your own and distribute it to the students beforehand.
Integration of Theoretical Knowledge and Flight Instruction	There is no point trying to explain something in the air or in a short briefing if the student has not already studied that concept in greater detail. As such, it is important to make sure the theoretical knowledge and the air instruction are synchronised. Find out if the student has done the required reading before the flight lesson. If not, it may be appropriate to cancel the flight and do ground school. This will ensure that next time he is better prepared. It is important that the theoretical and practical sides of the training run roughly concurrently – If the student has already read a certain chapter of the book, it makes the lesson much more relevant.
3a. Instructor Standards	
Appearance & Conduct	The instructor at all times must appear smart, well groomed and professional. A sloppy or dishevelled appearance is indicative of poor personal standards and attitude towards the job.
Personal Habits	Personal habits, such as scratching, picking, mumbling etc detract from the student's experience and should be minimised where possible as they are distracting.
Food & Cleanliness	An instructor should avoid eating smelly or gas-producing foods, such as garlic or beans, in the hours before instructing. Remember you will be sharing a very small space together!
Personal Standards	The instructor should strive for the highest standard of tuition and aircraft operation throughout. He should keep himself up to date with the latest rules and regulations, as well as aircraft and flying school procedures.
Professional Standards	All instructors at a school should be standardised – ie they should all teach in the same way. This allows them to share students easily. The method your ATO uses to teach each lesson will be in the relevant ATO manual. Most ATOs maintain standardisation by regular standards meetings where such matters are routinely discussed.

4a. Techniques of Applied Instruction - Theoretical Knowledge – Classroom instruction Techniques:	
Use of Training Aids	There are a great many training aids that should be used to assist in instruction: Whiteboard, OHP, PowerPoint, Aircraft models, cockpit window cut-outs, real aircraft instruments, charts, computers etc. The importance of these visual aids cannot be overstated, and no pre-flight briefing should be given without the aircraft model being close at hand. Audio-visual presentations, such as short videos or photographs can make a theoretical knowledge lesson come alive. The CAA still value the ability of an instructor to deliver a briefing on a whiteboard.
Group Lectures	If there are several students at around the same stage in training, a group lecture can be a good way to reduce time for the instructor, but more importantly, the interaction between several students can generate positive learning benefits.
Individual Briefings	Sometimes, a one-on-one briefing can be more valuable, especially if the student has a special need or is struggling/racing ahead.
Student Participation/Discussion	As with Group Lectures, above, student participation and discussion can be a very useful tool in learning. Observing students discussing a topic can tell the instructor the level of understanding that has been gained.
4b. Techniques of Applied Instruction - In-Flight – Airborne Instruction Techniques:	
The Flight/Cockpit Environment	The cockpit environment in flight is alien to most students, and has a number of limitations when it comes to teaching and learning. The student will be under a workload – possibly overloaded, or may be anxious. The side by side seating and lack of eye contact poses challenges, which need to be overcome. The lack of a 'pause button' means that the instructor cannot go into in-depth explanations during flight. This is best dealt with by making a note on the kneeboard for later discussion. But do not forget to return to the subject after the flight.
Techniques of Applied Instruction	Nothing in the airborne lesson should be new to the student. Everything should have been discussed on the ground in either the long briefing or the short briefing. Any airborne debriefing should always involve the instructor taking control first, to allow the student to concentrate fully. Some students feel that the instructor taking control is an admission of failure on their part. A good way to do this is to say 'I have control, just so I can explain this to you'.
4c. Techniques of Applied Instruction - Post-Flight:	
Debrief	The importance of a good debrief cannot be overstated. An effective debrief cannot be conducted in the air, and it is vital that a debrief is carried out after flight to ensure the relevant messages are driven home. The debrief need not take very long, but it is a critical, and all too often forgotten part of the lesson. The debrief should include any notes you made during the flight for discussion later. Make sure the student takes notes during a debrief or the chances are, the information will be lost.
4d. Techniques of Applied Instruction - In-Flight Judgment and Decision Making	
Judgment and Decision Making	It is more or less impossible to teach judgement and decision making effectively in the classroom. The best way is to teach by example. Whenever opportunities arise during the flight (weather or technical situations), try to involve the student and allow them to see how decisions are made and solutions are found. This sets the seed for the teaching of CRM.

5a. Student Evaluating & Testing - Assessment of Student Performance:	
The Function of Progress Tests	Progress Tests are important to allow both the student and instructor to gauge the student's performance. As a fundamental tenet of instruction is 'to take the student from where he is to where he needs to be', we need to know where the student is in order to be able to do this effectively. Progress tests can be written or practical.
Recall of Knowledge	The regular asking of questions during ground and flight instruction can give a good idea of the student's factual knowledge. **The Law of Exercise.** This law states that things most often repeated are best remembered. Frequently asking your student to give the answer to an important question will help him to remember it when needed. For example, every time he lines up for take-off, ask him the demonstrated crosswind. Every time he starts the engine, ask the starter duty cycle.
Translation of Knowledge into Understanding	More probing questions will be needed to make sure the student's knowledge of facts has been fully understood. Many students are good at remembering facts, but they need to be understood. For example – the student knows the crosswind limit is 13 kts. But, when the tower gives the wind for take-off, fails to understand whether or not this limit has been exceeded.
Development of Understanding into Actions	The most advanced form of learning allows the previously learned facts and their understanding to be translated into actions. For example after a simulated cabin fire in flight, the student has learned that turning off the Battery Master Switch is an item on the checklist. He is able to recall and understand this fact. However, this fact in itself is only the beginning. Once he has translated this knowledge into understanding, he should be able to realise that he has now lost the use of the radio transponder, and any electrically operated flaps. The final stage is developing this understanding into actions – the student then tells you he will have to join the airfield non-radio and perform a flapless landing.
The Need to Evaluate Rate of Progress	Every student learns at their own rate, and this rate needs to be understood by both parties. Sometimes the rate may be so slow that a serious conversation is needed. Sometimes, an enthusiastic student wants to race ahead. This also needs to be managed.
5b. Student Evaluating & Testing - Analysis of Student Errors:	
Establish the Reason for Errors	Students rarely make errors deliberately. There is always a reason why errors are made – it may be poor instructional technique or a failure to grasp a concept. The key to improving performance is identifying the reasons why an error is made. For example, on the ILS, the student always goes high on the glide slope at the FAF. The reason turned out to be that he always selected flap at the FAF. Knowing the reason can help prevent its recurrence by forewarning.
Tackle Major Faults First, Minor Faults Second	It is unrealistic to try to solve all the problems in a flight by a single debrief. It is important to prioritise the major faults first and fix them before tackling the smaller ones.
Avoidance of Over-Criticism	If too much criticism is levelled at the student, he may become despondent and this may result in demotivation. As above, tackle the major problems first (or in isolation).
The Need for Clear Concise Communication	As in all elements of flight instruction, communication is the key. The student must always understand what is required of him, and how his performance fared.

6. Training Programme Development	
Lesson Planning	Good lessons are not made up as the instructor goes along. They have well defined aims, well thought out content, with various visual aids, and a summary at the end.
Preparation	Spend time preparing the material, including any handouts or visual aids. Not only does it make your teaching job easier, but the student feels that a more professional job is being done.
Explanation & Demonstration	Be ready to explain concepts in more than one way if a student struggles to grasp it the first time – just because you understand that explanation, doesn't mean your student will.
Student Participation & Practice	Asking of questions and practical exercises will allow you to ascertain if the student understands. Less outgoing students may just nod rather than admit they don't understand something.
Evaluation	Make sure you (and your student) are happy with the student's progress before moving on to the next subject.

7. Human Performance and Limitations Relevant to Flight Instruction	
Physiological Factors	A student who is tired, hung-over or airsick will not be in a good place to learn. Get the student used to assessing his own condition before deciding to fly.
Human Information Processing	Make sure the student does not become overloaded during lessons. Often, the instructor will want to move on to the next part before the student has fully assimilated the previous section. This is counter-productive.
Behavioural Attitudes	Monitor student attitude and behaviour to see if any negative trends are developing. If they are, address them early on so that there is time to change.
Development of Judgment & Decision Making	While training your student, if decisions have to be made, involve the student – that is how he will learn to make decisions himself. Explain to him why you made the decisions you did. This is how CRM is best taught.

8. Hazards Involved in Simulating Systems Failures and Malfunctions in the Aeroplane During Flight	
Selection of a Safe Altitude	Have minimum altitudes for hazardous activities such as stalling, spinning, engine shutdowns, EFATO etc. They may be set by the training establishment, or you may need to set your own. Never be tempted to go below them as this sends the wrong message to the student.
Importance of 'touch drills'	Make it clear to the student whether the failure and subsequent drills will be real or touch drills only. Certain items can still be moved during touch drills – throttle, fuel pump etc.
Situational Awareness	Introduce the term 'Situational Awareness' and stress that it applies to Geographical environment as well as checklist status and aircraft operational state. Consider such tools as 'Plane-Path-People' to help develop awareness.
Adherence to Correct Procedures	Always use the correct procedures, and do not hesitate to refer to the appropriate checklist in flight. This sends the message to the student that it is ok to do this himself.

9. Training Administration		
General:	**Flight/Theoretical Knowledge Instruction Records:** The importance of the instructor making such student records as soon as possible after the event. **Log books:** The need to keep both instructor and student log books up to date. **Flight/Ground Curriculum:** The instructor should know the curriculum and know where to find the details. **Study Material:** The importance of knowing what material is available for instruction and study. **Official Forms:** The instructor should have a good knowledge of the required CAA and ATO/DTO forms. **AFM/PoH:** The instructor should be familiar with these publications and encourage the student to study them. **Flight Authorisation:** The instructor and the student should both be familiar with flight authorisation procedures. The student should be encouraged to take responsibility for this. **Aircraft Documents:** The instructor should be familiar with these documents and encourage the student to study them. **Licence & Rating Requirements:** Both instructor and student should understand the privileges and limitations of their licencing documents.	
The FI(A)'s Responsibilities:	**Training standards:** A high level of personal standards should be maintained by the instructor. **Standardisation:** A high level of commonality with other instructors should be maintained. **Authorisation & Supervision of Student Solo Flight:** The instructor, whether restricted or not, should understand the requirements for student solo flying, including weather minima. **Preparation for Skill Tests/Proficiency Checks:** Although not primarily there to teach the student to pass the test, the instructor should be fully aware of the requirements of the relevant test the student is being prepared for. **Training Effectiveness:** The instructor must consider how effective his instruction is, and if necessary, seek to address this. **Examination & Fault Analysis:** The instructor must be effective at analyzing student faults before he can correct them. **Development of Student Responsibilities**: The instructor must strive to encourage the student to take responsibility from an early stage of training – PPR, walkarounds etc. Not only does this reduce workload on the instructor, but it makes the student feel empowered. **Instructor Continuity Training:** The instructor role is continually changing and both theoretical and flying skills need to be kept up to date.	
FCL FI(A):	**Introduction** **General Information** **Privileges** **Experience Requirements** **Skill Tests & Proficiency Checks** **FI(Restricted) & Removal of Restriction** **Revalidation/Renewal of Ratings**	The instructor must have a good working knowledge of all of these pieces of legislation, and keep up to date with them as they change.

Appendix 5: Flight Training

1: General Considerations:

During FI training, the trainee instructor may never have done 2 things that will be asked of him:

- Fly from the right hand seat. He may be particularly anxious about landing from the unfamiliar seat. Make sure he is able to land satisfactorily from the other seat before sending 2 trainees off together on a mutual. There are other difficulties in operating from the other seat, such as parallax errors. For example, if the student in the left hand seat sets 2300 rpm, it may look like 2200 rpm when viewed from the right hand seat. The trainee instructor must get used to this and take this into account. Similarly with other instruments.
- Spinning. The fact that many trainee instructors have never done spinning before, may mean a few extra hours are needed to train this thoroughly.

2: Give and Give-Back:

The in-flight section of the FI course follows a very specific format. It involves the FIC instructor giving the lesson to the trainee instructor as though he were a PPL student. This is done in real time and will involve the trainee instructor practicing what he has been shown.

Once this is complete, the FIC instructor will ask the trainee instructor to give the lesson back to him, he now assuming the role of the PPL student. This 'give back' should again occur in real time, and the FIC instructor may make typical student errors when invited to practice. Afterwards, feedback may be offered to the trainee instructor which may involve a repeat of the give and give back.

Once this, initially odd, procedure has been learnt, it is repeated for all the exercises in the syllabus and soon becomes second nature.

Some FIC instructors give the whole lesson in one go, and then expect the 'give back' in one go also. However, a better, and more practical method is to break down the lesson into bite-sized chunks. An example for Ex10a(i) follows:

'Text in blue' indicates the FIC instructor talking to the supposed PPL Student.
'Text in green' indicates the FIC instructor talking to the Trainee Instructor.

1. The FIC instructor starts by demonstrating only, with no follow through, of the approach to a clean stall including HASELL Checks. 'I have control. I am now going to demonstrate the full stall and standard stall recovery. I just want you to watch what happens – we will break it down later'. He carries out a HASELL check and demonstrate in silence a full clean stall with SSR. 'So, by the end of this lesson, you should be able to do that.' 'Now, I'd like you to give that back to me.' The trainee instructor now repeats that chunk of the lesson.
2. 'I have control. We are now in the local area and ready to start the exercise. Remind me what we must always do before practicing a stall.' 'That's right a HASELL check. So our Height is 3000', which is sufficient to recover by 2000' agl. Airframe: We are clean, which is what we want for this stall. Security: I am secure, are you? No loose articles in the aircraft. Engine: Ts & Ps are checked OK, and I will put the Carb Heat on for 10 seconds. Location: We are not above any Airfields, Built-Up areas, Controlled Airspace or Cloud, or Danger Areas. Now the Lookout. I will do a 90 degree turn to the left followed by one to the right. Give me a hand looking for other traffic, please.'

‘OK, so we are now ready to start the approach to the stall. No need to follow me through, just watch my demonstration. So, I begin by putting on the Carb Heat to protect the engine. I close the throttle, keeping the aircraft straight with rudder. I am preventing the nose from dropping by holding the back pressure. I am trimming some of it off. Still holding the back pressure.’ You may wish to leave some power on to prolong the deceleration and allow you to better point out the signs. ’Notice the high nose attitude. I can remove this symptom of the stall by simply moving the control column centrally forwards – see. But let’s say I don’t do that – I keep holding the nose up. The next thing I notice is the reduced airspeed. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. But let’s say I keep holding the nose up. The next thing I notice is the sloppy controls – have a feel. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. But let’s say I keep holding the nose up. The next thing I notice is the stall warner sounding. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. At any time that any of these symptoms of an approaching stall occur, I can remove them by just moving the control column centrally forwards.’ At this point, move the control column centrally forwards to remove all signs of the approaching stall.

3. Recover the aircraft to 3000’ again. ‘Now I’d like you to have a go at carrying out a HASELL check and setting the aircraft up for the approach to the stall. I want you to note each symptom and when you have seen all the symptoms, remove them by moving the control column centrally forwards. You have control.’ The trainee instructor now practices this as though he were a PPL student.
4. ‘I now want you to give me that section back.’’ The trainee instructor now gives this section of the lesson back to the FIC instructor. When it is the FICI’s turn to practice, he may make a mistake or two, such as forgetting to carry out a HASELL check. This should be addressed by the trainee instructor. The FICI will then offer feedback. Then the next section.

NOTE: This can get a little confusing at times. The trainee instructor can lose track as to which role he is supposed to be playing. One way of making this easier is to assign a name to the supposed PPL student. For example, if the trainee instructor’s name is Mark, he may choose David as his PPL student name. The FIC instructor’s name may be Steve, but chooses Jimmy when he is a supposed PPL student. This way, when the FIC instructor says ‘OK, David, I want you to show me a stall’, the trainee instructor immediately knows which role to assume.

See the previous lesion section using this method:

1. Steve starts by demonstrating only, with no follow through, of the approach to a clean stall including HASELL Checks. ‘OK, David, I have control. I am now going to demonstrate the full stall and standard stall recovery. I just want you to watch what happens – we will break it down later’. He carries out a HASELL check and demonstrate in silence a full clean stall with SSR. ‘So, David, by the end of this lesson, you should be able to do that.’ ‘Now, Mark, I’d like you to give that back to me.’ Mark now repeats that chunk of the lesson. ‘OK, Jimmy, I have control. I am now going to demonstrate the full stall and standard stall recovery. I just want you to watch what happens – we will break it down later’. He carries out a HASELL check and demonstrate in silence a full clean stall with SSR. ‘So, Jimmy, by the end of this lesson, you should be able to do that.’
2. ‘I have control. We are now in the local area and ready to start the exercise. David, remind me what we must always do before practicing a stall.’ ‘That’s right a HASELL check. So our Height is 3000’, which is sufficient to recover by 2000’ agl. Airframe: We are clean, which is what we want for this stall. Security: I am secure, are you? No loose articles in the aircraft. Engine: Ts & Ps are checked OK, and I will put the Carb

Heat on for 10 seconds. Location: We are not above any Airfields, Built-Up areas, Controlled Airspace or Cloud, or Danger Areas. Now the Lookout. I will do a 90 degree turn to the left followed by one to the right. Give me a hand looking for other traffic, please David.'
'OK, so we are now ready to start the approach to the stall. No need to follow me through, just watch my demonstration. So, I begin by putting on the Carb Heat to protect the engine. I close the throttle, keeping the aircraft straight with rudder. I am preventing the nose from dropping by holding the back pressure. I am trimming some of it off. Still holding the back pressure.' You may wish to leave some power on to prolong the deceleration and allow you to better point out the signs. 'Notice the high nose attitude. I can remove this symptom of the stall by simply moving the control column centrally forwards – see. But let's say I don't do that – I keep holding the nose up. The next thing I notice is the reduced airspeed. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. But let's say I keep holding the nose up. The next thing I notice is the sloppy controls – have a feel. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. But let's say I keep holding the nose up. The next thing I notice is the stall warner sounding. Again, I can remove this symptom of the stall by moving the control column centrally forwards – see. At any time that any of these symptoms of an approaching stall occur, I can remove them by just moving the control column centrally forwards.' At this point, move the control column centrally forwards to remove all signs of the approaching stall.

3. Recover the aircraft to 3000' again. 'Now, David, I'd like you to have a go at carrying out a HASELL check and setting the aircraft up for the approach to the stall. I want you to note each symptom and when you have seen all the symptoms, remove them by moving the control column centrally forwards. You have control.' David now practices this.
4. 'OK, Mark, I now want you to give me that section back.'' Mark now gives this section of the lesson back to Steve. When it is Jimmy's turn to practice, he may make a mistake or two, such as forgetting to carry out a HASELL check. This should be addressed by Mark. Steve will then offer feedback. Then the next section.

3: Simulated Emergencies:

During FIC training as well as all other forms of flight training, there is a need to simulate emergencies. It is important that these 'simulated' emergencies are managed carefully so that they do not in themselves become real emergencies.

Types of Emergency:

There are two basic types of simulated emergency:

- **Life-threatening emergencies** such as engine fire, engine failure, pilot incapacitation.
- **Non-Life-threatening emergencies** such as radio failure, electrical failure, getting lost.

Simulated Engine Failures:

There are 2 ways the instructor can simulate an engine failure:

- **Closing the throttle** – ideal for an engine failure after take-off (EFATO), but not the best way in cruise flight.
- **Building a Scenario –** Far better and more realistic for engine problems in the cruise. A problem can be built up in a more realistic way by the instructor pointing out things that are not normal. For example, starting with a high oil temperature, then a strange vibration, then possibly some smoke or fumes from the engine. This may encourage the student to run the engine at lower power and carry out some diagnosis (which may fix the problem) before rushing in to the full engine failure drills. There is no time for this method during an EFATO.

During the course of the ensuing practice engine failure in single-engined aircraft, the instructor is effectively also acting as a safety pilot. In a real engine failure, the student would not be expected to 'warm the engine' periodically. If they choose to do so then that is ok, otherwise the instructor must do so since he has a 'duty of care' to the aeroplane. This is no negative reflection on the student. In a similar manner, the instructor is responsible for making sure the carb heat is on, low flying rule adherence and calling the go-around.

Simulated engine failures of single-engined aircraft may also be practiced in the circuit, but be careful not to inconvenience other airfield users.

Simulated Engine Failures (Multi-Engines Aeroplanes):

Practice EFATOs on multi-engined aircraft should always be carried out at a suitable height. Each ATO will specify a minimum height, but 500' is typical. Remember, if the student puts the full 'wrong' rudder in, would you be able to recover from the height at which you gave the failure? At some airfields, due to noise abatement restrictions, this may mean that a practice EFATO will occur on the crosswind leg rather than climbout. After completing an asymmetric/OEI circuit to land, a full stop landing should always be made rather than a touch and go. This is in case the simulated failed engine is slow to respond when power is added for take-off. If further training is required, vacate the runway and taxi back to the holding point.

Touch Drills:

The student should know what touch drills are – just touching the control and saying what you would do with that control works well. It is important that the student not only touches the correct control, but also says the correct thing. For example, a student, in the feather drill in a multi-engined aeroplane may touch the left propeller control and say 'feather right'. Obviously, this is not acceptable. Neither is just touching it, or touching it and saying left. He needs to unequivocally touch the left prop control and say 'feather left'.

Some controls in some drills can actually be moved by the student: Throttle, fuel pump, carb heat, flaps etc. This should be encouraged. Imagine in an engine fire scenario if the throttle wasn't retarded.

Circuit Breakers

The instructor should not deliberately and secretly pull circuit breakers (CBs) in order to simulate a failure. It may be that that service cannot be restored.

Simulated Fires:

Many skill tests require a simulated fire to be dealt with. This can also be built up using a scenario. The instructor could start coughing, then point out a faint smokiness in the cabin. Then, slowly report worsening symptoms until the student responds by actioning the appropriate checklist.

Simulated Distress Calls:

Instructors should be encouraged to train students to make Practice PAN calls and training fixes during their training. Remember, a practice PAN can be made on any frequency, including a tower or AFIS frequency.

Intervention

It is very important to know when and how to intervene during flight training. Several accidents have occurred as a result of the instructor failing to intervene in a timely manner.

If the instructor intervenes too soon, the student misses a valuable learning point, and begins to rely on the instructor to get him out of trouble. If the instructor leaves it too late, then there is a possible safety problem.

There is also the question of how the intervention is done. There are 4 main levels of intervention, that can be summarised as shown:

1: Hint & Tip

If time is not too critical, a timely hint or tip can achieve the desired result. For example, when a student is low on the approach, a comment such as ‘How do you think the vertical profile is looking?’ might be enough for them to have a think about the situation. Similarly, on base leg, with a strong tailwind that has gone unnoticed: ‘What do you think the wind is up here?’

2: Tell me what’s wrong

If hinting and tipping haven’t worked, a more direct approach may be needed. For the student low on approach: ‘We’re a bit low’. This still gives the student a chance to consider the problem and work out how to resolve it.

3: Tell me how to fix it

If pointing out the problem doesn’t work, it may be that the student cannot think how to resolve the problem. They may need you to say something like ‘add more power now’ or ‘raise the nose now’.

4: Fix it for me.

The last level occurs when all other avenues have been exhausted. You will need to say ‘I have control’ and fix the problem.

Post Flight Debrief

General

It is essential to deliver a timely and effective debrief after every flight. Reinforce what went well, stress the take home messages and correct any errors or omissions that were observed during the flight.

Negative Training

It is important to avoid giving any negative training to the student. This is rarely given intentionally, but before giving any feedback, consider how to best deliver it to ensure a positive outcome for the student.

For example: During a stall recovery the student is very slow to apply full power. Positive training would be for the instructor to say ‘Remember to apply full power rapidly’. In this case negative training might say ‘Don’t apply the power slowly’.

Remember, what the student hears is what the student does, so make sure the message he takes home is the right one.

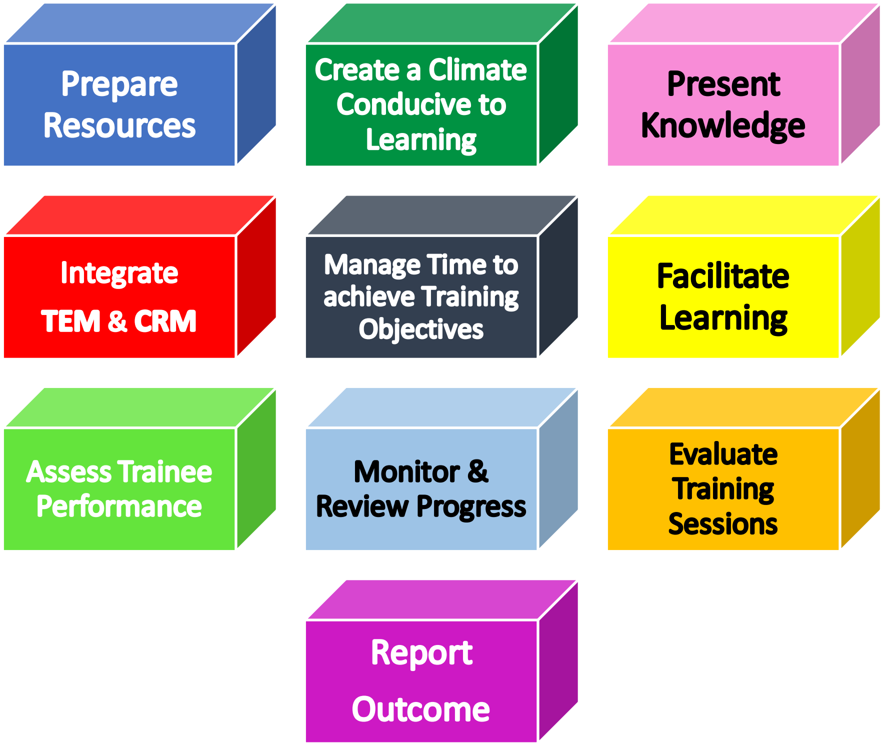
Appendix 6a: Trainee Needs

It is important when training a student that their needs are covered. Not every student is the same and they each have differing needs. These needs can be summarised as follows:

- **Start from where I am.**
- **Let me know where I am going.**
- **Give me a reason to want to get there.**
- **Let me know how I am doing.**
- **Use *MY* experience.**
- **Progress at *MY* pace.**
- **Let me make the knowledge and skill my own.**
- **I acknowledge responsibility for my own learning.**

Appendix 6b: Instructor Competencies

According to CAA Standards Document 10: **All instructors shall be trained to achieve the following competences:**



These will de dealt with in turn:

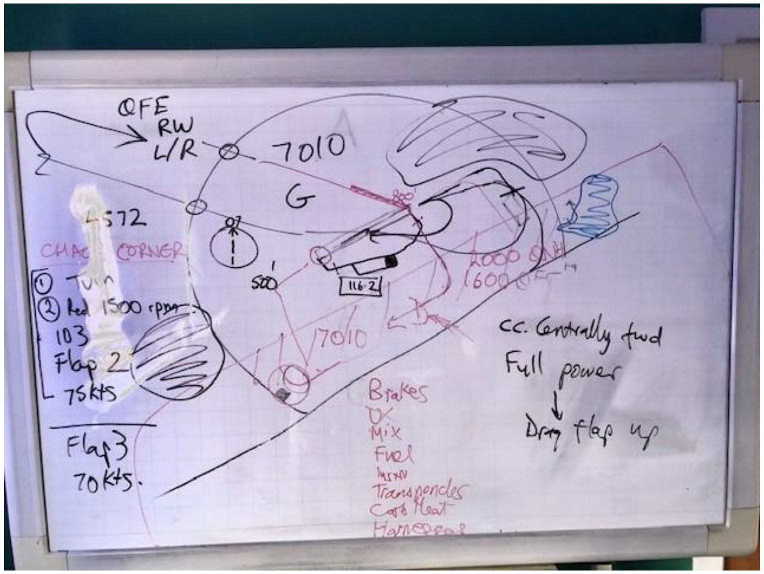
Prepare Resources

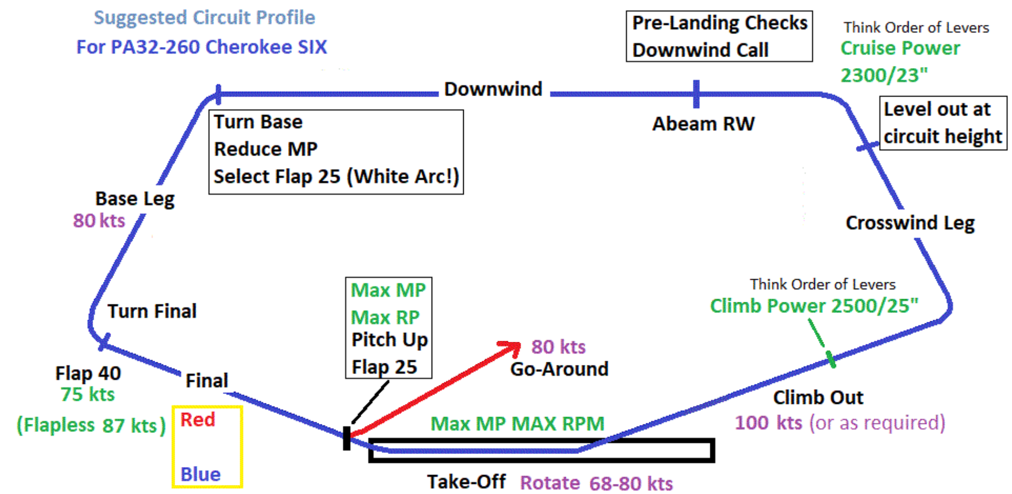
A lesson, be it ground or in the air requires considerable preparation on the part of the instructor. It will require:

- **A Framework:** The lesson should be structured in order to keep it concise and on track. This will usually begin with an aim, and then continue into the body of the lesson. At the end there should be a summary and time for questions.
- **Teaching Aids:** On the ground, these might include an airc4aft model, a white board and pens, aircraft instruments, video clips etc. There use should be integrated into the lesson. In the air, such items as IMC goggles, instrument covers, maps etc should all be ave to the instructed as and when needed. It does not inspire the student with confidence if the instructor cannot find or has forgotten to bring these items along.

- **Course Books:** It may be appropriate for the student to have been recommended or given a book, or other prepared documents (such as checklists or flight profiles) to guide them through a coure or lesson.

It is important to make sure any resources you use are effective. Consider the following example.





Which of these 2 teaching aids would you use?!

Create a Climate Conducive to Learning

The learning environment is very important. This has several aspects:

- **Instructor Manner:** The instructor must be patient, approachable and unhurried in his behaviour. Many instructors allow insufficient time for lessons or briefings, and the result comes across negatively to the student who feels they are under pressure to learn and understand quickly. The general nature of the instructor here is also importance – appearance, professionalism and sense of humour are important.
- **Physical Climate:** The place where teaching is to take place (classroom, aeroplane or simulator) must be suitable in terms of temperature, light and other facilities needed. Briefing or teaching should never take place at a table in a crowded café.

Present Knowledge

It sounds obvious, but learning is much about the transfer of knowledge (and skill) from instructor to student. It is important that this transfer happens.

Integrate TEM & CRM

- **TEM:** It is a CAA requirement now to integrate Threat and Error Management into all aspects of aviation instruction. This begins in the classroom, and pre-flight briefings should already contain this element. One way to introduce this is to colour code as follows:

  Aim: To learn how to safely perform one engine inoperative turns, descents & climbs.

  Threats: Other aircraft, Terrain, Engine overheat.

  Errors: Loss of control, Infringement, fuel mismanagement

  Management: Lookout, Speed & bank angle awareness, Checklist discipline, Pre-flight planning, Altimeter checks.

  In this way, once the aim of the lesson has been established, there can follow a discussion about what the possible threats and errors are associated with that exercise. This then allows another discussion on how to manage those threats. It is not sufficient to just list the threats and then not continue to the management phase. Later in the flight, these threats, errors and management techniques should be pointed out as they occur to underline their importance.
- **CRM:** Crew Resource Management should be encouraged at all times, but it is particularly important in the aeroplane. The use of interactive briefings, verbalization and open questions will help guide the student in this matter. CRM is something that is best led by example. As an instructor, always try to display high levels of CRM at all times. Explain why you make the decision you did.

Manage time to achieve Training Objectives

During the lesson, there is usually only a limited time available. This may be due to aircraft or instructor availability, airport operating hours etc. It is important that the time available is used to best manage the training requirements. If a student needs more practice, it may become necessary to drop a later exercise in order to properly practice the troublesome section.

Facilitate Learning

Not all students learn in the same way. Some grasp ideas quickly, others need more time. Some students are very ‘visual’ and rapidly understand concepts when diagrams are used. Sime like mathematical formulae – others don’t! It is your job as an instructor to find a way to make that student learn as best he can.

Assess Trainee Performance

Obviously, the student's performance must be continually assessed in order to ensure that progress is being made. This assessment is important to the student, the instructor and the training establishment. This is done partly in the post flight debrief, but should also be recorded in student records. Traditionally, such records were handwritten, but increasingly, ATOs are using on-line training records. Such records should also be available to the student.

Report writing is an integral part of any instructor's daily activity. It is a skill that may require development. This section offers suggestions for use by instructors as guidance material to produce accurate reports.
All reports must reflect the debrief. Instructors should avoid writing comments that have not been discussed during the debrief.

An accurately written report can serve the following purposes:

- As a written hand-over to the next instructor
- To provide the trainee with an overview of how the training is progressing
- To provide the trainee with tips for improvement
- To allow the HoT to analyse progress or areas for development
- To allow the HoT to deal with poor performance in a structured and fair manner

Use CAP (Commentary, Appraisal, Pointers):

Commentary

Detail how much of the lesson has been completed and to what overall standard has been achieved. Phrases to describe the standard might include; "to standard, below standard, good standard, very good standard and excellent standard".

Appraisal

Write a phrase or phrases to discuss where the student is in more detail. For example; "X continues to overbank in turns, 30 degrees AoB as a maximum! S&L flight is improving now that X trims effectively. Checklist usage needs further study though.

Pointers

List a couple of Main Points and a couple of Minor Points for improvement going forward. The Main Points would have formed the main part of the debrief. The exact number of Pointers is unimportant but would probably be between 1 and 4. Pointers can of course be positive! Ensure that remedies are offered where possible.

Signing Off the Report

Instructors should remember that student confidence is vital. Positive reinforcement is more powerful and aim to leave them with a word of encouragement. For example: "X is a pleasure to teach, keep up the hard work"

Comments:

```
Set course overhead. Nav to Chinnor - Abingdon Diversion to Newbury. Diversion to EGLK
Very well flown. Do not check instruments on taxi when in close proximity to other a/c.
Headings accurately flown. Diversions well flown. Do not change heading or alt without explanation.
Go-around due RW blocked. Good decision and well handled.
Navigation coming along very nicely.
```

Recommendations:

```
More navigation practice
```

Giving positive feedback is a task most instructors enjoy. However, it is equally important to deliver negative feedback too. Negative feedback can be hard to handle and, when poorly delivered, unhelpful. We have all been on the receiving end of criticism - it is neither easy to give nor take. And yet, if appropriate, timely, and well wrapped, feedback can be a positive experience. While negative feedback might suggest a focus on the worst, it creates an immense opportunity for improvement when viewed in the right light. After all, an insightful critique provides a chance to grow and excel.

There are several points to think about before giving a student feedback:

- Harsh feedback may be counterproductive. Deliver feedback carefully and respectfully. If given too frequently and without regard to feeling, the student may revert to defence mode - possibly losing confidence, self-esteem, and motivation.
- Feedback isn't always negative. Don't persistently focus on what isn't working or isn't being done right. Attending to what is going well can support a student's growth and steer their development in the right direction.
- Feedback isn't always positive. On the other hand, don't always focus on strengths. If you only address the positives, the student will return to what they were doing, believing they have nothing to improve. Nevertheless, they will be delighted as they appear to be doing almost everything right. The balance between the points above is essential.
- Providing a fix may not be the answer. Ask facilitative questions that encourage reflection. Such open support can lead the student to understand what they did well, or poorly.
- Avoid wrapping negative feedback in praise. The feedback sandwich (there are more colloquial names for it), while popular, may not always be appropriate. The standard compliment/critique/compliment can give a false view of how someone is performing. Two positives outweigh one negative and, therefore, might suggest successful performance.
- Constructive criticism. Identifying the problem, then coming up with a plan to fix it is a powerful development tool. Help the student find ways to avoid making the same mistake while learning a new skill.
- Be honest and sincere. Students are often aware of their underperformance, so the feedback should not be a surprise. Make it clear you are keen to help them improve, rather than find fault.

- Be direct and clear. At the end of the feedback, don't let the student walk out of the room thinking 'what just happened?' State the feedback clearly and directly, without being rude or uncaring.
- Be specific. Don't overgeneralize or drift into other issues. Focus on the point(s) of feedback.
- Don't become personal. Do not confuse the person with their actions. Being personal may lead the student to shut down. They will be less likely to act on, or learn from, the points shared.
- Be consistent. Depending on the feedback frequency, the student shouldn't be surprised by what you have to say. Regular interaction can help avoid lengthy, negative, and unexpected feedback.
- Keep feedback fresh. Avoid a long gap between the lesson and providing feedback. The discussion should be current so that no one is trying to remember what happened.
- Always provide feedback in private, rather than in a public area.
- Always make a note of the feedback given so that any trends can be identified early.

Monitor and Review Progress

In much the same way as assessing trainee performance (above), the instructor should conduct a longer-term review of the student's progress to check for any undesirable trends. These should be communicated to the student as soon as possible.

Evaluate Training Sessions

It is important to find out if the training has been successful as soon as possible afterwards, or even during the training. Ask questions to find out if the lesson objectives and aims have been met.

Report Outcome

Make it clear to the student whether or not they have met the aims and objectives of the lesson using the same techniques as for feedback.

Appendix 7: CAA Forms & Documents (Click to visit)

Example forms are shown on the following pages, with guidance notes. Visit links for latest versions

SRG 5018: Course Completion Certificate for an Instructor Course

SRG 2159: On-line Form for Application, the issue, renewal, revalidation or variation of an instructor certificate.

SRG 1133R: Record of Supervised Solo Flights

SRG 1169: Examiner's Record - FI(R)/FI/CRI/IRI/FIC Authorisation Test/Check

Other Useful Documents

CAA Standards Document 10: Assessment of Competence for Instructor Certification

CAP 804: Flight Crew Licensing - For Guidance Only

Full List of CAA Forms (Click to visit)

SRG 5018: Course Completion Certificate for an Instructor Course

CAA5018 Instructor Training Course Completion Certificate in Accordance with Part-FCL

This form is intended for use in the provision of evidence in support of an application made to the CAA using the CAA's online application service. Once completed the form should be scanned or photographed and uploaded by the applicant as part of an online application to the CAA.

FALSE REPRESENTATION STATEMENT
It is an offence under the UK Air Navigation Order to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission, or other document. This offence is punishable on summary conviction by a fine and on conviction on indictment with an unlimited fine or imprisonment or both.

GUIDANCE NOTES

GUIDANCE NOTE 1: Authorised signatories
An authorised signatory acts as a representative of the Head of Training, authorised by the Head of Training or through approved procedures to confirm that the stated training has been conducted by the Approved Training Organisation (ATO). The ATO must maintain a record of those so authorized.

GUIDANCE NOTE 2: Which sections of the course completion to complete
You are only required to complete and print the sections relevant to your application.

Application applied for	Sections to be fully completed
FI initial issue	**1, 2, 3, 5**
FI/CRI/IRI variation	**FI - 1, 6(i) or 6(ii) / CRI - 1, 6(vi) / IRI - 1, 6 (vii)**
FI/CRI/IRI renewal or revalidation	**1, 5(v), 5(vi)**
CRI/IRI/FTI initial issue	**1, 2, 5(i), 5(ii), 5(iii), 5(iv)**
MCCI initial issue or renewal	**1, 4, 7**
MCCI revalidation	**1, 7**
MCCI variation	**1, 6(v), 7**
FTI revalidation	**1, 5(v)**
FTI renewal	**1, 5(v)**
Mountain rating instructor initial issue	**1, 2, 3, 5**
TRI / SFI / STI initial issue	**1, 2, 5**
TRI / SFI renewal	**1, 2, 5**
TRI / SFI revalidation	**1, 5**
TRI / SFI variation	**1, 2, 6**
STI renewal	**1, 5**

1. APPLICANT DETAILS — **To be completed by the Training Provider**

CAA Personal Reference number (if known): .... Date of Birth: ....

Title: .... Forename(s): .... Surname: ....

This application is for (please select all that apply): Initial issue ☐ Renewal ☐ Revalidation ☐ Variation ☐

2. PRE-REQUISITES — **To be completed by the Training Provider**

I certify that (name) .... has met the pre-requisites for (certificate(s)) ....

I further certify that I have examined the Pilot's logbook and confirm they have met the pre-requisite hours requirements: Yes ☐ No ☐ N/A ☐

The following hours have been flown and verified in the pilot's logbook (please provide a summary of total hours as per the requirements in the regulation):

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date: ....

3. Flight or Mountain Rating Instructor (FI/MI) Pre-Entry Flight Test — **To be completed by the Instructor**

I confirm the pilot has satisfactorily completed a pre-entry flight test on (date): ....

I recommended the pilot for the specified course (select one): Flight Instructor (FI) ☐ Mountain Rating Instructor (MI) ☐

Name of FI/MI who conducted the flight test: ....

Instructor reference number: .... Competent authority issuing certificate: ....

Signature of Instructor: .... Date ....

4. MCCI Course Instructor (if applicable) — **To be completed by the Training Provider**

I can confirm that I have reviewed the pre-entry requirements alongside the applicant's experience and can confirm that the applicant meets Part-FCL.915.MCCI pre-entry requirements and FCL.930.MCCI a1) + a2) and/or FCL.940.MCCI (where appropriate) and therefore propose that the applicant proceed to formal observation by CAA or a nominated deputy.

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable) : ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

5. TRAINING COURSE DETAILS — **To be completed by the Training Provider**

5)i) Theoretical knowledge — **To be completed by the Training Provider**

.... hours of theoretical knowledge (TK) instruction

The applicant has satisfactorily completed: *(select one)*: Full TK training ☐ Reduced TK training ☐ Not applicable ☐

The applicant has completed reduced course of TK training on the basis of: (if applicable)

5)ii) Teaching and learning — **To be completed by the Training Provider**

.... hours of teaching and learning completed

The applicant has satisfactorily completed: *(select one)* Full teaching and learning ☐ Reduced teaching and learning ☐ Not applicable (exempt) ☐

The applicant has completed a reduced course of teaching and learning in accordance with FCL.915(c)(1) on the basis of: (if applicable)

5)iii) Technical training (IRI, CRI initial issue) — **To be completed by the Training Provider**

The applicant has satisfactorily completed .... hours of technical theoretical training

5)iv) Flight training — **To be completed by the Training Provider**

I confirm the pilot has satisfactorily completed an approved course of training in accordance with Part-FCL for the following:

- i) FI(A) ☐ FI(H) ☐ FI(AS) ☐ FCL.900C FI(A) ☐ FCL.900C FI(H) ☐
- ii) Class Rating Instructor CRI SE ☐ ME ☐
- iii) Instrument Rating Instructor IRI(A) ☐ IRI(H) ☐ IRI (AS) ☐
- iv) Flight Test Instructor ☐
- v) Mountain Rating Instructor (FCL.930.MI(a)) ☐
- vi) Type Rating Instructor TRI(A) (Please specify type): ....
- vii) Type Rating Instructor TRI(H) (Please specify type): ....
- viii) Type Rating Instructor TRI(PL) (Please specify type): ....
- ix) Type Rating Instructor issued in accordance with FCL.725(e) (Please specify type) ....
- x) Synthetic Flight Instructor SFI (Please specify type): ....
- xi) Synthetic Flight Instructor SFI (SPA) ☐ (MPA) ☐ (H) ☐ (PL) ☐
- xii) Synthetic Training Instructor STI A ☐ H ☐

Course start date: .... Course end date: ....

The applicant has satisfactorily completed: (select one) Full flight training ☐ Reduced flight training ☐ Not applicable ☐

The applicant has completed a reduced course of flight training on the basis of: (if applicable)

The course consisted of .... hours of flight instruction of which .... hours instrument ground time in a FTD 2/3 or FNPT I or FNPT II/III or FFS.

FSTD identification number of simulator used (which must be issued in accordance with UK Regulation No. 1778/2011) ....

Competent Authority issuing qualification certificate for the simulator: ....

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable) : ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

5)v) Instructor refresher training course — To be completed by the Training Provider

I confirm the pilot has satisfactorily completed the instructor refresher training course on .... (date).

For the revalidation ☐ or renewal ☐ of an instructor Certificate in accordance with Part-FCL

Training Provider Details

Name of Approved Training Organisation (ATO): (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature (Head of Training): .... Date: ....

5)vi) Instructor revalidation/renewal information — To be completed by the Examiner

I can confirm that the pilot has met the requirements of Part-FCL for the revalidation/renewal of the following Instructor:

FI(A) ☐ FI(H) ☐ FI(As) ☐ CRI ☐ IRI ☐ SFI ☐ STI ☐ TRI ☐ MCCI ☐ MI ☐

The Certificate of Revalidation has been signed and the rating/certificate is valid until (date) ....

Examiner's Name: .... Examiner's Number: ....

Competent Authority issuing Examiner's Certificate: ....

Signature (Examiner): .... Date: ....

6. Training Course/Information Details — To be completed by the Training Provider

6)i) Flight instructor variation (course)

I certify that the pilot has satisfactorily met the variation hours requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905.FI(h) IR ☐ FCL.905.FI(h) IR(R) ☐ FCL.905.FI(i) SPA ME ☐

Please note section 5 iv) must be completed with the relevant course information

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)ii) Flight instructor variation (other) — To be completed by the Instructor

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905.FI(c) Flying multi-pilot operations on a single pilot aircraft ☐ FCL.905.FI(e) CPL ☐ FCL.905.FI(j) FI, IRI, CRI, STI or MI ☐

Signature of Instructor: .... Date ....

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905(k)(1) MPL ☐

I certify that the pilot has satisfactorily completed at least 500 hours of flight time as a pilot in aeroplanes, including at least 200 hours of flight instruction

Signature of Instructor: .... Date ....

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905(k)(2) MPL ☐

I certify the pilot holds a multi-engine aeroplane IR and the privilege to instruct for an IR ☐ And

I confirm the pilot has satisfactorily completed at least 1500 hours of flight time in multi-crew operations ☐ or

Is already an FI qualified to instruct on ATP(A) or CPL(A)/IR integrated courses and has completed a structured course consisting of the following training ☐ :

MCC qualification

Observation of five sessions of flight instruction in Phase 3 of an MPL course

Observation of five session of flight instruction in Phase 4 of an MPL course

Observation of five operator recurrent line-oriented flight training sessions

The content of the MCCI course

Signature of Instructor: .... Date ....

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

FCL.905.FI(f) Night ☐ FCL.905.FI(g) Banner Towing ☐ FCL.905.FI(g) Glider Towing ☐ FCL.905.FI(g) Aerobatic ☐

Date of demonstration flight: ....

Name of Instructor: .... Instructor Reference Number: ....

Competent Authority issuing Instructor's Certificate: ....

Signature of Instructor .... Date ....

6)iii) TRI variation — To be completed by the Training Provider

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of TRI in accordance with Part-FCL for the following:

FCL.905.TRI(2) ☐ FCL.905.TRI(3) (SPH PA) SP to MP ☐

FCL.910.TRI(b)/(c) (please specify type): ....

FCL.910.TRI(a) FSTD ☐ FCL.910.TRI(a) Line Flying (LIFUS) ☐ FCL.910.TR (b) Aircraft ☐

FCL.910(c)(2) TRI SPH to MPH ☐ FCL.910.TRI(a) Aircraft Takeoffs and Landings only ☐

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)iv) SFI variation — To be completed by the Training Provider

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of SFI in accordance with Part-FCL for the following:

FCL.905.SFI(b) (SPHPA) SP to MP ☐

FCL.910.SFI (please specify type): ....

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)v) MCCI variation — To be completed by the Training Provider

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of MCCI in accordance with Part-FCL for the following:

FCL.910.MCCI (please specify type): ....

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)vi) CRI variation — To be completed by the Training Provider

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of CRI in accordance with Part-FCL for the following:

FCL.905.CRI (Please specify class or type): ....

FCL.905.CRI(a) Banner Towing ☐ FCL.905.CRI(a) Glider Towing ☐ FCL.905.CRI(a) Aerobatic ☐

FCL.905.CRI(ba) Flying multi-pilot operations on a single pilot (please specify class or type): ....

Date of demonstration/assessment flight: ....

Name of Instructor/Examiner .... Instructor/Examiner reference number ....

Signature of Instructor/Examiner .... Date ....

6)vii) IRI variation		To be completed by the Training Provider
I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of IRI in accordance with Part-FCL for the following:		
FCL.905.IRI(b) (upgrade to MPL) ☐	FCL.915.IRI(a) (adding ME privileges in aeroplanes) ☐ **Note: Must also complete section 5(iv)**	FCL.915.IRI(b) (adding ME privileges in helicopters) ☐ **Note: Must also complete section 5(iv)**

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable): ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date....................

6)viii) Mountain Rating Instructor variation	To be completed by the Training Provider
I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges in accordance with Part-FCL for the following:	
FCL.930.MI(a) Mountain Rating Instructor (wheels) ☐	
FCL.930.MI(a) Mountain Rating Instructor (skis) ☐	
FCL.930.MI(a) Mountain Rating Instructor (wheels and skis) ☐	

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date....................

7) Observation Report Form for Multi-Crew Co-Operation Instructor (A/H/PL) — **To be completed by the Examiner**

FSTD Qualification Number: .... Aircraft Represented: ....

Date: .... Start time: .... Finish time:.................... Duration: ....

	Assessment		Remarks
a)	Prepare Resources		
b)	Create a climate conducive to learning		
c)	Present knowledge		
d)	Integrate threat and Error management (TEM) and crew resource management		
e)	Manage time to achieve training objectives		
f)	Facilitate learning		
g)	Assess trainee performance		
h)	Monitor and review progress		
i)	Evaluate training sessions		
j)	Report outcome		

I confirm that the Applicant detailed in Section 1 above has conducted at least 3 hours of flight / MCC instruction under my supervision and to my satisfaction, in accordance with Part-FCL.920, Part-FCL.930.MCCI and / or Part-FCL.940.MCCI and should therefore be issued with the following authorisation.

Initial Authorisation ☐ Revalidation/Renewal ☐ Variation ☐

Multi-Crew Co-Operation Instructor (A) ☐

Multi-Crew Co-Operation Instructor (H) ☐

Multi-Crew Co-Operation Instructor (PL) ☐

Examiner Details

Name of Examiner: .... Examiner reference number: ....

Competent Authority issuing Examiner's Certificate: ....

Signature of Examiner: .... Date....................

SRG 1133R: Record of Supervised Solo Flights

SRG 1133R Issue 02

RECORD OF SUPERVISED SOLO FLIGHTS OR AIR EXERCISES FOR REMOVAL OF SUPERVISORY RESTRICTION FROM AN INSTRUCTOR CERTIFICATE IN ACCORDANCE WITH PART-FCL

Please complete this form online (preferred method) then print, sign and submit as instructed.
Alternatively, print, then complete in BLOCK CAPITALS using black or dark blue ink.

Unique No. (to be completed by CAA)

Civil Aviation Authority

FALSE REPRESENTATION STATEMENT
It is an offence under Article 256 of the Air Navigation Order 2016 to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine up to £5000, and on conviction on indictment with an unlimited fine or up to two years imprisonment or both.

1. RECORD OF SUPERVISED SOLO FLIGHTS/AIR EXERCISES TO REMOVE SUPERVISORY RESTRICTION FCL.910.FI — **To be completed by applicant**

	Date of flight	Students name	Students licence or reference number	Exercise Number of Air Exercise	Name of Supervising Flight Instructor	Signature of Supervising Flight Instructor	Licence Number of supervising Flight Instructor	Name of ATO Flight training conducted with and approving competent Authority
1	21/04/19	Mike Smith	456789A	Ex18	Jonathan Bloggs	J Bloggs	AT123456A	ABC Flying School
2								
3								
4								
5								
6								
7								
8								
9								
10								

Page 1 of 2

SRG 1169: Examiner's Record - FI(R)/FI/CRI/IRI/FIC Authorisation Test/Check

This form is used by the examiner for recording of an AOC for an instructor. It is a useful guide to the instructor as it shows what will be tested during the AoC.

Sections 1-2: Self-explanatory.

Section 3: Filled out by the ATO.

Sections 4 & 5: Self-explanatory.

Examiner's Record - FI(R)/FI/CRI/IRI/FIC Authorisation Test/Check Schedules - Aeroplane

Please complete this form online (preferred method) then print, sign and submit as instructed. Alternatively, print, then complete in BLOCK CAPITALS using black or dark blue ink.

Civil Aviation Authority

Unique No. (to be completed by CAA) ____________

Please read attached Guidance Notes before completing this form.

FALSE REPRESENTATION STATEMENT
It is an offence under Article 256 of the Air Navigation Order 2016 to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission or other document. This offence is punishable on summary conviction by a fine up to £5000, and on conviction on indictment with an unlimited fine or up to two years imprisonment or both.

1. Applicant Details — **To be completed by the Applicant**

Surname .... Forename(s) ....

CAA reference number: ☐☐☐☐☐☐☐

2. Test/Check Details — **To be completed by the Applicant**

Type of Test: .... Location: .... Date: ....

A/C or STD reg & type: .... Off blocks: .... On blocks: ....

A/C or STD reg & type: .... Off blocks: .... On blocks: ....

Type (including variants): ....

FSTD Identification Number of simulator used (which must be approved in accordance with Commission Regulation (EU) 1178/2011 as amended): ....

Competent Authority issuing Qualification Certificate for the simulator: ....

Date flying training complete: ....

SECTION 1: Theoretical Knowledge	Pass	Fail	Observations/Reasons for Failure
Long Briefing Title			
a. Air law			
b. Aircraft general knowledge			
c. Flight performance and planning			
d. Human performance and limitations			
e. Meteorology			
f. Navigation			
g. Operational procedures			
h. Principles of flight			
i. Training administration			

SECTION 2: Pre Flight Briefing	Pass	Fail	Observations/Reasons for Failure
a. Visual presentation and content			
b. Technical accuracy			
c. Clarity of explanation			
d. Clarity of speech			
e. Instructional technique including TEM/ CRM			
f. Use of model and aids			
g. Student participation			

4 copies required. Copies of the report shall be submitted to (1) The Applicant (2) The Applicant's Competent Authority (3) The Examiner (4) The Examiner's Competent Authority (if different)

SECTION 3: Flight	Pass	Fail	Observations/Reasons for Failure
a. Arrangement of demonstration			
b. Synchronising of speech/demo			
c. Assessment and correction of student faults			
d. Aeroplane handling			
e. Instructional technique			
f. General airmanship/safety			
g. Positioning and use of airspace			
h. Risk assessment including TEM/CRM			
Main Exercise Title and No.			
i			
j			

SECTION 4: Mandatory Exercises and other exercises at Examiner's discretion	Pass	Fail	Observations/Reasons for Failure
a. Spin avoidance (SE aeroplane)			
b. Safety module			
c. Take-off and climb, engine failure after take-off (SE aeroplane)			
d. Approach, landing, missed approach			
e. Forced landing without power (SE aeroplane)			
Additional exercises Title and No.			
f			
g			

SECTION 5: Multi engine (Aeroplane) - may be conducted in FNPT 2 or Simulator	Pass	Fail	Observations/Reasons for Failure
a. Engine failure (simulated) after take-off or on go-around			
b. Asymmetric approach and go-around			
c. Asymmetric approach and landing			

SECTION 6: Instrument Exercises - give exercise Title and No. in space provided	Pass	Fail	Observations/Reasons for Failure
a. Basic instrument flight			
b. Applied instrument flight			
c. Instrument approach			
d. Limited panel and unusual attitudes			

SECTION 7: Post Flight Debriefing	Pass	Fail	Observations/Reasons for Failure
a. Visual presentation and content			
b. Technical accuracy			
c. Clarity of explanation			
d. Clarity of Speech			
e. Instructional technique and facilitation			
f. Use of model and aids			
g. Student participation			

3. APPROVED TRAINING ORGANISATION

Approved Training Organisation (ATO): .... ATO Approval No: ....

Competent Authority issuing approval: ....

Head of Training (block capitals): ....

Signature (Head of Training): .... Date: ....

PLEASE REFER TO FALSE REPRESENTATION STATEMENT ON PAGE 1

4. RESULT

Tick appropriate box

Pass ☐ Fail ☐ Partial ☐

Retest Requirement: .... Rating Revalidated Until (if applicable): ....

I have received information from the applicant regarding their experience and instruction and certify that this complies with the requirements of EASA Part-FCL.

I have assessed the ICAO English Language Proficiency of the Applicant at Level 6: Yes ☐ No* ☐ Not Assessed ☐

(*I have advised the Applicant to complete Form SRG 1199 and be assessed by an appropriate organisation, see CAP 804, Section 4, Part M.) Assessment is not required if Applicant holds Level 6.

Examiner's Name (block capitals): .... Examiners Number: ....

Authorising Competent Authority: .... Date of Examiners Briefing (if applicable): ....

Signature (Examiner): .... Date: ....

PLEASE REFER TO FALSE REPRESENTATION STATEMENT ON PAGE 1

5. TEST, CHECKS AND ASSESSMENTS OF COMPETENCE – NOTICE OF FAILURE

To be completed by examiner

You are hereby notified that you have failed the .... for the following reasons:

....

....

In accordance with Part FCL an Approved Training Organisation shall determine and deliver the required refresher/ remedial training prior to the applicant reattempting the skill test, proficiency check or assessment of competence. The applicant must provide evidence of this training to the examiner who conducts the next test, check or assessment of competence.

Minimum training recommended by the Examiner:

....

I understand that I have failed the items notified above.

I understand that I may not exercise the privileges of my.. following the failure of this test, check or assessment of competence until the successful completion of training and a further test, check or assessment of competence.

Received (Applicant) Signature: .... Date: ....

PLEASE REFER TO FALSE REPRESENTATION STATEMENT ON PAGE 1

Civil Aviation Authority Regulation 6

Regulation 6(5) of the Civil Aviation Authority Regulations 1991 as follows: Any person who has failed any test or examination which he is required to pass before he is granted or may exercise the privileges of a personnel licence may within 14 days of being notified of his failure request that the Authority determine whether the test or examination was properly conducted. In order to succeed you will have to satisfy the Authority that the examination or test was not properly conducted. Mere dissatisfaction with the result is not sufficient reason for appeal.

SRG 2159 Application for the issue, renewal, revalidation or variation of an instructor certificate (on-line form)

Below is a screen-shot of what can be applied for using this on-line form.

APPLICATION - VARIATION (FI)

Do not use the browser back button, as it will restart the form and lose of any unsaved form data. Use the forms "Continue" and "Ba

Fields marke

Application

Please select the privileges you are applying for: *

Aeroplanes

- ☐ FCL.905.FI (c) Flying multi-pilot operations on a single pilot
- ☐ FCL.905.FI(g) Aerobatic
- ☐ FCL.905.FI(g) Banner Towing
- ☐ FCL.905.FI(g) Glider Towing
- ☐ FCL.905.FI(h) IR(R)
- ☐ FCL.905(k)(1) MPL
- ☐ FCL.905(k)(2) MPL
- ☐ FCL.945 Obligations for Instructors
- ☐ Removal of LAPL only restriction

Aeroplanes and/or helicopters

- ☐ FCL.905.FI(e) CPL
- ☐ FCL.905.FI(f) Night
- ☐ FCL.905.FI(h) IR
- ☐ FCL.905.FI(i) SPA ME
- ☐ FCL.905.FI(j) FI, IRI, CRI, STI or MI
- ☐ FCL.910.FI Removal of Supervisory Restriction

Appendix 8: Typical Flight Instructor Course

Course Content:

In order to assist the instructor and student and to enable them to interpret the particular depth of knowledge required in each item, the depth to which instruction should be given is indicated by the use of the ICAO system devised for this purpose. The knowledge indicators are as follows:

Principles (P):	Denotes an understanding of the principles involved.
Basic (B):	Denotes a knowledge of the subject and the ability to apply it practically.
Intermediate (I):	Denotes a knowledge of the subject and an understanding beyond principles
Detailed (D):	Denotes a thorough knowledge of the subject and the ability to apply it with speed & accuracy.

TEACHING & LEARNING

1. The Learning Process (B)

Motivation, Perception & understanding, Memory and its application, Habits & transfer, Obstacles to learning, Incentives to learning, Learning methods, Rates of learning.

2. The Teaching Process (B)

Elements of effective teaching, Planning of instructional activity, Teaching Methods , Teaching from the 'known' to the 'unknown', Use of 'lesson plans'.

3. Training Philosophies (B)

Value of a structured (approved) course of training, Importance of a planned syllabus, Integration of theoretical knowledge and flight instruction.

4. Techniques of Applied Instruction (B)

(a) Theoretical knowledge - classroom instruction techniques: Use of training aids, Group lectures, Individual briefings, Student participation/discussion.

(b) Flight - Airborne instruction techniques: The flight/cockpit environment, Techniques of applied instruction, Post-flight & in-flight judgment and decision making.

5. Student Evaluating & Testing (B)

(a) Assessment of student performance: The function of progress tests, Recall of knowledge, Translation of knowledge into understanding, Development of understanding into actions, The need to evaluate rate of progress.

(b) Analysis of student errors: Establish the reason for errors, Tackle major faults first, minor faults second, Avoidance of over-criticism, The need for clear concise communication.

6. Training Programme Development (B)

Lesson planning, Preparation, Explanation & demonstration, Student participation & practice, Evaluation.

7. Human Performance and Limitations Relevant to Flight Instruction (B)
Physiological factors, human information processing, behavioural attitudes, Development of judgment & decision making.

8. Hazards Involved in Simulating Systems Failures and Malfunctions in the Aeroplane During Flight (B)
Selection of a safe altitude, Importance of 'touch drills', Situational awareness, Adherence to correct procedures.

9. Training Administration (D)
General: Flight/theoretical knowledge instruction records, Log books, Flight/ground curriculum, Study material, Official forms, Aircraft/Owner's Manuals/Pilot's Operating Handbooks, Flight authorisation, Aircraft documents, The private pilot licence requirements.
The FI(A)'s Responsibilities: Training standards, Standardisation, Authorisation & supervision of student flying, Preparation for skill tests/proficiency checks, Completion of SRG 1107 Course Completion Certificates, Training effectiveness, Examination & fault analysis, Development of student responsibilities, The need for continuity training. Training in and outside of an ATO/DTO. Preparation of documentation for examiners. Application to CAA for licences and ratings.
FCL FI(A): Introduction, General information, Privileges, Experience requirements, Skill tests & Proficiency checks, FI(Restricted) & Removal of restriction. Revalidation/renewal of ratings.

Teaching & Learning Classroom Breakdown

Item No.	Tuition hrs	Classroom Practice hrs	Comment	Prog Tests
1: The Learning Process	2:00	-	Introduction. Allow for questions and short discussion periods.	0.30
2: The Teaching Process	4:00	-	Introduction. Allow for questions and short discussion periods.	1.00
3: Training Philosophies	2:00	-	The PPL training syllabus should be used as reference material.	0.30
4(a): Techniques of Applied Instruction: Theoretical Knowledge - classroom instruction techniques	5:00	34	The time spent in practice under this item will involve applicants refreshing their technical knowledge and developing their classroom instruction techniques. It will also include discussion between applicants and advice on teaching from the supervising instructor.	
4(b): Techniques of Applied Instruction: Airborne Instruction Techniques	4:00	34	The time spent in practice will be mainly directed to the giving of pre-flight briefings. It will allow the applicants to develop their ability to give a practical and short briefing (10 - 15 minutes) to a student pilot. The briefing will outline in a logical sequence the flight lesson to be undertaken.	
5(a): Student Evaluating & Testing: Assessment of student performance	2:00	-	The need for continuous assessment of performance. How to measure student performance. Emphasis should he placed on the validity of questions used in the progress tests	1.00
5(b): Student Evaluating & Testing: Analysis of student errors	2:00	-	Methods of analysis. Importance of a structured analysis. Emphasis should be placed on the need to give encouragement to the student in addition to honest feedback.	1.00
6: Training Programme Development	5:00	15	The time spent in practice will be directed towards the planning of classroom lesson periods and the development of the applicant's ability to construct lesson plans.	
7: Human Performance and Limitations Relevant to Flight Instruction	5:00	-	Scenarios relevant to good judgment and decision making should be set and analysed. Discussion of instructor and student fatigue.	1.00
8: Hazards in Simulating Systems Failures & Malfunctions in Flight	2:00	-	Examples of hazards should cover a broad range of light aeroplanes and types of operation and not be confined to the aeroplanes used on the course.	1.00
9: Training Administration	2:00	-	General revision of relevant documents.	1 .00
TOTAL	35:00	83		7.00
COURSE TOTAL:	**125 hours (including progress tests)**			

FLIGHT TRAINING AND FLIGHT INSTRUCTION

Introduction

The air exercises are similar to those used for the PPL(A) but with additional items designed to cover the needs of the flight instructor. The numbering of exercises as follows is used primarily as a reference guide, otherwise, demonstrations need not necessarily be given in the order listed below. Instructors will be taught how to construct flight lesson plans so as to make the best use of each flight lesson.

Planning of flight lessons

The preparation of lesson plans is an essential pre-requisite of good instruction and the student instructor will be given supervised practice in the planning and practical application of flight lesson plans.

General Considerations

The student instructor will complete flight training to practise the principles of basic instruction at PPL(A) level. During this training, except when acting as a student for mutual flights, the student instructor shall occupy the seat normally occupied by the FI(A). Airmanship is a vital ingredient of all flight operations. Therefore, in the following air exercises the relevant aspects of airmanship will be stressed at the appropriate time during each flight.

Long Briefings and air exercises

1. Familiarisation with the aeroplane
2. Preparation for and action after flight
3. Air experience
4. Effects of controls
5. Taxying
6. Straight and level flight
7. Climbing
8. Descending
9. Turning

10A. Slow flight & 10B Stalling

11A. Spin recovery at the incipient stage & 11B. Developed spins – entry & recovery

12. Take-off and climb to downwind position
13. The circuit, approach and landing
14. First solo
15. Advanced turning
16. Forced landings without power
17. Precautionary landings

18A. Pilot navigation & 18B. Navigation at lower level/reduced vis & 18C. Radio nav

19. Introduction to instrument flying.

Note: Although exercise 11B is not a requirement of the PPL course, it is a requirement for the FI course.

Appendix 9: Pre-FI Course Assessment

The pre-course assessment for the FI course is conducted by an FIC instructor (not necessarily an FIE). There is no approved format for this assessment.

The airborne part of the assessment should be based on the SEP proficiency check and should be done in the six months preceding the start of the FI course.

It is a good idea if the trainee is given a written test to do beforehand. It should be done in handwriting, rather than on a computer, so that the course instructor can assess handwriting and presentation skills.

The purpose of the flight assessment is to assess the suitability of the applicant to undertake and pass the course. As well as looking for good flying skills, the assessment is checking that the trainee has spare capacity available, a good 'bedside manner', and is self-critical. Remember, flying skills can improve, but basic personality and communication are unlikely to. During the assessment, the instructor may try to distract the trainee or feign airsickness to see how the trainee deals with the situation.

The assessment need not be completed at the ATO where the FI training will take place. If this is the case, the ATO doing the training has no right to demand a second assessment.

On completion, the assessment is signed by the FIC instructor at section 3 of the **CAA 5018** – Instructor Course Completion Certificate.

3. Flight or Mountain Rating Instructor (FI/MI) Pre-Entry Flight Test	To be completed by the Instructor
I confirm the pilot has satisfactorily completed a pre-entry flight test on (date): …………………………	
I recommended the pilot for the specified course (select one): Flight Instructor (FI) ☐ Mountain Rating Instructor (MI) ☐	
Name of FI/MI who conducted the flight test: …………………………	
Instructor reference number: ………………… Competent authority issuing certificate: …………………	
Signature of Instructor: …………………………	Date…………………

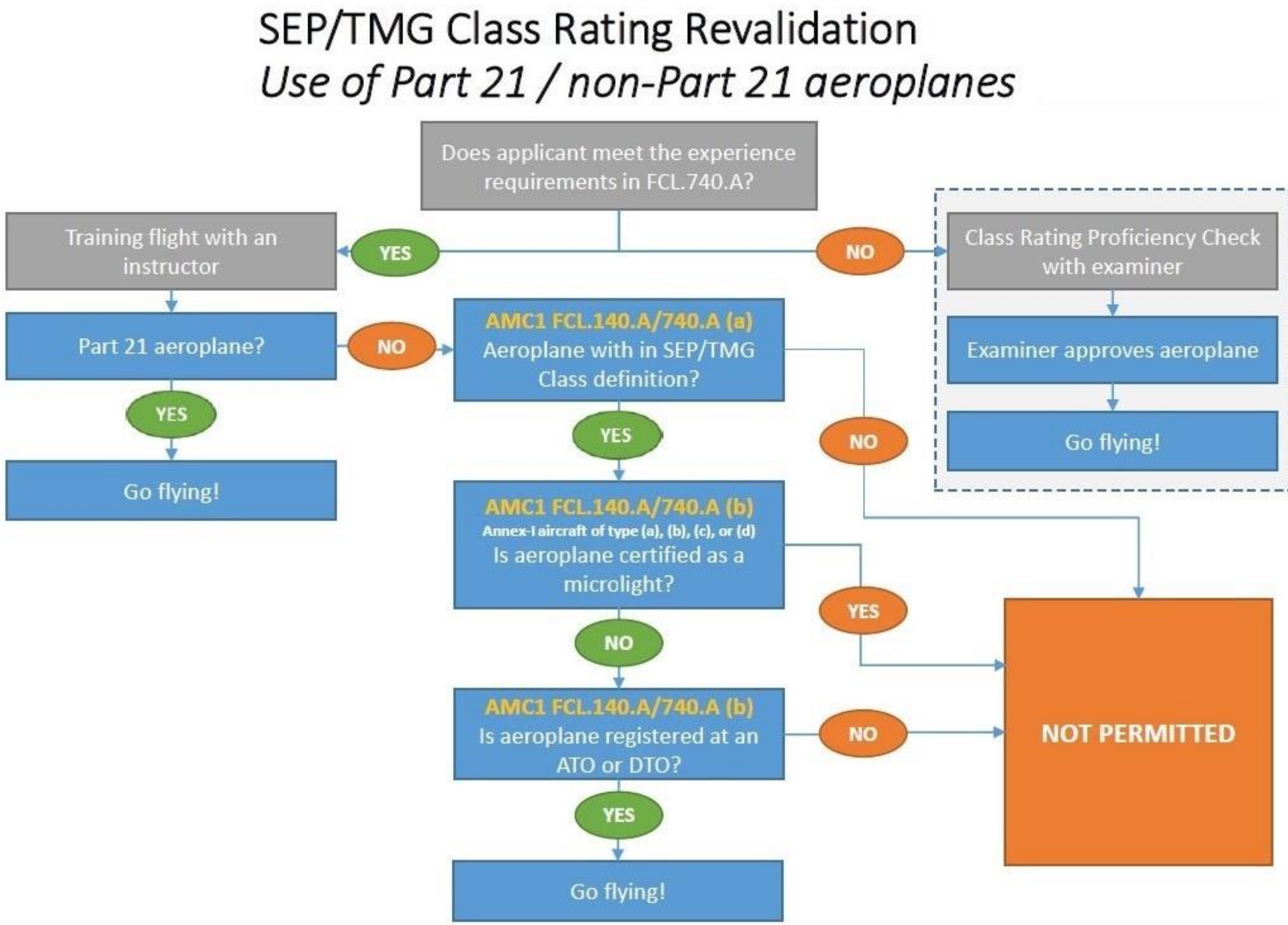
For various reasons, it is unusual for an applicant to fail this assessment. There is a financial incentive by the flying school for the trainee to pass the assessment.

Example Pre-Entry Written Assessment for Flight Instructor (Restricted) Course

Please write the answers in handwriting and draw diagrams where necessary. Use source documents, not WIKIPEDIA!
Imagine you are explaining these concepts to a new student or new PPL as appropriate and describe the required steps or points in simple terms.

1. How many hours are required for issue of the EASA Part FCL PPL – dual and solo?
2. What is the validity period for a class 2 medical certificate for a student aged 28, 38, 48 or 58 years old?
3. How is a single engine piston class rating revalidated?
4. Which documents should you inspect to ensure that an aircraft is legally fit to fly?
5. What is the minimum visibility in which a PPL/LAPL without any instrument qualifications may legally fly by VFR in the UK?
6. Using diagrams, explain a rule of thumb for calculating crosswind component.
7. Using a diagram describe how to do an overhead join.
8. What is the purpose of a magneto check and when is it performed?
9. What is adverse aileron yaw and what design features assist in its prevention?
10. How would you demonstrate the effect of slipstream to a student and what is the important teaching point that you would wish to emphasise?
11. What do you understand about the term “airmanship”? Explain it to a new student.
12. What do you understand about the phrase “Threat and Error Management”? Explain to a student.
13. How would you deal with a student on a trial lesson who complained of feeling unwell? What symptoms would you expect to observe?
14. Explain in simple terms, using diagrams, why an aircraft stalls.
15. Why does a wing drop at the stall?
16. What is the purpose of a pre-flight briefing and how long should it be?
17. For how long is a Flight Instructor certificate valid and how is it revalidated?
18. What is a check ‘A’ and who may perform it?
19. What are a Form 214 and a Form 215?
20. List the uses of engine oil (at least five).
21. Why does advection fog form and at what time of year/time of day is it most prevalent?
22. Using a diagram, explain sea breeze effect.
23. When should you use carburettor heat?
24. Explain what a Basic service and a Traffic service are, and when you might use them.

Appendix 10: Use of Non-Part 21 Aircraft for Training



UK Part-FCL extract: AMC1 FCL.140.A & FCL.740.A

AMC1 FCL.140.A; FCL.140.S; FCL.740.A(b)(1)(ii) Recency and revalidation requirements

ED Decision 2020/005/R

All hours flown on aeroplanes or sailplanes that are subject to a decision as per Article 2(8) of the Basic Regulation or that are specified in Annex I to the Basic Regulation should count in full towards fulfilling the hourly requirements of points FCL.140.A, FCL.140.S, and FCL.740.A(b)(1)(ii) under the following conditions:

(a) the aircraft matchesthe definition and criteria of the respective Part-FCL aircraft category, class, and type ratings; and

(b) the aircraft that is used for training flights with an instructor is an Annex-I aircraft of type (a), (b), (c), or (d) that is subject to an authorisation specified in points ORA.ATO.135 or DTO.GEN.240.

NOTES TO INSTRUCTORS & EXAMINERS

1. AMC1 FCL.140.A / FCL.740.A extract above can be found in the LAPL(A) section of the regulation
2. Annex I aircraft under EASA are now described in UK Part-FCL as **non-Part 21 aircraft**
3. Requirements regarding non-Part 21 aircraft also applies to refresher training flight for LAPL(A) recency
4. FCL.140.A/FCL.740.A: 'Training flight with an instructor' **does not** need to be carried out under the auspices of an ATO/DTO: instructor should check the aircraft is registered at an ATO/DTO
5. LAA Permit to Fly aeroplanes may already be registered with the Light Aircraft Association Declared Training Organisation; check with LAA Head of Training

However, the is some contradiction in this published on the CAA website:

> *There has been a long-standing GA Programme item to look at further liberalising the use of smaller GA permit aircraft for commercial operations that consist of flight training and/or their use for self-fly hire.*
>
> *In November 2015, the CAA published **ORS1143** to permit owners or joint owners of permit aircraft to receive any type of training in their own aircraft as a 'quick win' approach in advance of a wider piece of work on training in permit to fly aircraft. **ORS1143** has now been discontinued because the substantive effect of it is embodied in the **ANO 2016** insofar as joint owners may now pay for training in their own aircraft.*
>
> *Flying instruction and hire of aircraft, is considered to be a commercial operation. Article 42 of the **ANO 2016** states that aircraft on National Permit to Fly must not fly for commercial operations or for hire without the permission of the CAA. Currently we permit the use of 'Type Approved' aircraft to carry out these specific operations through a General Permission contained within Official Record Series 4 (**ORS4**) **1554**.*
>
> *After substantial consultation with internal and external stakeholders, we now allow flight instruction and self-fly hire to utilise aircraft flying in accordance with a National Permit to Fly subject to specified conditions. This relaxation has been published through an additional General Permission and is designed to sit alongside the General Permission already in place for Type Approved microlight's and gyroplanes.*
>
> *This permission does not apply to flight instruction and examination where the recipient does not hold a licence, except when the recipient is:*
>
> *The registered owner or joint-owner, or*
> *A registered shareholder of the company of which owns the aircraft, or is the spouse or child of a registered sole or joint owner.*
>
> *Since with **ANO 2016**, Permit aircraft can be used for training if they are the owner as this is considered to be a non-commercial operation. Commercial operations being defined in Article 7. The term 'Commercial Operation' is used now, which removes complexity from situations involving legitimate joint-owned aircraft when payments are made by the owner of the aircraft (for example to an instructor) such that they remain non-commercial.*
>
> *For amateur built aircraft that are not type approved, ab-initio training is not allowed at this time and will be subject to further future consideration. Nevertheless, if the recipient or candidate already holds a valid license for the same aircraft category, then flight instruction and examination will be allowed.*
>
> *Introductory Flights in accordance with Article 15 of the ANO will only be permitted on aircraft that are either "Type Approved" or is a type formerly holding a UK Certificate of Airworthiness, in respect of which, there is a 'Type Responsibility Agreement' with the CAA under BCAR A5-1 and the operator will have entered into an arrangement with the TRA holder for such operation.*
>
> *This permission does not apply to flight instruction or examination in Ex-Military aircraft that are operated in accordance with **CAP 632**, since these are addressed by separated arrangements within **CAP 632** and through the Aeronautical Information Circular W 055/2016.*

Appendix 11: Typical Instructor Assessments of Competence

Typical FI AoC 1

Date of Test: 28 Aug 02. Location: Shoreham. Examiner: Jill Develin. Aircraft: Cessna 152 G-BZEB

The subjects chosen for the test by the examiner were as follows:

Long Briefing: Forces in the turn

Flight Exercise: Ex 18A Introduction to Pilot Navigation

Jill arrived on time and was very relaxed and succeeded in putting me at my ease very quickly. She gave a ten minute brief on how the exam would be conducted. She said that since the PPL skill test now has a compulsory requirement for the student to recover from a spiral dive, she would like to see me recover from one, and to be able to put the aircraft into such a dive. She stressed that this would not be part of the test, but in order for me to learn how best to carry out this manoeuvre.

The weather on the day was 12km visibility with scattered cloud at 2500'. It looked like the visibility was going to improve, and so I had hoped to give my lecture first and fly later. Jill suggested reversing this order and stressed that there was no pressure to do so – her reason for this being to maximise aircraft availability for students that day. I hesitated pointing out that I considered the visibility to be at the lower limit for the exercise I wished to carry out, but agreed to alter the order. No criticism or even mention was made in the debrief.

I gave the briefing for the air exercise, which lasted about 25 minutes with many questions being asked by Jill, and many more had to be deflected saying the answers would be covered in future ground school lectures. I stressed that the exercise was to give a taste of the way a Navex is carried out and that we would not be getting overly concerned with planning or calculation at this stage.

The route I had planned was to begin from the A23/A27 junction north of Brighton to Bewl Water to the Northeast. This route was chosen after consultation with other instructors, and proved to be a perfect choice. I had assumed that the teaching exercise would be terminated at or before Bewl Water.

We went out to the aircraft and we carried out a walk around between us. The start-up and taxi out were very relaxed with no teaching input required. After the power checks, she asked me to teach her the take-off, which I did.

I then gave her control and pointed her in the general direction of the junction. On arriving overhead I noted the time on the map and asked her to set heading (which I had previously calculated) and carry out a FREDA check. I then proceeded to point out various features and show their relation to the map. Quarter and half way points were noted, and ETA's calculated which worked out exactly.

On reaching Bewl Water, it was clear that the exercise was not going to end there, so I had to improvise. I asked her to estimate a heading to reach Seaford. Jill replied with a sensible heading which we took up. After measuring the distance I asked her for an ETA, which she gave. We then proceeded to continue the map reading exercise until Seaford at which point the exercise was terminated.

We then carried out the spiral dive exercise – her method of entry being a wing over at about 55kts in a high nose attitude with some power on. This was fairly straightforward.

We then climbed up and she asked me to teach power on stalling, assuming the student had mastered power off stalls. I demonstrated a stall at 1500 rpm showing the wing drop and a standard stall recovery. I stressed the need to avoid aileron input and prevent further wing drop with rudder until flying speed was regained. I then asked Jill to practice. At the point of the stall she applied rudder to prevent wing drop, but failed to apply power or forward pitch, resulting in a wallowing of the aircraft. I allowed this to continue for a few seconds before taking control. I then stressed the use of elevator to unstall the wings and re demonstrated the manoeuvre. At this point this exercise was terminated.

I then demonstrated a spin. She specified to the left, and I climbed to 4000' before doing so. She later commented that she was pleased that I had used FULL rudder, as most people she had seen had only used partial rudder. She commented that I hesitated too long before pulling out of the dive after applying forward elevator pressure, resulting in a greater loss of height.

She then simulated an engine failure, and asked me to practice (but not teach) a forced landing. I chose a large field that looked flat from altitude, but by 1500' it became evident that it was unsuitable due to the slope. I picked another field on the left and managed to line up at the correct height in time to go around at 500' agl.

I was then asked to teach a descent on instruments, assuming climbing had already been taught. This we did and then returned to the airfield. I was asked to demonstrate a normal circuit and landing followed by a short-field landing to conclude. At about 3 feet in the flare on the second landing, I misheard an urgent ATC instruction for the aircraft behind to go around, and went around myself. This caused further consternation on the part of the ATCO who made no secret of his displeasure. The subsequent circuit and landing was completed by Jill, who made no further mention of the incident.

Back in the briefing room I gave my lecture, and was stopped after about 15 minutes. She asked a few questions involving the use of rudder in the entry to turns.

Further general questions followed:
1: Explain how a sea breeze occurs by day.
2: Explain how and why carburettor ice occurs.
3: Explain spark retard and impulse coupling during engine start.
4: How can a SEP rating be revalidated?
5: What are the dimensions of an ATZ?
6: If you have been unable to contact the tower/info due to a busy radio frequency, may you enter an ATZ anyway?
7: What does the * mean next to the symbol for a danger area?
8: In an aircraft with a low drag line and a high thrust line, how is the couple balanced?

During the short nav briefing she had also asked me to explain VMC airspace and license requirements. I had in fact stalled most of the questions that I had anticipated from her, by asking her first.

In summary, I found her to be extremely pleasant and relaxed. In the event of the answer to a technical question being a little weak, she would explain fully and helpfully the correct answer.

Typical FI AoC 2

Date of Test: April 2023. Location: Blackbushe. Examiner: Chris Kingswood. Aircraft: Cessna 152 G-BZEB

The subjects chosen for the test by the examiner were as follows:

Long Briefing: **Your Favourite Long Briefing**

Flight Exercise: **Ex 6.2 Straight & Level Part 2**

Examiner asked questions about thrust/drag couples, aircraft stability, impulse magnetos, and a discussion about Centre of Gravity & Centre of Pressure, and how they move during a stall.

The flight went well, started off with circuits due to the time. Examiner asked me to patter a circuit while he acted as a competent student getting ready for solo circuits. I pattered it fine, gave him control for the second one which was good up until final, where he was way too low. I took control and went around, chatted about it on the climb out, third one was similar but he was too high. I took control and pattered the landing instead. We spoke about it briefly and he said not to be afraid of light coaching as it can be useful. For example, I noticed that he was too high at the start of final (so he said to mention it then, instead of leaving it halfway and taking control).

Then departed the circuit to the west to do the main lesson. I was halfway through, had just finished speed changes in Straight &Level flight, when he stopped me, said there was a good tone and pace and he asked me to patter a PFL. That was good, then asked me to go around and patter a spin. It ended up un-spinning itself and he said don't worry.

Returned to Blackbushe for a straight in on runway 07.

Typical FI Theoretical Knowledge Questions

Air Law

1. What classes of airspace are there in the UK? Where would you find each type?
2. What airspace class is the Heathrow CTR and what must I do to enter. What does that class of airspace mean?
3. List the airworthiness documents for a typical light aircraft and add some detail.
4. What are the revalidation and renewal requirements for an SEP (land) rating?
5. What are the dimensions of an ATZ and MATZ. What rules surround their use?
6. If you have been unable to contact the tower/info due to a busy radio frequency, may you enter an ATZ anyway?
7. What does the * mean next to the symbol for a danger area?
8. Explain 'differences' and 'familiarisation' training in relation to SEP aircraft.
9. What are the rules concerning flight near congested areas and open air assemblies?
10. How long does an FI certificate remain valid. How can it be revalidated or renewed?
11. Explain the restrictions initially placed on an FI certificate.
12. How can these restrictions be removed?

Aircraft General Knowledge

13. Show with the use of a diagram how an ASI and VSI work.
14. State the properties of a gyroscope. Show how they are used in the principles of operation of the aircraft gyroscopic instruments.
15. Why does an AI gyro spin at around 20 000 rpm whereas a turn co-ordinator gyro spins at around 9000 rpm?
16. Explain how and why carburettor ice occurs.
17. Explain spark retard and impulse coupling during engine start.
18. In an aircraft with a low drag line and a high thrust line, how is the couple balanced?
19. What is the purpose of differential ailerons?

Flight Performance & Planning

20. What calculations should be made for take-off in a SEP aeroplane?
21. Show how to calculate the mass and balance for a typical SEP aeroplane.
22. Must a calculation be performed before every flight?
23. Without making any calculations, how would the take-off C of G position change if a heavy bag was placed in the rear?
24. What fuel requirements are required for a VFR flight?

Human Performance and Limitations

25. What causes a pilot to suffer from hypoxia? How can this be remedied?
26. What causes a pilot to suffer from hyperventilation? How can this be remedied?
27. Explain why a highly motivated student is more likely to succeed than a disinterested one.
28. What personal factors should a pilot consider before flight?
29. What is the difference between a threat and an error?

Meteorology

30. State the ISA.
31. Explain how a sea breeze occurs by day.
32. What happens to the surface wind following the passage of a cold front?
33. State the hazards of a thunderstorm to aviation.

Navigation

34. Describe the principles of operation of a VOR.
35. Explain the Standard Closing Angle method of track adjustment.

Principles of Flight

36. Why does an aircraft in S&L flight slow down when the nose is pitched up?
37. Draw a graph of lift vs angle of attack for a basic wing. Then for the addition of flaps. Then slats.
38. Why is there low pressure on the upper surface of an aerofoil?
39. Explain the forces on a propeller.
40. How can a wing designer reduce induced drag?
41. When does an aircraft suffer a sudden loss of induced drag?
42. What does it mean when the balance ball is in the middle?
43. What is the difference between thrust and power?
44. Does flight at Vy require flight at maximum excess power or maximum excess thrust?

Training Administration

45. State the hours required for a PPL course. What is the solo/dual breakdown?
46. State the test profile for a PPL skill test.
47. Explain the non-flying tests that an applicant for a PPL must undergo.

Advice to Applicants for an FI AoC

1. Have the necessary paperwork signed and ready: **SRG 5018** (Course completion certificate, see below) & **SRG 1169** (Examiner's Report). **Note:** Both of these forms require a signature from the head of training of the ATO.

CAA5018 Instructor Training Course Completion Certificate in Accordance with Part-FCL

This form is intended for use in the provision of evidence in support of an application made to the CAA using the CAA's online application service. Once completed the form should be scanned or photographed and uploaded by the applicant as part of an online application to the CAA.

FALSE REPRESENTATION STATEMENT
It is an offence under the UK Air Navigation Order to make, with intent to deceive, any false representation for the purpose of procuring the grant, issue, renewal or variation of any certificate, licence, approval, permission, or other document. This offence is punishable on summary conviction by a fine and on conviction on indictment with an unlimited fine or imprisonment or both.

GUIDANCE NOTES

GUIDANCE NOTE 1: Authorised signatories
An authorised signatory acts as a representative of the Head of Training, authorised by the Head of Training or through approved procedures to confirm that the stated training has been conducted by the Approved Training Organisation (ATO). The ATO must maintain a record of those so authorized.

GUIDANCE NOTE 2: Which sections of the course completion to complete
You are only required to complete and print the sections relevant to your application.

Application applied for	Sections to be fully completed
FI initial issue	1, 2, 3, 5
FI/CRI/IRI variation	FI - 1, 6(i) or 6(ii) / CRI - 1, 6(vi) / IRI - 1, 6 (vii)
FI/CRI/IRI renewal or revalidation	1, 5(v), 5(vi)
CRI/IRI/FTI initial issue	1, 2, 5(i), 5(ii), 5(iii), 5(iv)
MCCI initial issue or renewal	1, 4, 7
MCCI revalidation	1, 7
MCCI variation	1, 6(v), 7
FTI revalidation	1, 5(v)
FTI renewal	1, 5(v)
Mountain rating instructor initial issue	1, 2, 3, 5
TRI / SFI / STI initial issue	1, 2, 5
TRI / SFI renewal	1, 2, 5
TRI / SFI revalidation	1, 5
TRI / SFI variation	1, 2, 6
STI renewal	1, 5

1. APPLICANT DETAILS — To be completed by the Training Provider

CAA Personal Reference number (if known): 123456A Date of Birth: 01/05/1997
Title: Ms Forename(s): Ellie Surname: Vaytor
This application is for (please select all that apply): Initial issue [X] Renewal [ ] Revalidation [ ] Variation [ ]

2. PRE-REQUISITES — To be completed by the Training Provider

I certify that (name) Ellie Vaytor has met the pre-requisites for (certificate(s)) FI(A)
I further certify that I have examined the Pilot's logbook and confirm they have met the pre-requisite hours requirements: Yes [X] No [ ] N/A [ ]

The following hours have been flown and verified in the pilot's logbook (please provide a summary of total hours as per the requirements in the regulation):

200 hours total time on aeroplanes of which 150 hours PIC.
30 hours PIC on SEP (land) of which 5 in the last 6 months.
A VFR cross-country flight as PIC of 300 NM with full stop landings at 2 different aerodromes.

Training Provider Details:
Name of Approved Training Organisation (ATO) (if applicable): M Pennage Flying School ATO number (if applicable): 6666
Competent Authority issuing approval (if applicable): UK CAA
Name of Head of Training (or authorised signatory): A Vulture
Signature of Head of Training or authorised signatory: Date: 24/04/2023

3. Flight or Mountain Rating Instructor (FI/MI) Pre-Entry Flight Test — To be completed by the Instructor

I confirm the pilot has satisfactorily completed a pre-entry flight test on (date): 01/11/2022
I recommended the pilot for the specified course (select one): Flight Instructor (FI) [X] Mountain Rating Instructor (MI) [ ]
Name of FI/MI who conducted the flight test: A Hawk
Instructor reference number: 234567B Competent authority issuing certificate: UK CAA
Signature of Instructor: Date 01/11/2022

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Applicant's CAA Personal Reference number: 123456A

4. MCCI Course Instructor (if applicable) — To be completed by the Training Provider

I can confirm that I have reviewed the pre-entry requirements alongside the applicant's experience and can confirm that the applicant meets Part-FCL.915.MCCI pre-entry requirements and FCL.930.MCCI a1) + a2) and/or FCL.940.MCCI (where appropriate) and therefore propose that the applicant proceed to formal observation by CAA or a nominated deputy.

Training Provider Details:
Name of Approved Training Organisation (ATO) (if applicable): M Pennage Flying School ATO number (if applicable): 6666
Competent Authority issuing approval (if applicable): UK CAA
Name of Head of Training (or authorised signatory): A Vulture
Signature of Head of Training or authorised signatory: Date 24/04/2023

5. TRAINING COURSE DETAILS — To be completed by the Training Provider

5)i) Theoretical knowledge — To be completed by the Training Provider
100 hours of theoretical knowledge (TK) instruction
The applicant has satisfactorily completed: *(select one)*: Full TK training [X] Reduced TK training [ ] Not applicable [ ]
The applicant has completed reduced course of TK training on the basis of: (if applicable)

5)ii) Teaching and learning — To be completed by the Training Provider
25 hours of teaching and learning completed
The applicant has satisfactorily completed: *(select one)* Full teaching and learning [X] Reduced teaching and learning [ ] Not applicable (exempt) [ ]
The applicant has completed a reduced course of teaching and learning in accordance with FCL.915(c)(1) on the basis of: (if applicable)

5)iii) Technical training (IRI, CRI initial issue) — To be completed by the Training Provider
The applicant has satisfactorily completed 10 hours of technical theoretical training

5)iv) Flight training — To be completed by the Training Provider
I confirm the pilot has satisfactorily completed an approved course of training in accordance with Part-FCL for the following:

i) FI(A) [X] FI(H) [ ] FI(AS) [ ] FCL.900C FI(A) [ ] FCL.900C FI(H) [ ]
ii) Class Rating Instructor CRI SE [ ] ME [ ]
iii) Instrument Rating Instructor IRI(A) [ ] IRI(H) [ ] IRI (AS) [ ]
iv) Flight Test Instructor [ ]
v) Mountain Rating Instructor (FCL.930.MI(a)) [ ]
vi) Type Rating Instructor TRI(A) (Please specify type):
vii) Type Rating Instructor TRI(H) (Please specify type):
viii) Type Rating Instructor TRI(PL) (Please specify type):
ix) Type Rating Instructor issued in accordance with FCL.725(e) (Please specify type)
x) Synthetic Flight Instructor SFI (Please specify type):
xi) Synthetic Flight Instructor SFI (SPA) [ ] (MPA) [ ] (H) [ ] (PL) [ ]
xii) Synthetic Training Instructor STI A [ ] H [ ]

Course start date: 01/11/2022 Course end date: 22/04/2023

The applicant has satisfactorily completed: (select one) Full flight training [X] Reduced flight training [ ] Not applicable [ ]
The applicant has completed a reduced course of flight training on the basis of: (if applicable)

The course consisted of 30 hours of flight instruction of which 0 hours instrument ground time in a FTD 2/3 or FNPT I or FNPT II/III or FFS.
FSTD identification number of simulator used (which must be issued in accordance with UK Regulation No. 1778/2011)
Competent Authority issuing qualification certificate for the simulator:

Training Provider Details:
Name of Approved Training Organisation (ATO) (if applicable): M Pennage Flying School ATO number (if applicable): 6666
Competent Authority issuing approval (if applicable): UK CAA
Name of Head of Training (or authorised signatory): A Vulture
Signature of Head of Training or authorised signatory: Date 24/04/2023

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Applicant's CAA Personal Reference number: 123456A

5)v) Instructor refresher training course — **To be completed by the Training Provider**

I confirm the pilot has satisfactorily completed the instructor refresher training course on .... (date).

For the revalidation ☐ or renewal ☐ of an instructor Certificate in accordance with Part-FCL

Training Provider Details

Name of Approved Training Organisation (ATO): (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable): ....

Name of Head of Training (or authorised signatory): ....

Signature (Head of Training): .... Date: ....

5)vi) Instructor revalidation/renewal information — **To be completed by the Examiner**

I can confirm that the pilot has met the requirements of Part-FCL for the revalidation/renewal of the following Instructor:

FI(A) ☐ FI(H) ☐ FI(As) ☐ CRI ☐ IRI ☐ SFI ☐ STI ☐ TRI ☐ MCCI ☐ MI ☐

The Certificate of Revalidation has been signed and the rating/certificate is valid until (date) ....

Examiner's Name: .... Examiner's Number: ....

Competent Authority issuing Examiner's Certificate: ....

Signature (Examiner): .... Date: ....

6. Training Course/Information Details — **To be completed by the Training Provider**

6)i) Flight instructor variation (course)

I certify that the pilot has satisfactorily met the variation hours requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905.FI(h) IR ☐ FCL.905.FI(h) IR(R) ☐ FCL.905.FI(i) SPA ME ☐

Please note section 5 iv) must be completed with the relevant course information

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)ii) Flight instructor variation (other) — **To be completed by the Instructor**

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905.FI(c) Flying multi-pilot operations on a single pilot aircraft ☐ FCL.905.FI(e) CPL ☐ FCL.905.FI(j) FI, IRI, CRI, STI or MI ☐

Signature of Instructor: .... Date ....

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905(k)(1) MPL ☐

I certify that the pilot has satisfactorily completed at least 500 hours of flight time as a pilot in aeroplanes, including at least 200 hours of flight instruction

Signature of Instructor: .... Date ....

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

Extend privileges to flight instructor certificate to include:

FCL.905(k)(2) MPL ☐

I certify the pilot holds a multi-engine aeroplane IR and the privilege to instruct for an IR ☐ And

I confirm the pilot has satisfactorily completed at least 1500 hours of flight time in multi-crew operations ☐ or

Is already an FI qualified to instruct on ATP(A) or CPL(A)/IR integrated courses and has completed a structured course consisting of the following training ☐ :

MCC qualification

Observation of five sessions of flight instruction in Phase 3 of an MPL course

Observation of five session of flight instruction in Phase 4 of an MPL course

Observation of five operator recurrent line-oriented flight training sessions

The content of the MCCI course

Signature of Instructor: .... Date ....

Applicant's CAA Personal Reference number: 123456A

I certify that the pilot has satisfactorily met the variation requirement(s) in accordance with Part-FCL for the following:

FCL.905.FI(f) Night ☐ FCL.905.FI(g) Banner Towing ☐ FCL.905.FI(g) Glider Towing ☐ FCL.905.FI(g) Aerobatic ☐

Date of demonstration flight: ....

Name of Instructor: .... Instructor Reference Number: ....

Competent Authority issuing Instructor's Certificate: ....

Signature of Instructor: .... Date ....

6)iii) TRI variation — **To be completed by the Training Provider**

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of TRI in accordance with Part-FCL for the following:

FCL.905.TRI(2) ☐ FCL.905.TRI(3) (SPHPA) SP to MP ☐

FCL.910.TRI(b)/(c) (please specify type): ....

FCL.910.TRI(a) FSTD ☐ FCL.910.TRI(a) Line Flying (LIFUS) ☐ FCL.910.TRI(b) Aircraft ☐

FCL.910(c)(2) TRI SPH to MPH ☐ FCL.910.TRI(a) Aircraft Takeoffs and Landings Only ☐

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)iv) SFI variation — **To be completed by the Training Provider**

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of SFI in accordance with Part-FCL for the following:

FCL.905.SFI(b) (SPHPA) SP to MP ☐

FCL.910.SFI (please specify type): ....

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)v) MCCI variation — **To be completed by the Training Provider**

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of MCCI in accordance with Part-FCL for the following:

FCL.910.MCCI (please specify type): ....

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date ....

6)vi) CRI variation — **To be completed by the Training Provider**

I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of CRI in accordance with Part-FCL for the following:

FCL.905.CRI (Please specify class or type): ....

FCL.905.CRI(a) Banner Towing ☐ FCL.905.CRI(a) Glider Towing ☐ FCL.905.CRI(a) Aerobatic ☐

FCL.905.CRI(ba) Flying multi-pilot operations on a single pilot (please specify class or type): ....

Date of demonstration/assessment flight: ....

Name of Instructor/Examiner .... Instructor/Examiner reference number ....

Signature of Instructor/Examiner .... Date ....

Applicant's CAA Personal Reference number: 123456A

6(vii) IRI variation		To be completed by the Training Provider
I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges of IRI in accordance with Part-FCL for the following:		
FCL.905.IRI(b) (upgrade to MPL) ☐	FCL.915.IRI(a) (adding ME privileges in aeroplanes) ☐ **Note: Must also complete section 5(iv)**	FCL.915.IRI(b) (adding ME privileges in helicopters) ☐ **Note: Must also complete section 5(iv)**

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable): ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date........................

6(viii) Mountain Rating Instructor variation	To be completed by the Training Provider
I certify that the pilot has satisfactorily met the variation requirement(s) to extend privileges in accordance with Part-FCL for the following:	
FCL.930.MI(a) Mountain Rating Instructor (wheels) ☐	
FCL.930.MI(a) Mountain Rating Instructor (skis) ☐	
FCL.930.MI(a) Mountain Rating Instructor (wheels and skis) ☐	

Training Provider Details:

Name of Approved Training Organisation (ATO) (if applicable): .... ATO number (if applicable): ....

Competent Authority issuing approval (if applicable) : ....

Name of Head of Training (or authorised signatory): ....

Signature of Head of Training or authorised signatory: .... Date........................

7) Observation Report Form for Multi-Crew Co-Operation Instructor (A/H/PL) — **To be completed by the Examiner**

FSTD Qualification Number: .... Aircraft Represented: ....

Date: .... Start time: .... Finish time:........................ Duration: ....

	Assessment		Remarks
a)	Prepare Resources	☐	
b)	Create a climate conducive to learning	☐	
c)	Present knowledge	☐	
d)	Integrate threat and Error management (TEM) and crew resource management	☐	
e)	Manage time to achieve training objectives	☐	
f)	Facilitate learning	☐	
g)	Assess trainee performance	☐	
h)	Monitor and review progress	☐	
i)	Evaluate training sessions	☐	
j)	Report outcome	☐	

I confirm that the Applicant detailed in Section 1 above has conducted at least 3 hours of flight / MCC instruction under my supervision and to my satisfaction, in accordance with Part-FCL.920, Part-FCL.930.MCCI and / or Part-FCL.940.MCCI and should therefore be issued with the following authorisation.

Initial Authorisation ☐ Revalidation/Renewal ☐ Variation ☐

Multi-Crew Co-Operation Instructor (A) ☐

Multi-Crew Co-Operation Instructor (H) ☐

Multi-Crew Co-Operation Instructor (PL) ☐

Examiner Details

Name of Examiner: .... Examiner reference number: ....

Competent Authority issuing Examiner's Certificate: ....

Signature of Examiner: .... Date........................

2. Make sure the aircraft is available and ready. Check weather minima.
3. Make sure your long briefing is ready and all visual aids are on hand eg aircraft model.
4. Make sure you have a briefing room available for several hours.
5. Make sure your theoretical knowledge is good. Some examiners will go into great detail, other less so. See Standards Document 10.

GOOD LUCK!